



## **3322 - Testing conservation and habitat restoration methods to preserve Rapa's avifauna (French Polynesia)**

French Polynesia, Rapa Island (Austral Archipelago); November 2021-July2023

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## Project Partners & Collaborators

**Local community of Rapa:** The local population was an essential collaborator, as through the activities of the projects, they have participated in the protection of their island. They also provided food for the teams.

**Raumatariki (environmental NGO):** has helped lead the forest restoration project and develop the plant nursery. They also helped us find competent staff for work on the field. Pamela Patira especially was the part-time staff that managed the plant nursery.

**Children of Rapa Island.** They were involved in the project via drawing activities & older kids (which normally intern in Tahiti and visits Rapa three times a year) have participated though field outings, where they removed invasive plant species or planted indigenous species.

**Mayor and Town Hall.** The mayor and Town Hall staff helped a lot with logistics for our biosecurity and restoration actions. They also led public meetings and allocated their staff to help on the field. They also provided accommodation and the use of the town hall boat & driver for free.

**The Council of Elders (Tohitu).** In Rapa there are no land-owners (if you don't belong in the local community of Rapa, you cannot buy land). This group is the only authority that can give permission to visit, work, and develop restoration projects at the sites. The council has already supported SOP Manu and Raumatariki's actions on many occasions during the project.

**SOP Manu & BirdLife international** – An ornithological NGO associated with BirdLife International for its projects. The NGO has many contacts across the science community to advice on the projects and has helped Raumatariki and smaller NGOs get funding for their environmental projects concerning birds

Name	Organization	Role
Rapa community collaborators		
Anna Avaeoru	General secretary of Rapa Town Hall	Logistics organization (boat, bus, car rides) and organized public meetings
Tuanainai Narii	Mayor of Rapa	Logistics & communication at public meetings. Granted the team the Town hall house & boat for free.
Teiki Watanabe	First deputy mayor	Helped logistics & communication with elder council and community
Anette Teipoarii	Second deputy mayor	Communication with elder council, and community/Town Hall staff
Poe Narii	Previous president of Raumatariki (now vice-president) & member of elder council	Communication with elder council, Biosecurity volunteer
Clara Varney	Town Hall secretary & Raumatariki member	Logistics organization
Alain Faraiere	Rapa Town Hall chief of police	Safety & Hazards
Vehia Agnieray, Nathan Ye-On, Pamela Patira	Raumatariki	Raumatariki staff, trained in biosecurity, plant and seabird

		identification. Pamela Patira worked essentially on the Plant Nursery.
Kaianu Flores, Hiri Itaia	Town Hall youth contract staff	Town hall staff trained on seabirds and invasive species
Alexandre Tetuamanuhiri	Chief of town hall technical staff and head firefighter & Raumatariki member	Boat driver and safety contact during fieldwork
Scientific advisers		
Steve Cranwell	Birdlife International	Project adviser, expertise on invasive species and biosecurity
Caroline Blanvillain	SOP Manu; ornithologist	Project adviser on biosecurity & terrestrial birds
Jean-François Butaud	Botanist, independent consultant	Project adviser for plant restoration
Jean-Claude Thibault	Ornithologist, independent consultant	Project adviser for seabird census
Thomas Ghestemme	SOP Manu director	Project adviser
Roberto Luta	SOP Manu President	Volunteer and has field experience
Astrid Hoffman	SOP Manu volunteer	Volunteer, had field experience

## Section 1: Background & Project Team members

### Summary

The island of Rapa is a place of extraordinary biodiversity that includes the Koko *Ptilinopus huttoni* (CR), the only fruit-dove of the Austral Archipelago (French Polynesia). Its off-shore uninhabited islets is also an essential reproductive site for many petrels, shearwaters and storm-petrels colonies, especially rare endemic seabirds, such as the Kakikaki Rapa shearwater *Puffinus auricularis myrtae* (EN) and the Koru'e White-bellied Storm-petrel *Fregetta grallaria titan* (LC). Over the last twenty years, the number of Koko has been declining, due to habitat loss. This loss is due to the progressive invasion of strawberry guava *Psidium cattleianum* within the native forest. This invasion, which affects all forested areas, merges with other on-going threats, such as the invasion of the Caribbean pine *Pinus caribaea* and the erosion of the island caused by the presence of wild ungulates. On another hand, off-shore islands are invaded by invasive rats and invasive plants. Finally, Rapa is still free from many other invasive species, present on other islands in French Polynesia, and should remain so. The risk of invasion is high and needs to be avoided at all costs. We improved conservation for this site by: protecting 2 key endemic forest areas by establishing invasive species control and re-foresting these sites with indigenous plants; we conducted surveys on seabirds and the Koko or Rapa Fruit-dove; and finally we involved the local community, by organizing public meetings, biosecurity and field survey training & school outings, thus providing the inhabitants with various tools and methods to help them protect their terrestrial environment in the long-term.

### Introduction

The main island has one terrestrial bird endemic species, the Rapa Fruit-dove 'Koko' *Ptilinopus huttoni* (CR). The off-shore islets are home to a unique assemblage of seabirds, with eleven species, seven of which are petrels and shearwaters including endemic form of White-bellied

storm petrel ‘Koru’e’ *Fregetta grallaria titan* (LC) and the Rapa shearwater ‘Kakikaki’ *Puffinus auricularis myrtae* (CR). The other ‘Koru’e’ – Polynesian storm-petrel *Nesofregetta fuliginosa* (EN) also nests in Rapa, and has known colonies in Gambier and Marquesas Archipelagos. Some plant species that are also critically endangered (Rapa sandalwood *Santalum insulare var. margaretae* CR, *Zanthoxylum tahitense* CR) would also benefit from this project.

On the main island, it seems that habitat deterioration by invasive plants is the main issue for the low number of Koko (Rapa fruit-dove). Protecting the last remnants of endemic forest is a priority, and producing more indigenous plants to re-forest impacted sites is needed. Clearing invasive plant species and starting Pacific rat control in key sites (as rats consume seeds and seedlings of endangered plants, especially of Rapa sandalwood) are priority activities needed at these mainland sites. We started to communicate on biosecurity since we discovered that the ship rat was absent in 2018, and to further emphasise the importance of biosecurity for the protection of species, we organized several public meetings and re-installed new bait stations on the main wharf. On off-shore islets, the decline of Kakikaki (Rapa shearwater) and Koru’e (storm-petrels species) is intrinsic to the islets: small area of habitat available for breeding, combined with issues from past invasive introductions. Pacific rat introduction is ancient, but it is doubtless a major cause of predation that can explain the low number of chicks. Only four out of 10 islets are free of rats (Thibault & Varney 1991; Butaud et al. 2017; Thibault et al. 2020). Invasive plants are also an issue: only one islet’s habitat, Tauturau, is threatened by strawberry guava. The seabird burrows area is invaded by a tall (2.5-3.5 m) and very dense grove. We targeted this particular grove for plant removal control, so that more shearwater can use the burrows underneath. Another issue is that two introduced grass species presence is problematic for the reproduction for burrowing seabirds.



Figure 1: Map of Rapa and its islets (name of bay written in blue)

## **Project members**

Adara Tehani Withers (32) - Originated from Tahiti, Tehani studied in NZ for 6 years for her tertiary and post-graduate studies. After obtaining a masters in science (ecology, research) in NZ (Waikato University) in 2015, Tehani volunteered with several organisations (Department of Conservation NZ, Project Tongariro trust NZ, Bream Head trust NZ) before being hired in 2016 as an Island Restoration Manager for SOP Manu and BirdLife International. Current position: Project manager for 3 restoration projects in French Polynesia. In charge of coordinating logistics and leading field expeditions for feasibility studies; technical planning and managing invasive vertebrate eradications in Marquesas, Gambier & Rapa Island.

Tiffany Laitame (38) - Originated from Rapa (from her mother's side). Worked for PEW for 1 year for the creation of the 'rahui' (protected marine areas) of the Austral archipelago, then did part-time botanical part-time jobs. Also has a lot of knowledge on Polynesian traditional sailings, so worked with various iwi (Maori) communities in NZ. Current employer: she has been working as a contractual primary school teacher since 2021 for the DGEE (Educational ministry), and on Rapa since the school year 2022-2023.

Maya Tehau (31) - Originally from Rangiroa atoll, has completed secondary school in Tahiti and spent 2 years as a secretary and class supervisor in a Catholic school in Tahiti (Sacré-Coeur de Taravao). She has been hired by SOP Manu since 2017. In charge of communication, organizing flights, boats, sometimes helps for logistical work and budgeting (finances). Responds to all phones calls, emails etc. for SOP Manu.

## **Section 2: Aim and objectives, methodology & initial results**

### **Aim and objectives**

Aim: The conservation status and threats faced by the endemic plants and breeding birds on Rapa and its surrounding islets is better and more widely understood and strategies to tackle these threats are devised and tested in key sites.

Objective 1: Two to three important mainland sites are restored, with effective long-term invasive plant control, Pacific rat control and restoration planting, especially around highly endangered trees. We conducted this work especially around Anatakuri nako, Teva I Tau site and Agnario bay, around Rapa sandalwood trees.

Objective 2: Two off-shore islets (Taturau and Tarakoi) habitat is restored and new conservation methods (i.e. nest-boxes) are tested, to improve seabird breeding conditions. We removed the nest-boxes from the project, as we are planning to eradicate rats with the help of BirdLife International in 2023.

Objective 3: Seabirds dynamics is better understood and monitoring of those seabird colonies and the Rapa Fruit-dove (Koko) survey is conducted by trained locals.

Objective 4: Rapa local community is involved in activities (i.e. invasive plant control, indigenous planting, biosecurity workshops, school outings etc.) and invested in the protection of their biodiversity.

### **Changes to original project plan**

We decided to remove the nest-boxes activity from the project, as SOP Manu (Tehani as a project manager, with a partnership with BirdLife International) were planning to eradicate rats via drone in November 2022, which would have made this activity not relevant anymore. Sadly there are major technology issues with the drones and the eradication project had to be postponed to November 2023. We did not have enough time left for the project to design a good nest-box, and to order material, so we preferred to invest more in trail cameras, plant nursery material and Pamela Patira salary (local staff, as part of the work for the plant nursery).

End of July 2021, the COVID delta variant started spreading through the community in French Polynesia, and we were first put in week-end lockdown beginning of August, and then from mid-august until 20<sup>th</sup> of September, we were in full lockdown again. To organize any trips onto Rapa was too risky (for the local community, but also getting stuck onto the island without any gear etc.). So we started the project in November 2021. Afterwards, when the situation improved, Tiffany managed to do one fieldtrip in April 2022 for 2 weeks (short school holiday) and brought on the field teenage children from Rapa to see the Koko Rapa fruit-dove and cultural forts of the island (Teva I Tau), but no other activity was possible apart from Plant Nursery work.

Tehani and a volunteer from SOP Manu went in July-August 2022 for 6 weeks, and managed to do several activities, while training locals: winter count of seabirds, install trail-cameras in front of active Rapa shearwater burrows, 3 days of weeding with the local community & school kids, and public meetings on biosecurity & seabirds. Tehani was supposed to come back in October to manage another SOP Manu project (rat eradication on 3 islets of Rapa) that was planned since last year; however, the eradication project had to be postponed to 2023. That is why we had to ask for another extension. In April 2023, Tehani and 2 SOP Manu volunteers, with the invaluable help from Pamela on the field, managed to accomplish several activities: Koko's survey; installing rat bait stations in the sandalwood area and on the wharf of the Ahurei village, and collect summer seabird data.

### **Methodology**

Objective 1: (A) We further developed the Raumatariki plant nursery and planting activities: Seeds were collected by the project team during field-work, and regularly by the Raumatariki employee (Pamela Patira), who maintained the nursery. The nursery (already in place, and extended since then) was provided via the CLP with new equipment, which increased its capacity, with the objective of producing 400 plants minimum and the establishment of half of them for the duration of the project (1500 plants were produced, 800 planted). The plants the most essential were identified according to their germination, the needs of the site and their ability to replace or prevent the re-growth of strawberry guava effectively, but also their situation with respect to the site. Several days or half-days were organized by Raumatariki and local volunteers for planting and checking survival rates (team members had to contact

employees and volunteers regularly to check). Objective 1 (B): Invasive pacific rat control around Rapa sandalwood at Agnario bay: a grid of 10 bait stations was installed around the 3 trees that are left of this species.

Objective 2 Invasive plant removal activities on mainland and off-shore sites: Plants that were large and could not be removed were cut at the base as close as possible to the soil, horizontally so as to retain the herbicide solution during the application. They were treated with a triclopyr herbicide solution. Twenty individuals per site were tagged, to see if they still grew. We decided not to treat with herbicide the strawberry guava grove on Tauturau islet – as it was too risky for seabirds that may burrow there.

Objective 3: On all off-shore islets, the seabird breeding success was assessed: chicks and adults were counted in 20 x 20 m quadrat. Stages of breeding for each species were notes: Chick at stage 1: entirely down; chick at stage 2: body covered by down, but feathers emerge from wings and tail; chick at stage 3: mainly feathered, but some down stay on different parts of the body, especially on back and head. The geographical coordinates of the burrows (used by Rapa shearwaters and black-winged petrels at two complementary periods of the year) were recorded using a GPS (Garmin GPSMAP64). Burrows were examined with endoscopes. Raumatariki employees and local volunteers were trained on bird species identification by Tehani Withers on the field. A number of 10 trail cameras were installed and allowed the team to assess occupancy rates. For the Koko (Rapa Fruit-dove), a point-count survey method was used (15 min in a fixed position), and we visited the same GPS points that were made in 2017.

Objective 4: Involving local community - The objective was to have as many local volunteers involved in the project – either during invasive plant removal, or in reforestation of native plants. Local guides were trained on bird and plant identification. 2 biosecurity workshops were organized so that they understand further the impact of invasive species and what to do if there is any arrival on the island. School presentation (& 1 drawing event) and 2 school outings were organized to show endemic birds and plants to children of the island (at fenced/re-forested sites and on Tarakoi island). This work has re-enforced the role of Raumatariki on the island, and the mayor, Town Hall and the elder council (Tohitu) were solicited to make all the important decisions on choosing sites or plants to restore. With their help, the team has lead public meetings with the local populations.

