

FY2024 Activity Report

1. Activities to Protect a World Natural Heritage Site, Subtropical Forests

As part of our activities this fiscal year, we carefully selected and imported GPS equipment, captured a wild goat, and put a GPS collar on it in order to initiate a behavioral tracking survey of wild goats using GPS. Despite the limited precedents in Japan, we were able to obtain as much information as possible and begin the behavioral tracking survey within the fiscal year through repeated discussions with stakeholders. In addition, regarding the survey of feeding damage by wild goats, it was decided to use DNA analysis of wild goat feces after repeated examinations of the method, and preparations, including collecting feces, were started. As a result, we were able to lay the basic groundwork for a full-scale survey in the next fiscal year.



A herd of wild goats. Photo by the Ministry of the Environment



Goat wearing a GPS collar



Bite marks of a wild goat

(1) Behavioral tracking survey of wild goats using the GPS

■ Purpose of the survey

Government agencies have surveyed the habitat of wild goats by placing automatic cameras in the forest or observing them from the air with drones. However, the whole picture has not been revealed yet. This survey intends to identify the home range and use areas of wild goats using GPS, and to facilitate and improve the efficiency of the

capture project carried out by government agencies utilizing the data obtained from the survey.

■ Selection of equipment

- We compiled examples of behavioral tracking surveys using GPS collars on animals (e.g., deer, wild boar) and other reference information from literature and stakeholders.
- The equipment was selected based on the data acquisition method.

[Purchased GPS collar and communication equipment]



■ GPS collar settings for data acquisition

- Before putting it on a wild goat, we brought the GPS collar into the forest environment of Iriomote Island and used it to verify the frequency of collecting data to do the activity successfully.
- Based on the verification results, battery life, and other factors, the details of the setting were determined through discussion with stakeholders.

■ Capturing the goat to put a GPS collar on it

- In cooperation with the capture project in Okinawa Prefecture, we asked the operator, who is engaged in capturing animals commissioned by the prefecture, to provide a goat suitable for putting on a GPS collar, if they capture it. We also asked hunters to cooperate by providing a goat if it was caught in a wild boar trap by accident during the wild boar hunting period.
- On January 24, 2025, a partner hunter notified us of the capture of a wild goat, and we then inspected the captured goat.

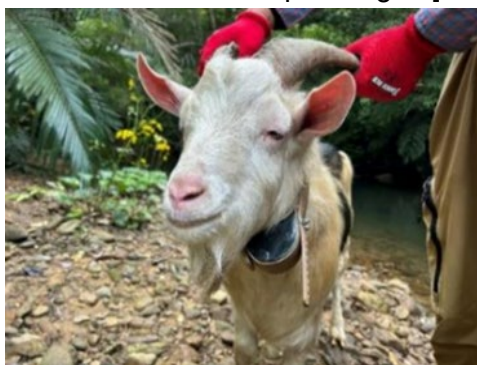
■ Putting on a GPS collar

- On January 24, we inspected the captured goat and determined that it could wear the GPS collar without any problems and then put it on the following day, January 25.

[The area where the wild goat wearing the GPS collar was released]



