FIRST

QUARTERLY ACTIVITY REPORT - TSFP 2025

January - February - March

TETIAROA SOCIETY

TETIAROA SOCIETY

SHARING THE HIGHLIGHTS OF TETIAROA TOGETHER

This first quarterly activity report marks a new step in how we keep you connected to the life of Tetiaroa Society.

For several years now, we've shared our projects, progress, and commitments.

This regular format strengthens that momentum, bringing together every three months the key moments lived on the atoll—from conservation missions and educational programs to scientific work and local partnerships.

It's also a way to honor the people who make these actions possible each day.

Thank you for being part of this shared journey. We hope this report will inspire you to keep following and supporting us.

Overview

TETIAROA SOCIETY

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1 - THE ECOSTATION

Summary of Educational and Scientific Stays on *Tetiaroa*

Use of the Ecostation and Base Vie

During the first quarter of 2025, the accommodation facilities of Tetiaroa Society recorded 1,374 user-days, across all programs. This number represents the total number of days people were present on site. For example, one person staying five days equals five user-days. It includes the presence of researchers, students, teachers, volunteers, and other collaborators staying either at the Ecostation or at the Base Vie for educational, scientific, or technical missions.

A focus on educational activitie

Educational programs made up the largest part of the activity, with more than 900 user-days, or nearly two-thirds of the total. These stays welcomed local schools such as Collège de *Tipaerui*, École élémentaire de Paopao, Lycée Agricole de *Taravao*, and RSMA, giving students the opportunity to discover *Tetiaroa*'s exceptional environment. The University of French Polynesia also took part. International partners, such as the University of California, Berkeley, enriched the experience by offering a global perspective on environmental education. Tetiaroa Society played a key role in supporting these groups, helping share cultural knowledge and raise awareness about conservation.

Ongoing and diverse scientific presence

With 431 user-days, scientific programs made up about one-third of the total activity. Several local and international institutions carried out research on topics such as rat and mosquito eradication, archaeology, groundwater chemistry, and shark monitoring. These stays varied from short field visits to regular follow-up trips. This variety shows the potential of the Ecostation as a multidisciplinary platform for science.

Additional missions

The Ecostation also hosted a few shorter stays:

- An audit by PBSC (8 days)
- A visit from a Community Manager (6 days)
- A training mission by CGC Consultants (2 days)

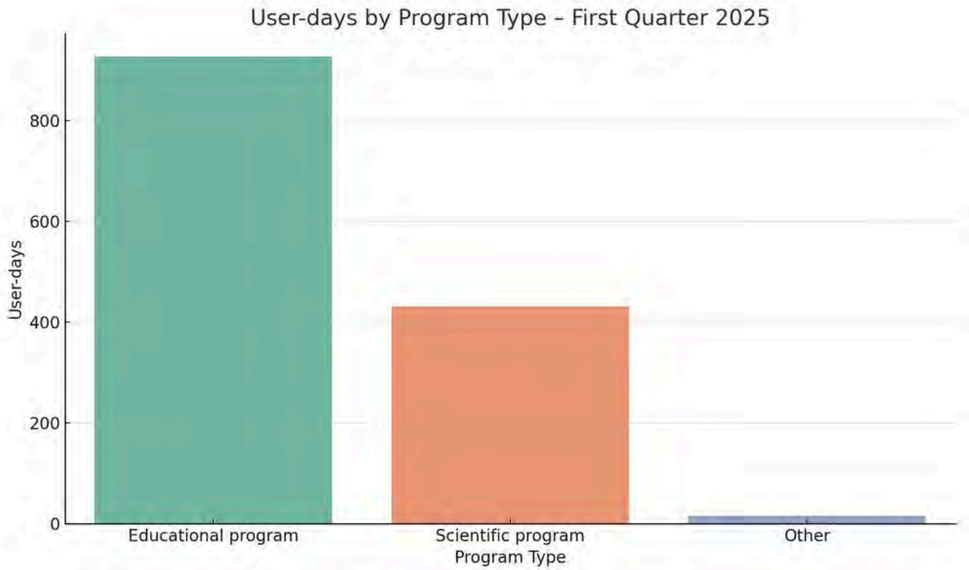
Even if they were small in number, these stays supported the site's smooth operations and helped promote the work of the Tetiaroa Society.

Occupancy rate and capacity management

Over the first three months of the year, the average occupancy rate was 97%, with some monthly variations:

- In January, the rate was 92%, with steady and balanced use of the available beds.
- In February, it dropped to 70%, a quieter period that still allowed activities to continue smoothly.
- In March, the rate rose to 126%, mainly due to the arrival of three school groups. These visits, concentrated over a few weeks, required good coordination between the Ecostation and the Base Vie to welcome everyone in good conditions.

This busy period highlights the team's flexibility, but also shows the importance of planning well for peak periods to avoid overcrowding.



This first quarter of 2025 was marked by strong activity in educational programs, especially thanks to the involvement of local and international schools and universities. These stays helped raise awareness about the environment, in line with the mission of the Tetiaroa Society. Scientific activity was still present, though less intense. Some projects continued at a regular pace, while others were shorter or more occasional. This suggests the need to reconnect with researchers and encourage new projects or more frequent returns to the field. Despite this, the overall energy on site remains positive. The Ecostation continues to welcome a variety of users in good conditions, with constant human presence. This solid foundation sets the stage for the rest of the year, aiming to maintain a healthy balance between educational and scientific activities.

TETIAROA SOCIETY

2 - CONSERVATION

2-1. Yellow Crazy Ants (YCA)

Principal Investigator(s): Ducatez Simon and DeVore Jayna

Collaborator(s) : Fabre Solène, Project Manager on Tetiaroa

Affiliation: Tetiaroa Society, Institut de Recherche pour le Développement (IRD), Université de la Polynésie française (UPF)

Author: Fabre Solène

Main objectives(s)

Following the detection of yellow crazy ants on *Horoatera* and *Aie motu* at the end of 2024, a new treatment was applied in December. To ensure its effectiveness, two additional applications were planned. The February 2025 operation represented the second phase of this treatment. On *Horoatera*, four infestation sites had been identified, and one on *Aie*. The main goal of this mission was to complete the second treatment phase and eliminate any remaining ants.

Fieldwork Summary

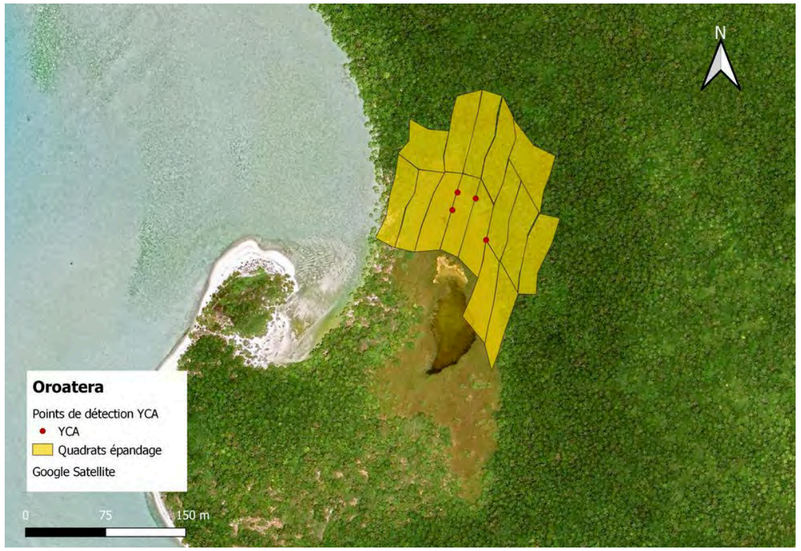
A total of nine people took part in the operation, including eight volunteers and Solène Fabre, the project manager. On *Horoatera*, fifteen 11.7 kg buckets of bait were used to ensure full coverage of the different sections, as shown on the attached map. On *Aie*, nine 11.7 kg buckets were needed.

