



Société d'Ornithologie de Polynésie



Tahiti Monarch Action Plan (*Pomarea nigra*) 2013-2017

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Cover: 'Ōmāma'o (*Pomarea nigra*) in orange or black plumage, Tahiti, 2012
Photos: Thomas Ghestemme, SOP Manu

Tahiti Monarch or 'Ōmāma'o Action Plan (*Pomarea nigra*) 2013-2017

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Family Monarchidae

Scientific name *Pomarea nigra*

Common name Tahiti monarch

Local name 'Ōmāma'o ou 'Ōma'oma'o

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ABSTRACT

Tahiti Monarch (*Pomarea nigra*) populations have been in decline since the arrival of humans to Tahiti around about 1000 years ago, resulting in species currently being precariously close to extinction. This is the first complete recovery plan for Tahiti Monarch and has a term of 5 years (2013–2017). This recovery plan provides a brief overview of the species, its status and population trend, and agents of decline and current threats to them. It outlines the strategic framework underlying Tahiti Monarch recovery, public awareness and community involvement in Tahiti Monarch recovery. The long-term goal for Tahiti Monarch recovery is: 'To restore and, wherever possible, enhance the abundance, distribution and genetic diversity of *Pomarea nigra* taxa'. The plan has three plan-period goals, covering management, community relations and engagement, and research. The implementation section sets out 12 topics, 42 issues, 49 objectives and 70 prioritized actions. This plan will be reviewed in 2018.

Keywords: *Pomarea*, Monarch, threatened species recovery, monarch sanctuaries, predation, taxon plan, community engagement.

1. Introduction

Tahiti Monarch (*Pomarea niga*) is one of the more endangered birds in French Polynesia. Endemic to Tahiti, and previously common all around the island¹, the bird progressively vanished from the coast side and remained restricted to few valleys of the east coast of Tahiti until recent time. The species was forgotten by the local population until SOP try to raise awareness for it and transform it as a (treasure) species of strong significance for Maori. Despite a recovery work initiated in 1998, knowledge about its life in the wild is still incomplete. The decline in abundance and distribution of Tahiti Monarch went largely unnoticed until less than two decades ago^{2,3}. Populations have declined since the arrival of humans more than 700 years ago, resulting in species currently being precariously close to extinction³. Today, few Tahiti people ever see a Tahiti monarch in the wild. This is the first recovery plan for Tahiti monarch. Before it 17 reports were written⁴⁻²⁰. Since this time some critical information on the main agents of decline and population trends is now available²¹⁻²⁵. Tools to mitigate or eliminate the threats to Tahiti monarch populations have been developed, implemented and refined^{5,10,12,16,18,20}.

The main focus for Tahiti Monarch recovery included first species management⁴⁻¹⁷ and research^{22,23}. It was progressively extended, including also raising awareness of the species' status and involving the public in their conservation, particularly since 2010 with the creation and animation of a Site Support Group¹⁸⁻²⁰.

Today, about 3 associations, 4 schools (600 children), 60 trappers, 2 owner's families are involved in the protection of Tahiti Monarch. Funding for Tahiti Monarch protection has increased significantly, both through public and private funds.

Yet, even with these extraordinary achievements, the fight for Tahiti Monarch is far from won. Even though the decline has been reversed in managed populations²⁰, the birds are still at such precariously low numbers that they remain vulnerable to catastrophic events, disease or population processes such as skewed sex ratios and inbreeding depression in some of its fragmented population (the actual population is divided in three: Tiapa, Papehue and Maruapo with unknown contact between each other, possibly no exchange at the moment).

The focus for this plan has shifted towards increasing our management efforts by using the knowledge and tools we have developed over a greater area to halt the overall decline of species, while still refining further tools for those threats for which existing methods are not yet fully effective (such as control of introduced birds that represent a threat to the species).

Such an increase in effort cannot be undertaken by SOP alone. Community groups (such as Takitimu Conservation Areas in Cook Island) and funds from outside French Polynesia, which are already an integral part of Tahiti monarch recovery, will need to play an even stronger role to reach the challenging goals of this plan. For protection of Tahiti monarch to be truly sustainable, it needs to take the health of the ecosystem into account rather than simply focusing on the species in isolation. In this way, Tahiti monarch will function as umbrella and indicator species, with their management benefiting many other species, and successes reflecting the increasing health of the entire ecosystem. Conversely, Tahiti monarch will also benefit from management undertaken for general ecosystem health improvement, such as landscape-scale animal pest control or carbon-credit restoration projects. The recognition and utilization of such synergies is likely to significantly advance Tahiti monarch recovery, as well as protect the environment they live in. Despite the scale of the issues, there are many positive signs that we can be successful: there is strong public awareness and engagement in the plight of the Tahiti monarch; advances have been made through critical research findings guiding recovery planning; and population trends are now positive.

This plan aims to provide a platform for the recovery of Tahiti monarch over the next 5 years, its ambitious goals setting out a challenge that needs to be met with joint effort. It will not be the last plan, but it will take us a step closer to reinstate Tahiti monarch as an important, flourishing part of our natural heritage.

2. Plan term and review date

Term of the plan: 5 years, from 2013 to 2017.

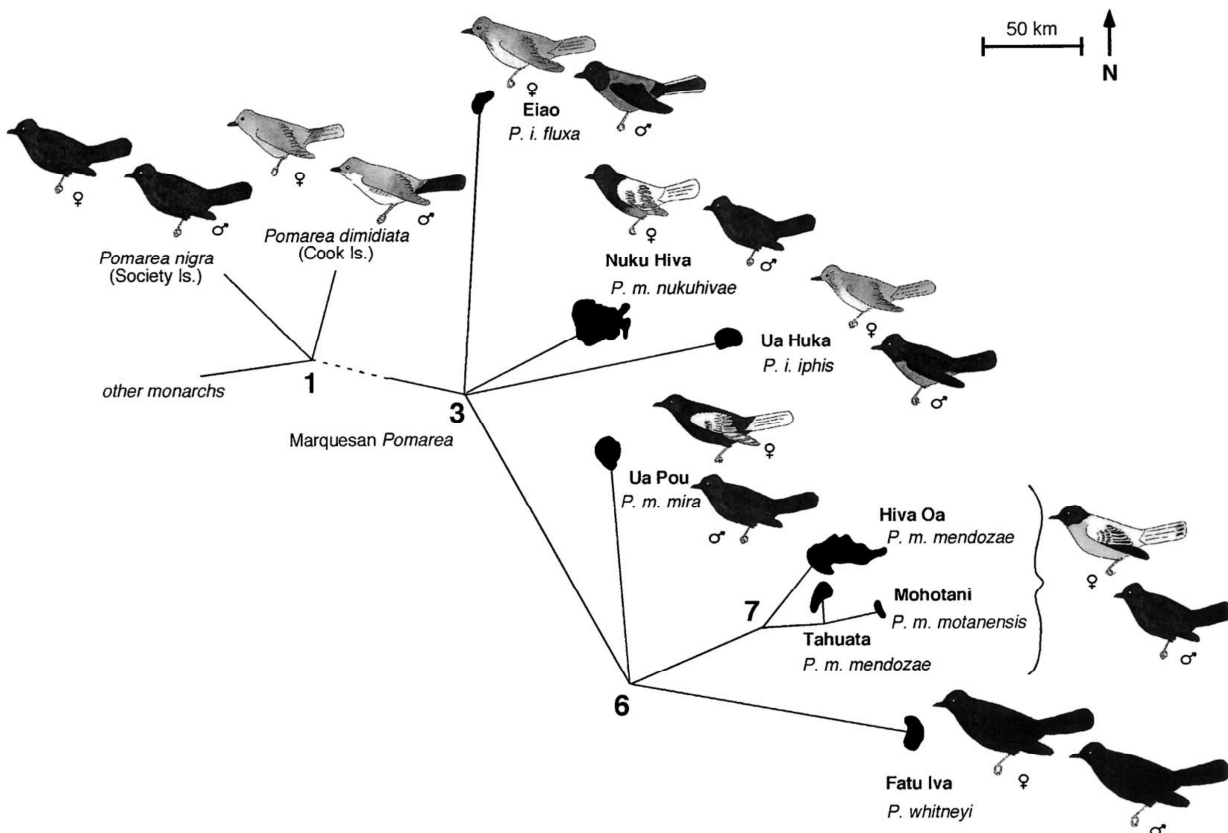
Review dates: 2017.

3. Context

3.1 Overview of species

3.1.1 Taxonomy

Among forest birds, monarchs (Monarchidae), a group of passerines widespread in Africa and Australasia²⁶, have been very successful in colonizing isolated islands, especially in the Pacific archipelagos from Melanesia to southeastern Polynesia. The monarch genus, *Pomarea*, is endemic to southeastern Polynesia (Murphy and Mathews 1928²), with several taxa distributed on the high volcanic islands of the Cook (one taxon), Society (two taxa), and Marquesas archipelagos (seven taxa)²⁷. This current patchy distribution strongly suggests that unrecorded taxa have disappeared from several other islands, for instance in the Society Islands². The genus is endemic to eastern Polynesia. The age of an island is the maximum age for a population inhabiting it under the assumption that the birds colonized the island shortly after its emergence (between 5.3 for Eiao, Marquesas archipelago to 0.3 million of year ago for Tahiti).