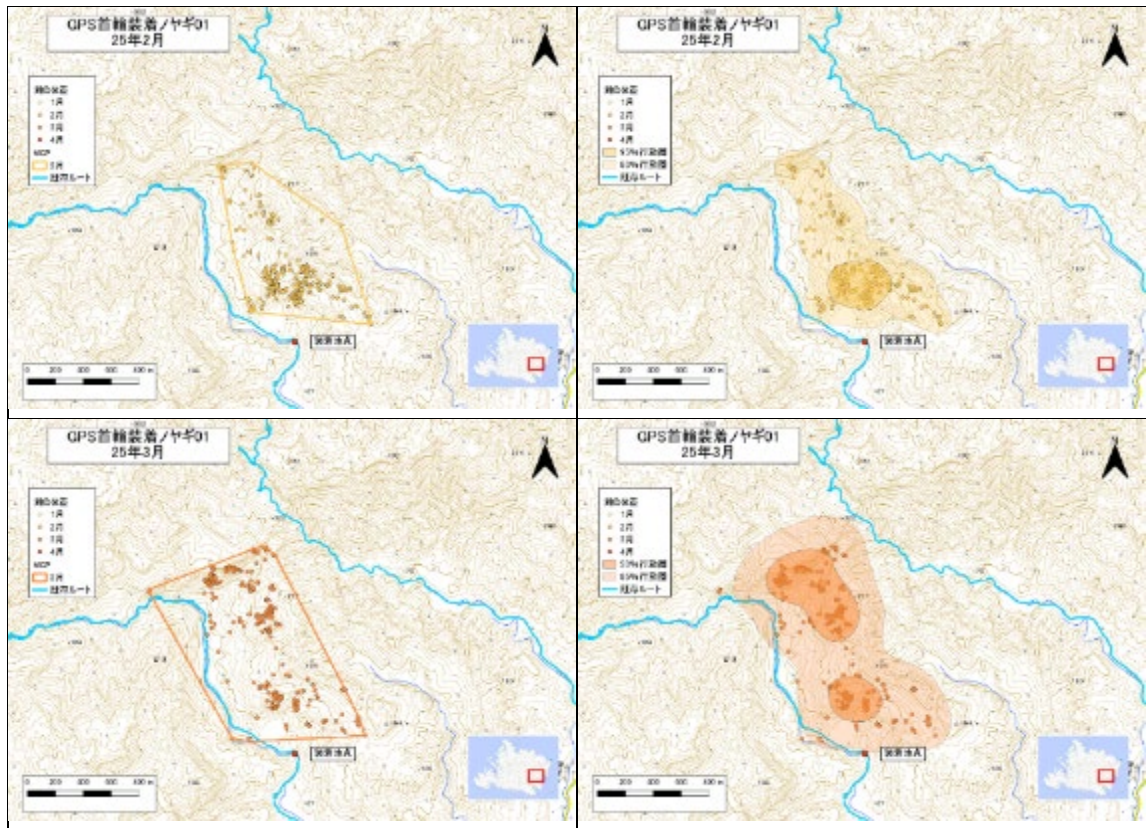
[Putting the GPS collar on the captured goat]



[Home range]

- Throughout the entire survey period, the goat's home range was between the left bank of the Shiira River and the upper reaches of the Fukari River and Aira River on the north side of the area where we put the GPS collar on the goat (where it was released), mainly on a slope facing southwest.
- In January, the goat was caught twice in a nearby wild boar trap immediately after its release, and did not move until it was released for the third time on the 31st.
- In February, the goat's core area was the north side of the release point. In March, it was the north side of the release point and the area between the Shiira River and the Aira River, located north-northwest of the release point.





(2) Survey on feeding damage by wild goats (fecal analysis)

■ Purpose of the survey

It has been observed that wild goats prefer to eat the pteridophyte (vascular plant) the king fern (*Angiopteris evecta*) in forests, but their other preferences and biology are unknown. This survey intends to identify the plants that wild goats eat on Iriomote Island and to obtain useful information for improving the efficiency of capturing and protecting rare plant species.



King fern with bite marks



A wild goat eating in the forest

■ Collection and preservation of feces for DNA analysis

To perform DNA barcoding analysis on the feces of goats, samples of feces were collected. To date, 15 samples, including those from the individual with a GPS collar, have been collected and preserved in frozen storage. After collecting a certain number of samples, we will ask a specialized agency to analyze them.



Goat feces found in the forest



Goat feces samples collected

2. Activities to Maintain the Health of Japan’s Largest Mangrove Forest

As part of our activities this fiscal year, we collected and disposed of debris that had washed up in the mangrove forest surrounding Funaura Bay in the northern part of Iriomote Island. We also examined a simple survey method for the mangrove forest around the collection site and began the survey. In addition, we planned and held beach cleanup events for local residents.