Impacts and preliminary results

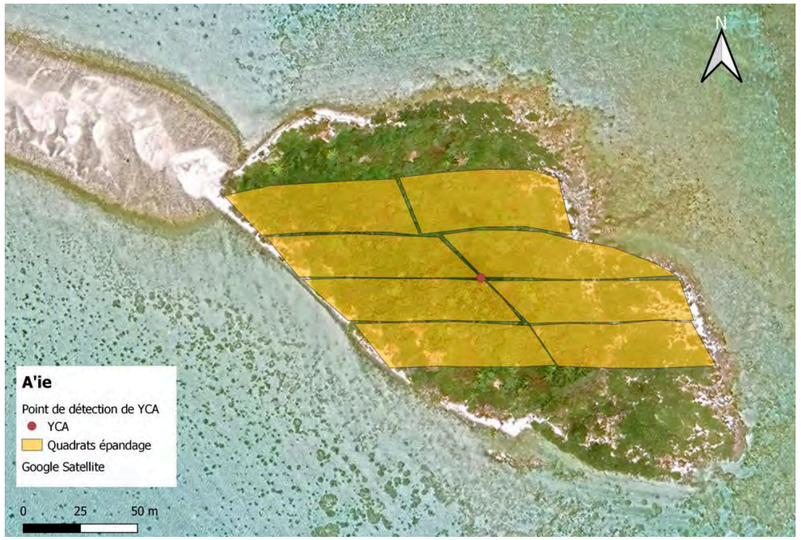
During the baiting process, treated areas were closely monitored, especially the previously infested sites. So far, no yellow crazy ants have been seen on *Horoatera* or *Aie*, which indicating promising results. Efforts to eradicate yellow crazy ants on *Tetiaroa* are going well. Early checks show that these invasive insects are no longer present in the treated areas. The final treatment planned for May 2025, along with ongoing monitoring, will help confirm the program's success and ensure the atoll remains protected.

Perspectives

A third treatment is planned for May 2025. Ideally, a team of nine volunteers would be needed to take part. In addition, a long-term monitoring protocol has been developed to detect any resurgence of yellow crazy ants. Continuous vigilance remains essential to prevent reinfestation and protect *Tetiaroa*'s ecosystem.



Detection and Treatment Map – *Horoatera Motu*



Detection and Treatment Map – *Aie Motu*

2-2. Rat eradication

Principal Investigator(s): Desmontiers Baudouin

Collaborator(s) : Robson Joan, Assistant of Operations ; Patii Hina, Supervisor ; Williams Teora, Field Agents ; Raddato Muriel, Usang Pasquelin et Teissier Heilani, Volunteers

Affiliation: Tetiaroa Society & Island Conservation

Author: Robson Joan

Main objective(s)

The main goal of this early-year mission was to confirm the absence of rats on the *motu* that had been treated during previous eradication campaigns, while also continuing logistical preparations for the next phase. Special attention was given to maintaining the transects on *Tiaraunu*, so they would remain in good condition to support the upcoming baiting operation.

Fieldwork Summary

January and February were the last two months in the field for the team before the end of their contract. During this time, efforts were focused on verification and preparation tasks. A second check of the camera traps was carried out on *Hiraanae*, *Horoatera*, and *Rimatuu*, just to be safe and make sure there were no signs of rats coming back. The devices were redeployed on these *motu*, and no rat presence was detected. Close attention was also given to the area between *Tiaraunu* and *Honuea*. Since rats are still present on *Tiaraunu*, there was concern that some might have crossed to *Honuea*. Cameras were installed to monitor this, and no sign of rats was observed on *Honuea*. On *Reiono*, where rat eradication was completed nearly seven years ago, a quick check also confirmed that no recolonization had occurred. Finally, the team worked again on maintaining the transects on *Tiaraunu*. Although they had already been cleared in previous missions, this new check made sure they are still accessible and ready for bait deployment during the next campaign.

Impacts and preliminary results

The absence of rat detections on all the *motu* that were checked (excluding *Tiaraunu*, *Tauvini* and *Ahuroa*) confirms the effectiveness of previous campaigns. *Reiono*'s status, still rat-free several years after treatment, adds to the confidence in the eradication strategy. The good condition of the transects on *Tiaraunu* is also a strong point for the upcoming operation. It will allow a faster and smoother bait deployment on site.

Perspectives

The next eradication campaign will target *Tiaraunu*, *Tauvini*, and *Ahuroa*. To make it efficient, a large number of buckets will need to be prepared and pre-filled ahead of time, then placed directly at the bait distribution points. This will allow the team to focus only on bait spreading on D-day, without wasting time filling buckets on site. Volunteer support will be essential to cover all the areas involved effectively.

Map of treated and rat-free areas

Placing flags for transects

Clearing transects

2-3. *TETIAROA* AeLIMIN+ Mosquito Breeding Site Survey

Principal Investigator(s): Bossin Hervé, Laboratory Manager

Collaborator(s): Wong-Sung Karine, field agent; Bionaz Océane, Research Assistant; Marie Jérôme & Tourancheau Hmeniko, Study Engineers; Mervin Manfred, Technician.

Affiliation: Institute Louis Malardé, Medical Entomology Laboratory (ILM-MEL), The Brando, Tetiaroa Society, Pacific Beachcomber SC company

Author(s): Bionaz Océane & Tourancheau Hmeniko

Main objective(s)

The mission carried out on *Tetiaroa* from February 3rd to 7th, 2025 was part of the AELIMIN+ program, which aims to control *Aedes polynesiensis* through the release of Wolbachia-incompatible males. Due to continued mosquito nuisance despite a 50% increase in the production of sterilizing males in 2024, a larval breeding site survey was conducted with the following objectives:

- Map all breeding sites present on *Onetahi*;
- Identify active sites and determine the mosquito species involved.

The results will help target the most productive breeding sites and improve prevention, elimination, and vector control strategies on *Onetahi*.

Fieldwork summary

A detailed inspection of each land parcel of *Onetahi* was conducted on foot to identify potential mosquito breeding sites. Prior to conducting the inspections of customer's area, consultation was held with the managers of each sector to ensure that guests would not be disturbed. Every water-holding site was systematically recorded, characterized (breeding site type) and georeferenced. Sites found to be positive for mosquito larvae and/or pupae were then sampled. The collected specimens were then analyzed to identify the mosquito species present.

