WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

ARGOS JOINT TARIFF AGREEMENT

JTA-34/ Doc. 9
(14-Nov-14)

THIRTY FOURTH SESSION

ITEM: 10

WEIHAI CHINA,
3-5 NOVEMBER. 2014

ENGLISH ONLY

NATIONAL REPORTS

(Submitted by the Representatives of Country (ROCs))

Summary and purpose of the document

This document provides the reports on Argos related national activities during the last intersessional period (2013-14)

ACTION PROPOSED

The Meeting will be invited to comment, and particularly make decisions or recommendations, as appropriate, on the following topics:

(a) Note and comment on the information contained in this document; and

(b) Take into account the contents of the report when discussing relevant agenda items.

Appendices: National reports from Australia, Canada, China, Germany, India, New Zealand, South Africa, Spain, Sweden, UAE, and USA.
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JTA NATIONAL REPORT

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<th>Year</th>
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**Section 1. Overall Summary**

Wildlife programs continue to dominate Argos usage for Australia. Of the 81 programs that transmitted between January to July 2014, 67 were wildlife tracking programs that contributed 66% of the total PPT years.

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<th>Actual usage (1 January – 31 July)</th>
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**PROJECTED 2014 PTT YEARS TOTAL**

| PROJECTED 2014 PTT YEARS TOTAL | 93.979 |

Overall, Argos usage continues to decline. The projected total PTT years in 2014 is 93.979. This is down 15.6% on the actual 2013 PTT consumption of 111.308 PTT years. This in turn was down 4.3% on the 116.293 PTT years consumed in 2012.

**Section 2. Future Plans**

*At the time of preparation, CLS Australia could not provide details of expected usage in 2015.*

**Section 3. Technological Changes that affect User Requirements**

**Section 4. User issues, problems, and level of satisfaction with Argos**

**Section 5. Successful programme use of Argos**

**Section 6. Analysis of Local Operational Issues**

See Appendix A
## Appendix A

### PTT Years by Organisation: 1st Jan - 31st July

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**Section 1. Overall Summary**

Canadian researchers consumed over eighty-six platform years from the start of the year to the end of August, 2014. Overall, bird, fish and land and marine animal tracking accounts for 84% of usage in Canada. The total usage, after capping, by the end of year is expected to be 140 PTT-Years down from 160 PTT-Years in 2013, 173 in 2012 and 215 in 2011, a decline of 75 PTT-Years over three years.

Animal tracking was the dominant activity as policy makers, resource developers and habitat managers ask for hard data from researchers to guide their decisions. Populations of caribou, bison, grizzly and polar bears, sea birds, foxes and others are being monitored by Argos transmitters for their responses to rapidly changing conditions, especially in the Arctic. Future resource development may contribute to animal tracking programs as part of environmental impact studies.

Government agencies have long been using Argos for operational programs as well as research activities. The Canadian Meteorological Service continues to operate data buoys and drifters along with the Canadian Ice Service and the Coast Guard Rescue units but report that they are converting to Iridium data transmission to save on costs. Fisheries and Oceans maintains its share, about 100, of the Argo float program as well as fish and marine mammal research programs. Some of these Argos activities are in decline because of increasing use of Iridium transmitters but the programs can be expected to continue because of their recognized high priority.

Activity is maximum during the late spring and summer months as a reflection of the field season when new transmitters are deployed but the intensity of Argos activity declines only partly as most programs are designed to collect year-round data.
Local issues typically involve transmission anomalies in wooded areas or snow cover affecting the antenna. Ice Service operators, tracking ice flows over several seasons, report that the Argos antenna performs better than Iridium when covered with wet snow.

Cost is an issue for most users and, in general, Iridium service seems to be more cost-effective. ArgosDirect service has had to be cancelled by one user for reasons of cost and others have complained about not being able to download their data from a web site without cost. The method of getting only ten or twenty days’ data at once was mentioned as an unnecessary restriction. This, and the apparent decline in usage this year, are perhaps a reflection of the continuing difficulty in getting research funding in Canada and any savings that CLS could offer would be welcome.

See Appendix 1 for individual program summaries

**Section 2. Future Plans**

Increased transition to Iridium transmitters will have a direct impact on Argos use.

Smaller transmitter packages are expanding the scope of Argos tracking to smaller species. See Appendix 2 for individual comments.

**Section 3. Technological Changes that Effect User Requirements**

Lighter, smaller equipment continues to be the technological driver, but in general users seem to be happy with the hardware especially with GPS fixes. Some users are switching to Iridium for the greater data volume and, in some cases, reduced cost. See Appendix 3 for individual comments.

**Section 4. User Issues, Problems and Level of Satisfaction with Argos**

The level of user satisfaction with Argos and CLS services is high but some areas of concern do exist that are making participants consider alternative technologies. The primary concern is costs associated with communications compared to other options such as Iridium. Secondary problems are associated with data download, namely limitations in size, format and the reception of remote signals. See Appendix 4 for individual comments.

**Section 5. Successful Programme Use of Argos**

All users indicate that Argos has been a critical cornerstone to the success of their programs. Data is of high quality and is being used in peer-reviewed publications. It has been an indispensable and cost-effective way to monitor wildlife populations, especially in remote locations and the data is showing meaningful interpretations for ecological and monitoring studies. With access to hard data on animal populations, hunter communities have been more engaged in conservation measures. More complex questions can be answered with the expanding foundation of raw data. It has been a primary component to the success of oceanographic and freshwater investigations and reported to be important for Search and Rescue operations. See Appendix 5 for individual comments.

**Section 6. Analysis of Local Operational Issues**

There is a small number of local operational issues. Cost continues to be cited and there are concerns of erroneous data points and lost transmissions from tagging collars that were deployed in remote locations. The latter however, has not been directly identified to be an issue with Argos itself. See Appendix 6 for individual comments.
Appendix 1. Summaries of Programs

As in previous years, animal tracking has dominated Argos activity in Canada this year with meteorological and oceanographic applications being significant Argos participants. The effects of Arctic climate change and habitat loss on migration and dispersion of species such as caribou, polar bears, arctic fox, snowy owl, whales and seals are being studied intensely and Argos technology is contributing strongly to wildlife management efforts.

Twenty-four operators replied to the questionnaire, some with multiple programs. Among these, animal trackers dominate with strong representation from large ungulate and seabird research. Ocean moored and drifting buoys operated by Environment Canada and the Argo programme of drifting, profiling floats operated through the Department of Fisheries and Oceans are gradually changing over to Iridium because of the reduction in cost to transmit large data files.

Below are the responding programmes. All responders were generally satisfied with their service with some suggesting improvements which will be covered in the appropriate sections below.

1. Canadian Argo Profiling Floats
   - Argos Programme Number 2442
   - Agency: Department of Fisheries and Oceans


   As of September 2014, Argo Canada was still operating 11 floats relying on Argos for data telemetry. This number of Argo profiling floats using Argos telemetry has been rapidly declining over the past three years for two main reasons: 1) Many floats that were purchased between 4 and 6 years ago have run out of battery power; 2) The new floats purchased in the past 3 years rely on Iridium telemetry.

   Canada has deployed 306 profiling floats, 75 still active, in the north Atlantic and north Pacific in support of Argo, which is a component of the Global Ocean Observing System. Data from around the world within this program is freely available to all and can be accessed through two Argo data centres. Examples of Canadian data products can be found at:


   Shown below is an example of an Argo data product. It shows deep convection, in 2003 and 2008, in the Labrador Sea. The top graph shows the low temperature of the descending water; the bottom graph, the low salinity. Such massive movements affect climate and sequestration of CO2.
Data from annual ship surveys along Line AR7W in the Labrador Sea is augmented with Argo data to provide a continuous record of seasonal changes.

Scientific publications from the Canadian Argo program include:


2. Government of Quebec Has Three Caribou Tracking Programs
   Argos Programme Numbers 959, 22857, 4229
   Agency: Ministère des Ressources naturelles et de la Faune du Québec

Caribou management currently relies on demographic and behavioural parameters that are mostly derived from remote sensing data. The Argos system has been used for over 20 years to achieve long term information and is still central to population monitoring programs in Québec. Remote sensing is promoted as a valuable tool in the implementation of conservation and management plans for upcoming years.
3. Arctic Buoy Program, Moored Met. Buoy Programs  
Argos Programme Numbers 323, 627, 693, 5626, 5693, 6693  
Agency: Environment Canada

Environment Canada’s Meteorological Service of Canada (EC-MSC) continues to utilize ARGOS communications for a number of drifting meteorological and oceanographic buoys deployed in the North Pacific, North Atlantic, and the Arctic Basin. ARGOS is used on moored weather buoys as a redundant (back-up) communications on the Pacific Coast, and also provides redundant position reports should primary GOES and GPS systems onboard the moored buoys fail. Below is shown an air launch of an Arctic buoy.

4. Canadian Ice Service, Ice Fragment Tracking  
Argos Programme Number 633  
Agency: Canadian Ice Service (CIS)

CIS has been involved in tagging Multi-year ice floes, Ice Island fragments, ice shelf fragments and icebergs in the past decades. The daily track obtained for each beacon eventually serves to validate Ice or Iceberg drift model over the Arctic and east coast.

No Argos beacons were deployed by CIS in 2014. 2013 was the last year of Argos telemetry beacon deployed by CIS.

The CIS buoy program now falls under the Meteorological Service of Canada (MSC) program managed by Chris Marshall Chris.Marshall@ec.gc.ca and Champika Gallage champika.gallage@ec.gc.ca where they currently have 6 Argos drifters that are transmitting.

5. Ring-Billed Gull Tracking  
Argos Programme Number 4203  
Agency: Université du Québec à Montréal

In 2010-2011, we purchased 22 22-g solar GPS PTTs to track Ring-billed gulls breeding in a colony near Montreal, Quebec. Our main objective was to study the post-breeding dispersal of these birds and to identify their migration routes and wintering areas. This was part of a larger study on the ecology of this species (http://gull.uqam.ca). A total of 25 birds were marked between 2010 and 2012 because some PTTs were recovered and deployed for a second time. Nineteen units have been lost due to predators, car accidents or have ceased transmitting for unknown
reasons. A proportion of birds dispersed rapidly in late summer in all directions before they undertook their fall migration to their wintering areas. Some birds, however, remained in the Montreal area before leaving for the winter. We will continue our tracking until the last three PTTs will last. Tracking the same birds over a year is particularly interesting to determine repeatability in their dispersal pattern and fidelity to their migration routes and wintering areas.

6. Department of National Defence Search and Rescue  
   **Argos Programme Number** 2019  
   **Agency:** Department of National Defence (Canada)

DND utilizes Argos to track and report location on the Self Locating Datum Marker Buoy (SLDMB) that is used to refine drift parameters for Search and Rescue. The SLDMB is programmable to one of 99 discrete channels to permit flexibility for multiple searches. Annual usage is highly variable since it depends on the number and types of searches. Usage tends to be highest in late summer and early Fall.

