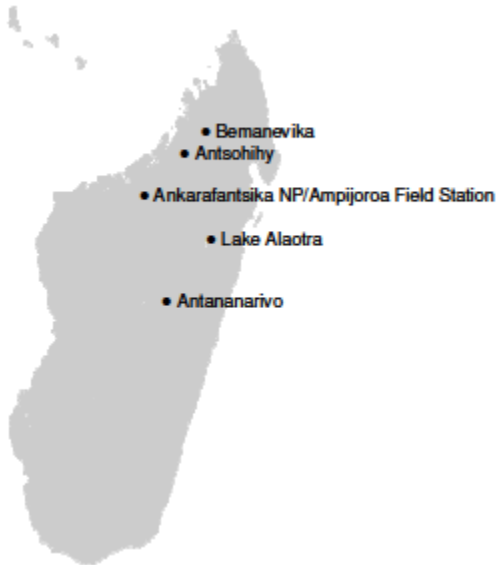
Darwin Initiative – Final Report

*(To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/) it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project Reference	18-009
Project Title	Saving the Madagascar Pochard: the world's most endangered duck
Host country(ies)	Madagascar
Contract Holder Institution	Durrell Wildlife Conservation Trust
Partner Institution(s)	Durrell – Madagascar, Asity Madagascar and Le Ministère de L'Environnement et des Forêts (Government of Madagascar). The Wildfowl & Wetlands Trust, The Peregrine Fund,
Darwin Grant Value	£282, 441
Start/End dates of Project	1st April 2010-31st March 2013 – extended to 31/03/14 following change request
Project Leader Name	H Glyn Young
Project Website	
Report Author(s) and date	H Glyn Young (Durrell), P Cranswick (WWT), L Woolaver and Felix Razafindrajao (Durrell Madagascar) and L-A Rene de Roland (TPF). 8th May 2014.

1 Project Rationale



The Madagascar pochard (*Aythya innotata*), the rarest duck and possibly rarest bird in the world, was believed extinct for 15 years until rediscovered in 2006. Historically best known from the extensive wetlands around Lake Alaotra, today around 20 birds exist in the wild primarily on one of four small lakes, in north-western Madagascar near Bemanevika; the species is classified as Critically Endangered by IUCN. Birds breed in a tiny area of one of the lake's shorelines, and although more than 10 nests were found in 2007 and 2008, no ducklings survived in 2008. Observations in 2009 revealed a skewed sex ratio, with just 6–8 females. The lake now has temporary statutory protection with the aim of completing full protected area status.

Given the imminent risk of extinction, Project partners undertook emergency action in October

2009. Three clutches of eggs were extracted from the wild and 24 ducklings were reared. Following the transfer of the new captive population to Ampijoroa Field Station (Ankarafantsika National Park) in December 2009 the birds were returned to the Sofia Region, to a newly built facility in Antsohihy, in September 2011.

The purpose of this project was to ensure the immediate survival of the Madagascar pochard, initiate the breeding programme through development of a purpose built Pochard Conservation Breeding Centre (PCBC) near the regional town of Antsohihy and facilitate participation of the local community in conservation actions at the breeding lakes. The long-term aim is to establish a viable population of Madagascar pochard in the wild, through a conservation-breeding and release programme to restore the species in its former range.

Male Madagascar pochard *Aythya innotata* at Lake Matsaborimena. Photo by Iñaki Relanzón http://www.photosfera.com/

Madagascar Pochard - Timeline of significant events (areas in blue are through this project)

1894 Madagascar pochard is described for science. Type location never identified

1929 The Madagascar pochard is reported as being “locally common” at Lake Alaotra

1960 Last confirmed reports of Madagascar pochard at Lake Alaotra

1970 Last reported sighting of Madagascar pochard (at Lake Ambohibao, Antananarivo)

1970-1990 Madagascar pochard not reported from Lake Alaotra or any other historical wetland despite extensive surveys in 1989-1990 (carried out by Durrell, WWT and WWF)

1991 A single male Madagascar pochard is captured alive at Alaotra by fishermen and is later presumed to be the very last of its kind

1991-1993 Extensive survey of High Plateau lasts 18 months and goes well beyond Lake Alaotra watershed but does not find any further pochards

2004 The Madagascar pochard is believed to have gone extinct

2006 A small population of fewer than 25 Madagascar pochards is rediscovered by The Peregrine Fund at an isolated volcanic lake in Sofia near the village of Bemanevika

2007 Sofia wetlands searched for pochards for first time but no further birds found

2009 A rescue mission is carried out by Durrell, WWT and the Malagasy government to collect eggs from wild nests to start a captive breeding safety-net population. Twenty four ducklings are hatched and raised at the Hotel Anais, Antsohihy

2009 Bandits threaten the staff taking care of the pochards in Antsohihy and all captive birds and staff move immediately to the Chelonian Breeding Centre in Ampijoroa (managed by Durrell Madagascar)

2010 Concerns over avian cholera, which is common in domestic birds throughout Madagascar, leads to an intensive vaccination programme for the captive pochard

2011 The wild population of Madagascar pochard is provided official protection within a New Protected Area for Bemanevika promoted by The Peregrine Fund in Madagascar

2011 A new captive facility is built and the pochards are moved back to Antsohihy. The breeding centre is officially opened by Lee Durrell and government authorities in November

2011 Eighteen ducklings hatch in captivity. The captive population is now twice that of the wild population

2011 Research investigating reasons for the rarity of the pochard in the wild determines that widespread wetland degradation and lack of invertebrate food for a diving duck are the most probable causes of the species' decline

2012 A large scale survey effort of 24 wetlands throughout the historical range of Madagascar Pochard is undertaken to search for potential release sites for captive-bred birds. Nearly all of the lakes surveyed are severely degraded and unsustainably used by people. Fortunately one site, Lake Sofia, is identified as a promising site for a reintroduction

2013 Twenty more ducklings hatch in captivity and the recovery programme is confident that Madagascar pochard can be kept and bred in captivity to provide ducks for future reintroductions

2013 The wild population at Bemanevika remains stable but extremely vulnerable with 20-25 birds, only 8-12 of which are adult females. The captive breeding population stands at 55 birds, 25 of which are females

2013 Three tonnes of duck food arrive from the UK to feed the 55 captive birds. With the success of the captive programme this will likely only be enough to feed the captive pochard for one year!

2013 A Species Action Plan Workshop brings together stakeholders from the local communities, government, and conservation NGOs to develop a strategy for the long term restoration of the Madagascar pochard

2014 Begin an intensive multidisciplinary effort to reintroduce captive-bred Madagascar pochard to Lake Sofia focussing on supporting local communities to wisely manage the lake and undertake ambitious wetland restoration project which can serve as a model for the rest of Madagascar

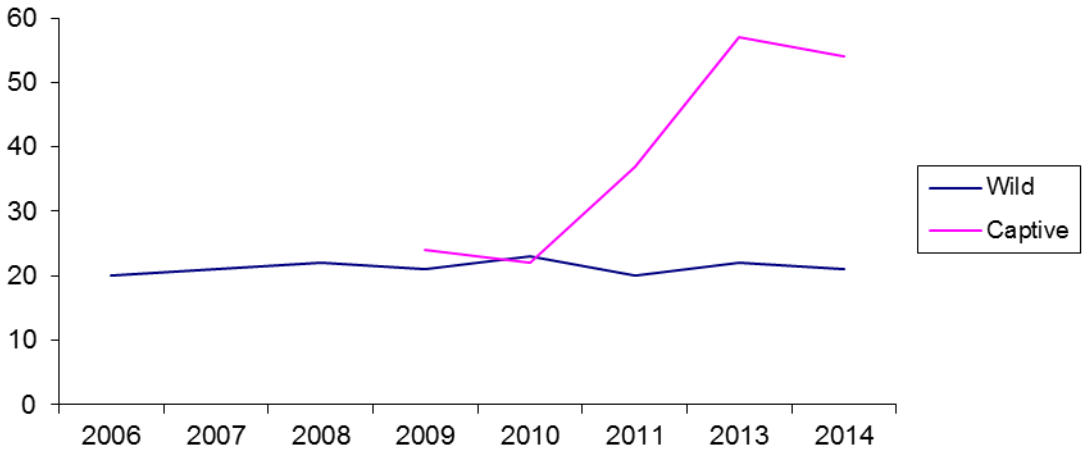
2 Project Achievements

2.1 Purpose/Outcome

Purpose. To avert imminent extinction of the Madagascar pochard through recovery planning and capacity building for a conservation breeding programme, site protection and public engagement.

The Project fulfilled its purpose (see **2.3 Outputs**). The Madagascar pochard was rediscovered in 2006 and since then, the number of wild birds at Bemanevika has remained at 20-25. The wild population has been safeguarded through presence of TPF and Project personnel at Bemanevika and national protection of the site. The captive population first bred in 2011 and has doubled in number since then. The Project has delivered public engagement and as well as undertaking research needed to find out why the pochards are in trouble in the wild and to

identify a release site. With the captive-breeding facility secured the Project enters a new phase: site restoration and release of captive-bred birds into parts of their former range.



Madagascar Pochard population 2006-2014.

Wild numbers are approximations

2.2 Goal/ Impact: achievement of positive impact on biodiversity and poverty alleviation

Goal. Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.

The project's longer term goal (i.e. sub-goal), and, therefore, potential impact, was to avert extinction of the Madagascar pochard and secure its long-term future in the wild. The conservation of the pochard will be used to promote wetland restoration through community involvement and human livelihood support.

Indicators

1. Madagascar pochard IUCN status downgraded from CR to EN within 10 years
2. Existing and one new population self-sustaining in the wild within the species' historic range within 25 years
3. Resident community engaged in conservation activities, and environmental awareness increased by project completion

There has not been sufficient time to fulfil the prescribed indicators. The Project has been very successful in averting immediate extinction of the pochard following rediscovery. There are now twice as many birds in captivity as there are in the wild (see **2.1 Purpose/Outcome**). Plans for release of captive-bred birds are well underway (see **2.3 Outputs**) with a potential first site identified. The local communities at both Bemanevika and Antsohihy have become very engaged in the conservation of the pochard (see **2.3 Outputs**) and the Project has successfully increased environmental awareness in Sofia.

2.3 Outputs

The Project set six outputs in the application (see **Annex 2**) aimed at averting the imminent extinction of the Madagascar pochard through conservation breeding, site protection, public engagement and capacity building.

1. Establish Project management team and planning structure

Indicators

1. *Annual reports and finance claims delivered on time and in budget.*

A management structure based from Durrell in Jersey and WWT in UK was established and managed locally by Durrell Madagascar in partnership with TPF and Asity Madagascar. A core of UK-based personnel communicates regularly and links with Durrell Madagascar through e-mail, Skype and telephone. Durrell and WWT Project teams have met annually in Jersey or UK and during visits to Madagascar. Durrell Madagascar organise monthly meetings with TPF and Asity Madagascar in Antananarivo whenever possible and regularly meet with local, regional and national government representatives. Monthly reports are circulated throughout the Project and all partners (see **6.1 Monitoring and evaluation**).

