

# Tracker News



**Microwave Telemetry, Inc.**

## **Diversity: From Jabiru to Jellyfish**

Dear Customers and Friends,

We are often amazed by the diversity of what is being tracked with our PTTs: from the majestic eagles to the tiny whimbrel, from the giant bluefin tuna to the smaller sharks not to mention the more unusual species.

Among so many worthwhile projects, it truly was difficult to pick four that would illustrate the diversity of what our customers track. We present here four fascinating projects.

We would like to especially thank Omar Figueroa and Ken Meyer for their article on the Jabiru stork; Craig Smith, Hume Field, Jonathan Epstein, Peter Daszak and Sohayati Abdul Rahman for their article on tracking the flying fox; Cameron Ellis for his article on tracking endangered Asian vultures; finally, Naoto Honda for his article on tracking jellyfish. It is so gratifying to know that our transmitters enable such valuable work: we are humbled by this.

Thank you too for the positive feedback that so many of you gave us about our last newsletter and its new format. It won the 2005 Award of Distinction among 5078 entries from the US and many foreign countries in the International Communicator Awards Print Media Competition. Congratulations Terri and thank you for making us look so good!

Have a good field season and a great summer.

Sincerely,  
Paul and the staff at MTI



Photo by Ken Meyer

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Above:  
Jabiru nest with surrounding scaffold.

## Conservation of the Rare Jabiru Stork in Mesoamerica

Omar Figueroa, Department of Wildlife Ecology and Conservation, University of Florida.

Ken Meyer, Avian Research and Conservation Institute, Gainesville, Florida.

The Jabiru is one of the world's largest storks and, with the second longest wingspan (2.4m) of any new world species, one of the largest birds in the world. Its geographic distribution extends from southern Mexico through Central America, and northern South America to northern Argentina and Uruguay. Three distinct populations occur throughout this extensive range. The Mesoamerican (southern Mexico through Panama) population, by far the smallest and most vulnerable, is considered regionally endangered and of immediate conservation concern. Regional estimates for this population range from 150 to 250 individuals, with Costa Rica and Belize supporting what may be the only two possibly sustainable sub-populations. Despite this status, very little research has been conducted on the



Omar Figueroa attaching transmitter to Jabiru nestling.

Mesoamerican population probably due to the inherent difficulties of studying such a rare and wide ranging species. In particular, seasonal movements and limiting factors have remained a mystery, thus restricting opportunities for conservation planning.

We used Microwave Telemetry's 70g solar-powered Argos/GPS PTTs to begin the first telemetry study of Jabiru Storks in Mesoamerica. Six units were deployed on juveniles in 2003 and 2004 to study post-fledging movements, to identify and define critical foraging habitats, and to map previously unknown travel routes. This work was made possible by generous contributions from the Disney Wildlife Conservation Fund, the Protected Areas Conservation Trust (PACT-Belize) and the Wildlife Conservation Society.

During the short period since deployment (April 2003 to March 2005), we have obtained highly accurate, detailed movement data for juvenile Jabiru Storks. Previous speculations that these birds undertook regular migrations from Belize to the Usumacinta drainage in Mexico may prove to be simply a myth. Instead, post fledging movement has demonstrated an exceptionally high site fidelity to the natal area. Using the GPS data in an analysis based on 100 random walk simulations, we tested the hypothesis that the storks' movements were more constrained than would be expected based on chance ( $P < .01$ ).

Moreover, 72% (6724 of 9282 fixes) of all locations were within two habitat types: short-grass savanna with shrubs; and tropical lowland tall herbaceous swamp. Additionally, 60%

(5567 of 9282 fixes) fell outside the existing protected areas network. This is a very conservative estimate because

three of the tagged birds were from nests that lay within protected areas. In short, nesting adults and juvenile storks all strongly selected specific habitats that occur mainly outside of publicly-owned protected areas. These habitats, furthermore, represent a very small portion of the total area of Belize and lie primarily within the region targeted by long-range government planning for the most rapid and intensive growth in the country.



Marcus Cakul capturing Jabiru nestling.



Young Jabirus in nest atop pine snag.

