SPRING 2013 Volume 14, Issue 1

Tracker News

Microwave Telemetry, Inc.

Coming Home...

Dear Customers and Friends,

It is with a heavy heart that I write this letter. Normally, Christiane, my wife of 34 years, would be asking me to finish this letter so that the newsletter could be sent to the printer. Losing her has left all of us without her guidance to lift our collective attitude. It has been a painful transition. However, it is impossible not to feel Chris's spirit here with us at every moment, inspiring us to keep going. It's clear to us that, like other angels, she has merely returned home to help us from a different perspective.

The theme of this newsletter focuses on migratory animals that return home. Inside this issue we see how our GSM units give new insight into bird home ranges and learn about San Diego Golden Eagle fledglings' dispersal patterns from a long-term telemetry study. In the marine realm, we find out about migratory patterns of a pelagic shark and marlin. Thanks so much to the Meybergs, Carsten Rohde, Dave Bittner, Katie Quint, and Emily Loose for contributing their amazing findings to this newsletter.

Home is a very broad term but we watch in amazement how animals can travel thousands of kilometers and return a few months or years later to the same nest or area of the ocean. The reason for these returns is species specific. Personally, I am thankful that my son and daughter also found their way home to help carry on with the values of our company. Russell and Lucy are dedicated to its cause and bring new energy and vision.

We are grateful for all your support over the years, and especially those who have sent kind words in recent months. It really means a lot to us.

Sincerely,

Paul and the Team at MTI

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GSM Telemetry, a Quantum Leap – First Results for Long-distance Migrating Lesser Spotted Eagles

Bernd Meyburg is Chairman of the World Working Group on Birds of Prey (WWGBP). Christiane Meyburg worked as a researcher at the National Institute of Statistics and Economic Studies (INSEE) in Paris. Since 1992 she has helped her husband analyse the satellite-tracking data from his projects. Carsten Rohde worked for more than 30 years intensively on the Lesser Spotted Eagle in Germany and since 2000 in Israel.

Many questions about the biology of the Lesser Spotted Eagle and other wildlife cannot be clarified without individual marking. As a rule, therefore, field observations alone, for reasons of methodology, do not permit questions such as territory size, distances covered when foraging, etc. to be satisfactorily answered. This is especially true for migration to distant continents. The Lesser Spotted Eagle which breeds mainly in Central and Eastern Europe, is a long-distance migrant that winters in Southern and Central Africa some 10,000 km distant from its breeding grounds.

Photo by Carsten Rohde

Lesser Spotted Eagle equipped with prototype GSM transmitter.

Satellite telemetry (ST) brought about a leap forward in scientific knowledge of the Lesser Spotted Eagle and many other species. With the help of ST it is possible to study changes of location of a number of individual birds worldwide over long periods of time. Until a few years ago the transmitters were located through the Argos system exclusively with the help of the Doppler effect. Shortly after the turn of the century, solar-powered satellite transmitters with the GPS locating system, small and light enough to be fitted to large birds, became available for the first time. Data continued to be transmitted via the Argos system, so that two different satellite systems were involved in this form of telemetry. The advantage of GPS telemetry over the previous form of ST using the Doppler effect is not only the much greater precision of fixes, but also their reliability.

Data transmission via the mobile phone (GSM) network was another quantum leap. The implementation of this technology has enormous advantages for the telemetry of birds, in that the transmission of data is much more secure than via the satellites and the costs are considerably less. In the meantime the global coverage of this system is large, local 'dead zones' are acceptable for land birds, as mobile phones are constructed for use on the move and the transmitter can store a large number of fixes. The prototype GSM transmitter we used was programmed to send as many data as possible. At times this provided fixes every 3-5 minutes. Currently available production-version GSM units can now achieve a position fix every 1-2 minutes, totalling several hundred per day.

Results of the transmitter fitting 2012

In 2012, as part of a long-term research project on the Lesser Spotted Eagle, five individuals were fitted with transmitters in Germany. After being fitted with transmitters, all five adult eagles resumed the breeding process and successfully reared a young eagle. At the usual time in September, they left the breeding area and migrated to their winter quarters in Southern Africa.

