State of Conservation Report of Amami-Oshima Island, Tokunoshima Island, Northern part of Okinawa Island, and Iriomote Island (Japan) (N1574)

in Response to the World Heritage Committee Decision 44 COM 8B.5

Government of Japan

November 2022

Contents

1. Executive summary of the report 2

2. Response to the Decision of the World Heritage Committee 3

2.1 Tourism management 4

2.2 Traffic management to reduce road fatalities 8

2.3 River restoration 10

2.4 Forest management 15

3. Other current conservation issues identified by the State Party which may have an impact on the property's Outstanding Universal Value 20

4. In conformity with Paragraph 172 of the Operational Guidelines, describe any potential major restorations, alterations, and/or new construction(s) intended within the property, the buffer zone(s) and/or corridors or other areas, where such developments may affect the Outstanding Universal Value of the property, including authenticity and integrity. 20

5. Public access to the state of conservation report 20

6. Signature of the Authority 21

Annexes

a-1. Outline of the Draft Iriomote Island Tourism Management Plan

a-2. Overview of Tourism Management on Amami-Oshima Island, Tokunoshima Island, and the Northern Part of Okinawa Island

b-1. Review of Existing Roadkill Prevention Measures and Future Approach

c-1. Lists and maps of river structures

d-1. Forestry Operation Policy in Consideration of the Natural Environment on Amami-Oshima Island and Tokunoshima Island

d-2. Forest Management in Buffer Zones in the Northern Part of Okinawa Island

1. Executive summary of the report

The Government of Japan established task forces for each of the four requests pursuant to Decision 44 COM 8B.5 adopted by the 44th session of the World Heritage Committee and examined its responses to these requests.

- For tourism management, the existing basic visitor management plan is being revised into the Iriomote Island Tourism Management Plan, an integrated plan of various concepts, plans, and systems related to tourism on Iriomote Island, based on the evaluation of the possible impact of tourism use. Under this plan, the tourist visitation level will be managed and other measures will be implemented, including legally binding entry regulations within the property and reducing visitor concentration during certain periods.
- For traffic management to reduce road fatalities, the current status on the four islands containing the property was compiled, including the roadkill incidents of threatened species, implementation of countermeasures, and their effectiveness. The result indicated that continued enhancement of roadkill prevention measures for threatened species is necessary on all four islands. In the locations where prioritized countermeasures were deemed necessary, traffic management measures were enhanced, or methods of enhancement were examined. Ongoing monitoring of roadkills and examinations of the effectiveness of countermeasures will continue so as to adopt the optimal measures for each location. In addition, relevant organizations will work together to promote the development of more effective countermeasures based on the examination of roadkill reduction measures and the mechanism of roadkill occurrence.
- For river restoration, a comprehensive river restoration strategy, presenting the basic approach to and process of river restoration on the property, was developed. In line with this strategy, research on the impact of river structures on the property and analyses and examinations of causal relationships will commence.
- For forest management, actions concerning future logging operations in the buffer zones were examined and compiled through discussions with forestry operators, taking into account the status of various systems for logging operations on Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island. Efforts with an enhanced consideration to the natural environment will be promoted, such as compliance with the forestry operation policy established for each region and regular information exchange and liaising between forestry operators and relevant government agencies, in addition to compliance with regulations such as the Natural Parks Act. Furthermore, research will be conducted to investigate whether logging operations in the buffer zones have any impact on the Outstanding Universal Value (OUV).

There are no other conservation issues identified nor development projects which may impact on OUV of the property.

Public access to the state of conservation report is acceptable.

2. Response to the Decision of the World Heritage Committee

The Government of Japan has established task forces consisting of relevant government organizations and experts in different fields under the Regional Liaison Committee (which comprises the administrative organs of the property, including Ministry of the Environment, Forestry Agency, Agency for Cultural Affairs, Kagoshima Prefecture, Okinawa Prefecture, and 12 municipalities), in response to the four requests pursuant to Decision 44 COM 8B.5, adopted by the 44th session of the World Heritage Committee. Under this structure, Japan's responses to these requests have been examined taking into account the scientific advice provided by the Scientific Committee (Figure 1).

The following is a report on the progress regarding the results of the review of each request.

