SPRING 2010 Volume 11, Issue 1

Tracker News

Microwave Telemetry, Inc.

Satellite Telemetry: a Catalyst for International Collaboration

Dear Customers and Friends,

When an 8.8 magnitude earthquake struck Chile on February 27 at 3:34 PM, our first thought flew to our customers there, especially to Peter Hodum, with whom we have worked for the last 10 years or so. We watched the news of a predicted tsunami with horror as it headed to the Juan Fernández Islands where Peter and his colleague Erin Hagen work to track shearwaters. Luckily, Peter was still in California and Erin, though actually on Robinson Crusoe Island when the tsunami hit, was safe. Sadly, 16 people were lost including 5 children that both biologists knew well. In an effort to help in rebuilding, Peter and Erin have established a charitable fund. We are asking you, our loyal customers and friends to give generously. We have already contributed to the fund and hope that you will do so too.

Strangely enough, we were one phone call away from asking Peter for a contribution to this newsletter when the earthquake struck. The focus of this issue is on the collaboration between biologists from different countries; it has become increasingly common to find projects carried out by scientists working together across the globe.

We enjoyed reading the articles contributed to this issue and hope that you will too. We especially wish to thank: Kim Aarestrup from Denmark, Housseini Issaka from Niger, Hiroyoshi Higuchi from Japan, Peter Hodum and Jerry Hupp from the USA, Mátyás Prommer from Hungary, Audun Rikardsen from Norway, Joseba Felix Tobar-Arbulu from the Basque Country and Martin Wikelski from Germany. Thank you for your wonderful articles; these truly illustrate how much more can be accomplished by pooling resources across international boundaries.

We thank you for the opportunity to work closely with you; we hope to remain a part of your professional journeys as satellite telemetry helps bring scientific communities together.

Stay tuned for our next newsletter which will kick off our 20th anniversary celebration. Have a safe and productive field season!

Sincerely,

Paul and the staff at MTI

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Going Wild, Going Global: International Collaborations in Movement Ecology

Martin Wikelski, Dept. of Migration and Immuno-ecology at the Max-Planck-Institute for Ornithology and Chair of Ornithology at Konstanz University, Germany. Martin@orn.mpg.de

Satellite telemetry resulted in a quantum leap forward in animal ecology and is a key technology in 21st century biology. The Max-Planck-Institute for Ornithology, 'Vogelwarte Radolfzell', was one of the first users of terrestrial animal PTTs in Europe with its program "Bird Migration in Africa and Eurasia - a Pilot Study". The pioneering efforts by Peter Berthold's team resulted in the first lifetime tracks of White Storks. Our 'Princess' was tracked by various PTTs for about 12 years, still one of the most beautiful individual data sets in movement ecology.

Meanwhile, some 20 years later, satellite telemetry has become an integral component of our day-to-day work. Birds are the quintessential world wanderers - thanks to the PTTs we can now move with them, personally and virtually. Whereas our initial scientific focus was more towards simply understanding 'Where do birds go?' and 'When do they migrate?' we are now contributing to international scientific investigations in four specific fields:

i) What ecosystem services do birds provide? Specifically, how important are birds in dispersing seeds of trees across forest gaps? Here we are collaborating with Tom Smith's Center for Tropical Research at UCLA (USA) to analyze over which distances hornbills disperse rainforest seeds in tropical Cameroon/Africa.

ii) What health risks do migrating birds pose? In collaboration with the FAO/Rome, USGS/USA, as well as universities and organizations in the UK, India and Mongolia, we are tracking Bar-headed geese across the Himalaya mountains. In this international research group, different interests feed off each other: How can birds cross the mountains at high altitudes? How quickly do they move in case they are diseased, that is, how far can they potentially carry a virus? How are different populations connected? Is there leap-frog migration, with more northern breeding populations migrating to more southerly non-breeding sites?

iii) Conservation and population connectivity: Together with the Wildfowl & Wetlands Trust, UK, and researchers in Mauritania, Botswana, Ethiopia and Kenya we are tracking Lesser flamingos in Africa to determine whether spatially separated populations in Africa are connected by individual movements. This is a long-term project and will ideally soon include Lesser flamingos from India, too.