In recent years the Mesoamerican region has experienced an unprecedented rate of habitat loss, fueled primarily by the associated explosive human growth rate, ever-increasing commercial exploitation of natural resources, and accelerating tourism development. Critical habitats and unique elements of the region's flora and fauna are being degraded and lost at an alarming rate. The future of many species and their habitats now depends on our ability to provide timely recommendations to key decision-making organizations. The types of data produced by satellite/GPS telemetry provide the best information for planning the conservation of the regionally endangered Jabiru stork and a host of other threatened sympatric species. This technology now makes it feasible not only to collect the necessary data, but to do so rapidly before the window of opportunity closes.

# The Amazing Adventures of Colossus

Craig Smith and Hume Field, Queensland Department of Primary Industries and Fisheries, Brisbane, Australia.

Jonathan Epstein and Peter Daszak, Consortium for Conservation Medicine, New York, United States of America.

Sohayati Abdul Rahman, Veterinary Research Institute, Ipoh, Malaysia.

During December 2003, the Henipavirus Ecology Collaborative Research Group (HERG) deployed a disease surveillance team in Malaysia. One of the team's goals was to attach a Platform Terminal Transmitter (PTT) onto a Malayan flying fox (*Pteropus vampyrus*), the largest flying fox in Malaysia and one of the largest in the world. HERG team members Dr. Jon Epstein, Consortium



Photo by Craig Smith

HERG team members Kwai Hoe Chong, International Medical University and Dr. Jonathan Epstein, Consortium for Conservation Medicine.

for Conservation Medicine, Dr. Sohayati Abdul Rahman, Veterinary Research Institute and Craig Smith, Queensland Department of Primary Industries and Fisheries, spent a week sampling the Malayan flying foxes for the presence of antibodies to Nipah virus and attaching the PTT.

*P. vampyrus* is a natural host of Nipah virus, a zoonotic virus responsible for the deaths of more than 100 people and the culling of over 1 million pigs in Malaysia in 1999. Whilst flying foxes do not display signs of clinical illness when infected with Nipah virus they have the potential to shed the virus and infect other species, including pigs. Satellite telemetry has allowed HERG to study the foraging patterns of flying foxes and determine the potential home range and movement of flying foxes and Nipah virus.

The fourth flying fox to be fitted with a PTT (Microwave Telemetry) by the HERG team and the first in Malaysia, Colossus, was caught feeding in an orchard in southwest Peninsular Malaysia. After a veterinary examination to confirm his good health, the 20g PTT was attached to the flying fox using a leather collar. Colossus was then released near his roosting colony, located in mangroves west of Benut.

Colossus had his PTT attached on the 16th of December 2003. On the 27th December 2003, after a 10 day duty cycle, Colossus's PTT transmitted his location to orbiting satellites indicating that he



Photo by Craig Smith

Colossus, a Malayan flying fox (*Pteropus vampyrus*), and his leather collar.

was foraging only 5 km from the capture site. Then on the 6th January 2004, satellites relayed his location to HERG team members informing them that Colossus was no longer in Peninsular Malaysia and that he had travelled 160 km, over 91 km of open ocean, to the island of Sumatra, Indonesia.

The duty cycle of the 20g battery PTT was configured to conserve power and allow the PTT to remain operational for almost a year. HERG team members are unable to say how long the journey took as the transmitter was off during Colossus's flight from Malaysia to Indonesia. But flying foxes can travel at 25 to 30 km/hr and in a wind tunnel the Australian Grey headed flying fox (*Pteropus poliocephalus*) maintained 26 km/hr for 4 hours. It is possible that Colossus flew over the 91 km of ocean in as little as 3 hours and could have made the 160 km journey from Malaysia to Sumatra in 5 to 6 hours.

Satellite telemetry studies in Australia using 18g solar PTTs (Microwave Telemetry) have shown that Black flying foxes (*Pteropus alecto*) travel similar distances across water.



Photo by Craig Smith

Colossus, a Malayan flying fox (*Pteropus vampyrus*), and his 20g battery-powered Microwave Telemetry PTT.

