Winter 2005 Volume 6, Issue 2

Tracker News

Microwave Telemetry, Inc.

Longevity & Long-Term Tracking

Dear Customers and Friends,

In 2006 we will celebrate 15 years in business, during which we have humbly served your needs. This makes us pause to appreciate the rewards of longevity: the exciting projects that revealed a wealth of scientific data, the long-term relationships with many of you whom we have known since the beginning, long-term tracking of some species and finally the tremendous advances in this field. When we brought out our first transmitter in 1991, our 95g PTT, little did we know that it would take 14 years to bring you a 9.5g PTT. It has literally taken this long for advances in the technology to allow such miniaturization. We are excited to break the 10g barrier!

In our last newsletter, we went in search of the longest running PTT and promised to publish the winning entry. We present here not one but three winning entries with fascinating stories. We would like to thank: Jim Watson for the story of 'Baldy', the eagle from Washington State that he tracked for 7 years 69 days, Adrian Aebischer for the story of 'Max', the stork from Switzerland that he tracked for 6 years 58 days and last but not least, Bernd and Christiane Meyburg for their story of a Greater Spotted Eagle from Poland that they tracked for 6 years 50 days. These dates were as of August 30, the cutoff date for our contest, but the last two PTTs are still transmitting! A GPS and two LC4™ GPS PTTs will be awarded to the winners.

We would also like to thank Ken Smith for his article on the wanderings of 'Wally' the whimbrel, an exciting story revealing the very long distances traveled by this tiny shorebird as it is tracked for the first time by satellite telemetry using our 12g solar PTT.

We are also pleased to bring you the latest information on our ongoing investigation of the serious interference problem in Europe impacting data reception in the general Mediterranean area. This chronic problem inspired us to develop the LC4™ PTT with GPS capability. Recently deployed LC4™ PTTs are yielding one hundred percent data collection through Argos in Europe.

We wish you peace, health and happiness this holiday season and throughout the coming year. We look forward to continuing to work with you.

Sincerely,
Paul and the staff at MTI

Photo by Adrian Aebischer

Above:
Max (on left) with her mother.

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Bald Eagle Monitored Seven Years by Satellite Telemetry

J. W. Watson, Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091

When we released bald eagle 28017 on that cold morning on January 20, 1998 we had no idea we would be tracking a special bird. This eagle was one of 26 migrant bald eagles we captured on the Skagit River in northwestern Washington to determine their breeding locations, long-range migration corridors, and identify sources of mortality (Watson and Pierce 2001). Over the next 2,624 days (7 years, 69 days*) the 95g PTT-100 harnessed to her back provided 2,838 locations (including Z class) that revealed a wealth of information about her annual habits.

Photo by Jim Watson

Mark Horowitz releases bald eagle 28017 on the Skagit River, Washington in early 1998.

The opportunity to monitor the long-range movements of any bird over such a long period is unusual. A few bald eagles marked with patagial markers have been resighted by researchers up to 20 years later, but satellite monitoring is unique in that it provides a continual history of movements on a specific individual. In fact, there were never any actual resightings of eagle 28017 after she left the Skagit River and everything we learned was through remote monitoring. Particularly interesting is the fact that eagle 28017 did not return to the Skagit River in any winter after her capture. While it would be easy to attribute that to her avoidance of the place where she was captured, several other eagles captured on the Skagit did return in subsequent years. It is more likely that in any given year eagle 28017 traveled no further south from her nest down the coast of British Columbia than was necessary to supply her winter food. Salmon begin to spawn in southeast Alaska in the summer, and salmon carcasses collect in estuaries and along lower rivers. Salmon runs progress down the coast

Photo by Jim Watson

Bald eagle 28017.

of British Columbia to Washington in the late fall. During the 7 years, eagle 28017 left her breeding territory between October 15 and November 18. In two winters subsequent to her capture, she wintered near the north end of Vancouver Island, and for three winters she wintered on the central British Columbia coast (Fig. 1). She was in southeast Alaska during early winter of 2004-05 when her PTT expired.

The coastal migration paths of eagle 28017 were similar during fall and spring and she typically ranged within 100 kilometers of the coast (Fig. 2). These movements were typical of eagles we found nesting in southeast Alaska and wintering in Washington (Watson and Pierce 2001). Eagle 28017 returned to Alaska between February 23 and March 13 in 7 consecutive springs. Although we were unable to confirm whether she nested each year, she returned to Wrangell Island each year (Fig. 3).

