

Tracker News



Microwave Telemetry, Inc.

Education in a Technological World

Dear Customers and Friends,

...speaking of the life of a man who knows that the world is not given by his fathers, but borrowed from his children; who has undertaken to cherish it and do it no damage, not because he is duty-bound, but because he loves the world and loves his children...

Wrote Wendell Berry in 1971.

When discussing education, we often think of educating our youth, but paradigm-shifting discoveries are made every day. New medications are developed, sub-atomic particles are described, and the migratory routes of endangered species are elucidated, all because of our unrelenting thirst for knowledge and desire to continue our educations well into adulthood.

As articulated by the authors of this current newsletter; a transmitter can be a highly effective instructional tool. Graham Chafe's work with Atlantic salmon provided vital information about its critical habitat and much needed public awareness for a struggling species. Dale Stahlecker and Robert Murphy's rehabilitated and released golden eagle has a new life as an internet sensation. The unknowing avian celebrity is educating the public about the plight of these iconic birds. David Johnson and his coauthors used what they learned from years of tracking burrowing owls to trouble-shoot and improve owl tracking techniques. Daniel Hegglin used his data to help make informed decisions regarding the reintroduction of a diminished species, the bearded vulture, into the wild. Thanks to all the authors for sharing their exciting findings.

Additionally, as we do in every winter issue, we are announcing the winner of our Christiane Howey Rising Scholar Award. An award I know my mother would deny deserving, but it is, in every way, an encompassment of her life's work and her spirit. With so many impressive applicants this year, it was difficult to choose the winner. Heather Marshall, who earned her PhD last year, will be studying salmon sharks in Alaska. You can read more about her impressive work within these pages.

Sincerely,
Lucy and the Team at MTI



Photo by The Gillis Club

Wild Salmon,
Wide Ocean
Page 2

One Tough Eagle
Page 3

Further Advances
on Burrowing Owl
Migration
Page 4

Bearded Vultures
on the Move
Page 5

Microwave Telemetry, Inc.
8835 Columbia 100 Parkway
Suites K & L
Columbia, Maryland 21045
USA

Phone 410.715.5292

Fax 410.715.5295

www.microwavetelemetry.com

Email support@microwavetelemetry.com

Above: Heather Marshall working as part of The Gillis Club to educate young girls about marine biology.

Wild Salmon, Wide Ocean

Graham Chafe is a biologist with the Atlantic Salmon Federation in Chamcook, New Brunswick, Canada. He has been tracking salmon using acoustic and satellite tagging methods for four years. Before that, he worked in salmon conservation at the Department of Fisheries and Ocean's Mactaquac Biodiversity Centre.



The Atlantic salmon (*Salmo salar*) is a species of vast cultural, social, and economic importance in Atlantic Canada. While no longer commercially fished, thousands of jobs and significant economic input result from an enormously active recreational fishery. First Nations place particular significance on wild populations for food and ceremonial purposes, but wild Atlantic salmon populations are declining throughout much of their range. Significant effort has been made to discover the reasons, halt the decline, and bring populations back to sustainable levels. The Atlantic Salmon Federation is a non-governmental organization dedicated to the conservation, protection, and restoration of wild Atlantic salmon and the ecosystems on which their well-being and survival depend.

Atlantic salmon are anadromous fish, born in rivers and streams. They spend from one to several years in freshwater before heading to sea. In the North Atlantic, they spend one or more winters growing at sea before returning to their natal rivers to spawn. While riverine factors, such as run-off from farmland or habitat degradation from bridges and culverts, are important, the mortality at sea is generally agreed to be the piece of the puzzle required to reverse the downward trend of many populations. For over a decade, the Atlantic Salmon Federation has been tracking salmon in an attempt

to narrow the search for problem areas. The program began with acoustic telemetry, using receivers in the rivers and bays of two New Brunswick rivers: the Miramichi and Restigouche. A line of receivers was added in the Strait of Belle Isle, between Newfoundland and Labrador, to measure survival and passage time across the Gulf of St. Lawrence.

To further our knowledge of salmon movements and swimming patterns, satellite tags were added

to the program in 2012. We have deployed 43 X-Tags from Microwave Telemetry, Inc. All tags have been deployed on post-spawn salmon adults in the Northwest Miramichi River. In addition to the satellite tags, each fish was also fitted with a small acoustic transmitter, so its passage by receivers would be recorded as well. This double-tagging has proven helpful in that fish that have returned to the river as consecutive-year spawners, after spending less than two months at sea, can be acoustically tracked in-river and the satellite tag recovered where it might not otherwise successfully release and transmit.