An experimental GSM transmitter was fitted to one of the birds, a male, known by the name Panni. This bird was selected for a number of reasons. Panni was ringed as a nestling in 1992 and the rearing of the young bird was recorded by video camera. The bird resettled only a few kilometres from its birthplace. From the day it was fitted with the transmitter on 8 August 2012 to its departure from the breeding area on 13 September a total of 2,665 fixes was received, many more than from the other four birds. The territories of the five birds were very different in size. Panni had by far the largest territory. This information can undoubtedly be ascribed in part to the fact that the GSM transmitter sent many more fixes than the other four Argos GPS transmitters.

On foraging flights Panni travelled the furthest distance from the nest site, up to 17 km. If the bird's transmitter had recorded fixes only on the hour, as was the case with the other eagles, the furthest excursion from the nest by Panni would have appeared some 13.5 km shorter. If a fix had not been received as programmed on the hour in the other PTTs, a further 1 km of the flight would not have been recorded, making a deficit of 14.5 km of distance from the eyrie in all. This case demonstrates that the old transmitters do not record in full the birds' activity and extent of the home ranges.

Figure 1. Map showing full autumn 2012 (red) and spring 2013 (turquoise) migration of Lesser Spotted Eagle 0024 (Panni) fitted with GSM prototype transmitter.

Panni's autumn migration, wintering and spring migration

Panni left the breeding area on 13 September, crossed the Bosporus on 26 September, and the Suez Canal on 4 October. On 10 November the eagle arrived in its wintering area in Southern Zimbabwe after a stop-over period from 25 October to 2 November in south-eastern Congo. During the autumn migration over 4,700 GPS fixes were received. We received 5,374 fixes from the wintering area which included Zambia, Zimbabwe, Botswana and South Africa. On 22 February 2013 the bird left its wintering area again, departed from Africa near Suez on 19 March, flew over the Bosporus on 29 March and arrived back in its old breeding area in Germany on 17 April (Figure1).

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Satellite Telemetry Fills Gaps Left by Traditional Methods

Dave Bittner is the co-founder and current Executive Director and Board Member for the Wildlife Research Institute, Inc. (WRI) with 40+ years of experience in avian ecology and reproduction. Katie Quint is a full-time Wildlife Biologist with WRI and has conducted aerial and ground surveys of Golden Eagles in CA and NV since 2011.

We live in an era of rapid response for answers to our questions. Most answers to colloquial questions are just a few keyboard clicks away, and even telemetry data are now available in nearly real-time delivery to our computers and cell phones. Drawing scientific conclusions from data puzzle pieces, however, requires much more patience and diligence (and funding).

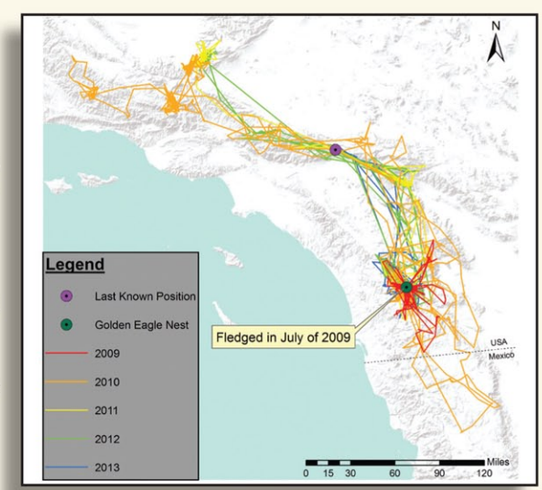
Photo by Chris Meador

Golden Eagle released by Dave Bittner, 2008.

The long-range migratory capabilities of Golden Eagles (*Aquila chrysaetos*) along with a long maturation to adulthood make the species a prime candidate for tracking its movements via telemetry studies. It is difficult for traditional wildlife tracking methods to match the data return capabilities of satellite and GSM telemetry methods. Wildlife Research Institute's (WRI) Montana migration study (2001-2011) applying leg bands and patagial tags on Golden Eagles and other raptors, was enhanced in 2007 by marking a sample of the Golden Eagles each year with 70g GPS Solar transmitters (N=24). Currently, live observation and mortality reportings via patagial tags have returned location data for 17% of 117 individuals not equipped with PTTs and 14% of the total number of subjects sampled (N=141). Satellite telemetry has returned location data for 100% of 24 individuals comprising 17% of the total sample size. Further, WRI has amassed comprehensive migration data per individual over the past seven years as they fly thousands of miles from wintering locations as far south as western Texas to breeding territories in Canada and northern Alaska.