Other than the fact that the PTT was equipped with an early version of the Lix2™ battery, there was nothing especially unique about the PTT. Evidently, the perfect combination of battery power, electronic tuning, and the fact that the eagle did not break or remove the antenna accounted for the exceptional life of the PTT. The duty cycle was variable and

Continued on page 6

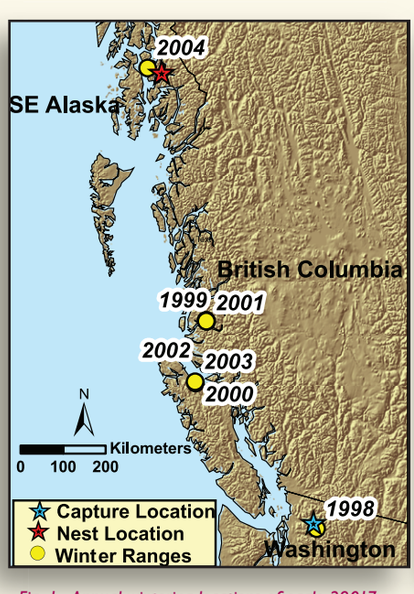


Fig. 1. Annual wintering locations of eagle 28017 with respect to her capture location in Washington, and breeding location in southeast Alaska.

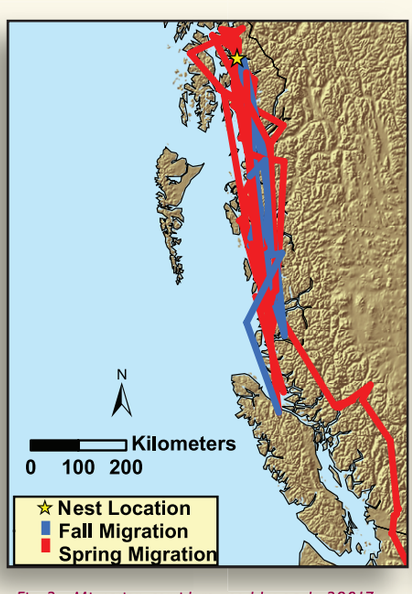


Fig. 2. Migration corridors used by eagle 28017 during seven complete migrations.

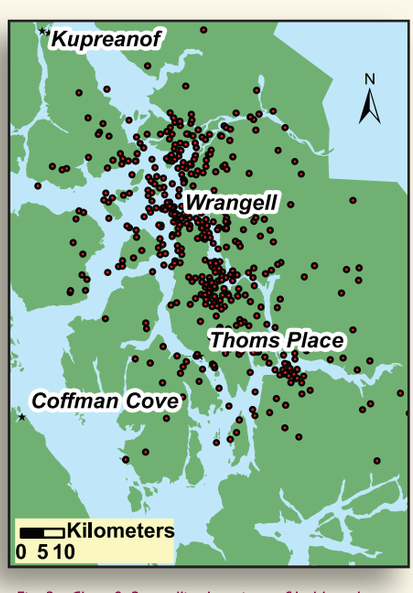


Fig. 3. Class 0-3 satellite locations of bald eagle 28017 in southeast Alaska during seven breeding seasons.

6 Years
58 Days

Long-Term Tracking of Max the Stork

Adrian Aebischer, Musee d'histoire Naturelle, Chemin du Musee 6, CH-1700 Fribourg, Switzerland

In July 1999, for the first time in Switzerland, an animal was fitted with an Argos PTT. It was a young White Stork *(Ciconia ciconia)*, "Max", born in May 1999 at Avenches in Western Switzerland. On 5 July 1999, a Microwave Telemetry solar 35 gram PTT was attached as a backpack to Max. It was decided that her journeys should be docmented and mapped for everybody to follow on the Internet.

Photo by Adrian Aebischer

Max being fitted with a 35g Solar PTT.

Max fledged on 12 July, but she stayed with her parents for a few weeks. On 12 August she started her first migration south. She passed through France and Spain, then crossed the Strait of Gibraltar to Morocco and tried to cross the Sahara desert. However, during a heavy sand storm she reversed her direction and flew back to northern Morocco where she spent her first winter close to the town of Guercif. The following spring Max returned to Spain and stayed the whole summer at a rubbish-dump near Madrid. Spanish ornithologists once spotted the bird eating the remains of a fowl.

In August 2000 Max flew again to Morocco, tried to cross the Sahara but returned to northern Morocco to spend her second winter there. Next spring she flew to Central Europe and visited a village called Salem in southern Germany, but she did not breed. In late summer she again migrated to Morocoo returning to Salem in summer 2002.