7. **Snowy Owl Tracking**  
   **Argos Programme Number** 3471  
   **Agency:** Department of Biology and Centre d’études nordiques, Université Laval

The objective of my program is to study the winter ecology of snowy owls with specific regards to their fall movements, their winter habitat use and diet as well as the factors influencing winter irruptions. During the first phase of the project, 12 PTTs were deployed on Bylot Island (NU) in summer 2007 and 4 additional ones on Herschel Island (YK) in 2008. These animals were successfully tracked across the Canadian Arctic for up to 3 years, until summer 2010. This program has revealed new and unexpected information on migratory movements, habitat use and breeding dispersal of this nomadic species. Winter use of sea-ice by snowy owls in the eastern Canadian Arctic was documented, a behaviour that was previously unknown. Hence, we continued our study to learn more about the pattern of winter habitat use by snowy owls. We deployed one PTT at Mary River (NU) in summer 2011 and 10 additional ones in Nunavik at Raglan (QC) in summer 2013. In summer 2014, 8 new PTT were deployed on nesting females on Bylot Island (NU).
8. Caribou Tracking  
**Argos Programme Number 2814**  
**Agency: Government of Northwest Territories, Department of Environment & Natural Resources, Fort Simpson**

Another very successful year with collared boreal caribou in the Dehcho region of the NWT. The use of the collars over the years has enabled us to determine when and where caribou calves are born based solely on movement data and without the need to conduct aerial reconnaissance. By maintaining 30 plus collars annually we are able to calculate vital rates and combined with a single annual survey we are able to monitor population trend. Such information is crucial to the National Recovery Strategy for boreal caribou.

9. Bison Tracking  
**Argos Programme Number 12814**  
**Agency: Government of Northwest Territories, Department of Environment & Natural Resources, Fort Simpson**

The last functioning collars for this program ended transmissions in late 2013 fulfilling the objective of monitoring movements and range used by male and female wood bison and to determine a sightability correction for a population survey. Currently the program is on hold but we plan on deploying up to 10 collars on wood bison of the Nahanni population by the end of 2015, prior to a population survey in 2016. Some collars have already been purchased and may be deployed this year.

10. HABITAT USE BY POLAR BEARS IN WESTERN HUDSON BAY  
**Argos Programme Number 00947**  
**Agency: Canadian Wildlife Service**

The objective is to study the use of sea ice habitat in Hudson Bay, Canada by polar bears by using satellite telemetry to monitor seasonal movements of up to 5 (five) individuals. The program just began last September. The collars deployed last year are still active and have provided some very useful data on habitat use by polar bears in Hudson Bay. These data will be used by several graduate students at the University of Alberta as part of their graduate programs. It is important to enable a better understanding of habitat use by polar bears and the impacts of climate change on that use. Intentions are to continue annual deployments of 5-10 collars, although this will very much be funding driven.
11. Grizzly and Polar Bear Tracking  
*Argos Programme Number 2846*  
Agency: University of Alberta

The core use of ARGOS is to track the movements of polar bears in various populations of the Canadian Arctic. The short term goals focus on habitat use, movement dynamics, population delineation, oil spill modeling, and response to changing sea ice conditions. Over the longer term, the tracking is being used to monitor critical life history events relative to changing sea ice conditions. Use of ARGOS GPS collaring is intended to continue for the foreseeable future. Due to limited funding for Arctic research in Canada, the scale of my research program will be slightly reduced over the next 5 years: fewer collars will be deployed. I have plans to move to shorter term ARGOS tags that will provide information on different population segments (i.e., adult males, subadults).

12. Caribou Tracking  
*Argos Programme Number 1572, 10572*  
Agency: Government of Northwest Territories, Department of Environment & Natural Resources

ENR in Inuvik region has been participating in Argos programme since 1996 to track the movements of barren ground caribou to assist in management decisions as well as for scientific researches of the caribou herds in the region and in the Northwest Territories. With years of tracking data, it has become possible to gain greater understanding of the caribou in such areas as migration, home range and seasonal utilization, and inter-herds interactions. A total of 104 collars were deployed in the spring of 2012 to track and record the detailed movement of the caribou for the next three years. There have been a few occasions where erroneous points are observed, and also transmissions from deployed platforms/collars are completely lost without explanations. To replace the 2012 deployments and continue the effort of the monitoring, another deployment is scheduled in the spring of 2015. Work is also underway within ENR to update its database management system this year.
13. **Polar Bear Tracking**  
*Argos Programme Number 11572*  
**Agency: Government of Northwest Territories, Department of Environment & Natural Resources**  
ENR in Inuvik region has been participating in Argos programme since 1996 to track the movements of barren ground caribou to assist in management decisions as well as for scientific researches of the caribou, grizzly bear, and polar bear in the region and in the Northwest Territories. Polar bears have been monitored since 2007 in collaboration with the University of Alberta. There are 11 polar bears that are currently monitored (3 collars deployed in 2012, 2 collars deployed in 2013, 6 collars deployed in 2014). Argos has provided years of tracking data and thus allowed us to gain invaluable insight into their movements in areas where continuous monitoring/tracking would be impossible to achieve otherwise. There have been a few occasions where erroneous points are observed, and also transmissions from deployed platforms/collars are completely lost without explanations. Currently active collars will be continuously monitored until July 2016 when the collars from this will be dropped off. Work is also underway within ENR to update its database management system this year.

14. **Marbled Godwit Connectivity**  
*Argos Programme Number 5376*  
**Agency: Environment Canada**  
Determining migration routes and wintering sites of Alberta, Canada, Marbled Godwits (Limosa fedoa) – in initial year 2013, 4 adults banded at nest. Satellite tagged an additional 4 Marbled Godwit adults on nest in Alberta for S&T Environment Canada, adding to the 4 marked in 2013. Complete migration data collected on 5 birds in total, and 2 partial.

15. **Woodland Caribou Tracking**  
*Argos Programme Number 4132, 3869, 4049*  
**Agency: Ontario Ministry of Natural Resources**  
Between winter 2010 and winter 2012, the Ontario Ministry of Natural Resources (OMNR) successfully deployed 119 PTT’s (GPS/Argos telemetry collars) on adult female woodland caribou with a planned 3 year monitoring period for each PTT (scheduled to end in winter 2013, 2014, or 2015, depending on deployment date). The 4132 program is a subcomponent of a broader provincial monitoring program for woodland caribou in Ontario, with PTT’s deployed in monitoring ranges overlapping areas where commercial forestry occurs on Crown land in Ontario. Forest-dwelling caribou are a species at Risk in Ontario and potential land use planning outcomes related to forestry, mineral development, access, dedicated protected areas, and subsistence harvest levels of caribou are all factors that may contribute to increased risk to caribou populations. The information collected from PTT monitoring will improve understanding of the behaviour and demography of caribou in relation to habitat dynamics and potential limiting factors, and assist OMNR in developing alternative policy options in relation to land use planning and conservation objectives. As of June 2013, 68 collars remained active under this program. No future plans for PTT monitoring are being considered under program 4132 at this time.
16. Ferruginous Hawk Tracking  
Argos Programme Number 5192  
Agency: University of Alberta

My ongoing study with the University of Alberta and Environment Canada has utilized the Argos system since May 2012 by allowing us to achieve our goal of monitoring breeding ferruginous hawks in the Canadian Prairies. Ten satellite GPS/Argos satellite transmitters have been attached to hawks and have provided data over 3 breeding seasons allowing my research team to successfully track the movements of this endangered species.

Currently there are no plans to deploy additional PTTs on this study. We will continue to collect information from the 3 individuals that are currently transmitting data.
17. Arctic Whales and Sharks
Argos Programme Number 01142
Agency: Fisheries and Oceans Canada

Canadian Arctic marine mammals, marine fishes and sharks are instrumented with satellite-linked position only, time-depth recorders, pop-up tags and tracked for a few months to a few years depending on the success of the attachment and provided there is no damage to the equipment. At present, this program targets bowhead whales, beluga, narwhals, killer whales, ringed seals, Greenland halibut and sharks. The objectives are to understand the seasonal spatial distribution of the animals, the habitat use and their dive activity. This information is important to assess their numbers and trends and to understand their habitat requirements.

For summer 2015, we are planning to deploy up to 10 satellite tags on both narwhal and bowhead whales, and up to 4 on killer whales. There is plan for deployment of 10 pop-up tags (PAT tag) on both Greenland halibut and Greenland sharks.

Action shots of whale tagging:

18. SABS Caretta
Argos Programme Number 5039
Agency: BEDFORD INSTITUTE OF OCEANOGRAPHY

Program dedicated to studying movements and diving behavior of free-swimming and incidentally-caught chelonid turtles tagged in Canadian waters

19. Sea Duck Tracking
Argos Programme Number 3261
Agency: Canadian Wildlife Service of Environment Canada

The CWS of Environment Canada is participating, through the Sea Duck Joint Venture, to the tracking of sea ducks. The “Atlantic and Great Lakes Sea Duck Migration Study” is a large-scale, multi-year, multi-partner satellite tracking program for sea ducks along the Atlantic coast and Great Lakes, with the following primary objectives:

- Fully describe the annual migration patterns for four species of sea ducks (surf scoter, black scoter, white-winged scoter, long-tailed duck) in the Atlantic flyway and Great Lakes by 2014.
- Map local movements and estimate length-of-stay during winter for individual radio-marked ducks in areas proposed for placement of wind turbines (e.g., Maine-Penobscot Bay, Nantucket Sound, and coastal Rhode Island).
- Identify near-shore and offshore habitats of high significance to sea ducks to help inform habitat conservation efforts.
• Estimate rates of annual site fidelity to wintering areas, breeding areas, and molting areas for all four focal species in the Atlantic flyway.

More than 250 satellite transmitters will be deployed in sea ducks from 2009-2013. The project is funded in part by the Sea Duck Joint Venture (http://seaduckjv.org/index.html) and in part by various partners.

Some results can be seen at:

http://www.seaturtle.org/tracking/index.shtml?project_id=499
http://www.seaturtle.org/tracking/?project_id=538
http://www.seaturtle.org/tracking/?project_id=759

20. Cod Tracking

Argos Programme Number  15367
Agency: Centre for Fisheries Ecosystems Research, Memorial University of Newfoundland
This project and its predecessors has put psat tags on over 100 Atlantic cod over the past 3 years. The tags are set to pop off the fish after 1 year. This is the first time this has been done on this species. Initial results have shown previously undocumented migration patterns and spawning areas, and will almost certainly be influential in management.
21. Caribou Tracking

**Argos Programme Number 1207, 9207**
**Agency: Government of Yukon**

The Porcupine Caribou satellite program is a multi-agency cooperative project to maintain satellite collars on adult female caribou to document seasonal range use and timing of migration to guide other field work activities on the herd. The first Argos satellite collars were deployed on this herd in 1985 and the program continued to 2013 when we switched to Iridium based transmitters. We currently have only 1 Argos collar on a caribou that we’ve not been able to recapture for collar removal. When the collar goes off the air we will discontinue the program.

22. Pinniped Tracking

**Argos Programme Number 788**
**Agency: Dalhousie University/DFO**

DFO, Canada and Dalhousie University have collaborated on the program which combines ARGOS location data with acoustic transceivers to develop a spatial and temporal map of predator-prey interactions in the ocean. These data are providing new ways to evaluate the importance of pinniped predation on species of commercial or conservation concern, e.g., Atlantic cod and Atlantic salmon. Since 2009, about 20 ptts have been used each year on adult grey seals.