iv) Inter-continental navigation in Lesser black-backed gulls: Here we engaged in the largest bird navigation project by tagging more than 120 individuals simultaneously, and experimentally changing their sensory systems on a temporary basis. In collaboration with Risto Juvaste and his Finnish team, Grigori Tertitski and his Russian team working in the White Sea area, the German Institute of Avian Research in Wilhelmshaven, as well as sensory physiologists Anna Gagliardo from Italy and Martin Wild from New Zealand, we altered the perception of environmental signals via the magnetic nerve or the olfactory nerve. We then translocated individuals by plane towards the West (from Finland to Germany's Heligoland Island) and the East (to the city of Kazan in the Volga valley, Russia) and followed their individual decisions throughout their voyage towards their non-breeding areas in East Africa (Lake Victoria).

None of these projects would have been possible without international collaboration involving many countries, institutions and dedicated individual researchers. Although it is often tedious to get all the paperwork in order to be able to track animals across the globe, it is perhaps the most rewarding part of our job to see a world on the move.

It is our deep conviction that animal movements are part of the human cultural and scientific heritage, particularly during times of unprecedented habitat alteration and climate change. Roland Kays, Mammal Curator at the New York State Museum, USA, and I have therefore started 'Movebank', a global data repository and online research platform that allows scientists and the public around the world to share their movement data. The current beta-version www.movebank.org already features real-time ARGOS feeds and additionally stores animal attributes that are collected from onboard sensors such as 3D-acceleration. We plan to expand Movebank into a Virtual Research Platform for movement ecologists. Data entered into Movebank will remain sole property of the individual researchers, who can then decide how and with whom to share the data if they wish to. Movebank is free to use and funded internationally, by the US National Science Foundation (NSF) and the German Max-Planck Society and the German Science Foundation (DFG), and is part of the New York State Museum archives for eternity. Data in Movebank will remain under the auspices of the Food and Agriculture Organization of the United Nations (FAO), a truly international patronage for the animal data that are so dear to all of our hearts.

Photo by Grigori Tertitski

Martin and Vladimir Semashko transporting gulls in Russia.

'Panta rei' – Everything moves, and movement is the essence of life, as the Greek philosopher Heraclitus said in 500 BC. I foresee that movement ecology and its most important technique, satellite tracking has not even started yet to enter its golden age. The world has become a small place for us; it always was for birds.

Finnish gulls on the dump.

Photo by Markku Kangasniemi

Satellite Tracking and the Importance of International Collaboration

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Jerry Hupp, Alaska Science Center, U.S. Geological Survey, Anchorage, Alaska. jhupp@usgs.gov

For nearly 20 years we have collaborated on tracking bird migration with Russian, Mongolian, Chinese, Korean, Indian and American scientists. Satellite tracking is especially well suited to Asian-based research because of the extremely large land area, sensitive political situations, and the many urgent conservation problems in the region. We have satellite tracked the migration of about 20 species of cranes, storks, swans, geese, ducks and hawks. We are interested in migration routes, migration patterns through time, and habitat use of threatened birds in East Asia.

Our research results have led to conservation outcomes in many East Asian countries, including the establishment of national nature reserves (about 3,000 ha in Mundok and 2,000 ha in Kumya) for migrating cranes in North Korea and of a 5,200 ha nature park for breeding cranes and storks in Muraviovka, southeastern Russia. Based on the results of the crane satellite tracking data, aerial surveys and satellite images, we recommended massive changes to the existing development plans in Three Rivers Plain in northeastern China, and some of the recommendations have actually been implemented. All these contributions are due to active international collaboration among scientists and conservationists.

Photo by Ken-ichi Tokita

USGS and Japanese scientists are removing pintails captured by a clap net in northern Honshu, Japan.