Photo by Adrian Aebischer

Max on one of her first flights after fledging at 9 weeks old.

During her journeys Max's movements were followed daily by several thousand people: her migration was published on the Internet and maps were regularly updated. All newspapers and other media in Switzerland and even many newspapers elsewhere in Europe reported on this bird. A Swiss TV team was present when she was fitted with this PTT, and filmed Max for the first time. Since then, several TV channels have broadcast reports on Max, and several people were lucky enough to film her.

Photo by Adrian Aebischer

In 2004 Max reared three young.

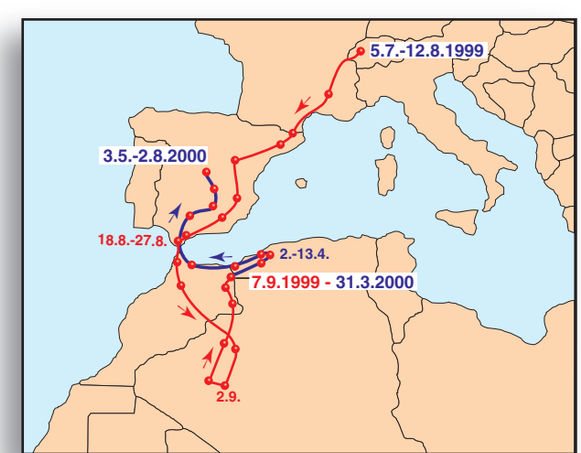
In 2002, when Max was breeding for the first time in a colony of White Storks at Salem, she chose the only nest of that colony that was surveyed by a video camera! Definitely, Max likes to be at the center of attention.

In subsequent years Max always returned to Morocco for the winter and came back to Salem to breed. Max leaves her winter quarters earlier each year: In 2000 and 2001, she started traveling on 1 April. In 2002 she left on 27 March and in 2003 on 7 February. Last year, her migration began on 31 January, and in 2005 she started her journey on 11 January.

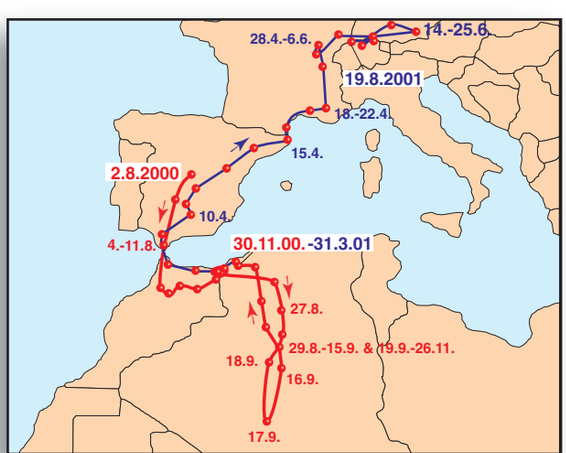
Max raises two or three young every year. She is surveyed by the responsible people at the White Stork colony at Salem in southern Germany. Once a year we visit her at her breeding place and take some pictures.

Many White Storks have been tracked through the Argos system, but Max is the first one that has been followed from the time she was a nestling up to the time she bred for the first time and beyond. All in all, she has been under close observation for over 6 years.

In September 2005 Max headed for the seventh time to her winter quarters in Morocco, 2200 km away from her breeding place. Even though the antenna of her PTT is now somewhat damaged, she is still regularly, almost daily, localized by the Argos system. From 5 July 1999 to 15 October 2005 Max was tracked on 2295 days and we are looking forward to even more results during the forthcoming months.



Max's first journey from Switzerland to Africa and back to Spain.



Max's second journey from Spain to her wintering ground in Morocco and back to Switzerland and southern Germany.

Tracking the Endangered Greater Spotted Eagle

Bernd-U. & Christiane Meyburg, World Working Group on Birds of Prey, Wangenheimstr. 32, 14193 Berlin, Germany www.Raptor-Research.de WWGBP@aol.com

The distribution range of the Greater Spotted Eagle *Aquila clanga* (GSE) runs, from west to east, from East Poland across to Ussuriland and Manchuria on the Pacific Ocean, in easternmost Russia and China. From north to south it extends from the southern edge of the taiga to the rim of the steppe zone. The GSE is not only the rarest, but also the least investigated European eagle species. Its migrations are poorly known because of the very low number of birds ringed and recovered, and because of the difficulty in distinguishing it from the closely related Lesser Spotted Eagle *Aquila pomarina* (LSE) during raptor counts at concentration points.