## **Outputs and Results**

### **Objective 1: Habitat restoration**

We collected indigenous seeds and plants for the Raumatariki plant nursery -1500 plants were produced and planted for fenced sites (3/4 used for Tarakoi project, 1/4 for mainland sites – meaning 500 or so plants were planted on the mainland sites).





Figure 2: Transporting plants with the Town Hall & Some of the plants produced at the Plant nursery (Pamela's son in the picture)

We installed 10 rat bait stations for rat control around Rapa sandalwood tree area (Agaira'o bay) in April 2023. Prior to installing the bait stations, Raumatariki had manually distributed some rodenticide around the trees (around 2 months prior the visit of Tehani & team in April), so the team had the nice surprise of finding fruits on the sandalwood trees while installing the bait stations. A number of 10+ seeds were picked and given to Pamela Patira from Raumatariki to grow in the plant nursery. Pamela from Raumatariki has started growing indigenous plants to plant with the sandalwood seeds (as this species is parasitic, and needs to grow with another plant to parasite on).



Figure 3: Picking sandalwood seeds from Agnario bay trees and one of the 10 rat-bait stations installed around this area.

### **Objective 2: Invasive species control**

An area of 0.5 ha of strawberry guava cleared in August 2022 with the help of the community (30 people), in front of 30+ burrows (which were all empty, were checked by the trained locals and the team).



Figure 4: Strawberry guava control by the local community

Activities of removal of strawberry and Caribbean pines patches at Rapa mainland sites (Anatakuri nako & Tevaitau) with the local community were successfully organized with the help of Raumatariki.



Figure 5: Pictures on the field of the community cutting off invasive species – Caribbean Pine and strawberry guava.



### Objective 3: Seabird Monitoring and Koko Point-Count survey

#### (1) Rapa Seabirds Monitoring

We recorded presence and absence for each species (see Appendix 3 for more details). In this final report, we detailed more on camera-trap data and quadrat counts.

A number of 5 trail cameras were installed in front of active nests in Rapa iti, 5 others were installed on Tauturau in front of random nests (not occupied). We used endoscopes to find active nests.



Figure 6: Endoscope picture of Kakikaki (Rapa shearwater) & Tehani installing a camera-trap in front of an active burrow.

More than 50 000 pictures were collected and have given information on the breeding success of the Rapa shearwater.



Figure 7: From left to Right - Location of Camera-traps in front of active nests on Rapa iti 2022, while camera-traps were located in random areas on Tauturau.

The camera Reconyx recorded 5 active nests from July 2022 until September 2022. See monitoring section for more details on camera-trap data.

We conducted 6 quadrats on Tauturau, while none on Karapoo rahi (not enough seabird nests to conduct quadrats – more like incidental observations) during winter season (July 2022). The main species counted were the Murphy petrel (*Pterodroma ultima*).

Table 1: Quadrat data and breeding success (comparative data from 2019).

*Pterodroma ultima* Pétrel de Murphy Murphy's Petrel e'upō

Recorded on Karapoo rahi (more than ten birds), Karapoo iti 04/07 (50 birds grouped with Kermadec Petrel), Rapa iti (more than twenty birds, two incubating birds), Tapiko (five birds; one incubating bird and two chicks), and Tauturau (see Table below).

Quadrat n°	single or couple	eggs	down chick (stage 1)	feathered chick (stage 2)	fledgling (stage 3)	eggs + chicks
Q1		5				5
Q2	2	6				8
Q3		18		1		18
Q4		6	1			7
Q5	5	9				9
Q6		5			1	5

Number of Murphy's Petrels of the different categories recorded in six quadrats on motu Tauturau.

Number of breeding birds in quadrats n°1-6 appears to be stable between 2019 and 2022. In this species, breeding is very seasonal, ratio of number of eggs is inverted between early July (beginning of laying) and late August.

Dates	eggs	Eggs + chicks
2019 (24-25 August)	4	47
2022 (5 July)	49	52

Comparison of breeding numbers in the quadrats (number 1 to 6) on Tauturau between 2019 and 2022; each quadrat measures 400m<sup>2</sup> (see localisation of the quadrats in the Report 2019)

We conducted endoscope checks on all burrows found on Rapa iti, Karapoo rahi & Tauturau, even if we did not install camera-traps.

Table 2: Seabird Data collected during each visit on the islets.

*Puffinus myrtae* Puffin de Rapa Rapa Shearwater kāki kāki

Data are given in the table below. Recorded in the three main breeding sites. A majority of burrows were empty. A maximum of 30 individuals calling together was recorded on 7<sup>th</sup> of July.

Date	motu	empty burrows checked	occupied burrows with adult	max. n. of birds calling together in flight at night
04/07/22	Karapoo rahi	5	none	
05/07/22	Tauturou	25	none	
07/07/22	Rapa iti	10		No Moon: 22 heard at 4:37-4:59, 24 at 5:00-5:10, 30 at 05:15-06:30
21/07/22		15	4	
26/07/22		10 (other burrows)	4 (other burrows)	
29/07/22				10
04/08/22		20	8 (same burrows)	

Contents of burrows on the three islets visited in 2022.

Table 3 : Number of occurrences on camera-trap of Rapa shearwater visiting the burrows on Rapa iti. We started to find active burrows from the 21/07, but only started installing the cameras on the 26/07.

Number of daily occurrences	C1	C2	C3	C4	C5
26/07/2022			0 start of recording	2 start of recording	
27/07/2022			0	0	
28/07/2022			0	1	
29/07/2022	1 start of recording	0 start of recording	0	2	0 start of recording
30/07/2022	2	0	Shearwater staying a long time in front of the camera, testing his wings or vocalizing. We think it had duvet, meaning it was a juvenile that was going to leave the burrow/pair had stopped 1 visiting. Camera lost battery power fast due to this.	1	0
31/07/2022	8	1	1 end of recording	6	0
01/08/2022	4	0		4	0
02/08/2022	2	0		0	1
03/08/2022	1	0		1	1
04/08/2022	2	2		2	15
05/08/2022	5	3		2	4
06/08/2022	2	4		1	0
07/08/2022	1	2 shearwater, preparing nest - bringing grass 14 into the burrow		3	1
08/08/2022	2 shearwater going in and out, maybe breeding 12 or preparing nest	9		0	0
09/08/2022	0	4		0	0
10/08/2022	0	6		1	0
11/08/2022	1	4		0	0
12/08/2022	0	2		0	0
13/08/2022	0	4		0	1
14/08/2022	2	5		0	0
15/08/2022	0	5		0	end of recording, note: too much 8 grass, hard to see
16/08/2022	2	4		0	
17/08/2022	1	5		0	
18/08/2022	1	5		0	
19/08/2022	0	9		1	
20/08/2022	6	2 end of recording		1	
21/08/2022	5			0	
22/08/2022	4			0	
23/08/2022	5			1	
24/08/2022	2				
25/08/2022	1			2	
26/08/2022	2			6	
27/08/2022	4			4	
28/08/2022	2			2	
29/08/2022	1			2	
30/08/2022	5			1	
31/08/2022	1			1	
01/09/2022	0			7	
02/09/2022	0			9	
03/09/2022	1			5	
04/09/2022	2			9	
05/09/2022	2 Rat ate the chick			8	
06/09/2022	Visits increased, probably pair looking for 8 chick...			7	
07/09/2022	12			5	
08/09/2022	7 end of recording			0	
09/09/2022				11	
10/09/2022				6	
11/09/2022				9	
12/09/2022				4	
13/09/2022				7	
14/09/2022				7	
15/09/2022				7	
16/09/2022				13	
17/09/2022				Shearwater in front of burrow for a long 8 time	
18/09/2022				8	
19/09/2022				8	
20/09/2022				5	
21/09/2022				2	
22/09/2022				0	
23/09/2022				0	
24/09/2022				1	
25/09/2022				2	
26/09/2022				3	
27/09/2022				end of recording, 10 min in front of 1 burrow	

We found out with the help of camera-traps that the Rapa shearwater was predominately nocturnal in behaviour. It is difficult to find a pattern in these daily occurrences at the burrow, but we found that when there was a sudden increase of visits when they were getting ready to breed (> 12 visits), then when they were incubating, they visited 2-5 times. When the chick was born, it seems that the chick was left alone at daytime, as we saw on camera that the chick was attacked by a pacific rat.

The breeding season also seems to be very random, with a couple (C1 & C4) preparing to breed end of July-beginning of August, while C3 contained an almost adult chick end of July, and C5 starting to breed mid-August. This data is still very qualitative information, but we have learned a lot already about the phenology of the species.



Figure 8: Camera-trap pictures of the birds coming in and out of burrows (daily occurrences) and Pacific rat attack on shearwater chick on the 5<sup>th</sup> of September – at 12:41 PM (while parent was probably absent).

We also conducted summer seabird incidental data (however, April was the end of season for many species – not enough nests to count for quadrat data). See raw data (Appendix 1) for more details.

## (2) Koko Rapa fruit-dove survey

We finally completed the Koko count in April 2023. We used the same method as Blanvillain & Patira 2017, by conducting point-counts of 15 min, and we visited the same locations of the point-counts (44 out of 50 locations). We estimated that 140 Koko (Rapa Fruit-dove) were present of the island. This decrease is probably due to habitat deterioration, such as invasive species and the forest regressing a lot since an accidental fire on Rapa took place in November 2022. See report in Appendices (written in French to share with the Rapa Town Hall & community).

Recommendations for the conservation of the Rapa fruit-dove were to redo a vegetation map of the island (especially since the 2022 accidental fire), re-plant indigenous plants and or fruit-trees that the Koko feed on now that a large part of the island has burnt, and continue to protect the remaining indigenous forest mainland sites. SOP Manu has asked (end of 2022) for a large funding from Europe to protect the remaining forest of Rapa with a 8km fence against ungulates (Fond vert), and we just have obtained it (June 2023). We shall start this project next year, and the current survey of the Koko numbers completed with the CLP funding will help convince the locals to actively do something to protect the remaining forests of Rapa.





**Résultats :**

Un nombre de 140 Koko a été estimé à partir du nombre de Koko compté sur les 44 points de comptage de 15 min.

Tableau 1 : Résultat de la méthode de recensement des koko par cartographie (PC = points de comptage)

Zone	Projection 2023	Nb de PC	% de la zone couverte	Nb de koko / 15 minutes	Koko hors PC	Nb de minimum de koko*	Nb moyen de koko**	Nb max de koko	Nb moyen de koko corrigé par le % de la zone couverte	Nb moyen de koko corrigé par le % des zones prospectées	Miri	Miki	Maai	Maa
<b>Zones de plus de 1 ha</b>														
Teugarere-Tevaitaura	X	6	75	4	3	4	7	7	10		8		12	
Ahurei	X	4	60	8	0	8	8	8	14		12		16	
Hiri rive gauche (Gapiri Gapuna)	X	5	40	8	0	8	8	8	20		16		23	
Morogouta-Putaketake (Hiri RD)	X	9	50	10	2	10	12	12	24		20		28	
Putakioe - Namure - Kaimano	X	3	50	1	0	1	1	1	2		2		2	
Per au														
Kaipos														
Ruapa-Akatanui	X	8	100	11	2	11	13	13	13		11		15	
<b>8</b>		<b>6 (75 %)</b>		<b>42</b>	<b>7</b>	<b>42</b>	<b>49</b>	<b>49</b>	<b>83</b>		<b>104</b>		<b>69</b>	<b>96 120</b>
<b>Zones de moins de 1 Ha</b>														
<b>Poutu</b>														
Ofairu - Pararaki	X	2	100	5	0	5	5	5	5		5		5	
1er vallon Hiri baie (Tevaitau)	X	1	100	5	1	5	6	6	6		5		6	
2e vallon Hiri baie (Gapiri)	X	1	100	2	0	2	2	2	2		2		2	
Vallon rive gauche Hiri baie														
Temokopuke 1	X	1	100	0	0	0	0	0	0		0		0	
Temokopuke 2	X	1	100	2	2	3	4	4	4		2		4	
Tokoroa	X	1	100	1	0	1	1	1	1		1		2	
Taunou	X	1	100	1	2	1	3	3	3		1		3	
Koropera	X	1	100	2	0	2	2	2	2		2		2	
Namure 1														
Namure 2														
Kapitaga 1														
Kapitaga 2														
Ruatara														
Teoragi rive droite 1														
Teoragi rive droite 2														
Teoragi rive droite 3														
Mata														
<b>19</b>		<b>8 (42 %)</b>		<b>18</b>	<b>5</b>	<b>19</b>	<b>23</b>	<b>23</b>	<b>23</b>		<b>36</b>	<b>19</b>	<b>30</b>	<b>24</b>
<b>27</b>		<b>14 (52 %)</b>		<b>60</b>	<b>12</b>	<b>61</b>	<b>72</b>	<b>72</b>	<b>106</b>		<b>140</b>	<b>88</b>	<b>116</b>	<b>120 158</b>

\* correction de 0% + koko observés hors PC, mais effectivement présents

\*\* + nb koko obs hors PC si ce chiffre est supérieur

Figure 9: Koko summary table data from the report

**Objective 4: Rapa local community involvement**

We conducted 3 public meetings with the elder council & the town hall about the restoration project & biosecurity.

A number of 5 fieldtrips were accomplished for locals to know more about their birds and plants (2 on the islets, 2 on mainland sites & 1 with kids specifically to observe the Koko).



Figure 10: Photos of the fieldtrip with the school kids of Rapa Island to observe Koko and remove strawberry guava and Caribbean pinus in the area.

Posters on rare birds were printed for the Tubuai Festival so that the Rapa community group can share their knowledge on birds. This was requested by Pierrot Faraire, the president of Tamariki Rapa (a NGO on sharing the culture of the Rapa to French Polynesia).

We organized an impromptu drawing activity with the youngest generation of children of the island during April School Holiday, where they drew Koko, but also things about nature that they liked (birds, their houses or the mountains).

For Biosecurity: we installed 15 rat bait stations around the wharf, with the help of the local staff from the Town Hall.



Figure 11: Rat bait-stations for the wharf and town hall staff installing those.