Impacts and preliminary results

Initial results showed that there are many mosquito breeding sites on the island, most of them caused by human activities. Two mosquito species were found: *Aedes aegypti* and *Aedes polynesiensis*. These breeding sites are mostly located around areas where people live or work — like the staff village, technical area, and northern zone. The most common are tarps and plastic bags, gutters, tires, and coconut shells that were opened to drink the water and then thrown on the ground. When it rains, these coconuts fill with water and become perfect places for mosquitoes to lay eggs. All these breeding sites reduce the effectiveness of the mosquito control strategies currently being used. They allow wild *Aedes polynesiensis* to continue reproducing, and they also help *Aedes aegypti* — a species that causes a lot of problems and is not yet targeted by the current methods — to spread.

Perpectives

The next steps will focus on implementing the recommendations for managing mosquito breeding sites, including regular monitoring visits to *Onetahi*. At the same time, communication and prevention materials will be shared with all entities operating on the island to raise awareness. Additionally, an innovative control strategy targeting *Aedes aegypti* is currently being developed in laboratory, in response to the increasing nuisance caused by this species.

Breeding site inspection map on *Onetahi*

Productive mosquito breeding sites and species map on *Onetahi*

2-4. *TETIAROA* AeLIMIN+ Three month activity report

Principal Investigator(s): Bossin Hervé, Laboratory Manager

Collaborators: Wong-Sung Karine, field agent ; Bionaz Océane, Research Assistant; Marie Jérôme, Study Engineer

Affiliation: Institute Louis Malardé, Medical Entomology Laboratory (ILM-MEL), The Brando, Tetiaroa Society, Pacific Beachcomber SC company

Author: Bionaz Océane

Main objective(s)

The AeLIMIN+ project aims to monitor mosquito nuisance in *Tetiaroa* and reduce it by releasing incompatible male *Aedes polynesiensis* mosquitoes. ILM uses the Incompatible Insect Technique (IIT), based on Wolbachia bacteria passed from mother to offspring. In the lab, males are produced with Wolbachia strain B. When they mate with wild females carrying strain A, the eggs don't hatch due to incompatibility. These males aren't sterile themselves, but sterilizing, as they prevent wild females from producing offspring. Over time, this helps reduce the *Aedes polynesiensis* mosquito population. To track progress, about 20 mosquito traps are set up on *Onetahi*. These traps help monitor nuisance levels and check how well the strategy is working, so it can be adjusted if needed.

Fieldwork summary

The key activities are as follows:

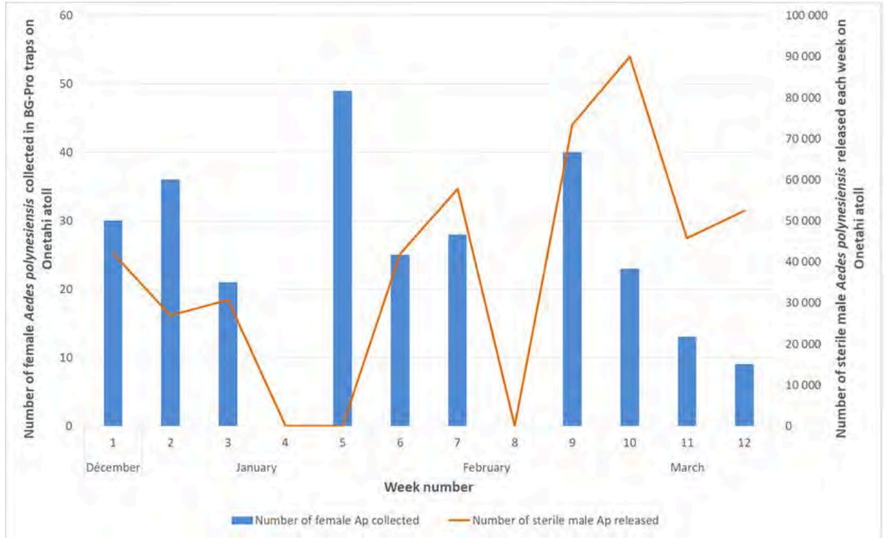
- Activation and collection of mosquito traps
- Identification of mosquito species collected in the traps
- Inspection and identification of mosquito breeding sites
- Release of sterilizing male *Aedes polynesiensis* on two *motu*: mainly on *Onetahi*, but also on *Honuea*

Impacts and preliminary results

During the first quarter of 2025, two increases in mosquito numbers were observed. These happened in the week after the number of sterilizing males released was reduced. In January, fewer mosquitoes were sent to *Tetiaroa* and released on *Onetahi* because the hotel was closed. In February, production increased again, with up to 90,000 males released. This time, unlike what happened at the end of 2024, the mosquito population went down, showing that the Incompatible Insect Technique (IIT) is working. This result was probably helped by the inspection and cleaning of mosquito breeding sites on *Onetahi* in February. Each week, between 27,000 and 90,000 males were released. In total, 461,250 were released over the three months — fewer than in the previous quarter. In March, Karine led a mosquito activity with *Paopao* school children to help them understand that mosquitoes can transmit diseases and be dangerous.

Perpectives

A new control method using the Sterile Insect Technique (SIT) is being developed in the laboratory to deal with the growing nuisance caused by *Aedes aegypti*. The release of sterile males represents a promising addition to existing mosquito control efforts in *Tetiaroa*.



Graph showing the number of *Aedes polynesiensis* females collected and the number of sterilizing males released per week

Karine preparing mosquito activities for *Paopao* school children

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3 - RESEARCH

3-1. Water Use Rates of Tropical Atoll Vegetation

Principal Investigator(s): Burnett Michael

Co-Investigor(s): Angeregg Leander & Young Hillary

Affiliation: University of California Santa Barbara (UCSB)

Author(s): Burnett Michael, Young Hillary & Anderegg Leander

Main objective(s)

The goal is to estimate how much water is used by each of the most common tree species on Pacific atolls. Because fresh water is such a scarce and important resource on small islands, this knowledge could change how atoll communities manage their forests. For instance, many people think coconut palms/*ha'ari* (*Cocos nucifera*) need more water than the other large trees native to Pacific atolls, like cabbage tree/*puatea* (*Pisonia grandis*) or velvet tree/*tahinu* (*Heliotropium arboreum*), but there is not much evidence behind this claim. By installing high-tech sensors into the trunks of these trees, plus *fara* (*Pandanus tectorius*) and *naupata* (*Scaevola taccada*), it becomes possible to figure out how many liters of water are used by each species per day. The hope is that this information helps communities make decisions about how they manage their forests and fresh water resources.

Fieldwork Summary

Dozens of tree water use sensors were installed last year. During this visit, batteries were changed, malfunctioning sensors were repaired, and other useful data were collected. For instance, vegetation surveys of *Tetiaroa*'s forests will make it possible to estimate how many trees of different species and sizes occupy one hectare of land. Tree cores (thin cylinders of wood removed harmlessly from the tree trunk) were also extracted to help understand where water is flowing within the trees.

Impacts and preliminary results

Coconut palms have been found to consume an average of 92 liters of water per day. Most *puatea* (*Pisonia grandis*) use between 20 and 50 liters daily, though additional data are still needed for the largest individuals, whose trunks exceed 1 meter in diameter.