As part of a long-term research program in northeast Poland, we are endeavouring to raise the level of knowledge and thereby the protection of this species, by also making use of the most advanced technology, i.e. satellite telemetry, to investigate its migration and overwintering.

Between 1995 and 2003 we equipped nine adult Greater Spotted Eagles (GSEs) with solar-powered satellite transmitters (PTTs) in the Biebrza river valley in northeast Poland and tracked them using the Argos satellite system. Four birds overwintered in Africa (Sudan, Chad and Zambia), two in Turkey and one in Greece.

Photo by Dariusz Kowalczyk.

The female Greater Spotted Eagle with PTT 08138 six years after fitting the transmitter at her breeding ground, Biebrza National Park, Poland, 3 April 2005.

The GSEs we tracked flew to at least five countries (Chad, Central African Republic, Tanzania, Zambia, Malawi) from which there had previously been no, or almost no, records. The overwintering of two males in Zambia is ca. 1500 km south of the hitherto southernmost points recorded for this species in Africa, in Kenya and Uganda.

In contrast to two young birds tracked, all the adults, apart from one male wintering in northwestern Greece, flew straight from the breeding area to the Bosphorus, their respective routes diverging only slightly. They left Poland in the vicinity of Brest, heading south. Almost parallel with the eastern Polish and Slovakian border they traversed Belarus and Ukraine to cross the Rumanian border in the Carpathians, using this mountain range as a guideline.

Widely divergent was the GSE's overwintering behaviour in comparison with the Lesser Spotted Eagle (LSE). The LSEs, which were simultaneously tracked, often wandered far over their wintering grounds in Central and Southern Africa, whereas all GSEs stayed the whole time within narrowly confined winter home ranges.

The mortality rate of this very rare and threatened species is truly alarming. Out of the first six birds fitted with transmitters apparently only an adult male survived for more than one year after being equipped. One young eagle was killed by an Eagle Owl shortly after fledging while the two other juveniles perished a few weeks after embarking on their autumn migration, in Ukraine and Albania respectively. One adult female was in all probability shot in the Lebanon, and another evidently died in spring 1997 near Lake Nasser in Egypt.

Photo by G & T Klosowscy

Female Greater Spotted Eagle with nestling.

Of the four adult female and five adult male Greater Spotted Eagles we fitted with radio transmitters between 1995 and 2003 in northeast Poland and tracked using the Argos satellite system, one adult female, trapped on 13 July 1999 and tagged with PTT 08138, is our record holder as far as long-term tracking is concerned.

Every year since 1999 this eagle has left her breeding area around 20 September to arrive after about two weeks of migration in her wintering grounds in the Göksu Delta on the Mediterranean coast north of Cyprus. Year by year she covers some 2240 km on autumn and spring migration, a short journey compared to that of some other Greater Spotted Eagles from Poland that winter in Africa.

The Göksu Delta (size 14,480 ha) is an important wintering area for both waterfowl and raptors, and regularly supports up to twenty different species of diurnal birds of prey including a significant wintering population of 6-8, in some years 10-15, Greater Spotted Eagles. The Göksu Delta's bird population deserves protection from shooting and habitat destruction, including the massive use of pesticides.

This particular bird roosts overnight some 14 km west of the delta in the mountains at an altitude of 350 to 400 m above sea level. She spends the day in the delta to search for food in freshwater wetlands, where she was observed and photographed by a German ornithologist.

To-and-fro migration route of adult female Greater Spotted Eagle with PTT 08138 between its breeding grounds in northeastern Poland and its wintering quarters in the Göksu Delta in Turkey.

The eagle leaves the Göksu Delta on about 10 March every year to arrive by approximately 5 April in the Biebrza National Park in northeastern Poland, thus the spring migration is even slower than the autumn migration.

The bird is still alive, breeding successfully again this year, and has been observed, photographed and filmed on her wintering ground in the Göksu delta in Turkey.

