CEPF SMALL GRANT FINAL PROJECT COMPLETION REPORT

Organization Legal Name:	Société d'Ornithologie de Polynésie
Project Title:	Makatea, a site of major importance for endemic birds
Date of Report:	13 February 2012
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CEPF Region: Polynesia-Micronesia Biodiversity Hotspot

Strategic Direction: SD-2

Grant Amount: 17 657 USD

Project Dates: 01 May 2010 – 31 October 2011

Implementation Partners for this Project (please explain the level of involvement for each partner):
- The Government of French Polynesia through the Regional Directorate for the Environment DIREN: Claude Serra has helped in communicating with the local community.
- Municipality: the mayor of Makatea has contributed to hold a public meeting on the state of the island natural heritage.
- Pacific Islands Conservation Research Association: Dylan Kesler has done the evaluation of endemic populations of birds and assessed the feasibility for the reintroduction of the Tuamotu Kingfisher.
- Jean-François Butaud: as a consultant in botanic, he assessed the importance of vegetation of Makatea.
- Fred Jacq is a botanist specialized in GIS. He has helped with the inventory of the vegetation and has mapped the remarkable vegetation of Makatea.

Conservation Impacts

Please explain/describe how your project has contributed to the implementation of the CEPF ecosystem profile.

The project has contributed to the implementation of the CEPF ecosystem profile, especially Strategic Objective 2.1 «Development and management of conservation areas for priority sites which are not yet protected, in particular safe place for species such as large forest zones and habitats which are free of exotic species, which are vulnerable». Indeed, the remote island of Makatea holds a forest with has the richest flora of all the Tuamotu Archipelago and three endemic and threatened bird species, but the area is not protected. This project has helped spark the debate about a legal protection of the territory.

The development of a Plan of Actions for the two endemic species and a feasibility study for the eradication of rats are part of Strategic Objective 3.1 «Development and implementation of restoration plans for critically endangered species which require targeted actions, in particular for those which have received little attention so far ».

Please summarize the overall results/impact of your project against the expected results detailed in the approved proposal.

Outcome 1- Collect data on Makatea plant species:
The different plant species were identified, which showed that the island of the Makatea holds the richest flora of all the Tuamotu Archipelago (76 atolls). It is home to 77 native species (four of them are protected) and 13 endemic species to French Polynesia, 4 of them being endemic to the island of Makatea (including a new genus discovered during this fieldtrip).
The different vegetal formations of the island were identified and precisely mapped.
Although Makatea has a unique flora, 18 species are invasive. The main recommendation to protect the native vegetation is to survey and control these invasive plants. It has also been suggested to classify the island as a natural reserve (Jacq and Butaud 2009).

Outcome 2- Gather data on the Polynesian Imperial-pigeon and the Makatea Fruit-dove:

Overview:
The island of Makatea hosts at least two species of concern, the Makatea Fruit-dove *Ptilinopus chalcurus* (VU) and the Polynesian Imperial-pigeon *Ducula aurorae* (EN) and an additional one that represents an endemic sub-species, the Tuamotu Reed-warbler *Acrocephalus atiphus eremus*. Populations of native birds on Makatea appear to be relatively stable, and there may even be prospects for population recovery as the anthropogenic mining activities that once occurred on the island have ceased (Albar et al. 2009). Makatea was heavily exploited for its vast phosphorous reserves, but the mining stopped in the 1960s and the human population was only 61 people in 2007 (Institut Statistique de la Polynésie française). Hunting pressure and rates of habitat loss were reduced, and the forests appear to be recovering in several areas (Jacq and Butaud 2009). Nonetheless, bird populations remain small and restricted to the land area of Makatea. Together, these may make the populations vulnerable to stochastic threats such as extreme weather, avian diseases, or inbreeding depression. Further, the island is being considered for new mining activities, which may further affect the birds. Finally, the island's proximity to Tahiti makes it vulnerable to invasion by the same predatory *Circus approximans* that likely caused the extinction of *Ducula aurorae* and the decline of Grey-green Fruit-dove *Ptilinopus purpuratus* (LC) on Tahiti (Gouni and Zysman 2007).