Annual reports and financial claims delivered on time. Project on budget and carryovers agreed with Darwin Initiative.

2. Key conservation needs for Madagascar Pochard identified

Indicators

1. Analyse genetic diversity of captive founders and recommend pairings
2. Key limiting factors at site identified
3. Species recovery plan endorsed by Government by Y3

1. Analyse genetic diversity of captive founders and recommend pairings

Blood samples were taken from all birds in the captive population by Tsanta Rakotonanahary during routine vaccinations and sent to Cardiff University for analysis in 2013 (see **5.1**). Breeding behaviour not unusual in pochards (*Aythya*) is apparent even within the very small adult population at Bemanevika. Clutches 1 (collected October 2009) and 3 (collected November 2009) show a high degree of relatedness but show none with clutch 2 (collected November 2009). Difficulties in exporting blood samples from Madagascar before 2013 meant that the breeding programme at Antsohihy was begun (2011) using traditional husbandry planning i.e. assuming that three clutches represented a founder input of six birds (three males and three females). All birds were included in a studbook and pairing recommendations made accordingly though PMx (formerly PM2000) accessory software to SPARKS for analysis and management of pedigreed populations.

Better understanding of true founder input in the three wild clutches collected in 2009 has allowed for a revision in breeding recommendations in 2014. Surviving founder birds will be paired from clutches 1 and 3, combined, with clutch 2.

2. Key limiting factors at site identified

Felix Razafindrajao and research team (FR, WWT senior researcher Andy Bamford and Rabenosy Médé (see **4**) parallel research programme has been wide-ranging and, based at the Bemanevika site, has included direct observation of nesting birds and sampling of water (depths and composition), substrates, aquatic invertebrates and plant life. The research team have undertaken similar studies at Lake Alaotra and a series of other lakes in Sofia and elsewhere on the High Plateau as far south as Lake Itasy and the Vakinankaratra Region. Feather samples of museum specimens have been collected to undertake stable-isotope analyses to determine diets of birds in the past.

Results of the ecological studies at Bemanevika will be published in due course and included in the thesis of Felix Razafindrajao. Initial findings do suggest that while the pochard survived at Bemanevika the crash in numbers and range that affected the species across Madagascar the conditions at this site are far from perfect for a diving duck. Very poor survival of ducklings (overall fledging rate for 2011 was 2% and, for 2012, 4%) may be due to low numbers of benthic invertebrates, depth of the lake bed (ducklings need to forage themselves and dive for food) and often low water temperatures and restricted opportunities for females to brood young. To date, hatchability and survival in captivity suggest that the species is not badly affected by inbreeding and that this is not the cause for such poor breeding results in the wild.

The key achievement for this output is that we have a far better understanding of the issues driving duckling mortality in the wild population, which will underpin the release programme in future years.

3. Species recovery plan endorsed by Government by Y3

The recovery plan was delayed until Y4 and held at Espace Dera in Antananarivo 3-6 December. David Mallon (IUCN), Peter Cranswick and Domoina Rakotobe were the facilitators, ably assisted by Felana Ranaivoarisoa and Kitty Brayne.

National government, several environmental agencies, regional and local authorities as well as representatives of local communities contributed to the workshop (list of attendants in **Annex 7**) which was funded by Darwin and organized by IUCN, Durrell and MEF.

Species action plans are recognised as important tools in conservation as they set out a long term vision and agenda to guide conservation efforts, improve partnership working and attract funding. Key to their success is the participation of all stakeholders in creating the plan.

The Species Action Plan for the Madagascar pochard was the first of its kind in Madagascar, following IUCN guidelines, with the full participation of representatives of stakeholder groups from the local community level to national government and international partners.

The workshop agreed to an overall vision and goals for the project:

The vision

Populations of Madagascar pochard are increasing and restored and thrive in healthy, well-managed ecosystems, involving local communities and other stakeholders, contributing to sustainable development and being a source of pride as a flagship species for Madagascar.

Goals

1. Increase the numbers and expand the distribution of Madagascar pochard in the wild
2. Ensure that each stakeholder benefits from conservation of Madagascar pochard and sustainable management of its habitats

The action plan will include the steps to be taken by the different stakeholders to work towards this vision and will be published in Malagasy, French and English and put into action in 2014.

The workshop was formally concluded on 6th December with speeches by Désiré Randriamaro, Director of Regional Development (DDR) for Sofia, Ruffin Zamany, Regional Director of Environment and Forests for Sofia (DREF), Jean Claude Rabemanantsoa, General Director of the Ministry of Environment and Forests (DG MEF), HE Timothy Smart (British Ambassador to Madagascar) and Nestor Robert Tilahy and Jean Nestor on behalf of the Community Associations of Bemanevika and Marotolana, Sofia.

The Action Plan will be published in 2014 and receive endorsement from national and local government.

3. Conservation-breeding programme and Malagasy capacity for aviculture established

Indicators

1. Captive breeding population producing around 20 birds Y1
2. Three Malagasy staff trained in aviculture, and endangered species management
3. Preliminary assessment of wetlands as sites for release of captive-bred birds

1. Captive breeding population producing around 20 birds Y1

The captive population was moved to Ampijoroa in 2009 following recommendations by the authorities in Antsohihy and not returned until September 2011 (Y2). Thirty eight birds were bred in Y2 and Y3. The facility can produce 50+ pochards annually but breeding is controlled to prevent overstocking until release plans are finalised.

The PCBC is now considered to be the primary captive breeding/rearing facility. Reappraisal in 2013 of the proposed site at Anjingo (approximately 45km from the PCBC) (see 1st and 2nd Annual Reports) was reported in the 3rd Annual Report. The partners have, after discussions decided not to develop the Anjingo site through remoteness of the site and associated security concerns for staff and lack of basic infrastructure (e.g. water, electricity and cell phone

coverage). The Project will maintain lease of the site through the regional government in case of changes to this plan.

The PCBC now has three blocks of aviaries including (13 units with ponds approximately 3.8 x 2.3m). Twelve smaller units (Mid-stage Rearing Units – MSRUs) (2.3 x 2.2m) with ponds were completed in 2013. A fourth row of aviaries will be completed in late 2014. See ground plan and photographs in **Annex 7**.

Carryover agreed by Darwin in 2013 will be used in part to build a second facility at the MEF offices in Antsohihy in 2014. This second facility will be used principally for educational purposes and for holding surplus birds not intended for release: it will free-up space for breeding higher numbers of birds for release at the PCBC.

2. Three Malagasy staff trained in aviculture, and endangered species management

The Project has developed a highly professional and motivated team of three full time aviculturalists at Antsohihy supported by a Project driver, veterinarian and co-ordinator (see **5.3 Capacity building**). Floriot Randrianarimangason (formerly from Durrell's chelonian staff at Ampijoroa) has received training from experienced aviculturalists in Madagascar since 2010 and spent six weeks in Jersey (Durrell) and Slimbridge (WWT) in 2011. Floriot assumed the role of Avicultural Manager at Antsohihy in 2011. Mahazaka Ratsimalandy and Rabenalimanana Samuelson (Samuel) were recruited in Sofia in 2011 and 2012 respectively and have received avicultural training throughout their employment. Guardiens (watchmen) have been employed at the facility throughout and, part of the Project team, ably help with avicultural duties whenever required – Samuel was employed first as a guardien before, having shown great interest and willingness to learn new techniques, he transferred to the avicultural team.

Wildfowl technicians from WWT and Durrell have continued spend time at the Antsohihy facility for short periods in rotation and act as advisors at the facility and to oversee staff development. Durrell Madagascar expects to continue the rotation of overseas technicians on site for the near future but this may be reduced to cover the most sensitive periods such as the breeding season.

Husbandry guidelines in English and French were produced in July 2011 and have been modified/updated several times: the most significant in March 2012 following transfer of the birds from Ampijoroa to Antsohihy and the required inclusion of incubation and rearing sections. Daily reports from the captive population have been submitted to Durrell in Jersey for inclusion in the ARKS record keeping system and distributed through Dropbox since June 2011. A record keeping manual for Madagascar pochard was produced in 2011. All the captive birds have been included in an International Studbook using SPARKS software (initiated in November 2011). *In situ* training has also included collection of biometric data, record keeping, report writing and problem solving. Each of the technicians has maintained support for their local counterparts after their return to the UK and one, Roland Digby (WWT), has established a regular phonelink to assist in staff development. Facebook is a popular medium for communication and all Malagasy staff keep in touch with their overseas colleagues.

3. Preliminary assessment of wetlands as sites for release of captive-bred birds

Following ecological studies at Bemanevika, Felix Razafindrajao and Andy Bamford visited 25 sites in 11 areas of Madagascar from June to August 2012 to assess potential for releasing captive-bred pochards. Data was collected on vegetation (surrounding and within wetland), depth, benthic invertebrates and sediment and water chemistry. Interviews were held with a sample of residents (ideally including a community leader and a sample of fishermen) to determine the communities present near the site; main livelihoods and resource use by communities; management of the site and who is responsible; previous involvement by NGOs; fish species present at the site and fishing practices; and seasonal changes in the site. The team's assessment of potential release sites was circulated in an internal report in 2012[1].

From this survey, it seems unsurprising that the Madagascar pochard is in such a critical state. None of the sites away from Bemanevika that were visited appear able to support pochards in their current state. The lakes at Bemanevika appear to be the best condition wetlands in the plateau region of Madagascar and Andriakanala one of only two lakes visited that could be

described as pristine. The other, Andasinimamba in Marotandrano Special Reserve, does not seem to hold anything of interest to pochards: no marsh for nesting and no food.

Map of Madagascar showing the 25 sites visited during survey (red dots).

Of the remaining sites, all lacked food or nesting habitat or both. Matsaborimena seems to have the most diverse benthic fauna although diversity may not be strictly necessary for the pochard diet. By far the most common group of invertebrates recorded here were chironomids. Chironomids alone may be sufficient for pochards dietary needs if they are abundant enough, and they were abundant in a few of the lakes. Pochards will also graze on submergent macrophytes, but only five of the lakes visited actually had any submergent macrophytes:

Andriakanala, Amparahinandiambavy, Andrakaiba, Andranobe and the small lakes in the Alaotra marsh (although the latter did not have many). These five lakes generally contained few benthic invertebrates.

Although huge areas of marsh have been cleared, many of these lakes did still have substantial areas remaining. Pochards use marsh for nesting, and require it dense enough to build a nest out of the water, and shelter. The presence of marsh may be less important in selecting a release site than food, as marsh can easily be planted and artificial islands constructed for nesting purposes. However, the marsh does need to be fairly undisturbed by people.