The DFO Marine Mammal Program (788) includes tracking of seals and cetaceans, but also includes projects on sharks. Ongoing projects are tracking the migrations and the diving behavior of grey seals (n=43 in 2013-2014), blue sharks (n=13 in 2013-2014) and blue whales (n=4 in 2013-2014) in eastern Canadian waters, and of ringed seals (n=7 in 2013-2014) off Labrador.

23. Lobster Tracking

**Argos Programme Number 5541**
**Agency: University of New Brunswick - Saint John**

In October 2013 I began a project looking at the seasonal migration and thermal histories of large egg bearing American lobsters (Homarus americanus). The hypothesis being tested is that lobsters with eggs that are incubating will make a seasonal shallow-deep migration in order to stay in the warmest water available in the area. It is thought that they will utilize the warm surface water in the summer, and then move to the deeper waters in the winter, which will be the warmest location during the winter period.

The starting point for this study was Flagg Cove in Grand Manan, New Brunswick which is in the Bay of Fundy. As satellite tags have never been used on lobsters before, 2013 saw the start of the pilot study where two lobsters were tagged. We utilized the Desert Star Systems’ Sea Tag MOD on
our lobsters, which was set-up to record depth, temperature, and location until July 31 2014. On this date both tags popped off the animals, and one tag was successfully recovered, and the data for the other was transmitted through the ARGOS system. The project so far was a great success; data analysis will begin this winter when the lobster temperature data will be compared to water temperature data from different areas, and the migration route will be determined.

In fall 2015 the second half of the ‘Seasonal migration and thermal histories’ project will begin. The goals will be largely the same as the pilot project completed in 2013/14, but will include a larger sample size now that the technology has been proven on lobsters, and we will have two starting locations. More questions may arise as the data from the pilot project is analyzed.

24. Caribou Tracking

**Argos Programme Number** 1207, 9207  
**Agency:** Government of Yukon

The Porcupine Caribou satellite program is a multi-agency cooperative project to maintain satellite collars on adult female caribou to document seasonal range use and timing of migration to guide other field work activities on the herd. The first Argos satellite collars were deployed on this herd in 1985 and the program continued to 2013 when we switched to Iridium based transmitters. We currently have only 1 Argos collar on a caribou that we’ve not been able to recapture for collar removal. When the collar goes off the air we will discontinue the program.

25. Arctic and Red Fox Tracking

**Argos Programme Number** 3297  
**Agency:** Universite du Quebec a Rimouski

The main objective of our program is to better understand habitat use and large scale movements of arctic foxes throughout the seasons in the Canadian Arctic. Our program also includes red foxes, which are gradually expanding their range to higher latitudes. In addition to characterizing both species movements, our objective is to better understand interactions between these two species, factors influencing their movements such as food resources availability, sea ice composition, and juvenile dispersal in the current climate change context. This program will continue again for 2015.
26. Sea Duck and Arctic Goose Tracking

**Argos Programme Number 30375**  
**Agency: Environment Canada**

We are marking selected species of sea ducks and Arctic geese with implant satellite transmitters to describe migration and connectivity patterns between wintering, breeding and molting areas. That data will be used to manage and/or conserve specific populations of these species. On the Pacific and Atlantic Coasts, we have marked well over 600 individuals of 10 different species and all age and sex classes.

27. Migratory Shorebirds Tracking

**Argos Programme Number 5545**  
**Agency: Canadian Wildlife Service, Environment Canada**

The main objective of our program is to better understand habitat use and large scale movements of arctic foxes throughout the seasons in the Canadian Arctic. Our program also includes red foxes, which are gradually expanding their range to higher latitudes. In addition to characterizing both species movements, our objective is to better understand interactions between these two species, factors influencing their movements such as food resources availability, sea ice composition, and juvenile dispersal in the current climate change context. This program will continue again for 2015.
28. Coyote Tracking

Argos Programme Number  5105
Agency: The Edmonton Urban Coyote Project

The Edmonton Urban Coyote Project aims to provide information on coyote movement, habitat use, diet, and perception by the public to city managers to improve non-lethal management of this controversial species. To date we have fitted 21 coyotes with GPS collars, 2 of which with ARGOS collars, for an average of 5 months collecting locations either every 3 hours or 30 minutes. Thus far using GPS data we have learned that coyote activity patterns and use of residential areas appears to depend on coyote health, and that shifting to nocturnal activity cycles appears to decrease the risk of vehicle collisions for coyotes. In future we will continue to collar and track coyotes to increase our sample size and test new hypotheses.
**Appendix 2. Future Plans**

<table>
<thead>
<tr>
<th>Comment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have successfully switched our program to the Iridium system. We are pleased with Iridium collar data quality, data management and ability for two-way communication with collars.</td>
<td>1207, 9207</td>
</tr>
<tr>
<td>DFO/Dalhousie University will continue their collaboration by deploying 20-25 PTTs on adult grey seals in 2015.</td>
<td>788</td>
</tr>
<tr>
<td>For summer 2015, we are planning to deploy up to 10 satellite tags on both narwhal and bowhead whales, and up to 4 on killer whales. There is plan for deployment of 10 pop-up tags (PAT tag) on both Greenland halibut and Greenland sharks.</td>
<td>1142</td>
</tr>
<tr>
<td>Currently there are no plans to deploy additional PTTs on this study. We will continue to collect information from the 3 individuals that are currently transmitting data.</td>
<td>5192</td>
</tr>
<tr>
<td>We will continue tracking the three remaining gulls that still have functioning PTTs. No other birds will be fitted with PTT in 2014-2015.</td>
<td>4203</td>
</tr>
<tr>
<td>Caribou: Monitoring of 104 collars (39 Argos collars for the program number 1572, and 56 Argos-GPS collars for the program number 10572) deployed in the spring of 2012 is scheduled to end in the summer of 2015. Another deployment of approximately the same number as in 2012 is scheduled in the spring of 2015 to continue the tracking of caribou for management purposes and scientific studies of the barren ground caribou herds in the Inuvik management region in the western arctic area of Canada in the Northwest Territories.</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>ENR is also developing an enterprise database and application system, in order to consolidate and streamline the management of the Argos data collected throughout the Northwest Territories. Several tests are planned over the next few months.</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>There are 11 active polar bears and they are continuously monitored for their movements: 3 collars from 2012 deployment are scheduled to end this year; 2 collars from 2013 deployment are scheduled to end next year; and 6 new collars were deployed in the spring of 2013 and are scheduled to end in 2015. There is no future plan for any more deployment at this point.</td>
<td>11572</td>
</tr>
<tr>
<td>Atlantic Lobsters: In fall 2015 the second half of the ‘Seasonal migration and thermal histories’ project will begin. The goals will be largely the same as the pilot project completed in 2013/14, but will include a larger sample size now that the technology has been proven on lobsters, and we will have two starting locations. More questions may arise as the data from the pilot project is analyzed.</td>
<td>5541</td>
</tr>
<tr>
<td>The ongoing projects should be maintained to a similar level in the next few years, with hope to deploy more instruments on blue whales, other whale species around Newfoundland.</td>
<td>788</td>
</tr>
<tr>
<td>We are overall satisfied by ARGOS data obtained and we will maintain our program in the next few years.</td>
<td>3297</td>
</tr>
<tr>
<td>Use of ARGOS GPS collaring is intended to continue for the foreseeable future. Due to limited funding for Arctic research in Canada, the scale of my research program will be slightly reduced over the next 5 years; fewer collars will be deployed. I have plans to move to shorter term ARGOS tags that will provide information on different population segments (i.e., adult males, subadults).</td>
<td>2846</td>
</tr>
<tr>
<td>The last functioning collars for this program ended transmissions in late 2013 fulfilling the objective of monitoring movements and range used by male and female wood bison and to determine a sightability correction for a population survey. Currently the program is on hold but we plan on deploying up to 10 collars on wood bison of the Nahanni population by the end of 2015, prior to a population survey in 2016. Some collars have already been purchased and may be deployed this year.</td>
<td>12814</td>
</tr>
<tr>
<td>We will continue to mark priority bird species for the next several years at least, and have no plans to wind down the marking program.</td>
<td>30375</td>
</tr>
<tr>
<td>MSC is now looking after the beacon program and the trend within MSC is to reduce Argos usage due to the associated cost and data reporting latencies.</td>
<td>00633</td>
</tr>
<tr>
<td>DND will continue to use the current Argos SLDMB for the next 6-12 months and will then transition to a new SLDMB that uses a different communications protocol.</td>
<td>2019</td>
</tr>
<tr>
<td>In future we will continue to collar and track coyotes to increase our sample size and test new hypotheses relating to connectivity for coyotes through cities and mitigation strategies for residents whose yards are used by coyotes.</td>
<td>5105</td>
</tr>
<tr>
<td>We have deployed a total of 35 PTTs to date, and we have no more left to deploy in the near future. We anticipate tracking the animals currently marked until 2017 at the latest, when the batteries will have died.</td>
<td>03471</td>
</tr>
</tbody>
</table>
Appendix 3. Technological Changes that Effect User Requirements

<table>
<thead>
<tr>
<th>Comment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENR is piloting the Iridium based location acquisition service on some of the caribou it monitors. Initial review indicates that they provide cheaper than and as reliable alternative as Argos system. Upon further comparison and reviews, we may reduce our usage of the Argos system in the future.</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>With the NOVA floats recently that we recently purchased, we use Iridium data telemetry (SBD = Short Burst data) instead of Argos telemetry.</td>
<td>02442</td>
</tr>
<tr>
<td>PTT size and weight are the limiting factors for future use. As the units become smaller/lighter they can be used in smaller birds, and therefore more species of migratory birds.</td>
<td>30375</td>
</tr>
<tr>
<td>The omni-directional signal provided by Argos PTT handles wet snow and total snow cover better than Iridium-type beacons.</td>
<td>00633</td>
</tr>
<tr>
<td>As researchers studying a mid-sized carnivore, lower collar weights and the possibility of camera collars for smaller animals are welcome.</td>
<td>5105</td>
</tr>
<tr>
<td>We are experiencing some problems with one PTT deployed in July 2014 (PTT #106401). The device only emits intermittently. Chances are that the problem comes from the device and not the Argos system, as the other PTTs deployed are transmitting normally.</td>
<td>03471</td>
</tr>
</tbody>
</table>
# Appendix 4. User Issues, Problems and Level of Satisfaction with Argos