Whimbrel Makes a Long Journey

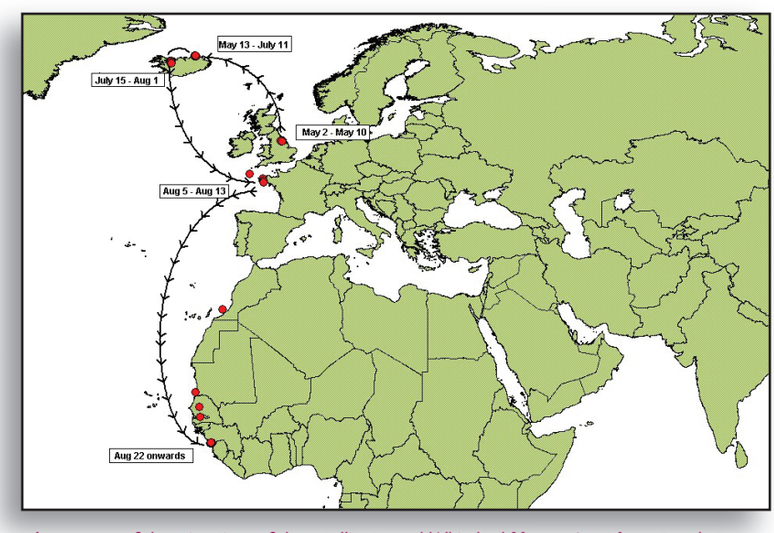
Ken Smith, Royal Society for the Protection of Birds, Sandy, England, Ken.smith.research@rspb.org.uk

The advent of Microwave Telemetry's 12g solar PTT has opened up the possibility of deploying satellite transmitters on medium sized birds – something that was simply not possible a few years ago. It is now feasible to tag some of the larger waders (shorebirds if you don't live in Europe). These birds undertake some of the longest journeys of any bird, with migrations often spanning the globe – from the high arctic all the way to South America, South Africa, Australia or New Zealand for instance.

Photo by David Tipling & rspb-images.com

*The successful use of the 12g solar PTT on a Whimbrel has demonstrated that we should plan to use such a tag to find the breeding area of the globally threatened Slender-billed Curlew **Numenius tenuirostris**.*

As part of a joint project between the Royal Society for the Protection of Birds (RSPB) and English Nature, "Wally", a Whimbrel *Numenius phaeopus* was trapped and fitted with a 12g solar PTT as he passed through UK on its northward migration in spring 2005. The PTT was fitted using a simple pelvic harness. Tagged in May in Yorkshire, England, the bird soon moved to northeast Iceland, a flight of 1600 km, where he remained in the breeding area for over 2 months. In August Wally moved briefly to the northwest of Iceland but then moved quite quickly all the way to Guinea in West Africa – a total journey of some 7000 km over 28 days including stopovers in France, Mauritania and Senegal. As of 30 October, the Whimbrel is still in Guinea. The PTT is programmed to transmit every four days which has allowed a sufficient period for the solar panel to recharge the battery between transmission periods. Perhaps this is not surprising given that the bird has spent the summer close to the Arctic Circle where the sun never sets and is now experiencing the strong sunshine of the tropics. Over the next few months we hope to gain even more valuable insights into the migration strategy of our Whimbrel and with luck follow his migrations north again next spring.



© The Royal Society for the Protection of Birds

*A summary of the migrations of the satellite tagged Whimbrel **Numenius phaeopus** between May and August 2005. Apart from two, the red dots indicate stop over areas and represent many individual fixes. The two red dots over the sea were locations obtained whilst the bird was actually migrating. We think the Whimbrel bred in northeast Iceland where it stayed in a small area through May and July. The arrows are purely illustrative.*

Although the Whimbrel is important in its own right, this project is also an important contribution to the conservation of the closely related Slender-billed Curlew *Numenius tenuirostris*. This is one of the rarest and most threatened birds in the world. Formerly the species spent the winter in North Africa, around the Mediterranean Sea and in the Middle East. It nested somewhere in Western Siberia but there have only ever been two confirmed breeding records, the last in 1924. Numbers are now so low that the bird is rarely seen. Conservation efforts are severely hampered because we do not know where the birds breed within the vast marshes and bogs of Western Siberia. Searches on the ground have failed to find the birds breeding. Working with BirdLife International, the RSPB has been trying to find a technical solution to the location of the breeding areas. The 12g solar PTT looks extremely promising. The successful trial of the tag on a Whimbrel means that we can now confidently recommend it for use on the Slender-billed Curlew. There remains the significant challenge of finding a Slender-billed Curlew and being able to catch it but the availability of this new technology will stimulate renewed efforts on the ground.