And finally, we produced T-shirts to further communication on seabirds. These sponsored shirts were used to increase the number of Raumatariki members in the Rapa local community (free shirts were distributed to people who paid their membership for 2023-2024). The shirts were produced end of June and arrived on Rapa in July 2023 (see communication).

### **Communication & Application of results**

We especially did communication on the island via public meetings or field training. We usually had 3 people that we had trained during each trip, and the town hall asked us to take on two young staff with us on the field (part of their contact CVD – which is a local contract for youth, paid by the government).

We produced two reports, one on seabirds (a summary was translated and shared with the Town Hall) and one on the Koko survey (written in French) – Appendix 3.





Figure 12: Tehani training Pamela on the use of endoscope, and group picture of the night survey team of July 2022.

Other communication products: Tehani wrote an article for the ‘Revelator’ on Rapa, its biodiversity and the conservation work that takes place there. The Revelator is a magazine that talks about conservation issues around the world. <https://therevelator.org/protect-rapa-island/> (see Appendix 2 for the whole article)

A number of 20 Posters were produced for the Tubuai Festival (with CLP logo), to communicate about birds to other islands of the Australs Archipelago. This was requested by the Town Hall.

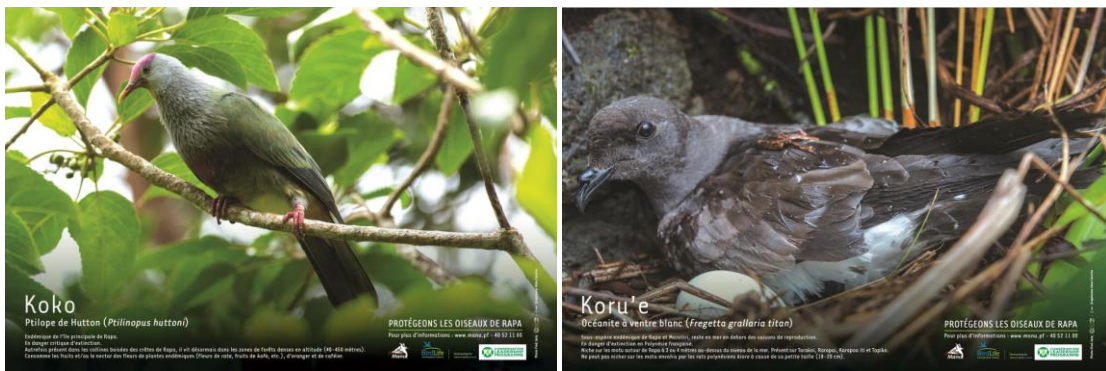


Figure 13 : Koko and Koru'e posters with basic information on the birds and logos.

Raumatariki T-shirts with stylish seabird designs were produced with CLP logo. Raumatariki do not sell the shirts, but use those to increase the number of members in the NGO. Indeed, the T-shirts are free for members of the NGO, and membership is 1000 xpf (8.38 euros). If the person does not want to be a member, it is 2000 xpf to buy a shirt.



Figure 14: Raumatariki free T-shirts for members

Black with Rapa shearwater design for Men, Women have the blue, Koru'e design. The tree logo (SOP Manu, Raumatariki & CLP) were placed on the sleeves of the shirts. Raumatariki ordered 50+ shirts.

## Monitoring and Evaluation

Objective 1 and 2: We had Pamela Patira from Raumatariki fill up a sheet of information on how many plants she produced what species and number of days that she worked. This fill-in sheet was sent once a month. She also had to fill-in the number of days she spent on the field to remove invasive species.

Figure 15: Example of fill-in sheet for Pamela Patira for March 2023

For objective 3: Analysis of Camera-trap data to follow breeding success of Rapa shearwater

The camera reconyx recorded 5 active nests on Rapa iti from July 2022 until September 2022. On C1, we found that the shearwater pair was the most disturbed by pacific rats, even with adults in the burrow incubating the egg or chick. Sometimes, we saw rats running out after entering the burrow, followed by the shearwater adults, which when incubating were defending themselves. However, after a while, we saw on camera a pacific rat dragging from the burrow a small live chick (downy stage) and it then probably ate it (5<sup>th</sup> of September). This happened when the pair was absent from the burrow, during the day (around mid-time). The shearwater pair using this burrow tried to find the chick without avail and visited 8 times & 12 times on the 6<sup>th</sup> and the 7<sup>th</sup> of September (the increase of visits might have caused the batteries to run out of power, as the camera stopped recording around the 9<sup>th</sup> of September).

On C4, same issue was found with rats entering as regularly as the shearwater the burrow. On C2, the individual seen on camera seems to have downy feathers on neck, cheeks and back, which means we recorded the end of the its growth stage (no other birds or adults were seen visiting). This individual stayed many times preening or vocalizing in front of the burrow, which meant that it was getting ready to fly off soon.

Camera-traps on Tauturau did record the presence of Rapa shearwater (C1C2), but not for long, thus it must have been a visiting adult, not a breeding individual. Titi (Black-winged petrel), which uses the same burrows and in bigger number than the Rapa shearwater were seen using the burrows, and even a large chick of Titi were observed on camera growing as a sub-adult (at some point the chicks will get out of the burrows to test their wings) (C5). Interestingly, apart from rats, we also observed spotted crakes on camera on Tauturau (C1C2). We thought that this species had disappeared from this site since the 90s, but it seems that there are still a few individuals inhabiting Tauturau.

### **Achievements and Impacts**

We re-developed the plant nursery with the help of Haiva Narii and Pamela Patira, 2 locals that have been trained and have worked before for Raumatariki. New material was bought so Pamela could produce plants regularly.



Figure 16: Raumatariki Plant Nursery re-built and plants produced by Pamela

Tiffany Laitame visited Rapa during the 2 weeks holiday in April 2022, and she managed to help Pamela on the plant nursery, as together they collected plants seeds and seedlings for the nursery. She organized one outing with the children (Teenagers – the older kids that were on holiday on the island) to show them the Koko (Rapa Fruit-dove) and got them to participate in restoration work – such as removing strawberry guava and pine trees patches around indigenous forests areas.

In July-August 2022, Tehani and a SOP Manu volunteer (Roberto Luta) worked on Rapa for 6 weeks. We collected the seabird winter monitoring data and used a number of 10 trail cameras to follow nesting practices of Rapa shearwater, which were moved around the Rapa iti site and Tauturau. We also did three outings with the local community – such as restoration work on Tauturau, Tarakoi and mainland sites Teva I Tau and Anatakuri nako (removing invasive plants).

In April 2023, Tehani, Roberto Luta, Astrid Hoffman and Pamela Patira worked on Rapa for 12 days, during the school holidays. We managed to update the Koko Rapa Fruit-Dove survey that was made in 2017 (41 out of 50 point counts from 2017 accomplished).

We installed bait stations around the Rapa sandalwood trees in Agnario bay in April 2017. Raumatariki (Tiffany & Pamela) had distributed manually rat poison before our trip in April in

the area, and we had the nice surprise of finding seeds on the sandalwood while we were installing the bait stations. We picked up a dozen of seeds. Now they are being grown in the plant nursery of Raumatariki, a first since the discovery of these 3 remaining trees in 2020. We also took the time to train local staff on how to install and use wharf rat-bait stations for biosecurity reasons.

### **Capacity Development and Leadership capabilities**

We have all learned more on project management and how to manage local staff. We have also further learned how to train people on the field effectively. We also learned a lot from the customs of the island and how the community functions and how to convince them to be part of the projects. Actually if you really want to have an impact on the local people, it is best to think long-term and work with people that will stay on the island, which in turn will influence the local community.

Tehani Withers has learned a lot about leadership, how to adapt to situations and how to depend on her team, and has learned a lot on effective habitat restoration. Tiffany Laitame has developed a lot of learning from communication with the local community, especially with the children. She also has learned about seabirds and the Koko habits. Maya Tehau has learned how to manage a project from the office, in terms of logistics and administration – without her this project would not have run smoothly. She also helped a lot in the financial side of this project.

## **Section 3: Conclusion & Lessons Learnt**

### **Conclusion**

For plant restoration objective, Raumatariki has further developed the plant nursery to be able to use the plants for the two protected sites. Strawberry guava patches and Caribbean pines were cleared at these two sites, and on Tauturau Island. Biosecurity has been put into place onto the Rapa mainland, with the training of Raumatariki local staff, the Town Hall staff and the installation of 15 bait-stations. We also installed bait stations around rare Rapa sandalwood trees, and we manage to collect some seeds for Raumatariki plant nursery, by controlling rat population. Seabird distribution, numbers and breeding status were assessed twice, during different time periods, to better understand threats and conservation measures we would need to address in the future. Phenology of the Kakikaki Rapa shearwater is now better understood, and the use of camera-trap has also been very helpful to understand further the negative impacts of invasive pacific rats. Raumatariki staff and volunteers were also trained to identify seabird species, and have helped a lot on collecting data for the team. The Koko survey was completed with the help of Raumatariki, and we found that there was a slight decrease of the population, probably due to the habitat deterioration – fire events: this will help communicate further with the locals to avoid accidental fires. The local community was involved in various ways in the different activities – especially during invasive plant patches clearance and plant nursery development. Multiple public meetings were organized to inform the population about the progress of the project. Rapa children were involved, with multiple fieldtrips that were organized with the older children of the island, while an impromptu drawing event with the

smaller ones. The Tohitu elder council authorized all visits to the sites and allowed the restoration projects on multiple sites (and even volunteered during the work). The Town Hall council allowed free stay for the house and the use of the boat and car, which was very helpful for the project.

### **Problems encountered and lessons learnt**

COVID-19 had a much bigger impact than we previously thought, and even if we tried to work around it, it did limit the work a lot, and made us start much later than we were supposed to, which was in August 2021. Indeed, during that period, the Delta variant had caused a lot of casualties in French Polynesia – 600 deaths in August and September. Also SOP Manu received around that same period funding for the Rapa rat eradication project, and the project was supposed to happen in November 2022. The CLP project was going to coincide with the eradication project so we would have time to do survey work on the island while the eradication project happened, but as the project got cancelled due to ENVICO not getting their drone ready on time, we had to postpone activities. Rapa is such a remote island to visit that we try to do all of our work in 1 or 2 periods of time of 6 weeks, which is not enough if the weather is not good.

It is difficult to manage projects when you are also working on other projects for different funders and complete activities in one year. We acknowledge that the CLP has been very lenient with our case and has helped us tremendously by giving us more time to finish the project.

*The purpose of this section is to provide information on lessons learned during the project work that can be usefully applied to other CLP projects. Please answer the below fields:*

- *Which project activities and outcomes went well and why?*

Mainland sites restoration work & Plant nursery development: There were 2 trips to restore mainland sites, with the local community. The plant nursery was well developed and many plants were planted (1000 + plants) at the sites. Only 1 person (Pamela Patira) has been hired to produce plants, so it is a huge amount of work but Pamela has been working very well and the nursery is very well looked after.

We installed the biosecurity bait stations with the help of local employees of the town Hall and explained to Raumatariki staff and members how to use them, and they will be in charge of communicating to the children and the local people about the use of the stations and that children should not touch them.

Off-shore islets & Seabird surveys: We managed to visit most of the sites for seabird surveys and do restoration work on Tauturau & Tarakoi (see seabird survey report of 2022 in appendices). We also did night surveys and camped on Rapa iti – at least 4 nights, to further understand the Rapa shearwater breeding period. We had less time and opportunity to gather summer data, but we still managed to gather some data of species presence.

Involving the local community: Fieldtrips with the local community is a good way for people to feel involved in the conservation work of the island. A number of 4 locals were trained on the field. Pamela Patira and Kai'anu Flores were trained during day-trips on seabird survey methods,



and on using trail cameras and GPS device. As Kai'anu is quite young (<20 years old), and Pamela had a child to look after at night, we preferred to have another 2 more experienced local guys to help us during night seabird surveys – Vehia Agnieray and Nathan Ye-On. The fieldtrip with the teenagers in April 2022 went very well, with local kids knowing more about birds and plants. In April 2023, we did not have time to organize another fieldtrip, but instead, we gathered the little kids in the village to draw endemic birds, which included the youngest generation of the island and it was an awareness activity that we planned during school, but it was good to idea to do it with them during their holiday.



Figure 17: Kids drawing at Rapa village, at the 'Fare Pote', a gathering area at the main village for local kids and people.

- *Which project activities and outcomes have been problematic and in what way, and how has this been overcome?*

Koko survey: We trained the young locals (Kai'anu Flores especially) on Koko survey as winter season is not the best time to conduct the surveys. However, when a member of the team is not there with them to supervise on the field, the work is not necessarily done. It was understood that this work could be done before November, but no data has been forthcoming. Pamela is already working part-time on the plant nursery so taking on this work was too much to handle alone. We asked for an extension because we could not get this activity done. In April 2023, Tehani, two SOP Manu volunteers, and with Pamela as a local guide, we re-did the Koko survey on 47 out of 50 point-counts. Next time we probably would need to find someone a bit older and that can work alone for this type of work.

- *Briefly assess the specific project methodologies and conservation tools used.*

For the restoration purpose of this project, having a local trained and willing to do the work without supervision was essential to the project, and having the fill-in sheet of numbers of plants produced was important. Controlling rat population was also effective, as we managed to collect some sandalwood seeds.

The use of camera-traps was essential, as we would not have detected rat predation and understood further the phenology of the Rapa shearwater, which is a rare species. As for the seabird counts, the technique really vary if chicks are present or not, so when we are in between season, it is difficult to assess the population correctly. As for the Koko, the technique developed before in 2017 (point – counts of 15 min) was effective enough, but point-counts location were not easy to reach (they were located mostly in very high areas, as view-points).

- *Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.*

The important lessons that we learned so far is that:

- Communication with the local community is essential for the project, especially on Rapa, where all decisions on land distribution depends on the elder council Tohitu.
- A year is not enough time to accomplish all activities and influence the local community, especially in isolated sites, even though this lesson learnt might counteract the funding regulations.
- Logistics is difficult to organize in remote areas, and we need someone constantly in Tahiti to organize all flights, boat trips and getting the gear ready – which was the role of Maya.
- COVID was a global event that really impacted our project. Even though we thought we could manage when we applied, it is difficult to predict what would happen – Tuhaa Pae rotations stopped, massive Delta contagion event.
- We took a really long time to finish all our activities due to the very few times there were boat rotations on the island. We are very grateful towards Pamela Patira for all her work on the plant nursery while we were away. She was an essential staff for the project.