Recently, we have collaborated with the USGS Alaska Science Center and the U.S. Fish and Wildlife Service (USFWS) to track the migration of Northern Pintails (*Anas acuta*) from their wintering areas in Japan. This research will help us understand whether migratory birds could carry avian influenza viruses such as the highly pathogenic H5N1 virus from Asia to North America. We deployed Microwave Telemetry PTTs to 129 pintails in northern Japan in February 2007, 2008 and 2009 and found that many pintails migrated to breeding areas in northeastern Russia that were also used by pintails from North American wintering areas. Some Japanese pintails even migrated to Alaska (Fig. 1). Virus exchange likely occurs between populations where North American and Asian pintails come into contact, a finding supported through genetic studies of low pathogenic influenza viruses from pintails in Alaska. This research will contribute to our understanding of how avian influenza viruses spread and will help identify important migration habitats of Northern Pintails in East Asia.

In spring of 2008 there was an outbreak of the H5N1 virus among Whooper Swans *(Cygnus cygnus)* at three locations in Japan. We had a unique opportunity to monitor Northern Pintails that we had marked with PTTs earlier in the winter and to observe their use and subsequent migration from the H5N1 outbreak sites.

Figure 1. Spring and fall migration routes and stopover sites of a Whooper Swan and Northern Pintail marked with satellite transmitters on wintering areas in Japan.

This is the first study in which birds marked with satellite transmitters were tracked during an occurrence of the H5N1 virus (Yamaguchi et al. 2010. Ibis 152:262-271). This information has been very helpful in understanding the potential for migratory birds to carry a highly pathogenic avian influenza virus to new regions during migration. As a result of those observations we collaborated with USGS and the USFWS to deploy satellite transmitters to 17 Whooper Swans in 2009 in order to better understand the migratory connections between swans and Northern Pintails. Microwave designed a reinforced solar powered PTT that we attached to swans via plastic neck collars. These allowed us to track all 17 swans to their nesting areas in Siberia between the Indigirka and Kolyma rivers, identify migration stopovers used along the way, and to track swans on their return migration to Japan (Fig. 1).

Photo by USGS

Dr. Noriyuki Yamaguchi of the University of Tokyo prepares to release a Whooper Swan in northern Japan following attachment of a neck collar mounted satellite transmitter.

Even though satellite tracking is costly, requiring expensive PTTs and high satellite tariffs, it is however more cost-effective than many other methods of tracking. For example, 229 Red-crowned Cranes were banded in Russia and China between 1981 and 1996, but only 11 have been re-sighted or recovered outside the ringing areas. The time, energy and money expended during this project were considerable. In contrast, only 1 or 2 years were needed to show the whole migration routes of the species through satellite tracking. Moreover, as mentioned above, the great contribution to conservation can be accomplished through satellite tracking work, which is much more cost-effective than expected from the cost itself.

The combination of advanced technology, field work, and international cooperation will help make great progress to promote the conservation and management of biodiversity.

Lost in Africa – Chasing Hungarian Sakers (*Falco cherrug*) in Niger

Mátyás Prommer, BirdLife Hungary, Budapest, Hungary. prommer.matyas@mme.hu
Housseini Issaka, Sahara Conservation Fund, Niamey, Niger.

When the Hungarian-Slovak Saker Falcon (*Falco cherrug*) Conservation LIFE-Nature project began, no one had ever thought that not only two countries, but also many other ones would be involved. The project aims to ensure the conservation of this globally endangered species in Central and Eastern Europe. The support of the European Union enabled experts of Bükk National Park Directorate, BirdLife Hungary and Raptor Protection of Slovakia to deploy 46 satellite transmitters on Sakers to explore migration and roaming routes of juveniles and habitat use of adult birds. Beside direct conservation measures, such as insulation of pylons of mid-voltage power lines and creation of appropriate nesting places, satellite tracking was an indirect tool to identify potential threats to falcons and show the priorities for conservation actions.

Due to the tagged Sakers, we know already that juveniles leave the parental eyrie 1-1.5 month after fledging. Until the fall migration, juveniles usually

Migratory route of a juvenile Saker from Hungary to Niger.

discover the Carpathian Basin (roughly covering Hungary, South Slovakia, West Romania and North Serbia), but some of them make it as far as Kazakhstan. Fall migration starts in September and may last until December. Juvenile Sakers are partial migrants, some birds migrate south, some remain for the winter. Adult Sakers do not migrate. The main wintering areas are the Mediterranean and North Africa – neither is without serious risks for juvenile Sakers.