The Golden Eagle dispersal cycle is quite different back home in San Diego. The adult Golden Eagle population in San Diego County is known to be firmly residential with museum records dating back to the late 1800s and evidence of nesting territories that are over 100 years old. We, as human residents of San Diego County, find kinship with the reasons motivating adult Golden Eagles to "stay put" — year-round beautiful weather being the common denominator; of course, food supply and other factors contribute to Golden Eagle territory dynamics. WRI's compilation of historical Golden Eagle territory records along with data from studies conducted since 1988 shape our approach to studying the resident population of Golden Eagles in San Diego County. Our project aims to determine dispersal patterns of fledgling Golden Eagles hatched in San Diego County as they mature to become breeding adults. Leg bands, patagial tags and VHF technologies have helped WRI identify San Diego-hatched juvenile Golden Eagles thousands of miles from their natal territories. One such juvenile Golden Eagle marked with a leg band and patagial tags as a nestling was reported to our institute as injured from a gunshot wound over 1,000 nautical miles away in Guadalajara, Mexico, within 7 months of fledging. Further, multiple Golden Eagles marked with leg bands and patagial tags as nestlings in their San Diego County territories have been observed alive approximately 7 years later as breeding adults within the county, and in each case in territories different than their natal territory. The patagial tags sometimes become mere illegible remnants after 7 years of weathering but indicate, even without identifying the individual *per se*, that Golden Eagles hatched in San Diego County later breed in the same region. The combination of these incidents well-illustrates the dearth of knowledge of natal dispersal and sub-adult movements prior to acquisition of a breeding territory and mate. Much like in our Montana study, early methods yielded location data for a small percentage of the total sample size whereas satellite telemetry has increased our percentage of location returns exponentially. We are now collecting data on sub-adult dispersal and answering the question: "Where are Golden Eagles from San Diego County going in the first 7-8 years of life and what mortality issues do they face in those places?"

Since 2006, WRI telemetry data have placed Golden Eagles marked with PTTs as nestlings (N=21) up to 500 nautical miles north and 680 nautical miles south of their natal territory and in most cases revisiting the natal territory multiple times along the way. WRI's longest-deployed transmitter on an individual Golden Eagle, "57092a," regularly returns data and is currently in its fifth calendar year. This case study has documented movement data between the natal area in San Diego County and the Tehachapi Mountains east of Santa Barbara, California, covering most inland mountain ranges along the way. Tehachapi Pass Wind Farm is a well-known wind turbine location in California established in the early 1980s. Acknowledging that wind turbines are a mortality issue for Golden Eagles when they leave San Diego County, it is almost hard to watch as location data approach and remain in the Tehachapi Pass area. Although having completed three round-trip flights to and from Tehachapi Pass, what's even more interesting is this individual stayed in San Diego for its first year and has since returned to its natal area for months at a time in both January 2011 and July 2012. We are 5 years into this dataset and hope for breeding territory location data within the next 2 years.

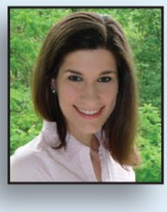


Annual dispersal of Golden Eagle "57092a" tracked via 70g PTT-100 GPS Solar, July 2009-April 2013.

Biologists studying birds with a lengthy sub-adult period grow grey waiting for a dataset complete from fledgling to breeding adult relative to the usual rapid delivery of answers we seek nowadays. However, we could never document long-range movements in such detail before satellite telemetry methods were available. Thus, it's worth the wait. Special thanks are in order to MTI for investing in and delivering the technology we need as biologists to answer important population management questions for avian and marine species.

Endangered Sharks Come Home to The Bahamas

Lucy Howey-Jordan is the Scientific Liaison at Microwave Telemetry, Inc. with personal research interests in shark biology and migration. Emily Gospodarczyk is the Data Analyst at Microwave Telemetry, Inc. specializing in light-based geolocation processing.