Wetlands are important to the Malagasy, for rice farming, for fishing and for collection of *Cyperus* from which mats, baskets and other items are made. While the human population density for the country overall may be low, the population density around the wetland areas of the plateau can often be very high. The extent of human traffic and the degree to which it can be controlled may be a crucial factor in the success of a release. Some of the lakes visited were relatively quiet: Amparahinandiambavy due to its customary protection; Antsomanagana due to it being in an area that is hilly and unproductive for farming; Itasy, where sheer size dilutes the human traffic.

A selection of the most promising sites visited were revisited for reassessment and to gather further data in November 2012. The team were joined by Lance Woolaver, Glyn Young and Rob Shore, Head of Wetland Conservation (WWT), and visited: Lakes Sofia, Andranotsinonia, Antafiandanaka, Antsomangana and Amparahinandiambavy.

It was informally decided that Lake Sofia (in Sofia Region: see **6 Lessons learned**) (S 14°35'09.82" E49°00'33.84), located about four hours' drive south-east of Bealanana, was the site with the most potential as a release site[2]. Plans are being developed for habitat restoration and stakeholder collaboration at Lake Sofia and funding sought.

[1] Bamford, A. *et al*. (In Press). The status and ecology of the last wild population of Madagascar pochard, *Aythya innotata. Bird Conservation International.*

[2] Cranswick, P. 2014. Sofia, so good. *Waterlife* January/March 2014: 26-30.

4. Malagasy capacity for environmental CEPA of Madagascar Pochard established

Indicators

1. Minimum of 20 school teachers and local groups and NGOs trained in environmental CEPA
2. Ten Malagasy project staff trained in environmental CEPA

Jacques Live Rajonarison established an impressive 'team' and 'pochard roadshow' through his work through schools and other groups in the Bealanana and Antsohihy areas. Jacques Live used the pochard (*fotsimaso*) as a flagship for wetlands conservation in general. The team recruited young volunteers (scout groups, environmental clubs) for further extending the message and incorporated other themes such as work with DREF on "the fight against bushfire" and reforestation in watersheds. The project final report was produced (in French) in June 2013[1].

The final report summary, however, includes the caution "but we believe that the change of behaviour will never be sustainable after this short intervention despite the membership of local players. Much remains to be done". It was recommended that future engagement was linked closely with the Bemanevika PA communication strategy and includes other species and highlights of the PA. The fragile and inexperienced groups established by JLR and those already more advanced (e.g. the Catholic High School) need continued support. Presence at local events (fairs, cultural events, etc.) needs to be maintained. Do date it has been difficult establish fully whether indicators have been met in full.

Rajonarison, J. L. 2013. l'Education Environnementale, à Bealanana. Rapport Final. Unpublished report to Asity Madagascar and Saving the Madagascar Pochard. 80 pages.

5. Long-term protection of Bemanevika secured

Indicators

1. Site included within the new Protected Areas framework by Y3
2. Site support group in place Y2

1. Site included within the new Protected Areas framework by Y3

In 2014, the site remains under a temporary protection. The necessary stages to set up the permanent protection status of the site have been completed despite delays at national government level. The national government extended the period for proposing new protected areas until 2013 with final ratification of areas due in 2014. The Management Plan[1] and Social and Environmental Safeguard Plan for Bemanevika have been updated and await approval at government level.

[1] Ministère de L'Environnement, et des Forêts & The Peregrine Fund. 2009. Plan d'Aménagement et de Gestion de la Nouvelle Aire Protégée Bemanevika. *Système des Aires Protégées de Madagascar*.

2. Site support group in place Y2

TPF has remained at Bemanevika since 2006 with five technicians based at the site part-funded by the Project. Felix Razafindrajao and the research team, notably Rabenosy Médé, have been based here since 2011. TPF has established a support group with local villages in the lake watershed to ensure protection of the lakes, surrounding forest and wetlands and sustainable use of natural resources.

NAP boundary markers were designed with panels within local communities following a meeting in June 2010. A local committee for wildfire prevention was established and is functioning: each village has their own local fire prevention agents who were equipped with uniforms provided by TPF. A reforestation plan was established in collaboration with the local forest officer and TPF built nurseries at four localities around the NAP.

TPF managed a programme of reforestation in the Bemanevika area. Villagers planted 13,359 young plants, a mixture of native species and eucalyptus for firewood. Following assistance by TPF in setting up beehives, local beekeepers collected 53 litres of honey from nine beehives in 2012.

The Ecotourism Development Plan for Bemanevika was begun and is still on-going. A two-month field study was done by a DEA degree student from the Geography Department at the Université D'Antananarivo. This study collected basic information in order to assist the preparation of the ecotourism plan completed in 2011.

The original tented camp moved back from the lake edge in 2010 to avoid any possible disturbance and pollution. Groups of foreign tourists (typically birders) visit the Bemanevika site to see key bird species[1]: Madagascar pochard, red owl *Tyto soumagnei*, Madagascar serpent-eagle *Eutriorchis astur*, Madagascar harrier *Circus macrosceles* and slender-billed flufftail *Sarothrura watersi*. Part of fees and donations collected from visitors were dedicated to pay the wages of the teacher in the Bemanevika Primary School.

[1] Mills, S.L. & Rogerson, M. 2013. How to see the Madagascar Pochard *Aythya innotata*, the world's rarest duck. *Bull. African Bird Club* 20: 201-2015

6. Local community and national audiences support conservation of the species.

Indicators

1. Rapid assessment of social, cultural and economic situation of communities undertaken
2. At least 80% of schoolchildren aware and supportive of conservation activities around the target species by Y3
3. Legal status of local communities to manage Bemanevika established

Within Madagascar the pochard was almost unknown until rediscovery in 2006. Previous conservation initiatives (surveys and awareness-raising programmes by Durrell, WWT, WWF and others) had concentrated on Lake Alaotra where the bird had become familiar since unsuccessful surveys in 1989 (appearing e.g. on taxi brousse signs) with the name *onjy*. Discovery in the north-west (at Bemanevika) in 2006 meant a change in vernacular name with *fotsimaso* used in that area. Although effectively unknown even to villagers around Bemanevika the *fotsimaso* has become something of a cause celebre not least in political rivalry between Sofia and the national capital. The sudden local importance of the species has needed sensitive management in relations between the Project and people in Sofia from the wild site to the regional capital (Antsohihy).

The improvement of the 'political' status of the captive pochards following their return to Sofia has allowed the project finally to be widely promoted in the region and nationally. Facebook is a very popular social media outlet in Madagascar and the pochard has featured regularly in the Durrell Madagascar site www.facebook.com/DurrellMadagascar. In 2012, Kitty Brayne, Durrell Madagascar press and publicity co-ordinator, began to promote the pochard within the national media. Felix Razafindrajao and Jacques Live Rajaonarison have made monthly radio interviews in Sofia both in Antsohihy and Bealanana. The pochard featured for the first time in the national environmental magazine *Tana Planète* in March 2014[1].

Continuing good relations and support are maintained through openness and regular interaction through festivals and public presentations. The Project has been enthusiastically supported throughout by MEF at Antsohihy and development of the Project interpretation facility and holding area for pochards at the MEF Offices in 2014 will further cement good relations.

Indicator 1 was not entirely supported. TPF undertook Social and Environmental Impact Assessments in order to create the NAP and the Project has access to these so did not recreate them. Assessments were started in 2013 for Lake Sofia area during Project visits and these will be continued in 2014 by Hery Andrianandrasana (Durrell Madagascar) and may be extended to Bemanevika. Methods have been developed for questionnaires, training local field assessors etc. as part of Hery's work at other Durrell sites in Madagascar.

While specific indicator 2 has not been achieved the Project is confident that local support has risen markedly since Y1 (see **6 Lessons learned**). The Project will continue with new funding after Y4 (2013-2014) and assess support in future.

Indicator 3 may have been outside the scope of the Project to date. However, TPF future programmes at Bemanevika include development of village management associations (FBM: Association of the Unified People of Bemanevika (Fikambanan'i Bemanevika Miray) and

FIMAKA: Association of People Protecting Forests of Amberivery (Fikambanana Miaro ny Ala Ketsan'Amberivery)[2]. These two associations will be responsible for managing, monitoring and control of the renewable natural resources. They are required to comply with specifications through a signed MoA and report to the Forest Service.

The villages at Lake Sofia (proposed release site) have sustainably managed the lake since 2002, through the establishment of local associations of resource users with agreed rules, management structures, fees and fines. This agreement has unfortunately lapsed but continues to be enforced albeit without any legal basis.

[1] Anon 2014. Les animaux en voie de disparition de Madagascar: le Fuligule de Madagascar (Aythya innotata). Tana Planète 73: 39-40.

[2] Ministère de L'Environnement, et des Forêts & The Peregrine Fund. 2010. Business Plan of the New Protected Area, Bemanevika. *Système des Aires Protégées de Madagascar*.

3 Project support to the Conventions (CBD, CMS and/or CITES)

This project has prevented the possible extinction of a unique and endemic species (the only true diving duck in Madagascar) and created a platform for the restoration of eastern wetlands, the most threatened ecosystem in Madagascar. Wetlands support high levels of biodiversity, and those in Madagascar support large numbers of endemic species. Wetland loss has resulted in a decline in important ecosystem processes, particularly aquatic plant dispersal and a revival of natural waterbird communities will help restore these.

The project proposed to assist Madagascar to meet its CBD obligations through the delivery of:

Article 6 (a) the development of national plans or programmes for the conservation and sustainable use of biological diversity

Madagascar has been assisted in Article 6 (a) through the Fotsimaso Action Plan (see **2.3 Outputs**) the first of its kind in Madagascar, following IUCN guidelines, with the full participation of representatives of stakeholder groups from the local community level to national government and international partners.

Article 9 (a-e) (Ex-situ conservation)

Article 9 is directly supported by the establishment and maintenance of the Pochard Conservation Breeding Centre at Antsohihy (see **2.3 Outputs**).

Article 12 (Research and Training)

Article 12 is supported through direct training of husbandry and research teams and support for in-country graduate and post graduate degrees (see **5.1** and **5.3**) and direct ecological research at Bemanevika and other plateau wetlands (see **2.3**).

Article 13 (Public Engagement and Awareness)

Article 13 is supported through local environmental awareness programme (see **2.3**).

The project is also contributes to Articles 7, 8 and 10 (d & e) notably (7) through direct Identification of biological diversity and monitoring of pochard population and (8) through site protection at Bemanevika. Article 10 (Sustainable Use of Components of Biological Diversity) will increasingly be fulfilled as the Project develops a restoration programme associated with release of captive-bred birds at Lake Sofia.

The project's primary purpose was to avert imminent extinction of the Madagascar pochard, a species not included in the Convention on the Conservation of Migratory Species of Wild Animals (CMS). Site protection at Bemanevika will, however, potentially support some CMS-listed species notably Malagasy pond heron *Ardeola idae* and study of the status, local ecology and threats to this species are future priorities.