From Cibois et al 2004⁽²⁷⁾: FIGURE 3. Phylogenetic tree for the *Pomarea* monarchs mapped on the Marquesas Islands. Branch lengths are not proportional to sequence evolution. *Pomarea* taxa endemic to other Polynesian archipelagos are connected to the Marquesan topology with a dashed line.

3.1.2 Species ecology and biology

Currently, Tahiti Monarch is only found between 80 m and 400 m in altitude, in valleys dominated by the introduced African Tulip tree *Spathodea campanulata*. The native tree *Neonauclea forsteri*, *Mara* in Tahitian, is the last native common feature of the valleys where the species survives²¹. Tahiti Monarch is highly territorial, with territories ranging from 1–2 ha depending on habitat and population density, foraging both in the canopy and the undergrowth for insects²⁸. For two adults male banded at the start of the recovery program (1998), life expectancy is today over 18 years old. All the following data on Tahiti Monarch reproduction are from Blanvillain & Ghestemme in prep.

Breeding season.

The reproduction is seasonal with nest building occurring between July and April with a peak lasting from September to November that varies from year to year.

Breeding pattern

Tahiti monarchs are monogamous, forming persistent pair bonds, although occasional divorces do occur; birds will re-pair following the loss of their mate. Sexes co-operate to incubate and raise nestlings. Second nests (up to seven nest-building attempts in one breeding season) are observed frequently each year.

A clutch always consists of 1 young (n=22), and re-nesting after successful breeding in a season is possible but remains uncommon (4 cases).

Nest Building

Tahiti flycatcher nests are constructed in a fork of Mara or tulip-tree, usually of three twigs, a short distance under an umbrella of leaves which protects the nests from rain and sun. Their nests are open cups and consisting of moss. The nest cup is lined with small twigs of the thin ferns. Scattered over the outer surface are white spiders' nests which camouflage the nests and help its cohesion.

Nests are built in 8.0 ± 1.8 days (n=8) and it is followed by an pre-egg laying phase which last from 2 to 66 days (15.9 ± 15.0 n = 18 observations). For 9 of them, the nest was finally abandoned before incubation.

Incubation period

The incubation period is around 14 days (13.7 ± 0.5 days, n = 7 observations), with incubation shared between the male and female but the later spent 55 ± 2 % of observation time incubating instead of 38 ± 2 % for the male (P < 0.004, Wilcoxon test). We never observed helpers. Mean incubation spells were 15.5 ± 0.6 min, longer in female than in male (19.1 ± 1.1 vs. 11.3 ± 0.7 min.; p < 0.0001, Mann-Whitney U test).

Nesting period

During the nesting period, which last from 12-17 days (14.2 ± 1.6 Days, n=9 observations), birds visited the nest at a rate of 9.7 ± 0.6 trips per hour. The nest attendance (brooding) time proved to be affected significantly by nestling age (P < 0.0001; Kruskal-Wallis test) and dropped under 10 % the second week. No significant difference were observed between sex (number of trip per hours or % brooding).

Fledgling period

Chick remains feed by parents two months (56.6 ± 6.9 days, n = 11) and disappear from parent's territory 48 – 132 days after fledging. Dispersal of juveniles is sometime local, although many young disappeared several months or forever after independence.

3.1.3 Conservation status and species recovery phases

Situation of the species:

The Tahiti Monarch is Critically Endangered (D).

According UICN 2001 classification criteria (version 3.1.), a taxon is Critically Endangered (CR) when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild. Criteria D means that population size estimated to number fewer than 50 mature individuals.

Situation of the genus:

The eight French Polynesian species of the genus *Pomarea* (Cibois et al, 2004) are listed as Extinct, Critically Endangered or Vulnerable (BirdLife International, 2008). The Maupiti (*Pomarea pomarea*) Eiao (*P. fluxa*) Nuku Hiva (*P. nukuhivae*) monarchs are extinct since 1830 or less. All the other five species are restricted to single islands after the extinction of 1 subspecies (*P. mendozae mendozae*) on Hiva Oa and Tahuata within the last century, and their main predator, the ship rat, has arrived on three of these islands (Thibault et al, 2004). Ua Huka and Mohotani contain respectively the last populations of Pied Monarch (*P. iphis*) and Marquesas Monarch (*P. mendozae*). The Ua Pou monarch (*P. mira*) was considered as extinct until a tourist give a convincing testimony on its survival in 2011. It was thus up-listed as critically Endangered. The Fatu hiva Monarch (*P. whitneyi*) and Tahiti Monarch (*P. nigra*) which face ship rats on their

respective island, as for Ua Pou, are on the brink of extinction. The only other Monarch living outside French Polynesia, The Rarotonga Monarch (*P. dimidiata*), from Cook Islands, is listed as endangered after a successful recovery program. This original genus, endemic to eastern Polynesia, is close to extinction.

Previous research phase:

- Impact of rats was established by experimental design²¹
- Impact of introduced birds was established by observation of breeding success^{23, 25}
- Reproduction study and impact of introduced birds has been completed in 2011/2012 by Blanvillain and Ghestemme (in prep)

Actual research phase:

- We are testing and comparing different methods of rat, bird, herd (goat, pig) and plant control as well as several methods of population awareness and implication in Tahiti monarch conservation.
- The genetic study of the Monarch (filiation and sexing) is in progress

The current population of Tahiti Monarch is still so vulnerable due to their small population size and limited number of populations that focus for their recovery is on securing the species from extinction, despite their slowly increasing numbers.

3.1.4 Range and abundance

Previously very common throughout the island¹, its range has become restricted to the north-west driest part of Tahiti during the twentieth century^{2,3}. At the start of the recovery programme in 1998, a survey based on its historical range established that the species was still present in 4 valleys⁴, but with a total of only 25 birds⁵. The trends in numbers of its 'basal', accessible population, and of the difficult to access population located above several 10-30m waterfalls (known as the 'High' population) is presented in Table 1. In 2002, 14 birds were known in the basal pop. and 33 in the high pop¹⁰. In 2010, 22 birds were known in the basal pop. and 14 in the high pop¹⁸. The number of bird increased since¹⁹⁻²⁰

Table 1 : Census of Tahiti monarch since the start of the recovery program⁵⁻²⁰

	1988	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Basal Pop.	19 (8) +2	25 (8) +6	23 (9) +3	19 (7) +1	14 (4) +1	12 (4) +1	17 (6) +2	16 (6) +3	17 (6) +1	17 (7) +5	20 (6) +2	23 (6) +4	22 (6) +5	22 (6) +4	22 (7) +4
High Pop.	2(1)	2(1)	4(1)	10(3)	33 +2	>2	>2	>2 +1	>2	>2	>1	12 (1) +1	14 (4) +1	18 (6) +3	22 (6) +4
Total Pop.					48 +3								36 (10) +6	40 (12) +7	44 (13) +8-9

Legend : fixed adult birds (pairs number) + number of fledgling during the X breeding season (August X-April X+1)

* 2012 breeding season will finish in March 2013. Our data are preliminary results for the ongoing breeding season

3.1.5 Threats

Generalities

This species is threatened mainly by predation by ship rats *Rattus rattus* on nest^{21,22}.

In addition a three-year study (1998-2000) showed that, when nests were protected against rodents, territories that experienced high nest failure or early fledgling death contained significantly more Red-vented Bulbul *Pycnonotus cafer* and Common Myna *Acridotheres tristis*. Also more aggressive interactions were observed between monarchs and bulbuls/mynas in these territories²³. The predation of chicks at nest and injury of adult birds by Common Myna was confirmed later²⁵ as well as the disturbances of breeding pairs by Red-vented Bulbul²⁵.

Other potential predators include feral cats, Swamp Harrier *Circus approximans*⁴ and the recently

introduced ant *Wasmania apunctata*¹⁷. *Miconia calvescens*²¹, with other invasive plant pests such as the African tulip tree and goats (for one valley)¹⁷ have substantially modified the structure and ecology of Tahiti's forests.

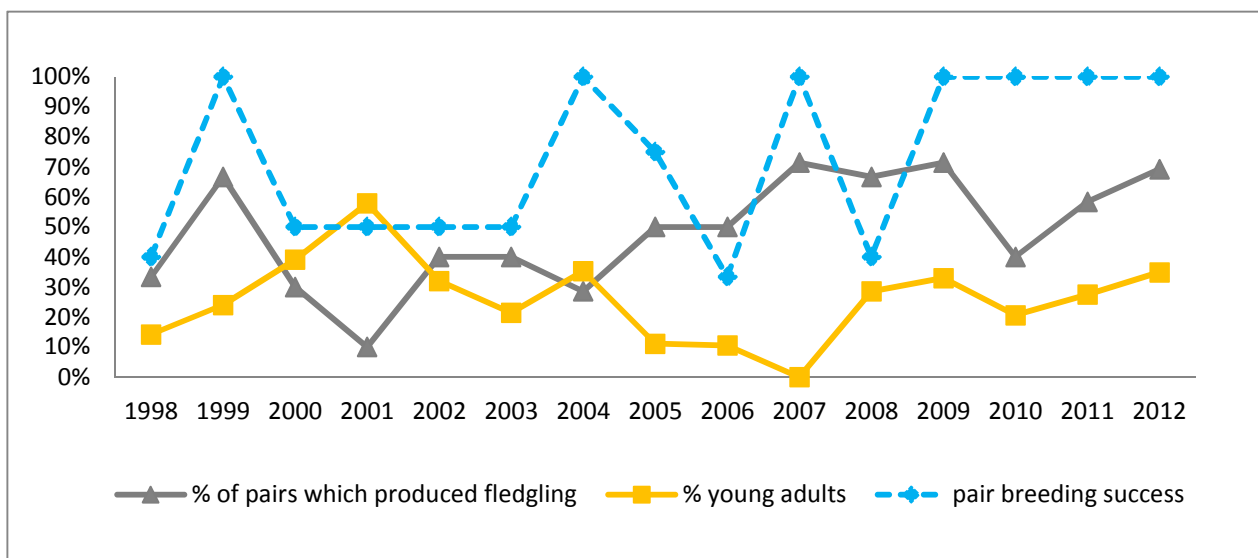
A decline in habitat quality decreases food availability and facilitates the penetration by both introduced birds and the native Tahiti Kingfisher *Todiramphus veneratus*²⁴. This bird has been revealed to be an aggressive competitor for space and has been observed driving 4 pairs of monarchs off their territory²⁴. 2011 observations¹⁹ confirm that kingfishers prevent monarchs from colonising a new territory.