<table>
<thead>
<tr>
<th>Comment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have found the ARGOS people to be a pleasure to work with. The website is easy and efficient to interact with and the data storage and availability near flawless.</td>
<td>15367</td>
</tr>
<tr>
<td>Satisfied with current service, but bandwidth continues to be a limitation.</td>
<td>788</td>
</tr>
<tr>
<td>We have cancelled our ArgosDirect service because it proved to be very expensive (ranging between 10 to 50% of Argos monthly cost). We are now only requesting monthly Databank CD. The issue with this service is that the Databank CD takes 3 weeks to receive. As much we like having hard Copy (CD) of the data sent to us, we would prefer accessing the monthly data through a dedicated website (e.g., Argos website/Data access). This would prove a better value than the 3 weeks delay to receive the Databank CD.</td>
<td>1142</td>
</tr>
<tr>
<td>I have not had any issues with the Argos system throughout the course of my study.</td>
<td>5192</td>
</tr>
<tr>
<td>• ArgosWeb &gt; Mapping &gt; Data filter &gt; Location class</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>When ‘Location class: G (GPS)’ is applied, it does not display any points on the map</td>
<td></td>
</tr>
<tr>
<td>• ArgosWeb &gt; Download COM/PRV/DIAG &gt; Download parameters &gt; Time frame: For n day(s)</td>
<td></td>
</tr>
<tr>
<td>‘n day(s)’ is limited up to 20 days. It will be much better if all the previously collected data longer than 20 days for a platform can be accessed online.</td>
<td></td>
</tr>
<tr>
<td>I do not have any ARGOS issues to report based on my experience. I was very satisfied during my 2013/2014 project.</td>
<td>5541</td>
</tr>
<tr>
<td>For species that don’t frequently come to the surface, like the blue whale, it would be nice to be able to provide the deployment location for each of the PTT, so that the algorithm starts with a plausible position at a given date and time. It would avoid the problem we had in early September to have the data for some of the PTT re-analysed to recover the initial few days or weeks of data. This might not be a problem for pinnipeds or species surfacing often, but we ran into these problems for blue whales, for which the tag is close to the dorsal fin and thus, may show itself to the satellite only once per surfacing (and satellite pass) as they dive for 12-20 min.</td>
<td>788</td>
</tr>
<tr>
<td>We have been very satisfied with services provided by Argos. However, we note the lack of two-way communications with conventional Argos and limited data throughput.</td>
<td>02442</td>
</tr>
<tr>
<td>Issue regarding ARGOS web access. An enhanced web access, for files download (superior number of lines per files) and to have more than the last 10 days of data would be much appreciated.</td>
<td>3297</td>
</tr>
</tbody>
</table>
ARGOS service remains consistently excellent. Response times are superb when any issues or questions arise. 2846

It would be good if CLS could email regular updates on the number of PTTs transmitting per program, rather than the PI having to request that information. 30375

CIS has been very satisfied; the only problem was with the cost of usage. 00633

Nice to be able to download 20 days data instead of 10, and useful to have the buyback policy for the past year. 5376
### Appendix 5. Successful Programme Use of Argos

<table>
<thead>
<tr>
<th>Comment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over the past 5 years we have instrumented some 120 grey seals to study habitat use and foraging tactics.</td>
<td>788</td>
</tr>
<tr>
<td>Arctic Marine mammals and Greenland sharks travel great distances and live in remote location where access is very expensive and limited in time. The use of Argos satellite tracking devices has proved to be the most cost effective way of studying those species. Over the past 20+ years, the Argos system has allowed us to gather significant information on their movements, diving behaviour and habitat use. The work continues as the tag technology is improving and more environmental data are becoming available. Now the challenge is to analyse the large amount of data into valuable species specific habitat use, migration pattern and movement range.</td>
<td>1142</td>
</tr>
<tr>
<td>The Argos system has allowed my project to successfully achieve our goals of tracking multiple breeding ferruginous hawks in the Canadian prairies. We have been able to collect 3 summers of breeding data for multiple hawks to date.</td>
<td>5192</td>
</tr>
<tr>
<td>We are still in the process of getting the data but we have already showed some fidelity in dispersal patterns.</td>
<td>4203</td>
</tr>
<tr>
<td>• Analyzing timing and pattern of migration</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>• Assessing home ranges/areas of seasonal usage and their shifts over the years</td>
<td></td>
</tr>
<tr>
<td>• Determining life cycle events such as calving</td>
<td></td>
</tr>
<tr>
<td>• Analyzing inter-herds movements</td>
<td></td>
</tr>
<tr>
<td>• Locating collared animals/herds and assessing the right timing of survey</td>
<td></td>
</tr>
<tr>
<td>• Collecting data on mortality</td>
<td></td>
</tr>
<tr>
<td>In October 2013 I began a project looking at the seasonal migration and thermal histories of large egg bearing American lobsters (Homarus americanus). The hypothesis being tested is that lobsters with eggs that are incubating will make a seasonal shallow-deep migration in order to stay in the warmest water available in the area. It is thought that they will utilize the warm surface water in the summer, and then move to the deeper waters in the winter, which will be the warmest location during the winter period.</td>
<td>5541</td>
</tr>
<tr>
<td>The starting point for this study was Flagg Cove in Grand Manan, New Brunswick which is in the Bay of Fundy. As satellite tags have never been used on lobsters before, 2013 saw the start of the pilot study where two lobsters were tagged. We utilized the Desert Star Systems’ Sea Tag MOD on our lobsters, which was set-up to record depth, temperature, and location until July 31 2014. On this date both tags popped off the animals, and one tag was successfully recovered, and the data for the other was</td>
<td></td>
</tr>
</tbody>
</table>
transmitted through the ARGOS system. The project so far was a great success; data analysis will begin this winter when the lobster temperature data will be compared to water temperature data from different areas, and the migration route will be determined.

The program is providing important information on grey seal distribution in eastern Canadian waters as part of an assessment of seal interaction with commercial fisheries. Tracking of blue whales tagged in the Gulf of St Lawrence in summer 2013, have shown them move to the edge of the Scotian Shelf, and hopefully, longer tracking in coming years should reveal potential wintering areas for the species which are unknown at present.

Using Argos, we have been successful in obtaining ocean temperature and salinity profile data from over 300 floats since the start of the Argo Canada program.

My research programme is making extensive use of ARGOS GPS technology. We have published many scientific papers in the peer reviewed literature and will continue to do so using our tracking data.

Another very successful year with collared boreal caribou in the Dehcho region of the NWT. The use of the collars over the years has enabled us to determine when and where caribou calves are born based solely on movement data and without the need to conduct aerial reconnaissance. By maintaining 30 plus collars annually we are able to calculate vital rates and combined with a single annual survey we are able to monitor population trend. Such information is crucial to the National Recovery Strategy for boreal caribou.

The Argos data we have been collecting are critical to our ability to delineate N.A. sea duck populations, and we are gradually becoming more successful in that goal as more data are accumulated.

Consistent signal received from a long lasting beacon: received almost 3 years of clear data information from one of our beacon deployed in the high Arctic (April 2010 to February 2013).

DND is unable to provide specific details; however, the data provided by the SLDMB through Argos has been instrumental in the successful completion of many Search and Rescue incidents since 1999 and has also contributed to DND’s knowledge and understanding of ocean currents and conditions.

ARGOS collars enabled us to track coyote movements in almost real time, allowing us to visit frequently-used sites (e.g. backyards with bed sites and routine foraging sites) in the field shortly after use by the coyote. This allowed us to identify what attractants are selected by coyotes and what mitigation strategies are needed for residents.

The first phase of our project (2007-2010) was highly successful and resulted in 3 published papers (see below). We expect to have the same success with our new deployed PTTs in the future.


Complete migration data collected on 5 birds in total, and 2 partial.

While the transmitters were only deployed in July 2014, we already are seeing the pathways that the birds are using for their fall migration. Determining migration routes is important for our ability to take conservation action for these species in population decline.
Appendix 6. Analysis of Local Operational Issues

<table>
<thead>
<tr>
<th>Comment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>• In several occasions, erroneous points were recorded far away from where animals could possibly be. They tend to appear when they are recorded outside of the scheduled time. We would like to learn the source of this problem, and also would like it to be fixed.</td>
<td>1572, 10572</td>
</tr>
<tr>
<td>• We completely lost transmissions from several collars before their life spans were due for an unknown cause.</td>
<td></td>
</tr>
<tr>
<td>• In several occasions, erroneous points were recorded far away from where animals could possibly be. They tend to appear when they are recorded outside of the scheduled time. We would like to learn the source of this problem, and also would like it to be fixed.</td>
<td>11572</td>
</tr>
<tr>
<td>• We completely lost transmissions from several collars before their life spans were due. It is extremely difficult to determine the true cause of this, however we suspected several causes: the collar slipped off the animal and dropped in the ocean; unit malfunctioned; battery died prematurely; it was buried underneath heavy snow/ice.</td>
<td></td>
</tr>
<tr>
<td>For CIS the precise location of a unit is not as critical as other user’s need. As such we have little use for GPS accuracy. Unfortunately, this is not the only driver within the organisation; communication cost is a much bigger issue.</td>
<td>00633</td>
</tr>
</tbody>
</table>


3. China

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>China</td>
</tr>
</tbody>
</table>

**Section 1. Overall Summary**

During Aug. 2013 and Jul. 2014, there are 20 institutes/organizations operating 28 programs using Argos to transmit data in China. The total of average active PTTS per month is 210.08, increased 36% compared to the previous year. Profiling floats and drifters account for 74.5% and 9.6% respectively, which indicate the physical oceanography community still dominates the Argos usage in China.

Ocean related agencies and universities such as National Ocean Technology Center, East China Sea Branch and North China Sea Branch of State Oceanic Administration (SOA), First, Second, and Third Institute of Oceanography (SOA), China Meteorological Administration (CMA), Ocean University of China carried out massive ocean observing using Argo floats and drifters with the aid of Argos system.

Animal related organizations/institutes such as Tianjin University, Chinese Academy Forestry, Institute of Hydrobiology Chinese Academy of Science, East China Sea Fish Research Institute conducted research on wildlife behavior by using satellite trackers.

<table>
<thead>
<tr>
<th>Table 1 user type by family (2013.08-2014.07)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average active PTTS per month</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Buoys and others</td>
</tr>
<tr>
<td>Profiling floats</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Fixed stations</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

**Section 2. Future Plans**

**China Argo Real-time Data Center** (Second Institute of Oceanography, SOA) plans to deploy 30 Argo floats in the next year. There will be 170-180 active floats using Argos system transmitting data in 2015.

**Institute of Hydrobiology, Chinese Academy of Sciences** purchased 5 Argos-linked Tags produced by Wildlife Computers Lnc. in 2013 to track the finless porpoise in the Yangzi River. Unfortunately, they didn’t find appropriate opportunity to deploy the Tag in the past year. One-day test was carried out in April 2014. The data transmission was fine but with unsatisfactory position accuracy. In the next 12 months, they are planning to track the finless porpoise in the Swan Delta and Poyang Lake to study its migratory routes.

Under the funding of ‘Antarctic Adjacent Waters Physical Oceanography and Marine Meteorology Project’, **Shanghai Ocean University** will deploy 2 CTD Oceanography SRDL in the Antarctic waters to study the physical environment there.

**Section 3. Technological Changes that affect User Requirements**
Users would be happy to operate with lighter, smaller instruments. For the transmission system, greater data volume and longer online availability with reduced cost would be appreciated.

**Section 4. User issues, problems, and level of satisfaction with Argos**

As the CLS’s Chinese partner and the largest Argos users in China, **Tianjin Hrydrowise Technology Development Center** has been operating well with increasing users and activities. By providing in-time service and related technical advisory to Chinese users, Hydrowise won high user satisfaction. During the past year, it has produced more than 70 sets of Argos-3 based drifters and 70% of them had been deployed in the field. More than 10 Argo floats equipped with Argos-3 module was deployed for oceanographic observations. Tests on moored buoy had been carried out. The Chinese version of Argos user manual was submitted to the CLS and will be released on the Argos Service website soon. This will greatly help the Chinese user in using the Argos system.

In summary, the level of user satisfaction with Argos is high in China but some concerns do exist. The major concern is the data availability. Some of the users are satisfied with the current 20 days, while some would like CLS to further extend the data online availability. Some worry about the low data transmission efficiency and effectivity. The secondary concern is related to the cost. See Appendix 1 for individual comments.