To date, we have received data from 28 out of 43 X-Tags. Two tags are currently still deployed and have not reached their programmed pop-off date. Six tags have been recovered over the four years. Of the transmitted tags, there has been an average of 88% data capture. The modelling of the data collected is in progress, and we are beginning to identify potentially critical habitats for Atlantic salmon. Preliminary analysis suggests that consecutive-year and alternate-year spawners follow similar

patterns for the early part of their time in the Gulf of St. Lawrence. By mid-June, the two groups separate, with consecutive spawners returning to the river and the alternates heading through the Strait of Belle Isle and into the North Atlantic. The region that all tagged fish inhabit for the same two to three weeks prior



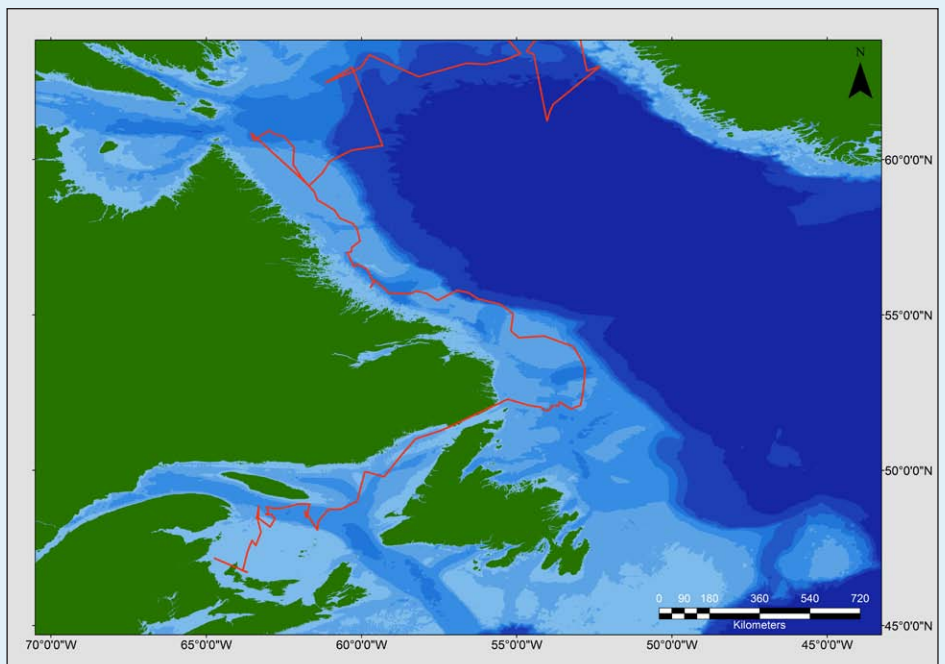
A 93 cm, 6.1 kg male salmon about to be tagged. This fish swam to near Nuuk, Greenland before its tag released and transmitted on the programmed date.

to returning to the river or leaving for the North Atlantic may prove to be critical feeding and re-conditioning grounds. Once analysis and modelling are complete, we will focus both satellite and acoustic telemetry efforts into the identified areas of concern. Not only will survival issues be explored, but the basis for consecutive versus alternate spawning in these fish may come to light.

Beyond the invaluable data that the satellite tags are providing, further benefits are being gained by the publicity they attract. Both public engagement and involvement in our tracking programs have increased as a result of the X-Tags. In order to deploy the tags, fish are angled in the river, and we have been able to rely upon volunteer anglers to catch the fish we need. The tracking program has been featured in several local newspapers which has increased awareness and interest in our organization and in the salmon in general. In the spring of 2015, two tags from 2014 were found and returned to us. Both had transmitted data and while we will refurbish them for future use, the real benefit has been in the form of publicity. One tag popped off near the west coast of Greenland and was found several months later on a rocky beach. The other tag popped off the coast of Labrador and floated clear to Ireland before being discovered on the shoreline by a vacationing family from England. Local and national news outlets picked up these stories and, in the process, we were able to reach a wide audience with tales of the specific fish's travels as well as information about the program and the need for research in general. The interest and involvement shown by the public is a great tool in our fight to keep wild Atlantic salmon here for future generations.



ASF Research Director, Jonathan Carr, releasing a satellite tagged kelt in the Northwest Miramichi River.

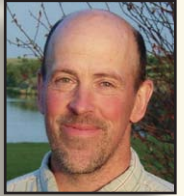
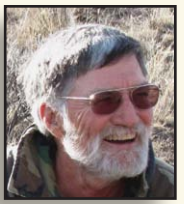


The preliminary route taken by a tagged kelt from the mouth of the Miramichi River in northern New Brunswick to near Nuuk in Greenland where the tag released as programmed.

One Tough Eagle

Dale Stahlecker, founder of Eagle Environmental, Inc. in Santa Fe, New Mexico, has conducted field surveys and research on raptors in the southwestern United States for three decades. Most of his work during the last 15 years has focused on golden eagles, involving work with tribes, as well as state and federal agencies. Since 2010, Dale has worked on satellite telemetry studies of golden eagles for the U.S. Fish and Wildlife Service.

Robert Murphy is a migratory bird biologist for the U.S. Fish and Wildlife Service's Southwest Region, where his focus is raptor conservation and research initiatives, especially for golden eagles. He currently leads a long-term, collaborative investigation of ranging behavior, survival, mortality factors, and resource selection by golden eagles in the Colorado Plateau and Southern Rocky Mountain regions.