As recent good results showed (no rat predation since 2008 in basal pop.), the rat control protocol is now efficient but needs to be extended more regularly into the high population in order to reverse the population trend¹⁸. The control of introduced birds and the transfer of *Todiramphus veneratus* has been a recent priority^{19,20} and the success of those operations coincide with the colonization of 7 new territories in 2012 while the production of young reach 7-9 fledging those two last breeding seasons^{19,20}.

The fact that there are so many threats on Tahiti and that the single remaining population is exceedingly vulnerable to a stochastic disaster indicates that it is a high priority to attempt to establishment a security population elsewhere. Recent studies have indicated that a second population could be established on Rimatara Island (Australes archipelago, South to Tahiti). This is a ship rat free island with sufficient suitable habitat to establish c70 pairs²⁹ (Rimatara = 8 km² ; suitable forest = 140 ha). We proposed that the establishment of this second population should be considered as the highest priority.

Information on breeding success and reasons of failures of the Monarchs nests (see also appendix 1)

Fig. 1: % of Young adults, % of pair which produced fledging and breeding success (Blanvillain & Ghestemme in prep.).



Between 1999 and 2007, there is a strong correlation between bird numbers in sub adult plumage and the capacity of pair to produce fledgling ($r = -0.87$ from 1999 to 2007) this correlation is more weak for the entire study period: $r = -0.46$ from 1998 to 2012.

The breeding success (number of breeding pair which produce fledgling surviving more than one month), erratic between 1998 and 2008, is very good since 2009 suggesting that threats affecting breeding success (when a pair is ready to breed) are now addressed by the SOP Staff.

Figure 2: Evolution of number of pairs identified in P. nigra population and number of successful fledgling

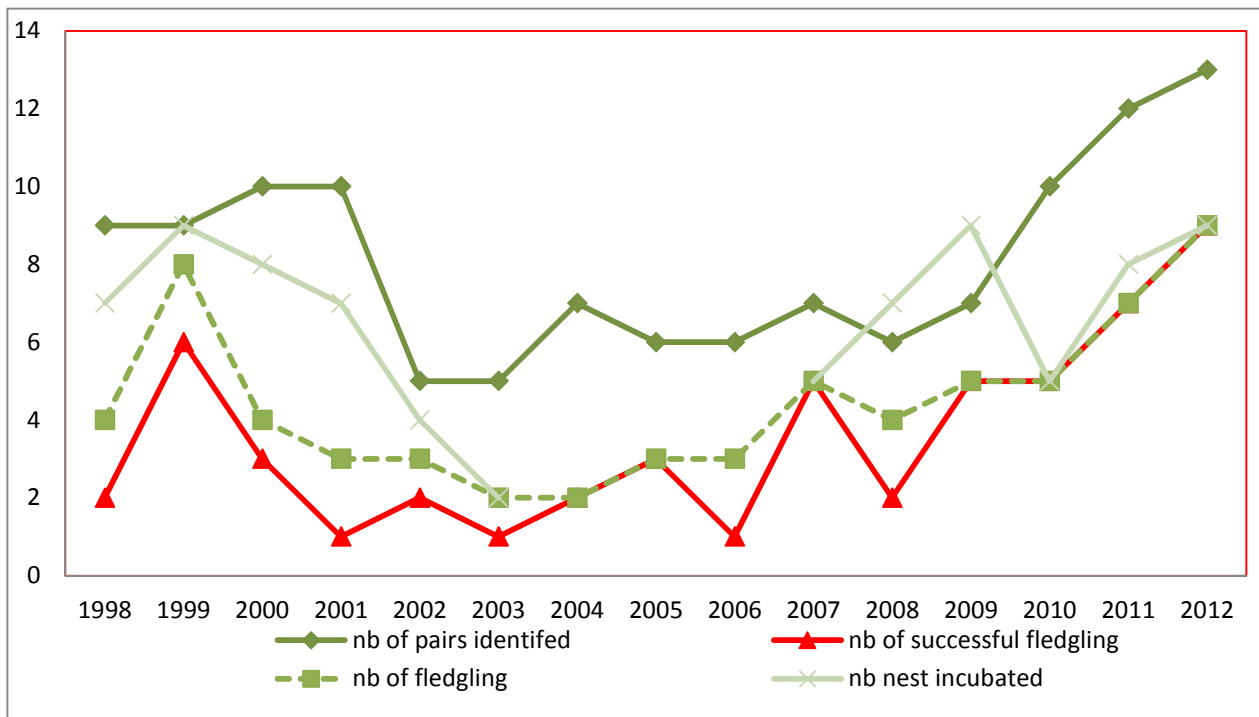
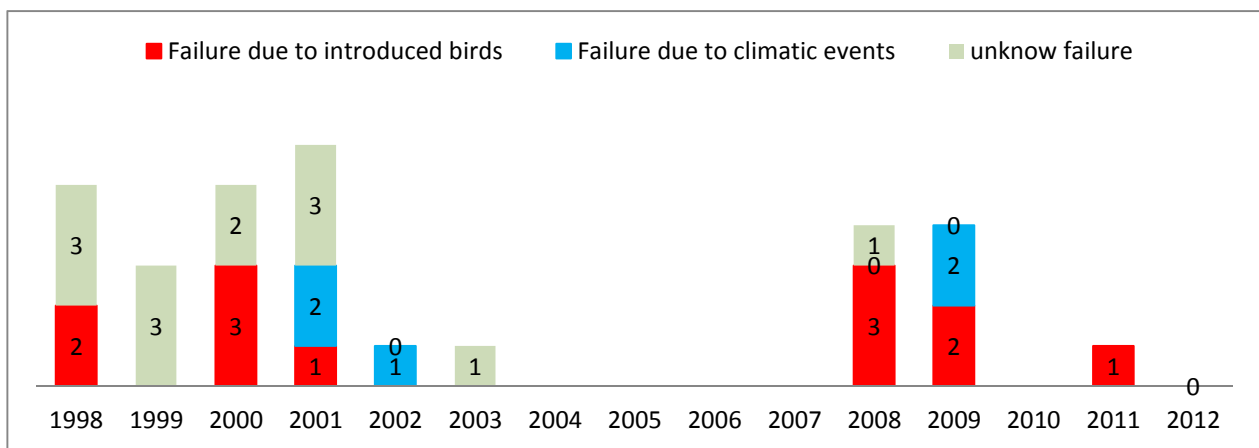


Figure 2 confirms the actual recovery of the species : slowly, a better breeding success combined with more pairs present resulting in an improved fledgling production and survival.

Figure 3 : Failure of incubated nest due to introduced birds, weather and unknow event since the start of the recovery program (failure were not recorded/documented between 2004 and 2007)



On the 34 failures documented on incubated nest since the start of the program, 33 % (12) were caused by introduced birds, 15 % (5) due to climatic event and 38 % (13) on unknown factors.

Other features of the Tahiti Monarch reproduction are presented in annexe 1, notably :
 - 50 % of nest protected against black rat produced fledgling against 10 % of unprotected nests
 - Between 18 and 27 % of fledgling died during the first two months after fledgling, which represent a critical period for the fledgling survival.

3.1.6 Past management (see also appendix 1)

The first phase management (conducted by C. Blanvillain) lasted from 1998 and 2002⁵⁻¹⁰
During this research phase:

- The impact of black rats was established by experimental design²¹
- The populations of Tiapa and Maruapo were discovered⁴
- Four populations (in Orofero, Papehue, Tiapa and Maruapo) were progressively protected during breeding season against rats
- The impact of introduced birds was established by observation of breeding success and first bird control strategies were tested^{9,10,23}
- The number of bird of Maruapo upper valley was established during an expedition from the top of Maruapo ridges²³
- 15 young fledged (3/years)
- The Orofero population crashed down (no more females before any successful fledgling)

The second phase management (conducted by Anne Gouni) lasted from 2003-2007¹¹⁻¹⁵

- The rat control was performed all year round from 2004, but only in Papehue and Maruapo basal population
- The threat represented by introduced bird were not really addressed
- The Maruapo high population and Tiapa population were not included in the recovery program
- 12 young fledged (2.4/years)
- The lower population of Maruapo crashed down with no more reproductive female since 2008, possibly because of goat proliferation leading to the destruction of the bird habitat in this part of the valley
- The upper population of Maruapo crashed down (from 33 to 14 birds)

The third phase management (conducted by Thomas Ghestemme) lasted from 2008-2012¹⁶⁻²⁰

Recent efforts have included :

1. Effective rat control on both basal and high population:

- The size of rat control area has been multiplied by 10 between 2007 and 2012 allowed to no nest predation by rat since 2008.
- Protection of the upper Maruapo (50 % of the population in 2012) since 2011, never protected before.
- It covers in 2012 25 territories for 12 singles and 13 pairs, including for the second consecutive year the high population, located over the waterfalls.