This work has been supported by an NIH/NSF "Ecology of Infectious Diseases" (R01-TW05869) award from the John E. Fogarty International Center and the Queensland Department of Primary Industries and Fisheries (Brisbane, Australia).

[www.henipavirus.org](http://www.henipavirus.org)

# The Peregrine Fund Uses GPS PTTs to Help Conserve Critically Endangered Asian Vultures

Cameron Ellis, *The Peregrine Fund*, 5668 West Flying Hawk Lane, Boise, ID 83709

In the past ten years three species of the large Gyps vultures of the Indian subcontinent have suffered more than 95% population declines. Once abundant, they are now listed among the most critically endangered birds on earth. The culprit is

diclofenac, a non-steroidal anti-inflammatory drug administered to sick and injured livestock with much the same effect as humans might use ibuprofen. The carcasses of ailing livestock, which frequently die despite treatment, often have levels of the drug in their system that are lethal to vultures when consumed, causing kidney failure and rapid death.

The challenge faced by The Peregrine Fund and its partners is to reduce vulture exposure to diclofenac, at least until the infrastructure for long term vulture conservation efforts is established. Extinction

catastrophic species decline in the wake of diclofenac introduction. The GPS PTTs are programmed to collect data every hour during daylight when birds are on the move, and to download the data every 24 hours. They deliver valuable information on flight altitude and speed, foraging range, feeding sites and dispersal, roost site fidelity and location of nesting sites. The level of detailed

information could be over-whelming but data is quickly downloaded into a GIS for analysis. Locations are so precise that biologists can often track down the individual vulture for direct observation, find the source of its last meal, and retrace its every move from the day before.

The GPS PTTs provide important data for designing overall conservation

strategies and they are central to evaluating stop-gap conservation measures, such as The Peregrine Fund's "vulture restaurant" at Toawala in Pakistan. The vulture restaurant provides the largest of the remaining *Gyps bengalensis* breeding colonies with diclofenac-free carcasses in an attempt to limit their rate of exposure to contaminated carcasses by reducing their foraging range. Data from the GPS PTTs illustrate that in some instances the vulture restaurant has constricted the foraging range of local vultures from 300 km to 10-25 km, significantly reducing their exposure to diclofenac contaminated meat. Rates of vulture mortality within the colony were also reduced during the breeding season when vultures were resident, granting these birds a new "lease on life" sufficient to buy time for the establishment of captive breeding facilities and release programs - their best chance for ultimate survival.



Photo by Martin Gilbert

In 2003 The Peregrine Fund discovered the lethal effects of the drug diclofenac, commonly used in livestock in south Asia, has decimated three Asian species of Gyps vulture (2004 Nature 427: 630-633). Conservation efforts have focused on minimizing exposure of vultures to diclofenac contaminated carcasses.



Photo by Martin Gilbert

Peregrine Fund student Shakeel Ahmed holds "White," one of six GPS PTT wing-tagged Oriental White-backed Vultures that provided hourly movement data in a project aimed to reduce exposure of vultures to the fatal effects of diclofenac contaminated carcasses, at Toawala colony, Pakistan.

looms on the horizon and their already reduced numbers leave no room for mistakes; but the task of reducing exposure to diclofenac in primary food sources is a difficult one, especially when the species is as far ranging and understudied as the Gyps vultures of the Indian subcontinent.

In late 2003 The Peregrine Fund fitted six Oriental White-backed Vultures with wing-mounted, solar powered GPS PTTs and set out to gather the information needed, fast. Now in their second year of use, the GPS PTTs have helped to make up for a severe lack of previous research on the Gyps vultures and close the gap on more than a decade of



Photo by Martin Gilbert

A Vulture named "Orange" takes flight from a tree-top after being fitted with a wing-mounted solar-powered Microwave Telemetry GPS PTT. Data provided intimate details of the vulture's daily life that helped conservation efforts focused on reducing exposure to diclofenac.