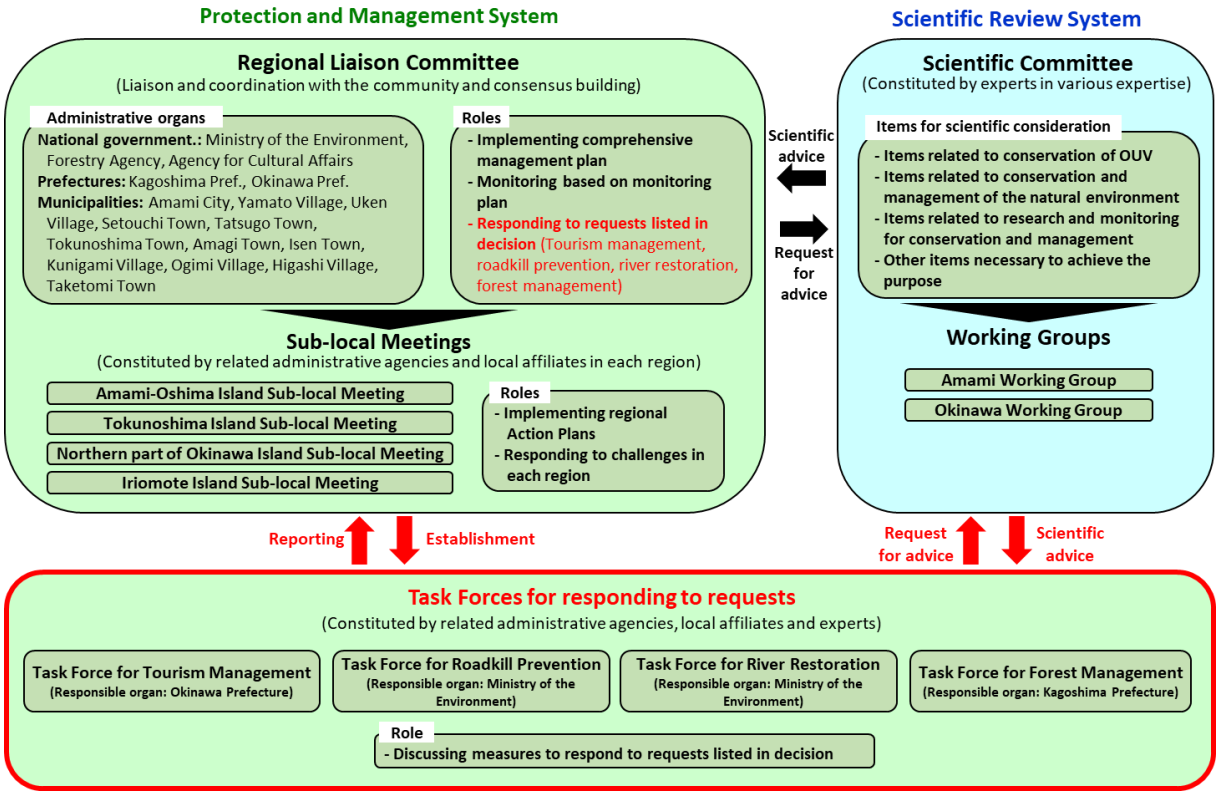


Figure 1: Comprehensive management system of the property

2.1 Tourism management

a) Capping or reducing levels of tourist visitation from current levels, especially on Iriomote Island, until a critical evaluation of tourism carrying capacity and impacts can be conducted and integrated into a revised tourism management plan.

2.1.1 Report on Iriomote Island

(1) The current status of tourism uses and tourism management on Iriomote Island

- On Iriomote Island, visitors to the island are managed based on the Basic Visitor Management Plan for a Sustainable Iriomote Island established in January 2020, and monitoring on the status of tourism uses and their environmental loads is conducted in cooperation with experts.
- The annual number of tourists visiting Iriomote Island averaged 330,000 for the ten years leading up to 2019 (excluding 2011 data, which was affected by the Great East Japan Earthquake). It peaked at 390,000 in 2015, and then showed a gradual downward trend. Since 2020, that number has fallen by 50% or more of the pre-2019 level due to the impact of movement restrictions in response to the COVID-19 pandemic. Accordingly, this report uses the number of tourists in 2019, the year immediately preceding the COVID-19 pandemic, as the current level.
- Tourism on Iriomote Island can be generally divided into the following two types: circular tours where tourists move around the island on large buses or motor-driven vessels; and nature experience-oriented tours where tourists enjoy canoeing, trekking and other nature-based activities. While the former often attracts group travelers, the latter is popular with individual travelers. The trend in recent years has been a decrease for group tours and an increase for individual travel. For both travel types, a small number of tourists stay overnight on Iriomote Island. According to a survey conducted from 2015 to 2016, the proportion of tourists staying overnight on Iriomote Island was 23%.
- The number of tourists who visited Iriomote Island in 2019 was 290,000. Of these, a cumulative total of approximately 70,000 people (24%) participated in canoeing, trekking and other eco tours led by tour guides to visit fields within the property. A cumulative total of approximately 150,000 people (52%) participated in sightseeing tours using motor-driven vessels on the Nakama and Urauchi rivers. In addition, tourists also used facilities and fields in the Surrounding Conservation Area and marine areas.
- The number of tourists visiting Iriomote Island fluctuates greatly from day to day. In 2019, it peaked at 1,543 people a day, averaged 862 people a day, with a standard deviation of 250 people a day, and trends indicate that tourism use is concentrated in certain periods.