2. Bird control:

- The Common Myna and Red-vented Bulbul control has been intensified by shooting, poisoning and trapping in monarch territories and at the entrance of the valley. This control was progressively improved (10, 15, 45 then 2733 introduced birds were shoot/poisoned/trapped in 2009, 2010, 2011 and 2012 respectively – see annex 1).
- The transfer of *Todiramphus veneratus* outside Papehue valley was performed.

3. Bird survey and conservation:

- Reproduction study and impact of introduced birds has been documented
- Impact of kingfisher on pair establishment on new territory has been found²⁴
- The monitoring of the reproduction of 13 pairs is actually performed in 2012 (vs. 6 in 2008). 29 young fledged (6/years)
- 19 birds have been banded during the course of the recovery programme (currently 13 of the 44 birds present in December 2012 are banded).
- We intensify surveys in areas most susceptible that contain Monarch and more largely on Paea and Punauia districts. 7 new territories were found in 2012 close to existing one, but some 'territories' may only be temporarily maintained.

4. Invasive goat control and habitat rehabilitation:

- The manual elimination of pest plants, including detection and cutting of mature tree of *Miconia calvescens*, *Spathodea campanulata* is continuing, especially in Hopuetamai valley.

- We encouraged the growth of young Mara *Neonauclea forsterii* trees and other indigenous species including endangered plant species in the field and in tree nursery.
- The agreement of the Maruapo valley owner for the eradication of the goat present in the valley has now obtained and two enclosures (one for pig and one for goat) have been constructed to give livelihood to the family owner.

5. Public awareness and site protection

- The Site Support Group (SSG) was created in November 2009 and five SSG meetings have already been organized. In 2012 we focused on setting-up the net of trappers and 60 voluntaries, 2 friendly NGO's and the two mayor houses of Paea and Punaauia were involved
- The support of four local enterprises as sponsors has been obtained in 2011, and 2012 after a call conducted near 70 local enterprises for the recovery of the Tahiti Monarch; 9 articles were published, three TV local news focused on the species.
- 600 children on 4 schools of Punaauia and Paea has been implicated in the recovery program through tree nursery programs, visiting the bird (for 300 of them), and conferences. Regular visits to Papehue valley by local associations and tourists occur.

3.1.7 Options for recovery

There are four main options for recovery of Tahiti monarch:

- 1. Do nothing:** This would result in the probable extinction of the species and the loss of many recovery gains made over the terms of the first three recovery periods.
- 2. Protect Tahiti monarch in captivity only:** This would lead to similar losses in the wild as doing nothing. Outcomes in captivity are uncertain, as for many taxa and moreover insectivorous birds, captive management has not yet proven a successful tool for maintaining healthy populations.
- 3. Protect only pairs in the accessible basal population, and face only rat's threat,** as in period 2: This would likely result in the complete loss of Maruapo upper valley population and will not secure habitat sustainability and reproductive success of reproductive pairs in Papehue (as birds which disturb them are invasive species and colonize now Papehue and Tiapa – Maruapo was colonized first), and would let the species at risk for hazard event such as hurricanes (already occurring in the past in its range)
- 4. Protect Tahiti monarch in all valleys where pairs remain and face all threats** at least until its population reach more than 100 individuals.
- 5. Translocate some pairs in an island free from predator's** and suitable for receive it.
- 6. Translocate some pairs in other Tahiti valleys,** more easy to manage

Options 1–3 are not seen as appropriate given the current threats to taxa, the range of available tools, and the strong public interest in saving the species. Option 6 is not feasible using the hard release method as one young caught and transferred from Maruapo to Tiapa in 2009 established back in its previous Maruapo territory in 2012.

Therefore, the preferred option for recovery of Tahiti monarch remains unchanged from the previous phase 3: to sustainably manage Tahiti monarch in its natural range by reducing its exposure to predators and improving its habitat protection.

In a longer term, habitat quality and presence of predators force to introduce this species on a ship rat free island (option 5).

3.1.8 Recovery principles for Tahiti monarch

The selection of goals, objectives and actions in this plan has been directed by a number of underlying principles for Tahiti monarch recovery, namely:

- Prevention of the extinction of the three sub-populations is the highest priority for recovery management.
- Mixed-provenance populations form an integral part of recovery planning in case of translocation distribution at the condition.
- Tahiti monarch recovery program will face all threats and, wherever possible, focus on gaining maximum benefits for the wider ecosystem and local communities.

- If the number of pair increase in the next 2 years continues, we think possible to remove 6-12 young in early 2015 and 6-12 young in 2016 for the translocation. Tahiti population would drops back to the 2012 population levels. Population models will help us in the next few month to analyse the effect of bird removal on the current population.

3.2 Strategic directives

3.2.1 French Polynesia (DIREN) Biodiversity Strategy²⁸

This plan support 3 of 4 plans of the DIREN strategy: (the following is an extract of DIREN part 2-4)

2) Protect endangered species and fight against the invasive species

1. Assure the funding of the protection of the species
2. Assure the protection of the most threatened species
3. Draw up a plan of preservation of the most threatened species and implement it
4. Prevent the introduction of invasive species (dogs, cats, birds, rats, plants, insects) in particular on the protected islands
5. Fight against the invasive species and manage the wandering cattle (goats, horses, cattle)
6. Rehabilitate sites (control or eradication of the intrusive species) and favor the native and endemic species
7. Multiply the native or endemic species, among which the most threatened first and foremost
8. To establish populations of help in adequate sites notices: the theme 8 " to communicate, to inform and to educate " is priority and transverse in the other themes.

3) Mobilize all the actors

1. Give responsibilities the public sphere
2. Manage and spread the information
3. Develop the key stakeholders (planner, association)
3. Use the " tapu " and the "rahui" (traditional site/species protections)
4. Lean on the local population and more particularly on the person's resources

4) Develop the scientific knowledge

Objectives: Inventories/Monitoring/Bio-security (diseases/ invasive species)

3.2.2 SOP and BirdLife International Strategic Direction

SOP Manu's strategic work programme is based on guidelines and strategies of BirdLife International and IUCN. SOP Manu's programmes focus on safeguarding French Polynesia's most threatened land birds, according to the IUCN Red List criteria (CR status and EN essentially), on protection of seabirds, on restoration of important sites for birds (Important Bird Areas / Key Biodiversity Areas) and on prevention of invasive species introductions into IAS-free islands. SOP Manu implements its programmes in partnership with local communities, decision-makers and other NGOs, as well as with national and international experts in research and biodiversity conservation.

3.3 Cultural importance

The first Tahitians called it ' Omama'o, or ' Oma'oma'o what means noisy and talkative person and evokes marvelously its sound singings which facilitate so much its predation. In French languages Monarch means king, what makes it king of the animals of Tahiti. But it is also king for Tahitian: Vairaatoa, arii of the district of Matavaï, would have chosen the name of Po-mare ' cough at night ' because of his youngest son, ill. It is the nephew of Napoleon, naturalist, who associated the name of *Pomare* in that of the Monarch of Tahiti by naming him '*Pomarea nigra*'. Tahitian people have forgotten their native birds: the only land birds present in their garden are mostly invasive ones. Tahiti monarch is a naïve and confident species, Tahitian people must recover the memory of their own species and Tahiti monarch, as a king of land, could be a good symbol of it, a flagship species.

3.4 Public awareness

There is now a better level of community awareness and concern about Tahiti monarch. Some people start to feel a strong association with Tahiti monarch and place great importance on the survival of the species. High-profile Tahiti monarch projects (e.g. BEST, SNB, CEPF), several

actions such as tree nursery initiated with school in 2011, the control of introduced bird undertaken in garden in 2012 and the future translocation have attracted media interest. Child (through habitat recovery) and adult (through being a trapper of invasive) can now become involved in Tahiti monarch recovery. Tahiti monarch must become flagship species for conservation and an umbrella species for the Tahiti island fauna and flora.

3.5 Partnerships and key associates

Tahiti monarch protection is now including a variety of organizations, agencies, groups and individuals outside SOP. Key actors include community groups, landowners, school, BirdLife International (SOP is the local partner of BirdLife International), 'Tamarii Pointe des pêcheurs' and 'Ecomarcheurs de Papara' associations and other non-governmental organizations, local government (Ministry of Environment in French Polynesia, DIREN, Service du Développement Rural/Agricultural Public Service SDR), Paea and Punauia district city council. Recently, the European Community and the French Government supported projects for the recovery of the species. Local industries: OPT, Vini, EDT and ATN are now following and sponsoring actions on the species in 2011 and 2012.

The relationship between land owners and Tahiti monarch and their involvement in its management will be hopefully formally recognized at the end of the BEST programs. An exchange between them and the Maori families of the Takitimu Conservation Areas of Cook islands as a model of development will be of a primary importance for their future implication.

4. Goals

4.1 Long - term recovery goal

- **To reach the number of 25 breeding pairs for the Tahiti monarch in the next 5 years**
- **To create a security population in Rimatara island (Austral Archipelago)**

This goal seems realistic as the pair number has increased by three between 2010 and 2012 and that we have now two locations to protect: the basal and the high one with an equivalent number of pairs in each of them. Moreover, we are going to improve our capacity to face more threats in the next two years.