Photo by David Tipling & rspb-images.com

*The Whimbrel **Numenius phaeopus** is a common long distance migrant shorebird with a worldwide distribution. The Palaearctic subspecies breeds in the northern hemisphere from Iceland through Fenno-Scandinavia into Russia and winters around the coast of Africa in the tropics and further south.*

Anyone interested in following the journeys of the Whimbrel can find the latest information on www.whimbrel.info/. The project partners RSPB, English Nature, the Huddleston & Jackson Ringing Partnership and Wheatear.biz keep the website up to date with the latest news.

In Search of

….your comments

Special

ANNIVERSARY EDITION

As you might expect, we are excited about celebrating our 15th anniversary in 2006. In honor of this momentous milestone, we plan on publishing a Special Anniversary Edition of Tracker News next year.

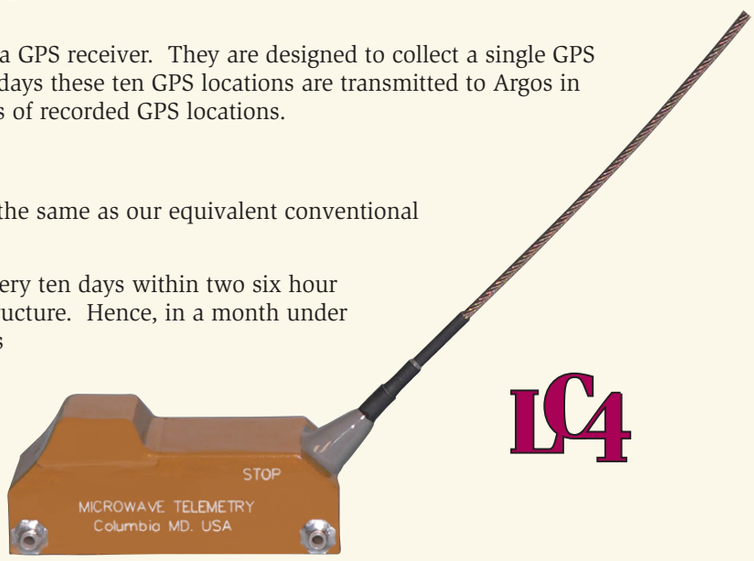
With that in mind, we are looking for feedback from you, our wonderful customers. Nothing long or extensive, please—just a few words or short sentences with your comments, testimonials, expressions of good wishes—whatever you would like to share!

Email us at microwt@aol.com before March 15, 2006

The LC4™ Advantage

Our range of LC4™ GPS enhanced PTTs has several advantages over conventional PTTs, both in cost and performance, especially when deployed in Europe.

LC4™ PTTs are battery powered and incorporate a GPS receiver. They are designed to collect a single GPS location each day at local noon time. Every ten days these ten GPS locations are transmitted to Argos in two messages each containing five alternate days of recorded GPS locations.



The Advantages:

Cost: We have priced these GPS enhanced PTTs the same as our equivalent conventional battery powered PTTs.

Argos Charges: These units transmit to Argos every ten days within two six hour windows, as designated by the new JTA price structure. Hence, in a month under the JTA plan, the cost would be for only 1.5 days worth of Argos service.

Accuracy: The locations are of GPS accuracy, so are typically accurate to within ± 10m. (The best Class 3 Argos locations are within ± 150m).

Reliability: Under adverse conditions, such as are now being experienced in parts of Europe, a single message from a LC4™ PTT will give 5 alternate days of GPS accurate locations for your bird. Only two messages are needed to receive 100% of the data, i.e. one location for each day. With a conventional PTT two messages would give a grade B location at best and only if these were received in the same satellite pass.

Our Apologies

Many of you emailed us in mid-October to inform us that you could not access our website. This disruption in service was due to Hurricane Wilma. Our server, located in southern Florida was down due to problems related to the storm. Although beyond our control, we apologize for any inconvenience this may have caused our customers.

Thanks for your continued support during a difficult time.

Continued from page 2

Eagle Monitored

programmed to transmit every 2 days in winter, extended to every 10 days during the nesting season.

On a personal note, this eagle was truly (or at least, nearly) a bald eagle when she was captured (photo). The crown of her head was missing a large patch of feathers probably a result of a tussle with another eagle over a salmon-- undoubtedly, another experience this eagle has long-forgotten since her days on the Skagit River.

*The last transmission that provided location information was at 6 years, 285 days.

Watson, J.W., and D.J. Pierce. 2001. Skagit River bald eagles: movements, origins, and breeding population status. Final Report. Washington Department of Fish and Wildlife, Olympia, Wash.

New Products

Check Our Website for the Most Recent Updates!