Accelerating energy development in the far southwestern U.S. poses challenges for conserving golden eagles, largely because the species' ranging behavior in the region is virtually unknown. During the late winters of 2012 and 2013, we worked with Dr. Gary Roemer of New Mexico State University and Dr. Jimmy Cain of the USGS Fish and Wildlife Cooperative Research Unit at NMSU in launching a study of the use of southern New Mexico landscapes by golden eagles, funded by the U.S. Bureau of Land Management. Our key tool was satellite telemetry. We met our target of capturing and tagging six 'goldens' with transmitters in 2012. As winter waned in 2013, however, the eagles "weren't buyin' what we were showing," and we had not yet deployed a transmitter. Meanwhile, on a windy early March



Windshield of car after striking adult male golden eagle "Thor" on a rural highway in southwestern New Mexico, 2 March 2013.

Photo by Denise Miller

capture or tagging. Thinking of the giant "spiderweb" he left in that car windshield, we agreed to name him Thor... he smashes things, doesn't he?

day, an adult male golden eagle made what should have been a fatal mistake. Feeding on carrion beside a rural New Mexico highway, he was flushed into the windshield of a car traveling at 100 km/hour, smashing the glass and denting the car's roof at the upper edge of the windshield. He was scooped up from the road by the following driver and taken to Gila Wildlife Rescue in nearby Silver City. Amazingly, a physical exam there revealed NO bone fractures, no nerve dysfunction...no permanent damage! "He did move a bit slowly for a couple weeks," said Dennis Miller,



Photo by Denise Miller

Adult male golden eagle "Thor" being received at wildlife rehabilitation center after being struck by a car traveling at 100 km per hour.

a retired fisheries professor who, with his wife Denise, has rehabilitated injured raptors for two decades. Dennis reported in late March that the eagle was "pounding his perch landings" in their large flight pen, a sure sign that he was ready for release.

A plumber told Dale of a TV news story about the "miracle eagle." We had previously decided to exclude rehabilitated birds from our study but considered this eagle a possible exception as he had merely been held in captivity for a few weeks and appeared healthy. Dennis supported the proposal. We fitted the eagle with a 45g Solar GPS unit from MTI on 29 March, and he was released the next day by the 80-year-old patriarch of a Silver City family, descendants of Geronimo, in memory of the elder's great-grandson who had recently died, merely a teenager. Unabashedly anthropomorphic, we give names to eagles we track, often based on something that happened during



Photo by Denise Miller

Dale Stahlecker and Dennis Miller attach a 45g PTT to an adult male golden eagle that had been struck by a speeding car less than 1 month earlier. The eagle flew 120 km the afternoon it was released with the PTT attached.

We thought Thor might be a local resident, but on the first download of his movement data, two days after his release, we realized that he clearly was not. He had moved 120 km north that first afternoon, another 330 km north on Day 2, and crossed into Colorado early on Day 3. He slowed his pace, but through early May he followed the Continental Divide northward, arriving in the Cassiar Mountains near Haines Junction, Yukon, about 170 km from the Gulf of Alaska, on 19 May. He remained there for about 1 month, then in late June, moved another 1000 km northward until reaching the Beaufort Sea near the Alaska-Yukon border. There, on the "North Slope" of the Brooks Range, he spent the rest of the summer, 4500 km north of where he had struck the windshield of a car a few months earlier near the U.S.-Mexico border. He just sort of ran out of continent!

Thor returned south during fall 2013, mirroring his previous northward migration, including a month-long stopover near Haines Junction (see map). On 23 November, he arrived at the same area in far south New Mexico where he had cheated death along a rural highway 9 months earlier. During the winter of 2013-14, he used a relatively small area (16 km², 95% kernel density estimate), mostly perched on transmission line poles along the highway or on an old windmill tower. He left his winter range 23 March 2014 and arrived at Haines Junction 1 month earlier than in 2013. He moved on to the North Slope for July and August, then returned to the same stopover site, and finally reached his same small winter core area in New Mexico in early November. As of this writing on 7 October 2015, Thor is making his third southbound journey carrying a MTI PTT; he left his stopover site two days ago. When he reaches his winter range, we will have witnessed three migration cycles, totaling roughly 35,000 km of flight. Data from his overwinterings in southern New Mexico add to our knowledge of origins and migration patterns of goldens wintering in the far southwest. His limited winter movement contrasts the wider-ranging behavior of other migrant goldens overwintering in southern New Mexico.



Migration tracks of adult male golden eagle between wintering range in southern New Mexico (black dot) to summer range on the northern Alaska-Yukon border (white dot): white track - 2013; blue track - 2014; yellow track - 2015 through early October. Migration stopover site is red square. Tracks are based on hourly (0700-1900 hrs) GPS locations.

Meanwhile, he has developed a following of internet fans, inspired by his story and anxious to see his next movements. We thank Dennis and Denise Miller for their help in making all this happen. To follow Thor's complete story, visit the Gila Wildlife Rescue page on Facebook, and look under "Albums."