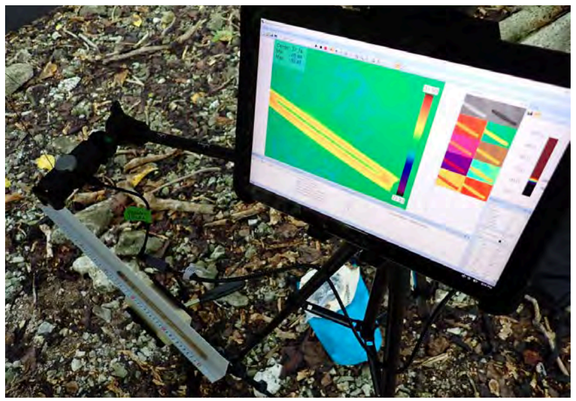
Perspectives

The sensors remain on *Tetiaroa*'s trees and will continue collecting water use data for another six months. Once the sensors are removed, it will be possible to calculate how much water each species uses, and how much water is used per hectare for each species.

Rayna and Michael repairing a water use sensor on a coconut palm

Michael coring a *puatea* tree on *Reiono*

Rayna measuring the area of a *puatea* trunk



Making thermal measurements of a *puatea* wood core

3-2. PASTAtolls - Multidisciplinary Approach of Polynesian Atolls Socio-Ecosystem in Time

Principal Investigator(s): Molle Guillaume, Professor; Conte Eric, Professor Emeritus

Co-investigators : Fournier François, Associate Professsor; Montaggioni Lucien, Professor Emeritus

Affiliation: Centre d'Enseignement et de Recherche de Géosciences de l'Environnement (CEREGE), Aix-Marseille Université, France. In partnership with le Centre International de Recherche Archéologique sur la Polynésie (CIRAP), Université de la Polynésie française.

Authors(s): Fournier François & Montaggioni Lucien

Main objectives(s)

The mission, carried out in January 2025, aimed to identify the materials used in the construction of the *marae* (traditional Polynesian sacred structures used for religious and social purposes). These elements may contribute to a better understanding of the history of the formation of the *motu* on which these *marae* were built.

Fieldwork Summary

The fieldwork carried out on the *motu* of *Onetahi* and *Ti'araunu* helped to better understand the materials used in the construction of the *marae*, as well as the type of sediments that make up these islets. It was found that the *marae* were mostly built using slabs and broken pieces of slabs made of skeletal elements, such as fragments of skeletons, red algae, and shells from corals, algae, and mollusks. These materials naturally cemented together along the lower beaches of the atoll, forming what is commonly called "*beach-rock*." However, the composition of the structures varies from one site to another. Some *marae* contain other types of materials, used in different amounts, from just a few scattered elements within the *beach-rock* to entire structures made from different materials. This is the case, for example, of the TIA-1 *marae* on the *motu Ti'araunu*, which is entirely made of coral colonies and coral fragments. These are mostly of the *Porites* genus, which are massive, dome-shaped corals. Also present are robust branching corals, such as those from the *Pocillopora* genus, and, more rarely, fragments of massive colonies from the *Faviidae* family. Volcanic rocks, such as pebbles, blocks, or fragments of lava columns were also found, though only occasionally. In addition, five test pits (or "soundings") were dug around the Fishermen's *marae* (ONE-1) and the ceremonial complex (sites ONE-4 to ONE-10). These allowed researchers to identify the type and layering of the sediments that make up the *motu* in these areas. The sediments are mostly made of coral sands and gravels, along with red calcareous algae nodules called rhodoliths. Coral pebbles and blocks were also found, but less frequently. All the soundings reached the surface of the freshwater lens, located about 1.60 to 1.70 meters below the top part (the highest point) of the *motu*.

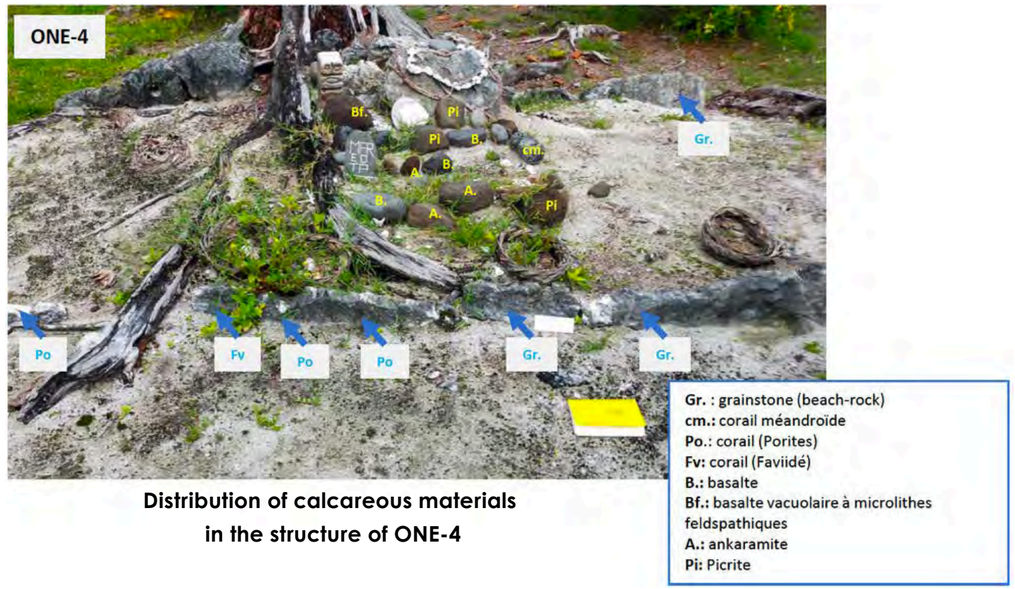
Impacts and preliminary results

The choice of materials used in the construction of the *marae* appears to have been deliberate on the part of past populations, with variations depending on the site and context. The use of *beach-rock* slabs and coral colonies, sometimes exclusively, sometimes in combination, has been observed. In contrast, volcanic elements, which are relatively rare, seem to have been deposited occasionally, probably as offerings rather than for construction purposes. In addition, measurements taken around the *marae* indicate that the thickness of the *motu* generally ranges between 1.70 m and 1.80 m above the surface of the freshwater lens. In the studied areas, this thickness consistently remains below 2 meters relative to the current average sea level. Based on comparable data from other islets in the Society and *Tuamotu* archipelagos, it is likely that the formation of the motu of *Tetiaroa* began around 2,500 to 2,000 years ago, at a time when sea level was about 0.50 m higher than it is today. At that time, the atoll was partially submerged.

Perspectives

Additional observations carried out along the north-west and northern shores of the *motu Ti'araunu* revealed large areas covered with coral and reef blocks, sometimes arranged in lines parallel to the reef front. These accumulations of blocks are the traces left by powerful marine events, such as storms or cyclones, that occurred well before the colonial period.

By dating these blocks and studying their spatial distribution, it should be possible to reconstruct the sequence of major climate events over the past thousand years. This research is part of a global effort led by the international scientific community to better understand the risks related to climate change in low-lying tropical islands. Creating a database in Polynesia on these past events could therefore become a valuable tool for anticipating the future risks that these islands may face in the medium and long term.