Every time our birds stop in a foreign country we look for local colleagues in order to request information on the area and possibly on our Saker. It is always a very exciting story and beneficial for all parties. As a result of the project, a 'Saker-network' has been built from Mauritania in Africa to Russia and Kazakhstan, at the edge of Europe and Asia involving 18 countries since the start of satellite tracking.

The African wintering range is especially interesting to us as we did not know much about it so far. On fall migration, 5 females out of 43 tagged juveniles reached Africa between 2007 and 2009. Unfortunately, only two of them made it to the wintering ground. Data from those two Sakers revealed the area and habitat types they prefer in Africa and enabled us to take further steps to gather more information.

Dorottya, the second Saker, arrived in Africa in October 2009 and established her temporary settlement area in Niger. At that stage there was an urgent need to find someone who could check the bird and the area. After some attempts with no results, a reply to an e-mail with an entirely different topic on the raptor conservation list-serve arrived from Mr. Wim Mullié, who as it turned out, worked in Niger. On his recommendation we turned to Mr. Joost Brouwer from Holland. From that point on, everything went easily, as he kindly organized an 'expedition' to search for Dorottya and survey the habitat.

Photo by Hans Hut

Housseini and his wife.

During the field visit in mid-February 2010, Housseini Issaka, a local biologist, patrolled the roosting sites of Dorottya. Prey remains and pellets were collected, habitats and prey species were surveyed and potential threats (power lines, poisoning, hunting, etc.) were estimated. In addition, locals were questioned about their attitude towards raptors and awareness raising activity was carried out. The results are still being processed, and along with other information will form the basis for a bigger study on Saker wintering sites in Africa.

Dorottya's story, however, came to a sad end. In early March, signals started to come from a single spot that appeared to be a village. Ms. Halimatou Amadou, biology student at the University of Niamey, was able to visit the area and discovered that Dorottya was killed by a young Peuhl herdsman with his slingshot. The circumstances are unclear and apparently it is not so easy to recover the PTT, but we are working on it.

Photo by János Bagyura

Dorottya right after tagging.

Undoubtedly, species conservation cannot stop at the border, but needs to be expanded to all affected areas even in the case of such partial migrants as Saker falcons. International conservation needs well focused international cooperation and this is where satellite tracking is an unbeatable tool. The Saker conservation project is an excellent example of that. Such projects also highlight the fact that developed and developing, rich and poor, technologically advanced and lagging behind countries have common responsibilities in conserving biodiversity, and all have to do their own share. Hungary and Niger are far away from each other, but the conservation of Sakers is their common responsibility.

We would like to thank the kind help of Dr. Joost Brouwer (Brouwer Environmental & Agricultural Consultancy, Holland); Ms. Halimatou Amadou (University of Niamey, Niger); Mr. Abdoulaye Harouna (WWF, Niger); Mr. József Fidlóczky (BNPI, Hungary) and all other colleagues who made it possible to search for Dorottya in Niger.

† *We have sadly learnt that Ms. Halimatou Amadou died of meningitis during an epidemic raging in her work area. We are deeply shocked to hear about the death of this talented and helpful student. We keep her in our hearts.*

Elucidating the Marine Behaviour of Atlantic Salmon

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Audun H. Rikardsen, Department of Arctic and Marine Biology, University of Tromsø, Tromsø, Norway. audun.rikardsen@uit.no

Atlantic salmon is highly prized as a recreational and commercial resource in the Northern hemisphere. Their large size, impressive leaping capability, long migration and exceptional homing ability have lead many authors to describe it as "the king of freshwater fishes". Although spawning and juvenile growth occurs in freshwater, the species is usually anadromous and undertake the bulk of their lifetime growth during a 1-4 year long sea migration covering large areas in the open ocean. Here they increase their weight from 10-50 grams at the start of their migration, to 1 to over 30 kg before they return to spawn. Unlike most Pacific salmon that all die after spawning, post-spawners (kelts) of Atlantic salmon may survive and migrate to sea again, and subsequently return to spawn one or several times more. Contrary to the vast literature on the salmon life cycle in freshwater, remarkably little is know on the life at sea despite the importance of this life phase for the total production of the species. Therefore, the Norwegian lead project, "Salmotrack", was initiated in 2006 where different electronic tracking methods are being used to map migrations of salmon and other northern anadromous salmonid fishes during different life-phases, with special emphasis on marine migrations.