4.2 Recovery plan - period goals

4.2.1 Management

Goal 1.1: pass over 25 pairs for the species, by controlling the different threats and surveys for "sink" areas

Goal 1.2: establish a security population on Rimatara

4.2.2 Community relations and engagement

Goal 2.1: Increase and sustain 2 community-led projects in Tahiti monarch recovery (tree nursery and trapping networks)

Goal 2.2: Implement sustainable development projects based on Tahiti monarch recovery for the benefit of the local population of valley owners

Goal 2.3: Establish protected areas for the three Tahiti monarch populations, in Papehueti, Tiapa and Maruapo

Goal 2.4: To secure regular and increasing funding for Tahiti monarch recovery

Goal 2.5: To improve advocacy and statutory texts

4.2.3 Research and innovation

Goal 3.1: To sex birds and provide robust information guiding management of genetic diversity

Goal 3.2: To undertake robust population modeling for the species

Goal 3.3: Pest management and research into tools for efficient then sustainable landscape scale pest control and monitoring

Goal 3.4: To establish the sanitary state of the wild bird population in Tahiti

5. Implementation

3 themes with a number of topics have been prepared, corresponding to each Goal of the recovery plan. Each topic outlines issue(s) and objective(s), and presents an action table showing how to resolve the issue(s).

All actions have been prioritized and time lined (see Appendix 2). Priorities are marked as follows:

- **Essential:** Needs to be carried out within the timeframe Highest risk for Tahiti monarch recovery if not carried out within the timeframe (and/or at the frequency specified).
- **High:** Necessary to achieve long-term goals. To be progressed and ideally completed within the term of the plan, with moderate risk if not carried out within the timeframe and/or at the frequency specified.
- **Medium:** Necessary to achieve long-term goals. To be progressed within the term of the plan, but least risk if not completed within the term of the plan or within the timeframe and/or at the frequency specified.

No actions are 'extras'; a medium priority does not mean that there are no reasons to do it.

Priorities are given to assist with choice if required.

Actions are time lined until 2018.

5.1. Management

5.1.1 Topic 1—To pass over 25 Tahiti Monarch (TM) pairs

Issues

Issue 1.1: TM is critically endangered due to its small population size and low numbers of populations

Issue 1.2: Manage only rats and protect only basal population have proven to be inefficient for recover the species

Issue 1.3: Lack of goat control (and habitat rehabilitation) has resulted in loss in habitat sustainable for 2 pairs at the entrance of Maruapo

Objectives

Objective 1.1: To continue to produce more young by protecting efficiently all pairs

Objective 1.2: To continue and improve predators' control: rat & introduced birds and cat as necessary (see topic 10)

Objective 1.3: To eradicate goat and implement habitat rehabilitation in each valley

Objective 1.4: To improve 'carrying capacity' in protected areas for helps new pairs to colonize them

Actions

Action/Accountability	Priority
1.1 Monitor bird population in each valley, including banding and monitor the success of reproduction for each pair	Essential
1.2 Perform rat control in all territories	Essential
1.3 Perform introduced bird control in all territories	Essential
1.4 Remove Kingfisher for improve carrying capacity in protected areas	High
1.4 Perform goat eradication in Maruapo	High
1.5 Perform habitat rehabilitation in each valley	High

5.1.2 Topic 2—Establish a security population in Rimatara

Issues

Issue 2.1: Do the young production is sufficient to allow this translocation without risk for the TM small breeding population ?

Issue 2.2: Do the translocation represent any sanitary risk for the endemic birds of Rimatara ?

Issue 2.3: How to select bird to improve genetic management of the future population (that may re-enforce initial population later) ?

Issue 2.4: Which operational plan for this translocation ?

Issue 2.5: Do the Tahiti population accept to give birds ?

Issue 2.6: Do the Rimatara population accept to receive birds ?

Objectives

Objective 2.1: Produce more young as possible (see topic 1)

Objective 2.2: Assess the disease risk represented by Tahiti wild birds populations (see topic 11)

- Objective 2.3: Perform genetic study and sexing of the TM population (see topic 9)
 Objective 2.4: Perform risk assessment of removing some fledgling for the Tahiti population survival rate (see topic 9)
 Objective 2.5: Establish an operational plan for the translocation with the help of the Monarch Recovery Group
 Objective 2.6: Present results of precedent objectives and obtain the agreement of both communities
 Objective 2.7: Implement the translocation

Actions

Action/Accountability	Priority
2.1 Define a level of sustainability in TM Tahiti population for young's removal	Essential
2.2 Establish with the Recovery Group a list of diseases that must be checked before translocation according to the bird species	Essential
2.3 Sample introduced birds (and eventually kingfisher and monarch) for disease assessment	Essential
2.4 Sample Tahiti monarch when banding for genetic and sexing studies	High
2.5 Identify laboratories/resources people for genetic, sexing and risk assessment studies	High
2.6 Present the project to the local Tahiti population and obtain their agreement	Essential
2.7 Present the project to the local Rimatara population and obtain their agreement	Essential
2.8 Prepare the Operational translocation plan with the M recovery group	Essential
2.9 Perform the translocation following the Operational plan	Essential

5.2. Community relation and engagement

Recovery and protection of TM relies on the interest, understanding and engagement of many sectors of French Polynesian society. We need a strong association between Tahitian people and TM.

5.2.1 Topic 3—Increase and sustain community-led project in TM recovery

Issues

Issue 3.1: Most adults, even those living in Paea and Punaauia districts are ignoring the fate of the Tahiti monarch

Issue 3.2: Most children are ignoring its existence and do not learn it at school

Objectives

Objective 3.1 engage adults through Site Support Group (SSG), habitat restoration and invasive bird control

Objective 3.2 engage children through habitat restoration

Objective 3.3 to ensure that community involvement in TM protection is optimized, sustained and follows best practice

Actions

Action/Accountability	Priority
3.1 involve Site Support Group in actions and decisions	High
3.2 promote volunteers network for introduced bird control in the residential areas	Essential
3.3 involve owners in habitat rehabilitation	Medium
3.4 set-up scholar's program in Paea and Punaauia (see also topic 7)	High
3.5 bring regularly scholar visits of Tahiti Monarch territories	Medium
3.6 continue tree nursery project for school and ask them to produce local tree for TM, teach them their own plants species	High

5.2.2 Topic 4—Improve sustainable development in the benefit of local population

Issues

Issue 4.1: Tahiti owners show little interest to protect the Tahiti monarch

Issue 4.2: SOP must be perceived positively by Tahiti owners because some of them can stop the control program with fear of environmental consequences of poisoning

Issue 4.3: Land is owned by several owners' families of more than hundred members that multiply the risk of access denied for the SOP if the program is not perceived positively

Objectives

Objective 4.1: help owners to develop honey production

Objective 4.2: help owners to develop sandalwood production

Objective 4.3: use TCA as model of sustainable development (see actions in topic 5)

Actions

Action/Accountability	Priority
4.1 help them to build honey project (local resources SDR, SOP Manu self-know-how) through SSG	Medium
4.2 help them to build sandalwood production through SSG	Medium
4.3 try to raise fund for international collaboration between SSG and TCA	Medium

5.2.3 Topic 5—Establish sanctuaries/protected areas for each TM sub-population

Three Tahiti monarch sanctuaries (Papehue, Tiapa, Maruapo) must be established in 2014 with the collaboration and agreement of the local people. Their focus is on the development of successful management prescriptions for TM protection at all sites, using mainly rat and introduced birds controls and habitat rehabilitation as tools.

Issues

Issue 5.1: the territories where the Tahiti Monarchs live belong to several Maori families, probably of more than hundred members each and 'non-division' of land is a major problem as every Polynesian owner today is trying to defend its ownership and cadaster was not established rigorously

Issue 5.2: non-division of land lead to land-use confusion and only one owner can stop SOP progression in the valley if he is afraid by the creation of protected areas

Issue 5.3: Even law cannot protect TM if owner feel unhappy and stolen from their land by the creation of the sanctuary

Objectives

Objective 5.1: Send Tahiti owners to TCA for its exemplarities in sharing the earth and its benefits all together: bird and hundreds of owners

Objective 5.2: Send TCA owners to Tahiti for owners awareness of those that didn't participated to the trip presented in 5.1

Objective 5.3: Formalize protected areas in each valley

Actions

Action/Accountability	Priority
5.1 Send Tahiti owners to TCA	Essential
5.2 hold a SSG for discuss of the trip with all owners at year 1	Essential
5.3 Send TCA owners to Tahiti	Essential
5.4 hold a SSG for present the TCA project with all owners at year 2	Essential
5.5 redact and sign the declaration of intention in each valleys for the creation of protected areas on the model of TCA	Essential

5.2.4 Topic 6—Secure regular and increasing funding for TM recovery

TM recovery is regularly funded by the Government on French Polynesia through DIREN grant to SOP since 2004. This funding is not sufficient to cover all the expenses necessary for the program and SOP staff has to complete the expenses by international grants.