Method:
All previous literature on the three species mentioned above was collected.
The populations of these species were assessed using the method of counting points, and the data collected were then analyzed with the software Distance 6.0 Release 2.
Maps of the birds and their habitats were produced. The main threats affecting these species were identified.
A Plan of actions for the two endemic species was established.

Results:

Ptilinopus chalcurus
We estimated densities and total populations based on point transect surveys conducted in July 2009 on Makatea Island. Surveys were conducted at 51 stations, and across the course of a week. Survey data were analyzed with program Distance (Thomas 2006) to estimate population densities. We excluded the most distant 15% of the observations, which left 49 for detection curve fitting. We used no pooling. We considered half-normal, hazard rate, negative exponential, and uniform detection function models. We used cosine series expansions with all models, and evaluated the relative fit and suitability of each model with a model selection approach (Burnham and Anderson 2002). The top-ranked model included a negative exponential detection function. Due to the restricted number of detections, parameters were constrained to obtain monotonicity. The resulting curve was nonetheless intuitively appealing, as it showed a decline in detectability with distance, and because the chi-square test for fit did not reject the model. Parameter estimates resulted in the density and abundance estimates presented below.
When multiplied by the total land area on Makatea (2800 ha), the resulting estimated population size was 993 birds, with a 95% confidence of being between 444 and 2219. Please note that the survey design included only a portion of the island (some of Makatea was inaccessible).

Additionally, our ability to estimate a robust detection function was hindered by limited observations. Nonetheless, we feel as if our estimate is a reasonable approximation of the actual population size. The last estimate of this population was about 1000 individuals in 1987 (Thibault and Guyot 1987).

Observations	Estimated Density	95% Confidence Interval	Estimated Population	95% Confidence Interval
49	0.3546/ha	0.16 to 0.79	993	444 to 2219

Ducula aurorae

We estimated densities and total populations using the same method described above. We right truncated the observation set at 100 m because of declining detectability at greater distances. We observed 76 birds during the survey sampling periods, and used 69 observations for curve fitting. We pooled observations into 20 m bins. We considered half-normal, hazard rate, negative exponential, and uniform detection function models and used cosine series expansions with all models. Using a model selection approach (Burnham and Anderson 2002), we evaluated the relative fit and suitability of each model. The top-ranked model was a uniform detection function. Due to the restricted number of detections, parameters were constrained to obtain monotonicity. The chi-square test for fit did not reject the model. Parameter estimates were similar across models, but the uniform detection model resulted in the density and abundance estimates presented below.

When multiplied by the total land area on Makatea (2800 ha), the resulting estimated population size was 1206, with a 95% confidence of being between 867 and 1677. The last estimate of this population was comprised between 100 and 500 birds in 1987 (Thibault and Guyot 1987).

Observations	Estimated Density	95% Confidence Interval	Estimated Population	95% Confidence Interval
69	0.4307/ha	0.31 to 0.60	1206	867 to 1677

Acrocephalus atyphus

Although the species *Acrocephalus atyphus* is widespread in the Tuamotu and thus listed by Birdlife as LC, it should be noted that Makatea hosts a subspecies *Acrocephalus atyphus eremus*, which is endemic to this island.

The same method was used as previously described. We right-truncated detections beyond 90 m because of declining detectability at greater distances, although other truncation distances resulted in similar density estimates. Detections were pooled into 4 equal-width bins. We detected 74 birds, of which 72 were used to develop a detection function. We considered half-normal, hazard rate, and uniform detection function models. We used cosine series expansions with all models. We evaluated the relative fit and suitability of each model with a model selection approach (Burnham and Anderson 2002). The top-ranked model was a hazard rate detection function. Due to the restricted number of detections, parameters were constrained to obtain monotonicity. The resulting curve was nonetheless intuitively appealing, as it showed a decline in detectability with distance, and because the chi-square test for fit did not reject the model. Parameter estimates resulted in the density and abundance estimates presented below.

When multiplied by the total land area on Makatea (2800 ha), the resulting estimated population size was 6820, with a 95% confidence of being between 3695 and 12587.