Oceanic whitetip sharks (*Carcharhinus longimanus*) exhibit a circumtropical distribution, inhabiting the pelagic environment. Jacques Cousteau considered the oceanic whitetip to be the most dangerous of all sharks and regularly encountered them on his expeditions. Yet, in the past half-century, industrial fishing fleets in the open ocean have depleted populations of this species to critically low levels. Sharks are fished for their fins which are used to make a soup consumed as an Asian delicacy. Emerging conservation plans to arrest these declines and initiate recovery hinge upon better understanding oceanic whitetip movements in relation to protected areas and potential threats.

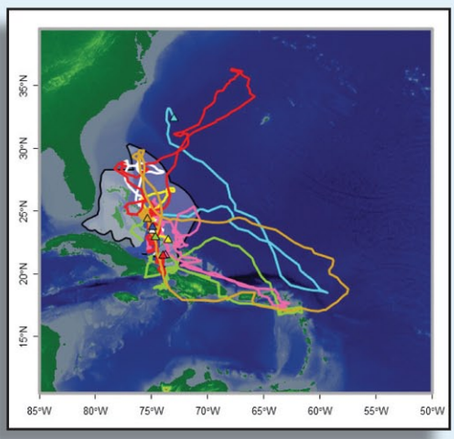


Figure 1. Filtered tracks of 12 oceanic whitetip sharks tagged at Cat Island, The Bahamas. Triangles indicate pop-up location.

In 2011, a group of researchers from the Cape Eleuthera Institute (Edd Brooks, Annabelle Brooks, Sean Williams), Stony Brook University (Demian Chapman, Debra Abercrombie), and Microwave Telemetry (Lucy Howey-Jordan, Lance Jordan) met in The Bahamas to begin a multi-year study of this poorly understood shark. Cat Island lies on the eastern margin of the Great Bahama Bank, exposed to tropical western North Atlantic waters (Figure 1). The southeastern tip of the island is called Columbus Point, marking the mouth of the Exuma Sound. This area represents one of the few locations in the world where oceanic whitetip sharks can be reliably encountered in abundance. Scuba divers and fishers have known for years that these sharks are present during summer months, then disappear as quickly as they arrive.

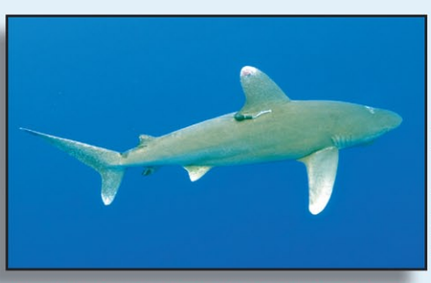


Photo by Lance Jordan

Photo 1. Oceanic whitetip shark instrumented with an X-Tag.

With the goal of increasing knowledge about the migratory behavior of oceanic whitetip sharks in the Atlantic, our group tagged 12 individuals at Cat Island with X-Tags the first year (Photo 1). Another 30 were tagged in 2012 (including the E-Tag prototype, see below), with 25 sharks tagged in May this year. Results from the first year of the tagging (published in PLOS ONE, February 2013) were surprising. As expected, the sharks left the waters adjacent to Cat Island in late summer. Some of the individuals migrated as far as the northern Leeward Islands (1400 km) but some actually remained within Bahamian waters. The Bahamas is a shark sanctuary where it is illegal to catch any shark species. Thus, those individuals that remained within The Bahamas' territorial waters were not exposed to longline fisheries.

Results from our study show that even though many of the tagged individuals migrated far from Cat Island, they return to the area. The reason for this apparent philopatry is unknown but suggests that waters of the central Bahamas are an important habitat for this pelagic shark. In an attempt to shed light on this behavior, a researcher from the University of North Florida (Brenda Anderson) joined our team in 2012 to examine reproduction in female individuals. Armed with an ultrasound machine, she was able to determine if females were carrying pups (Photo 2).

Despite being rejected in 2010, oceanic whitetip sharks gained global protection under Appendix II of the Convention on International Trade in Endangered Species (CITES) in March 2013. Hopefully, this measure will help curb further population declines of this once abundant apex predator.

Photo by Lance Jordan

Photo 2. Team performing ultrasound on female to determine if she was gravid.