Aythya innotata is not currently listed in the CITES Appendices although EU list it in Annex A (Regulation (EU) No 750/2013) and future trade is unlikely.

The partners are committed to a long-term investment in this species. Eventual re-establishment of the pochard will require a network of healthy wetlands, and habitat restoration will be an important part of the key long-term objectives. These will develop solutions for

sustainable wetland use and livelihood needs of local communities in a particularly poor country. This will also be the first bird re-introduction project in Madagascar and will provide transferable skills for other species. Aichi Biodiversity Targets e.g. Strategic Goals C (to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity) and D (enhance the benefits to all from biodiversity and ecosystem services) will be increasingly supported.

4 Project Partnerships

This project has three local and three international partners and has collaborated through signed MoUs since 2009.

The three host country partners are: Durrell Wildlife Conservation Trust Madagascar (Durrell Madagascar), Asity Madagascar (a BirdLife Affiliate) and le Ministère de L'Environnement et des Forêts (MEF) (for the Government of Madagascar). All three organizations have offices in Antananarivo. Asity Madagascar has been responsible for awareness programmes (CEPA) and undertook this work principally in the area of the existing wild pochard population and in the vicinity of the captive population. Asity and Durrell signed an MOU for co-operation in the Environmental Education Programme in April 2011 and co-ordinator Jacques Live Rajaonarison was based in Bealanana in the TPF office. Jacques Live spent most of his time in the field, reporting monthly and held meetings with the partners in Antsohihy and Antananarivo. Following completion of the Darwin and establishment of one or more release sites, the partnership with Asity Madagascar will be re-assessed in order to better utilise this NGO's strengths. Durrell Madagascar provides full logistical support and all locally-employed project staff and temporary technicians were employed through this partner.

There are two further, international, partners: The Peregrine Fund (TPF) and the Wildfowl & Wetlands Trust (WWT). TPF, who rediscovered the pochard during fieldwork in the area, were responsible for site protection at the Bemanevika lakes including the development of plans for full national site recognition. TPF were represented in Madagascar through their in-country office and full-time local staff; however, the Project also maintained contact with USA-based personnel. TPF scientists undertook monthly systematic pochard counts at the four lakes at the Bemanevika site. TPF has five technicians based at the Bemanevika site mainly in charge of collecting research data on bird species, especially red owl and Madagascar serpent-eagle, and in monitoring the wild pochard population and other waterbirds on the four lakes. One further technician is in charge of the socio-economic aspect of the project and ensuring awareness of the protected area and bird projects within the local communities.

WWT provided essential expertise in management of wild and captive wildfowl populations and methodologies for emergency extraction of birds from the wild. WWT provided avicultural expertise, the design and planning of development at the breeding centre and have raised extensive funds (*c*. £180,000) for this part of the project from several donors (e.g. Mitsubishi Corporation Fund for Europe and Africa, MCFEA).

The Project partnership was very effective and well received. Durrell Madagascar organised monthly meetings between in-country partners (Durrell Madagascar, TPF and Asity Madagascar) in Antananarivo. Regular meetings were held with government and elected officials at national, regional and local level.

Other collaborations during this Project have been in research and veterinary support and, typically, established during the lifetime of the project:

A research programme, jointly supervised by WWT and Durrell, began in 2011 co-ordinated by Dr Andy Bamford (WWT secured £60,000 from the BBC Wildlife Fund for two years study). Andy (employed by WWT) worked under Durrell's accord with the Madagascar government and established a field team that included Project member Felix Razafindrajao and, locally recruited, Rabenosy Médé employed as a full time research team member. This research project worked closely with the TPF team at the Bemanevika lakes and was based at their established field camp. The research team's work included monthly sampling for invertebrates at the Bemanevika lakes and at a wide selection of other wetlands in Madagascar including Lake Alaotra. The team began an extensive analysis of wetlands on the High Plateau in early 2012 in order to identify potential sites for reintroduction of captive-bred birds and was joined in

November 2012 by Rob Shore, Head of Wetland Conservation at WWT. Hannah Robson (WWT) spent time with the research team at Bemanevika training team-members on invertebrate sampling and identification.

Felix Razafindrajao is registered for a pochard ecology-based PhD at the University of Antananarivo with Andy Bamford as in-country supervisor.

Professor Mike Bruford, Cardiff University, has overseen genetic studies aimed to determine relationships of the captive pochard population.

Tsanta Rakotonanahary, a veterinary student from Université d'Antananarivo, Faculté De Médecine, studied the captive pochard. Tsanta undertook a period of internship on the Durrell (Jersey) Veterinary Department and visited WWT at Slimbridge in 2011. She has continued to provide veterinary support to the pochards and completed her project: *Assessment of the antibodies response to selected vaccines against fowl cholera and Newcastle disease in the captive Madagascar pochards Aythya innotata* and successfully defended her degree in 2013. Tsanta is one of the first ever wildlife vets in Madagascar and has become a full time Durrell Madagascar staff member and veterinarian to the Pochard Project.

Saving the Madagascar Pochard will continue to work as it has done since 2009 with an increasing focus on habitat restoration and associated village sensitisation and release into the wild of captive-bred pochards. All existing partners will continue their roles although there may be some changes in emphasis at restoration site(s). Project management and reporting will continue unchanged. Educational Awareness programmes will be undertaken by Durrell Madagascar with Asity Madagascar undertaking biodiversity assessment work.

The development of the second, MEF, holding facility and restoration/release work at Lake Sofia will require further personnel who will be recruited locally.

5 Contribution to Darwin Initiative Programme Outputs

5.1 Technical and Scientific achievements and co-operation

The Project's principal purpose was to ensure the immediate survival of the species through development of a purpose built Pochard Conservation Breeding Centre (PCBC) at Antsohihy.

Madagascar Pochard had bred in captivity in Europe before World War 2; however, none of the captive birds survived the war and nothing was written about their husbandry. This project started with no knowledge of basic biological details of *Aythya innotata* (e.g. diet, clutch size, incubation period, fledging period etc.) and relied on our knowledge and experience of other *Aythya* sp. in captivity (particularly ferruginous duck *A. nyroca*) and published details of all other pochards (notably hardhead *A. australis*).

Madagascar Pochard reproductive biology

To date no papers have been submitted for publication. However, basic was data collected during the Project and published in the species profile in Safford & Hawkins (2013)[1] (see **Annex 7**). NOTE all Madagascar duck profiles (pages 238-262) were compiled by HGY.

[1] Safford, R. & Hawkins, A.F. 2013*. The Birds of Africa.* Vol 8: The Malagasy Region. T & A D Poyser, London, UK. Pages 260-262.

Madagascar pochard ecological studies

The research team of Felix Razafindrajao, Andrew Bamford and Rabenosy Médé undertook studies of wild Madagascar pochard at Bemanevika 2011-2014 as well as an Island-wide assessment of freshwater wetlands. The team have prepared their first paper on the pochard's ecology[1].

Summary from Bamford, A. et al. (In Press)

One of the rarest birds in the world, the Madagascar Pochard *Aythya innotata* was thought to be extinct until a small population was found in 2006. Little is known about this diving duck as it had not been studied prior to its decline and disappearance. Its rediscovery provided the opportunity to study this species in the wild for the first time and to assess the viability of this

last remaining population. The population is small, fluctuating close to 25 individuals, and mainly utilises two small volcanic lakes in the far north of Madagascar. Nesting occurs on only one of these lakes, Matsaborimena. Nest success (76% in 2007-08) and hatching success (89% in 2007-08) are both good compared to other *Aythya* species, but fledging success (4% in 2011-12) is extremely low. Duckling mortality rates peak at 14-21 days old. We propose that starvation is the major cause of duckling mortality. Examination of faecal samples and stable isotope analysis of feathers and potential food items show that adult pochards are entirely insectivorous, apparently favouring caddis fly (Trichoptera) larvae. Habitat surveys show that the invertebrate density in the lake benthos is low. Adults spend 38% of daylight hours foraging, mostly in the shallowest parts of the lake. However, Matsaborimena is steep sided and has no very shallow areas that would be suitable for diving ducklings to feed. We conclude that these lakes are not good breeding habitat for pochards. Even with such low fledging success, this population may be stable in the long term if adult survival is high enough. The pochards' persistence here and not at other sites is probably due to a lack of human-induced habitat degradation that almost every other wetland in Madagascar has been subject to.

[1] Bamford, A. *et al*. (In Press). The status and ecology of the last wild population of Madagascar pochard, *Aythya innotata. Bird Conservation International.*

Preliminary assessment of wetlands as sites for release of captive-bred birds

The research team's assessment of potential release sites was circulated in an internal report in 2012[3]. Twenty five sites were visited in 11 areas of Madagascar (see **2.3 Outputs**).

It was informally decided that Lake Sofia (in Sofia region: see **6 Lessons learned**) (S 14°35'09.82" E49°00'33.84), located about four hours' drive south-east of Bealanana, was the site with the most potential as a release site[1]. Plans are being developed for habitat restoration and stakeholder collaboration at Lake Sofia and funding sought.

[2] Bamford, A. & Razafindrajao, F. 2012. Madagascar pochard *Aythya innotata* release sites: A survey of the lakes and wetlands of the Madagascar plateau. Internal report.

Genetic studies

Blood samples were taken from all birds in the captive population by Tsanta Rakotonanahary during routine vaccinations and sent to Cardiff University for analysis. A full report by Christina Paddock (supervised by Isa-Rita Russo and Mike Bruford) is in preparation but preliminary results show that there is sharing across clutches with a lot of genetic mixing between clutches 1 and 3, less between 1 and 2 (a couple of half siblings, possibly with extra pair paternities), and some mixing between clutches 2 and 3.

Breeding behaviour apparent even within the very small adult population at Bemanevika is not unusual in pochards (*Aythya* spp.)[1]. Difficulties in exporting blood samples from Madagascar meant that the Madagascar Pochard breeding programme at Antsohihy was begun (2011) using traditional husbandry planning - assuming that three clutches represent a founder input of six birds (three males and three females). All birds were included in a studbook and pairing recommendations made accordingly though PMx (formerly PM2000) accessory software to SPARKS for analysis and management of pedigreed populations.

The better understanding of true founder input in the three wild clutches collected in 2009 has allowed for a revision in breeding recommendations in 2014.

[1] Štovícek, Kreisinger, Javurková & Albrecht. 2013. High rates of conspecific brood parasitism revealed by microsatellite analysis in a diving duck, the common pochard *Aythya ferina*. *Journal of Avian Biology* 44: 369–375).

Disease studies

Tsanta Rakotonanahary undertook an assessment of the antibodies response to selected vaccines against fowl cholera and Newcastle disease in the captive Madagascar pochards for her veterinary degree (see **4. Project partnerships**) while the population was at Ampijoroa (December 2009-September 2011). Tsanta's thesis was submitted in 2013[1].