### **In the future**

We are currently working on the rat eradication project, which will happen manually on two of the three islets invaded by rats – Rapa iti and Tauturau. This has been planned for many years and we are hopeful that it will finally happen in November 2023. We had professional climbers work there in August September 2023, and they found that Karapoo rahi was too dangerous to do it by hand due to the cliffs.

SOP Manu has applied and managed to obtain a major funding - the “Fond Vert”, which is a European funding that will permit us to continue conservation projects across several sites in French Polynesia – and Rapa is one of the main islands where conservation work will take place. For Rapa, more than 500 000 euros is allocated, to monitor seabirds and the Rapa fruit-dove, to construct a barrier against ungulates (as to protect the Rapa forest), and to restore several more uninhabited islets site for seabirds (Tapiko, Karapoo iti). If we manage to create this anti-ungulate fence, we would stop significantly the spread of invasive plants in the endemic forest.

Tehani Withers will be the project manager for Rapa, and Tiffany Laitame has taken a contract with the DAG (Department of Agriculture) on Rapa, so she will help with managing the Raumatariki staff and help with communication with the local community (especially to convince locals to agree with the barrier against ungulates). Without the experience of managing CLP funding and the data and the work that was done has enabled SOP Manu to obtain this funding. We are grateful for the experience of working with the CLP.

## Financial Report

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification (Justification must be provided if figure in column D is +/- 25%)	Proposed Spending (Preliminary Report Only)
<b>PHASE I - PROJECT PREPARATION</b>					
Communications (telephone/internet/postage)	49,00		-100%	covers camping equipment	
Field guide books, maps, journal articles and other printed materials	166,00		-100%	covers outreach/education activities	
Insurance	343,00		-100%	covers Food for Team members & local guides	
Visas and permits	0,00		#DIV/0!		
Team training	166,00	114,00	-31%	covers outreach/education activities	
Reconnaissance	0,00		#DIV/0!		
Other (Phase 1)	490,00	474,99	-3%		
<b>EQUIPMENT</b>					
Scientific/field equipment and supplies	1 261,00	1231,90	-2%		
Photographic equipment	98,00	118,75	21%		
Camping equipment	215,00	285,11	33%	covered by team training and communications	
Boat/engine/truck (including car hire)	343,00	342,76	0%		
Other (Equipment)	2 904,00	2410,42	-17%		
<b>PHASE II - IMPLEMENTATION</b>					
Accommodation for team members and local guides	490,00	474,99	-3%		
Food for team members and local guides	490,00	733,46	50%	covered by insurance (we are already insured via our jobs)	
Travel and local transportation (including fuel)	4 359,00	4896,46	12%		
Customs and/or port duties	490,00	531,63	8%		
Workshops	490	607,99	24%		
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	980,00	1356,81	38%	covered by phase I and III expenses	
Other (Phase 2)	980,00	949,98	-3%		
<b>PHASE III - POST-PROJECT EXPENSES</b>					
Administration	98,00		-100%	covers outreach/education activities	
Report production and results dissemination	98,00		-100%	covers outreach/education activities	
Other (Phase 3)	490,00	474,99	-3%		
<b>Total</b>	<b>15 000,00</b>	<b>15 004,22</b>			

## Section 4: Appendices, Bibliography & Outputs

### Appendices

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	3	BirdLife International has been partner on Rapa projects since 2017
Number of species assessments contributed to (E.g. IUCN assessments)	3	Koko Rapa Fruit-dove Kakikaki Rapa Shearwater Koru'e White-bellied storm-petrel
Number of site assessments contributed to (E.g. IBA assessments)	1	Rapa island and islets
Number of NGOs established	1	Raumatariki is an established NGO for many years now
Amount of extra funding leveraged (\$)	1	More than 500 000 euros from the Fond vert will be dedicated to the birds of Rapa and habitat restoration
Number of species discovered/rediscovered	0	
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	1	Rapa and its islets are an IBA
Number of species/sites legally protected for biodiversity	1	Rapa indigenous forest and islets are protected
Number of stakeholders actively engaged in species/site conservation management	35	5 Raumatariki staff and town hall staff & volunteers – 30
Number of species/site management plans/strategies developed	3	Koko survey, Kakikaki survey and 3 sites managed (Agnario bay, Tauturau)



		island, Anatakuri bay)
Number of stakeholders reached	137	137 people of an island of 400 inhabitants. With the town hall and raumatariki staff (35), elder council (12), tomite rahi and town hall council (10), 30 people at meetings, 60 kids (high schoolers and primary)
Examples of stakeholder behaviour change brought about by the project.	1	There are less visits on the islets to
Examples of policy change brought about by the project		Not a policy, but some of the elders don't hunt for seabirds as much as they did before
Number of jobs created	1	Pamela Patira – Plant nursery job, will become a permanent staff after, with the help of the Fond vert project
Number of academic papers published	0	
Number of conferences where project results have been presented	Maybe 1	In August-September 2024, we will present the work on seabirds of Rapa will be presented at the Oceania Seabird Symposium in New Caledonia – still in preparation

Appendix 4.1 CLP M&E measures

## Appendix 1: Field pictures & Raw data



More field work pictures (From left to right: moving plant nursery plants to site 2022; Tehani installing acoustic recorders on seabird sites 2022 – funded by BirdLife International; local kids drawing birds and plants at the Fare Pote in April 2023).



Group picture after Koko survey and Seabird field work with Tiffany, Roberto, Tehani, Astrid, Pamela and one local volunteer who helped on the field that day (Tiffany's aunt) in April 2023.

## Raw data for camera-traps on shearwater daily occurrence

Lieu (Rapa iti ou Tautaurau)	Camera (1 a 5)	Date debut	Heure debut	Ref image debut	Date fin	Heure fin	Ref image fin	Kakika	Kiore	Titi	Kea/Euŋ	Poussi	Nb passai
Rapa iti	1	29/07/2022	20:25:36	RCNX0036.JPG	29/07/2022	20:26:49	RCNX0033		x				
Rapa iti	1	30/07/2022	18:13:40	RCNX0184.JPG	30/07/2022	21:28:16	RCNX1323	x					
Rapa iti	1	30/07/2022	21:29:20	RCNX1326.JPG	30/07/2022	21:32:23	RCNX1346	x					2
Rapa iti	1	30/07/2022	23:33:29	RCNX1347.JPG	30/07/2022	23:33:34	RCNX1351		x				
Rapa iti	1	31/07/2022	00:59:52	RCNX1353.JPG	31/07/2022	01:20:57	RCNX1415	x					
Rapa iti	1	31/07/2022	04:07:15	RCNX1415.JPG	31/07/2022	04:07:27	RCNX1463	x					
Rapa iti	1	31/07/2022	04:12:51	RCNX1469.JPG	31/07/2022	04:13:27	RCNX1495.JPG	x					
Rapa iti	1	31/07/2022	04:16:34	RCNX1503	31/07/2022	04:16:57	RCNX1509	x					
Rapa iti	1	31/07/2022	04:49:05	RCNX1530	31/07/2022	04:50:09	RCNX1535.AVI	x					
Rapa iti	1	31/07/2022	04:59:19	RCNX1545	31/07/2022	04:59:31	RCNX1555.JPG	x					
Rapa iti	1	31/07/2022	20:18:37	RCNX1650	31/07/2022	20:18:41	RCNX1655		x				
Rapa iti	1	31/07/2022	20:36:02	RCNX1657	31/07/2022	21:13:00	RCNX1826	x					
Rapa iti	1	31/07/2022	21:20:22	RCNX1827	31/07/2022	23:27:57	RCNX2149	x					8
Rapa iti	1	01/08/2022	03:35:40	RCNX2180	01/08/2022	03:36:07	RCNX2181	x					
Rapa iti	1	01/08/2022	04:03:16	RCNX2198	01/08/2022	04:07:04	RCNX2318	x					
Rapa iti	1	01/08/2022	04:33:22	RCNX2329	01/08/2022	04:34:47	RCNX2341	x					
Rapa iti	1	01/08/2022	05:20:58	RCNX2364	01/08/2022	05:21:58	RCNX2375	x					4
Rapa iti	1	01/08/2022	16:29:47	RCNX2446	01/08/2022	16:29:49	RCNX2448		x				
Rapa iti	1	01/08/2022	20:56:43	RCNX2457	01/08/2022	20:56:45	RCNX2459		x				
Rapa iti	1	02/08/2022	00:11:26	RCNX2460	02/08/2022	00:11:47	RCNX247		x				
Rapa iti	1	02/08/2022	05:05:16	RCNX2532	02/08/2022	05:05:53	RCNX2558	x					
Rapa iti	1	02/08/2022	05:08:24	RCNX2563	02/08/2022	05:08:33	RCNX2573	x					2
Rapa iti	1	02/08/2022	18:47:24	RCNX2670	02/08/2022	18:47:26	RCNX2672		x				
Rapa iti	1	02/08/2022	19:26:36	RCNX2673	02/08/2022	19:26:41	RCNX2680		x				
Rapa iti	1	03/08/2022	05:33:08	RCNX2758	03/08/2022	05:34:09	RCNX2772	x					1
Rapa iti	1	03/08/2022	19:37:47	RCNX2847	03/08/2022	N.A	N.A		x				
Rapa iti	1	04/08/2022	04:55:42	RCNX2906	04/08/2022	04:57:39	RCNX2935	x					2
Rapa iti	1	04/08/2022	05:00:13	RCNX2938	04/08/2022	05:05:00	RCNX2944	x					
Rapa iti	4	21/07/2022	17:56:41	RCNX0025	21/07/2022	17:56:43	RCNX0027		x				
Rapa iti	4	21/07/2022	18:50:32	RCNX0028	21/07/2022	18:50:34	RCNX0030		x				
Rapa iti	4	21/07/2022	20:01	RCNX0031	21/07/2022	20:14:58	RCNX0040		x				
Rapa iti	4	21/07/2022	21:12:48	RCNX0043	21/07/2022	21:18:08	RCNX0047		x				
Rapa iti	4	22/07/2022	01:31:30	RCNX0049	22/07/2022	01:31:32	RCNX0051		x				
Rapa iti	4	Abandon de l'analyse: juste des rats; déplacement caméra											
Rapa iti	4	26/07/2022	17:48:34	RCNX0007	26/07/2022	18:07:23	RCNX0018		x				
Rapa iti	4	26/07/2022	19:04:41	RCNX0022	26/07/2022	19:04:45	RCNX0027	x					2
Rapa iti	4	26/07/2022	19:48:12	RCNX0028	26/07/2022	19:48:20	RCNX0033	x					
Rapa iti	4	26/07/2022	19:59:43	RCNX0034	26/07/2022	20:32:12	RCNX0044		x				
Rapa iti	4	26/07/2022	21:45	RCNX0049	26/07/2022	21:45:26	RCNX0051		x				
Rapa iti	4	26/07/2022	22:21:49	RCNX0052	26/07/2022	22:25:39	RCNX0057		x				
Rapa iti	4	27/07/2022	00:18:46	RCNX0058	27/07/2022	00:18:48	RCNX0057		x				
Rapa iti	4	27/07/2022	01:29:16	RCNX0061	27/07/2022	01:29:18	RCNX0063		x				
Rapa iti	4	27/07/2022	12:46:41	RCNX0139	27/07/2022	12:46:43	RCNX0141		x				
Rapa iti	4	27/07/2022	13:26:55	RCNX0145	27/07/2022	13:30:18	RCNX0150		x				
Rapa iti	4	27/07/2022	17:57:33	RCNX0226	27/07/2022	17:57:35	RCNX0228		x				
Rapa iti	4	27/07/2022	18:36:32	RCNX0229	27/07/2022	18:38:13	RCNX0234		x				
Rapa iti	4	27/07/2022	18:50:06	RCNX0235	27/07/2022	18:54:41	RCNX024		x				
Rapa iti	4	27/07/2022	10:54:02	RCNX0251	27/07/2022	10:54:05	RCNX0255		x				
Rapa iti	4	28/07/2022	05:07:04	RCNX0316	28/07/2022	05:08:23	RCNX0324	x					1
Rapa iti	4	28/07/2022	12:35:11	RCNX0340	28/07/2022	12:35:13	RCNX0342		x				
Rapa iti	4	28/07/2022	17:43:29	RCNX0418	28/07/2022	17:44:55	RCNX0426		x				
Rapa iti	4	28/07/2022	19:40:00	RCNX0427	28/07/2022	19:40:02	RCNX0429		x				
Rapa iti	4	28/07/2022	20:44:04	RCNX0430	28/07/2022	21:17:51	RCNX0444		x				
Rapa iti	4	28/07/2022	22:06:44	RCNX0445	28/07/2022	23:18:09	RCNX0453		x				
Rapa iti	4	29/07/2022	10:39:08	RCNX0526	29/07/2022	01:50:00	RCNX0535		x				
Rapa iti	4	29/07/2022	17:55:21	RCNX0018	29/07/2022	17:55:22	RCNX0019		x				
Rapa iti	4	29/07/2022	18:52	RCNX0021	29/07/2022	18:52:12	RCNX0023		x				
Rapa iti	4	29/07/2022	19:40:55	RCNX0024	29/07/2022	19:41:03	RCNX0032	x					2
Rapa iti	4	29/07/2022	20:35:53	RCNX0033	29/07/2022	20:35:55	RCNX0035		x				
Rapa iti	4	29/07/2022	21:45:21	RCNX0036	29/07/2022	00:41:00	RCNX0044		x				
Rapa iti	4	29/07/2022	22:16:47	RCNX0045	29/07/2022	22:16:49	RCNX0047	x					
Rapa iti	4	29/07/2022	23:02:30	RCNX0048	29/07/2022	23:37:34	RCNX0056		x				
Rapa iti	4	30/07/2022	01:31:37	RCNX0057	30/07/2022	01:31:39	RCNX0059	x					1
Rapa iti	4	30/07/2022	01:44:21	RCNX0060	30/07/2022	01:44:23	RCNX0062		x				
Rapa iti	4	30/07/2022	10:38:12	RCNX0135	30/07/2022	11:20:24	RCNX0140		x				
Rapa iti	4	30/07/2022	13:19:34	RCNX0144	30/07/2022	13:19:36	RCNX0146		x				
Rapa iti	4	30/07/2022	14:51:56	RCNX0176	30/07/2022	14:52:28	RCNX0184		x				
Rapa iti	4	30/07/2022	15:24:46	RCNX0197	30/07/2022	15:24:50	RCNX0201		x				
Rapa iti	4	30/07/2022	16:36:54	RCNX0233	30/07/2022	16:36:56	RCNX0235		x				
Rapa iti	4	30/07/2022	18:20:07	RCNX0240	31/07/2022	02:40:00	RCNX0348		x				
Rapa iti	4	31/07/2022	04:50:25	RCNX0405	31/07/2022	04:50:32	RCNX0411	x					2
Rapa iti	4	31/07/2022	04:52:29	RCNX0414	31/07/2022	04:52:31	RCNX0416	x					
Rapa iti	4	31/07/2022	08:12:26	RCNX0435	31/07/2022	08:12:28	RCNX0438		x				
Rapa iti	4	31/07/2022	08:21:00	RCNX0441	31/07/2022	13:53:03	RCNX0496		x				
Rapa iti	4	31/07/2022	15:02:16	RCNX0525	31/07/2022	15:02:18	RCNX0527		x				
Rapa iti	4	31/07/2022	15:19:55	RCNX0537	31/07/2022	15:29:23	RCNX0545		x				
Rapa iti	4	31/07/2022	19:01:06	RCNX0579	31/07/2022	19:01:08	RCNX0581		x				
Rapa iti	4	31/07/2022	19:56:01	RCNX0590	31/07/2022	19:56:09	RCNX0590	x					4
Rapa iti	4	31/07/2022	22:22	RCNX0591	31/07/2022	22:22:15	RCNX0593	x					
Rapa iti	4	01/08/2022	00:36:36	RCNX0594	01/08/2022	00:36:38	RCNX0596	x					
Rapa iti	4	01/08/2022	00:40:36	RCNX0597	01/08/2022	00:40:38	RCNX0599	x					
Rapa iti	4	01/08/2022	04:05:47	RCNX0636	01/08/2022	04:05:49	RCNX0638	x					
Rapa iti	4	01/08/2022	10:31:07	RCNX0675	01/08/2022	10:31:16	RCNX0686		x				
Rapa iti	4	01/08/2022	11:19:14	RCNX0690	01/08/2022	11:19:16	RCNX0692		x				
Rapa iti	4	01/08/2022	12:41:43	RCNX0693	01/08/2022	12:45:11	RCNX0700		x				
Rapa iti	4	01/08/2022	13:18:58	RCNX0702	01/08/2022	13:19:00	RCNX0704		x				
Rapa iti	4	01/08/2022	14:12:46	RCNX0715	01/08/2022	14:12:48	RCNX0717		x				
Rapa iti	4	01/08/2022	14:32:13	RCNX0729	01/08/2022	14:32:15	RCNX0731		x				
Rapa iti	4	01/08/2022	19:20:46	RCNX0786	01/08/2022	19:20:58	RCNX0797	x					4
Rapa iti	4	01/08/2022	19:35:38	RCNX0798	01/08/2022	19:35:46	RCNX0806		x				
Rapa iti	4	01/08/2022	21:05:12	RCNX0807	01/08/2022	21:05:17	RCNX0812		x				
Rapa iti	4	02/08/2022	12:29:31	RCNX0807	02/08/2022	12:29:33	RCNX0890		x				
Rapa iti	4	02/08/2022	15:31:46	RCNX0933	02/08/2022	15:31:48	RCNX0935		x				
Rapa iti	4	02/08/2022	15:36:07	RCNX0938	02/08/2022	15:36:09	RCNX0940		x				
Rapa iti	4	02/08/2022	17:06:18	RCNX0972	02/08/2022	17:06:20	RCNX0974		x				
Rapa iti	4	02/08/2022	18:24:07	RCNX0978	02/08/2022	20:52:55	RCNX1019		x				
Rapa iti	4	03/08/2022	05:15:46	RCNX1090	03/08/2022	05:15:48	RCNX1092	x					1
Rapa iti	4	03/08/2022	09:50:24	RCNX1101	03/08/2022	13:21:42	RCNX1127		x				
Rapa iti	4	03/08/2022	15:33:52	RCNX1170	03/08/2022	15:34:06	RCNX1175		x				
Rapa iti	4	03/08/2022	17:35:25	RCNX1212	03/08/2022	21:26:17	RCNX1250		x				
Rapa iti	4	04/08/2022	07:51:08	RCNX1323	04/08/2022	07:51:18	RCNX1328		x				