**Section 5. Successful programme use of Argos**

**National Ocean Technology Center (NOTC)**

1) **Northwest Pacific Marine Monitoring and Forecasting System Project**

In the Northwest Pacific Marine Monitoring and Forecasting System Project funded by the SOA, NOTC is responsible for the monitoring of marine radiation and the R&D of online monitoring technology. In 2013, 15 surface drifters and 2 Argo floats were deployed in Bashi Channel and Northwest Pacific during the spring and autumn cruises.

2) **Emergency Forecasting System for MH370 Wreckage Search**

In May 2014, 5 surface drifters were deployed in Indian Ocean for collecting the observations for the Emergency Forecasting System for MH370 Wreckage Search.

**China Argo Real-time Data Center (Second Institute of Oceanography, SOA)**

From August 2013 to July 2014, 171 Argo profiling floats of China Argo Real-time Data Center used Argos satellites as communication system. Most of the floats are funded by the projects of Ministry of Science and Technology and SOA. They are part of the International Argo Project. More than 150 float are active to the end of July 2014.
East China Sea Fish Research Institute
East China Sea Fisheries Research Institute has been studying the migration pattern of Yellow-fin tuna (Thunnus albacares) in South China Sea under the support of a project of National Science & Technology Pillar Program, 'Development of Fishing technology and New Resources in the South China Sea (2013BAD13B06)'. In April to June, 2014, the project hired a fishing boat “Dianbai 42212” of Dianbai County of Guangdong Province to set tuna that attached with satellite tags free in the Nansha Waters of the South China Sea. Two tuna were set free. One died soon. Data with good quality were transmitted back after three days. Data from the second tuna have not been transmitted yet.

Ocean Science College of Shanghai Ocean University undertook a sub-project of the Special Project of SOA “Integrated Environmental Investigation and Assessment of Polar Waters”, that is the observation of physical oceanography and marine meteorology in the waters around the Antarctic in 2013. In October 2013, the sub-project deployed two sets of CTD Oceanography SRDL on seals. The devices obtained the profiling data with the aid of seal's up and down in the sea and transmitted the data to user.
Liaoning Ocean & Fisheries Sciences Research Institute
The institute conducted satellite tracking of spotted seal by using the SPOT5 and MK10, which are suitable for large marine mammal’s application, to study the migration and population distribution of seal. 12 tags were deployed during the past years, and the location information of 3-100 days were successfully obtained.

Section 6. Analysis of Local Operational Issues
None.

Appendix 1 Individual comments on User Issues, Problems and Level of Satisfaction with Argos

<table>
<thead>
<tr>
<th>Organization/Program</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Argo Real-time Data Center</td>
<td>We would like to suggest CSL to contact the PI or National Argo Data center of the Argo project member states to discuss the</td>
</tr>
<tr>
<td>National Ocean Technology Center (NOTC)</td>
<td>We highly appreciate the new free services provide through the Argos website. The extension to last 20 days of data available on ArgosWeb and the provision of trajectory figures have greatly facilitate the users.</td>
</tr>
<tr>
<td>Shandong Academy of Science Institute of Oceanographic Instrumentation (SDIOI)</td>
<td>In 2011, we bought 2 Argo transmitter and antenna to conduct the experiment of transmitting the observation data by use of Argos satellites. After a half-year experiment, we found that the Argos satellites were not applicable for the real-time data transmission. The problems were: 1. Data transmission could not be really real-time. Marine buoy data should be transmitted in real time to the receiving station. There were only a few Argos satellites. Data received at the receiving station sometimes could be delayed for several hours, which was not able to meet the requirement for real-time transmission. 2. Argos system only had two satellites with high data rate channel when our experiment was conducted. Back then, these two satellites had low success of data transmission in the high data rate channel, which was not able to meet the requirement of data receiving. 3. Argos satellites had high rate of data transmission success in the low-speed channel, but the small data volume could not meet the requirement for large data transmission. The above are the problems identified by our experiment. They are only for reference. Therefore, we did not choose Argos system for data transmission for the buoy deployed later on in the Greenland Sea.</td>
</tr>
<tr>
<td>East China Sea Fisheries Research Institute</td>
<td>Due to limitation of field operation and the harsh environment, a lot of biologists like us could not always download the data in time. We hope the ArgosWeb to prolong the time for online data access. The programs in our institute are small programs with limited budget. We would be very happy if CSL take the character of the organization in to consideration, to reduce the cost of data transmission for NGOs and limited funded program. We hope to get access to the technical materials about the new Argos system with two-way communication mode, so as to help our application. We also hope that CLS organizes Argos system technical training to help more users to better understand the system and therefore to facilitate the daily usage. The tags we purchased were well kept in the refrigerator. However, we could still get some data delivered by the Argos satellite for the tag that is not triggered. Is it possible that the Argos misjudged the tags with similar serial number? We would like to find out the reason for this small volume data transmission, and therefore prevent unnecessary cost in the future.</td>
</tr>
<tr>
<td>Liaoning Ocean &amp; Fisheries Sciences Research Institute</td>
<td>During the use, we found that location data have relative low accuracy, probably because marine mammals spend most of...</td>
</tr>
</tbody>
</table>
4. Germany

Germany national report to the JTA
(JTA National Report on Current and Planned Argos Use)

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Germany</td>
</tr>
</tbody>
</table>

**Section 1. Overall Summary**

1. Water masses in the Nordic Seas  
Detlef Quadfasel, DETLEF.QUADFASEL@ZMAW.DE  
Hamburg University, Zentrum für Meeres- und Klimaforschung, Institut für Meereskunde, Bundesstr. 53, 20146 Hamburg, Germany  
ARGOS Programme Number 592

The aim of the program is to monitor the water masses in the different basins of the Nordic Seas with the data from profiling floats (Greenland Sea, Norwegian Sea, Iceland Sea, Lofoten Basin). Since 2001 floats were deployed in the Greenland Sea, since 2004 also in the Norwegian Sea and Lofoten Basin and since 2005 in the Iceland Sea. Changes in the water mass transformation processes and therefore also in the water mass characteristics are examined in the context of climate change. The floats are part of the international ARGO programme. No more floats have been deployed in the report period.  
*More information is available at* http://www.ifm.zmaw.de/forschung/regionale/projekte/mersea/

Deployment of a float during heavy weather at the Lofoten Basin in 2012 from RV Poseidon

2. IFM-GEOMAR: Mooring ARGOS beacon  
Jürgen Fischer, JFISCHER@GEOMAR.DE  
Johannes Karstensen, JKARSTENSEN@GEOMAR.DE  
Helmholtz-Zentrum für Ozeanforschung Kiel, GEOMAR, Düsternbrooker Weg 20, 24105 Kiel, Germany  
Argos Programme number 783
The aim of the project is to monitor subsurface moorings that get accidentally released and are at drift by using ARGOS beacons. The beacons are equipped with a pressure or conductivity sensitive switch which activates them when at the sea surface. The present and envisioned activities cover all ice free areas of the global ocean, from the shelves to the deep basins, but with a focus on the Atlantic.

3. Norwave
Kai Herklotz, kai.herklotz@bsh.de
Bundesamt für Seeschifffahrt und Hydrographie, Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany
ARGOS Programme Number 948

The Norwave measurements take place at fixed monitoring stations in the North Sea and Baltic Sea (see Marnet programme). Waverider buoys are measuring sea state conditions, one of these is transmitting data through the ARGOS satellite system. Watchdog services are used for the other buoys. More information is available at [http://www.bsh.de/de/Meeresdaten/Beobachtungen/Seegang/index.jsp](http://www.bsh.de/de/Meeresdaten/Beobachtungen/Seegang/index.jsp).

4. Bird migration in Africa and Eurasia - a pilot study
Martin Wikelski, martin@ORN.MPG.DE
Max Planck Research Centre for ornithology, Migration and Immuno-ecology (Vogelwarte Radolfzell), Schloß Möggingen, Schloßallee 2, 78315 Radolfzell, Germany
ARGOS Programme Number 983

5. Migration of raptors
Bernd Meyburg, BUMeyburg@aol.com
World working group on birds of prey and owls (Berlin), Wangenheimstr. 32, D-14193 BERLIN, Germany.
ARGOS Programme Number 1126

Wave measurements at station Helgoland.
The W.W.G.B.P. has been active for thirty years now and today plays an important role in the promotion of raptor conservation and research on an international level. Its membership list today comprises over 3,000 raptor specialists and enthusiasts in all parts of the world, and anybody with an interest in raptors is welcome to become a member. The W.W.G.B.O tracks birds of prey world-wide since 1992. These raptors are belonging to 14 species. Resulting publications are available as PDF files: www.raptor-research.de".

More information is available at http://www.raptors-international.de/index.htm

6. Migratory behaviour of Antarctic seals
Joachim Plötz, JPLOETZ@AWI-BREMERHAVEN.DE
Alfred Wegener Institut, Helmholtz Zentrum für Polar- und Meeresforschung, P.O.Box 120161, 27515 Bremerhaven, Germany
ARGOS Programme Number 1535

The Marine Mammal Tracking (MMT) project of AWI and its Partner Institutions concentrates on the Southern Ocean. Variations in the foraging ranges and movements of marine mammals are an important source of information about environmental variability integrated over a wide range of spatial and temporal scales. The complex synthesis of data on marine mammal positioning and feeding locations with oceanography and bathymetry aims to identify those parameters which are characteristic for feeding areas of top predators in the respective regions, and will provide clues as to why some areas of the Antarctic Ocean are important to these animals while others are not. This will further our understanding of the distribution patterns of marine mammals in Antarctic and Subantarctic marine ecosystems of the Southern Ocean. More information is available at http://www.wdcmare.org/projects/mmt.html

Tagged southern elephant seal
7. IfM-Geomar: gliders
Gerd Krahmann, gkrahmann@geomar.de
Helmholtz-Zentrum für Ozeanforschung Kiel, GEOMAR, Düsternbrooker Weg 20, 24105 Kiel, Germany
ARGOS Programme Number 1783

The gliders are equipped with Argos beacons to be located in case other navigational and communication devices fail. There are 10-14 Gliders to be used in all parts of the Ocean. More information is available at http://gliderweb.geomar.de/

Glider deployment with Rubber Boat – the usual procedure

8. German-Argo/BSH
Birgit Klein, BIRGIT.KLEIN@BSH.DE
Bundesamt für Seeschifffahrt und Hydrographie, Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany
ARGOS Programme Number 1895

The aim of the program is to contribute to the international Argo programme with about 50 floats per year. Presently all 101 BSH floats are transmitting their data through the ARGOS system. The BSH is using Argo data to monitor water mass changes in the North Atlantic since they are changing inflow conditions for waters entering the North Sea. Main deployment areas will be the Atlantic and source regions in which deep water formation occurs in the polar areas. More information is available at http://www.german-argo.de.
09. Marnet, BSH
Kai Herklotz, KAI.HERKLOTZ@BSH.DE
Bundesamt für Seeschifffahrt und Hydrographie, Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany
ARGOS Programme Number 2120

The Marnet program consists of fixed monitoring stations in the North Sea and Baltic Sea which measure oceanic parameters as temperature, salinity, oxygen and currents in the water column. Wave rider buoys are measuring sea state conditions, one of these is transmitting data through the ARGOS satellite system. Watchdog services are used for the other buoys. More information is available at http://www.bsh.de/de/Meeresdaten/Beobachtungen/MARNET-Messnetz/index.jsp.