Funaura Bay with vast mangrove forests



Washed-up debris deposited in the mangrove forest



Funaura nipa palm community (protected species)

(1) Collection and disposal of washed-up debris in Funaura Bay

■ Collection of washed-up debris

Since handling washed-up debris in mangrove forests is time- and labor-consuming due to the environment, it has been almost untouched by volunteers or other activities on the island. In this project, temporary workers were hired from the region to collect and properly dispose of the washed-up debris that had accumulated in and around the mangrove forest.

■ Activity summary

1. Date and time

Three events: 9:00–13:00 on March 10, 2025, 9:00–13:00 on March 12, and 10:00–14:00 on March 13

2. Venue: Mangrove forest around Funaura Bay (this time the site is north of the prefectural road)



3. Participants and number of participants

Local residents: A total of 17 persons participated (5 persons in the 1st cleanup, 6 persons in the 2nd, and 6 persons in the 3rd)

■ Results of debris collection

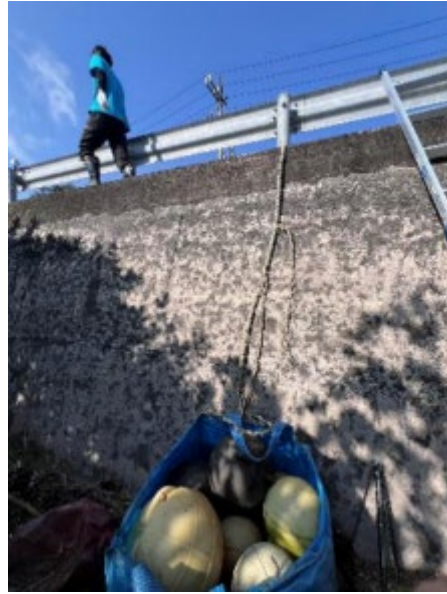
A total of 19 flexible container bags of debris were collected during three cleanup events. The collected debris was separated by type, and the amount of each type was recorded. (See the table below.)

Of all the debris collected, the number of flexible container bags containing buoys/fishing gear and polystyrene foam was the largest, with a total of seven bags each. These two types of debris accounted for more than 70% of the total debris collected. This is because there were many large polystyrene foam buoys, fenders and plastic buoys.

[Debris deposited in the forest]



[Collection work]



■ Disposal of washed-up debris

The collected debris was transported to Uehara Port by a crane truck and then properly disposed of at the final industrial waste disposal site in Ishigaki City. A total of 37 flexible container bags, including those collected at the cleanup event held on March 19, were transported and disposed of.

(2) Fixed-point monitoring of the mangrove forest surrounding Funaura Bay

■ Purpose of the monitoring survey

Okinawa Prefecture is investigating crustaceans and shellfish to examine the effects of washed-up debris on coastal organisms. However, the effects on plant growth remain unknown. The purpose of this monitoring survey is to examine whether the washed-up debris affects the growth of mangroves by using a simple method.

■ Monitoring survey overview

Indicator	Tree height, breast high diameter, photograph
Target tree species	Loop-root mangrove (<i>Rhizophora mucronata</i>), large-leafed orange mangrove (<i>Bruguiera gymnorhiza</i>)
Survey area	Two 5 × 5 m survey areas Survey area A: The place where washed-up debris is collected Survey area B: The place where washed-up debris is not collected
Survey method	(1) Selection of survey areas (2) Selection of survey trees (20 trees per survey area) (3) Measurement of tree height and breast high diameter (4) Survey on the effects of washed-up debris (photographic records) (5) Collection and recording of debris in survey area A
Remarks	The selected survey areas were those directly facing the sea, not affected by the bridge of the undersea road, where loop-root mangrove and large-leafed orange mangrove, the representative species of mangrove forest, grow.