Observations	Estimated Density	95% Confidence Interval	Estimated Population	95% Confidence Interval
72	2.44/ha	1.32 to 4.50	6820	3695 to 12587

Outcome 3- Evaluate the populations of introduced mammals and implement biosecurity measures:

A rat-trapping control campaign was carried out on the island. 282 night-traps were conducted using VICTOR snap traps and coconut as a bait. 17 rats were caught in the traps. The presence of Pacific rats *Rattus exulans* and Black rats *Rattus rattus* in low densities was established.
No mouse was observed.
A few cats were observed in the village, and feral cats are believed to be present in the other areas of the island.
The presence of dogs and pigs were confirmed but these species are confined to the village.
The biosecurity measures that were planned in order to prevent any possible invasion of Black Rats were not carried out because of the presence of Black rats. Instead, a feasibility study for the eradication of rats from the entire island was drafted.

Outcome 4- Raise awareness among local people on the wealth of their natural heritage and involve them in the implementation of biosecurity measures

A public information meeting was organized and held at the city hall of Makatea, with the help of the Mayor, in order to encourage inhabitants to sustainably manage their environment. Nine persons attended this public information meeting. All members of the scientific team presented briefly the purpose of their work on the island, and explained the possible future actions in order to protect the heritage and environment of Makatea. They gathered feedbacks from residents, generally reluctant to the idea of eradicating rats from the entire island. The meeting also provided an opportunity to learn that the Common waxbill *Estrilda astrild* was observed on the island in 2009.

Two members from the team visited the single class of primary school of the island, including twenty children. The presentation lasted two hours, and the following topics were discussed: the endemic birds of Makatea, habitat, threats, why and how to protect them. It appeared that children had little awareness of the importance of biodiversity for Makatea, and were unfamiliar with the risks to birds. An oral quiz has controlled the knowledge acquired by children during the presentation. They seemed to be very interested and concerned.

Two additional outcomes were added since the proposal was written:

Outcome 5- Collect data on seabirds:

The presence of 6 seabird species previously mentioned as breeders was confirmed, and the discovery of an additional breeding seabird species, the Audubon's Shearwater, was made. Two other species (Lesser Frigatebird and Greater Frigatebird) were also observed but their breeding status could not be confirmed.

Outcome 6- Evaluate the potential for the translocation of the Tahiti monarch *Pomarea nigra* (IUCN Critically Endangered) and the Tuamotu Kingfisher *Todiramphus gambieri* (IUCN Critically Endangered) to Makatea:

The island of Makatea presents a suitable habitat for a population of Tahiti monarch. Indeed, 34% of the forest could host several hundreds of Tahiti Monarch territories. It could then be possible to consider the introduction of this species, provided that the rats are eradicated from the island and the area is protected.
Translocation of the Tuamotu Kingfisher from Niau to Makatea is a potential rescue strategy for the endangered bird. Habitats on Makatea are dissimilar to those of Niau, but the vegetation is not different from many other tropical islands in the region. As such, the island may provide suitable habitat for the birds, which are likely evolutionarily adapted to dispersal and settlement. However, the vegetation and geomorphological differences between Niau and Makatea are greater than the differences between Niau and Anaa. After evaluating the island of Makatea, the same research crew assessed the high islands of the Anna Atoll complex. Vegetation, ecology, and island size were all more compelling on Anaa. Thus, we recommend that translocation of Tuamotu Kingfishers first include a movement of individuals from Niau to Anaa. Only then should a translocation to Makatea be considered.

Please provide the following information where relevant:

Hectares Protected:
Species Conserved:
Corridors Created:

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives.

The project has provided and updated valuable scientific knowledge about plants and birds.

It has included the evaluation of the introduced species including the discovery of the presence of Black Rats *Rattus rattus* that was not believed to be present, and it has identified the main threats for birds, that are invasive plants and introduced mammals.

This project was particularly successful in achieving some additional outputs such as the evaluation of the reintroduction of Tahiti Monarch and the Tuamotu Kingfisher.

The different results collected have conducted to the development of a Plan of Actions for the two endemic species and a feasibility study for the eradication of rats from the island.

The collaboration initiated with Pacific Islands Conservation Research Association (Dr Dylan Kesler) has developed capacity building in the SOP team and helped design replicable methods to evaluate bird populations.

Community awareness has been successfully implemented, as two actions aimed at informed the local population about the importance of Makatea according to the richness of its biodiversity. The residents expressed interest and concern about protecting their heritage.