Further Advances on Burrowing Owl Migration

David Johnson was a staff researcher with the Idaho Cooperative Fish & Wildlife Research Unit for the research described below. He has worked in wildlife and fish conservation for 38 years and is the Director of the Global Owl Project.

Courtney Conway is the leader of the U.S. Geological Survey - Idaho Cooperative Fish & Wildlife Research Unit at the University of Idaho.

Troy Wellicome is a Senior Species At Risk Biologist with the Canadian Wildlife Service and an Adjunct Professor with the University of Alberta. Troy has chaired the National Burrowing Owl Recovery Team since 2003.

Ryan Fisher is currently working with the Province of Saskatchewan, Canada as the Landscape Conservation Specialist. Ryan has been involved with research related to grassland wildlife conservation in Canada for over 10 years.

Julie L. Conley is a Range Management Specialist with the Land Management Research & Demonstration Program of the U.S. Fish & Wildlife Service and works in monitoring and research efforts in shrubsteppe ecosystems.

In 1799, an Italian physicist and chemist, Alessandro Volta, invented the battery. At that time, it was called the "voltaic pile," a cylindrical stack of alternating zinc and copper plates with copper conductors. A marble statue of Volta (built in 1926)

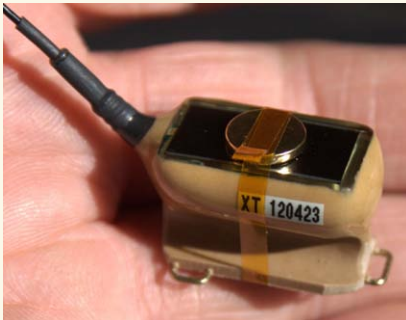


Six young Burrowing Owls. (Photo by Alexandra Munters)

shows owls at the corners of the pedestal supporting him, symbolizing the positive relationship between owls and science. Small, powerful batteries are a critical part of the Platform Terminal Transmitters (PTTs) that we are using to examine the migration of Western Burrowing Owls (*Athene cunicularia hypugaea*).

Our project builds upon the efforts of Geoff Holroyd and Helen Trefry (see "5g PTTs Improve Tracking of the Burrowing Owl" MTT Tracker News, Winter 2010) and colleagues in New Mexico. At that time, a 5g backpack-mounted PTT was attached to the owls, often with a neoprene pad glued to the device's underside to raise the transmitter and prevent it from being obscured by feathers.

The neck feathers of the owls also needed to be trimmed to reduce obstruction of the solar panel. To deal with the weight (and eventual failure) of the neoprene pad, and to eliminate the need to trim the feathers (which are molted), we sought out the expertise of MTT's Russell Howey to help design and build a 'lift kit' for the 5g PTTs. In June 2013, we attached



A solar-powered PTT with lift-kit base. Total weight of modified unit with Teflon tubing harness is 6.2 g. The shape minimizes aerodynamic drag and weight, and allows the owls' feathers to be groomed alongside the unit.

10 of these new lift-kit-equipped PTTs to adult female Burrowing Owls in Oregon, Washington, South Dakota, and Colorado. We used 32-kg-test nylon-coated stainless steel cable for the harness (other scientists use 18-kg-test cable for PTT harnesses on falcons). Owls are tough on equipment, and at least 5 of these 10 owls chewed through

this steel cable harness, dropping their units. In 2014, we switched to Teflon tubing for harness material.

In June 2014, we attached PTTs to 12 Burrowing Owls in Alberta and Saskatchewan, and 10 owls in Idaho, Utah, Montana, and Nebraska. We also had 3 owls marked in Oregon and Washington that continued to carry the PTTs that we placed onto them in June 2013. All owls marked were adult females; females are



Solar PTT with lift kit just attached to a female Burrowing Owl. The owl will groom the unit into her feathers a bit, but feathers will not cover the solar array.

heavier than males and better suited to carry the combined weight of the modified PTT and harness (6.2 g). Of the 25 owls we tracked during 2014-2015, 9 owls made full-year migrations, and

12 made partial migrations; we recovered 4 other PTTs from the nesting areas because the owls either died or dropped their PTTs before migration.

For the specific time period of 1 June 2014 through 31 May 2015, Argos satellites received signals and calculated 25,493 locations from 25 of our PTTs; of these, 8.7% were Class 3 and 15.8% were Class 2 locations. Burrowing Owls use burrows for nesting and, especially in the case of females, for winter roosts. We have found that wintering females will rest at burrow entrances during the day, ducking farther into the burrow when necessary. While this scenario reduces the vulnerability of the owls, it also results in the PTTs receiving reduced sunlight for recharging. Subsequently, we have had a few PTTs that gave no signals for 1.5-2 months. When the owls started migrating, and were again in the sun, the PTT signals began again.

We have gained important insights on the migration timing and routes, as well as winter destinations, of 21 Burrowing Owls (see map). Results from our project emphasize the critical need for tri-national conservation efforts for this species.

Burrowing Owl Migration 2014-2015



The migration routes of 21 adult female Burrowing Owls. Southward migration in October/November 2014, and northbound migration in March/April 2015. The vast majority of migratory owls from the U.S. and Canada winter in Mexico.