Issues

Issue 6.1: funding for TM recovery has no multi-annual contract from DIREN

Issue 6.2: funding for TM recovery needs to increase to allow for the necessary expansion of projects

Objectives

Objective 6.1: obtain from government a multi-annual engagement

Objective 6.2: give to the TM recovery a local high public profile and interest

Objective 6.3: continue the fundraising near international foundations according complementary needs for the project for priority actions

Actions

Action/Accountability	Priority
6.1 identify stakeholder for conduct the negotiation at a politic level	High
6.2 initiate negotiation at soon as the politic profile of French Polynesia is fix in medium term	High
6.3 prepare and sign a multi annual engagement between SOP and DIREN	High
6.4 continue public awareness in local press, TV and radio	Medium
6.5 build a fund-raising plan with the help of BirdLife International Pacific	Medium
6.6 prepare as much demands as necessary for implements actions detailed in the TM recovery plan	Essential

5.2.5 Topic 7—Improve advocacy and statuaries texts

Advocacy is an important component of TM recovery, helping to ensure broader public acceptance and buy-in, as well as creating actual support and resources. It includes sharing information, promoting specific issues and solutions, and generally raising awareness about TM protection. The development and dissemination of advocacy material is important as well as supports TM recovery projects through visits, workshops and technical advice. Some of the threats to TM are activities that can be addressed by statutory authorities by means of legislation, regulations, rules, incentives and policies.

Issues

Issue 7.1: Advocacy is not always considered as an integral part of recovery planning

Issue 7.2: Advocacy material is sometimes of poor quality or outdated, underutilizing opportunities or even creating negative advocacy

Issue 7.3: Predation of TM by domestic animals, in particular cats, is likely to increase with further land development and is difficult to manage outside public conservation land

Objectives

Objective 7.1: To increase awareness and support for TM protection through the provision of high-quality advocacy for TM projects at all levels and by creating a TM protecting team at a local level

Objective 7.2: To avoid, remedy or mitigate threats to TM and their habitat by promoting legislative and policy changes to statutory authorities

Actions

Action/Accountability	Priority
7.1 Develop an advocacy section	Medium
7.2 Produce correct material for advocacy and identify people ready to imply themselves in this topic	Medium
7.3 Promote the inclusion of statutory protection of TM sanctuaries	Medium
7.4 Provide local authorities with information on TM sanctuaries and eventual high priority areas for management of TM	Medium

5.3 Research and innovation

The recovery of TM will continue to be dependent on good scientific understanding and adequate tools. Unfortunately telemetry cannot be used due to valley ridge due to the cliffs present in the valley (one attempt)

5.3.1 Topic 8—Sexing birds and provide robust information guiding management of genetic diversity

The current TM population appears healthy, despite being based on a limited number of founders. Inbreeding depression remains a potential risk. The decline of TM populations as probably resulted in a loss of genetic diversity. Screen the genetic pedigree of the population will help to prepare translocation. Genetic research could confirm or infirm isolation of the 3 separate populations of TM, as well as fine-scale genetic variation (filiation) will help to understand juvenile dispersion. Sexing bird will help managers and biologists.

Issues

Issue 8.1: Inbreeding depression might increase the risk of population failure due to the small number of founders (The potential or actual effects of genetic bottlenecks on TM populations have not yet been quantified but may be significant)

Issue 8.2: Translocation between valleys is not realistic as the test in 2009 proven to go-back to its initial territory when translocated in the same island.

Issue 8.3: We are actually ignoring if contact between Maruapo, Tiapa and Papehue populations exist

Issue 8.4: When a young bird unbanded arrive in a valley, biologists ignore if it is coming from an unidentified population, neighborhood territories, or from the other valleys.

Objectives

Objective 8.1: Research genetic diversity within current remaining populations of TM to find bottleneck effects

Objective 8.2: To Identify/confirm the sex of all banded birds

Objective 8.3: To maintain genetic integrity within species at the appropriate scale and try to find an operational solution to succeed genetic exchange between each sub-population as necessary

Objective 8.4: To integrate mixed-provenance populations into the future Rimatara population

Objective 8.5: To establish filiation in order to understand juvenile dispersion and to understand if the 3 sub-populations live isolated or not

Actions

Action/Accountability	Priority
8.1 Genetic sample of a maximum of individual	Medium
8.2 Bird sexing	Medium
8.3 Pedigree research	Medium
8.4 Genetic diversity/bottleneck assessment	Medium
8.5 Discuss of genetic exchange options with the TM recovery group	Medium

5.3.2 Topic 9—To improve monitoring, understanding of the species biology and undertake robust population modeling for the species

Recovery effort needs to be directed and informed by data on population trends. All birds must be managed because 2003-2007 period showed that unmanaged populations have high risk of extinction. Regular checks of banded populations of TM have provided a good basis for measuring broad population trends since the early 2008. These need to be continued to provide sufficiently robust information. More detailed assessment of population trends requires robust data on key population parameters (mortality, recruitment, etc.) through monitoring of individual birds. Several points remain mysterious today: did the 3 populations are in contact; did some unidentified populations exist? What is the survival rate of young and their dispersion ?

Issues

Issue 9.1: Population trend monitoring requires a long-term commitment of effort is difficult to maintain with short-term funding cycles

Issue 9.2: Detailed population monitoring is cost- and labor-intensive

Issue 9.3: Some high populations (Papehue ?, Tiapa ?) may persist and attract young whereas they are unprotected. A 2003-2007 scenario with basal population increasing but total population decreasing is still possible if an unprotected sink population remain elsewhere

Objectives

Objective 9.1: To ensure that sufficient and robust information is available to assess the status and trends of TM key populations

Objective 9.2: To survey more place in order to find eventual sink populations

Actions

Action/Accountability	Priority
9.1 Initiate/improve collection of baseline data for research and modeling TM	High
9.2 Initiate population modeling and disseminate results from available data	High
9.3 Liaise with research providers to initiate/support research on the ecology and behavior of TM, throughout the the plan	Medium
9.4 Survey other valleys and remote areas in Papehue and Tiapa	High

5.3.3 Topic 10—Pest management and research for efficient then sustainable landscape scale pest control and monitoring

As pest control will be permanent for maintain the species in Tahiti, it is of primary importance to find best way to control each threats and to improve the cost-effectiveness of each pest control management. In this context, NZ expert excluded in 2012 the feasibility of build control fences in Tahiti on the model of mainland in New Zealand for prevent rat, cat and wild cattle intrusion in protected areas due to rivers and valleys relief.

Issues

Issue 10.1: Existing technologies for pest control to protect TM are labour intensive

Issue 10.2: Rats will represent a permanent threat for TM

Issue 10.3: Tools for bird control are limited or need to be improved

Issue 10.4: Introduced bird (BB, MM and Swamp Harrier) will represent a permanent threat for TM

Issue 10.5: Reducing introduced birds fixed in TM valleys is still a problem
 Issue 10.6: Cat predation risk, even if decreased by rat poisoning, has to predict on Tahiti
 Issue 10.7: Invasive Miconia and Tulip tree will represent a permanent threat for habitat of TM
 Issue 10.8: Feral goat and pig are in considerable number in Maruapo valley and destroyed its vegetation
 Issue 10.9: fire ant will represent a permanent threat for TM on Tahiti

Objectives

Objective 10.1: To reduce in a sustainable way the impact of rats on TM populations
 Objective 10.2: To find the best method to reduce Mynah and Bulbul in TM territories
 Objective 10.3: To find the best method to reduce Swamp Harrier in TM valleys
 Objective 10.4: To reduce in a sustainable way the impact of introduced birds on TM populations
 Objective 10.5: To reduce in a sustainable way the impact of wild cats on TM populations
 Objective 10.6: To Eradicate goat and pig in Maruapo valley and to restore the vegetation
 Objective 10.7: To find the best method to reduce Miconia in TM valley
 Objective 10.9: To find the best method to reduce Tulip tree in TM valley
 Objective 10.10: To prevent the arrival of little fire ant in TM valley

Action/Accountability	Priority
10.1 compare cost-effectiveness of chemical versus physical control for rats	Medium
10.2 compare cost-effectiveness of several traps/poisoning/ shooting methods to control MM and BB	Essential
10.3 find a protocol for control of Swamp Harrier control in TM valleys	High
10.4 monitor re-colonization of introduced bird following successful control attempts in order to rationalize introduced bird control efforts for TM recovery	High
10.5 monitor wild cat population in valley at regular intervals to establish their potential impact on TM populations and undertake control as necessary	High
10.6 test different methods for habitat restoration, continue systematic control of Miconia and Tulip tree, monitor new development on control topics	High
10.7 contact stakeholders to organize the prevention of little fire ant invasion in TM valley	High

5.3.4 Topic 11—To assess the health of wild bird in Tahiti

Establish with pacific island epidemiologist specialists the health status of the birds present in monarch territories and valleys in order to secure that the translocation will not introduce new diseases for birds on Rimatara island; evaluate the potential risk that may represent introduced birds for public health, poultry and for endemic avifauna

Issues

Issue 11.1: Introduced birds may represent a sanitary risk for TM, poultry and public health
 Issue 11.2: TM introduced in Rimatara may represent a sanitary risk for its native avifauna

Objectives

Objective 11.1: Assess the sanitary risk presented by introduced birds in Tahiti
 Objective 11.2: Build a list of disease to focus on with local epidemiologists and international specialists
 Objective 11.3: Perform the survey

Actions

Action/Accountability	Priority
11.1 Perform a list of target diseases	High
11.2 Sample birds on Tahiti and in TM valleys	Medium
11.3 Disease screening	High

Topic 12: Development of young production for Captive management based on pair aptitude to re-laying ? (to discuss, need time, investment, money....not essential for the recovery, may be an option in case of control failure)