# Giant Medusa Tracking in the Sea of Japan, 2004

Naoto Honda, National Research Institute of Fisheries Engineering, Fisheries Research Agency, Japan

The Echizen Jellyfish *Nemopilema nomurai* is one of the largest medusa in the world; its maximum bell diameter is 2 meters and body weight is 150 kg. A main area of distribution of the Echizen Jellyfish is guessed to be the coastal



Photo by Singo Kurihara

Naoto Honda, back on land after attaching Pop-Up Tags to Echizen Jellyfish for research

area of China, but this jellyfish appeared in the Japanese coastal area in large quantities in 2002 and 2003, and caused serious damage to coastal fisheries.

Since 2004 I have been working on technical developments to reduce the damage to fisheries from the Echizen Jellyfish. However, the ecology of this jellyfish, such as its lifecycle and growth mechanism, or the distribution depth, is hardly elucidated under the present

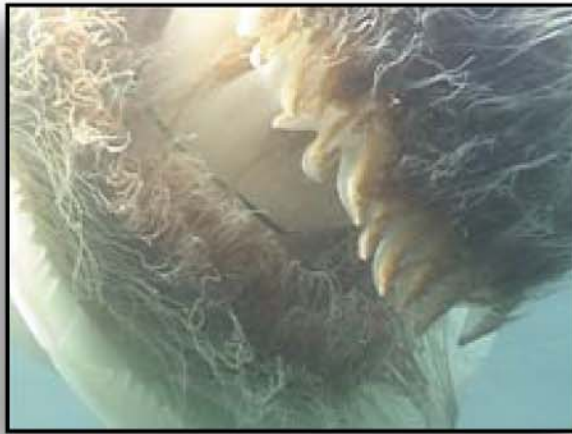
conditions. If the distribution depth of the Echizen Jellyfish is investigated, fishermen could avoid the jellyfishes in fishery operations, and we might estimate the jellyfishes' transportation course and speed from an ocean current.

I applied PTT-100 Standard Archival and PTT-100 High Rate Archival Pop-Up tags to examine the swimming depth of the Echizen Jellyfish. I mounted the Pop-Up tags on two jellyfishes (both with bell diameter of approximately 1 meter) which were found offshore in the Sea of Japan in October 2004. While scuba diving, I tied the Pop-Up tags around a narrow part of the body (the neck?) of the jellyfishes with a thin plastic belt. Mounted in this way, the Pop-Up tags did not damage the body of the jellyfishes nor disturb their movement and swimming.

Each tag provided recorded data from its jellyfish; one of the tags washed ashore, and I could pick it up! The jellyfishes I observed through this experiment spent almost all their time floating on the surface of the sea, occasionally diving to a maximum depth of about 40 meters. The horizontal movement speed of the jellyfish was almost the same as the speed of an ocean current at the surface. Generally, plankton have circadian rhythm in their behavior. The Echizen Jellyfish had remarkable repetitious vertical up-down motion at night only once; continuous circadian rhythm was not confirmed in this investigation.

Our project just started last year and has not yielded enough results yet. Therefore, I am planning to continue this investigation with four Pop-Up tags this year.

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Right: Close up view of the enormous medusa, Echizen Jellyfish.  
Bottom: Attaching the Pop-Up tag



Photos by Singo Kurihara

# Win an Argos/GPS PTT!

## In Search of

....the longest running PTT.

We were recently contacted by a customer claiming to have the longest running PTT (about 5 years)!! He was disappointed to learn that we know of PTTs that had run for even longer. So, we decided to go in search of the longest running PTT.

If you think that you have it, tell us in 250 words or less about it. Tell us the date the PTT was deployed, where, and if it is still running or the date you stopped receiving data from it. Tell us briefly about the travels of your bird.

We will publish the winner's story in our next issue; the prize is an Argos/GPS PTT.

**Deadline for entry: emailed or postmarked by midnight August 31, 2005.**



## Happy to Meet You

The recent Argos International Conference in Annapolis gave us the opportunity to put faces to voices and emails. We enjoyed meeting everybody, especially those customers we have dealt with for many years without ever meeting in person.

Many thanks to all who visited our booth and also to those whose images made our graphics look wonderful.

For those of you unable to attend, have a look! Do you recognize anything?