Photo by D.H. Johnson

Photo by Dan Somers

Bearded Vultures on the Move: Satellite Telemetry for the Monitoring of Reintroduced Birds in the Alps



Daniel Hegglin works for SWILD, an independent research and consulting non-profit association of wildlife biologists where he is responsible for the satellite tagging in the reintroduction project for bearded vultures in the Alps. He is engaged as president of the management board in the Vulture Conservation Foundation and as managing director of the Swiss Foundation for Bearded Vultures.

The return of bearded vultures in the Alps

A bad reputation was the main reason that bearded vultures disappeared in the Alps. In the scientific literature of the 19th century, this species was described as a bloodthirsty bird of prey that attacks lambs, sheep, and even children. The authorities actively supported the eradication of this



Bearded vulture in flight.

species by paying bounties for shot animals. Together with a lack of food due to the low densities of wild ungulates during this period, the population decreased dramatically in the 19th century, and the species disappeared completely

from the Alps in the beginning of the 20th century. The understanding that bearded vultures are not voracious predators but highly specialized raptors which live mainly on the bones of ungulate carcasses, came too late for the Alpine population.

Luckily, in the 1970s, a group of scientists, zoo-specialists, conservationists, and representatives of governmental organisations and universities initiated an international project for the reintroduction of the bearded vulture to the Alps. This project is an outstanding example of how a nearly extinct species can be brought back to nature when nature lovers and conservation organisations work closely together over decades, with very different stakeholders, and over international boundaries. Today, roughly 200-250 bearded vultures live with 29 established breeding units thanks to an international bearded vulture breeding program and the annual release of young bearded vultures, which began in 1986. While further releases are required, the project is in a final stage and can be considered as a great success for nature conservation.

Satellite telemetry: an important tool for monitoring the success of the reintroduction

A critical component to the success of the project is close surveillance of the program. According to the IUCN guidelines for reintroductions, it is mandatory to accompany any reintroduction program with sound and scientifically meaningful monitoring. Adequate marking methods have to ensure that the success of restoration programs can be evaluated and that possible risks and failures are recognized in time. Therefore, young released bearded vultures in the Alps are closely monitored with various techniques. An important tool is satellite telemetry. Thanks to this technology, we have already recovered several very valuable birds, which otherwise would have died, and thus learned about the risks that released birds encounter in the wild. Some birds had problems in the beginning of the first winter, as during this period the supply of carcasses is limited and the fresh snow cover makes it difficult to locate food. With the satellite tags, we were able to recapture several inexperienced birds and bring them to aviaries where they could regain their strength for a second release. Satellite telemetry also helped to identify relevant anthropogenic risks. We were able to find weakened birds which were suffering from lead intoxication after ingesting the remains of lead bullets in their food or were injured after being shot.

In the framework of the Alpine reintroduction project, 50 bearded vultures have been marked with satellite tags, and more than 170,000 locations have been recorded. Thanks to these data, we now have much more detailed knowledge about the spatial behaviour of the released bearded vultures and insight into how they settle once they reach sexual maturity (Figure 1). The data of the peregrinating young birds show a very patchy distribution of the locations. Some regions, which are not related to a release site, are very frequently visited (e.g. the Austrian Lechtal, the north-eastern part of the Vallais in Switzerland, the French Vanois region, and some part of the Italian Aosta Valley). On the other hand, there are regions, like the Ticino in Switzerland, which were only occasionally visited (Figure 2).

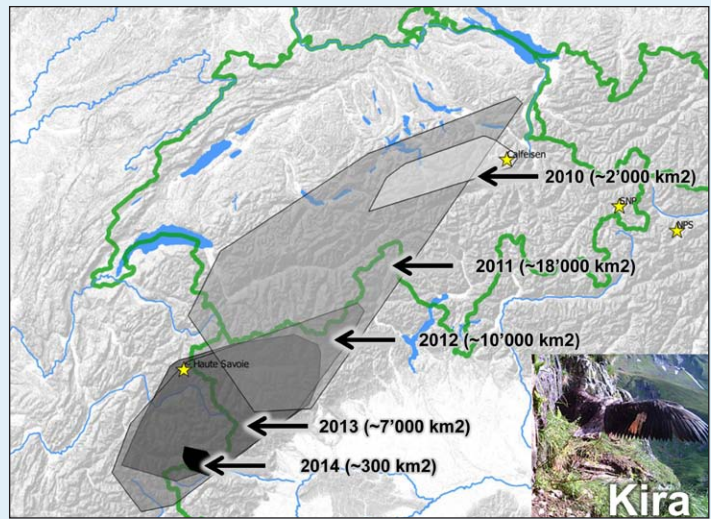


Figure 1. Minimum convex polygon of the bearded vulture Kira, released in 2010 in the Swiss Calfeisen Valley.