E-Tag Update

This first-generation E-Tag is ~40% smaller in volume than the X-Tag, allowing for the study of even more species. The current version of the E-Tag only records (time-series) temperature and provides a pop-up location. However, the next version of the E-Tag will also record light-level data and calculate geolocation.

In addition to providing a means for tagging smaller animals, the E-Tag is intended to be deployed alongside X-Tags with the goal of improving geolocation estimates from X-Tag light-level data. Near the autumnal and vernal equinoxes, light-based geolocation methods fail to produce reliable latitude estimations. An E-Tag, programmed to release at the equinox, would reveal the animal's actual location during the time of uncertainty.

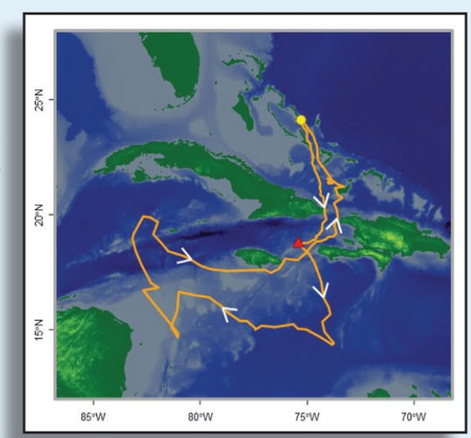


Figure 2. Filtered track of an oceanic whitetip shark tagged in May 2012 with an X-Tag and E-Tag. Tagging location (Cat Island, The Bahamas) indicated with yellow circle. E-Tag pop-up location indicated with red triangle.

The first E-Tag was successfully deployed on an oceanic whitetip shark alongside an X-Tag in May 2012. Double-tagging the individual allowed us to test the E-Tag against our already proven X-Tag and incorporate the E-Tag pop-up location as a known point in the X-Tag's estimated track. Figure 2 displays the filtered X-Tag track. The tagging location is indicated by the yellow circle. One month into the track, the E-Tag released on time at the location indicated by the red triangle, confirming that the animal traveled south of Cuba. Then, the track from the corresponding X-Tag indicates the individual looped through the Caribbean Sea and released in September 2012 at the tagging site (similar to other individuals, see above). The utility of this application holds much promise.

What is "Coming Home" for a Highly Migratory Species of Fish?

Emily Loose is a graduate student working with Dr. John Graves at the Virginia Institute of Marine Science, College of William and Mary. Her thesis research is focused on movements of white marlin and an analysis of scale morphology of white marlin and roundscale spearfish.

The white marlin (*Kajikia albida*) is broadly distributed within the Atlantic Ocean, ranging from approximately 45°N to 45°S latitude. The species is overfished with a current biomass probably less than 20% of that necessary to support maximum sustainable yield. Genetic analyses are consistent with a single, Atlantic-wide stock of white marlin, although the degree of mixing that occurs between geographical regions on a seasonal basis (fishery connectivity) is not well understood. Although conventional ("spaghetti") tagging results have provided some insights on movements of white marlin, tag reporting rates are very low (< 2%), and the varying times at large for recaptured animals (from days to as long as 15 years), afford limited resolution of individual movements on a seasonal basis.

Photo by Ken Neill

White marlin tagged with a PTT-100 PSAT.

Over the past several years our lab has deployed more than 100 pop-up satellite archival tags (PSATs) on white marlin taken in recreational and commercial fisheries to study post-release survival and habitat utilization. However, as these tags were programmed to release after ten days, they provided limited information on seasonal movements. As part of my thesis research I am studying movements of white marlin caught on recreational gear during the late summer in waters offshore of the U.S. mid-Atlantic region. To date I have tagged 11 white marlin using Microwave Telemetry PTT-100 archival tags programmed for 6 and 12 month deployments. Several tags have gone to term, and the results indicate these animals are truly highly migratory, and that there are multiple routes travelled by these fish.