The "Salmotrack" project coordinates available logistics and equipment in order to maximize the synergetic effects of each subproject. It utilizes telemetry techniques like PIT, acoustic, archival, radio and most recently pop-up satellite archival tags (PSAT). Almost all life stages of salmon have been covered, including juveniles and smolts in rivers, post-smolts in fjords, open ocean migrations of adults, returning adults in fjords and rivers, kelts (post-spawners) in the river and fjord and escaped farm salmon. Two post-doc positions, three PhD positions and several master and bachelor students have been, or are directly involved in the project. The project is managed by the University of Tromsø in northern Norway with Dr. Audun H. Rikardsen as the project leader. As all the skills required in such a project are rarely embedded in only a few persons, it involves extensive Norwegian and international cooperation. This includes scientists from Canada, Denmark, England, Finland, Iceland, and Ireland, that together hold various competencies needed from different disciplines, including salmon ecology, telemetric and tagging expertise, oceanography and mathematical statistical skills. There is also a large set of logistics involved in obtaining and tagging the fish in sufficient numbers from different locations.

The necessity of such studies is underlined by the severe decline in the species over the last decades. Atlantic salmon is now protected under the endangered species act in the USA and listed as threatened in several European countries. Proper management action to restore populations will require detailed knowledge of all life stages.

The majority of knowledge that exists about the marine phase comes from fishing and classical marine cruises. This gives some information on the distribution and marine feeding. However, marine cruises are very expensive, time consuming and also give the classical problem of being "CPUE based" (i.e., you can only catch salmon where and when you fish for them) and say nothing about where the fish was before capture (or in case of release, after).

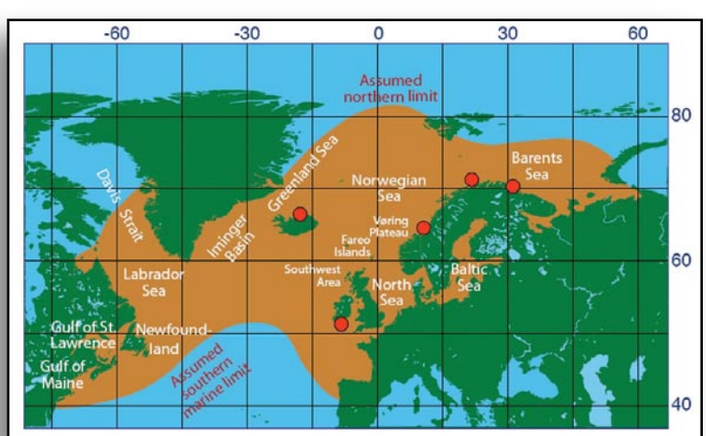
Photo by Salmotrack

Audun is releasing the first PSAT out of several tagged post-spawn Atlantic salmon (kelt) into the Alta Fjord in northern Norway.

However, the development of electronic tagging (DST and PSAT tags etc.) has provided a tool to gather catch independent continuous high-resolution information on depth, temperature and geo-location information, making it possible to track long-term individual migration behaviour of salmon at sea. The vast number of data these methods can bring holds the potential to model the behaviour at sea, given sufficient quality of data. PSAT technology specifically gives the advantage of a direct position observation in the sea shortly after the tag detaches from the fish and comes to the surface. Light measurements can furthermore be used for a more detailed mapping of the migration by modelling the sunset and sunrise times.

The Salmotrack-project has since 2008 attempted to unravel some of the mysteries of Atlantic salmon behaviour in the open sea by employing various methods including PSAT tags. Therefore, extensive effort has been (and still is) put on developing a tagging, handling and data analysing procedure that could maximise the data information gathered by each fish. For example, it was a challenge to get the PSAT to stay on the fish for up to one year, as well as to track these animals above the Arctic Circle by use of sunset and sunrise due to the midnight sun and dark winters at these latitudes. The most important field season so far will be 2010 where we intend to tag salmon in a number of rivers around Europe in order to map the migration pattern of salmon from different regions, including northeast, northwest and southern part of Norway, Ireland and Iceland (see map). We hope to be able to expand the tagging areas in the near future, as well as possibly including other species, and to share experiences and cooperate with new research scientists in this regard.