[Location map of the survey area]





Survey area A: The place where debris is collected

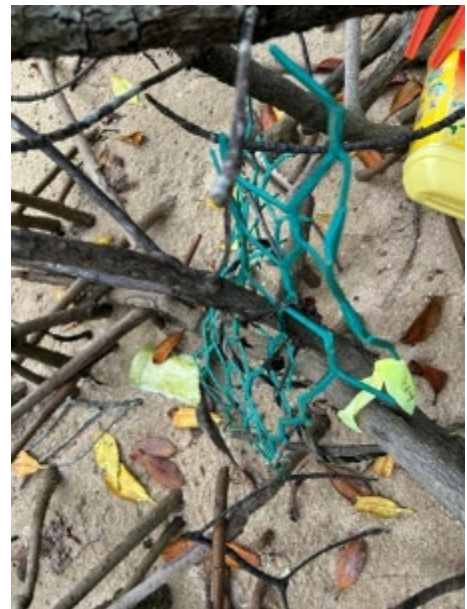


Survey area B: The place where debris is not collected

[Survey activity (photo)]



Tree height measurement



Effects of washed-up debris



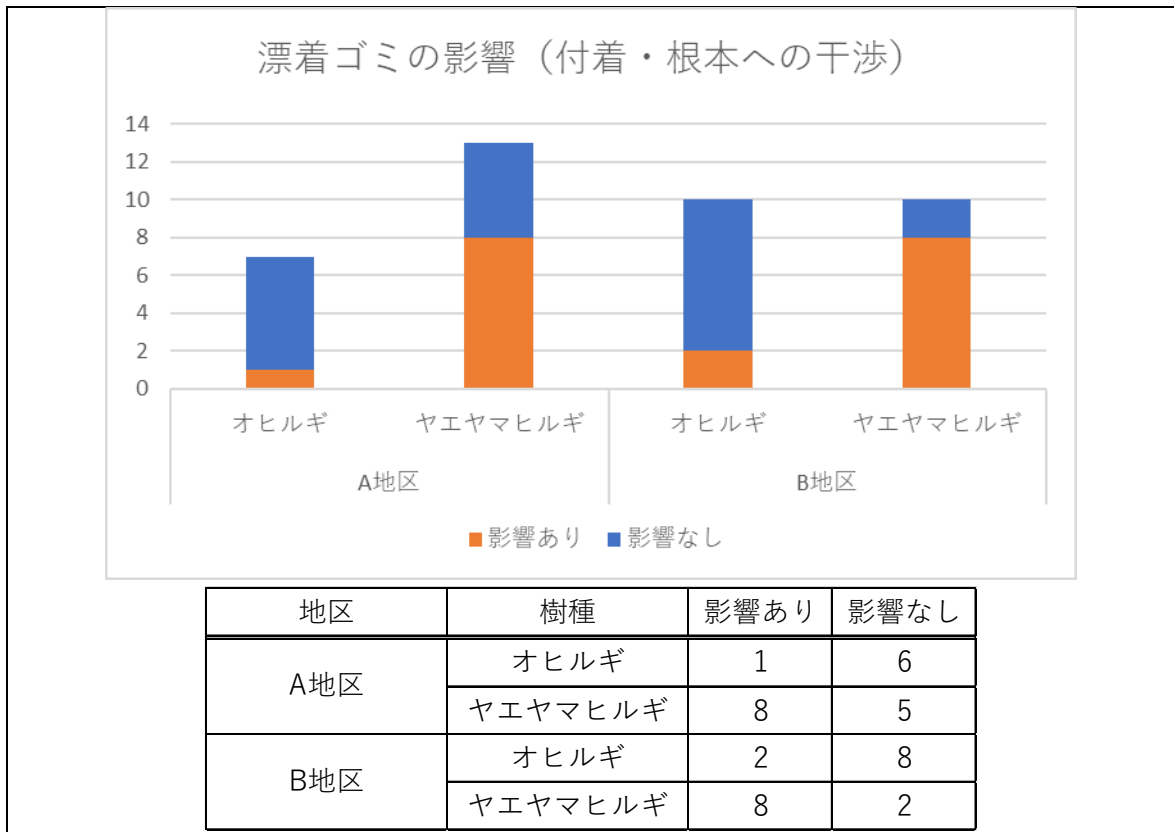
Target tree (large-leaved orange mangrove)



Debris collected from survey area A

■ Results

[Effects of washed-up debris]



■ Discussions and next steps

Among the mangroves, loop-root mangrove generally grows most seaward, while large-leaved orange mangrove grows in the hinterland behind it. However, a large number of loop-root mangrove trees that grow seaward were classified as “Affected.” In many cases, the ropes used for fishing gear were entangled. In some cases, the ropes with plastic buoys still attached were entangled.