Distribution of calcareous materials in the structure of ONE-4

3-3. Investigating the ecology of reef sharks in *Tetiaroa*

Principal Investigator : Wirsing Aaron

Co-investigators : Gastrich Kirk, Heithaus Mike, Clementi Gina, Caselle Jenn, Farabaugh Frances, Kilfoil Jimmy

Affiliation: UW (Wirsing, Farabaugh), FIU (Gastrich, Clementi, Heithaus), UCSB (Caselle), CofC & DNR (Kilfoil), Tetiaroa Society, CRIOBE, Te mana o te moana

Author(s): Gastrich Kirk, Clementi Gina, Farabaugh Frances

Main objective(s)

Coastal nursery areas are widely considered to be critical habitat for sharks, and are of increasing importance given recent declines of many populations across the globe. These essential areas provide habitats for sharks to feed, reproduce, and/or refuge to grow to maturity. Understanding how sharks utilize these habitats, both spatially and temporally, is thus critical for developing species-specific management plans and conservation measures. Previous research has focused on how multiple shark species may inhabit the same nursery, highlighting how habitats may be partitioned in time and space as well as investigating trophic interactions. Less attention, however, has been given to how these dynamics may change in relation to the size/age within a single species. Such ontogenetic shifts in how nursery areas are used could have population level consequences as a result of increased competition, which is likely to have the greatest impact on younger individuals whose survival rates strongly influences population growth rates, particularly for exploited populations. Of the limited studies that have examined differences in movement patterns between age classes, nearly all have been conducted within stressed environments that have experienced varying degrees of fishing pressure and/or habitat degradation. Accordingly, there remains a need to establish a baseline for how sharks utilize these key habitats in a relatively undisturbed ecosystem. We study the spatial ecology of a two large marine predators, the sicklefin lemon shark (*Negapron acutidens*) and blacktip reef sharks (*Carcharhinus melanopterus*), and how these movement patterns may vary in relation to age/size within a relatively undisturbed nursery: *Tetiaroa*, French Polynesia. Using a combination of passive acoustic and underwater video data, we will compare how space use within the nursery differs between individuals, as well as across different age classes. Specific metrics to compare between individuals and across different age classes: Residency time, home range size, core use areas, natal homing, time before dispersal from natal site, social networks, influences of environmental factors on these metrics, and changes in species richness and relative abundances of reef fishes.

Fieldwork Summary

During the February 2025 trip, a complete download and redeployment of the acoustic array was conducted. Several secondary objectives were also completed, including collaboration with project partners, execution of receiver range testing procedures, and integration of data into new analysis software developed by Innovasea. The ongoing acoustic study in the lagoon has generated 800,000 observations, with a total of 120 sharks now tagged in the system (85 blacktip reef sharks and 35 sicklefin lemon sharks).

Impacts and preliminary results

Sicklefin lemon and blacktip reef sharks are listed as vulnerable by the IUCN with populations currently in decline, yet *Tetiaroa* and her neighboring islands represent some of the few places in world where both species are abundant. These large marine predators also play a key role in maintaining the overall health of local coral reef ecosystems. The results of our work will improve our understanding of how nursery habitats serve these species throughout various life stages and will set a baseline for which we can compare to future changes (i.e., climate change, habitat loss, policy changes). The data collected on this trip, as well as during past trips, are now sufficient for rigorous statistical analysis as the basis for several manuscripts.

Perspectives

A return to *Tetiaroa* is planned for October/November, with the objective of downloading new data from the receivers (as many sharks are still being tracked), performing another round of receiver maintenance, and potentially expanding the acoustic array. Additional lemon sharks will be tagged to gain a deeper understanding of their role within the atoll. The mission will also continue to explore predator-prey dynamics in the lagoon through long-term underwater video camera deployments, providing insight into how predation risk influences the survival and behavior of juvenile sharks in lagoon nursery systems.

Gina releasing a blacktip reef shark

Gina and Frances searching for sharks

Called the Shark team at *Tetiaroa*

Left to right : Kirk, Gina, Théo (Te mana o te moana) and Frances

3-4. Study of the alteration of terrestrial ecosystem functioning by three introduced species on a Polynesian atoll

Principal Investigator(s): Ducatez Simon, Research Fellow; DeVore Jayna, Research Engineer; Demortier Michael, PhD student at the University of French Polynesia

Affiliation: UMR SECOPOL (UPF, IRD, ILM, IFREMER)

Author(s): Demortier Michael, DeVore Jayna & Ducatez Simon

Main objectives(s)

This study is part of a long-term monitoring effort, essential for understanding the impact of introduced species on the *Tetiaroa* ecosystem. Two main research areas were addressed. The first focuses on monitoring nesting brown boobies (*Sula leucogaster*) on *Tahuna Iti*, *Horoatera*, and *Tiaraunu*, with the aim of establishing a baseline prior to the study planned for March 2025 on the effect of mosquitoes. This monitoring will help assess potential changes in population size, nesting behavior, and reproductive parameters in relation to mosquito presence. The second research area concerns the nutrient input from seabirds and its influence on soil dynamics and litter decomposition. To this end, guano was collected from three species—brown noddies (*Anous stolidus*), red-footed boobies (*Sula sula*), and brown boobies (*Sula leucogaster*)—and cameras were installed on their nests to estimate defecation frequency. This monitoring aims to improve understanding of the role seabirds play in soil fertilization and to assess the impact of coconut palms (*Cocos nucifera*) on this key ecological function.

Fieldwork summary

A survey of brown booby (*Sula leucogaster*) nests was conducted on *Tahuna Iti*, *Horoatera*, and *Tiaraunu* to assess the distribution and abundance of breeding pairs. Egg size was measured to detect any abnormalities potentially linked to environmental factors. The distance between nests and surrounding vegetation was also recorded to determine whether brown boobies (*Sula leucogaster*) avoid certain areas, possibly due to increased mosquito presence. In parallel, guano was collected from brown noddies (*Anous stolidus*), red-footed boobies (*Sula sula*), and brown boobies (*Sula leucogaster*). These samples will be used to analyze nutrient input across different habitats on the atoll and its influence on litter decomposition—a key process in soil cycling. To refine this study, cameras were installed on nests to measure seabird defecation frequency and better evaluate their contribution to nutrient fluxes. This work is part of a multi-year monitoring program, essential for identifying long-term trends and understanding the effects of introduced species—particularly coconut palms (*Cocos nucifera*)—on the ecological balance of *Tetiaroa*.

Impacts and preliminary results

Data analysis is still ongoing, and no definitive results can be established at this stage. For the brown booby (*Sula leucogaster*) monitoring, the data will serve as a baseline for comparison with future observations and to detect any potential impacts of mosquitoes on their reproduction and nest site selection. Regarding the study of nutrient fluxes, the results will help assess the effect of guano input on soil fertility and litter decomposition. This work is essential for improving our understanding of the role seabirds play in shaping soil dynamics, as well as the influence of coconut palms on these ecological interactions.

Perspectives

The next field mission, scheduled for March 2025, will mark a new stage in the study of interactions between mosquitoes and brown boobies (*Sula leucogaster*). An evaluation protocol will be implemented to assess whether high mosquito density influences the birds' reproduction and behavior. In addition, the analysis of guano and defecation frequency will continue over the long term to refine the assessment of nutrient inputs from seabirds and their effects on the terrestrial ecosystem. This multi-year monitoring will gradually feed into a broader analysis of the impacts of coconut palms (*Cocos nucifera*) on biodiversity and soil functioning.