The current size and configuration of the PSAT tags dictate an external attachment on rather large fish. Therefore, we tag only adult post-spawn Atlantic salmon (kelts) on the return migration to the sea. Initial tagging has been performed and the results are very promising and will hopefully generate many new insights to the marine biology of this fascinating animal. We hope to keep you updated on this in the near future.



© A. Rikardsen / Salmotrack

Map of the assumed ocean distribution of Atlantic salmon at sea (area in brown) and recent PSAT tagging locations (red dots). Rikardsen & Dempson 2010.

Finding the "Holy Grail" in Russia

Joseba Felix Tobar-Arbulu, Professor at the University of the Basque Country

When Araba, a Eurasian woodcock, set off on his 3280 km journey from the Basque Country to Karelia, Russia in March 2008, he carried a 9.5 g Solar PTT from Microwave Telemetry, Inc. Little did we know then that this would lead to our own adventure eighteen months later to search for our "Holy Grail", Araba's PTT.

Sadly, Araba's PTT started transmitting intermittently around August 2008, with no transmissions at all during the winter. From the data, it appeared that Araba was dead or the PTT had been shed. Looking at detailed maps in the area of Karelia, we knew that the PTT was close to Rantala, north west of Suojarvi. Lo and behold, the PTT started intermittent transmissions again in May 2009.

We decided to undertake a trip to Russia to find Araba's PTT but first, Ibon and Ruben, members of our Basque team, experimented with locating another PTT we had with a scanner and Yagi antenna. After placing the PTT in different places, they tried to locate it with the small antenna of the scanner, without any antenna at all, with different frequencies (above and below the PTT's frequency), silencing the scanner in different positions and so on. Using the triangulation method described in a past issue of MTI's newsletter, they figured out how to locate the PTT. We were now ready to set off for Russia.

With the help of Dr. Nikita Chernetsov, with whom I had corresponded, we contacted Dr. Misha Markovets and a friend of his born in Suojarvi: Sergey Ponomarev. They provided us with detailed maps of the area. The Russian team they proposed included Alexandr Artemjev and his son Ilya. We set off for Rantala in Suojarvi in two cars, with the GPS and the scanner.

We soon had a problem: the forest road taking us to our search location (as determined from the most recent high quality Argos locations) was closed, as a bridge over a river was down! We were still 10 kilometers away. We took another forest road but 3 km on, the road turned into small roads. We set off on foot for the remaining 7 km; most importantly we would also have to walk the same distance back. Anyway, we trudged on in the pouring rain. Finally, we stopped for food, cheese, tea and the much needed cognac that Alexandr and Ilya had brought.

We only had one chance to find the PTT since we were leaving for Saint Petersburg the next morning after the transmission. As we sipped cognac to warm up, we calculated the possible beginning of the PTT's transmission. During this 16 hour window, we would need special clothes, sleeping bags, food, tea, and of course vodka. Many thanks to Valery Shpilevoi, the owner of the small hotel in which we stayed in Suojarvi, who provided it all and took on this project as his own.

Using the scanner and the Yagi antenna, Ibon, David and I narrowed our search to 2 x 3 meter square where we thought the PTT was. By then, it was raining, snowing and very cold. Valery prepared the fire, coffee and vodka.

Photo by Alexandr Artemjev

The "Holy Grail", as found in all its beauty.

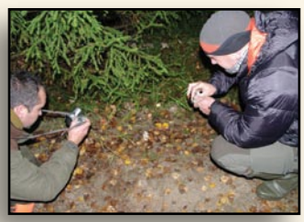


Photo by Ilya Artemjev

Eureka!

Photo by Ibon Teletxea

Ilya holding the PTT.

Photo by David Rubio

Valery starting the fire while it is snowing and freezing cold.

Photo by David Rubio

Valery our wonderful cook with Ilya and Alexandr.

Photo by Ilya Artemjev

Taking a break in the rain.

Photo by Alexandr Artemjev

Basque team having drinks after dinner.