## Raw data seabird absence/presence and numbers on each islet in April 2023

Karapoo rahi	07/04/2022	Tehani, Roberto, Kai'anu & Hiri	Kakikaki						5	terrier vides
			taketake		3					
			Tavake		1					
			Kea	<10	2	1				
			Eupo	10+	5					
Karapoo iti	07/04/2022	Tehani & co	SM4							KRSM1, KRSM Installation of
			Kea et Eupo	50+			1			KKSM3 - Installation
Tapiko	07/04/2022	Tehani & co	Eupo		5+	1	2			vu en montant installer le SA
Tauturau	07/05/2022	Tehani & co	Eupo			5				vu en recuperant le audiome
			Eupo		2	6				Q1
			Eupo			18		1		Q2
			Eupo			6	1			Q3
			Eupo		5	9				Q4
			Eupo			5			1	Q5
			Eupo	100+						Q6
			Kea	10+						
			taketake	5+						
			Tavake	5+						25 vide
			Kakikaki							flying around
Rapa iti	07/08/2022		Eupo	20+		2				Installation of
			Pararaki	5+						vu en montan
			Kakikaki							10+ vide
			Kakikaki							3 vu 00h30-3h
			Kakikaki							1GLS (n°8) inst
Rapa iti	21/07/2022	Tehani & co	Kakikaki						15+ vide, 4 occupé	Installation of
			Kakikaki	10+	1					5 cameras ins
Rapa iti	26/07/2022	Tehani & co	Kakikaki		8					4 même occupé+ 4 nouveaux
			Kakikaki		2					1 arrivé+ 2 tag
Tarakoi	29/07/2022	Tehani & co	Koru'e (GB)			1				1H de prospec
			Tavake	10+						
			Pararaki	50+						
Rapa iti	29/07/2022	Tehani & co	Kakikaki	10+						10+ entendu,ta
Tarakoi	01/08/2022	Tehani & co & cae mairie	Koru'e (GB)	5+						Plusieurs trou
Tauturau	02/08/2022	Tehani & co & cae mairie								Jour de netto
Rapa iti	04/08/2022	Tehani, Roberto et Pamela	Kakikaki						20+ vide, 8 avant trouvé	Vérification di
Rarapai	04/04/2023	Tehani, Rober 09:30	Eupo	5+	2	1				
			Noddi Brun (C5)	5+	3					
			Pararaki	5+	3					
			Kea	5+	2					
			Koru'e		2					en vol
			Kerereia (chevalier errant)		1					
Tauturau	05/04/2023		Taketake	10+						
			Tava'e		1					
			Eupo		1					
			Kermadec	10+				1		5 entendu dar
			Titi		1					
Rapa iti	10/04/2023		Eupo		2					
			Tava'e	5+						
			Taketake	10+						
			Pararaki		2					
Karapoo rahi	11/04/2023		Taketake	5+						
			Kea	10+						
			Kotokoto		1					vu dans l'herb
Tarakoi	13/04/2023		Koru'e					1		
			Noddi Brun (Goio)		1					
			Kermadec		1					flying

# Raw data for Koko survey

Date	Site	Code	Location	Vegetation	Area (ha)	Height (m)	Notes					
04/04/2023	ensoleil	RA43	Ruapai	estuaire	vég introduite	10940	15					
		RA44	Ruapai	zone érodée	forêt semi-sèche	111E5	15	1 coq				
		RA45	Ruapai	gouyavier		111E9	15					
		RA46	Ruapai	gouyavier, purau		12H	15	1 Kiko				
		RA47	Ruapai	gouyavier		134D0	15	2 Kiko				
		RA48	Ruapai	gouyavier		14H	15	2 Kiko				
05/04/2023		RA49	Ruapai	purau, gouyavier		15H10	15	3 Kiko				
		RA53	Ruapai			15E55	15	3 Kiko				
		RA28	Tevaitaurs	agriculture	bois de G	Zone agricole	ouvert	100 9430	2 Kiko	2 entendu	hors comptag	
07/04/2023		RA29	Tevaitaurs	lande	forêt semi-sèche	Zone érodée	ouvert	100 9450				
		RA30	Tevaitaurs	lande	forêt semi-sèche	Zone érodée	ouvert	100 104D5				
		RA32	Tevaitaurs	forêt semi-sèche	forêt semi-sèche			100 104E0				
		RA33	Tevaitaurs	forêt semi-sèche	forêt semi-sèche			80 114E5	2 Kiko	2 vu		
		RA71	Ahurei	Tevait savane érodée	forêt semi-sèche	ouvert		100 94E0	3 Kiko	3 vu	hors comptag	
08/04/2023		RA72	Tevaitau	savane érodée	forêt semi-sèche	ouvert	100 109H8	1 coq				
		RA73	Temokopuke	savane érodée	forêt semi-sèche	ouvert	100 10946	3 savanille	1 Kiko	1	hors comptag	
		RA74	Monogouta 2i	1er vallon	forêt humide	ouvert	100 114E9	1 savane	1 Kiko	1 vu		
		RA75	Monogouta 2i	2ème vallon	forêt humide	ouvert	100 114E2	1 Kiko	1 Kiko	1 entendu		
		RA76	Temokopuke 2 et Tokoroa	forêt humide	ouvert	100 12H	1 savanille	1 Kiko	1 vu		>100m	
		RA77	Monogouta 3ème vallon	forêt humide	ouvert	100 124E7	2 Kiko	2 entendu	1 vu		>100 m	
		RA77	Monogouta 3ème vallon	forêt humide	ouvert	100 124E9	1 savanille	1 Kiko	1		hors comptag	
08/04/2023		RA61	Ahurei - Pararaki				08E5	3 Kiko	1 entendu	>100 m		
		RA59	Ofanua	zone agricole	forêt secondaire		08E9	1 savanille	3 vu			
		RA60	Ofanua	zone agricole	forêt secondaire		100 94E8	1 Kiko	1 vu			
		RA58	Teaparene	pinus	ruaire		94E1	1 coucou de nz				
		RA64	Teaparene	forêt semi-sèche	jardin		100 114E2	3 savanille	1 Kiko	1 entendu	>100m	
		RA56	Teaparene	forêt semi-sèche	jardin abandonnés		1246	1 Kiko	1 vu		>100m	
10/04/2023		RA57	Pararaki	village	jardin	forêt second	ouvert	100 10948	1 Kiko	1 entendu		
		RA54	Hiri, 2ème val	maquis sommital	forêt humide	ouvert	100 0840	1 Kiko	1 entendu			
		RA86	Gapiri	Gapunc pinus	pinus	fermé		0 84E0	1 Kiko	1 entendu	>100 m	
		RA87	Gapiri	Gapunc lande envahie	pinus	forêt de nuag	ouvert	100 9415	5 Kiko	5 entendu		
		RA88	Gapiri	Gapunc	pinus	forêt humide	ouvert	70 104E8	1 Tawite	1 entendu		
		RA90	Gapiri	Gapunc	forêt humide	ouvert		70 11H	1 coucou de nz	1 entendu		
		RA92	Gapiri	Gapunc pinède	forêt humide	ouvert		114D8	1 Kiko	1 entendu	>100 m	
		RA93	Gapiri	Gapunc	Coconutie	forêt semi-hu	fermé	114E7	5 savanille			
		RA95	Hiri	Rive D	maricage	tarodièr	forêt semi-sèche	fermé	12E8	1 coucou de nz		
		RA96	Hiri	Rive D	bord de mer	forêt littorale		100 134E3	1 savanille			
10/04/2023		RA98	Monogouta	petit vallon	forêt humide		100 ?					
		RA02	Ahurei	agriculture	forêt second	Zone agricole	ouvert	70 134E6	1 Kiko	1 entendu	>100 m	
		RA03	Ahurei	agriculture	forêt second	Zone agricole	ouvert	70 13443	1 savanille	2 vu	1 entendu	
		RA04	Ahurei	agriculture	forêt second	Zone agricole	ouvert	70 144E3	2 Kiko	2 vu	1 entendu	>100 m
12/04/2023		RA39	Taunua	lande	pinus, G	forêt humide	100 12448	1 savanille	2 Kiko	2 entendu		
		RA104	Putakataka	crête	forêt humide		100 14E9	1 Kiko	1 vu		hors point	
13/04/2023		RA105	Konopea	crête	forêt semi-humide	< 1 ha	100 154E5	2 Kiko	2 entendu	>100		
		RA106	Putakataka	crête	forêt semi-humide	< 1 ha	100 164E7	1 savanille	1 Kiko	1 vu		

Appendix 2: Copy of the online article wrote by Tehani Withers for the Revelator.

<https://therevelator.org/protect-rapa-island/#>

# The Revelator

Wild, Incisive, Fearless.

An initiative of the Center for Biological Diversity

## Protect This Place: Rapa Island, Home of Rare Seabirds and Beautiful Forests

The most remote inhabited island in French Polynesia is the habitat for several rare indigenous plants and animals, but it's severely threatened by invasive introduced species.

### Voices

*April 22, 2022 - by [Tehani Withers](#)*

## The Place:



Rapa is the most southeastern island of the Austral Archipelago in French Polynesia. Ten islets, ranging in size from two to 64 acres, surround the main island, with a total land area of just 15.6 square miles (about 40 square kilometers). Rapa is sometimes called Rapa Iti, or “Little Rapa,” to distinguish it from Rapa Nui (better known as Easter Island). As of 2017 Rapa had a population of 507 people, a unique community that still follows old Polynesian traditions and speaks its own Polynesian language, Rapa. There are three main villages — Ahurei, Tukou and Area — all located around the central bay. It's the only island in the country that has a winter season, usually between May and October, when the temperature can go down to 37 degrees Fahrenheit (3 degrees Celsius). That



temperature difference is one reason there are seabirds and plants living here that don't live in other parts of French Polynesia.



Caption: Rapa Island, courtesy SOP Manu/BirdLife.

### Why it matters:

Rapa is a place of extraordinary biodiversity, with at least 300 endemic species. The main inhabited island has one terrestrial endemic bird species, the endangered Rapa fruit-dove (*Ptilinopus huttoni*, local name *Koko*), which is the country's largest fruit-dove.



White-bellied storm-petrel (Koru'e) ©Hadoram Shiria, used with permission.

Rapa Island is also a very important site for seabirds, with 11 species, mainly rare petrels, shearwaters and storm-petrels. Three species breeding on its uninhabited islets are now in danger of extinction: the Rapa's shearwater (*Puffinus myrtae* or more locally as *Kakikaki*), white-bellied storm-petrel (*Fregetta grallaria titan*) and Polynesian storm-petrel (*Nesofregetta fuliginosa*) —

the latter two locally named *Koru'e*. These species are very rare, difficult to observe, and of significant scientific interest. It's suspected that the Rapa's shearwater and white-bellied storm-petrel are endemic to this island — an exception among seabirds, who normally have large reproductive areas and breed in many different countries.

Rapa Island also has a unique human community. It was first settled by Polynesians, most likely in the 13th century. Their dialect developed into what is today the Rapa language. It's believed that the depletion of natural resources on the island resulted in warfare, and the inhabitants lived in up to 14 fortified settlements (*pa* or *pare*, a type of fort, similar to the Māori *pā*) on peaks and clifftops.

Contact with Europeans brought liquor and disease, and between 1824 and 1830 over three-quarters of the local population died. Peruvian slavers raided the island as well. When a handful of their victims were returned to the island, they brought smallpox, which caused an epidemic. In 1826 there were almost 2,000 inhabitants; forty years later, there were fewer than 120.

The independent island kingdom was declared a French protectorate in 1867 and formally annexed on March 6, 1881. Subsequently the local monarchy was abolished. But the Rapa Island community still follows the old traditional ways — even if it has a governing town hall and an elected mayor.

The land belongs to the community and their descendants, so it can't be bought by any exterior landowners. There is an elder council (*Tohitu*) that decides who the land goes to; if the land isn't used for more than two years it can be taken away and redistributed to another local that needs it. There is also a *Tomite Rahi* (leaders from different factions of the island — religious groups, fishermen, taro planters, school teachers, etc.) that decides on *rahui* delimitations (protected marine areas where people are not allowed to fish, to protect food resources in the long term). These groups are not recognized in France or French Polynesia governments, but on Rapa Island their decisions are law.



Making Taro “popoi,” beaten cooked taro with rocks and mixed with water from the river, a job mainly done by women. Often the sounds resonate in the village. They sing local songs to have a constant rhythm when beating. ©Tehani Withers, used with permission.



On the island almost every plant, bird and fish species has a unique local name. That's part of why it's so important to protect these species: If they were to be lost to extinction, Rapa's local community would also lose a part of its cultural heritage, which was already close to disappearing in the 1800s.

### **The threat:**

Due to its large number of uninhabited islets and remoteness, Rapa is an ideal site for the protection of endemic animals and plants. But they're threatened by invasive species.

Non-native species were introduced to Polynesia by humans and have profoundly altered the ecosystems where they settled. Invasive plants, for example, can gradually occupy a space and squeeze out local species. Other species can cause significant habitat destruction: Goats consume native plants and cause significant erosion, while predatory species like rats and feral cats directly attack chicks and eggs.

Threats to Rapa's flora and fauna have increased dramatically. Twenty years ago overgrazing and extensive degradation of the endemic forests was caused by the introduction of cattle, goats and horses. Now the invasion of strawberry guava (*Psidium cattleianum*) and Caribbean pine (*Pinus caribaea*) has worsened the situation. Introduced plants had already invaded 64% of the island in 2005, including most of the forested areas. A local environmental NGO, Raumatariiki, has tried to reverse the situation since 2012 by installing a fence around important native forest areas to prevent further grazing by domestic stock and setting up a native plant nursery. Further measures are needed to avoid this ecological disaster.



Raumatariiki staff cut strawberry guava around Rapa's endemic sandalwood tree — once thought to be extinct, rediscovered in 2020.



©Roberto Luta, used with permission. One of the last seven Rapa sandalwood trees in the world. © Tehani Withers, used with permission.

All offshore sites are affected by invasive grass species, especially *Comelina nudiflora* and *Melinis minutiflora*. These can form dense patches, restricting the growth of native endemic plants, which can consequently affect the breeding success of seabirds since they provide less protection against the weather conditions and make it more difficult for burrowing seabirds to nest.

Of the nine islets first surveyed in 2017, three are invaded by Pacific rats — a major problem for seabirds nesting in burrows or on the ground, as they eat chicks and eggs. Unstopped this will eventually cause the birds to disappear. For example, the Rapa shearwater population (a burrow-nesting species) has collapsed from 1,000 pairs in the 1990s to fewer than 200 pairs today.

The restoration of the important indigenous forest areas on Rapa main island and offshore islets are essential projects for the Polynesian Ornithology Society, or SOP Manu, and its partner BirdLife International. The disappearance of the *Koko* and these seabird colonies would constitute a significant loss of the Polynesian cultural heritage and undoubtedly serious damage to our environment.

### **My place in this place:**

I work for SOP Manu as an island restoration project manager, and my projects take place in multiple islands across French Polynesia. With the help of BirdLife International, I'm in charge of organizing restoration projects on uninhabited islets that are biodiverse or have populations of rare bird species. Rapa was of course identified as one of the hotspots, especially for seabird colonies. Since it's very remote, there have not been that many visits from scientists — for birds especially. The last ornithological work was done in the 1990s.



Tehani Withers on top of Tauturau islet.

In the background: Karapoo rahi and Tapiko islets, and the Rapa mountain/cliff named Makatea. Photo ©Roberto Luta, used with permission.

The first time I went onto Rapa was during school holidays in 2017, when I joined one of the special ship rotations for children of the island to go home for two weeks every six weeks. There's only one primary school on the island, so kids need to leave home when they're 11 years old for schooling.

To go there, you really need to be prepared. A week before, you have to send all your gear and food onto a ship named the Tuhaa Pae, take a flight to an island the ship will stop at before going on to Rapa, and then spend 36 to 48 hours at sea.

With a team of scientists from SOP Manu and BirdLife International, we had to survey the fauna and flora on 10 different islets. It was a lot of work — during very bad weather. The town hall lent us a very old small boat. Sadly, while we were camping, we lost it! The rope broke during the night due to tumultuous waves and it floated away. We had to have a team of locals come pick us up in a bigger boat. The scariest part was jumping off the islet into the waves to catch the buoy and be pulled onto it. Of course, BirdLife helped us compensate the loss of the boat with a new one, so we could continue to have a good relationship with the town hall and the local community.

The second time I went, during school holidays in 2018, everyone remembered me: “You were with the group who lost the boat!” I met more locals than I had the time before, as my role was to start training them on biosecurity: We'd discovered on the previous trip that ship rats were absent from the island, and we wanted to keep it that way. Again, it was super fun, but bad weather limited what we could do.

I thought then that if I wanted to do more, I'd have to spend more time on this island. With the president of Raumariki and my other colleagues from SOP Manu, we decided to form a team to do more work on the restoration project and applied for the Young Conservation Leadership Award.

I remember going for the third time in 2019, alone, to join Tiffany, Raumariki's president, and help her with the YCLA project for six weeks. At that time, I was in a slump because my SOP

Manu projects on other sites weren't working out. It had just been so discouraging to even be in this field. But the third trip saved me. I got to know more about Rapa and its local community, and it made me passionate about conservation again. Their involvement in our project and their views on nature are what I think of when I think of how our Polynesian society should be: protectors of our island resources for future generations and protectors of our cultural heritage.



Tehani explaining differences between rat species for biosecurity during a public meeting. ©Roberto Luta, used with permission.

I've returned three times since then. Each time I visit, people recognize me — they've kind of adopted me as their own bird expert. I'm often invited to village meetings and events. I get so much help from them, both in the field and when I'm staying in the village. They like to share everything, and if we walk around we never go home without a gift like fish, fruit or vegetables.

At each public meeting we organize to share our progress, a lot of people attend and give their opinions. In 2020, during my fifth time on the island with Raumariki, we brought school kids onto islets to see birds and onto the main island restored forest sites to remove invasive plants. I learned a lot of their culture and we helped kids know more about their birds and plants.

I'm now very attached to this community and this beautiful island, and I really hope I can continue to help them restore the sites. Each time we arrive, we get flower crowns; each time we leave we receive necklaces of local blue seeds (which means you will come back). Life on Rapa isn't perfect, and sometimes our visions clash with public opinions, but having the mayor, his employees and the *tohitu* (elder council) support our projects has made my experience a joy. I feel I've learned a lot more about the Polynesian way of life than during my lifetime in Tahiti, which has become modern and individualistic.

They probably won't read this, but *Tongia maitaki* (thanks a lot!) to everyone on Rapa Island. You're the best.

### **Who's protecting it now:**

Raumariki protects the environment and cultural aspects related to the nature of the community. They produce indigenous plants in their plant nursery, remove invasive plant species, and plan to restore important archeological sites such as fishing pools (*Paeka*) and forts (*Pa*). They're our local partners in protecting the birds of the island, so we train volunteers and staff to identify

birds and invasive species, as well as in biosecurity and related subjects. In exchange they help us communicate with the population and give us logistical support.

### What this place needs:

Funding is of course essential. Volunteers would be welcome, if they're ready to spend months in remote conditions. But paying someone local to oversee these tasks full-time would be ideal. We also need more scientific help in researching rare birds, their habits, and ways to protect them and restore their habitat. Some plant species, too, are so rare we just don't know how to produce them on a larger scale for replanting at restored sites.

### Lessons from the fight:

I've learned that the local community must be involved in conservation projects. Without their support, you can't effectively protect these sites in the long term. Even though community dialogue can slow down the projects — since there are always diverging opinions — you learn to adapt your methods. Having everyone working together is better for the future of the island's environment and for the future generations of these remote communities.

### Previously in The Revelator:



Tags: [Birds](#) | [Invasive Species](#) | [Protect This Place](#)



[Tehani Withers](#) is the island restoration project manager at SOP Manu (Ornithological Society of French Polynesia). She grew up in Tahiti Island (French Polynesia) and is from a multicultural family (part-Kiwi (NZ), Tahitian, French and Singaporean Indian). After high school she studied for six years in New Zealand at the University of Waikato, where she received her bachelor's and master's degrees with a focus on restoration ecology. Once she finished her master's on the Takahe (an endangered, flightless New Zealand bird) for the Department of Conservation, she volunteered for the Department and for various NGOs before being recruited by SOP Manu. That prompted her to go back home and work on French Polynesia's environmental issues, especially in remote islands such as Rapa, Marquesas, and south of the Tuamotu and Gambier archipelagos.

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### Appendix 3: Scientific reports written for SOP Manu & BirdLife.

Seabird report of 2022 (includes previous work done in 2021 for BirdLife – GLS tags on Rapa shearwater and installation of acoustic recorders)

## Seabirds of Rapa, Austral Is., French Polynesia: breeding 2022

**Tehani Withers & Roberto Luta**

avec la collaboration sur le terrain de Vehia Agnieray & Nathan Ye-On

et de Thibaut Chansac, Frédéric Jiguet & Jean-Claude Thibault



Partnership for  
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FOUNDATION

Studies of seabirds on Rapa Island were initiated by SOP-Manu in 2017. In 2022, we stayed on Rapa Island from the 28<sup>th</sup> of July until the 06<sup>th</sup> of August to visit islets and to advance the rat eradication project. One of the objectives on this project is to monitor the number and breeding of the endemic Rapa Shearwater, locally known as KAKIKAKI.

Acknowledgment: Nous sommes redevables envers la Mairie de Rapa, le Tohitu et le Tomite Rahi de l'île. Merci à la communauté locale pour votre aide sur le terrain. Merci aux enfants de l'île de s'occuper des oiseaux et de nous avoir ramené des oiseaux échoués lors de notre séjour. Tongia maitaki à la population de Rapa pour votre accueil.

### Methods

We landed on six islets to search and count breeding seabirds. Dates of visit are given in the table below. Coordinates of nests were recorded with a GPS. Count of gadfly petrels on Tautourau was done in six of the quadrats delimited in 2019. On Rapa iti, four nights were devoted: 1) to check with an endoscope occupied burrows by the Rapa Shearwater, 2) to install new geolocators (GLS), and 3) to recover birds equipped previously. We recovered data from the camera-traps installed several months ago and from audio-moths to record vocalisations of seabirds.

Motu	Date
Karapoo koio (iti)	4th July 2022 (by day)
Karapoo rahi	4th July 2022 (by day)

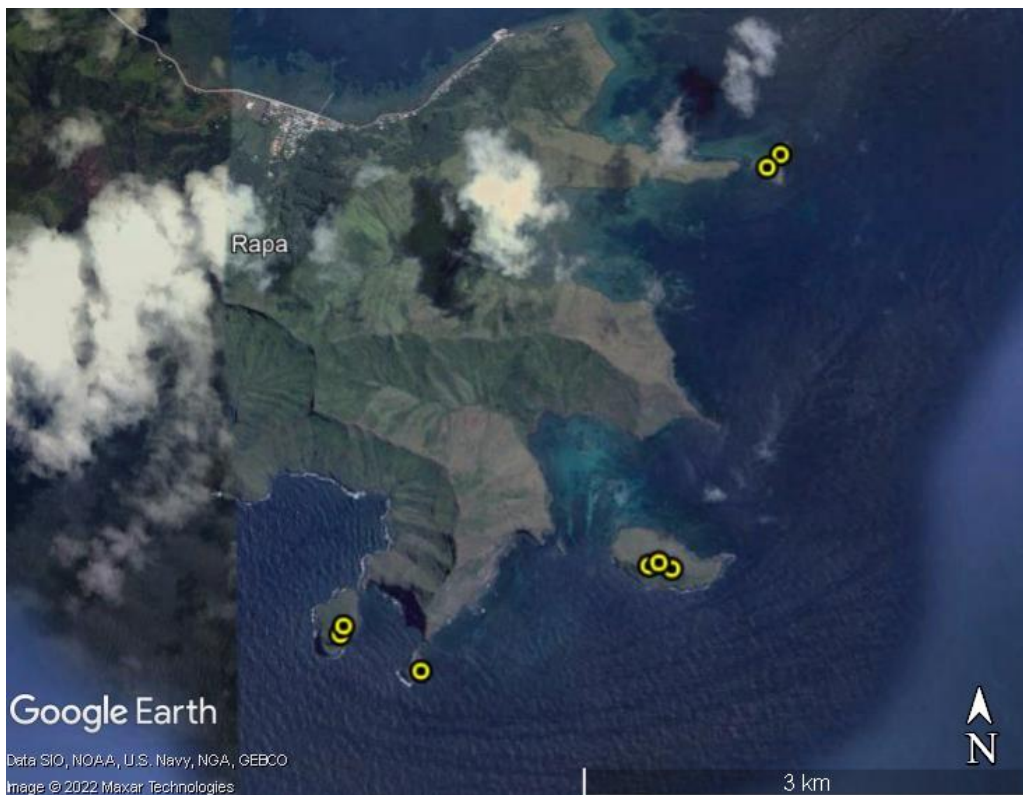
Rapa iti	8, 21, 26, 29 <sup>th</sup> July, 4 <sup>th</sup> August 2022 (by day and night)
Tapiko	4th July 2022 (by day)
Tarakoi	29th July, 1st August 2022 (by day)
Tauturau	5th July, 2 <sup>nd</sup> August 2022 (by day)

## Results

### Installation of audio-moths and equipment with geolocators (GLS)

We managed to pick up all the audiomoths installed in 2021, apart from the one in Rarapai (5 out of the 6). A number of 3 audiomoths were installed in Rapa iti, 1 on Tauturau, 1 on Tapiko and 1 on Rarapai in 2021. The data is currently being analyzed by Thibault Chansac.

In 2022, we installed 8 SM4 from WildLife Acoustics with battery boxes on the islets of Rapa, which would last much longer than the audiomoths. A number of 3 SM4 were installed on Tauturau, 2 on Karapoo rahi, 1 on Karapoo iti and 2 on Rapa iti. We could not install one other on Karapoo iti (2 was supposed to be installed), because the island is not easy to climb and we preferred to come again with a local later, but we were unable to because of the weather.



*Map of the location of the 8 SM4 installed on Rapa iti*

Table below indicates the information on the GLS. Unfortunately, the only GLS recovered this year has only worked 6 days after activation, did not bringing interesting

data. The manufacturer believes that the bird is diving deep and that the model W65 was not sufficiently 'waterproof'.

n° GLS	n° darvic ring	date of equipping	date of recover
BZ ?	08	08/07/2022	
BZ276	21	02/06/2021	
BZ277	18	---	
BZ278	90	26/07/2022	
BZ281	16	---	
BZ283	14	26/07/2022	
BZ285	11	02/06/2021	7/07/2022
BZ287	15	---	
BZ291	60	29/07/2022	
BZ292	12	02/06/2021	
BZ295	19	08/07/2022	

Information about the GLS. Two shearwaters equipped (in 2019 or 2021) were probably seen (08/07), but not caught, indicating the very small number of birds present on Rapa iti.

#### Control of strawberry guava grove on Tauturau

Since fifty years, growing and development of the introduced guava (*Psidium cattleianum*) could impede access to their burrows by the Rapa Shearwater and the Black-winged Petrel, using the same burrows at two different periods of the year. A day was dedicated to the clearing this grove around 30-40 burrows (02/08/2022).



*Strawberry guava control by the local community*

#### Comments on breeding seabirds

##### Phaethontidae

*Phaethon rubricauda* Paille-en-queue à brins rouges Red-tailed Tropicbird **tava'e**

Recorded on the following islets: Karapoo rahi (4/07: 1 ex.), Tauturau (5/07: 5 ex.), Tarakoi (29/07: 10 ex.).

Oceanitidae (very few storm-petrels were recorded, none on Tapiko, and we did not land on Rarapai)



*Fregetta grallaria titan* Océanite à ventre blanc White-bellied Storm-petrel **Kōrue**

No data; although at this period of the year, birds visit breeding sites only by night. One individual was found at night, at the Town Hall by Tehani Withers, which fell on the ground due to light pollution. It was captured as feral cats roam around the village. It was then released the next day.



*White-bellied storm-petrel found at the Town Hall at night*

*Nesofregetta fuliginosa* Océanite à gorge blanche Polynesian Storm-petrel **kōrue**

Tarakai: one incubating bird on 29/07 and five on 01/08.

Procellariidae

*Puffinus myrtae* Puffin de Rapa Rapa Shearwater **kāki kāki**

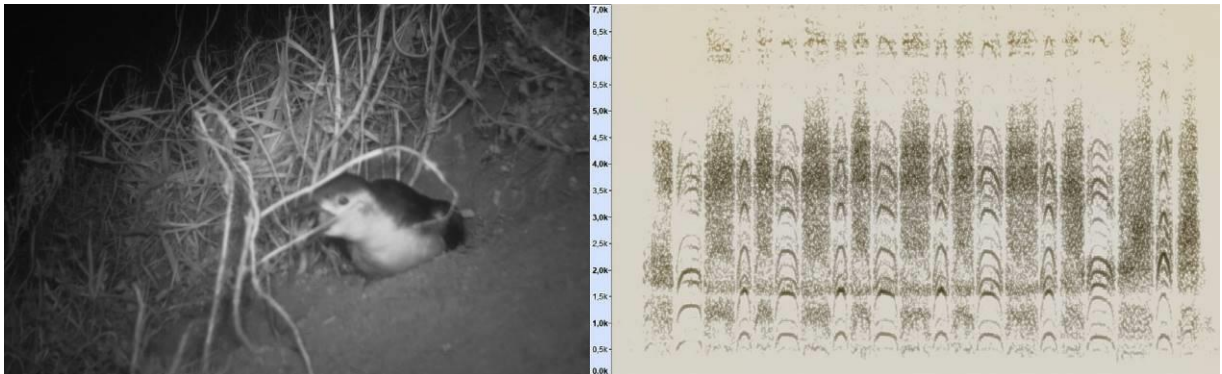
Data are given in the table below. Recorded in the three main breeding sites. A majority of burrows were empty. A maximum of 30 individuals calling together was recorded on 7<sup>th</sup> of July.

Date	Motu	empty burrows checked	occupied burrows with adult	max. n. of birds calling together in flight at night
04/07/22	Karapoo rahi	5	None	
05/07/22	Tauturou	25	None	
07/07/22	Rapa iti	10		No Moon: 22 heard at 4:37-4:59, 24 at 5:00-5:10, 30 at 05:15-06:30
21/07/22		15	4	
26/07/22		10 (other burrows)	4 (other burrows)	
29/07/22				10
04/08/22		20	8 (same burrows)	

*Contents of burrows on the three islets visited in 2022.*



26<sup>th</sup> July or 4<sup>th</sup> August, motu Rapa iti. Rapa Shearwater incubating its egg, photographed with the endoscope.



Left: 1<sup>st</sup> August 2022, 5h21 (motu Rapa iti), a Rapa Shearwater adult calling at the entrance of its burrow, photographed with an automatic camera. Right: sonogram of vocalization in flight, Rapa iti, July 2022.



3<sup>th</sup> August 2022, 19h37 (motu Rapa iti): A Polynesian Rat leaving the same burrow, photographed with an automatic camera.

*Puffinus nativitatis* Puffin de la Nativité Christmas Shearwater (no specific name in Rapa language)

No data obtained in 2022.

*Pterodroma neglecta* Pétrel des Kermadec Kermadec Petrel **ke'a**

Recorded on Karapoo rahi (less than 10 birds on 4/07, including one incubating); Karapoo koio (50 birds together with Murphy's Petrel on 04/07); and Tauturau (at less than 10 birds on 5/07).

*Pterodroma nigripennis* Pétrel à ailes noires Black-winged Petrel **titi**

No data in 2022, this species being absent from their breeding sites at this period of the year.

*Pterodroma ultima* Pétrel de Murphy Murphy's Petrel **e'upō**

Recorded on Karapoo rahi (more than ten birds), Karapoo iti 04/07 (50 birds grouped with Kermadec Petrel), Rapa iti (more than twenty birds, two incubating birds), Tapiko (five birds; one incubating bird and two chicks), and Tauturau (see Table below).

Quadrat n°	single or couple	Eggs	down chick (stage 1)	feathered chick (stage 2)	fledgling (stage 3)	eggs + chicks
Q1		5				5
Q2	2	6				8
Q3		18		1		18
Q4		6	1			7
Q5	5	9				9
Q6		5			1	5

Number of Murphy's Petrels of the different categories recorded in six quadrats on motu Tauturau.

Number of breeding birds in quadrats n°1-6 appears to be stable between 2019 and 2022. In this species, breeding is very seasonal; ratio of number of eggs is inverted between early July (beginning of egg-laying) and late August.

Dates	Eggs	Eggs + chicks
2019 (24-25 August)	4	47
2022 (5 July)	49	52

Comparison of breeding numbers in the quadrats (number 1 to 6) on Tauturau between 2019 and 2022; each quadrat measures 400m<sup>2</sup> (see localisation of the quadrats in the Report 2019)

Laridae (our visit was outside their breeding period)

*Anous stolidus* Noddi brun Brown Noddy **n'goio**

No record during our stay.

*Anous albivittus* Noddi gris Grey Noddy **pāraraki**

Recorded on Rapa iti (five birds on 08/07) and Tarakoi (ca. 50 birds on 29/07).

*Gygis alba* Sterne blanche White (Fairy) Tern **take take**

Recorded on karapoo rahi (three birds on 4/07) and Tauturau (five birds on 5/07).

### Conclusion

The conservation of seabirds on Rapa and their islets requires the removal of several introduced species and the restoration of habitats. Goats constitute a soil degradation factor leading to reduced opportunities for petrels and shearwaters to dig burrows; in the last two years they have been eliminated from Rapa iti, Karapoo iti, and Tauturau, main breeding sites of Rapa Shearwaters and Black-winged Petrels. The Polynesian Rats eradication from all the islets could occur during the year 2023, also opportunity to eliminate a cat introduced in Tauturau and observed at least twice in 2022. Lastly, the restauration of the vegetation of Tarakoi, one of the two main breeding sites of storm-petrels, is conducted by « Raumatariki » in collaboration with the « SOP-Manu ». This islet is invaded by two species of invasive introduced weeds (*Melinis minutiflora*) and (*Commelina diffusa*) which limit the reproduction of seabirds, causing the death of certain individuals who are entangled in it.

In Tarakoi, the coastal area invasive grass *Commelina* was cleared by the women of the village, and the men cleared the top of the island, to remove the *Melinis*. A number of 50 purau, fara and miro were planted (which were added to the hundred cuttings planted by Pamela Patira, the Raumatariki nursery and Tarakoi restoration manager). This was an opportunity for local people to observe the Polynesian storm petrels, some for the first time.



*Before & After picture of Tarakoi site; Team pictures of local working on Tarakoi*



Koko survey report (written in French for the Rapa Town Hall & the Rapa community)



**CONSERVATION  
LEADERSHIP  
PROGRAMME**

## Comptage du 'Koko' Ptilope de Hutton, endémique à Rapa en Avril 2023



Koko au village de Ahurei © Luta Robert.

**Tehani Withers<sup>1</sup>, Astrid Hoffman<sup>1</sup>, Robert Luta<sup>1</sup> & Pamela Patira<sup>2</sup>**

Rapport de mission réalisée entre le 3 et 12 Avril 2023

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### Introduction

Le Ptilope de Hutton, *Ptilinopus huttoni* est endémique de l'île de Rapa, nommé 'Koko' en langue Rapa.

En 1990, un recensement des Koko par une série de comptage de 30 minutes sur des points culminants situés au-dessus de 27 zones forestières de moins d'un hectare (19 zones) ou de plus d'un hectare (8 zones) avait été fait. Avec une densité moyenne de 0.94 individu / hectare dans les zones d'un ha (S.D.=0.69), les auteurs avaient estimé qu'un nombre de 274 (175-368) Koko persistait sur les 292 hectares considérés comme recouverts de forêt à l'époque (c-à-dire 292 x 0.94 individus).

Vingt-sept an après, en 2017, un recensement des Koko présents sur différents sites de l'île avait été effectué, lors d'une mission scientifique menée par la SOP Manu & BirdLife International. Caroline Blanvillain (SOP Manu) accompagnée de Pamela Patira (représentant l'ONG locale de conservation de la nature Raumatariki Rapa), ont pu visiter 19 des 27 sites de 1990 et réaliser un total de 50 points de comptage indépendants d'au moins 15 minutes effectués dans des zones situées en hauteur ou permettant une bonne visibilité de ces sites. En estimant le % de surface de chaque site couvert lors de cette mission, elles ont pu établir que seuls 160 (145-243) individus étaient encore présents en 2017. Un envahissement préoccupant des dernières forêts de l'île par le Goyavier de Chine, *Psidium cattleianum* était également constatés. Ces résultats suggéraient une diminution des effectifs du Koko de 57 % en 27 ans, soit une baisse de 33% de ses effectifs sur une génération pour une longévité estimée être de 16 ans – ce qui a amené à ré-évaluer son classement IUCN, de EN à CR.

En 2023, il a été décidé de refaire un inventaire sur la population du Koko, dans le cadre du projet de restauration financé par **Conservation Leadership Program**. En 10 jours de mission, 44 points de comptages ont été établis et 14 sites ont pu être revisités.

### Méthodologie :

Les Koko n'ont pas de territoire en particulier, donc les points de comptage de 15 min ont été accomplis sur les mêmes points qu'en 2017, dans les zones forestières de l'île (surtout sur des zones en hauteur et dégagées). Les zones forestières avaient été délimitées en 1990 par Thibault et Varney, mais la forêt a beaucoup évolué depuis, et certaines zones qui devaient être moins de 1ha sont maintenant envahies de goyavier de chine ou de Pinus des caraïbes. Dans la partie nord de l'île, les zones forestières ont énormément régressé dû à la présence des bœufs, chèvres et chevaux. Vu le temps imparti sur l'île et la météo changeante, il a été préférable de faire des points de comptage de 15 min uniquement, alors qu'en 2017, 20% des points de comptages avaient été fait jusqu'à 30 minutes (et leurs résultats à 15 puis 30 minutes comparés) afin d'établir le pourcentage d'oiseaux manqués lors des comptages les plus courts.

Puisque nous n'avons pas accomplis des points de comptage de 30 minutes comme en 2017, nous avons retiré le pourcentage de correction (16%) des comptages de 15 minutes effectués en 2017 pour estimer le nombre de Koko. Ainsi en 2017, 146 (119-208) Koko avaient été comptabilisé. Cependant, lors du comptage de 2023, trois observateurs scrutaient les zones prospectées alors qu'ils étaient deux en 2017.

### Résultats :

Un nombre de 140 Koko a été estimé à partir du nombre de Koko compté sur les 44 points de comptage de 15 min.

Tableau 1 : Résultat de la méthode de recensement des koko par cartographie (PC = points de comptage)

Zone	Prospection 2023	Nb de PC	% de la zone couverte	Nb de koko / 15 minutes	Koko hors PC	No de minimum de koko*	No moyen de koko**	No max de koko	No moyen de koko corrigé par le % de la zone couvert	No moyen de koko corrigé par le % des zones prospectées	Mini	Mini	maxi	Maxi



<b>Zones de plus de 1 ha</b>															
Teugarere-Tevaitaura	X	6	75	4	3	4	7	7	10		8		12		
Ahurei	X	4	60	8	0	8	8	8	14		12		16		
Hiri rive gauche (Gapiri Gapuna)	X	5	40	8	0	8	8	8	20		16		23		
Morogouta-Putaketake (Hiri RD)	X	9	50	10	2	10	12	12	24		20		28		
Putakioe - Namure – Kaimano	X	3	50	1	0	1	1	1	2		2		2		
Perau															
Kaipoa															
Ruapai-Akatanui	X	8	100	11	2	11	13	13	13		11		15		
<b>8</b>	<b>6 (75 %)</b>			42	7	42	49	49	83		104	69	86	96	120
<b>Zones de moins de 1 Ha</b>															
Poutu															
Ofairui – Pararaki	X	2	100	5	0	5	5	5	5		5		5		
1er vallon Hiri baie (Tevaitau)	X	1	100	5	1	5	6	6	6		5		6		
2e vallon Hiri baie (Gapiri)	X	1	100	2	0	2	2	2	2		2		2		
Vallon rive gauche Hiri baie															
Temokopuke 1	X	1	100	0	0	0	0	0	0		0		0		
Temokopuke 2	X	1	100	2	2	3	4	4	4		2		4		
Tokoroa	X	1	100	1	0	1	1	1	1		1		2		
Taunoa	X	1	100	1	2	1	3	3	3		1		3		
Koropera	X	1	100	2	0	2	2	2	2		2		2		
Namure 1															
Namure 2															
Kapitaga 1															
Kapitaga 2															
Ruatara															
Teoragi rive droite 1															
Teoragi rive droite 2															
Teoragi rive droite 3															
Mata															
<b>19</b>	<b>8 (42 %)</b>	<b>44</b>		18	5	19	23	23	23		36	19	30	24	38
<b>27</b>	<b>14 (52 %)</b>	<b>44</b>		60	12	61	72	72	106		140	88	116	120	158

\* correction de 0% + koko observés hors PC, mais effectivement présents

\*\* + nb koko obs hors PC si ce chiffre est supérieur

Nous avons moins de zones prospectées qu'en 2017 (moins de points de comptages), surtout dans les zones de moins de 1 Ha, mais nos résultats semblent indiquer que le nombre de Koko est assez similaire : 140 (116-158) en 2022 contre 146 (119-208) en 2017. Il y a tout de fois une légère baisse du nombre de Koko comparés aux chiffres estimés en 2017, et le nombre maximum de Koko est descendu à moins de 200 individus. C'est en partie dû au fait que nous n'avons pas pu visiter certaines zones de 2017 qui avait eu beaucoup de Koko, comme par exemple les zones de Poutu et Namure.

Un biais dans ces estimations a pu être introduit par la présence de trois observateurs simultanés en 2023 au lieu de deux en 2017, ce qui a sans doute permis de détecter plus d'individus malgré la période de 15 minutes qu'en 2017.

Il devient assez urgent de ré-établir les cartes de végétation, car l'habitat a régressé dans la partie Nord de l'île, alors que la zone autour des villages a été envahie par les forêts de Pinus des caraïbes et par le goyavier de Chine. Dans la partie nord de l'île, les zones forestières ont énormément régressé dû à la présence des bœufs, chèvres et chevaux.

De plus, en 2022, il y a eu de très grand feux de forêt qui a tout de même bien détruit une grande partie de la zone forestière indigène (juste en dessous de Perau, et autour du village de Tukou), ce qui va donc provoquer surtout le développement rapide de forêts envahissantes de goyavier de Chine et de Pinus de Caraïbes. Sans une carte à jour, il devient très difficile d'estimer correctement le nombre de Koko, puisque ce chiffre est dépendant du % de forêt indigène, et cette forêt en particulière a récemment régressé en hectares. Il n'est pas sûr que le Koko consomme les fruits et fleurs de goyavier de Chine, mais d'après les locaux et autres missionnaires, il a été observé qu'il mange les fruits de goyavier, et donc le nombre de Koko pourrait être sous-estimé.

Certaines zones ont été très difficiles à prospecter, vu que qu'elles étaient auparavant plus visitées pour l'agriculture, mais qui ont été maintenant abandonnés (Commentaire personnelle de Pamela Patira, qui a participé à le suivi du Koko en 2017). Ouvrir les chemins pour se rendre sur les hauteurs de l'île peuvent vraiment prendre énormément de temps aux équipes, surtout lorsqu'il y n'y avait que 10 jours sur Rapa pour accomplir le travail. Il faudrait donc plus régulièrement faire des suivies Koko (1x ans), pour maintenir les chemins dans ces zones de prospections et établir des points permanents de comptage de Koko.

Pour la population locale de l'île, il semble que le Koko soit en grand nombre, car beaucoup les observent régulièrement dans les villages, surtout lors de la saison des fruits en Nombre-Décembre (surtout dû à la présence de pommes, pêches et mûres). Il serait intéressant qu'il y ait un suivi régulier dans les villages, une activité qui serait en plus que les suivies dans les zones de forestières. Nous pourrions éventuellement proposer le suivi régulier du Koko dans le village d'Ahurei, comme activité scolaire pour les enfants de CM2, une fois les professeurs de l'école primaire formés. Par contre, il faudra bien communiquer à la population que même si le Koko semble être en grand nombre dans le village, cela ne veut pas dire que le Koko est en grand nombre sur l'île. En effet, le Koko n'a pas de territoires établis, et a déjà été observé plusieurs fois traverser des grandes parties l'île en vol, et de voler d'une baie à l'autre (ce qui peut rendre le suivi aussi difficile). Il est peut-être amené à fréquenter plus les villages vu la disparition de son habitat naturel.

Plus la forêt indigène régresse, plus la population de Koko risque de disparaître. Pour contrecarrer ce problème, la restauration de l'île est primordiale, surtout dans les zones brûlés : il faut dès que possible développer la pépinière de Raumatariki et commencer la restauration de ces sites en plantant des plantes indigènes, ou à la limite, des plantes fruitiers, qui sont aussi très prisés par le Koko (orangers, mûriers, etc.). Ce qui évitera aussi que les Koko viennent aux villages manger les fruits autour des habitations – car ces villages abritent aussi beaucoup de chats sauvages.



Figure 1 : Dégâts constatés du feu de forêt de Novembre 2022, ce qui repousse surtout sont les arbres de Pinus de caraïbes.

### **Conclusions et recommandations :**

En conclusion, un suivi du Koko a été accompli aux alentours de la même période que 2017 (Vacances scolaires d'Avril), soit 7 ans plus tard, mais avec un nombre moindre de points de comptage (44 vs 50 points de comptage). Alors que nous étions plus d'observateurs, nous avons trouvé qu'il y avait une légère diminution du nombre de Koko avec un nombre 140 individus estimés (minimum : 116 et maximum 158), qui pourrait être dû au fait qu'il y a eu moins de points de comptage qu'en 2017 et pas sur les mêmes sites exactement, ou résulter du fait qu'il y ait une régression très importante de la forêt indigène entre-temps.

En effet, il n'y a pas de cartes de végétation récente de l'île, surtout depuis les derniers feux de forêts de Novembre 2022, qui a été vraiment eu un effet dévastateur sur la flore de l'île ; la partie du nord de l'île étant envahis de bêtes sauvages et l'envahissement progressifs du Pinus de caraïbes et du Goyavier de Chine dans la forêt indigène de la partie sud de l'île, il se peut que ces effectifs calculés ne reflète pas exactement la situation de la seule population de Koko à Rapa.

Les recommandations pour la conservation du Koko seraient :

- D'accomplir un suivi du Koko lors de la saison chaude de Rapa (Novembre à Mars), car il semblerait que les Koko soient plus facile à détecter, surtout près des villages. Ou de former les enseignants de l'école primaire pour accomplir un suivi régulier 1x par an avec les enfants de l'île.
- Pour faciliter le comptage du Koko sur l'île, il faudrait des suivies plus réguliers (min 1x par an) avec les même points permanents de comptage de 2017.
- Continuer de développer la pépinière de Raumatariki à plus grande échelle, pour restaurer les forêts indigène brulées en Novembre 2022.
- Protéger les zones de forêts indigènes contre les animaux domestiques lâchés à l'état sauvage (chèvre, bœuf et chevaux au nord de l'île) via des enclos.
- Vu l'exploitation de Pinus qui a commencé en 2021-2022, après que ces arbres soient abattus, il faudrait soit replanter des plantes indigènes et ou à la limite des arbres fruitiers, pour que le Koko puisse continuer de se nourrir.
- Avoir une discussion avec la population sur le problème des feux non contrôlés, non seulement pour leur sécurité, mais pour le futur du Koko, espèce emblématique de Rapa.

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## Annexe 1 : Données comptage Koko 2023

jour	meteo	vent	Parcours	GPS	doublons	quel PC	VP	?	VP 30 min	lieu	Habitat 1	Habitat 2	habitat 3gm	Ouvert/ferm	Pourcentage	heure de déj	Habitat PC	durée	obs	espèce	koko	contact	distance	essence
				RA76						Temokopuke 2 et Tokoroa			forêt humide ouvert		100	12H				3 taketako 1 Koko 1 vu	1 ostende 1 vu		>100m	
				RA77						Morogouta 3ème vallon			forêt humide ouvert		100	12H27 12H29				2 Koko 1 Koko 1 taketako	2 ostende 1		>100 m	hors comptage
08/04/2023					3					Akeri - Pararaki						08H55				3 Koko 1 taketako 1 Koko	0 vu			
				RA61						Otaurai zone agricole			forêt secondaire		100	3H28				4 taketako 1 cocou de nz	1 vu			
				RA63B RA64	5					Teugarere Pinus rivière Teugarere forêt semi-sèche			jardins		100	3H51 1H02				3 taketako 1 Koko 1 Koko	1 cocou de nz 1 vu		>100m	
				RA65B RA65						Teugarere forêt semi-sèche Pararaki village jardin			jardins abandonnés		100	12H46 12H48				1 cocou de nz 1 Koko	1 ostende			
10/04/2023				RA84						Hiri, ter valc maquis sommital			forêt humide ouvert		100	08H03				1 cocou de nz 1 Koko 2 vu	1 ostende 2 vu		>10 m	
				RA85						Hiri, 2ème v maquis sommital			forêt humide ouvert		100	08H40				1 Koko 1 Koko 1 Koko	1 vu 1 ostende 1 ostende			
				RA86 RA87						Gapiti Gapu pinus Gapiti Gapu lande envah pinus			pinus fermé forêt de nua ouvert		0 100	8H50 3H15				1 Koko 5 Koko 1 Tsv's	1 ostende 5 ostende 1 ostende		>100 m	
				RA88 RA90 RA92 RA93						Gapiti Gapuna pinus Gapiti Gapu forêt humide Gapiti Gapu pinède Gapiti Gapu Z cultivée			forêt humide ouvert forêt humide ouvert forêt humide ouvert forêt semi-fermé		70 70 100 100	10H08 1H1 1H28 1H57				1 cocou de nz 1 Koko 5 taketako 1 cocou de nz	1 ostende 1 ostende 1 ostende		>100 m	
				RA95 RA96 RA98						Hiri Flve D maréage Hiri Flve D bord de mer Morogouta petit vallon			forêt semi-fermé forêt littorale forêt humide		100 100 100	12H55 13H35 ?				1 cocou de nz 1 taketako				
10/04/2023				RA002						Ahurei agriculture			forêt secon Zone agricc ouvert		70	13H06				1 Koko 1 coq 3 taketako	1 ostende		>100 m	
				RA003						Ahurei agriculture			forêt secon Zone agricc ouvert		70	13H43				1 juv taketako 2 Koko 2 Koko	2 vu & ostende 2 vu		>100 m	
				RA004						Ahurei agriculture			forêt secon Zone agricc ouvert		70	14H33				1 Koko 2 taketako 1 tau's	1 ostende			
12/04/2023				RA33						Taunoa lande pins, G			forêt humide		100	12H46				1 taketako 1 Koko	2 ostende		hors point	



Annexe 2 : Galleries de photos de mission Avril 2023



Figure 2 : Photos d'équipe sur le terrain

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**Address list and web links**

Protect this place: Rapa Island <https://therevelator.org/protect-rapa-island/>

Raumatariki Rapa Facebook page <https://www.facebook.com/raumatariki.rapa>

Société d'Ornithologie 'MANU' <https://www.manu.pf>