20 Bibliography

- 1 Peale, T.R., 1848. U.S. Exploring Expedition during the year 1838-1842, etc. Mammalogy and Ornithology, in Vol 8. Philadelphia.
- 2 Holyoak, D.T., Thibault, J.C., 1984. Contribution à l'étude des oiseaux de Polynésie orientale. Mémoires du Muséum National d'Histoire Naturelle, nouvelle série, Série A, Zoologie, Tome 127. Editions du Muséum, Paris, 209 pp.
- 3 Monnet, C., Thibault, J.C., Varney, A., 1993. Stability and changes during the twentieth century in the breeding landbirds of Tahiti (Polynesia). *Bird Conservation International* 3: 261-280.
- 4 Gaze, P. & Blanvillain, C. 1998. Report to Société d'Ornithologie de Polynésie on the Tahiti monarch (*Pomarea nigra*). 16 pp.
- 5 Blanvillain C., 1998. Rapport mensuel sur le suivi du succès reproducteur chez le Monarque de Tahiti (*Pomarea nigra*). Société d'Ornithologie de Polynésie, Papeete. 6p
- 6 Blanvillain, C., Pierce, R., Salducci, J.M., 1999. Quarterly report on the reproductive success of the Omama'o or Tahiti Flycatcher (*Pomarea nigra*) from 6 July to 29 September 1999. Rapport SOP. 18 pp
- 7 Blanvillain, C. (2000) Programme de sauvegarde du monarque de Tahiti : des premiers résultats prometteurs pour la survie de l'espèce. *Bull. Soc. Ornithol. Polynésie (Te Manu)* 30: 3-4.
- 8 Blanvillain, C., Punuaaitua M., Bessert O., 2000. Quaterly report on the reproductive success of the Tahiti Monarch (*Pomarea nigra*). Société d'Ornithologie de Polynésie, Papeete 15 pp
- 9 Blanvillain C, Tamaititahio M, Noguera C, Marion J., 2001. Rat and introduced bird control to save the critically endangered Tahiti Flycatcher (*Pomarea nigra*) from extinction : Report on the TFC reproductive success for the 2001 breeding season, 2ème partie. SOP, 25pp
- 10 Blanvillain C, Tamaititahio M, Noguera C, Butaud JF, Bonnardot L, Marion J. 2002a. Contrôle des rats et des oiseaux introduits pour sauver le Monarque de Tahiti (*Pomarea nigra*), en danger critique d'extinction. Saison de reproduction 2001- 2002. Rapport SOP/UPF 15 p
- 11 Gouni A., 2003. Sauvegarde du Monarque de Tahiti en danger critique d'extinction (*Pomarea nigra*) -Rapport sur la période du 1er Juillet au 30 Septembre 2003 - Société d'Ornithologie de Polynésie, Papeete. 26p.
- 12 Gouni A., Noiret C., 2004. Sauvegarde du Monarque de Tahiti (*Pomarea nigra*) en danger critique d'extinction. Société d'Ornithologie de Polynésie, Papeete. 29p.
- 13 Gouni A., Noiret C., Durieux J., Raust P., 2005. Sauvegarde du Monarque de Tahiti (*Pomarea nigra*) en danger critique d'extinction. Société d'Ornithologie de Polynésie, Papeete. 17p
- 14 Gouni A., NOIRET C., DURIEUX J., RAUST P., 2006. Programme de sauvegarde du omama'o ou Monarque de Tahiti, *Pomarea nigra*, en 2005 et 2006. Société d'Ornithologie de Polynésie, Papeete. 22 pp
- 15 Gouni A, Durieux J, Corry E. 2007. Programme de sauvegarde du omama'o ou Monarque de Tahiti, *Pomarea nigra*, en 2007. Rapport SOP/DIREN 13 p.
- 16 Ghestemme T., Portier E., Durieux J., Gouni A., 2008. Programme de conservation du Monarque de Tahiti, *Pomarea nigra*. Société d'Ornithologie de Polynésie, Papeete. 28p.
- 17 Ghestemme T., Gouni A., Portier E., Durieux J., Larguier J., 2009. Conservation of Tahiti monarch (*Pomarea nigra*) and perspectives of action. The 11TH Pacific Science Inter-Congress & 2nd Symposium on French Research in Pacific, 2-6 mars, Poster.
- 18 Ghestemme T., Yan L., Portier E., Quemin M., Autai T., Ricatte S., Maillard S., Atlan P.J., Saul E., Gouni A. 2010a. Programme de conservation du monarque de Tahiti en 2010 Rapport SOP/DIREN. 30 pp.
- 19 Ghestemme T., Yan L., Autai T., Ricatte S., Annunziata S., Digard E., Butaud J.F., Blanvillain C. 2011. Programme de conservation du monarque de Tahiti. Bilan de la saison de reproduction 2011. Rapport SOP/DIREN. 23 pp.
- 20 Blanvillain C., Saavedra S., Ghestemme, T., Yan L., Mataua B., Tehiva M., Maraetefau, R., Digard E., Butaud J.F. 2012. Programme de conservation du monarque de Tahiti. Bilan de la saison de reproduction 2012. Rapport SOP/DIREN. 21 pp.
- 21 Thibault, J.-C., Blanvillain, C. and Monnet, C. (1999) Plan de conservation du 'Omama'o (monarque de Tahiti *Pomarea nigra*): étude des mécanismes d'extinction. Pape'ete: French Polynesia. Société d'Ornithologie de Polynésie.
- 22 Thibault J.C, Martin J.L, Penloup A, Meyer J.Y. 2002. Understanding the decline and extinction of the monarchs (Aves) in Polynesian Islands. *Biological Conservation* 108, pp 161-174.
- 23 Blanvillain, C., Salducci, J.M., Tutururai, G. and M. Maera. 2003. Impact of introduced birds on the recovery of the Tahiti Flycatcher (*Pomarea nigra*), a critically endangered forest bird of Tahiti. *Biological Conservation*, 109 : 197-205.
- 24 Ghestemme, T. (2009) Le Monarque de Tahiti rajeunit mais les martins chasseurs l'empêchent de s'établir. *Te Manu* 69: 3-4.
- 25 Ghestemme T. 2011. Impact of introduced birds on Tahiti Moanrch. PII Newsletter. Dec 2011.
- 26 Sibley, C. G., Monroe JR, B. L. 1990. Distribution and taxonomy of birds of the world. Yale University Press, New Haven, CT.
- 27 Cibois, A., Thibault, J.-C., Pasquet, E. 2004. Biogeography of eastern Polynesian Monarchs (*Pomarea*): an endemic genus close to extinction. *Condor* 106: 837-851
- 28 Pratt HD, Bruner PL, Berrett SG. 1987. A field guide to The birds of Hawaii and the Tropical Pacific. Princeton University Press
- 29 Portier E. 2010, Etude de faisabilité d'introduction de deux oiseaux en danger critique d'extinction en Polynésie Française : les Monarques de Tahiti et de Fatu Hiva. Rapport de Master 2 SOP/Université de La Réunion. 41 p + annexes.

APPENDIX 1:

Results of Tahiti Monarch Recovery Programme, 1998–2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	% ou M	Total
Basal population	19	25	23	19	14	12	17	16	17	17	20	23	22	22	22	19,2	
High population	2	2	4	10	33	2	2	2	2	2	1	12	14	18	22	8,5	
% young adults	14%	24%	39%	58%	32%	21%	35%	11%	11%	0%	29%	33%	21%	28%	35%	26%	
number of pairs in basal population	8	8	9	7	4	5	6	6	6	7	6	6	6	6	7	6,5	
number of pairs in high population	1	1	1	3	1	1	1					1	4	6	6	2,4	26
number of pair identified	9	9	10	10	5	5	7	6	6	7	6	7	10	12	13	8,1	122
number of pair monitored	8	8	8	6	5	5	4	4	4	6	6	7	6	12	13	6,8	102
% orange mixtes ds couples suivis	6%	19%	25%	42%	25%	0%	10%	0%	13%	0%	16%	29%	33%	29%	35%	0,2	
number of pair incubating	5	6	6	2	4	2	2	4	3	5	5	5	5	7	9	4,7	70
number of pair producing fledgling	3	6	3	1	2	2	2	3	3	5	4	5	4	7	9	3,9	59
number of pair protected against rat	5	9	7	6	4	5	4	4	4	5	6	7	6	11	13	6,4	96
nests found	20	13	19	12	6	4	5	4	4	5	9	11	9	23	15	10,6	159
nests incubated	7	9	8	7	4	2	3	3	3	5	7	9	5	8	9	5,6%	89
percent of incubated nests	35%	69%	42%	58%	66%	50%				100%	78%	82%	56%	35%	60%	56%	
incubation failure	2	1	0	2	1	0	np	np	0	0	2	4	0	0	0	17%	12
young born	5	8	8	5	3	2	np	3	3	5	5	5	5	8	9	5,3	74
nestling failure	1	0	4	2	0	0	np	0	0	0	1	0	0	1	0	12%	9
number of fledgling	4	8	4	3	3	2	2	3	3	5	4	5	5	7	9	4	67
flegling failure	2	2	1	2	1	1	0	0	2	0	1	0	0	0	0	18%	12
no of successful fledgling	2	6	3	1	2	1	2	3	1	5	2	5	5	7	9	5,4	
uncertain fledgling survival	0	0	2	0	0	0	0	2	0	1	0	0	0	0	0	9%	5
number of fledgling per monitored pair	0,25	0,75	0,38	0,17	0,40	0,20	0,50	0,75	0,25	0,83	0,33	0,71	0,83	0,58	0,69	0,50	
fledgling success per reproductive pair	1,00	1,25	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,20	1,20	1,00	1,00	1,0	
pair breeding success	40%	100%	50%	50%	50%	50%	100%	75%	33%	100%	40%	100%	100%	100%	100%		
% of pairs which produced fledgling	33%	67%	30%	10%	40%	40%	29%	50%	50%	71%	67%	71%	40%	58%	69%	48%	
number of fledgling per incubated nest	0,29	0,67	0,38	0,14	0,50	0,50				1,00	0,29	0,56	1,00	0,88	1,00	0,6	
rat control	saïson	saïson	saïson	saïson	saïson	saïson	continue	continue	continue	continue	continue	continue	continue	continue	continue		
no nest protected against rat	9	9	16	8	6	4	5	4	4	5	8	11	8	11	15	8,2	123
protected nest producing fledgling	3	7	4	3	3	2	2	3	3	5	3	5	5	4	9	50%	61
no nest unprotected against rat	11	4	2	3	0	0	0	0	0	0	1	0	0	0	0	1,5	21
unprotected nest producing fledgling	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10%	2
introduced bird control shooting				2 ois/tirs									10	15	25	3	
introduced bird control poisoning														15	30-50		
introduced bird control trapping				23										5	2700		
failure (incubation, nesting and fledgling)	5	3	5	6	3	1			2	0	4	4	0	1	0		34
Failure due to introduced birds	2		3	1							3	2		1		35%	12
Failure due to climatic events				2	1							2				15%	5
unknow failure	3	3	2	3		1			2		1					38%	13