Summary from thesis

Every year, Newcastle disease and fowl cholera are endemic among domestic and wild birds in Madagascar. Based on these findings, it was recommended to begin a vaccination programme against *Pasteurella multocida* and Paramyxovirus-1 in the captive *Aythya innotata*, for the

conservation of this rarest species of waterfowl of the world and endemic to Madagascar. A serological test using indirect ELISA was performed to determine the safety and efficacy of the selected vaccines. Plasma antibody levels were measured before and post-vaccination at regular intervals. Antibodies were detected and quantified but each individual reacts differently to the vaccines and there is a significant difference between the antibodies levels before and post vaccination. In general, antibody level against PMV-1 is reasonable and decreases with time but antibody level against *P. multocida* is quite weak even after vaccine booster. Clinical signs compatible with the diseases above were noticed during the study but many factors can bring those results. We suggest performing again the study by considering all limiting factors.

[1] Rakotonanahary, T. F.. 2013. Evolution des titres d'anticorps vaccinales contre la maladie de Newcastle et le cholera aviaire des fuligules de Madagascar A*ythya innotata*. Thèse de Doctorat en Médecine Vétérinaire. Universite D'antananarivo, Faculte de Medecine, Departement D'enseignement, Des Sciences et De Medecine Veterinaire.

The Species Action Planning Workshop

The Species Action Planning Workshop was held at Espace Dera in Antananarivo 3-6 December. David Mallon (IUCN), Peter Cranswick and Domoina Rakotobe were the facilitators (see **2.3 Outputs**).

On 2nd December David Mallon (IUCN) held a one-day workshop on developing action plans for participants from conservation NGOs in Madagascar. This training was followed by the Pochard Action Planning Workshop. Several environmental agencies, regional and local authorities as well as representatives of local communities contributed to the workshop (list of attendants in **Annex 7**) which was funded by Darwin and organized by IUCN, Durrell and MEF.

The Species Action Plan for the Fotsimaso was the first of its kind in Madagascar, following IUCN guidelines, with the full participation of representatives of stakeholder groups from the local community level to national government and international partners. The Action Plan will be published in 2014.

5.2 Transfer of knowledge

The Project's principal purpose was to ensure the immediate survival of the species through development of the purpose-built pochard captive-breeding (PCBC) at Antsohihy. Development of the Bemanevika Protected Area, monitoring of the wild pochard population and the widescale analysis of plateau wetlands were predominantly undertaken by Project partners as separate projects in parallel to and in support of the Darwin Initiative project. However, the Project did ensure that the previously unknown Madagascar pochard or *fotsimaso* entered the consciousness of all levels of Society across Sofia. This was not always in ways expected at the project's onset, or, indeed, ways that were always helpful (see **6 Lessons learned**). There are several other extremely important plant and animal species resident in Sofia; however, the *fotsimaso* seems alone in the way it has entered the regions psyche.

The Species Action Planning Workshop (see **5.1 Technical and Scientific achievements and co-operation**) further spread the importance of the *fotsimaso* survival to local, regional and National Government whilst also reinforcing the importance of Sofia and its people to this goal.

5.3 Capacity building

The Project has supported the development of a full time aviculture team at Antsohihy. Floriot Randrianarimangason (formerly from Durrell's chelonian staff at Ampijoroa) has received training from experienced aviculturalists in Madagascar since 2010 and spent six weeks in Jersey (Durrell) and Slimbridge WWT). Floriot assumed the role of Avicultural Manager at Antsohihy in 2011. Mahazaka Ratsimalandy and Rabenalimanana Samuelson (Samuel) were recruited in Antsohihy in 2011 and 2012 respectively and have received avicultural training throughout their employment. Guardiens (watchmen) have been employed at the facility throughout and, part of the project team, ably help with avicultural duties whenever required.

Felix Razafindrajao, Durrell Madagascar staff member since 1999, has taken on additional new roles within the Project. Felix successfully undertook the Durrell Endangered Species Management Graduate Certificate (DESMAN) (officially validated by the University of Kent) in 2009[1] and visited Slimbridge as part of his training. Since 2010 Felix has been the Project

Supervisor and has undertaken two significant roles as: 1, liaison between Project and lakeside villages, local and regional government and, 2, as part of the research team. Felix is registered to do his PhD at the Université d'Antananarivo.

Tsanta Rakotonanahary became part of the project in 2010 while a veterinary student from Université d'Antananarivo, Faculté De Médecine. Tsanta studied the captive pochard population as part of her degree (completed in 2013) and undertook a six-month intensive period of internship on the Durrell (Jersey) Veterinary Department and visited WWT at Slimbridge in 2011. Tsanta successfully completed the DESMAN in 2011[2].

Tsanta qualified as a veterinarian in 2013 becoming one of only a very small number of Malagasy vets trained in wildlife medicine.

Zoavina Randriana was Durrell's second veterinary intern in 2011 and graduated as a veterinarian in 2013. Zoavina has assisted Tsanta with veterinary duties at Antsohihy. The Project has significantly increased wildlife veterinary capacity in Madagascar. Zoavina gave a presentation at the Earthwatch annual debate at the National Geographical Society in London in October 2012 (topic: Conservation Tomorrow: Creating Future Leaders) on her work with the Project.

Rabenosy Médé has been a full time member of the research team since 2011 under the supervision of Felix Razafindrajao and Andy Bamford. Médé has been trained in a full range of ecological monitoring techniques and has also spent time at the Antsohihy facility with a view to, possibly, joining the aviculture and/or reintroduction team in the future.

[1] Razafindrajao, F. 2009. Incubation and captive breeding/rearing protocols for Madagascar pochard *Aythya innotata.* Unpublished DESMAN project report. Durrell Wildlife Conservation Report.

[2] Rakotonanahary, T.F. 2011. Wildfowl diseases surveillance in the north-west region of Madagascar (Sofia region). Unpublished DESMAN project report. Durrell Wildlife Conservation Report.

5.4 Sustainability and Legacy

The Madagascar pochard has been identified as one of the rarest vertebrates in the world and this duck has a very high profile. Significant amounts of funding have been received from outside of the Darwin Initiative grant and conservation work for the bird and the Bemanevika Protected Area will continue.

Within Madagascar the pochard was almost unknown until rediscovery in 2006 (see **2.3 Outputs**). Previous conservation initiatives (surveys and awareness-raising programmes by Durrell, WWT, WWF and others) had concentrated on Lake Alaotra where the bird had become familiar since unsuccessful surveys in 1989. Although effectively unknown even to villagers around Bemanevika the Madagascar pochard (*fotsimaso*) has become something of a *cause celebre* not least in political rivalry between Sofia and the national capital. The sudden local importance of the species has needed sensitive management in relations between the Project and people in Sofia from the wild site to the regional capital (Antsohihy). Continuing good relations and support are maintained through openness and regular interaction through festivals and public presentations. The Project has been enthusiastically supported throughout by MEF at Antsohihy and development of the Project interpretation facility and holding area for pochards at the MEF Offices in 2014 will further cement good relations.

The site of the wild birds at Bemanevika has been receiving tourists since 2010 with around 50 birders per year now making the difficult trek to see the pochard and a good variety of rare endemic birds. The Peregrine Fund has managed visits through a basic camping site at Lake Matsaborimena and each tourist makes a financial contribution to local villages. Expectation of riches from eco-tourism has had to be managed, not least a feeling that the facility in Antsohihy would stop visits to Bemanevika (the facility is not open to visitors).

The entire project will continue after 2013 with new funding. The captive breeding and rearing facility at Antsohihy will remain for the foreseeable future in order to maintain a safety-net population and to produce young pochards annually for release at chosen sites. All current Project staff in Madagascar retain their jobs and are included within the Durrell Madagascar workforce.

The pochard's local importance and public mood will be utilised to further ensure support. The Antsohihy facility represents significant investment both financially and logistically by the partners. The second facility at the MEF offices in Antsohihy (to be developed in 2014) will be used for education and awareness purposes including school visits, visits from Sofia residents and tourists – the current PCBC is not open to visitors except in special circumstances. The Prime Minister of Madagascar, Omer Beriziky, made an official visit to the PCBC on 5th December 2012.

Durrell Madagascar will continue to co-ordinate management of the facilities and their associated personnel and expects this project to become as well established as that for the Angonoka (Madagascar ploughshare tortoise) which celebrated its 25th Anniversary in 2011.

6 Lessons learned

The Project was managed very effectively by the combined efforts of the partners' project co-ordinators and the technical staff in Madagascar. However, projects without a dedicated field manager, on site and able to oversee practical and administrative challenges, are harder to run than those where a manager is embedded within the field team. It is recommended that future projects of this sort employ a dedicated field manager.

The Project failed to predict during planning that this almost unknown bird would become such a big political issue in Madagascar. Sensitivities involving the temporary removal of the pochards from Sofia (to Ampijoroa in the neighbouring region of Boeny, December 2009-September 2011) and long-lasting insecurities surrounding the birds have required constant management. Villagers and officials were bussed to Ampijoroa during the ducks' stay there to confirm their presence here. Unhatched eggs, egg shells and carcases of deceased ducks have all been retained in Antsohihy and are available for inspection if required. The importance of Felix Razafindrajao (coincidentally locally born) cannot be stressed enough as he has been able to liaise between Project staff (including Malagasy personnel) and officials and villagers in Sofia understanding how local sensitivities, expectations and relations between Sofia and the National Government work.

Local politics have become much more part of the Project's working environment than was ever imagined during planning. Sofia's 'nationalism' has also, in part, further hindered some long term proposals. Good animal husbandry would suggest that satellite captive populations are established elsewhere in Madagascar or even outside of the country. The search for potential release sites should include all wetlands in Madagascar, particularly those within the species' natural range. However, to date neither dispersal of the captive population or consideration of release sites outside Sofia has been feasible. The Species Action Plan workshop in Antananarivo in December 2013 did receive support amongst Bemanevika residents for dispersal of birds to other wetlands in Sofia. This first step may prove very important and, as the captive population increases, acceptance of birds moving outside of Sofia may become more likely. The development of a second captive facility at the MEF offices in Antsohihy (2-3km from the existing facility) will allow the first spreading of the population albeit using some of the same personnel and food supplies.

In view of history in Madagascar, foreigners and Malagasy from the capital are at times, particularly around Bemanevika, viewed with suspicion and possibly an expectation they are there to exploit people and/or natural resources. This is understandable but there is also an apparent feeling that projects like ours are about aid by way development and provision of infrastructure like roads and schools. This was obvious too at the Species Action Plan workshop and we plan to address these needs separately and can help, possibly, by directing more appropriate funding and expertise in future.