The magnitude of seasonal movements that some white marlin undertake was exemplified by a 50 lb

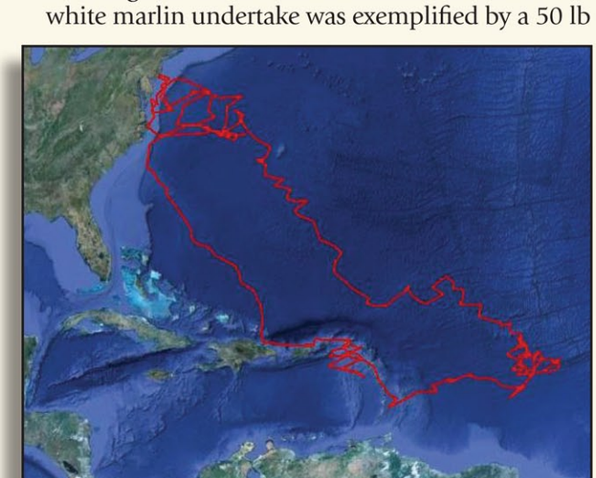


Figure 1. Map showing circuitous track of a white marlin tagged offshore of Maryland.

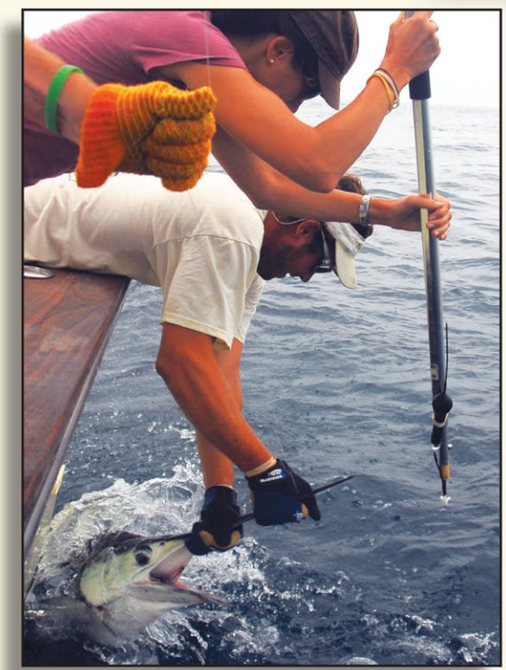


Photo by Bill Gooch

Bringing a white marlin alongside the boat can be a very exciting time. Great care is taken to ensure the marlin are not injured during tagging.

fish that I tagged on September 11, 2011 off the Washington Canyon, about 60 miles off the coast of Maryland. The 12 month tag went to term, popping up about 480 km to the northeast of the original tagging location. However, light-based geolocation analysis (Figure 1) tells a very different story than the straight line distance between the points of release and pop-up. After release the fish spent a little over two weeks in the Mid-Atlantic Bight, leaving the area on approximately September 26. By mid-December it had traveled to waters off northern Brazil, a straight-line distance of approximately 3800 km from the tagging location, while covering well over 7000 km to get there. The white marlin remained in this general area throughout the winter, before beginning to travel west in mid-April. By mid-June, it had reached the Dominican Republic, an area where white marlin spawning is known to occur at that time of year. After spending a few weeks in that area, it headed north, making its way back to the Mid-Atlantic Bight by mid-July. Although those of us who live in the Mid-Atlantic region may consider this as the fish's "homecoming", to the fish it is simply a foraging area in a region of warmer water. Regardless of why white marlin return to this area, they are clearly a highly migratory species!

As for daily vertical excursions, marlin and sailfish tag data generally show that little time is spent at depth compared to time at surface, and this white marlin was no different. This individual spent the vast majority of its time in surface waters of 0-10 m, although it frequently dove as deep as 100 m.

Results from other white marlin tagged in this study indicate that a variety of routes are used when exiting the Mid-Atlantic Bight, with most animals moving large distances to the south or east, although some appear to remain in the same general area, overwintering in warmer waters on the eastern side of the Gulf Stream. Following the movements of white marlin with PSATs has given me a great appreciation for the connectivity of fisheries throughout the Atlantic and the need for strong international cooperation for the conservation of this incredible species.