All data, information and recommendation has been compiled in various reports that will enable government management of the island and informed other stakeholders about the importance of the island.

Were there any unexpected impacts (positive or negative)?

One of the impact objectives of the project was to implement biosecurity measures in order to protect the island from the invasion of Black rats *Rattus rattus*. However, the presence of this former species on Makatea has been discovered during the study. As a consequence, our team could not implement biosecurity measures and plan the reintroduction of other threatened species such as the Tuamotu Kingfisher or the Tahiti Monarch.
Furthermore, the long-term objectives had to be changed. The alternative solution was to assess the feasibility study for the eradication of rats from the entire island, in order to protect the flora and the birds. The feasibility study has been written but needs peer-reviewed.

The positive impact about the involvement of the population of Makatea was the interest from the Mayor who supported the entire team and showed interest in hosting future scientific teams.
The associate negative impact was that it turned out that it was irrelevant to train a local to implement biosecurity measures as it was initially planned.

Lessons Learned

Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

The difficulty of the fieldwork was perhaps slightly underestimated during project planning. Indeed, the geology of the island makes the fieldwork very difficult to be processed, and as a consequence only a small surface of the island could be surveyed.

Black Rats were believed to be absent from the island according to observations from previous surveys. However, this species was found during the rat-trapping campaign. The lesson learned from this unexpected detail is that rat-trapping and species identification should always be performed in order to confirm the rats species.

The project raised the importance of implementing awareness to the local community as several people among the population were unaware about the importance of their island in terms of biodiversity.

Because of the remoteness and inaccessibility of the island, the visitors are scarce. We learnt that it is crucial to listen and pay attention to the community opinion and develop good relations with the residents in order to make them support the scientific work and management actions.

Project Design Process: (aspects of the project design that contributed to its success/shortcomings)

The design of the project meant that it was successfully implemented, although we recommend a lengthier fieldwork period for the future in order to increase the relevance of data collected.

Project Implementation: (aspects of the project execution that contributed to its success/shortcomings)

Collaborations initiated during project planning were comprehensively developed and broadened during the implementation of the project. These collaborations contributed to the success of the project.

Good relationships were developed with the community during the course of the survey.

Other lessons learned relevant to conservation community:
None.

ADDITIONAL FUNDING

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Notes
French Polynesia Government	A	17000 USD	1.600.000 XPF

***Additional funding should be reported using the following categories:**

A *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*

B *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*

C *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

Sustainability/Replicability

Summarize the success or challenge in achieving planned sustainability or replicability of project components or results.

Methods used to assess the population of birds can be replicable and will help compare results over the years. The Polynesian Imperial-pigeon and the Makatea ground-dove populations could be monitored every 4 years using these methods.

A Plan of Actions for the Makatea ground-dove Polynesian and Imperial-pigeon was developed, and a clear strategy was described on those species along with a long-term management, which will allow to thwart industrial projects planned by some investors.

The main conservation action that needs to be implemented on Makatea was identified and its feasibility was evaluated (rat eradication).

The debate about a legal protection of the territory has been sparked with the Regional Directorate for the Environment.

Summarize any unplanned sustainability or replicability achieved.
None.

Safeguard Policy Assessment

Provide a summary of the implementation of any required action toward the environmental and social safeguard policies within the project.

The richness of this heritage, particularly natural forests and cliffs of the island, largely justify its classification as a natural reserve or protected reserve. Protected areas of the proposed zoning would cover about 60% of the surface of the island, mainly corresponding to non-exploited areas. It is also proposed to classify this area under a protected area according to the Environmental Code of French Polynesia, which represents an area of habitat and species management (category IV) allowing interventions such as the control of invasive species.

Additional Comments/Recommendations

The eradication of introduced predators from the island would provide significant conservation benefits for a number of forest and seabird species (as well as other biodiversity) but remains a large, complex (and expensive) undertaking. Nevertheless, there are no large mammalian free islands in French Polynesia thus a site like Makatea would provide an opportunity to secure a number of globally threatened species. However, the community as yet does not support such a concept primarily as they would need to cease harvesting coconut crabs (a major income source) for some months after a bait operation. Such issues are not insurmountable and through

consultation and appropriate incentives livelihood solutions can be addressed. Restoration of the island is considered to be broadly feasible and the issues necessary in taking an eradication forward are being outlined in the feasibility document.