The future survey focuses on the following:

- Are there specific trees affected by the debris each time it is washed up?
- In survey area B, does the uncollected debris remain entangled with the surveyed trees? Is the growth of the trees affected by the debris that remains entangled?

And we will continue measurements.

We also hope that continuously informing participants in the beach cleanup about the growth of mangroves will raise their awareness and help them develop an emotional attachment to the mangrove forest at the site.

(3) Funaura Bay beach cleanup event

■ Beach cleanup event

By incorporating event-like features into the beach cleanup volunteer program, we held a beach cleanup event for islanders to encourage participation from islanders who had not previously joined beach cleanups, and to provide an opportunity for them to learn about and increase awareness of the problem of washed-up debris in mangrove forests.

■ Event summary

Venue, time and date: 13:00–17:00 on March 17, 2025 (Monday) in the mangrove forest surrounding Funaura Bay

Participants: 5 Iriomote Island residents

■ Results

[Results of debris collected]

In this event, debris was collected in the bay, which was the south side of the site, where debris collection took place in March, across the prefectural road. A total of nine participants, including management staff and instructors, collected 16 flexible container bags of debris during the cleanup event. The collected debris was separated by type, and the amount of each type was recorded. (See the table below.)

Of the collected debris, the number of bags containing polystyrene foam was overwhelmingly high, totaling nine, followed by four bags of buoys/fishing gear. As with the previous collection work, there were many large polystyrene foam buoys and plastic buoys, which accounted for more than 80% of the total collected debris.

[Amount of collected debris by type]

ゴミの種類	回収量
ブイ・漁具	4
発砲スチロール	9
プラスチック	1
ペットボトル	1
金属・ビン・カン	1
トン袋	16

Summary and discussion

In this fiscal year, the total amount of the debris washed ashore and collected in the mangrove forest around the Funaura Bay by 24 participants in the collection activities including a collection event was 35 one-ton bags. The number is broken down to 19 bags in the collection work conducted on the north of the prefectural road by a total of 17 participants for three days and 16 bags collected by seven people in the event carried out on the south of the prefectural road. In spite of the small number of participants and the short duration of the event, the amount of debris collected was relatively large. One reason for this is that large volumes of debris such as large Styrofoam products, metal drums, and plastic buoys were collected.

Debris accumulated quite densely in small areas of the Funaura Bay though it was not clear how long the debris had remained there because a beach cleanup by volunteers or collection work by a government organization had hardly been carried out in the bay. While walking into the mangrove forest, we often found ropes entwined around the prop roots of mangrove trees, and Styrofoam and plastic bottles caught between the roots extending like octopus legs. We had to collect such debris carefully using a tool such as reaping hook, clearly finding that it took more time and effort to collect debris in a mangrove forest than to collect debris in a usual beach cleanup.

Future plans and prospects

Through this fiscal year's activities, we realized again the importance of collecting the debris in the mangrove forests, a precious natural resource of Iriomote Island, to maintain the environment for the mangrove forests. We would like to carry out the activities such as collection work and events in an ongoing manner and call on many people including local residents to participate in the activities in the future. We are also strongly aware of the need to speed up the search for ways to reduce costs and reuse debris as resources, given the current circumstances where the cost of transporting and disposing of the collected debris is high and the collected debris has been landfilled. This is also a key point to increase the amount of debris to be collected; thus, we would like to enhance cooperation with the related organizations to consider effective measures.

[Plan for FY2025]

- (1) Collection of debris washed ashore in the mangrove forests
 - To be carried out in an ongoing manner

- (2) Fixed-point monitoring of the mangrove forest
 - To be conducted once a year with experts' advice
 - Linkage with investigations by experts will also be considered.