Life, Legacy Celebrated: Christiane Howey (1953-2012)

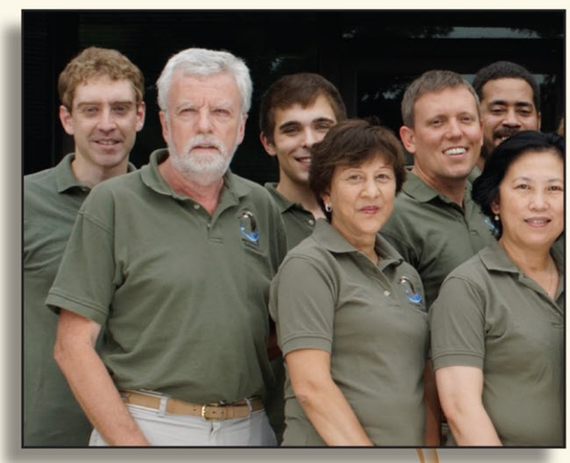
On December 18, 2012 our beloved Christiane passed away after a hard-fought, 16-year battle with breast cancer. Most people never knew about Chris's illness; her positive outlook never gave the slightest hint of her private struggles with this disease. Chris was a true leader who knew how to bring out the best in the staff. She was fair, generous, dedicated, and her work ethic inspired us all.

Chris and Paul began this company together. Chris's vision took MTI to new horizons: from the basement of the family home during the company's infancy to the forefront of wildlife conservation technology. Many of our customers had the opportunity to interact with Chris personally, especially at our conferences. She had a genuine interest in every project, large or small, and ran the business with the best interests of the researchers and the animals as the focus. Her commitment over the past 21 years has made it possible for MTI products to be available as a powerful tool to understand movement and behavior of hundreds of species worldwide.

Losing Chris has been profoundly painful, and we greatly appreciate those of you who reached out to us to offer your sympathy.

Chris's legacy will live on in this company. She developed the culture of our workplace and we are committed to its ideals and high standards. Here, the customer and animal come first. This will never change. In keeping with her generous spirit, we will now offer an annual award - in Chris's name - for start-up projects. Please see page 7 for details.

We all dearly miss Chris but her memory will live on forever.



News

Christiane Howey Award

Chris had a generous nature. In the 21 years she was at the helm of this company, she found many opportunities to help people. Chris always believed that it was important to "give back" and she did so, in both her personal and professional life. In addition to granting many educational awards for transmitters over the years, Chris 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 announce an annual award in Chris's name: the Christiane Howey 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 for the 2014 award will be accepted before November 1, 2013 and reviewed prior to the publication of the Winter 2013 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. Applicants are encouraged to include an educational component in their research but this is not required.

2013 MTI Photo Contest

This year, we will be holding another photo contest. First prize is 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. We will have two contests, one for marine transmitters and one for avian transmitters.

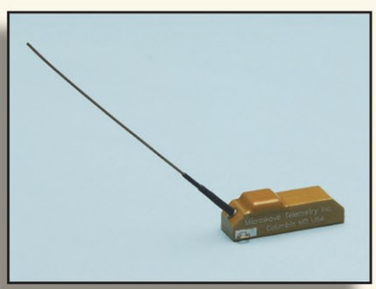
Groups or organizations, as well as individuals are eligible to enter. Be sure to include the photographer's name and affiliation. Please send all entries in high resolution digital format to: lhowey@microwavetelemetry.com.

Put "Photo Contest" in the subject line. Please submit your entries no later than October 1, 2013.

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.

Retirement Party

Since Microwave Telemetry's inception in 1991, we have been busy developing tracking devices utilizing the latest in technology to meet the needs of researchers and their study species. Our product line includes 24 unique models of avian PTTs, GSM transmitters, and archival pop-up tags. We continue to expand programming options, to better address the varied requirements of tracking studies. At the same time we have retained many of our older, time-proven models. Although it is a lesser-used model now, we still manufacture our first model of transmitter: the 95g battery powered PTT-100. Also, we are happy to refurbish recovered transmitters as time and their condition allows (see page 8). Unfortunately, due to lack of demand and parts limitations, we are formally retiring the 40g LC4 which was introduced nine years ago. This battery powered GPS PTT was designed for birds that couldn't be tracked with solar powered PTTs, due to habitat or preening behavior. It will have a permanent home in our museum collection!



40g LC4 Transmitter.

GSM Telemetry, a Quantum Leap

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What is the advantage of the GSM transmitter?