Interestingly, among the 50 tagged individuals, seven made extended excursions to areas outside the Alpine chain (Figure 2). Five juvenile individuals flew far north, up to the North Sea. Three of them made their way back home, whereas two individuals were greatly weakened and had to be re-trapped. Only one animal flew south and spent the entire winter of its first year in the Italian Alpi Apuane before it flew back to Austria.

The satellite data from the Alps were used to analyse the movement patterns of pre-adult individuals, comparing wild-born individuals from the Pyrenees and released individuals from Andalusia. These analyses, which were published in Plos One (Margalida et al., 2013*), showed that the tagged bearded vultures in Andalusia and the Alps moved significantly farther than those in the Pyrenees, where no excursions out of the Pyrenees have been recorded. To link the different bearded vulture populations and establish a metapopulation, the reasons for this observed pattern have to be carefully analysed, and possible management measures must be taken to improve the connectivity between the populations evaluated (e.g. management of feeding places). This is also the reason

why a new release site has been established since 2012 between the Alps and the Pyrenees in the French region of Grands Causses/Cévennes.

*Reference: Margalida, A., Carrete, M., Hegglin, D., Serrano, D., Arenas, R., & Donazar, J. A. (2013). Uneven Large-Scale Movement Patterns in Wild and Reintroduced Pre-Adult Bearded Vultures: Conservation Implications. PLoS ONE, 8(6), e65857. doi:10.1371/journal.pone.0065857

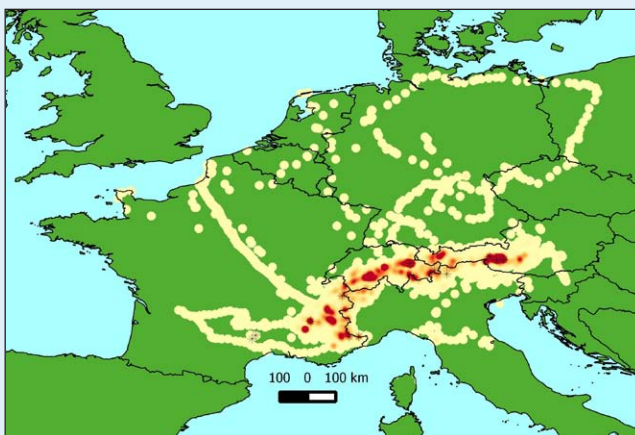


Figure 2. A heatmap showing the distribution of the locations of satellite-tagged bearded vultures in the framework of the reintroduction program for bearded vultures in the Alps.

2016

Christiane Howey Rising Scholar

To honor the life of Christiane Howey, her incredible dedication to our company, as well as her passion for conservation and helping researchers worldwide, we created the Rising Scholar Award in 2013 – an annual award to foster career development in researchers starting on their professional journeys.

We are pleased to announce the winner of the 2016 award: **Congratulations to Heather Marshall!**

This year, we are proud to grant our annual award to an enthusiastic, bright, and dedicated marine biologist. The caliber of applicants made the selection difficult, but it was Heather's ongoing dedication to fostering the next generation of scientists by which Christiane would be particularly impressed.

Heather's fascination with sharks began as a young girl when she saw a world record white shark brought into the docks of Montauk, NY, sparking a life-long interest that led her to college internships working with sharks at the Massachusetts Division of Marine Fisheries and Mote Marine Laboratory. After obtaining her BS at Smith College in 2005, Heather went on to obtain her MS in 2009 and PhD in 2014 from the University of Massachusetts Dartmouth. Heather's graduate research focused on shark physiology and how these animals respond to the stress of capture from fishing gear. This work included the first assessment of post-release mortality in the dusky shark and revealed which blood characteristics may be the best predictors of survivorship for this species.

Heather is now a Postdoctoral Research Fellow in the Behavioral Ecology and Physiology Program at Mote Marine Laboratory. Her current work incorporates both blood physiology and tagging to study several shark species in the Gulf of Mexico, as well as a potentially vulnerable population of salmon sharks in Alaska, the project to which the X-Tags from this award will be applied.

Heather is also a co-founder and Science Team Coordinator of The Gills Club, an international group that works to connect girls with female marine biologists in the field, share knowledge, and empower them to take leadership positions and inspire others with their own passion for sharks. Heather engages in this outreach mission through social media, monthly Gills Club activities at Mote, and multiple expeditions, including white shark tagging in the Atlantic, and travels to Galapagos, Chile, and the Gulf of Mexico.

Interested in applying for the 2017 award?

See our upcoming Spring 2016 edition of Tracker News and our website for the call for proposals.



Photo by OCEARCH / R. Snow



Photo by Heather Marshall

MTI Employee Spotlight

Emily Tolentino – Data Analyst & Research Assistant

Q: What do you do here?

A: Eat snacks! Just kidding (though we all agree that MTI has great snacks). I'm responsible for processing the fish tag information, so I parse the data and translate it into a format that's easy to understand. Additionally, I have the opportunity to work with Lance and Lucy on tracking projects where I'll help with data analysis and preparation of the publications.

Q: Is there something specific you like about working at Microwave Telemetry?