APPENDIX 2

Timeline and priorities for recovery actions for Tahiti Monarch

Topic 1: to pass over 20 Tahiti Monarch pairs	Priority	2013	2014	2015	2016	2017	2018
1.1 Monitor bird population in each valley, including banding and monitor the success of reproduction for each pair	Essential						
1.2 Perform rat control in all territories	Essential						
1.3 Perform introduced bird control in all territories	Essential						
1.4 Remove Kingfisher for improve carrying capacity in protected areas	High						
1.4 Perform goat eradication in Maruapo	High						
1.5 Perform habitat rehabilitation in each valley	High						
Topic 2: Establish a security population in Rimatara							
2.1 Define a level of sustainability in TM Tahiti population for young's removal	Essential						
2.2 Establish with the Recovery Group a list of diseases that must be check before translocation according to the bird species	Essential						
2.3 Sample introduced birds (and eventually kingfisher and monarch) for disease assessment	Essential						
2.4 Sample Tahiti monarch when banding for genetic and sexing studies	High						
2.5 Identify laboratories/resources peoples for perform genetic, sexing and risk assessment studies	High						
2.6 Present the project to the local Tahiti population and obtain their agreement	Essential						
2.7 Present the project to the local Rimatara population and obtain their agreement	Essential						
2.8 Prepare the Operational translocation plan with the TM recovery group	Essential						
2.9 Perform the translocation following the Operational plan	Essential						
Topic 3: Increase and sustain community-led project in TM recovery							
3.1 Involve Site Support Group	High						
3.2 Animate voluntaries network for introduced bird control in the residential areas	Essential						
3.3 Involve owners in habitat rehabilitation	Medium						
3.4 Set-up scholar's program in Paea and Punaauia (see also topic 7)	High						
3.5 Bring regularly scholar visits of Tahiti Monarch territories	Medium						
3.6 Continue tree nursery project for school and ask them to produce local tree for TM, teach them their own plants species	High						
Topic 4: Improve sustainable development in the benefit of local population							
4.1 help them to build honey project (local resources SDR, SOP Manu self-know-how) through SSG	Medium						
4.2 help them to build sandalwood production through SSG	Medium						
4.3 try to raise fund for international collaboration between SSG and TCA	Medium						
Topic 5: Establish sanctuaries/protected area for each TM sub-populations							
5.1 send Tahiti owners to TCA	Essential						
5.2 hold a SSG for discuss of the trip with all owners at year 1	Essential						
5.3 send TCA owners to Tahiti	Essential						
5.4 hold a SSG for present the TCA project with all owners at year 2	Essential						
5.5 redact and sign the declaration of intention in each valleys for the creation of protected areas on the model of TCA	Essential						
Topic 6: Secure regular and increasing funding for TM recovery							
6.1 identify stakeholder for conduct the negotiation at a politic level	High						
6.2 initiate negotiation at soon as the politic profile of French Polynesia is fix in medium term	High						
6.3 prepare and sign a multi annual engagement between SOP and DIREN	High						
6.4 continue public awareness in local press, TV and radio	Medium						

6.5 build a fund-raising plan with the help of BirdLife International Fidji	Medium						
6.6 prepare as much demands as necessary for implements actions detailed in the TM recovery plan	Essential						
Topic 7: Improve advocacy and statuaries texts							
7.1 Develop an advocacy section	Medium						
7.2 Produce correct material for advocacy and identify people ready to imply themselves in this topic	Medium						
7.3 Promote the inclusion of statutory protection of TM sanctuaries	Medium						
7.4 Provide local authorities with information on TM sanctuaries and eventual high priority areas for management of TM	Medium						
Topic 8: Sexing birds and provide robust information guiding management of genetic diversity							
8.1 Genetic sample of a maximum of individual	Medium						
8.2 Bird sexing	Medium						
8.3 Pedigree research	Medium						
8.4 Genetic diversity/bottleneck assessment	Medium						
8.5 Discuss of genetic exchange options with the TM recovery group	Medium						
Topic 9: To improve monitoring, understanding of species biology and robust population modeling of the species							
9.1 Initiate/improve collection of baseline data for Research and modeling TM	High						
9.2 Initiate population modeling and disseminate results from available data	High						
9.3 Liaise with research providers to initiate/support Research and research on the ecology and behavior of TM, throughout the plan	Medium						
9.4 Survey other valleys and remote areas in Papehue and Tiapa	High						
Topic 10: Pest management and research into tools for efficient-sustainable landscape pest control and monitoring							
10.1 compare cost-effectiveness of chemical versus physical control for rats	Medium						
10.2 compare cost-effectiveness of several traps/poisoning/shooting methods to control MM and BB	Essential						
10.3 find a protocol for control of Swamp Harrier control in TM valleys	High						
10.4 monitor re-colonization of introduced bird following successful control attempts in order to rationalize introduced bird control efforts for TM recovery	High						
10.5 monitor wild cat population in valley at regular intervals to establish their potential impact on TM populations and undertake control as necessary	High						
10.6 test different methods for habitat restoration, continue systematic control of Miconia and Tulip tree, monitor new development on control topics	High						
10.7 contact stakeholders to organize the prevention of little fire ant invasion in TM valley	High						
Topic 11: To assess the health of wild bird in Tahiti							
11.1 Perform a list of target diseases	High						
11.2 Sample birds on Tahiti and in TM valleys	Medium						
11.3 Disease screening	High						

APPENDIX 3

Budget projection for recovery actions In XPF (1 Euro = 119.33 XPF)

Actions	2013	2014	5 years
<i>Rat control (basal and high populations)</i>			
1.0 Local technician (rat and cat control) x 12	23.000	23.000	115.000
1.0 Program manager x 3	10.500	10.500	52.500
1.1 Poison, stations & rat tunnels	10.000	10.000	50.000
1.2 Mission	1.500	1.500	4.500
Total	45.000	45.000	225.000
<i>Bird control</i>			
1.0 Technician x 6	11.500	11.500	57.500
1.1 Investment (shot gun, wire..)	10.000	10.000	50.000
1.2 Material renew & baits	1.000	2.000	9.000
1.3 Mission	600	600	3.000
Total	13.200	14.200	119.500
<i>Bird monitoring (improved) and Rimatara translocation</i>			
1.0 Program manager x 3	10.500	10.500	52.500
1.1 Second biologist x 6	21.000	21.000	105.000
1.2 Material (lens, bird net, band, comput)	3.500	1.000	7.500
1.3 Mission	600	600	3.000
1.4 Fly and Pension 2 x 4-2 p /year	5.500	3.000	17.500
1.5. Analyses (Genetic, Diseases)	4.000	1.000	8.000
Total	45.100	37.500	193.500
<i>Habitat rehabilitation</i>			
1.0 Valley owners salary (implication)	12.000	12.000	60.000
1.1 Grants for habitat rehabilitation	4.000	4.000	20.000
1.2 Enclosure cost	3.000	500	5.000
1.3 Small materials	2.000	500	4.000
Total	21.000	17.000	89.000
<i>Public awareness (adult/child), creation of Protected Areas and sustainable development</i>			
Staff or voluntaries implication (x6)	9.000	9.000	45.000
1.0 SSG meetings twice a year	200	200	1.000
1.1 Materials (child lens, flyer, book..)	3.000	250	4.000
1.2 School animations	800	800	4.000
1.3 Advice panels	2.500	500	4.500
1.4 Exchange with TCA (Rarotonga)	5.400	2.200	7.600
1.5 Habitat survey and potential	8.300	8.300	16.600
1.6 Santalwood plantation	500	1.000	1.000
1.7 Ecotourism potential	7.000		7.000
1.8 Development of Ecotourism	6.000	6.000	12.000
Total	42.700	28.500	152.700
Total	170.900	142.100	739.700