Michael measuring brown booby egg size to detect potential anomalies linked to environmental factors

3-4. Study of the alteration of terrestrial ecosystem functioning by three introduced species on a Polynesian atoll

Principal Investigator(s): Ducatez Simon, Research Fellow; DeVore Jayna, Research Engineer; Demortier Michael, PhD student at the University of French Polynesia

Affiliation: UMR SECOPOL (UPF, IRD, ILM, IFREMER)

Author(s): Demortier Michael, DeVore Jayna & Ducatez Simon

Main objectives(s)

This field session, conducted in March allowed Michael to work on two key components of his research program. The first focuses on the influence of coconut palms on the terrestrial ecosystem of *Tetiaroa*. In this context, data were collected on soil conductivity, pH, temperature, and moisture to compare soil properties between areas dominated by coconut plantations and those covered by native vegetation. A new protocol was also tested to extract microinvertebrates from the litter in both habitat types. This approach will help assess potential differences in microinvertebrate community composition between coconut-dominated and native plant-dominated zones. In parallel, progress was made on another major research focus: the influence of mosquitoes on the nutrient cycle driven by seabird inputs on *Tetiaroa*. Nest monitoring of brown boobies (*Sula leucogaster*), initiated in late February, continued on three *motu*—*Tahuna Iti*, *Horoatera*, and *Tiarauunu*—along with the implementation of a mosquito trapping protocol within these colonies. The main objective is to explore a possible relationship between mosquito density and the reproductive success of nesting brown boobies across the different sites.

Fieldwork summary

As part of the recent fieldwork, soil property measurements and macroinvertebrate extractions were carried out on five *motu*—*Tahuna Rahi*, *Tahuna Iti*, *Aie*, *Horoatera*, and *Hiraanae*—across a total of nine surveyed sites. In parallel, the brown booby (*Sula leucogaster*) nest survey continued on three *motu*: *Tahuna Iti*, *Horoatera*, and *Tiarauunu*. A mosquito trapping session was also conducted on each motu using BG-Pro traps deployed in triplicate for 24 hours. Additionally, at least six camera traps in video mode were installed on different brown booby nests on each motu during the same 24-hour period, in order to detect potential behavioral signs of mosquito disturbance. At the end of the trapping period, the cameras were switched to timelapse photo mode to monitor nest attendance until the next field session, scheduled for late April.

Impacts and preliminary results

A total of 42 brown booby (*Sula leucogaster*) nests were recorded on *Tahuna Iti*, 122 on *Horoatera*, and 45 on *Tiarauunu*. Observations also revealed a notably higher mosquito density within the brown booby colonies on the two northern *motu* compared to *Tahuna Iti*. Only one mosquito species was identified: *Aedes polynesiensis*, with the vast majority of individuals captured in the BG-Pro traps being females.

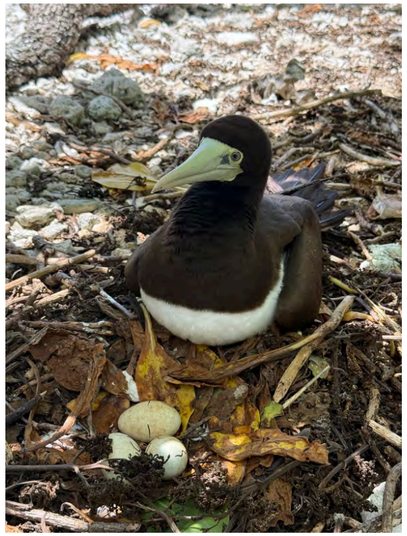
Perspectives

Another field session is planned for late April, allowing Michael to continue his work on both components of his research program, with a particular focus on mosquito density monitoring and microinvertebrate extraction.

Litter samples for microinvertebrate extraction

BG-Pro - Mosquitoes trap

Measuring an egg



Brown boody

3-5. Cascading consequences of rat-induced decreases in seabird abundances on herbivore communities

Principal Investigator(s): DeVore Jayna, Research Engineer - Ducatez, Simon, Research Fellow

Co-Investigator(s) : Ho Raimana, University Lecturer - Martin Emma, Masters Student

Affiliation: Université de Polynésie française - Institut de Recherche pour le Développement, Tahiti

Author: DeVore Jayna

Main objective(s)

Seabird guano is essential for fertilizing the atoll. It helps plants grow better and makes them more nutritious for herbivores. However, if seabird populations decline due to rat or ant invasions, it can disrupt the entire ecosystem. This project aims to understand how guano levels influence the food chain by studying herbivores and their impact on plants in areas with different seabird abundances. The project also looks at how plants respond to herbivores, as some develop defense mechanisms, such as chemical substances or tiny protective hairs.

Fieldwork Summary

During this visit, herbivores were quantified and identified on three *Heliotropium arboreum* (*tahinu*) trees at each of 15 sites distributed across the atoll. Scans of each leaf were taken to assess herbivore damage, and the leaves were then dried to allow for later analysis of their chemical composition. The goal is to understand how variation in both seabird and herbivore abundances affects leaf chemistry, in order to determine how nutrient inputs and inducible herbivore defences interact to influence herbivores in this system.

Impacts and preliminary results

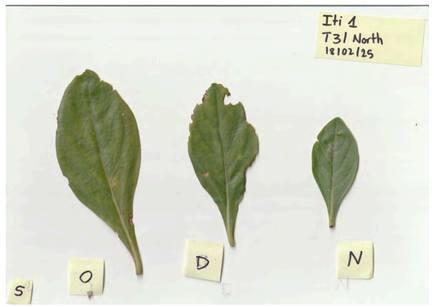
Over the past year of herbivore monitoring, the caterpillars of the *Heliotropium* moth have been identified as the dominant herbivores on tahinu trees. Caterpillar abundances are highest in areas with abundant seabirds (i.e., *motu* that were never invaded by rats), and leaves from these areas are preferred by moths when laying their eggs. However, tahinu trees experiencing high levels of herbivore damage produce defenses against herbivore attack, such as defensive hairs. These defenses are highly effective against caterpillars; leaves with many defensive hairs are difficult for caterpillars to eat, and caterpillars fed these leaves grow slowly and are more likely to die. During this monitoring period (Feb 2025), caterpillar populations were found to have crashed over the past few months, with no moths or caterpillars observed at any of the sites.

Perspectives

Current investigations focus on whether *tahinu* trees produce increased chemical defences (in addition to physical defenses) in response to herbivore damage. The objective is also to determine whether defenses produced by plants in response to herbivore damage can cause population crashes in herbivore communities, and to monitor these communities to see if and when they recover.

Caterpillar

***Heliotropium* moth**



Scanned *Heliotropium* leaves

TETIAROA SOCIETY

4 - HONU PROJECT

Operations Update

Dive Operations Manager : Romain Clervoy

Presentation and Mission

The Honu Project's mission is to deepen the connection between the ocean and humanity, offering unprecedented access to its depths to foster knowledge, awaken compassion, and inspire lasting ocean protection.

The project aims to open access to the mesopelagic zone — a little-known layer of the ocean that holds 95% of its biomass, yet remains largely unexplored due to its inaccessibility. Thanks to cutting-edge submersibles designed by DOER Marine and legendary oceanographer Sylvia Earle, researchers will be able to explore these depths for up to eight hours, collecting data, samples, high-resolution images, and acoustic recordings.