A: In the five years that I've been here, I have learned new research and statistical methods. I love the challenge of finding patterns in the data and using them to discover motives for animal behavior. I've been a part of designing new data management strategies and have given my input when we're designing new products and analytical methods. I enjoy meeting other scientists and learning about their projects, but mostly, I love how we're like a little family here. The environment is so friendly and encouraging, and we get to eat cake when we have staff birthday celebrations!

Q: What is your life like outside of the office?

A: Pretty simple, I guess. Generally, I eat, sleep, and do homework. Right now, I'm attending Johns Hopkins to earn my master's degree in Applied and Computational Mathematics (isn't that a mouthful?), but when I'm free I'll go biking or spend time outdoors with my husband. I also love visiting my family in the Midwest.

Q: Do you have a favorite memory from your time here?

A: After working hard all year, the annual Christmas party is our chance to experience some camaraderie. We get to take a break and come together for fun, our Secret Santa gift exchange, and cookies!

Emily initially studied physics, but has since developed an interest in marine biology and data analysis. She takes pride in knowing that the studies she is involved in are aiding global conservation efforts. While your X-Tags are out to sea, rest assured knowing that your data will be in good hands.





The World's Lightest Solar PTT - 2g



At our conference in the spring of 2012, Paul announced that our long-term aim was to eventually produce a 2 gram PTT suitable for tracking birds. In fact, at that time, we were actively working to achieve this goal and already had a functioning prototype. Unfortunately, due to the loss of Christiane Howey, progress on this project was halted. However, over the last two years, Paul (along with his colleagues at MTI) rekindled the project and, in the end, exceeded the initial goal set forth. We have developed a new Argos 3 compatible PTT, the electronics of which weigh less than 250 mg.

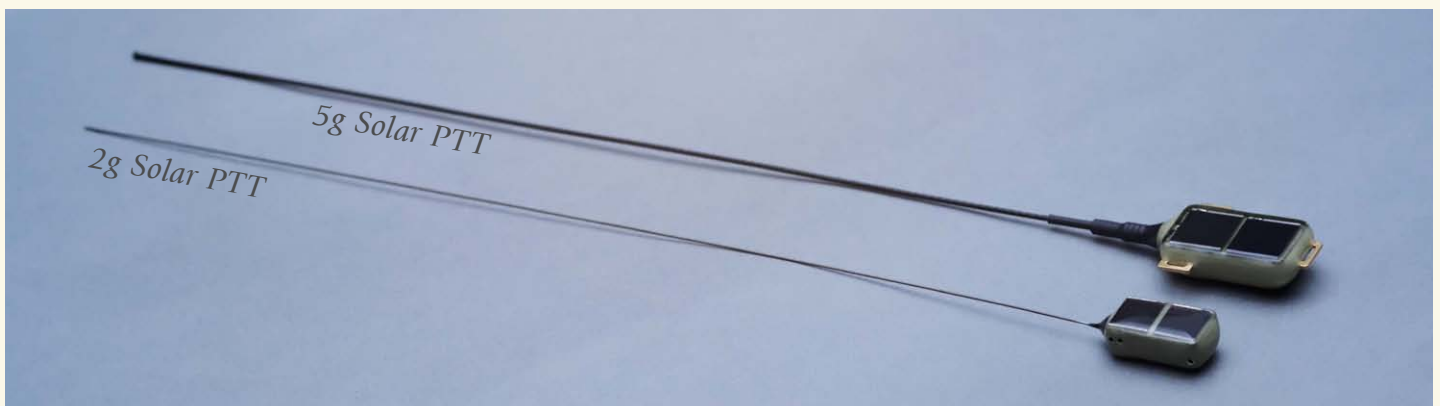
Using this tiny module, we propose to produce a new range of PTTs, each model weighing less than 2.5 grams. The lightest prototype we have constructed so far weighs a mere 1.8 grams. However, by using a new lighter battery that we are developing, we eventually hope to produce a version nearer to 1 gram in weight.

This tiny PTT module has already been submitted to CLS for certification testing and has been approved, achieving the highest Class "A" certification and exceeding the specifications of our other certified PTTs. We are very excited about this accomplishment, as this represents the start of a new era of satellite tracking the travels of small birds. In fact, as some of you may already know, the new era has already begun. Two prototype 2.2 gram PTTs have been successfully attached to Roseate Terns in the British Virgin Islands as part of a larger study funded by a grant from The Darwin Initiative. Their deployment would not have been possible without the help of Ken Meyer of the Avian Research and Conservation Institute, together with Susan Zaluski and Captain Luverne Peterkin of the Jost van Dykes Preservation Society.

Unfortunately, although the announcement of this new PTT has generated much attention, we are not in a position to produce a large number of these tiny PTTs immediately – a first, limited-production run is planned for this spring.

UPDATE

As of September 2015, another new version of the Argos 3 PTT has been certified. Again, it received a Class A rating from CLS. This new version has the potential to lead to a version even lighter than our 2g PTT. We will keep you posted, but please have patience with us as we find ways to produce them efficiently.