## Disappointed Potential Customers!

We all work very hard and we take our jobs seriously, but every now and then something comes up that makes us stop in our "tracks," so to speak, and take time out for a good laugh.

One source of such humor at MTI comes to us from the occasional and rather bizarre requests we receive for transmitters to track the unexpected and unusual.

Here are a few of the items that "disappointed potential customers" have inquired about. Alas, we had nothing suitable for tracking these "creatures".

tumbleweeds



socks (where *DO* they go when they disappear from the dryer?)

clams, snails, horseshoe crabs and peccaries

valuable paintings, cars and boats

wives, husbands, kids and pets



and, yes, believe it or not, a drug shipment across the Mexico/U.S. border (and, yes, we *did* call the FBI!)



# New Products

Check Our Website  
for the Most Recent  
Updates!

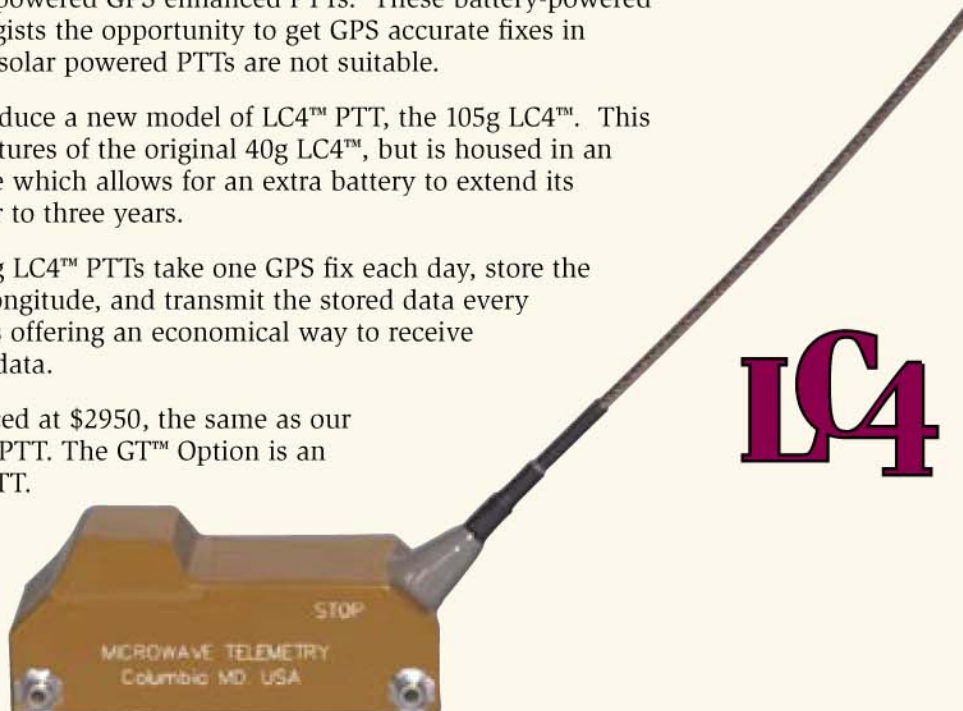
## 105g LC4

Several years ago, in response to biologists' need for more accurate location data, and as a strategy to deal with the problem of radio interference in certain parts of the world, we incorporated a GPS receiver into our PTTs. In our winter 2004 newsletter we highlighted some of the research made possible by this advance in technology. In the same issue we introduced the "LC4™" PTTs, a new line of battery powered GPS enhanced PTTs. These battery-powered LC4™ PTTs give biologists the opportunity to get GPS accurate fixes in circumstances where solar powered PTTs are not suitable.

We are happy to introduce a new model of LC4™ PTT, the 105g LC4™. This PTT shares all the features of the original 40g LC4™, but is housed in an especially rugged case which allows for an extra battery to extend its lifetime from one year to three years.

Both the 40g and 105g LC4™ PTTs take one GPS fix each day, store the precise latitude and longitude, and transmit the stored data every 10 days to Argos, thus offering an economical way to receive high quality location data.

This new LC4™ is priced at \$2950, the same as our 40g LC4™ Argos/GPS PTT. The GT™ Option is an additional \$200 per PTT.