6.1 Monitoring and evaluation

Regular monitoring of Project progress has been achieved through a number of means and will continue after completion of the Darwin project:

A daily record is maintained by aviculturists at the breeding facility, comprehensively documenting all significant activities. Records are input into the ARKS computerised records system ensuring standardised recording. Both daily records and ARKS reports are passed back to HQs in Antananarivo, Jersey and Slimbridge;

Management reports are provided each month by key personnel for each main aspect of the Project (breeding, research etc.) and compiled and circulated between management teams at Durrell and WWT;

A monthly report of progress is maintained by Durrell's Project manager, and circulated to all partners and supporters;

Regular progress meetings are held in Antananarivo between Madagascar partners;

Regular (often weekly) Skype conferences are held between Durrell, Durrell Madagascar and WWT Slimbridge and, when the internet allows, with the facility at Antsohihy;

The Durrell Veterinary Department, former Durrell vet Javier Lopez (now at Chester Zoo) and veterinarians at WWT (Slimbridge) have maintained contact with Tsanta and staff at the Antsohihy facility. Visiting technicians each maintain contact with their Malagasy counterparts and a protocol for any emergency advice has been installed. Durrell's new Head of Veterinary Services, Andrew Routh, visited the captive-breeding centre in November 2013 to assess and provide recommendations to improve biosecurity of the captive population.

The Project managers from Durrell and WWT Slimbridge have visited the Project sites in Madagascar annually, to review progress and meet with Project personnel;

Durrell (Jersey) vets have visited the Antsohihy site annually to assess biosecurity and evaluate protocols and training needs;

Reports are also provided to other funders (e.g. MCFEA and BBC Wildlife Fund) according to their reporting schedules.

Felix Razafindrajao has made regular visits to villages at Bemanevika and Marotolana (Lake Sofia) and the regional town, Bealanana. Felix has particularly held, often informal, meetings with village heads, associations and regional government representatives (often in association with TPF) to ensure that the Project's motivation and progress are known and fully understood.

6.2 Actions taken in response to annual report reviews

Annual report reviewer's feedback was only received in June 2013 following submission of the 3rd Annual Report.

The reviewer noted that "while the project has clearly faced some challenges, the project should be commended for the progress and activities completed to date in such a difficult environment. As a reviewer, the only major comment I have is that the annual report indicates a significant amount of work that remains to be completed in Y4 of this project".

The Project was not able to fulfil all of its proposed activities within the initially proposed timeframe mostly through delays in establishing the PCBC following the move of the birds to Ampijoroa in 2009. We believe, however, that, through the provision of an extension (Y4) we have adequately caught up. Saving the Madagascar Pochard will continue as it has since 2010 using the original submitted logframe (**Annex 2**).

The 2013 reviewer requested more clarifications and evidence to provide the reader a better context of the situation and to provide evidence and increase accessibility of the report. This and answers to some more specific questions have, hopefully, been answered in the text.

7 Darwin identity

All material disseminated by the Project has acknowledged the Darwin funding. The logo has been included on all printed and online material, and where appropriate the funding has been acknowledged within text as part of the description and background of the project, for example in press releases, media interviews, presentations and on the website.

Darwin Initiative has received particularly strong exposure amongst government staff and decision makers, particularly in Sofia, due to the Project's relatively high profile.

Darwin Initiative was publicised in all reports etc. produced by partners in relation to Project. Materials such as pens, badges and stickers were widely used and circulated.

8 Finance and administration

8.1 Project expenditure

Finances for Y4 (2013/14) are made up from a project underspend of £5,243.60 and an agreed carryover of £39,264. Total £44,507.60. Project expenditure report will follow on completion of funds.

Project spend since last annual report	2012/13 Grant (£)	2012/13 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
TOTAL				

Staff employed (Name and position)	Cost (£)
TOTAL	

Capital items – description	Capital items – cost (£)
TOTAL	

Other items – description	Other items – cost (£)
TOTAL	

8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Mitsubishi Corporation Fund for Europe and Africa (MCFEA)	
Fota Wildlife Park	
BBC Wildlife	
Mr & Mrs James	
WWT Membership appeal	
Mohamed bin Zayed Species Conservation Fund	
Synchronicity Earth	
US Fish & Wildlife Service	
Durrell Membership appeal	
Aviornis UK	
Tikva Travel	
TOTAL	**438,439**

Source of funding for additional work after project lifetime	Total (£)
Mitsubishi Corporation Fund for Europe and Africa (MCFEA)	
Fota Wildlife Park	
TOTAL	**45,000**

Durrell and WWT provided in-kind contribution through staff time and technical support including eight avicultural staff members seconded to the project for a total of 13 (typically three month) periods. Technicians were based at the captive-breeding facility (Ampijoroa and Antsohihy) from 2009 onwards and assisted in developing facility, training personnel and writing protocols. WWT sent three staff members to Antsohihy in 2011 to oversee conversion of domestic accommodation to dedicated breeding centre, put in relevant wiring and technical equipment. Veterinary support for captive birds, both locally, through Tsanta Rakotonanahary, and remotely has been provided by Durrell and WWT and included annual site inspections.

Annual visits to captive facility included personnel funded by Darwin and by additional funders.

8.3 Value for Money

The Project achieved exceptional value for money from the Darwin funds. Darwin funding was critical to the realisation of this project as all personnel at the Antsohihy captive-breeding facility (aviculture team, driver and guardiens) were paid through these funds. A significant proportion of the funds were also used on local travel expenses ensuring that the project could be supported as necessary in a country with otherwise very low capacity. It was possible to maintain a presence of avicultural specialists from Jersey, UK and Mauritius, for lengthy periods throughout the project lifetime. This ensured the smooth development of a highly specialised breeding centre in a very isolated part of Madagascar and the necessary training for local personnel with no previous bird-keeping experience. Additional funders provided resources for the majority of the PCBC build and specialised materials but these would have meant less without Darwin's funding of personnel and logistical support.

Annex 1 Report of progress and achievements against final project logframe for the life of the project

Note: For projects that commenced after 2012 the terminology used for the logframe was changed to reflect DFID's terminology.

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year 2013-2014	Actions required/planned for next period
Goal/Impact: Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources		Protection of Bemanevika site will contribute to safeguarding a potentially unique biodiversity in Madagascar. Several other critically endangered vertebrates are present in the protected area. Work by Project and parallel work by TPF is ensuring co-operation of local communities and ensuring that they benefit through many schemes such as forest resource protection etc.	Do not fill not applicable
Purpose To avert imminent extinction of the Madagascar pochard through recovery planning and capacity building for a conservation breeding programme, site protection and public engagement.	• Conservation breeding programme established in-country • Species' current habitat at Bemanevika officially protected. • Community outreach programme established • Species recovery plan developed with all stakeholders		Do not fill not applicable
Output 1. Project effectively managed and coordinated	• Annual reports and finance claims delivered on time and in budget		
Activity 1.1 Establish Project management team and planning structure		Management structure established, based from Durrell in Jersey and WWT in UK. Managed in host country by Durrell Madagascar in communication with Durrell and WWT through e-mail, monthly Skype conference calls and telephone. Durrell and WWT meet annually in Jersey or UK, Durrell Madagascar organise regular meetings with TPF and Asity Madagascar in Antananarivo. Monthly reports are circulated throughout the Project and all partners.	
Output 2. Key conservation needs for Madagascar pochard identified	• Analyse genetic diversity of captive founders and recommend pairings • Key limiting factors at site identified • Species recovery plan endorsed by Government by Y3		

Activity 2.1. Research prioritisation and development of collaborative studies		Research priorities have been identified and include both ecology of the Madagascar pochard and husbandry related to the captive-breeding programme. WWT Senior Research Officer Andy Bamford and research team working with Project including Felix Razafindrajao have continued to establish baseline ecological data at current and former sites and wetlands across High Plateau. Birds have been monitored monthly throughout year at Bemanevika and factors including benthic invertebrate abundance, water depth and ambient temperatures identified as possible limiting factors.
Activity 2.2. Analyse genetic diversity of captive founders and recommend pairings		Blood samples collected from all birds were analysed at the University of Cardiff in 2014 (report in prep.). The captive population has been managed through a studbook (SPARKS) and recommended pairings identified through PM2000 based on unrelatedness of the three clutches collected in 2009. Initial genetic results suggest relatedness of clutches 1 and 3 so future pairings will be planned accordingly.
Activity 2.3. Hold Recovery Plan workshop, action plan published and circulated		The Species Action Plan workshop was held in Antananarivo, December 2013 through IUCN guidelines. Action Plan will be published in 2014.
Output 3. Conservation-breeding programme and Malagasy capacity for aviculture established	• Captive breeding population producing around 20 birds Y1 • Three Malagasy staff trained in aviculture, and endangered species management • Preliminary assessment of wetlands as sites for release of captive-bred birds	• Thirty eight young hatched and reared in 2011-2012 and 2013 breeding seasons • Three avicultural staff, veterinarian, field manager, Project driver and two site guardiens employed. • Andy Bamford, Felix Razafindrajao and research team undertook widescale survey of potential release sites in Sofia and on High Plateau. Priority sites were re-visited in November 2012 with further Project members and WWT's Head of Wetland Conservation. Lake Sofia (in Sofia) identified as site with highest potential for restoration and release. Project partnerships with local village associations and plans for restoration to be established in 2014. Funding proposals submitted.
Activity 3.1. Build captive-breeding facility		Captive-breeding facility at Antsohihy was officially opened in November 2011. Further blocks of aviaries constructed in 2012 and 2013 with a new aviary block to be completed in 2014 when entry to facility will be altered to increase biosecurity. Proposed holding facility at Anjingo postponed and unlikely to progress through site's remoteness. A second, smaller, captive facility will be established at MEF offices at Antsohihy. New facility will be used for holding birds and environmental education.
Activity 3.2. Recruit avicultural and support staff		Avicultural and support staff (Field Manager, Captive Manager, aviculturalists (2), Project driver, site guardiens (2) and veterinarian) remain in place.
Activity 3.3. Collect eggs from wild birds and establish breeding pairs in captivity		Collection of further eggs has been postponed temporarily. Initially considered politically difficult, return of captive birds to Sofia in 2011 was well received by the local authorities and communities. Collection may again be possible but, with facility is at maximum capacity, will be delayed until later date.