MTI Holiday Donation



Here at MTI, we try to take time to extend our gratitude, especially during the holidays, for your continued support, friendship, and the health and happiness of our staff. In the past, a small token of our appreciation has been enclosed with our winter newsletter. However, the global crises of the last year, and our sustained interest in education, have urged us to make a donation instead. We've chosen to support educational efforts for refugee children in Turkey through a US-based charity, **Karam Foundation**, and their "Learn Not Earn" program. Unfortunately, many Syrian children now taking refuge in Turkey are not afforded the opportunity to attend school or are forced to forfeit their education in order to provide financially for their families. The Karam Foundation offsets the potential earnings of the child and allows them to pursue an education. Additionally, the devastating earthquake that damaged or destroyed thousands of homes and historical and religious sites in and around Nepal's capital, Kathmandu, also destroyed many schools and, with it, many children's opportunities to learn. To assist in rebuilding and reestablishing educational institutions for children living in areas affected by the earthquake, we are making a donation to the international charity **Room to Read**, and their ongoing efforts in Nepal.

Please see their websites for more details:

<http://www.karamfoundation.org/education/>

<http://www.roomtoread.org/page.aspx?pid=311>

A Reminder about Our Refurb Policy

(enacted 1 January 2015)

As a courtesy to our customers, Microwave Telemetry, Inc. (MTI) continues to refurbish devices at our sole discretion. However, due to a variety of factors, we have made significant changes to the way MTI devices are refurbished, from both a technological and procedural approach. Refurbishment is an extremely time-consuming and delicate process, and the price we offer in no way reflects the actual cost of the labor involved. In many circumstances, we cannot be certain the refurbishment was successful until all of the work has been completed and the device is tested. Thus, scheduling shipment of refurbished units can be problematic. Increasingly, we have been receiving severely damaged devices that have no chance of ever working again. We would prefer that customers not waste their money shipping un-refurbishable units to us. Ultimately, the steps below allow us to better serve you.

For Avian PTTs and GSM/GPS Units*

- Prior to sending us devices to be refurbished, you are required to provide (via email) digital images (pictures) of any damaged area(s) of each transmitter housing. The file names of the images must reference the Argos ID (or GSM ID) associated with the transmitter. Ex: 130000a, 130000b, 130000c (Ex: 121a, 121b, 121c for GSM). Examination of these images will allow us to determine if the transmitter has the potential for refurbishment.
- We are no longer able to refurbish devices built prior to June 2010. Refurbishment of these older units is not possible due to incompatible components.
- Avian tracking devices in which the hermetically sealed housing has been breached (punctured, crushed, etc.) can no longer be refurbished.
- Upon our examination of photos and determination of eligibility for refurbishment, please submit a production form. Also include a copy of the production form with the devices to be refurbished.
- Transmitters must have all attachments (harnesses, etc.) removed prior to shipping.
- Transmitters must be cleaned prior to shipping.
- All returned devices should be packaged in original packaging and sent via Federal Express, our preferred carrier. Devices returned via other carriers often incur Customs clearance charges which we must pass on to you.

For Pop-up Satellite Archival Transmitters*

- We are no longer able to refurbish/rebuild Standard Archival Tags and X-Tags built prior to Dec 2011 (Serial # 19840). Refurbishment/rebuilding of these older units is not possible due to incompatible components.
- Before returning tags to us for refurbishment/rebuilding, fill out a production form. Also include a copy of the production form with the tags to be refurbished/rebuilt.
- All returned tags should be packaged in original packaging and sent via Federal Express, our preferred carrier. Devices returned via other carriers often incur Customs clearance charges which we must pass on to you.
- Each unit is eligible for only one refurbishment.

*We reserve the right to determine whether or not a tag can be refurbished. Microwave Telemetry, Inc. (MTI) does not provide any warranties, express or implied, for refurbished PTTs.

2016 MTI Photo Contest



It's that time again! Have your cameras ready while you're out in the field because MTI is holding another photo contest. First prize will be a **free transmitter**. Second prize is a **free refurbishment of a transmitter**.

All photo entries must depict animals tagged with MTI transmitters in the animal's natural environment. Groups or organizations, as well as individuals are eligible to enter. Be sure to include the photographer's name and affiliated organization. Please send all entries in high resolution (preferably a minimum of 2100x3000 pixels) digital format to:

support@microwavetelemetry.com

Put "Photo Contest" in the subject line of your email. Please submit your entries no later than October 1, 2016. Photographs will be judged anonymously, and all winners will be announced and featured in our winter newsletter. Photos previously used in our publications are ineligible. All contestants submitting entries grant permission for the future publication of their photos by Microwave Telemetry, Inc.; appropriate photo credit will be given. Multiple entries are permitted.

Bits & Pieces

In celebration of our 25th anniversary, we will be offering free Ground Track throughout 2016.

Our office will be closed 24 December through 3 January 2016. Happy Holidays!

Send us your 2015 publications so that they can be added to our online reference library.

Our new website is on its way, so keep an eye out for changes in 2016!