Under poor lighting, we searched for the PTT to no avail. As we were about to give up, Ilya and Alexandr shouted to us the news: "Here it is!" Our "Holy Grail" at the base of a fir tree! Amidst shouts of joy and laughter, we headed back.

It has been a real pleasure to get to know so many people: Nikita Chernetsov, Misha Markovets and Sergey Ponomarev through emails and the Internet, Alexandr, Ilya and Valery in person. Thank you for your valuable help. We thank the Araba team of Asier and Rubén San Vicente, Josu Salazar, Victor Regueiro, Javier Uriarte and Ikatz Pérez de Arriba. Last but not least, we would like to thank the Club de Cazadores de Becada, Fedenca, Irec and Txepetxa for sponsoring us and Microwave Telemetry, Inc. for donating the PTT and their support.

MTI Photo Contest

It's been ten years since our last photo contest; back then entries were submitted on 35 mm slides! We are excited to invite you to participate in a photo contest designed to showcase your work and ours. Please submit photographs of your study subjects fitted with our PTTs in the animal's natural environment (similar to photos shown). We will have two contests, one for the marine transmitters (pop-up tags) and a separate contest for the avian transmitters.

Groups or organizations are eligible to enter as well as individuals. Please include the photographer's name and affiliation.

Please send all entries in high resolution digital format to lhowey@microwavetelemetry.com with "Photo Contest" in the subject line.

Prizes are as follows:

1st Place Avian-
Solar or GPS transmitter of your choice

1st Place Marine-
Pop-up tag of your choice

2nd Place Avian-
Yaesu receiver and Yagi antenna with Ground Track™ option free on one transmitter

2nd Place Marine-
free refurbishment of Pop-up tag

3rd Place Avian and Marine-
Dummy transmitter and
MTI rain jacket

All entries are due by Sept. 1, 2010 allowing you the entire summer field season to take photographs. 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.

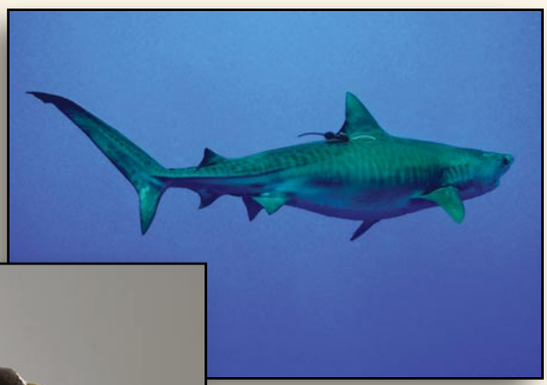


Photo By Tyler Smith

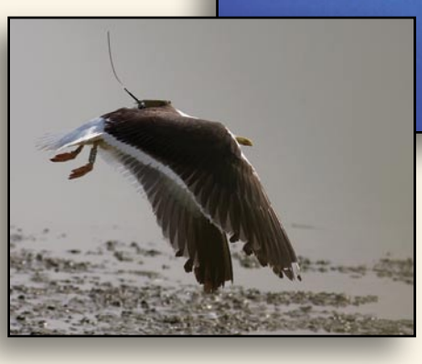


Photo by Gal Shon Maagam Michael

Recently Published Papers

We are updating our website and would like to create an online reference library. Please send us citations of your recent publications which include our transmitters. Here is a list of recently published papers:

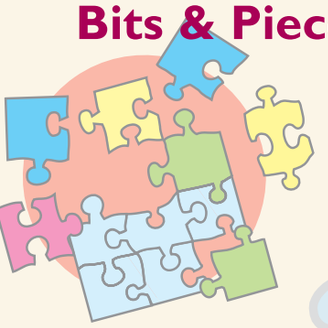
Takekawa, J. Y., S. R. Heath, D. C. Douglas, W. M. Perry, S. Javed, S. H. Newman, R. N. Suwal, A. R. Rahmani, B. C. Choudhury, D. J. Prosser, B. Yan, Y. Hou, N. Batbayar, T. Natsagdorj, C. M. Bishop, P. J. Butler, P. B. Frappell, W. K. Milsom, G. R. Scott, L. A. Hawkes, and M. Wikelski. 2009. Geographic variation in Bar-headed Geese *Anser indicus*: Connectivity of wintering areas and breeding grounds across a broad front. Wildfowl. 59:100-123.