Output 4. Malagasy capacity for environmental CEPA of Madagascar pochard established	• Minimum of 20 school teachers and local groups and NGOs trained in environmental CEPA • Ten Malagasy project staff trained in environmental CEPA.	
Activity 4.1. Develop local partner's capacity for CEPA training and establish CEPA training in Bemanevika area		Project Environmental Education Officer, Jacques Live Rajaonarison, was based at Bealanana working in villages and towns in the Bemanevika/Bealanana area. Jacques Live has established local groups through Asity Madagascar model and is working with schools and scout groups to train teams in each area.
Output 5. Long-term protection of Bemanevika secured	• Site included within the new Protected Areas framework by Y3 • Site support group in place Y2	• The Bemanevika site still has temporary protected status and process of upgrading to full protection is currently with the Government • TPF work closely with local communities
Activity 5.1. Maintain protection of Bemanevika site		The Peregrine Fund team have maintained their camp at Bemanevika and undertake protection of the forest and wetlands while working closely with local villages and National Government in establishing full statutory protection for the site. TPF manage visitors to the site and use fees and donations within the local village communities.
Activity 2.2. Establish statutory protection for site		TPF succeeded in getting the site, Bemanevika Protected Area, established as a Nouvelles Aires Protégés: a significant feat in political conditions. A Management Plan Environmental and Social Safeguard Plan (ESSP) were completed in collaboration with the local communities. During the lengthy process of developing a NAP, the site is given the status of 'Temporary Protected Area' giving it the full legal protection of a NAP but with a time limit – full ratification will be given by newly (2013) elected government..
Output 6. Local community and national audiences support conservation of the species.	• Rapid assessment of social, cultural and economic situation of communities undertaken • At least 80% of schoolchildren aware and supportive of conservation activities around the target species by Y3 • Legal status of local communities to manage Bemanevika established	
Activity 6.1. Establish national awareness programme through local media and publicity materials		Madagascar pochard now freely reported in regional and national media since the return of the captive population to Sofia. Species features too in social media such as Facebook page of Durrell Madagascar
Activity 6.2. Assess communities and undertake questionnaire surveys in Bemanevika area		Not undertaken.

Annex 2 Project's full logframe, including indicators, means of verification and assumptions

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Sub-Goal: Extinction of Madagascar Pochard averted, and its long-term future secured in the wild. The conservation of the Pochard is used to promote wetland restoration through community involvement and human livelihood support	• Madagascar Pochard IUCN status downgraded from CR to EN within 10 years • Existing and one new population self-sustaining in the wild within the species' historic range within 25 years • Resident community engaged in conservation activities, and environmental awareness increased by project completion	• IUCN Red List • Population monitoring reports • Reports on awareness campaigns. Numbers of nationals employed by the project	
Purpose To avert imminent extinction of the Madagascar Pochard through recovery planning and capacity building for a conservation breeding programme, site protection and public engagement.	• Conservation breeding programme established in-country • Species' current habitat at Bemanevika officially protected. • Community outreach programme established • Species recovery plan developed with all stakeholders	• Conservation breeding programme assessed against *IUCN Technical Guidelines on the Management of Ex Situ Populations for Conservation* • Site included in Government official list of protected areas • Regular field reports produced. • Species recovery plan endorsed by Government of Madagascar	• Current level of Government support for conservation continues • Stochastic events do not lead to extinction of the wild population before *ex-situ* population is established • Political stability in Madagascar allows project to be completed
Outputs 1. Project effectively managed and coordinated	• Annual reports and finance claims delivered on time and in budget	• Annual reports and finance claims to Darwin	

2. Key conservation needs for Madagascar Pochard identified	• Analyse genetic diversity of captive founders and recommend pairings • Key limiting factors at site identified • Species recovery plan endorsed by Government by Y3	• Species recovery plan published, and widely circulated in-country and abroad • One scientific publication	
3. Conservation-breeding programme and Malagasy capacity for aviculture established	• Captive breeding population producing around 20 birds Y1 • Three Malagasy staff trained in aviculture, and endangered species management • Preliminary assessment of wetlands as sites for release of captive-bred birds	• Updates posted in project website • Studbook created • Reports on breeding success and survival of birds in captivity • Annual avicultural assessment reports for all staff • Husbandry guidelines produced • Two scientific papers published	• Fecundity of birds not affected by inbreeding depression • Political support is national stability are maintained
4. Malagasy capacity for environmental CEPA of Madagascar Pochard established	• Minimum of 20 school teachers and local groups and NGOs trained in environmental CEPA • Ten Malagasy project staff trained in environmental CEPA.	• Training reports produced. • Ten CEPA certificates awarded.	
5. Long-term protection of Bemanevika secured	• Site included within the new Protected Areas framework by Y3 • Site support group in place Y2	• Necessary documentation produced to justify declaration of site as protected area • Site management plan produced	• Assignation of protected area status compatible with the long-term survival of the Pochard and other key species in the site
6. Local community and national audiences support conservation of the species.	• Rapid assessment of social, cultural and economic situation of communities undertaken • At least 80% of schoolchildren aware and supportive of conservation activities around the target species by Y3 • Legal status of local communities to manage Bemanevika established	• Project start and end questionnaire surveys • Awareness and education material produced in Malagasy for communities and schools • Training reports produced.	

Activities (details in workplan) 1.1 Establish Project management team and planning structure 2.1 Research prioritisation and development of collaborative studies 2.2 Analyse genetic diversity of captive founders and recommend pairings 2.3 Hold Recovery Plan workshop, action plan published and circulated 3.1 Build captive-breeding facility 3.2 Recruit avicultural and support staff 3.3 Collect eggs from wild birds and establish breeding pairs in captivity 4.1 Develop local partner's capacity for CEPA training and establish CEPA training in Bemanevika area 5.1 Maintain protection of Bemanevika site 5.2 Establish statutory protection for site 6.1 Establish national awareness programme through local media and publicity materials. 6.2 Assess communities and undertake questionnaire surveys in Bemanevika area.
Monitoring activities: Indicator 1: Project leaders to track and report progress against measurable indicators and institutional workplans to ensure timely delivery of project outputs Indicator 2: Constant monitoring of key demographic rates in captive population as part of adaptive management of the captive breeding programme Indicator 3. Repeat appraisals to monitor staff skill development and knowledge generation of CEPA techniques Indicator 4. Evaluation of change in community awareness of the pochard and conservation intervention through repeated questionnaires.

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring		Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	10	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation	60	Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	10	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	15	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair

Article No./Title	Project %	Article Description
		and equitable way of results and benefits.
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution	5	Smaller contributions (e.g. of 5%) or less should be summed and included here. 5 % Species Action Plan workshop in Antananarivo, December 2013.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	1. Felix Razafindrajao
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	1. Floriot Randrianarimangason
4a	Number of undergraduate students receiving training	2. Tsanta Rakotonanahary Zoavina Randriana
4b	Number of training weeks provided to undergraduate students	17. Floriot Randrianarimangason
4c	Number of postgraduate students receiving training (not 1-3 above)	
4d	Number of training weeks for postgraduate students	
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(i.e. not categories 1-4 above)	

Code	Description	Totals (plus additional detail as required)
6a	Number of people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	4. Aviculturalists at Antsohihy and Tsanta Rakotonanahary
6b	Number of training weeks not leading to formal qualification	118. From avicultural support
7	Number of types of training materials produced for use by host country(s)	
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	150. 10 x avicultural support 3 x Annual site inspection at PCBC 2 x Veterinary inspection at PCBC
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	The Peregrine Fund documents in support of Bemanevika NPA
10	Number of formal documents produced to assist work related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	
11b	Number of papers published or accepted for publication elsewhere	
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1. Captive population on ARKS
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	
13b	Number of species reference collections enhanced and handed over to host country(s)	
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	2. Project workshop with partners and local NGOs, Antananarivo, December 2012 Species Action Plan Workshop, Antananarivo, December 2013
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	
15a	Number of national press releases or publicity articles in host country(s)	1
15b	Number of local press releases or publicity	

Code	Description	Totals (plus additional detail as required)
	articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	5
15d	Number of local press releases or publicity articles in UK	3
16a	Number of issues of newsletters produced in the host country(s)	35
16b	Estimated circulation of each newsletter in the host country(s)	5,000
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	
17b	Number of dissemination networks enhanced or extended	
18a	Number of national TV programmes/features in host country(s)	
18b	Number of national TV programme/features in the UK	
18c	Number of local TV programme/features in host country	2
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in host country(s)	11
19b	Number of national radio interviews/features in the UK	6
19c	Number of local radio interviews/features in host country (s)	12
19d	Number of local radio interviews/features in the UK	
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	
23	Value of additional resources raised for project (*See Section 8.2 above*)	
Other Measures used by the project and not currently including in DI standard measures		

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
Manual*	Madagascar Pochard Husbandry Protocols. Young *et al*. 2012	Durrell/WWT	Glyn Young	Manual*
Webpage	IUCN Species of the day 24/4/2010	IUCN	www.iucnredlist.org/sotdfiles/aythya-innotata.pdf	N/A
Article	Back from the brink. 2010. Jeggo, Whitford & Young.	EAZA News	EAZA www.eaza.net	N/A
Article	Fuligule de Madagascar. 2010. Aviornis, Young & Lewis.	AVIORNIS France	Aviornis, France www.aviornis.fr	N/A
Article	Find us, keep us. 2011. Jarrett.	WWT . *Waterlife.*	WWT www.wwt.org.uk	N/A
DVD	Saving the world's rarest bird. WWT 2011	WWT	Watch on YouTube http://www.youtube.com/watch?v=WcdolbS7VzY	
Article*	Return of the native. Cranswick 2012	WWT *Waterlife*	WWT www.wwt.org.uk	N/A
Article	Pochards get a new home.	Durrell *On The Edge*	Durrell Wildlife Conservation Trust www.durrell.org	N/A
Thesis	Rakotonanahary, T. F.. 2013. Evolution des titres d'anticorps vaccinales contre la maladie de Newcastle et le cholera aviaire des fuligules de Madagascar *Aythya innotata*	. Universite D'antananarivo, Faculte de Medecine, Departement D'enseignement, Des Sciences et De Medecine Veterinaire	Glyn Young	N/A
Article	Sofia, so good. Cranswick, P. 2014.	WWT *Waterlife*	WWT www.wwt.org.uk	N/A
Chapter	Madagascar Pochard *Aythya innotata* Donald *et al*. 2010. Facing Extinction: the World's Rarest Birds and the Race to Save Them.	. T & A D Poyser, London	Amazon UK http://www.amazon.co.uk/Facing-Extinction-worlds-rarest-birds/dp/1408189666	£21

Annex 6 Darwin Contacts

Ref No	18-009
Project Title	**Saving the Madagascar Pochard: the world's most endangered duck**
Project Leader Details	
Name	**H Glyn Young**
Role within Darwin Project	Durrell (Jersey) project co-ordinator
Address	Durrell Wildlife Conservation Trust, Les Augrès Manor, La Profonde Rue, Trinity, Jersey JE3 5BP, Channel Islands
Phone	
Fax/Skype	
Email	
Partner 1	
Name	**Lance Woolaver**
Organisation	Durrell Madagascar
Role within Darwin Project	Durrell Madagascar project co-ordinator
Address	Durrell Wildlife Conservation Trust, BP8511, Antananarivo 101, Madagascar
Fax/Skype	
Email	
Partner 2	
Name	**Peter Cranswick**
Organisation	Wildfowl & Wetlands Trust
Role within Darwin Project	Wildfowl & Wetlands Trust project co-ordinator
Address	Wildfowl & Wetlands Trust, Slimbridge, Gloucestershire, GL2 7BT, United Kingdom
Fax/Skype	
Email	
Partner 3	
Name	**Lily-Arison Rene de Roland**
Organisation	The Peregrine Fund (Madagascar)
Role within Darwin Project	The Peregrine Fund (Madagascar) project co-ordinator
Address	c/o 5668 West Flying Hawk Lane, Boise, Idaho 83709, USA
Fax/Skype	
Email	

Partner 4	
Name	**Raminoarisoa Voninavoko**
Organisation	Asity Madagascar
Role within Darwin Project	Asity Madagascar, project co-ordinator
Address	Ter Analamahitsy, Lot IIN 184 PH, BP 1074, Antananarivo 101, Madagascar
Fax/Skype	
Email	
Partner 5	
Name	Zamany Rufin
Organisation	Direction Régionale de L'Environnement et des Forêts
Role within Darwin Project	DREF project co-ordinator
Address	Ambalabe Ouest, 407 Antsohihy, Madagascar
Fax/Skype	
Email	

Annex 7

Madagascar Pochard reproductive biology (see 5.1 5.1 Technical and Scientific achievements and co-operation)

From: Safford, R. & Hawkins, A.F. 2013*. The Birds of Africa.* Vol 8: The Malagasy Region. T & A D Poyser, London, UK. Page 261.