But Honu goes beyond exploration: the project is building a committed research community, guided by ancestral knowledge that views the ocean as a sacred ancestor — a source of life and creation. By weaving together modern science and Oceanic culture, Honu represents a new way of exploring, rooted in respect.

Summary of project progress

During this quarter, with the submersibles still under construction, activities have focused primarily on technical oversight in close collaboration with DOER Marine, the company building the vehicles.

The main objective at this stage is to gain a thorough understanding of the engineering and design choices in order to:

- select appropriate auxiliary equipment based on the needs defined by the Tetiaroa Society and the project's scientific advisors,
- anticipate operational and maintenance procedures,
- ensure proper training of the dive operations team and future pilots.

A job description for the submersible pilot position has been finalized, and initial applications are currently being reviewed. Recruitment is expected to take place in the second half of 2025, with pilot training scheduled in preparation for the start of underwater operations in early 2026.

In parallel, work is also underway with DOER on the development of a lander — a mobile underwater platform equipped with sensors that can be deployed at selected sites for extended monitoring. Equipment selection has been completed, and orders will be placed shortly. Initial field tests around Tetiaroa are planned for late summer 2025.

Honu submersible prototype


TETIAROA SOCIETY
5 - EDUCATION

4-1. Island Sustainability Program - UC Berkeley

📘 Context and objectives

From January 22 to 31, 2025, the atoll of *Tetiaroa* welcomed 20 students from the University of California, Berkeley, accompanied by their teacher, Hannah Stewart, as part of the *Island Sustainability Program* (ISP). This program aimed to provide a comprehensive approach to the environmental challenges faced by tropical islands, combining scientific learning, cultural immersion, and hands-on fieldwork.

🤝 Cultural exchange and knowledge sharings

A key highlight of the stay was the rich intercultural exchange, particularly thanks to the participation of four students from the University of French Polynesia, who were fully integrated into the program. Each morning, they led Tahitian language workshops and shared their insights based on their island experience and cultural background. Together with the Berkeley students, they rehearsed and presented a performance at the end of the stay, featuring a Tahitian song (*Tapa'o nō te here*) and the *Māori haka* (*Ka Mate*), creating a heartfelt moment for the *Tetiaroa* community.

🔬 Scientific activities

On the scientific side, students took part in a variety of field activities designed to deepen their understanding of island ecosystems. They explored the coral reefs between *Onetahi* and *Honuea*, attended lectures on atoll geomorphology, observed seabird colonies on the motu of *Ahuroa* and *Tahuna Iti*, and participated in plant surveys along transects. They also contributed to ecological restoration efforts by planting coastal species such as *Pisonia*, and were introduced to the issues related to invasive species, including rats and yellow crazy ant.

🌱 Meetings and local perspectives

Throughout the stay, students engaged with local experts on topics such as conservation, traditional resource management, sea turtle protection, and ecological initiatives implemented on the island. These encounters helped bridge academic knowledge and traditional wisdom, encouraging a holistic and sustainable perspective.

✨ A meaningful and engaging experience

The program took place in a spirit of openness, respect, and engagement. Each participant left with a deeper understanding of the complexity of island ecosystems and a stronger belief in the importance of connecting cultures and disciplines to build a more sustainable future.

This unique experience reminded us that to know an island, we must walk its shores, learn its language, and listen to its people. It is through the meeting of science and culture that true understanding begins. After all, every exchange is a bridge — between people, places, and perspectives.

Dance rehearsal by ISP students

Traditional shelter (*Karuru*) workshop with Hinano

Field course on plant ecology with Jean-Yves Meyer

Green Tour – learning about local salt production

4-2. *Tipaerui* Middle School – 7th Grade Class

Context and objectives

From February 7 to 10, 2025, the 7th grade class from Louise Carlson Middle School (*Tipaerui*), accompanied by their teacher Mrs. Nathalie Roche, stayed on the atoll of *Tetiaroa* for an educational and cultural program co-organized with the Tetiaroa Society. The aim of the stay was to encourage students to think about sustainable development and innovation, to discover the island's cultural heritage, and to explore the theme of the shark through art and legend, in connection with their participation in the *Heiva Taure'a* (an artistic and cultural festival for middle schools in French Polynesia).

Learning differently, through experience

During these four days, students took part in many activities designed to spark their curiosity, improve their observation skills, and raise awareness about environmental issues in an island context. They visited several motu of the atoll, including *Rimatu'u*, *Onetahi*, *Honuea*, and *Tahuna Iti*, where they observed seabirds, looked for turtle tracks, visited ancient *marae*, and learned about cultural sites such as *Ma'ite* (a ceremonial area related to agricultural rituals like planting) and the *Paepae* (a stone platform used for traditional ceremonies and gatherings). They also took part in a planting activity and helped build a traditional *Karuru* shelter.

On the main beach, they joined a *Land Art* workshop (a form of art using natural materials like sand, leaves, or stones to create temporary pieces in nature), where they worked in groups to express their vision of the shark, linked to their artistic project for the *Heiva Taure'a*. A guided tour of the recycling center added to this learning, along with a hands-on activity where they sorted and weighed trash collected on the *motu Rimatu'u*.

Culture, environment, and engagement

This stay gave students the opportunity to experience daily life in a group and to think about how human actions affect the environment. Through the different activities, they were invited to respect shared spaces, cooperate with others, become more independent, and take part in actions that support environmental protection. The stay ended with a performance of songs and *'orero* (spoken word) presented by the class to thank not only the Tetiaroa Society, but also all the people and teams who contribute to life on the atoll — guides, rangers, boat crews, kitchen staff, and everyone who helped make this experience possible.

On *Tetiaroa*, students were invited to see the land not only with their eyes, but with their culture. In the whispers of the island, they found stories of nature, respect, and the bonds that carry knowledge from one generation to the next.

Welcoming the island in silence at the *Paepae*

Land Art - A shark drawn in the sand

Weighing what the ocean gives back

Wings above the lagoon

4-3. John Doom Agricultural Taravao High School

📘 **Context and objectives**

From March 3 to 7, 2025, students from the NGLF vocational program (Nature, Garden, Landscape and Forest) at the Agricultural High School of *Taravao*, accompanied by their teacher Mrs. Valérie Tchung and a team of supervisors, stayed on the atoll of *Tetiaroa*. This educational trip was part of a learning approach focused on observation, preservation, and hands-on experimentation with coastal ecosystems.

The objectives were multiple: to understand how a fragile ecosystem works, to take part in real restoration activities, to discover the island's natural and cultural heritage, and to think about how new technologies can support sustainable development. The stay took place during Sustainable Development Week, which reinforced the learning goals of the project.

🧠 **Learning by observing, acting to protect**

Throughout the week, students participated in a variety of scientific and cultural activities on several *motu* of the atoll. On *Rimatu'u*, they explored the history of the village through a treasure hunt, covering its journey from ancient kingdoms to the time of Marlon Brando, with a focus on coprah production and the legend of *Haumea*. They made field observations, collected waste, gathered seeds, cuttings, and seedlings, and conducted plant surveys in marked areas.