10. Iffezheimer Störche auf Reisen
Herbert König, KINGSCASTLE@T-ONLINE.DE
Initiativgruppe Naturschutz, Severin-Schäfer-Str. 3, 76473 Iffezheim
ARGOS Programme Number 3100

The conservation initiative Iffezheim has ringed a storch in 2006 which hatched in Iffezheim. The Argos transmitter is used to study the migratory behaviour of this bird. More information is available at http://www.iniffezheim.de/
11. European Whitefronted Geese Research Project, European whitefronted goose (Blessgans)
Helmut Kruckenberg, HELMUT.KRUCKENBERG@BLESGANS.de
Europäisches Blessgans Forschungsprogramm, Am Steigbügel 3, D-27283 Verden (Aller), Germany
ARGOS Programme Number 3189

The project studies the European White-fronted Goose (Anser albifrons)- its migration, behavior, and ecology. The White-fronted Goose is the most numerous goose species wintering in Western Europe. By satellite tracking important new facts about migration behavior and routes were found. The project used microwave GPS transmitters for 36 birds and relays data via ARGOS, a special internet tool (live tracking) based on GoogleEarth was developed in 2006. The project is support by NIOO (Wagenigen). Additional transmitters (microwave solar GPS, 30g) have been used to tag three Lesser White-fronted Goose (Anser erythropus) and three more taggings are underway. More information is available at http://www.blessgans.de

Reports / Publications:


12. Montagu’s Harrier
Klaus-Michael Exo, MICHAEL.EXO@IFV-VOGELWARTE.DE
Institut für Vogelforschung, "Vogelwarte Helgoland", An der Vogelwarte 21, 26386 Wilhelmshaven, Germany
ARGOS Programme Number 3338

The project studies the migration routes as well as the location of stopover sites and wintering areas of Circus pygargus (Montagu’s Harrier, Wiesenweihe) breeding in NW- and NE- Europe, respectively. The German project has been terminated but the research is continued under Dutch ledad. Circus pygargus is an endangered long distance migrant, breeding in northern Europe and wintering in sub-Saharan W-Africa. Reports can be downloaded at http://www.ifv-vogelwarte.de/downloads/96/wiesenweihe_dbu_abschlussbericht_ifv_jan_2009.pdf http://www.ifv-vogelwarte.de/files/Dateien/DBU_Bericht_2011_ifV.pdf

13. ESA precursor, Tracking of individual birds
Klaus-Michael Exo, MICHAEL.EXO@IFV-VOGELWARTE.DE
Institut für Vogelforschung, "Vogelwarte Helgoland", An der Vogelwarte 21, 26386 Wilhelmshaven, Germany
ARGOS Programme Number 3490
The project is carried out in the context of the ESA FlySafe activities. It analyses the technical prospects and limits in using satellite based bird tracking and monitors small scale and large scale movements. The work includes analyses of medium- and long-range bird migration behavior as well as small scale feeding flights (study species: Herring Gull Larus argentatus, Lesser blackbacked Gull Larus fuscus, Barnacle Geese Branta leucopsis). A report is available at http://www.ifv-vogelwarte.de//downloads/96/esa_report_sovon_cover_2008-10.pdf

Figure 5.1 (ESA report): Colour marked Herring Gull (M.AFH) carrying a GPS PTT on the beach of Texel, Netherlands, on 24-10-2007. Photograph by Pieter Veeling

14. Hobby falcon
Bernd Meyburg, BUMeyburg@aol.com
World working group on birds of prey and owls, Wangenheimstr. 32, D-14193 BERLIN, Germany.
ARGOS Programme Number 4126 (sub-PGM of PGM 1126)

The W.W.G.B.P. has been active for thirty years now and today plays an important role in the promotion of raptor conservation and research on an international level. Its membership list today comprises over 3,000 raptor specialists and enthusiasts in all parts of the world, and anybody with an interest in raptors is welcome to become a member. The W.W.G.B.O tracks birds of prey world-wide since 1992. Theses raptors are belonging to 14 species. Resulting publications are available as PDF files: www.raptor-research.de".
More information is available at http://www.raptors-international.de/index.htm

15. CV Turtle Tracking
Bjoern Fiedler, bfiedler@geomar.de, Victor Stiebens vstiebens@geomar.de
Helmholtz-Zentrum für Ozeanforschung Kiel, GEOMAR, Düsternbrooker Weg 20, 24105 Kiel, Germany
ARGOS Programme Number 4810

The department of marine ecology studies the endangered Loggerhead Sea Turtle, which boosts the third largest nesting aggregation at the islands of Cape Verde. During 2011, 2012 and 2013 a couple of turtles have been tagged with satellite transmitters equipped with CTD sensors (Conductivity, Temperature and Depth) and oxygen optodes to get a grip on the habitat turtles live in. However such devices can only be mounted on adult and subadults. The program has been continued in 2014 with tags on 6 turtles, 3 males (Fra, Zé and Mingo) and three females (Bemvinda, Kika, Kamoka).

The project has benefited from the addition of numerous amazing volunteers from Turtle Foundation, the Maio Biodiversity Foundation, Projecto Vitó and the Instituto Nacional de Desenvolvimento das Pescas (INDP). The work is supervised by Dr. Christophe Eizaguirre (Evolutionary Biologist- GEOMAR, c.eizaguirre@qmul.ac.uk).
16. Studies to understand the decline in migratory waterbirds using the German Wadden Sea
Klaus-Michael Exo, MICHAEL.EXO@IFV-VOGELWARTE.DE
Institut für Vogelforschung, "Vogelwarte Helgoland", An der Vogelwarte 21, 26386 Wilhelmshaven, Germany
ARGOS Programme Number 4852

About 40% of the birds using the Lower Saxon Wadden Sea during migration declined during the last decades. The main aim of the project is to analyze (ecological) factors that may cause the decline, therefore migration routes and connectivity between the Wadden Sea and Arctic breeding grounds as well as African wintering areas will be analyzed for a few selected species, the Grey Plover *Pluvialis squatarola* and the Bar-tailed Godwit *Limosa lapponica*, using satellite transmitters as well as geolocators.

17. Satellite Tracking of Cuckoos
Dr. Andreas von Lindeiner a-v-lindeiner@lbv.de, Friederike Herzog f-herzog@lbv.de
Landesbund für Vogelschutz in Bayern e.V., Eisvogelweg 1, 91161 Hilpoltstein, Germany
ARGOS Programme Number 5362
The aim of the project is to identify the migration routes, stop-over sites and wintering locations of German and Belorussian cuckoos. The knowledge that the study will provide, should be used for conservation measures for the endangered species. At the moment there are 11 active PTTs in the project.

More information about the project is available at www.lbv.de/kuckuck.

Left: cuckoo with satellite tag from the LBV project (© LBV). Right: the 11 individual cuckoos tagged in 2014.

19. Population of ruddy-headed goose
Klemens Puetz, klemens.puetz@ewetel-net
Antarctic Research Trust
ARGOS Programme Number 5526

The migratory sheldgeese (Ruddy-headed Goose Chloephaga rubidiceps, Ashy-headed Goose C. poliocephala and Upland Goose C. picta) are endemic species of southern South America. All three species have been historically considered an agricultural pest by local ranchers. Although little data exist on sheldgeese ecology, hunting of these species has been encouraged across their entire range and allowed without restriction in terms of number of birds killed. Consequently, the Ruddy-headed Goose is already endangered, whilst the other two species are rapidly approaching this status. Our main goal is to gather essential knowledge about the migratory patterns of the three sheldgeese species and ultimately identify important areas for their conservation throughout the annual cycle. Furthermore, we intend to evaluate their interactions with human activities in order to apply effective conservation measures.

20. Argo Floats
Lothar Stramma, Istramma@GEOMAR.DE
Helmholtz-Zentrum für Ozeanforschung Kiel, GEOMAR, Düsternbrooker Weg 20, 24105 Kiel, Germany
ARGOS Programme Number 8165

Floats tracks at 400 m and 1000 m depth on the climatological annual mean oxygen distribution at 400 m depth of floats deployed in 2011 (left panel, 5 of 8 still active) and 2014 (right panel).
In 2014 seven floats were deployed in the eastern tropical South Pacific to continue the study of the circulation and water mass anomalies. Most of the floats were placed in eddies to investigate water mass and oxygen changes within the eddy during its westward propagation along the boundary of the oxygen minimum zone. The data transmission of the floats deployed in 2014 is made now via Iridium. The floats are equipped with oxygen sensors and were provided by the SFB-754. More information is available at http://www.sfb754.de.

21. Subsurface mooring monitoring
Gerd Rohardt, Gerd.Rohardt@awi.de
Alfred Wegener Institut, Helmholtz Zentrum für Polar- und Meeresforschung, P.O.Box 120161, 27515 Bremerhaven, Germany
ARGOS Programme Number 8919 (sub-program 919)

The aim of the project is to monitor moorings with Argos watchdogs. About 50 watchdogs have been pooled in this programme. More information is available at: http://www.awi.de/de/forschung/fachbereiche/klimawissenschaften/messende_ozeanographie/instrumente/verankerungen/

22. Norwave
Kai Herklotz, kai.herklotz@bsh.de
Bundesamt für Seeschifffahrt und Hydrographie, Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany
ARGOS Programme Number 9948 (see 948)

The Norwave measurements take place at fixed monitoring stations in the North Sea and Baltic Sea (see Marnet programme). Waverider buoys are measuring sea state conditions, one of these is transmitting data through the ARGOS satellite system. Watchdog services are used for the other buoys. More information is available at http://www.bsh.de/de/Meeresdaten/Beobachtungen/Seegang/index.jsp

23. Argo sub-surface
Olaf Boebel, OBOEBEL@AWI-BREMERHAVEN.DE
Alfred Wegener Institut, Helmholtz Zentrum für Polar- und Meeresforschung, P.O.Box 120161, 27515 Bremerhaven, Germany
ARGOS Programme Number 10919 (Sub-program of program 919)

The project studies variability and long-term changes in warm deep water in the Weddell Gyre. It also monitors convection events. The floats are equipped with special ice sensing technology to withstand the ice season during winter. The floats are part of the international ARGO programme. A total of 4 remaining floats with ARGOS communication are registered in the programme. Due to wintery surface ice coverage the transmission of the floats are switching to Iridium, due to shorter surface transmission times. More information is available at http://www.awi.de/en/research/research_divisions/climate_science/observational_oceanography/projects/weccon/
24. Red Kite
Bernd Meyburg, BUMeyburg@aol.com
World working group on birds of prey and owls, Wangenheimstr. 32, D-14193 BERLIN, Germany.
ARGOS Programme Number 11126 (Sub-program of PGM 1126)

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25. Seismic ice flow drifter
Gerd Rohard, Gerd.Rohardt@awi.de
Alfred Wegener Institut, Helmholtz Zentrum für Polar- und Meeresforschung, P.O.Box 120161, 27515 Bremerhaven, Germany
ARGOS Programme Number 12919 (sub-program of 919)

The project uses Argos beacons to locate seismometers on ice floats during expeditions. The use of the beacons is suspended at the moment and will be used again in 2014-2015. A total of 6 beacons are registered in the programme.