Yamaguchi, N., J. W. Hupp, H. Higuchi, P. L. Flint and J. M. Pearce. 2010. Satellite-tracking of Northern Pintail *Anas acuta* during outbreaks of the H5N1 virus in Japan: implications for virus spread. Ibis. 152: 262-271.

Oppel, S. and A. N. Powell. 2010. Carbon isotope turnover in blood as a measure of arrival time in migratory birds using isotopically distinct environments. Journal of Ornithology. 151:123-131.

Urios, V., P. López-López, R. Limiñana, A. Godino. 2010. Ranging behaviour of a juvenile bearded vulture (*Gypaetus barbatus meridionalis*) in South Africa revealed by GPS satellite telemetry. Ornis Fennica. 87.

Bits & Pieces



We have updated our GPS parsing software for the new 6 digit ID format Argos is now using. If you do not have this latest version of the software, please contact us.

Do not modify your PTT in any way without discussing it with us first! In particular, do not put anything on the PTT (e.g., stickers, tape, VHF transmitters), as any of these could interfere with the operation of the PTT.

Pop-up Tag Customers: Please remember to confirm your deployment information and provide predeployment test data when you forward data to us for processing.

We will begin a second limited production run of the 5 g solar PTT in August.

Please contact us if you have incomplete production forms on our server that you would like deleted.

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Appeal to Help Rebuild the Juan Fernández Islands, Chile

Peter Hodum, Co-Director, Juan Fernández Islands Conservancy, a program of Oikonos Ecosystem Knowledge

In 2001, my colleague Dr. Erin Hagen and I began what we hoped would be a long-term conservation project in the Juan Fernández Islands, Chile. Nearly ten years later, we now have a well-established program, the Juan Fernández Islands Conservancy, that focuses on applied ecological research and community-based conservation, education and capacity-building. Our research approach has been to use applied ecology to understand trends of, and threats to, the threatened land- and seabird communities of the archipelago, including satellite tracking of pink-footed shearwaters to better understand at-sea threats on their foraging grounds and migratory routes. We are now also working on invasive plant control and habitat restoration in critically endangered native forest systems.

A critical part of our work on the islands has involved community outreach, education and capacity-building. We strongly believe in training island residents in conservation and restoration work, with all of our projects having active involvement by islanders. Over the years, this strong engagement with the local community has resulted in extremely close professional and personal relationships. The community has welcomed us not just as conservation biologists and colleagues, but also as friends.

Thus, the tsunami that struck the Juan Fernández Islands after the massive earthquake in Chile on 27 February 2010 has affected us personally. In fact, Erin was actually on the principal island of Robinson Crusoe when the tsunami hit. Thankfully, she was okay but the small community lost 16 people, including five children, all of whom we knew well. In addition to the human tragedy, the town was devastated by the impact of the waves. The entire coastal zone of the single town on the island was erased. The school, pre-school, community/cultural center, gymnasium, municipal offices, most shops, many hostels and a number of homes disappeared. Fishing is the principal economic driver for the town and the fishing community suffered serious losses, with their offices, boat shop, gear storage sheds and nearly one quarter of the small artisanal fleet of boats being destroyed.

In the short-term, the island community is being well taken care of by the Chilean government. However, the town is going to need long-term assistance to help rebuild and recover. We have established a charitable fund through our non-profit organization, Oikonos Ecosystem Knowledge, to raise money to help with the recovery. 100% of all donations will go directly to community rebuilding efforts. Because of our long-term relationships with the island community, we are in a unique position to direct resources to projects that the community considers to be of highest priority and of greatest benefit.

If you are interested in learning more, please visit: www.helpjuanfernandezislands.org and if you have any questions about the fund or our work in the islands, please contact Peter Hodum: peter@oikonos.org

Photo by Peter Hodum

Cristian Lopez, islander and on-island co-coordinator for Juan Fernández Islands Conservancy, using an infra-red camera probe to show children from the local community a pink-footed shearwater breeding burrow, Robinson Crusoe Island, Juan Fernández Islands.