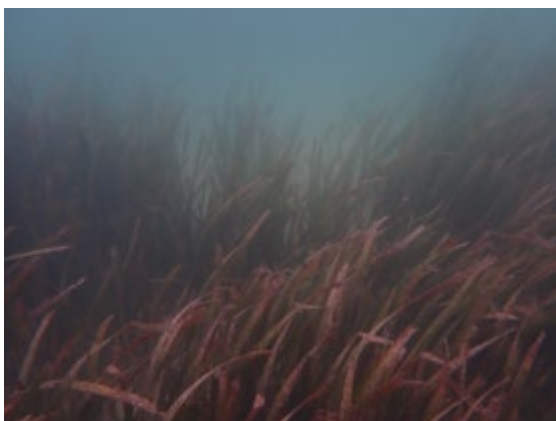
- (3) Holding of beach cleanup events
 - Events for elementary and junior high school students and parents and children will be planned and held.

3. Activities to restore sea forests (seagrass beds) that support biodiversity

In this fiscal year's activities, with the cooperation of experts, we verified where in the sea area around Iriomote Island would be effective as site for installing feeding-prevention fences for tape seagrass. We inspected several seagrass beds, which had been confirmed in the past, to check the condition of the tape seagrass growing in the beds. After narrowing down candidate sites, we monitored the tape seagrass there. Then, we went through the procedures for the required permit application procedures while coordinating with local communities and fishery stakeholders. At the same time, we examined the structures of protection fences and procured materials from the main Okinawa island. As it took time to coordinate with the relevant parties and complete the permit application procedures, we could not install the fences within the fiscal year, which forced us to postpone the installation work to the following fiscal year.



Feeding-prevention fence installed by the Ministry of the Environment and a sea turtle
Image provided by the Ministry of the Environment (photographed by IDEA Consultants, Inc.)



Well-growing tape seagrass meadows in the east coastal area around Iriomote Island

(1) Installation of feeding-prevention fence

■ Selection of installation site

As the purpose of installing feeding-prevention fences was to protect and restore the tape seagrass meadows and to utilize the area as a place for providing environmental education to local residents and children, we investigated five candidate sites from A to E based on the following conditions and criteria to select an installation site.

[Conditions and criteria for selection]



- An area where there are no such fences installed by the Ministry of the Environment or under other projects
- Tape seagrass that used to grow well in the area is in danger of extinction → Extent of feeding damage
- Easy access from the village or shore







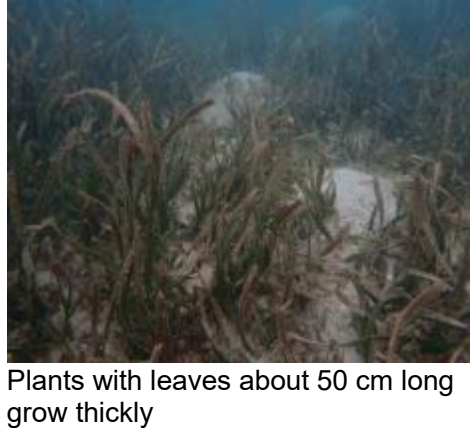
[Candidate sites]



A: Midara Hama, B: Sonai Kita Hama, C: Hoshitate Mae no Hama, D: Takana, and E: Nohara

[Results of investigating the candidate sites]

	Location	Condition of tape seagrass	Remarks
A Midara Hama		 There are a few small plants with short leaves	Prevention fences installed (left uncontrolled)

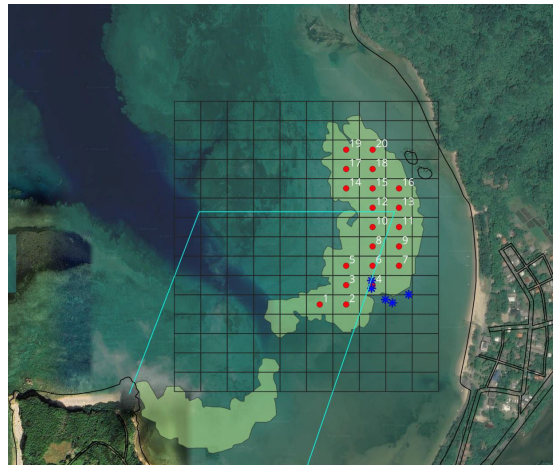
<p>B Sonai Kita Hama</p>			<p>Prevention fences installed (left uncontrolled) In front of Iriomote Elementary School, adjacent to the village</p>
<p>C Hoshitate Mae no Hama</p>		<p>No photo available (same as that in the Sonai Kita Hama) There are a few small plants with short leaves</p>	<p>Adjacent to a village</p>
<p>D Takana</p>			<p>Prevention fences installed, near the prefectural road</p>
<p>E Nohara</p>			<p>Distant from the coast</p>

After examining the investigation results, we selected C: Hoshitate Mae no Hama as the installation site.