26. European whitefronted ringing Project  
Helmut Kruckenberg, helmut.kruckenberg@blessgans.de  
Europäisches Blessgans Forschungsprogramm, Am Steigbügel 3, D-27283 Verden (Aller), Germany

27. Bird migration and conservation  
Martin Wikelski, martin@ORN.MPG.DE  
Max Planck Research Centre for ornithology, Migration and Immuno-ecology (Vogelwarte Radolfzell),  
Schloß Möggingen, Schloßallee 2, 78315 Radolfzell, Germany Argos Programme Number 14983 (sub-program of 983)

28. MPIO Arctic foxes  
Martin Wikelski, martin@ORN.MPG.DE  
Max Planck Research Centre for ornithology, Migration and Immuno-ecology (Vogelwarte Radolfzell),  
Schloß Möggingen, Schloßallee 2, 78315 Radolfzell, Germany Argos Programme 17983

29. Eagles  
Bernd Meyburg, BUMeyburg@aol.com  
World working group on birds of prey and owls, Wangenheimstr. 32, D-14193 BERLIN, Germany  
ARGOS Programme Number 31136 (sub-PROGRAM OF PGM 1126)

The W.W.G.B.P. has been active for thirty years now and today plays an important role in the promotion of raptor conservation and research on an international level. Its membership list today comprises over 3,000 raptor specialists and enthusiasts in all parts of the world, and anybody with an interest in raptors is welcome to become a member. The W.W.G.B.O tracks birds of prey world-wide since 1992. Theses raptors are belonging to 14 species. Resulting publications are available as PDF files: www.raptor-research.de".  
More information is available at http://www.raptors-international.de/index.htm

The following projects have not been active in 2014:  
Programme 1027 (Full scale wave measurements), Programme 1461(Lander), Programme 1806  
(Bigset), Programme 3338 (Montagu's Harrier), Programme 3932 (Cosyna), Programme 3991  
(Nordatlantik), Programme 4163 (Great Bustard Research Programme), Programme 4237 (Tracking of Silver eel during their spawning), Programme 4288(Intra-African Migration of Black Coucals),  
Programme 4805(Behavioral ecology of pectoral sandpiper).

Section 3. Technological Changes that affect User Requirements

GEOMAR activities will be continued at the same level. That is relevant for the following programs:  
8165 (Argo equivalent float missions), 1783 (Glider missions), 783 (mooring watchdogs). No additional floats will be deployed within the ARGOS project 8165 in the eastern Pacific

AWI will continue to use the ARGOS system for their mooring watch dogs (program 8919) but uses Iridium communication for all of its Argo Floats.
Programm 5362 will run until December 2015. At the moment, there are 13 active PTTs (5g). Probably, there will be about 10 additional PTTs in Germany and Belarus in use in spring 2014.

Programme 3189 reports plans to use additional GSM transmitters with high resolution data loggers next year. Those transmitters and loggers have already been tested on a joint expedition to Russia with MPI.

Programme 3189 also reports that a Webtool with a gateway to MOVEBANK is ready next and can be used to display GPRS transmitters. The programme is expecting to expand the number of tracked birds.

Programme 34810 will continue the tagging of loggerhead turtles with 3-6 individuals.

Programme 1857 „Tracking of penguins at sea“ has been inactive for the last year but is expected to continue soon.

Section 4. User issues, problems, and level of satisfaction with ARGOS

The bird trackers in general mentioned higher accuracy needs in locations and needs for smaller and lighter transmitters.

Programme 8919 has mentioned the wish for two-way communication for the mooring watch dogs to be able to change the communication parameters in case that recovery after unexpected surfacing is delayed.

Section 5. Successful program use of ARGOS

Programme 5362 is using the Argos telemetry successfully.

Section 6. Analysis of Local Operational Issues

The compilation of a list of users for each individual country has helped a lot in compiling the national report. The new format for the national report is also very helpful.

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>India</td>
</tr>
</tbody>
</table>

Report submitted by M. Ravichandran, INCOIS, India)

Year: 2014
Country: INDIA

Section 1. Overall Summary

India is using ARGOS services for Ocean Observation platforms such as Argo floats, drifting buoys, ADCP moorings, fish tagging and moored buoys.
Section 2. User Types by family (Table of PTT use by the country)

<table>
<thead>
<tr>
<th></th>
<th>Average active PTTs per month</th>
<th>Total PTT.Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buoys and others</td>
<td>26</td>
<td>19.77</td>
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<tr>
<td>Profiling floats</td>
<td>79</td>
<td>15.32</td>
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<tr>
<td>Animals</td>
<td>10</td>
<td>3.51</td>
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<tr>
<td>Fixed stations</td>
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<td>12.78</td>
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<tr>
<td>TOTAL</td>
<td>125</td>
<td>51.38</td>
</tr>
</tbody>
</table>

Section 3. Technological Changes that Affect User Requirements
Since the bandwidth is low, we could not acquire higher vertical resolution of temperature and salinity. Also, the floats need to be longer time on the surface for transmission, it quickly drifting to the shore or beached. Further, we could not communicate to the float/buoy, once deployed. Hence, we started using some of the floats with Iridium communication. ARGOS can think about higher bandwidth and also two way communication.

Section 4. User issues, problems, and level of satisfaction with ARGOS
Though ARGOS could cater many useful services with low cost, bandwidth need to be increased. Also, more number satellites are required for the low latitude regions for better repeatability.

Section 5. Successful program use of ARGOS
Low cost, low power one way communication is very much suitable for some platforms, but it will not cater all platforms. Improvement in location accuracy is good initiative by ARGOS.

Section 6. Analysis of Local Operational Issues
Nil

6. New Zealand

<table>
<thead>
<tr>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>Country</td>
<td>New Zealand</td>
</tr>
</tbody>
</table>

Section 1. Overall Summary
The NZ JTA Argos usage in 2014, consists of the MetService Buoy programme and ten other programs which track a variety of animals (5 bird, 3 fish and a mammal) and includes a ground monitoring station which observes the temperature of a volcano crater lake. The organisations using Argos are several Governmental departments, Universities and a private company.

Section 2. Future Plans
As mentioned by last years JTA report the NZ MetService buoy program is still moving towards Iridium Drifters due to the cost savings in communications. Any reduction of these costs could
possibly reverse this and increase Argos usage. There is no mention of the future plans of Argos users as there is no provision in the user report for this. There seems to be a reduction of Argos users from previous years perhaps due to a cutback of government funding.

Section 3. Technological Changes that affect User Requirements

Weight of the PTT is a limitation of one user that tracks birds as it limits the species that can be used for PTT tag deployment.

Section 4. User issues, problems, and level of satisfaction with Argos

All users seem generally happy with the Argos system often switching programmes with different species not included in the program name logged. Users mention their satisfaction with the equipment being reliable in the varied types of climate that New Zealand has got to offer. One user mentioned that working with animals that are difficult to find and tag the unused PTT charges can become a bit of a financial burden.

Section 5. Successful programme use of Argos

The MetService buoy programme and the GNS volcano monitoring continues to be successful due to the reliability of equipment and service provided. The users gave indication that their programs are successful with some examples being:

- Tracking NZ Sea lions at Campbell Island into area of commercial fisheries.
- Understanding habitat, migrations, residency and diving patterns of Great White sharks in NZ.
- Making informed conservation actions for the Long-tailed Cuckoos by tracking them for the first time.

Section 6. Analysis of Local Operational Issues

Generally Argos users are content with needs with a request for new technology to diversify their studies. Some users feel that the Argos costs are too high and the charging schemes too inflexible to fully extend their research.

7. South Africa

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Republic of South Africa</td>
</tr>
</tbody>
</table>

Role Player 1 – South African Weather Service (SAWS)
Role Player 2 – University of Pretoria – Mammal Research Institute (MRI)
Role Player 3 – Ezemvelo KZN Wildlife
Role Player 4 – University of the Witwatersrand (Wits)
Role Player 5 – Mulilo Renewable Energy

Section 1. Overall Summary

RP1: SAWS has been deploying drifting weather buoys on behalf of the Global Drifter Program for the past year. These deployments fall under the DBCP’s respective programmes (ISABP, IBPIO and IPAB). They also act as liaison between the Governments of South Georgia, the Falklands and Tristan da Cunha for assistance in deployment and permission to place fixed weather buoys on the Islands of Tristan da Cunha and South Thule for atmospheric pressure measurements. The drifting weather buoys make use of the Argos System to transmit the data.

RP2: The Mammal Research Institute (MRI) of the University of Pretoria conducts multi-species tracking on Marion Island. During the previous year Southern Elephant Seals (Mirounga leonina), Subantarctic fur seals (Arctocephalus tropicalis), Antarctic fur seals (A. gazella) and Killer Whales (Orcinus Orca) were all tagged and tracked. The animals are tagged at various sites around the Island, depending on the time of the year. The MRI’s research program has received approval for an additional three year’s funding.

RP3: As part of the Maluti Drakensberg Vulture Project, 10 Bearded Vultures and 4 Cape Vulture are currently fitted with microwave telemetry PTTs. For the next year, 2 more Cape Vulture will be tagged. The objective is to determine the causes of mortality of these birds and to obtain more information on the spatial and temporal use of their home range to assist in the conservation of these two red data species.

RP4: Since June 2013, no new collars were deployed. Awaiting the capture of two animals in order to deploy two collars – hopefully by January 2015.

RP5: The Black or Verreaux Eagle (Aquila verreauxii) it is a large bird of prey distributed from Israel, southern Chad and western Sudan to South Africa. It breeds on rocky areas and river gorges where its main prey, the rocky hyrax occurs. It is not a globally threatened species but it is vulnerable to human threats like poisoning, collision and electrocution with powerlines. Its population size it is unknown but it seems that as a consequence of the mentioned threats it has decline. Because of the huge extensions of the Nama Karoo grasslands, its ecology remains unknown, despite recent studies developed (Davies 2000). It lays in June-July usually two eggs and incubation lasts 43-46 days. For a proper
 ecological monitoring, satellite transmitters may greatly contribute. It is impossible for researchers to do monitoring through such huge and rugged terrain. Furthermore, wind energy projects are under evaluation and eagles habitat coincide to some extent with wind energy planning. Thus, for an appropriate planning GPS/Argos may provide accurate information. The aims of the study will be the following:

1) Monitoring movements of a Black Eagle population in the Karoo, Northern Cape (South Africa) according to land use and prey availability.
2) Acquire knowledge of flying behaviour in relation to landscape characteristics.
3) Design mitigation and conservation measures according to wind development projects.