On *Tahuna Iti*, they observed seabirds, identified different species, and learned about the conservation issues related to that motu. On *Honuea*, they searched for turtle (*Honu*) tracks and helped build a *karuru*, a traditional Polynesian shelter.

🌱 **Culture, engagement, and experimentation**

On Onetahi, the students took part in a welcoming ceremony at the *Paepae* of *Paepaeroa*, followed by a visit to ancient *marae* and key cultural sites like *Ma'ite* and *Puna I'a*. They also joined the Green Tour and visited the island's recycling station.

Although participation in the *Faatura i te Tahatai* restoration program with *Te mana o te moana* could not happen as originally planned, the students still contributed to a planting activity on the *'Ōfa'i Tuatahi* site, with guidance from Hinano and Belinda Hui (*Te Ora Naho*). They helped prepare the site and planted various native coastal species.

Back from Rimatu'u, they worked on identifying and labeling the plants they had collected and prepared them for transfer to the school's nursery. These outdoor learning sessions were also moments of group bonding, music, singing, and ended with a closing performance of songs and *'ōrero* at the cafeteria.

This stay, filled with practical activities and human connections, allowed the students to go beyond technical knowledge and explore something deeper: their relationship with living things, with the land, and with the responsibility that comes with planting and passing on knowledge. It was not only about learning how to plant, but about understanding what it means to care.

Planting activity on the *'Ōfa'i Tuatahi* site

4-4. Adapted Military Service Regiment (RSMA)

📘 **Context and objectives**

As part of a partnership between the RSMA of Arue and the Tetiaroa Society, 22 young volunteers from three training groups (landscaping, welding, and Preparation for Careers in Public Security and Administration) stayed on the atoll of *Tetiaroa* from March 10 to 17, 2025.

The goals of this stay were to strengthen technical skills through public service missions, to promote cohesion and discipline in an isolated setting, and to give participants the opportunity to discover a unique natural and cultural environment.

The program, developed jointly with the Tetiaroa Society and its educational committee, also aimed to spark curiosity about topics such as ecosystem preservation, cultural history, ecological restoration, and biosecurity principles.

🔧 **Taking action: work and restoration**

The young volunteers carried out a wide range of tasks on several motu of the atoll:

- On *Onetahi*, the three groups took part in a welcoming ceremony at the *Paepae* of *Paepaeroa*, visited several *marae* and historical sites, and helped clean and improve the surrounding areas. The welding group also worked on fitting out a technical container at the Ecostation.
- On *Horoatera*, they cleared coconut palms, cleaned archaeological sites, and helped open access to scientific areas, under the guidance of archaeologists and researchers. These moments were also opportunities to discuss *mā'ohi* culture, ancient rites, and the emotions sparked by the discovery of human burials.
- On *Reiono*, with botanist Jean-Yves Meyer, the group cleaned a scientific transect and followed strict biosecurity protocols in this preserved natural area.
- On *Honuea*, all three groups took part in a coastal restoration activity led by *Te mana o te moana*, as part of the *Faatura i te Tahatai* program. They planted nearly 300 native seedlings in two marked planting zones.

🌱 **Understanding to better protect**

Beyond manual work, the young participants also took part in a series of discussions and meetings with specialists: archaeologists, botanists, researchers, cultural guides and educators. These exchanges helped them explore a variety of themes, including:

- the history of marae and traditional rituals,
- the concept of time in Mā'ohi culture and its role in identity building,
- biosecurity measures and the fight against invasive species,
- and the challenges of coastal ecological restoration.

A final slideshow presentation allowed the group to revisit the different motu explored (*Onetahi*, *Horoatera*, *Reiono*, *Honuea*), and connect their field experiences to the broader history of the atoll — including *Rimatu'u*, which could not be visited due to technical constraints.

This stay centered around hands-on work and meaningful exchanges, gave the RSMA youth the chance to actively contribute to real-world projects while developing lasting values: respect for natural sites, teamwork, discipline, mutual support, and environmental awareness.

Sweating to maintain, listening to understand, planting to pass on: on *Tetiaroa*, every gesture mattered.

A collective effort: 300 plants to restore the coastline of *Honuea*

4-4. École élémentaire de Paopao

📘 **Context and objectives**

From March 26 to 31, 2025, the CM2 (5th grade) students from *Paopao* Elementary School spent a week on the atoll of Tetiaroa, accompanied by their teacher, Mrs. Caroline Faua, and three parent chaperones. This educational trip was part of a learning approach focused on observation, discovery of nature, and awareness of environmental protection. The main goal was to help the children better understand how an atoll functions, to learn to recognize the species that live there, to explore aspects of Polynesian cultural knowledge, and to take part in hands-on environmental actions. The trip also provided a valuable opportunity to live together, learn differently, and develop curiosity, respect, and cooperation.

🧠 **Observe, understand, and take action**

Throughout the week, the students explored several motus of the atoll. On *Onetahi*, they were welcomed in a cultural space where they sang songs, visited *marae*, planted a native coastal plant used to fight erosion, and learned about the life cycle of the coconut palm. They also built a traditional Polynesian shelter called a *karuru*, participated in the Green Tour led by a guide to learn more about waste management, and observed a mosquito control program with a release of male mosquitoes. Evenings were filled with fun and educational activities about coral reefs, turtles, plants, and weaving with coconut palm leaves. At the end of the stay, the students performed songs, dances, and a traditional *ōrero* as a heartfelt thank-you to the Tetiaroa Society team. On *Honuea*, they focused on the theme of sea turtles by creating a land art piece shaped like a *Honu*, learning about the threats they face, and observing the marine environment during a walk through the lagoon. On *Rimatu'u*, the children took part in a historical treasure hunt, visited a freshwater spring, discovered a small lake and its fish, and collected litter to help protect the area. On *Tahuna Iti*, also known as Bird Island, they learned to identify different species of seabirds and understood their vital role in the atoll ecosystem.

🌱 **Living together and learning differently**

Beyond all the discoveries, this trip was a true life lesson. The children learned to follow instructions, support one another, stay curious, and live together with kindness and respect. They came to understand the importance of avoiding waste, protecting nature, and listening to those who share their knowledge.

💬 **A big thank you**

This trip would not have been possible without the dedication of many people. A heartfelt thank you to the *Tetiaroa* Society for their warm welcome and fascinating explanations, and to all the guides, cooks, rangers, and partners involved in making this experience possible. The students returned home inspired, moved, and full of ideas to keep caring for nature.

The students of *Paopao* after completing the Green Tour, together with Tihoni, Head Guide of the Tetiaroa Society.

BE A GUARDIAN OF TETIAROA

BY SUPPORTING THE ASSOCIATION

This first quarter of 2025 has been filled with meaningful moments: children amazed by their first sunrise on the atoll, students planting, observing, and asking questions, scientists monitoring birds, turtles, mosquitoes, and soil, and field teams making sure every detail matters.

These experiences wouldn't be possible without you. Your support makes it possible to keep our education programs running, to advance research, to strengthen conservation efforts, and to welcome those who, like you, believe in the power of community to protect this unique place.

Thank you for being part of this shared momentum.

Thank you for believing, with us, that another way of relating to nature is possible.

THANK YOU FOR YOUR TRUST AND BELIEF IN OUR MISSION.

TETIAROA SOCIETY

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