■ Investigation of the current conditions of tape seagrass meadows

The tape seagrass meadow, where growth of tape seagrass was once confirmed, was divided into 50 m meshes, and then 20 fixed points were selected in the center (marked with red dots). The number of tape seagrass plants, leaf length, leaf width, and number of leaves per 1 × 1 m quadrat were counted/measured.



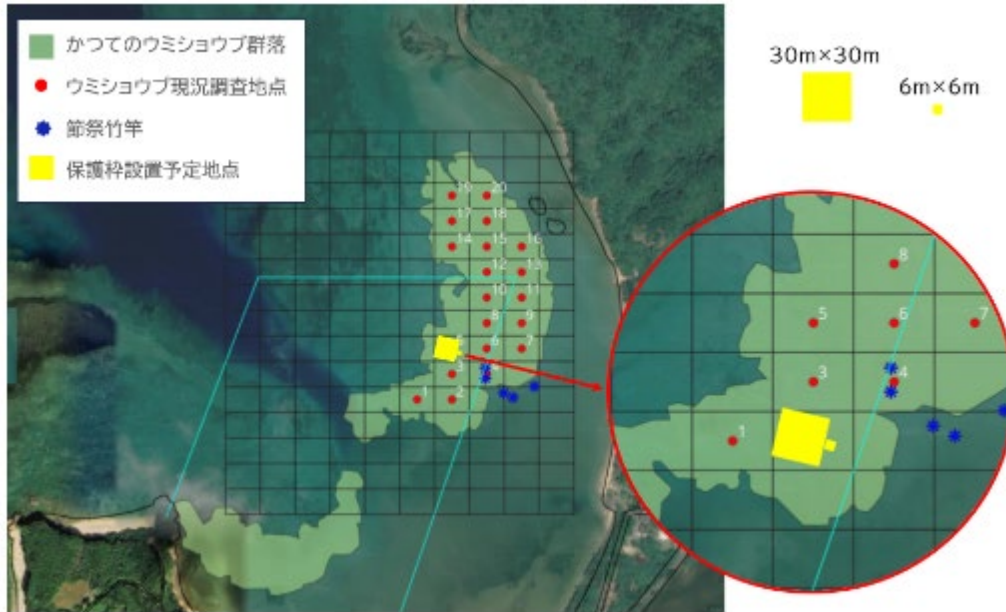
[Images showing the actual investigation]



■ Determination of installation location

Among the areas where tape seagrass meadows were once observed and the current conditions of the tape seagrass meadows were investigated, we determined the

locations where feeding-prevention fences would be installed through consultation with the Hoshitate community center. After examining the structures of fences, we drew up a plan and submitted it to the Yaeyama Fishery Cooperative Association to seek approval for installing the fences.

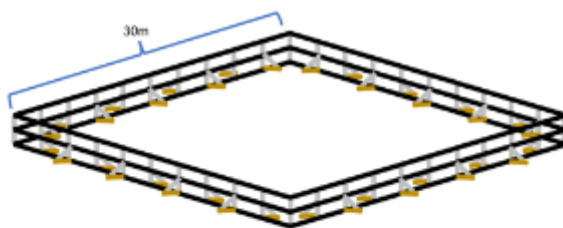


[Images showing briefing for the Hoshitate community center]