Section 2. User Types by family (Table of PTT use by the country)

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</tr>
<tr>
<td>Profiling floats</td>
<td>18 (did not change)</td>
<td>18 (did not change)</td>
</tr>
<tr>
<td>Animals</td>
<td>33 [19 (RP2) 14 (RP3)]</td>
<td>33 [19 (RP2) 14 (RP3)]</td>
</tr>
<tr>
<td>Fixed stations</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>85</strong></td>
<td><strong>85</strong></td>
</tr>
</tbody>
</table>

Section 3. Technological Changes that Affect User Requirements

RP1: None
RP2: None
RP3: None
RP4: Nothing to report – no deployments done
RP5: None

Section 4. User issues, problems, and level of satisfaction with ARGOS

RP1: No issues experienced. Can always access the data immediately when we need to.
RP2: No issues or problems were experienced. The manufacturing problem reported last year (devices failed to switch on) seemed to have been resolved.
RP3: The new contract has been signed. There are no problems experienced, apart from manufacturing problems of the devices itself.
RP4: Nothing to report – no deployments done
Section 5. Successful program use of ARGOS

RP1: Argos is used to verify that the drifters are operational before deployment, as well as track and download the data.
RP2: None
RP3: The use of Argos in obtaining GPS locations of a number of individual vultures on an hourly basis has provided information on their daily movement patterns that can be used to inform planned wind-farm developments.
RP4: Nothing to report – no deployments done
RP5: No feedback received

Section 6. Analysis of Local Operational Issues

RP1: We have no problems with ARGOS.
RP2: No problems were experienced.
RP3: No problems were experienced.
RP4: Nothing to report – no deployments done
RP5: No feedback received

Compiled by S du Toit
For the JTA National Report

8. Spain

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Spain</td>
</tr>
</tbody>
</table>

Section 1. Overall Summary

Animal tracking dominated Argos activity in Spain in 2014. 47 programs for Wildlife and 10 for Oceanography are currently active. The animal applications track mainly birds (97% of the devices), land animals (1%), marine animals (1%) and fishes (1%).

Section 2. User Types by family (Table of PTT use by the country)
The number of active PTTs has decreased from 2013 to 2014, possibly due to the economical situation in Spain and the appearance of new and cheaper technologies for the remote monitoring of animals.

**Section 3. Technological Changes that Affect User Requirements**

**Section 4. User issues, problems, and level of satisfaction with ARGOS**

The price of the service is a point that all the programs that have contact us have commented, over all now that new cheaper technologies of remote monitoring are been developing, mainly for animals. Also, the bird trackers in general mentioned higher accuracy needs in locations and needs for smaller and lighter transmitters.

**Section 5. Successful program use of ARGOS**

Since 2011, the Migra Programme ([www.migraciondeaves.org](http://www.migraciondeaves.org)) of SEO/BirdLife has become one of the most successful programs of bird migration monitoring in Spain. It includes information about movements and migration of birds tagged with PTTs and other remote monitoring devices, of individuals marked in the program itself as well as of birds tagged in other programs of different researching groups. Two papers about raptors migration had been published in international scientific journals, and other two are in preparation, all of them using data from PTTs.

The Ramed Project of Spanish Institute of Oceanography (IEO) has, at this time, two Argos locators that allow us to find our mooring lines in the case of release or break earlier than planned. They currently have a line anchored in Ibiza Channel and at the end of this year or the beginning of the following they will take out another anchoring in the north of Menorca. Lately they have not had any setbacks and have recovered their material on schedule. Years ago (1997) Argos service was very useful to recover some lines.

The Marine IBAs Project of SEO/BirdLife in Spain finished very successfully, and the Spanish Government has declared as protected areas the majority of the IBAs proposed in the Project. The BirdLife IBA Programme was a worldwide initiative aimed at identifying and protecting a network of critical sites for the conservation of the World’s birds.

**Section 6. Analysis of Local Operational Issues**

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

Below is status for ARGOS program of Thomas Alerstam, Lund University reported

**Section 1. Overall Summary**
Project 1204 (satellite tracking of migrating birds) continues at a moderate level. Presently there are 8 active PTTs on raptors, cuckoos, terns and shorebirds.

**Section 2. Future Plans**

The plans are to focus on continued tracking also during the coming years. Long-term tracking of the same individual for many years are particularly important for the project, and the project is planned to operate at approximately the same level during the next few years.

**Section 3. Technological Changes that affect User Requirements**

**Section 4. User issues, problems, and level of satisfaction with Argos**

Mr Alerstam is satisfied with the Support Argos is giving to the research project.

**Section 5. Successful programme use of Argos**

**Section 6. Analysis of Local Operational Issues**

Below is status for ARGOS program of Susanne Åkesson, Lund University, reported.

**Section 1. Overall Summary**

No active trackers during 2014

**Section 2. Future Plans**

The program may be activated during May/June 2015 with two trackers

**Section 3. Technological Changes that affect User Requirements**

**Section 4. User issues, problems, and level of satisfaction with Argos**

**Section 5. Successful programme use of Argos**

**Section 6. Analysis of Local Operational Issues**

---

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>United Arab Emirates</td>
</tr>
</tbody>
</table>

**Section 1. Overall Summary**

The United Arab Emirates started the satellite-tracking program in 1994 through the National Avian Research Center (NARC) of the Environment Agency – Abu Dhabi, primarily for studying movement and migration of the Asian Houbara. The number of programs and use of the technology has grown since then and at present 10 programs and sub-programs are registered for
the country. All the Argos activities in the country are on wildlife and majority of them are on birds. There has been some work on marine mammals and reptiles too in the recent past. The use of Argos program in the UAE has been highly successful in improving the conservation of the tracked species and their habitats.

<table>
<thead>
<tr>
<th>Family</th>
<th>Program Number</th>
<th>Program Name</th>
<th>Organization name</th>
<th>Program Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird</td>
<td>1440</td>
<td>Wildlife in Asia and Africa</td>
<td>Environment agency</td>
<td>Mohammed S. Al Baidani</td>
</tr>
<tr>
<td>Bird</td>
<td>3763</td>
<td>Emirates Centre for the Conservation of Houbara</td>
<td>Emirates Centre for the Conservation of Houbara (ECCH) Uzbekistan.</td>
<td>Yves Choquet</td>
</tr>
<tr>
<td>Bird</td>
<td>3416</td>
<td>Survey of Houbara bustard</td>
<td>ECWP (Emirates Centre for Wildlife Propagation) Morocco.</td>
<td>Yves Hingrat</td>
</tr>
<tr>
<td>Bird</td>
<td>4162</td>
<td>Post-natal dispersal of Houbara bustards</td>
<td>Emirates Bird Breeding Centre for the Conservation of Houbara-Abu Dhabi (EBBCC)</td>
<td>Keith Scotland</td>
</tr>
<tr>
<td>Bird</td>
<td>3657</td>
<td>Birds Arabia</td>
<td>Environment Agency</td>
<td>Salim Javed</td>
</tr>
<tr>
<td>Dugong</td>
<td>23657</td>
<td>Dugongs in AD (sub-program of 3657)</td>
<td>Environment Agency</td>
<td>Himansu Das</td>
</tr>
<tr>
<td>Bird</td>
<td>5421</td>
<td>Socotra cormorant foraging ecology</td>
<td>United Arab emirates university</td>
<td>Sabir Muzaffar</td>
</tr>
<tr>
<td>Marine Animals</td>
<td>4189</td>
<td>Gulf turtle project (sub-program 4189)</td>
<td>Emirates Wildlife Society- WWF</td>
<td>Lisa Perry Shlake</td>
</tr>
<tr>
<td>Marine Animals</td>
<td>14189</td>
<td>Gulf turtle project (sub-program 4189)</td>
<td>Emirates Wildlife Society- WWF</td>
<td>Lisa Perry Shlake</td>
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<tr>
<td>Land Animals</td>
<td>24189</td>
<td>Ungulates (sub-program 4189)</td>
<td>Emirates Wildlife Society- WWF</td>
<td>Lisa Perry Shlake</td>
</tr>
<tr>
<td>Marine Animals</td>
<td>5073</td>
<td>Burj al Arab</td>
<td>Burj al Arab</td>
<td>Warren Baverstock</td>
</tr>
</tbody>
</table>

**Section 2. Future Plans**

New deployments are planned for the coming year, mainly within the Houbara programs and various bird programs. However, number of tags to be deployed were not received from the Houbara Program. No tagging is planned for programs 4189 and 14189. For program, 3657 10-15 tags are likely to be deployed on different bird species. Also under program 5421, there is plan to redeploy nine transmitters on the Socotra Cormorant towards the end of 2014.

**Section 3. Technological Changes that affect User Requirements**

None

**Section 4. User issues, problems, and level of satisfaction with Argos**

In general, satisfied, but some of the users show reluctance to submit contributions for the national report, saying that all the information is available with the CLS. Users also complained of higher tariff.

**Section 5. Successful programme use of Argos**
UAE has successfully used Argos for tracking a range of species from fishes, to birds, reptiles and mammals. Given the success of the first program in 1994 on Asian Houbara, many new programs have been registered covering much wider spectrum of species. The use of technology has allowed government and non-government organizations in the country in understanding the migration routes, stopover sites, foraging areas of key wildlife species in the country. Use of the technology has provided interesting and new information including the discovery of new and important areas of high conservation values and thus contributing to the conservation of the species and their habitats. Tracking the movement of the globally threatened Socotra Cormorant *Phalacrocorax nigrogularis*, although lasted a short period due to incorrect programming, provided interesting information. Post-breeding. As the birds started to leave the colony, they were either gradually moving east towards Abu Dhabi to roost and remain in those areas. Alternately, they moved northeast out of the Hormuz and remained in the Musandam area.

**Section 6. Analysis of Local Operational Issues**

Programs continue to be registered without the knowledge of ROC. In addition, many users show reluctance to provide information for the national report and hence is the reason for delay in submission of report.
11. USA

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>United States</td>
</tr>
</tbody>
</table>

Section 1. Overall Summary

The United States continues to be a world leader in the use of the ARGOS data collection system. It is a primary observing tool for monitoring the oceans for essential climate variables; understanding marine animal life; as well as increasing our understanding of the habits of terrestrial animals not only for research, but increasingly for regulatory purposes.

Section 2. Future Plans

Over the next 5 years, it is expected that the U.S. Global Drifter Program and the U.S. Argo Float Program will gradually reduce its usage in favor of a different satellite telecommunications service provider. Consequently, the JTA 5 year plan has been adjusted to account for this declining use.

However, it is expected that the marine animal and other animal tracking programs will continue to increase their usage as ARGOS provides outstanding services for this family of users.

Section 3. Technological Changes that affect User Requirements

Data timeliness, through-put, and energy consumption will continue to dominate user needs.

Section 4. User issues, problems, and level of satisfaction with Argos

Since the ARGOS JTA 33 in Paris, user costs are consistently a source of contention between the U.S. users and the JTA. In particular, the animal family as represented by a tag manufacturer are most interested in receiving a discount in service rates.

Section 5. Successful programme use of Argos

The ARGOS system is the satellite telecommunication system of choice for the Animal “Family” of researchers and will become more so as new, more creative uses are identified as ARGOS 4 and the new chipset are put into operational use. Animal telemetry is poised to become as critical to monitoring the ocean environment as the floats and drifters have been. Animals are particularly adept at helping scientists identify critical habitats, spawning locations, and important oceanographic features and are becoming more useful for meteorological purposes. Lastly, animal telemetry also provides important insights into regions of the oceans that are difficult and expensive to monitor.

Section 6. Analysis of Local Operational Issues

The marine animal tracking community of researchers are now organizing themselves more consistently and have recently been looking at 3 issues they want from the JTA:

1) How can they be better represented at the JTA?
2) How come they’re paying so much of the JTA bill?
3) Who do they work with to get their meteorological data on to the GTS?