9.5g Solar PTT

When we introduced our 95g PTT nearly 15 years ago, it was revolutionary; for the first time a PTT was commercially available that weighed less than 100 grams. This unit opened up the field of satellite tracking to the biologist, allowing the worldwide tracking of large birds.

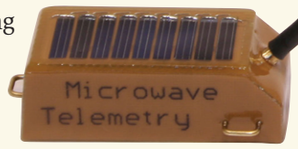
We now have available a PTT weighing less than 10 grams!

It retains all the standard features of our other Solar PTTs.

- Duty cycle timer
- Temperature sensor
- Battery voltage sensor
- Activity sensor
- Microprocessor controlled battery charging
- GT™ - Ground Track option

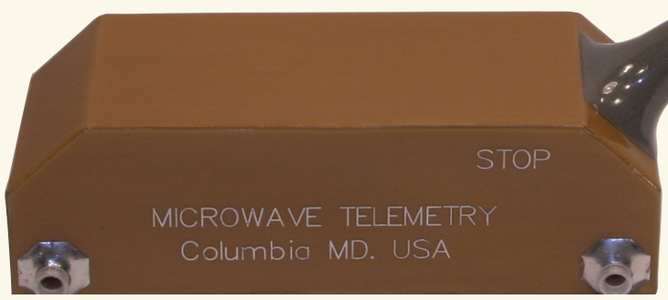
See our website for full specifications of this amazing unit and our full range of PTTs.

Now...



9.5g PTT actual size

Then...



95g PTT actual size

Archival Pop-Up Tags

We have made several upgrades to the software used in our Standard and High Rate Archival Pop-up tags over the last year. Both versions of the tag now have upgraded SiV™ software to take better advantage of all four of the Argos II satellites while further optimizing the use of the battery.

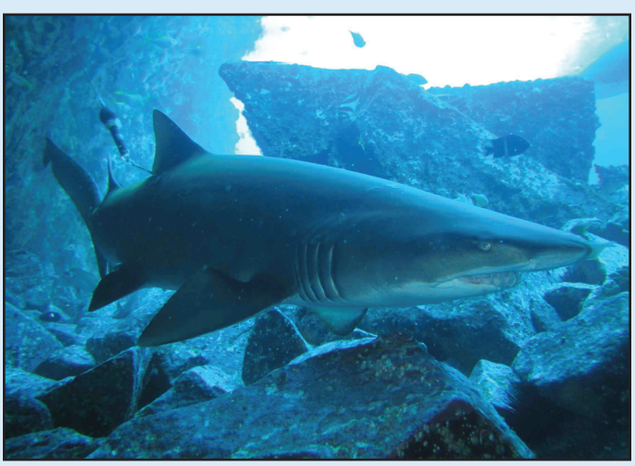


Photo by Noel Hitchins

Male Grey Nurse Shark with Pop-up tag photographed at Fish Rock off South West Rocks in northern New South Wales, Australia.

Standard Archival Tags

Unfortunately attachment of the tag to the fish still remains one of the biggest challenges for you the researcher. We often see small data sets from standard archival tags that have remained attached for only a few weeks. To take full advantage of the capability of each tag to transfer all of its data through Argos we have changed the data recording strategy. Instead of taking readings of temperature and pressure every hour during the first 4 months of deployment, readings are now taken every 15 minutes. After 4 months, readings are taken every 30 minutes, and only after 8 months on the fish are readings taken at the original hourly intervals. This strategy results in many more data points from tags that unfortunately become detached prematurely.

High Rate Archival Tags

The resolution of the pressure readings has now been increased to 1.26m. This allows finer detail of the water column use to be revealed. As a reminder, High Rate tags record temperature, pressure, and light levels from 5 to 30 days at approximately 1 to 6 minute time intervals.

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Argos Performance in Europe

As our European customers are well aware, the performance of the Argos system in that region of the world is less than optimal. For many years we have observed a significant difference in the real life performance of a PTT transmitting in the USA and the same PTT operating in Europe. In the late 1990's when our Pop-up tags were first deployed in the Mediterranean (and when they were being tested on land before deployment) it was observed that the data returned from them through the system was significantly less than that from similar tags elsewhere in the world. Often less than 10% of the expected data was received.

These results were the first inkling that the problem was worse in the Mediterranean than in northern Europe, and therefore, might be caused by a source of radio "noise" somewhere nearer the Mediterranean.