Breeding habits

Displays not studied in wild but some components observed and videoed in captive population (HGY). Males use 'Bill-flicks' and 'Raised shakes'; 'Kinked-neck' display used by multiple or single ♂ in presence of ♀ with head and neck raised or with bill close to water. Male 'Head-throw' is very visible with head thrown onto back and accompanied with whistle. Female displays less obvious with 'Kinked-neck' associated with more pronounced calls.

NEST A platform on ground, made from available aquatic or marsh vegetation, 0–2 m from water in dense cover; diameter 22.5 ± 8.7 (SD) cm (The Peregrine Fund). Lined with down feathers by ♀ at onset of incubation.

EGGS In 2007, 7–10, mean 8.7 (*n*=14); in 2008, mean 8.9, (*n* uncertain) (The Peregrine Fund); in 2009, 7–9, mean 8.3, *n*=3 clutches collected for captive rearing (N. Jarrett). Previous reports of C/2 probably refer to an incomplete clutch. Ovate, buffish white. SIZE. 47.9–55.4 × 37.5–41.0 (mean 51.6 × 39.7, *n*=19) (The Peregrine Fund) in 2007–2008; 47.6–55.6 × 38.1–42.1 (mean 51.9 × 40.2, *n*=25) in 2009 (N. Jarrett); in captivity, 55 × 40 (*n* uncertain) (Delacour 1959).

LAYING DATES At Bemanevika, Jul–Nov (The Peregrine Fund); previously assumed to breed Oct–Jan (Delacour 1959).

INCUBATION By ♀ alone; in captivity, period reported 26–28 days (Delacour 1959) but *c*. 24 days (*n*=24) in 2009 (N. Jarrett).

FLEDGING In captivity, period reported 8 weeks (O. Joiner).

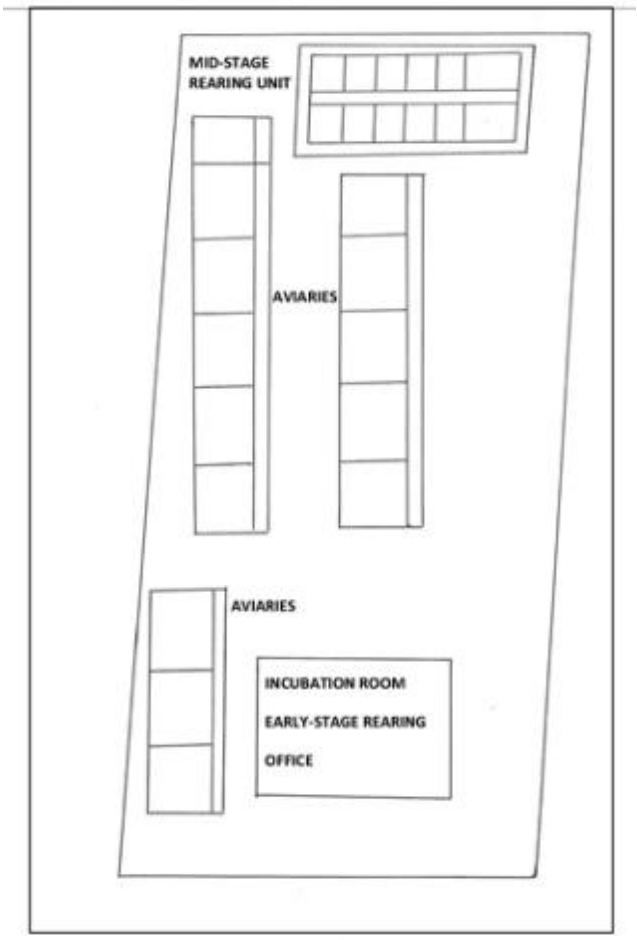
BREEDING SUCCESS/SURVIVAL Madagascar Harriers *Circus macrosceles* seen to take at least 2 ducklings in 2009 (Donald *et al*. 2010).

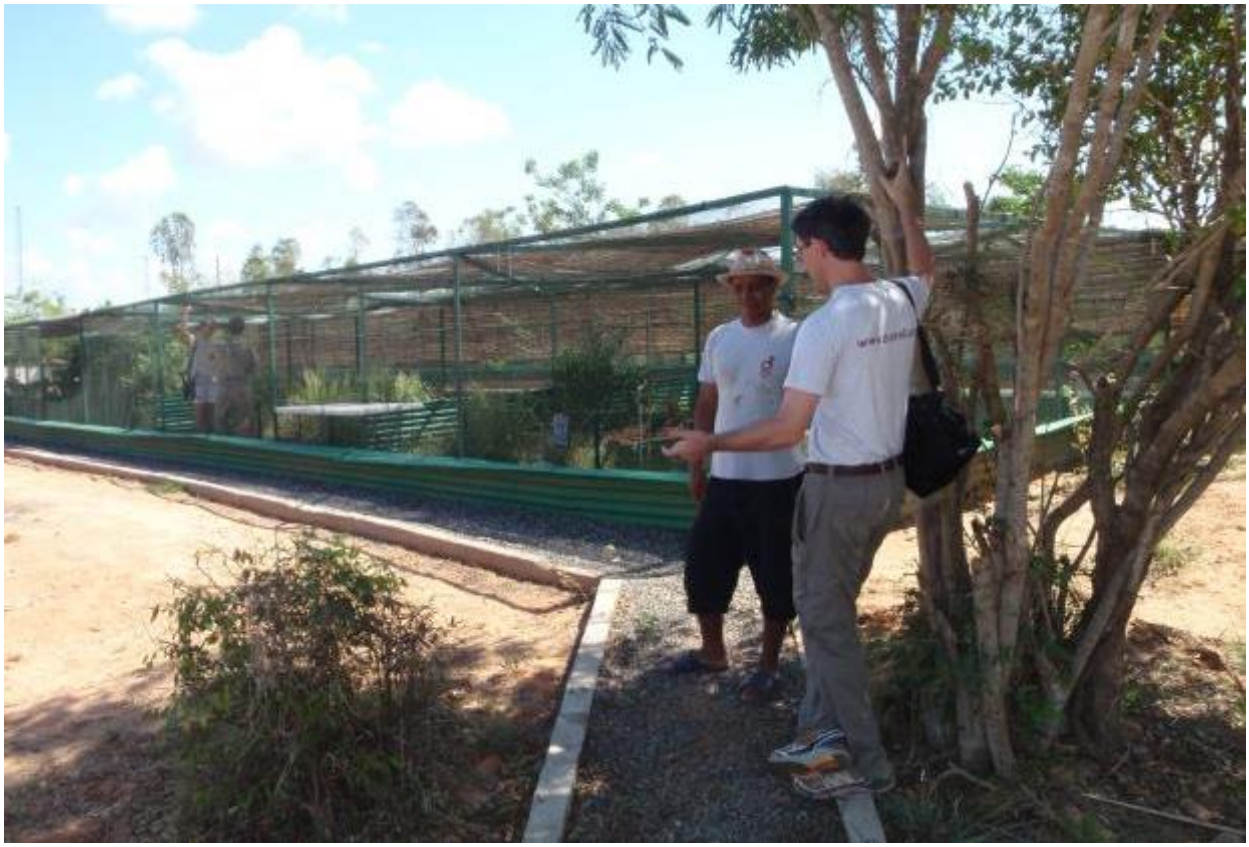
Madagascar pochard nest (left) and one-day old ducklings (right).
Photos by H G Young and M Roberts (left) and Richard Lewis (right).

Bemanevika NAP

Lake Matsaborimena and forest 2006
Photos by H G Young

Pochard Conservation Breeding Centre, Antsohihy





Photos by H G Young

Avicultural team at Antsohihy

Floriot Randrianarimangason (left) and Mahazaka Ratsimalandy. Photo by L G Woolaver

Rabenalimanana Samuelson (left) and Tsanta Rakotonanahary. Photos by L G Woolaver

Felix Razafindrajao and Andy Bamford (top) and Felix with villagers at Lake Sofia (bottom)
Photos by H G Young (top) and Lance G Woolaver (bottom)

Community support

Photos by Jacques Live Rajaonarison

Species Action Planning Workshop, Antananarivo 3-6 December

Workshop participants 3rd December
Photo by Peter Cranswick

Participants during 3-6 December

Nestor Robert Tilahy	FBM
Jaomanody	FBM
Eric Ferdinand Randrianantenaina	Sofia Mandroso
Jean Nestor	Sofia Mandroso
Marineva	VOI Marotolona
Désiré Randriamaro	DDR Region Sofia Cantonnement
Jean Claude Tsaramila	Bealanana
Michel Rakotoson	TPF Bealanana
Tolojanahary Richard Andriamalala	TPF
Ruffin Zamany	DREF Sofia
Luciano Andriamaro	Conservation International
Sahondra Abesihanaka	MEF
Lance Woolaver	Durrell
Hywel Glyn Young	Durrell
Andrew Bamford	WWT
Linda Ange Faratiana Jonah-Fandro	MEF DCBSAP
Peter Cranswick	WWT
David Mallon	IUCN
Eric Robsomanitrandrasana	DGF/DVRN
Marius Rakotondratsima	TPF
Falitiana Rabemananjara	A.S.G- A.S. Faune
Kitty Brayne	Durrell
Vony Raminoarisoa	Asity Madagascar
Richard Lewis	Durrell
Felix Razafindrajao	Durrell
Domoina Rakotobe	Consultant
Felana Ranaivoarisoa	Consultant
Julien Ramanampamonjy	PBZT (Div Oiseau)
Lily Arison Rene De Roland	TPF
Jean Claude Rabemanantsoa	DGF

Pochard Conservation Breeding Centre, November 2013

Photos by L G Woolaver