With the new GSM transmitters, basic questions about migration, which could not previously be clarified, can now be answered. Whether, when and where the bird feeds on migration are questions that until now have remained open for most species. Due to the large number of fixes at very short intervals, as well as data on flight speed and height, it can be determined whether the bird is migrating or if it has temporarily broken off its migration flight to forage for food. In addition, the flight height throughout the complete migration phase can be established for the first time. The previous transmitters only enabled heights of up to some 2,050 m ASL to be registered. For instance on 28 September in Turkey, Panni flew three times at heights of over 3,000 m ASL. The migration routes are of course recorded much more precisely than previously, which can be important to establish whether the birds are threatened by existing or planned wind farms on migration. Finally, the home ranges in the breeding area can be recorded much more accurately.

Comparison of the density of the GSM-GPS fixes (red) of Lesser Spotted Eagle 0024 (Panni), fitted with the GSM prototype transmitter and the female 52030 (Peggi), fitted on the same day with a conventional GPS Argos transmitter (yellow) during migration along the north-eastern Mediterranean.

Scottish Schoolchildren Take on Satellite Tracking to Monitor Their Local Bird of Prey

Fiona Corner, RSPB Scotland

Satellite tags provided by Microwave Telemetry, as part of their PTTs for schools program, have enabled an exciting Royal Society for the Protection of Birds (RSPB) tracking education project to go ahead last year. In the Scottish Highlands, the Black Isle is a beautiful peninsula and important area for one of the UK's most spectacular native birds of prey, the red kite (*Milvus milvus*). Illegally persecuted to near extinction across the UK during the 1900s, red kites have since been successfully reintroduced by the RSPB throughout the British Isles, with the Black Isle population now an important Scottish stronghold for the species.

Photo by Andy Hay

Red Kite perching on branch.

This project involved three young birds being attached with the satellite tags, and working closely with the local Ben Wyvis School to help children (4–12 age range) track the birds' movements as they dispersed from the nest. Children have been absolutely fascinated with this insight into the young birds' lives, and the accessibility of this screen based learning has proven very inclusive for a broad range of ages. Learning within the classroom has been complemented with outdoor trips to RSPB's nearby nature reserve, Fairy Glen, where the children were awed to see close-up views of these wild birds in their local habitat. Red kites are such a feature of the local area that they are fast becoming a daily highlight for children and local communities, frequently spoken about in conversation and seen when out and about.

During the summer school holiday open events were held at RSPB's local 'Tollie' Red Kite Centre which helped over 350 members of the local community to understand and appreciate red kites. Children watched as the birds swooped down to eat the venison that had been left out for them by local volunteers! RSPB Biologist Stuart Benn and schoolchildren from Ben Wyvis introduced the satellite tagging project to the wider community and discussed how it helps to protect these birds through monitoring their habitat and highlighting any threats to it, such as the continuation of illegal persecution. Local people were very engaged, as these birds carry strong natural and economic significance within the area, and some hadn't previously understood they were threatened. Additional open days have given the opportunity to talk about red kites, specifically on their protection and how the satellite tagging is helping to better understand these fantastic birds of prey.

The project has really boosted enthusiasm and a more in-depth scientific understanding amongst children of red kite ecology and uses of tracking equipment. The wider community has engaged with real interest in the project too and genuinely seems to wish to do more for the red kite. We hope this project will help establish greater stewardship and sense of local pride in our younger generation to safeguard a future for this magnificent bird as part of the north Scotland landscape.

Photo by Andy Hay

Tollie Red Kite.

Reminders

Refurbishment

As a courtesy to our customers we are happy to offer refurbishment of transmitters. You are welcome to return recovered PTTs, GSM transmitters and Pop-up Tags to us at any time. However, we may not be able to give them our immediate attention, as new production remains our highest priority. We have set aside the months of August through February for refurbishment of PTTs and GSM transmitters. Please return your transmitters as soon as possible so that we can complete the work in the time allotted and return them to you for next field season.

Data Extraction

The archival abilities of our X-Tags allow for extraction of high-resolution time-series data (2-minute records.) The extraction process is extremely time consuming. Please allow several months for delivery of extracted data reports.

Peer-reviewed Publications

Please send us links/citations for your 2012 and 2013 publications that use MTI products. We will add these to our online reference library.