Literature cited

Albar, G., Gouni, A., Ghestemme, T., Faulquier, L., Autai T., Kesler, D. C. and Serra, C. 2009. Etude de l'avifaune endémique de l'île de Makatea, Archipel des Tuamotu, Polynésie française. Technical report. Société d'Ornithologie de Polynésie Manu, Tahiti, French Polynesia, 22 p.

Burnham, K. P. and Anderson D. R. 2002. Model selection and multimodel inference: a practical information-theoretic approach. Springer, New York, USA.

Gouni, A., G. Albar, D. C. Kesler, M. Pascal, E. Vidal, D. Lacoste-Zarzoso, T. Autai, C. Serra, T. Tehei, S. Gaugne, J. Champeau, G. C. Coulombe, and P.-E. Chaillon. 2009. Programme de conservation du Martin-chasseur des Gambier Todiramphus gambieri. (Conservation program for Tuamotu Kingfishers, Todiramphus gambieri niauensis). Société d'Ornithologie de Polynésie Manu, Tahiti, French Polynesia.

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Jacq, F. and Butaud J. -F. 2009. Inventaire et cartographie des intérêts patrimoniaux (flore et avifaune) de l'atoll soulevé de Makatea. Service de l'Urbanisme, Polynésie francaise.

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Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below:

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*****If your grant has an end date other than JUNE 30, please complete the tables on the following pages*****

Performance Tracking Report Addendum

CEPF Global Targets

(Enter Grant Term)

Provide a numerical amount and brief description of the results achieved by your grant.
Please respond to only those questions that are relevant to your project.

Project Results	Is this question relevant?	If yes, provide your numerical response for results achieved during the annual period.	Provide your numerical response for project from inception of CEPF support to date.	Describe the principal results achieved from July 1, 2007 to June 30, 2008. (Attach annexes if necessary)
1. Did your project strengthen management of a protected area guided by a sustainable management plan? Please indicate number of hectares improved.	Yes	2800 ha	2800 ha	Plan of actions fot the two endemic species of the island of Makatea (2800 ha)
2. How many hectares of new and/or expanded protected areas did your project help establish through a legal declaration or community agreement?	No			Please also include name of the protected area. If more than one, please include the number of hectares strengthened for each one.
3. Did your project strengthen biodiversity conservation and/or natural resources management inside a key biodiversity area identified in the CEPF ecosystem profile? If so, please indicate how many hectares.	Yes	2800 ha	2800 ha	Plan of actions fot the two endemic species of the island of Makatea (2800 ha)
4. Did your project effectively introduce or strengthen biodiversity conservation in management practices outside protected areas? If so, please indicate how many hectares.	No			
5. If your project promotes the sustainable use of natural resources, how many local communities accrued tangible socioeconomic benefits? Please complete Table 1below.	No			

If you answered yes to question 5, please complete the following table.

Table 1. Socioeconomic Benefits to Target Communities

Please complete this table if your project provided concrete socioeconomic benefits to local communities. List the name of each community in column one. In the subsequent columns under Community Characteristics and Nature of Socioeconomic Benefit, place an X in all relevant boxes. In the bottom row, provide the totals of the Xs for each column.

Name of Community	Community Characteristics								Nature of Socioeconomic Benefit													
									Increased Income due to:													
	Small landowners	Subsistence economy	Indigenous/ ethnic peoples	Pastoralists/nomadic peoples	Recent migrants	Urban communities	Communities falling below the poverty rate	Other	Adoption of sustainable natural resources management practices	Ecotourism revenues	Park management activities	Payment for environmental services	Increased food security due to the adoption of sustainable fishing, hunting, or agricultural practices	More secure access to water resources	Improved tenure in land or other natural resource due to titling, reduction of colonization, etc.	Reduced risk of natural disasters (fires, landslides, flooding, etc)	More secure sources of energy	Increased access to public services, such as education, health, or credit	Improved use of traditional knowledge for environmental management	More participatory decision-making due to strengthened civil society and governance.	Other
Total																						

If you marked "Other", please provide detail on the nature of the Community Characteristic and Socioeconomic Benefit: