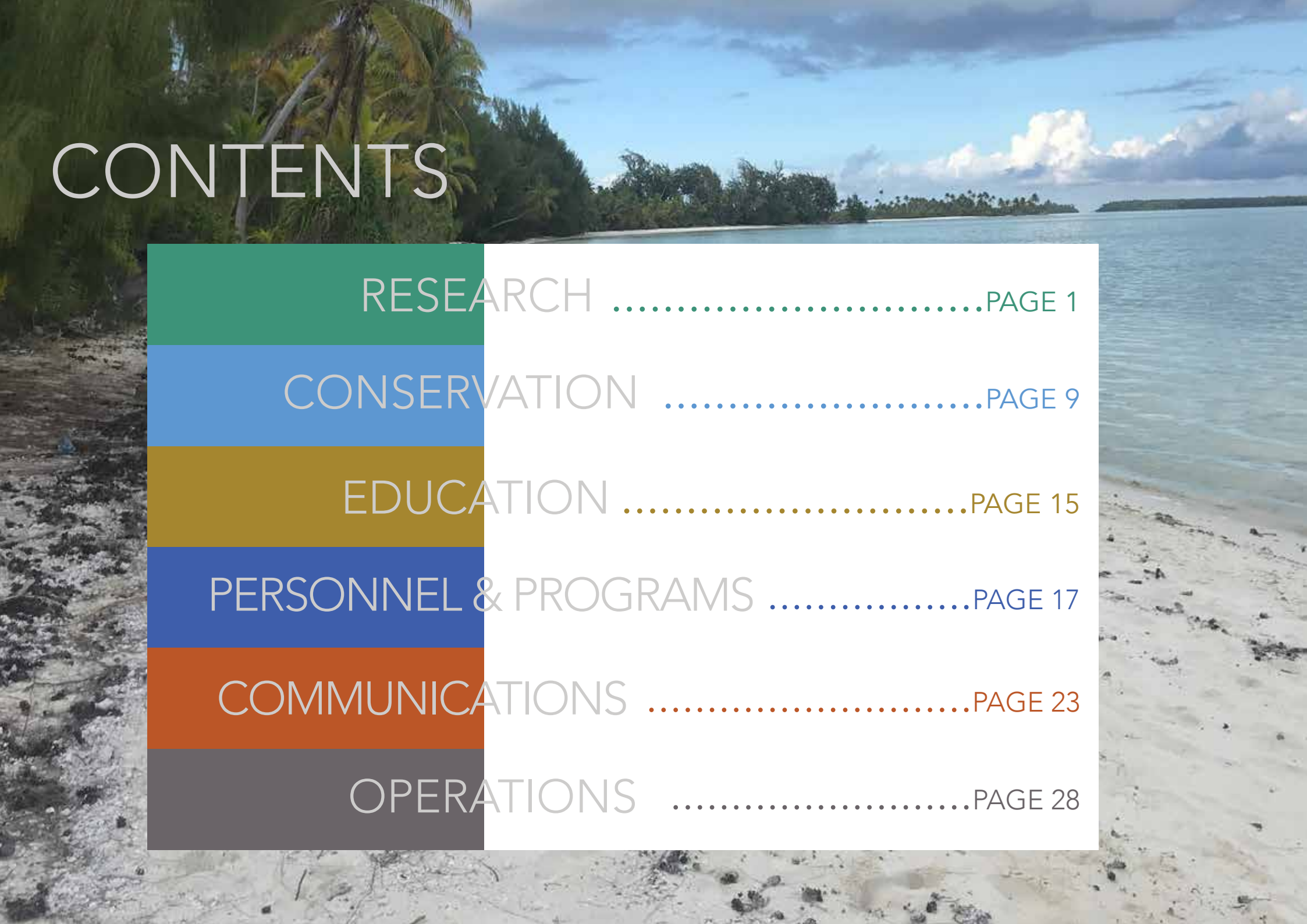
TETIAROA SOCIETY

2018 ANNUAL REPORT



CONTENTS

RESEARCH

It was an exciting year for scientific research on Tetiaroa.

Some of our on-going projects wrapped up this year (Lagoon Replenishment), some continued (Ocean Acidification), and some morphed into new projects (Mosquito Abatement). We added new projects as well; two of which (ARMS Recovery and Fish Gut Analysis) highlighted the huge advantage to researchers of the Moorea/Tetiaroa Biocode database to ID species.

As always the community of researchers who have worked here this year on all projects created a wonderful atmosphere of shared stories and wide-ranging interests.

Following is a summary of each of the key science programs we hosted or supported in 2018.

Managing Invasive Rats on Tetiaroa

"Results will inform the eradication plan for the whole Tetiaroa Atoll, as well as rodent eradication and biosecurity strategies for larger tropical islands.

Progress:

Fieldwork completed;
Data analysis underway.

Lead PI: James Russell

Project Leader: Araceli Samaniego

Project duration: November 2017 to December 2018

Project Abstract: Eradications of invasive rodents from tropical islands have a lower success rate compared to temperate islands. Understanding why is essential to improve our methods and hence increase the chance of eradication success. Tetiaroa is a great site to conduct research as there are two rodent invasive species present, several islands with different habitats, all three main groups of land crabs, low human disturbance, and the Ecostation.

The main questions are:

1) Do all rodents eat bait at the same rate regardless their age, reproductive condition and habitat?
2) Do reproductive females behave or eat differently than non-reproductive individuals?
3) Where do rats nest when the ground is dominated by land crabs?
4) Can we deter crabs from eating bait?

Funding: Auckland University, Island Conservation, Royal Society for the Protection of Birds, Tetiaroa Society

Ocean Acidification and Climate Research on Tetiaroa

"We will continue our research effort to determine rates of calcification, dissolution, photosynthesis, and respiration on a variety of spatial scales within Tetiaroa Atoll

Progress:
Fieldwork completed;
Data analysis underway.

Lead PI: Julian Sachs, University of Washington
Additional PI: Anton Eisenhauer, GEOMAR – Helmholtz Centre for Ocean Research Kiel
Additional PI: Bradley Eyre, Southern Cross University
Additional PI: Alexander Chess Gagnon, University of Washington
Additional PI: Casey Saenger, University of Washington
Project duration: January 1, 2014 to December 31, 2019
Project Abstract: We will continue our research effort to determine rates of calcification, dissolution, photosynthesis, and respiration on a variety of spatial scales within Tetiaroa Atoll by deploying in situ sensors that will continuously measure pH, O2, salinity, temperature, and depth. We will combine these analyses with discrete water samples collected on a twice-daily basis for the measurement of alkalinity, DIC and nutrients. Independent measurements of carbonate dissolution in lagoon sediments will be measured with benthic chamber deployments. Short borings of coral (~45 cm in diameter) will be collected for the analysis of stable isotopes and trace elements in an effort to reconstruct historical climate variations. Precise measurements of land and reef heights will be measured with GPS systems for the determination of sea level variations.
Funding: Private donor to the Univ. of Washington

Investigating the Ecology of Reef Sharks in Tetiaroa

Society Islands, French Polynesia: Year 3

"Coastal nurseries are critical for the development of juvenile sharks...

Project duration: August 1, 2014 to December 31, 2018

Project Abstract: Coastal nurseries are critical for the development of juvenile sharks, such as blacktip (Carcharhinus melanopterus), and sicklefin lemon sharks (Negaprion acutidens), which are the most common shark species in the waters of French Polynesia. In the pristine lagoon of Tetiaroa, several nurseries have been previously identified during field missions conducted by CRIOBE (Centre de Recherche Insulaire et Observatoire de l'Environnement/EPHE Perpignan, France). However, little is known about the abundance and spatial and trophic ecology of the shark species using these nurseries. Thus, in August 2014, we initiated a pilot research project in partnership with CRIOBE and the Tetiaroa Society aimed at understanding: 1- the spatial and temporal dynamics of juvenile reef shark species in their nursery habitats of Tetiaroa; and 2- their trophic ecology. During our pilot season and second year (2015), we focused primarily on achieving objective 1 through a combination of drone transects and underwater videography. In year 3 (2016), we returned to Tetiaroa to continue exploring the spatio-temporal dynamics of reef sharks in nurseries while also addressing their trophic ecology. During this visit, we examined elasmobranch communities inside the atoll using baited remote underwater videos (BRUVs, for sharks) and, for the first time, captured reef sharks as part of a capture-mark-release effort to estimate numbers. The results of our work thus far have helped to reveal the status and ecological roles of reef sharks in Tetiaroa and, just as importantly, set a baseline for further monitoring and comparison with other French Polynesian systems. This year (2017), we wish to continue using BRUVs to monitor shark presence and behavior in Tetiaroa's lagoon, and will also be using 360 degree underwater cameras to explore sources of bias associated with cameras with a more limited field of view.

Funding: Gift to the University of Washington College of the Environment (from the Seeley family)

Progress:

Fieldwork completed;
Data analysis underway.

Metabarcoding Fish Gut Content on French Polynesia Reefs

"In the present project, we plan to employ fish gut content metabarcoding with next-generation sequencing on fishes collected around Moorea and Tetiaroa

Co-PIs: Jordan Casey (EPHE, Smithsonian), Chris Meyer (Smithsonian), Serge Planes (CNRS, EPHE), Valeriano Parravicini (EPHE)

Project duration: October 2018 to November 2018

Project Abstract: Coral reefs harbor the highest levels of diversity in the ocean, but anthropogenic stressors such as climate change are leading to unprecedented biodiversity losses. In order to understand the effects of such losses, it is essential to disentangle species functional roles on coral reefs. Yet, we have a paucity of information on trophic relationships among species on coral reefs, and in particular, Indo-Pacific food webs have been over-simplified and poorly studied. One way to examine trophic interactions among species is to conduct dietary analyses. However, the most commonly employed techniques to examine diet, gut content analysis and stable isotope analysis, do not provide adequately high taxonomic resolution to assign species-specific trophic pathways in complex food webs such as coral reefs. Recent advances in molecular techniques have made metabarcoding, the mass amplification of DNA barcodes from samples containing a multitude of eukaryotes, an accessible and invaluable tool. Further, French Polynesia provides a unique opportunity for fish diet analysis due to the existence of an extensive DNA-barcode library (Moorea BIOCODE barcode library), which contains barcodes of the vast majority of marine organisms around Moorea. In the present project, we plan to employ fish gut content metabarcoding with next-generation sequencing on fishes collected around Moorea and Tetiaroa, French Polynesia across a wide array of trophic guilds. With this technique, we be able to pinpoint detailed, species-level trophic assignments that considerably supersede traditional, broad-scale trophic assignments (e.g. herbivores, corallivores, invertivores, etc) and demonstrate the efficacy of utilizing metabarcoding for food web reconstruction. Ultimately, this study represents a large-scale effort to metabarcode the gut contents from fishes from Moorea and Tetiaroa, with the goal of constructing the highest resolution food web currently available for coral reefs.

Funding: Sponsor: BNP Paribas

Progress:

Fieldwork completed;
Data analysis underway.

ARMS Recovery

"ARMS have become a standard for monitoring marine biodiversity and creating comparative baselines for marine communities...

Progress:
Fieldwork completed

Lead PI: Chris Meyer (Smithsonian)

Additional PI: David Liittschwager (National Geographic), Sarah Tweedt (Yale University),

Project duration: October 2018 to November 2018

Project Abstract: Autonomous Reef Monitoring Structures (ARMS) will be recovered after having been deployed for three years on both Moorea and Tetiaroa to compare the biotic assemblages between high island and low island reef communities. ARMS have become a standard for monitoring marine biodiversity and creating comparative baselines for marine communities particularly those associated with coral reefs, with now close to 2500 deployed worldwide. Because of the previous Moorea Biocode Project, ARMS from Moorea in particular are the best characterized marine communities among global sites. This trip will recover 6 ARMS from each of Moorea and Tetiaroa that have been soaking for three years, the standard deployment duration. Prior studies of ARMS on Moorea were for only one or two year deployments, and previous ARMS from Tetiaroa were displaced by storm events. Moreover, because both Moorea and Tetiaroa were deployed contemporaneously, we can directly compare recruitment period through the recovery process post-COTS.

Funding: Smithsonian Institute

Density-dependence in Field Populations of Aedes Aegypti and Aedes polynesiensis

"This study aims to characterise density dependence in Aedes mosquitoes to inform policies relevant for mosquito borne disease control.

Progress:

Fieldwork completed;
Data analysis underway.

Lead PI: Herve Bossin (Institute Louis Malarde)

Additional PI: Neil Davies (UC Berkeley), Katherine Heath (Oxford University)

Project duration: September 2018 to October 2018

Project Abstract: Aedes mosquitoes are vectors of diseases including dengue, chikungunya and Zika which present enormous global health problems. Both Aedes aegypti and Aedes polynesiensis are endemic in French Polynesia and can act as vectors of disease. In order to properly inform public health policy and vector control, models of mosquito population dynamics must accurately capture mosquito ecology. This study aims to characterise density dependence in Aedes mosquitoes to inform policies relevant for mosquito borne disease control. The objective of the research is to understand crucial components of Aedes mosquito ecology across a microhabitat gradient. The research will investigate the association between Aedes larval density and Aedes larval development in multiple microhabitat locations. Preliminary laboratory experiments at the University of Oxford have demonstrated that environmental conditions - particularly resource availability - are crucial components of the density dependence process. Therefore we expect that the association between larval density and larval development will depend upon microhabitat conditions.

Funding: Sponsor: Tetiaroa Society

IDEA Tetiaroa Island Digital Ecosystem Avatar

"...our IDEA will empower people worldwide to engage in the health of their local communities, strengthening the resilience of their ecosystems and enhancing the well-being of all their citizens.

Progress:

Tetiaroa Biocode coupled to Moorea Biocode:

- Most species identified,
- Genetic data captured.

LiDAR mapping of the island is complete.

Lead PI: Neil Davies, University of California, Berkeley
Additional PI: Sally Holbrook, University of California, Santa Barbara
Additional PI: Serge Planes, CRIOBE
Additional PI: Russell J Schmitt, University of California, Santa Barbara
Additional PI: Matthias Troyer, ETH Zurich (Microsoft)
Project duration: January 1, 2014 to November 1, 2020

Project Abstract: Our key goal is to predict how biodiversity, ecosystem services, and society on the islands will co-evolve over the next several decades, depending upon what actions are taken. This goal is critical to many, if not most places on Earth, but thanks to its relatively small size and extraordinarily well-described biota, Tetiaroa provides a wonderfully tractable model to show such a goal is attainable.

Specifically, we will ask:

What is the physical, biological, and social state of the island system today? How did it get to this point? What is its future under alternative scenarios of environmental change and human activity? We will address these questions by building a sustainability simulator: a place-based data science infrastructure and computational platform for scenario-based planning. It will inform Tetiaroa's "Conservation and Sustainable Use Plan" (CASUP), helping to model the complex links and feedback loops between the environment, biodiversity, and human activities across a coupled marine-terrestrial landscape. The avatar technology will be broadly applicable to islands in general. For researchers, it will highlight data needs and help generate new hypotheses. For communities, it will illuminate the consequences of different management actions under alternate environmental scenarios. Ultimately, we seek to emulate at the ecosystem level P4 Medicine - the Predictive, Preventive, Personalized, and Participatory approach to human health that has revolutionized the biomedical field. In a similar way, our IDEA will empower people worldwide to engage in the health of their local communities, strengthening the resilience of their ecosystems and enhancing the well-being of all their citizens.

Duration: Sep 1, 2016 - Jun 30, 2017
Amount: $50,000

CONSERVATION

"This relevant achievement will inform future eradication programs, and produce important data for modeling ecological change on tropical islands.

This year in conservation began with the record numbers of green sea turtles nesting on Tetiaroa beaches. The 2017-18 turtle season produced the highest number of nests and hatchlings since Te Mana o Te Moana began keeping records in 2007. All of this points to a steady recovery for green sea turtle populations in the region, which is of course very good news.
Habitat Restoration took center stage this year with a successful eradication of rats on Motu Reiono, the addition of a University of Washington seabird population study, and a very successful workshop with world-leaders in this field.

Habitat Restoration on Reiono

"This relevant achievement will inform future eradication programs, and produce important data for modeling ecological change on tropical islands.

Progress:

Project completed

Applicant: Neil Davies, University of California, Berkeley
Additional PI: Araceli Samaniego, University of Auckland
Additional PI: James C Russell, University of Auckland
Additional PI: Richard Griffiths, Island Conservation
Additional PI: Frank Murphy, Tetiaroa Society
Project duration: December 1, 2017 to December 20, 2018

Project Abstract: A research project seeking to expand our knowledge of Rattus exulans basic population biology with specific regard to diet and breeding was undertaken on tropical Reiono Island (22 ha), Tetiaroa Atoll. The one-year project included five field trips for data collection and rat eradication planning, a bait consumption placebo trial, and an experimental eradication using moderate bait application rates of brodifacoum bait (2 applications of 16 kg/ha, one week apart). Over four months after baiting, both formal (island-wide survey and statistical modelling) and casual monitoring (observations of other scientists) indicate eradication success. This is a relevant achievement, as the operation encountered many of the factors associated with eradication failure on tropical islands. This will inform future eradication programs,and produce important data for modeling ecological change on tropical islands. It will also inform the use of Tetiaroa as a sanctuary for the re-introduction of endangered bird species such as the Tuamotu Sandpiper and the Blue Lorikeet.

Funding: University of Auckland, Royal Society for the Protection of Birds, Island Conservation, Tetiaroa Society,

Baseline Seabird Study on Tetiaroa

"...a baseline for the demography and health of Tetiaroa's seabirds is timely. oastal nurseries are critical for the development of juvenile sharks...

Co-PIs: Beth Gardner, Julia Parrish, Sarah Converse, University of Washington

Project duration: October 2018 to December 2020

Project Abstract: Seabirds are an ecological grouping of avian species that are highly threatened worldwide (Sydeman et al. 2012) due to a multitude of issues, including fisheries bycatch, rising sea levels, marine pollution, invasive species, and off-shore wind energy development. Plastic pollution is increasingly viewed as a risk to marine life, including seabirds (Ryan 1987). The goal of our project is to update the baseline information on the demography and health of seabirds on Tetiaroa. The Tetiaroa Society is actively engaged in rodent eradication as one means to improve seabird habitat. To assess the success of these efforts and inform conservation plans, a baseline for the demography and health of Tetiaroa's seabirds is timely. We propose to build on and extend the work of Russell and Faulquier (2009) and Faulquier (2013) to establish comprehensive baseline information, including population estimates and breeding status of seabird species on each of Tetiaroa's motu.

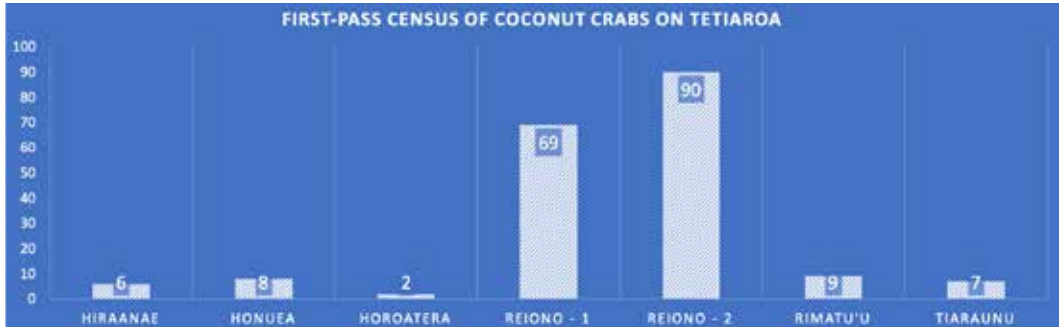
Funding: Private donation to University of Washington.

Progress:

First field season (Oct-Nov 2018) completed.

Coconut Crab Monitoring

"We will visit 3 motu every month to document and better understand the reproductive cycle of kaveu in this area of the Pacific.



Lead PI: Cécile Gaspar (Te Mana o Te Moana)

Additional PI: Quentin Genet (Te Mana o Te Moana)

Project duration: September 2018 to May 2019

Project Abstract: A study in 2017 by the NGO Te mana o te moana established the first estimation of the population of coconut crab, *Birgus latro*, on Tetiaroa atoll. During this second study, we will visit 3 motu every month to document and better understand the reproductive cycle of *kaveu* in this currently undocumented area of the Pacific. This study will be baselined on the density of *kaveu* on the one motu where rat eradication will occur during the next year, which will enable us to monitor juvenile density. For larger kaveu we may use another, more permanent marking process (cold marking) in order to better understand their movement patterns. Beaches will be monitored at night to observe larvae climbing back inshore, and to observe the movement of adult crabs. Crabs during their molting periods will be monitored using non-invasive methods such as motion activated cameras and reproduction phase -mating

Funding: Foundation Prince Albert II of Manaco, The Brando, Vilebrequin, Hinerava, Air Tahiti Nui, IFBD, Van Oord, Tetiaroa Society, Direction of the Environment in French Polynesia

Progress:

Fieldwork completed;
Data analysis underway.

Green Sea Turtle Nesting Monitoring

"The turtle program is a long-term monitoring project which shows pluriannual trends over a 15 year period, and its outcome will be used as a model for monitoring programs in other South Pacific countries.

Progress:

Monitoring of 2018-19 season underway.

Applicant: Cécile Gaspar (Te Mana o Te Moana) **Project duration**: September 2018 to May 2019

Project Abstract:

A -Research on the adult population.

Research and monitoring of green sea turtle nesting on Tetiaroa atoll is reaching its 12th consecutive year of study. This program is part of a larger program developed by the Direction of Environment in French Polynesia. This new phase will help confirm the 3-year annual cycle for female nesting, as well as identify the preferred nesting sites on the atoll. The new photo identification program of each female in addition to flipper tagging will be key to a better understanding of their inter-annual nesting frequency. Genetic samples and size measurements are also taken on each individual. To date, over 150 individuals have been identified.

B -Research on eggs and hatchling survival rate.

Over 2000 nests have been inventoried to date, using new, high-end technology for the localization of the nests, leading towards a better understanding of the parameters and the flooding risks.

It will include key data of the incubation temperatures of the nests, which is crucial in determining the sex ratio of the hatchlings, within the global context of climate change. (If incubation is higher that 28,5°C – to be confirmed- the nest produces 100% females). Hatchling success and protection of babies is the second key component of this program, aimed at increasing the survival rate.

Rate of predation monitoring was developed this year. It involves teams making nightly observations, and includes the use of infra-red cameras. After hatching, each nest is excavated. Deformed hatchlings, weak, dehydrated, or injured babies are transferred to the Moorea Sea Turtle Clinic. The project aims to have team of biologists present for rounds every night on 3 of the main nesting motu (Tiauraunu, Horoatera and Onetahi), comprising a shoreline of 10 kilometers. The turtle program is a long-term monitoring project which shows pluriannual trends over a 15 year period, and its outcome will be used as a model for monitoring programs in other South Pacific countries.

Funding: Foundation Prince Albert II of Manaco, The Brando, Vilebrequin, Hinerava, Air Tahiti Nui, IFBD, Van Oord, Tetiaroa Society, Direction of the Environment in French Polynesia

Lagoon Fish Replenishment

"Overall, the implementation of this project is part of a responsible approach to management of the resource in the context of sustainable development...

Progress:
Program completed

Applicant: David Lecchini CRIOBE

Project duration: November 23, 2015 to November 29, 2018

Project Abstract: The present project planned over 3 years to replenish the Tetiaroa lagoon by rearing and releasing fish and crustaceans caught at post-larval stage. The marine post-larvae will be caught using nets set up on the reef crest of Tetiaroa. The post-larvae will be kept in aquarium at Tetiaroa research center in cages or in the lagoon between 1 to 3 months according to species, and then released in the lagoon of Tetiaroa. Released fish and crustacean will be tagged by external tags or implantations of magnetic bars in the flesh of fish and crustaceans. This tagging will allow to estimate, several months after being released, the proportion of marine post-larvae raised involved the adult stock of fish and crustaceans at Tetiaroa. The replenishment of fish and crustacean will be conducted in the different parts of the Marine Protected Area at Tetiaroa. Overall, the implementation of this project is part of a responsible approach to management of the resource in the context of sustainable development on Tetiaroa and is part of The Tetiaroa Sustainable and Conservation Plan

Funding: Mission Blue, Sylvia Earle Alliance

EDUCATION

"...an Education Program to teach school children about the nature and culture of Tetiaroa and sustainable development.

Tetiaroa Society created an Education Program to teach school children about the nature and culture of Tetiaroa and sustainable development. In 2017, TS worked with teachers and administrators to create online modules in English and French for teachers to use in their classrooms and developed programs to use in the field. Starting in March of 2018 TS began hosting one group or classroom per month on the island. These field trips are generally 4 to 5 days in length and the groups can be up to 30 in total. Most of the groups are young children from 8-17 with their teachers, but we also welcome university students, and groups of teachers that come to develop curricula on sustainable development. Students are accompanied by teachers and assistants and TS provides a coordinator/teacher and a cultural expert.

Achieved through cooperation

"As we write this report, the schedule for school groups for 2019 is already full, promising another year of adventures in learning.

Following generous donations this year, TS was able to purchase large tents that gave us the capacity to house groups outside of the ecostation. Excellent cooperation from the owners and management of The Brando allowed us to transport, feed, and teach these groups safely and comfortably on the island. Over the course of this year TS hosted 11 groups as part of the Education Program. These groups included grade school to high school classes from Tahiti and Moorea, groups of local teachers and educators working on curriculum, and one field course from Flathead Valley Community College in Montana, USA. In all TS hosted 165 students and 61 teachers/adults for 862 user days.

PERSONNEL & PROGRAMS

"We are only as good as our people, and we have a fabulous team!

Executive Director

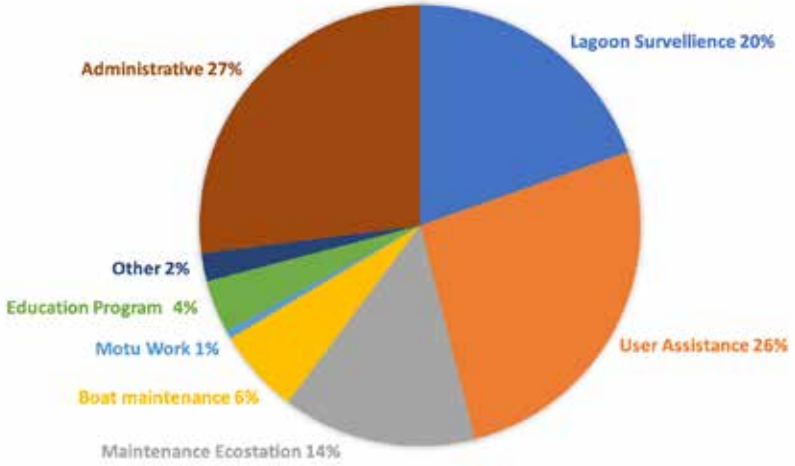
Frank Murphy continued as Executive Director of TSFP. His duties include: overseeing the Guide Program, the Ranger Program, all administrative issues, human resources, accounting, communications, and developing and managing CASUP programs. He also interfaces with guests of The Brando, does lectures, and occasionally guides tours. He works on the island and also out of a home office on Moorea.

Ranger Program

"TS Rangers are multi-taskers: they manage and maintain the Ecostation, host users, assist scientists in the lab and in the field, drive the boats, assist the Education Coordinator, maintain the boats, do trail work, and do administrative work... Whew!

TS had two full-time Rangers this year, Moana Le Rohellec and Lusiano Kolokilagi. We also had two volunteers working temporarily, Stephan Gygax, and Temakehu Murphy, and we hired one part-time worker, Camille Gauche, for 6 weeks. Following a request from the EC the Ranger Program began keeping daily activity records, and spending more time surveying the lagoon and Motu Rimatuu (see chart below). Reports are compiled monthly and data is available.

The Rangers continued to manage and maintain the Ecostation, host Ecostation users, assist scientists in the lab and in the field, drive the boats, assist the Education Coordinator, maintain the boats, do trail work, and do administrative work for the Ranger Program. The cost of the Ranger Program for 2018 (two salaries) was 9,059,170 CFP (about $90,000), and these costs were covered by a combination of the payment by Frangipani, 5,069,223 CFP (about $50,000) and the Conservation Fee.



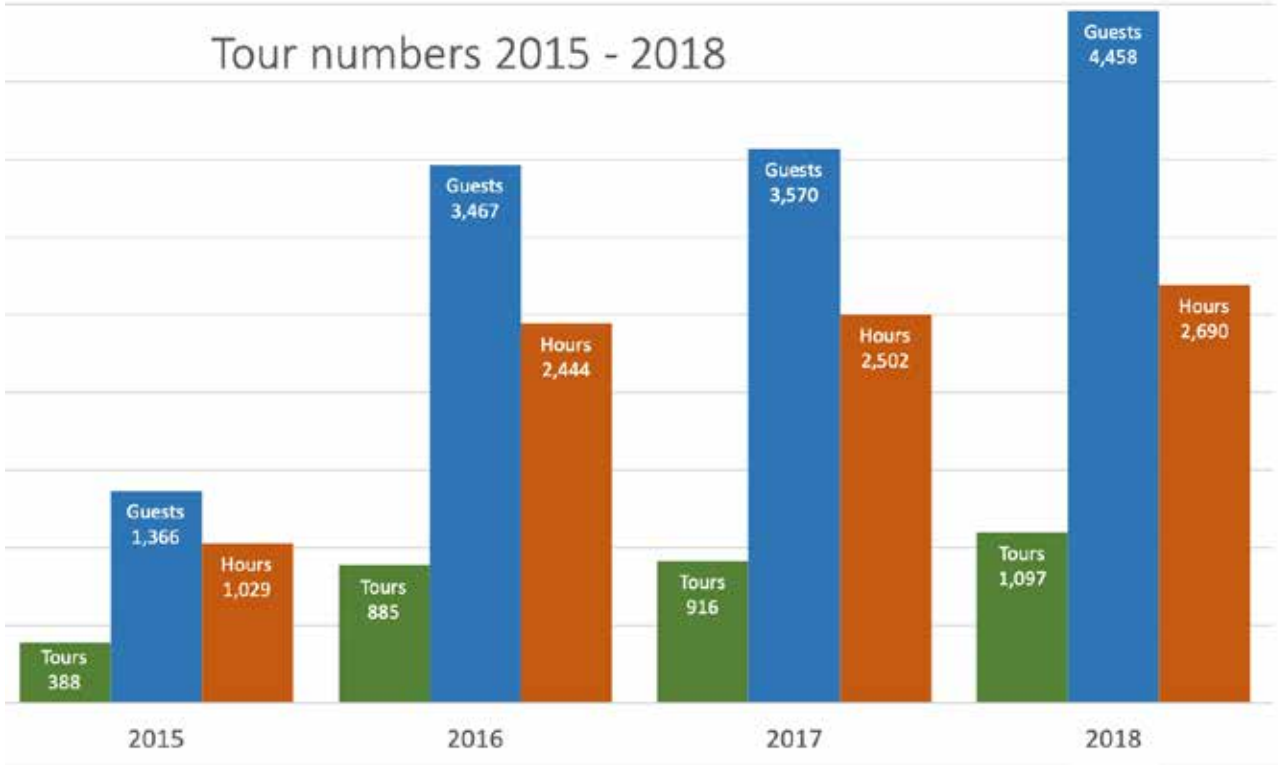
Guide Program

"The group worked exceptionally well together and made a lot of guests very happy with their knowledge and guidance.

The Guide Program had some turn over and hired a total of 9 people in 2018: Aeata Richerd (Head Guide), Tihoni Maire, Xenia Jost, Ngahina Moua, Hawaiki Mahiti, Stephan Gygax, Teva Beguet, Vanille Thullier, and Virginie Poly, and Thierry Sommers was hired part time. Despite the turn over the group worked exceptionally well together and made a lot of guests very happy with their knowledge and guidance. The plan was to have 5.5 working positions through the year in order to cover higher tour numbers during whale season and turtle season. In the end, with all of the shuffling of people throughout the year, the actual budget was less.

“The number of tour selections and tours carried out by TS increased again in 2018.

There are 21 different tours to choose from in 2018, up from 13 in 2015.



Flora & Fauna & Culture Data

The guides also continued their work compiling information on the flora and fauna and culture of Tetiaroa, and participated in gathering data in the field while on tours.

"The guides participate in gathering data in the field while on tours.

Clients (villa - nom) :						
Cycle lunaire (jour même) :						
Date :						
Bateau :	O Tautukau II PY 16981		O Tetiaroa Society		O Autres :	
N° obs. (put on map)	1		2		3	
Lieu :						
Heure D-F :						
AUTRES ESPECES MARINES						
Espèces :						
Nombre :						
Interaction avec Bln :	O Oui	O Non	O Oui	O Non	O Oui	O Non
BALEINES						
Mode d'obs.	O de la côte O en bateau	O en plongée O PMT	O de la côte O en bateau	O en plongée O PMT	O de la côte O en bateau	O en plongée O PMT
Dist. Bln / récif						
Direction déplac[nt] :	O Nord O Sud	O Ouest O Est	O Nord O Sud	O Ouest O Est	O Nord O Sud	O Ouest O Est
Activité de Bln	O accoupl[nt] O saut O repos O déplace[nt] O sonde O parade O mise bas	O caudale frappe O caudale levée O pec. frappe O pec. levée O tête levée O allaitement O chant	O accoupl[nt] O saut O repos O déplace[nt] O sonde O parade O mise bas	O caudale frappe O caudale levée O pec. frappe O pec. levée O tête levée O allaitement O chant	O accoupl[nt] O saut O repos O déplace[nt] O sonde O parade O mise bas	O caudale frappe O caudale levée O pec. frappe O pec. levée O tête levée O allaitement O chant
Réaction Bln / bateau	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux
Réaction Bln / nageurs	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux	O agressivité O fuite O sonde	O indiff[ce] O s'approche O jeux
Dist. d'obs. / nageurs	O 0-30 m O 50-100 m	O 30-50 m O >100 m	O 0-30 m O 50-100 m	O 30-50 m O >100 m	O 0-30 m O 50-100 m	O 30-50 m O >100 m
Nb adultes (>5ans) **Nb juvnl** (1-5ans) **Nb nvx nés** (<1an)						
Nb total Bln						
Nb bateaux						
Nb pax à l'eau						

Etat de la mer :
(entourer l'indice correspondant le plus aux conditions du jour)

Force	Descriptif	Hauteur en mètres
0	calme	0
1	ridée	0 à 0,1
2	belle	0,1 à 0,5
3	peu agitée	0,5 à 1,25
4	agitée	1,25 à 2,5
5	forte	2,5 à 4

L'échelle de Beaufort

Nombre de Beaufort (degré)	Terme générique (descriptif)	Vitesse du vent à 10 m de hauteur: en m/sec	en km/h	en noeuds	Que se passe-t-il au large ? (remarques)
0	Calme	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Weekly Presentations

This year we instituted regular weekly presentations for the guests of The Brando on a variety of topics, including:

- Tetiaroa Birds,
- Conservation Programs,
- History,
- Archaeology,
- Whales and Dolphins, and
- Green Sea Turtles.

Atoll Clean-up Day

"The guides also led tours and clean-up programs with The Brando staff.

RAISING AWARENESS

Live & Digital Events

Raising awareness to the endangered wildlife of atolls and educating people about the research and conservation efforts we support is integral to our mission.
By gathering, meeting with, and engaging supporters, TS is working towards a 'self-sustaining educational model' to insure that every single one of our **Island ~ Earth ~ Sustainabilty** efforts recieves the intellectual, financial, and moral support that it deserves.

Some highlights of our efforts during 2018:

- Hosting workshops, fundraisers, and brainstorming sessions with influential members of the 'scientific brain trust' and the media.
- Developing the ***Tetiaroa Fish Guide App***.
- Publishing monthly newsletters which feature articles on endangered atoll species.
- Instigating the ***Island Earth Initiative*** and providing resources and contacts for the planning of the ***Island Earth Summit***.
- Commissioning a video series on some of the major conservation programs on the atoll during 2018.

Tetiaroa Holistic Ecosystem Workshop

"Tetiaroa is one of the very few atolls in the world where sustained whole ecosystem holistic research can conceivably be done.

T.H.E. Workshop was held on Moorea November 2-3, 2018 with 21 participants from the US, France, and New Zealand. The main goal of the workshop was to plan the Tetiaroa Holistic Ecosystem Experiment (THE Experiment) leveraging the removal of invasive species (notably rats and mosquitoes) as an extraordinary opportunity to apply novel technologies for conservation (e.g., genetic control of invasive species; drones for deployment/surveillance), test hypotheses of ecological function (e.g., nutrient cycling and food web dynamics), and develop innovative decision support tools (e.g., IDEA scenario-based planning platform).

Key Findings of the meeting were:

- Eliminating rats is a key management priority on Tetiaroa
- Eradication of rats would create an important sanctuary for endangered native birds
- Tetiaroa is one of the very few atolls in the world where sustained whole ecosystem holistic research can conceivably be done.
- The interest of close collaboration between the Palmyra and Tetiaroa.
- Tetiaroa can serve as a site to study the effect of rat eradication on coral reefs.

Island Earth Initiative & Summit

"Unleashing the ocean's potential.

Our oceans face extraordinary damage ranging from coral reef loss, ocean acidification, and overfishing to pollution from plastics and chemicals. Yet, intelligently managed oceans offer an exceptional opportunity to ecologically supply humanity with abundant energy, fresh water, nutritious food, and a stable climate. Science, technology, and innovation hold the keys to safeguarding our seas and wisely tapping the ocean's potential. But to unlock these urgently needed solutions, we need immediate concerted action — an ocean innovation movement.

In support of this movement, we are assembling leaders from a variety of fields to join a sprint to unleash the ocean's potential, culminating at a major summit in the heart of the Pacific in September 2020.

Island Earth | Ocean Innovation Summit will usher in the U.N.'s Decade of Ocean Science for Sustainable Development, drawing on the latest scientific research, new technologies, and best practices to showcase a curated portfolio of ocean innovations for support and investment.

Monthly Newsletters "News from the Atoll"

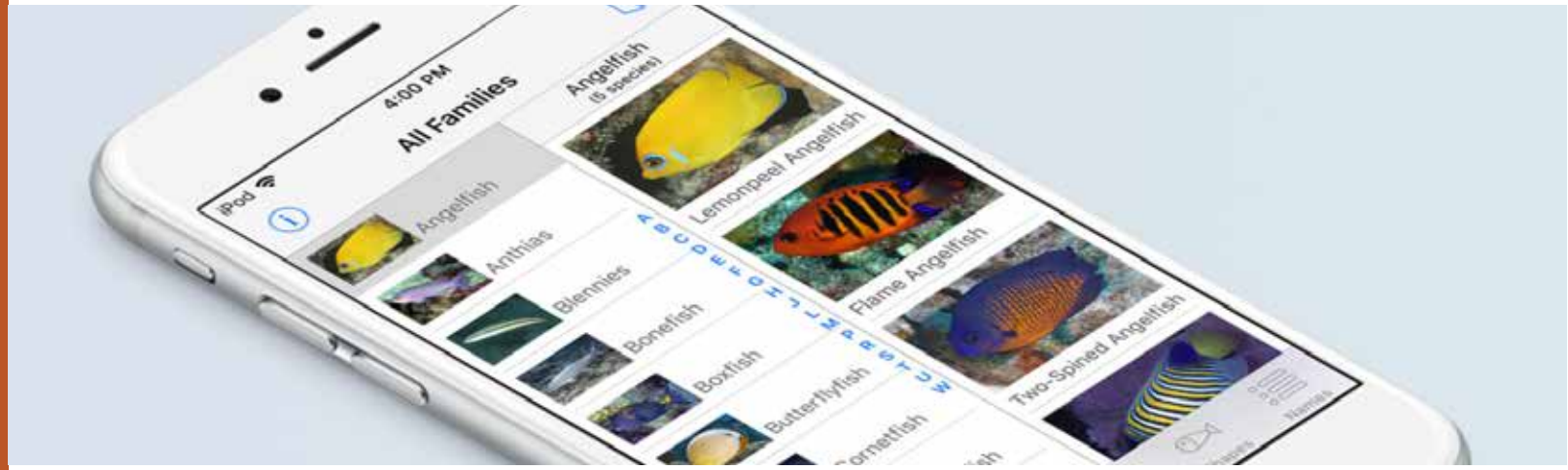
"TS followers have a 42% 'open rate'; more than double the average for non-profits.

The decision was made this year to publish a monthly newsletter. This has been a very successful endeavor and greatly expanded our communication reach. TS followers combined with TB contacts make up over 12,000 subscribers. From September to December we sent out 62,073 newsletters. The TS followers have a 42% 'open rate', more than double the average for non-profits, with the Brando contacts showing a 20% open rate.
Archives of all issues are available on the website.

Tetiaroa Fish Guide App

TS produced a Tetiaroa Fish Guide App for iPhones this year. This free app (available on the Apple App Store) allows guests to learn about fish before they go snorkeling or ID them afterwards.

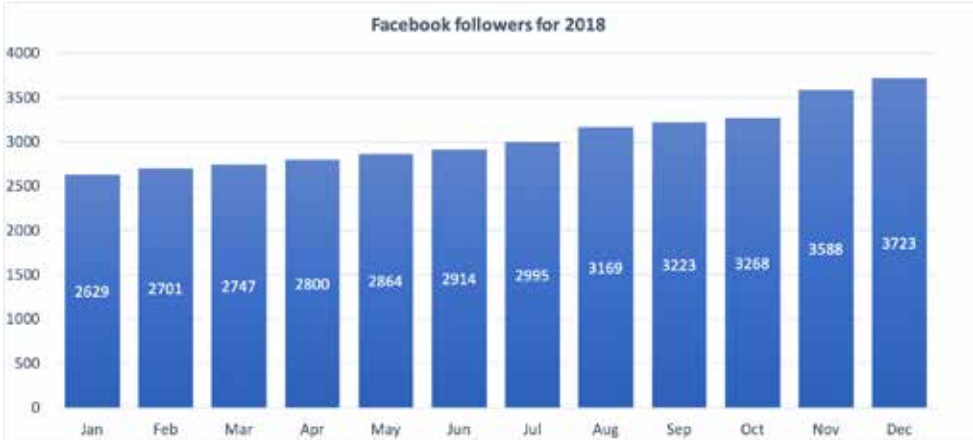
"It is the only fish guide app specifically for French Polynesia.



Communications via Website and Social Media

"The number of TS Facebook followers showed a steady increase during the year. It continues to be a lively site with an active user base.

TSFP saw substantial changes in Communications and Marketing in 2018. The TS website continued to increase its content with new species descriptions created by the TS Guides, and increased use of the "News" page.



Villa Book

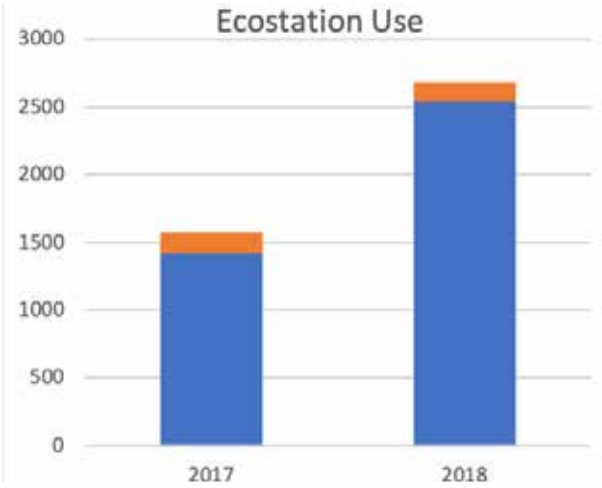
The decision to put a TS promotional booklet in the villas was made this year and after a couple of versions it is now finished. This book introduces TS with beautiful photos and invites the guest to participate in supporting our mission. So far the booklet has definitely paid for itself, with several hotel guests commenting that they donated after seeing the information there. A copy of the latest version of the Villa Booklet is in the TS EC Meeting Feb 2019 Documents folder.

OPERATIONS

Ecostation Use

"Total user-nights for 2018 was 2,538 - an increase of 75% from 2017.

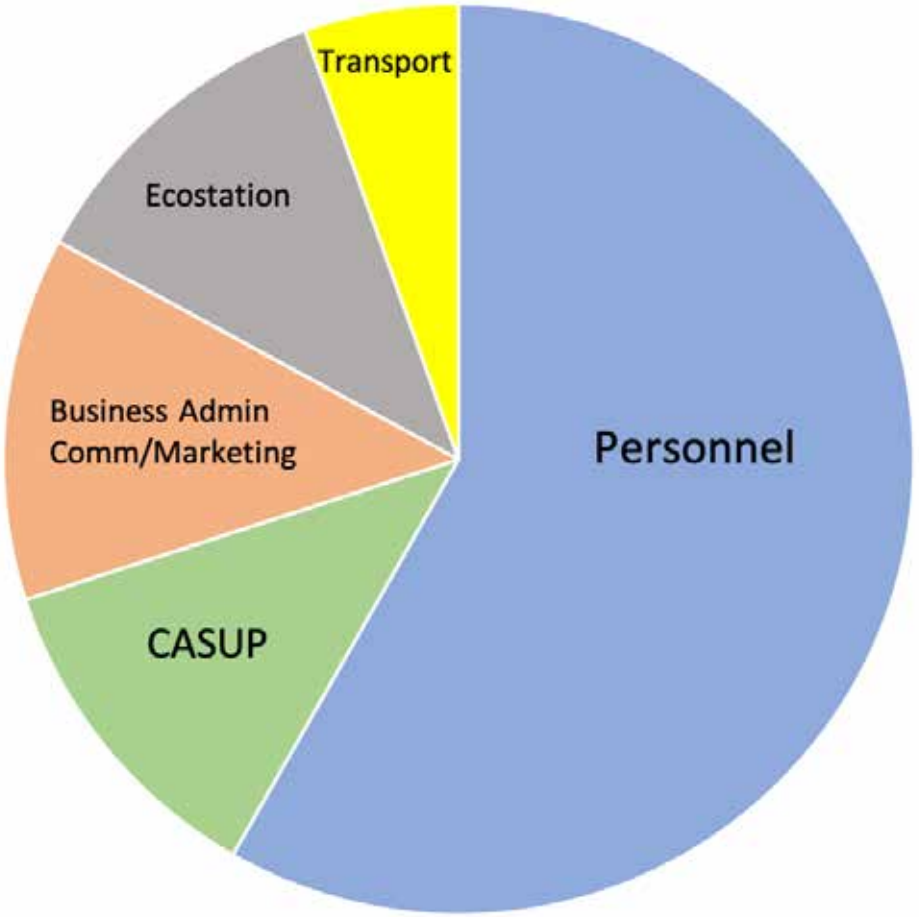
This year the Ecostation had a 146 Users which was slightly down from 2017 (164), but those users stayed longer than last year, giving us a total of 2,538 User Nights (1,447 in 2017). The largest user groups were researchers and student groups but TS also hosted a lot of media people working on programs on TS and TB. TS also brought in volunteer groups to help with field work, particularly the rat eradication work on Reiono.



Total Ecostation Users	146
Total User Nights	2538
Number of Scientists	63
Number of Scientific Teams	20
Number of Journalists	19
Number of TV Teams	8
Number of Teachers	20
Number of TS Volunteers	22
Number of TMTM Volunteers	14
TS Personnel	7

Costs

"Our organization is growing and with it the costs of basic operations.



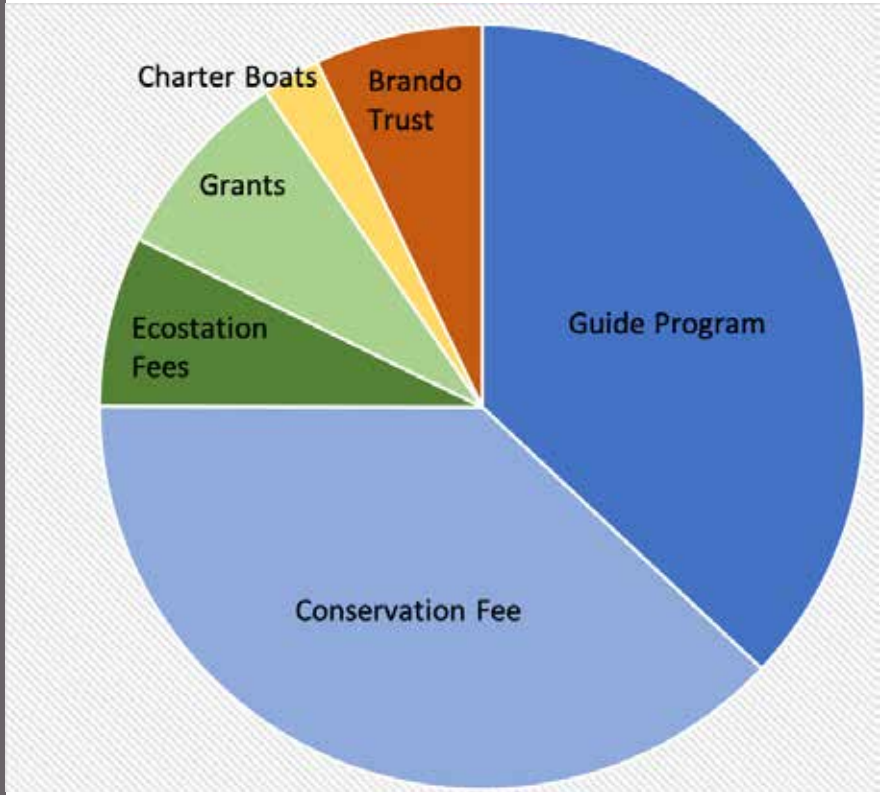
ITEM	CFP	$USD
Personnel	40,038,697	$381,321
CASUP	8,077,407	$76,928
Business	8,875,134	$84,525
Ecostation	7,967,904	$75,885
Transport	3,767,569	$35,882
TOTAL	68,726,711	$654,540

As with every year, the bulk of the costs went to staff salaries: 5 Guides, 2 Rangers, one Executive Director, and some part-time help.
CASUP costs were mostly for the Education Program but also covered Habitat Restoration (rat eradication), and work on Rimatuu Village restoration.
The Business costs covered administration, accounting, communications, and marketing. Ecostation costs are those associated with all facilities on the island including: electricity, maintenance, housekeeping, boats, etc.
Transport costs are those of getting on and off the island.

Income

"Donations to TS in 2018 totaled $149,421.

TSFP Income comes from 5 main sources:
The partnership with The Brando presently accounts for about 75% of all income.
About 15% of the income is generated by Ecostation Use.
Grants from TSUS this year constituted about 17% of income. TSUS funds are raised by donations, of which we received about $150,000 in 2018.
The partnership that we have developed with local charter boats also contributes to our income.
The Brando Trust also supports our CASUP programs.



Guide Program	26,400,000
Conservation Fee	27,158,842
Ecostation Fees	5,146,348
Grants	5,838,653
Charter Boats	1,764,000
Brando Trust	5,069,223
TOTAL	71,377,066