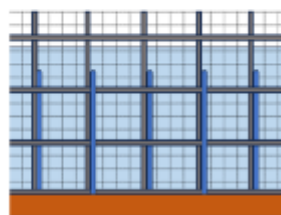


■ Structure of protection fence

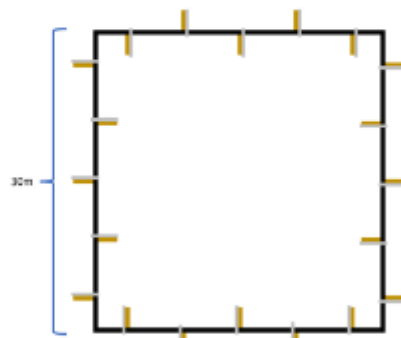
- Structure made up of steel pipes and clamps
- Area: 936 m², the sum of 900 m² (30 × 30 m) of 1 unit and 36 m² (6 × 6 m) of 1 unit



※上面開放型で周囲にワイヤーメッシュ
 ※6m×6mも同構造



海中側面からの設置イメージ



上面からの図

※設置時に地元漁業者と協議の上、コーナーへのパイプの設置やパイプへの反射テープを張り、視認性を確保し、船舶の航行に支障がないようにする

■ Activity plan with feeding-prevention fences

○ Prevent feeding damage by green sea turtles and promote the regeneration of tape seagrass plants

- Installation, periodical servicing (once a month), and emergency servicing (in case of typhoon, etc.) of feeding-prevention fences

○ Periodically investigate the growth of tape seagrass

- Investigation of current conditions (conducted)
The tape seagrass meadow, where growth of tape seagrass was once confirmed, is divided into 50 m meshes, and then 20 fixed points are selected in the central area (marked with red dots). The number of tape seagrass plants, leaf length, leaf width, and number of leaves per 1 × 1 m quadrat are counted/measured.
- Monitoring of the recovery process
Four permanent fixed points are established outside the fences. The number of tape seagrass plants, leaf length, leaf width, and number of leaves per 1 × 1 m quadrat are counted/measured twice, immediately after the installation of the fences (in summer) and three to four months later in winter.

○ Use as a place for providing marine education to students in elementary and junior high schools on the island

- Small 6 × 6 m meshes are made available to the elementary and junior high school students so that they can observe tape seagrass and learn under the guidance of experts. Establishment of continuous learning system.

Future plans and prospects

We would like to complete the first protection fence and conduct monitoring and environmental education. At the same time, we would like to examine the possibility of installing the second protection fence. We wish to carefully consider the installation site and structure of the fences while checking the effects of the first one. In addition, we would like to closely monitor the trend of experimental land-based aquaculture of tape seagrass, which was started by a specialized agency. We have high hopes for transplanting seedlings through land-based aquaculture into the area within the fences because doing so can accelerate the recovery of seagrass beds.

[Plan for FY2025]

- [1] Installation, maintenance and management of feeding-prevention fences
 - Installation and maintenance of the first completed protection fence
 - Study for installation of the second protection fence and its installation
- [2] Monitoring of the growth of tape seagrass within the fences
 - Implementation of continuing investigations by specialized agencies
 - Training coordinators

- [3] Development and implementation of environmental education programs for local communities using tape seagrass as a theme
 - Linkage with the marine education at Iriomote Elementary School and Iriomote Junior High School

- [4] Study on the propagation of tape seagrass by transplantation
 - Collection of information on land-based aquaculture of tape seagrass

4. Study for initiating the Iriomote volunteer activities

To start the “Iriomote Volunteer Program” by the Daikin employees in FY2025, we examined, planned, and arranged/coordinated the schedule, accommodation, and activities. In September 2024, we inspected the “Shiretoko Volunteer Program.” Through the inspection, we learned about the planning and management of volunteer programs and were able to envisage a way to accept volunteers in Iriomote Island. In February 2025, we conducted part of the planned program as a model tour, and as a result, fixed the final itinerary and contents of the “Iriomote Volunteer Program.”

[Tips learned through participation in the inspection]

- Program structure, operating system, and safety management
- Mechanisms to motivate or enhance motivation of participants
- Physical strength level required for the work
- Building of relationship with participants, interaction with staff, and necessary equipment

The first Iriomote Island volunteer activity will be held from May 24 (Sat.) to May 27 (Tue.), 2025.

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