Over the last 12 months in cooperation with CLS/Argos we have been carrying out tests and analyzing the raw data from PTTs in and around Europe. Initially we did tests with a special frequency-hopping PTT to see if the problem could be circumvented by taking advantage of the new Argos II wide bandwidth receivers and moving to an interference free part of the band. However, it soon became obvious the problem was equally affecting the whole Argos II band, so there was little advantage in operating on any frequency relative to another to avoid this presumed interfering signal. (Moving away from the Argos I center frequency generally improves performance in all parts of the world but this is a separate phenomenon).

Analysis of the number of messages received from a PTT during a satellite pass from a given location has proven to give valuable insight into the problem. We have been able to start plotting a map (Fig. 1), of the affected area using test data from PTTs*.

Although the map is far from complete it seems to show that the affected area is roughly the size of the satellite footprint, the area of the earth that the satellite is in view of at any given moment. This area seems to be centered in the Mediterranean in the region of southern Italy/Sicily. The closer a PTT is to the center of this area the worse is its apparent performance.

Closer analysis of the message data and the exact positions of the satellites when messages are received, show that when messages from PTTs in this area are successfully received, the footprint of the satellite does not usually include southern Italy/Sicily.

Looking at this in reverse, whenever the satellite can "see" southern Italy/Sicily, messages from anywhere else in its footprint (which can be just about anywhere in Europe) are much less likely to be received.

These two separate observations lead us to the conclusion that the cause of the problem is probably a wideband transmission from somewhere geographically near the center of the observed affected area on or near the Argos frequency of 401.650MHz.

We have presented these findings to Service Argos here in the USA, who together with CLS in France are now implementing an investigation. This includes global satellite based measurement of the noise floor at the Argos frequencies and global analysis of received power levels from the Argos platforms. We hope that by the time we write the next newsletter we will be closer to solving this problem that denies European users the full benefits of the Argos system enjoyed by researchers everywhere else on earth.

*If you have any data from birds within this area or especially ones migrating through it and would like us to use it in our analysis please contact us.

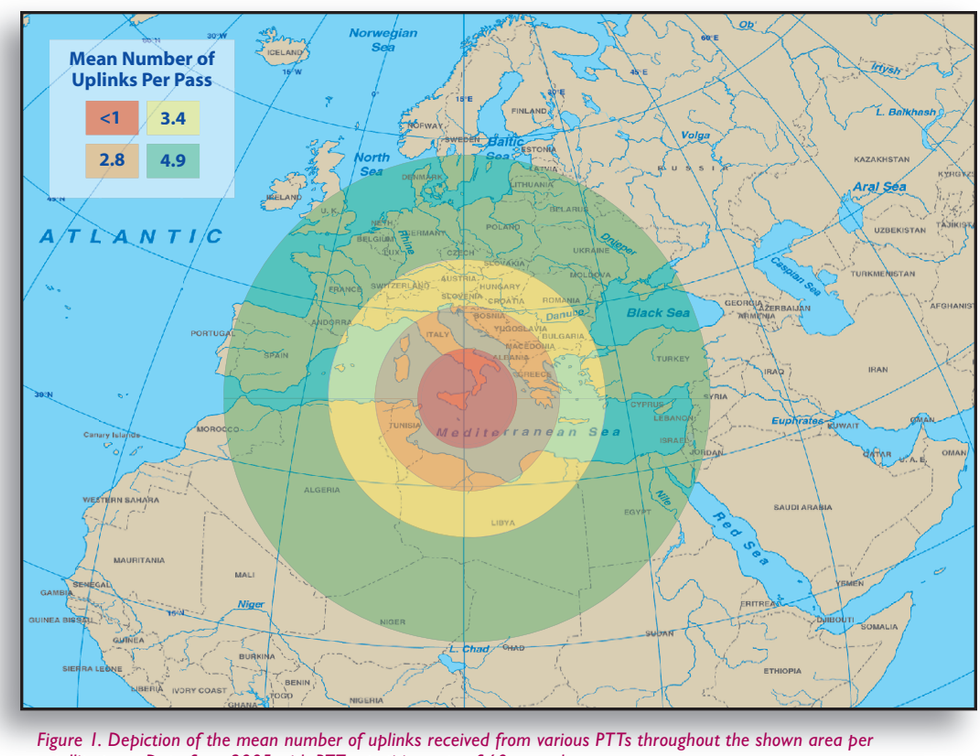

Figure 1. Depiction of the mean number of uplinks received from various PTTs throughout the shown area per satellite pass. Data from 2005 with PTT repetition rate of 60 seconds.