## Please Note...

We have revised our production forms (previously called 2 page forms) for 2005. All orders for the current year will **only** be fulfilled from information from the current 2005 production forms.

We request that you do not submit your order information on earlier versions of our production forms. Incomplete forms or outdated versions will be returned to you for completion or revision.

We appreciate your cooperation in this matter. Your cooperation ensures our timely delivery of your order.

## JTA Optimized SiV™ Duty Cycle Timers

In January of this year Argos implemented a new pricing structure for customers charged under the Joint Tariff Agreement (JTA). These charges are based on a new method of accounting for system use. Customers are now charged retrospectively for their actual use of the system rather than on upfront payment based on their estimated use.

In simple terms, charges are now based on the number of 6 hour time slots in which Argos receives a PTT's signals in a given month. The 6 hour time slots being defined as the four 6 hour quarters of a GMT day starting at midnight. Please refer to the Service Argos 2005 catalog (USA JTA) for more details.

This new method of calculating usage supersedes the various other programs such as "Limited Use Service" and "Data Only Service" for most JTA users.

Since its implementation we have been asked by our customers to program their PTTs so that they only transmit within the boundaries of one or two 6 hour blocks per transmission period. Although this was not immediately possible with our existing software we have now developed new routines for most of our SiV™ equipped PTTs so that they will transmit only within two of the 6 hour time slots per transmission day.

So now, for example, a solar powered GPS PTT transmitting every third day to Argos will incur charges of twenty 6 hour periods per month ie. 5 full days. Whereas our LC4™ GPS PTT transmitting every ten days would normally incur charges for only six 6 hour periods per month ie. 1.5 days per month, even though it would give a precise GPS location for each of the days of the month!

## School Girls Discover Tag, Gain a Lesson in Marine Science

Molly Lutcavage, Department of Zoology, University of New Hampshire

I had picked up my mail in the faculty boxes and walked down the long hall to our lab. This was a routine I looked forward to: checking in with my three grad students to catch up on any news. My right hand clutched a simple manila envelope that had been forwarded to me from the New England Aquarium, where I'd spent ten years as the head of the bluefin tuna research program. As the students and I talked, unconsciously my hand picked up the familiar shape of a Pop-Up satellite archival tag. Within an inner envelope, along with a used Pop-Up tag, we found a letter reading:

*"Found on Crossapol Beach on the Isle of Coll,  
Argyll, Scotland following Storm Force 12.*

*Date Wed. Jan 12<sup>th</sup> 2005.*

*Please write & let us know more about it.*

*Bridget & Helena, Age 11  
and their sister Luisadh, Age 2*

*Carolyn"*



*Bridget and Helena suited up.*

The tag bore our return label, but we didn't know if the tag the sisters had found on the Isle of Coll had been deployed on a giant bluefin tuna or leatherback sea turtle, since over the past few years we had tagged both. Both of these highly migratory marine species regularly cross the Atlantic. To solve the mystery, we consulted Microwave Telemetry. Once we returned the tag to them, they were able to identify it from its internal serial number. From there, we could trace the tag's history.

It seemed the girls had discovered a Pop-Up tag we deployed two years earlier on a 240 lb bluefin tuna. We tagged that fish on January 13, 2003, off Morehead City, NC. It was a day of high seas and horrendous weather, but despite that we managed to tag two bluefin tuna from the fishing vessel Striker of Yorktown, VA, lead by Captain Paul Evans and first mate Buzz Evans. The tag's data revealed that it had detached from the tuna on August 4, 2003.

Over 17 months had passed between the tag's release from the fish in the area known as the Flemish Cap and

its drift to the Isle of Coll, Hebrides. Although we have had other tags returned to us, this one



*11 year old twins, Bridget and Helena, discover and return a Pop-Up satellite archival tag.*

was special. The discovery of this tag created a lovely link joining the curious schoolchildren on Coll, the crew of the Striker, and my graduate students and I, uniting us in our shared interest in and abiding love of the sea and the magnificent creatures that swim past our shores.



*Route of the Bluefin Tuna Tag 14656— North Carolina to Scotland*