(2) Evaluation of tourism carrying capacity and its impact

- Okinawa Prefecture has identified all the potential impacts (threats) of tourism within and outside the property on Iriomote Island, and for each threat, the prefecture evaluated the current risk level and its fluctuations based on the level of importance and tourism carrying capacity of the affected areas. The results of the evaluation are as follows.

  (i) With respect to nature experience-oriented tours in the property, the number of fields used and the number of people entering each field have been on the rise in recent years. For the most heavily used Hinai River, the number of people entering the field on a peak day far exceeded the river's tourism carrying capacity calculated from the spatial volume of the visited area. The current level of risk is therefore evaluated as high and on the rise with respect to the number of the fields used, the number of visitors entering each field, and the impact of visitor activities. On the other hand, with respect to circular tours using motor-driven vessels on the Nakama and Urauchi rivers, which are also in the property, the current level of risk is evaluated as low and the likelihood of future increase in the risk is also low, given that measures to reduce their impact have already been taken and the number of tourists using these services has been declining in recent years.

  (ii) As for the total number of tourists to Iriomote Island, including outside the property, the island's tourism carrying capacity has been examined from the viewpoint of its capacities of transport, waste and sewage treatment, clean water supply, and so on. The island's clean water supply capacity was identified as one of the factors in restricting the daily number of tourists visiting the island, given the situation where water supply capacity approaches its limit and there is concern that the lives of local residents could be temporarily affected by tourism during certain periods of concentrated tourism use. At the current tourist visitation level, the island's tourism carrying capacity calculated from its clean water supply capacity was exceeded on 24 days a year (approx. 7%). However, given that the actual water shortage was not severe and the actions taken so far have been limited to making requests to save water, the current level of risk is evaluated to be medium and there is no clear sign of it rising.

  (iii) On changes to the travel type of tourists, no direct causal relationship has been identified between the occurrence of roadkill involving Iriomote cats or other animals and an increase in traffic on the island as well as the diversification of tourists' behavior due to an increase in individual travelers. However, judging from the severity of fatal traffic accidents involving Iriomote cats or other animals, the current level of risk has been evaluated to be high and on the rise.

(3) Management methods of tourist visitation levels on Iriomote Island

- Tourist visitation levels are managed by the following methods in response to the risks and threats identified in the above evaluation.

  (i) To manage nature experience-oriented tours in the property, based on the Ecotourism Promotion Act of Japan, the Taketomi Town Iriomote Island Ecotourism Promotion Council has established appropriate management standards for the number of fields to be used, the number of people entering each field, and visitors' behaviors within the field. In fields where there is an especially strong concern over the impact of tourism, entry is restricted by establishing the maximum number of visitors per day below the current visitation level. With respect to other fields, ceilings are also set on the number of tourists per tour guide and total daily number of tourists per business operator. Specifically, in accordance with the Ecotourism Promotion Act, those who intend to enter the field must apply in advance to the Mayor of Taketomi Town, and only those who are approved are allowed to enter, within the maximum number of visitors. Those who fail to comply with this provision will be penalized. With regard to the limitation on the number of tourists per tour guide and business operator, compliance with management standards is required in the licensing system based on the Ordinance Concerning Tourism Guides in Taketomi Town. Administrative penalties shall be imposed on violators. By combining the provisions of the Ecotourism Promotion Act and this Ordinance, nature experience-oriented tours is regulated and legally bound. Additionally, the Iriomote Foundation, established mainly by local people, is expected to be commissioned by Taketomi Town to operate the entry regulation and guide licensing system.

  (ii) To manage the daily number of tourists visiting Iriomote Island, the island's tourism carrying capacity calculated from its clean water supply capacity (1,200 people/day)* is used as the management standard. To adhere to this standard, the daily number of tourists visiting the island is controlled at or below the current visitation level, and visitor concentration in certain periods is mitigated by encouraging individual travelers to visit the island during the off-season through the enhancement of information dissemination by measures such as an ethical tourism calendar that predicts congestion on Iriomote Island. The visiting periods of group tours are also coordinated in advance at liaison meetings with tourism-related businesses (airlines, shipping companies, travel agents) transporting tourists to Iriomote Island.

  ** If the proportion of tourists staying overnight on the island rises, the island's tourism carrying capacity calculated from its clean water supply capacity will fall. The tourism carrying capacity must therefore be reviewed according to the monitoring results of the overnight stay.*

  (iii) In response to the growing trend towards individual travel, for the time being, measures are being taken, such as installing devices in rental cars to alert against exceeding the statutory

speed limit, placing warning signs in areas where roadkills have been found, and enhancing public awareness activities. Going forward, we will analyze the relationship between tourists and traffic accidents involving Iriomote cats and so on. Based on the results of this analysis, more effective measures will be considered in national, prefectural, and other projects.

- In addition to the management methods described in (i) to (iii) above, administrative organs will accelerate efforts to introduce the followings as new mechanisms to nurture tourists' awareness about the environmental load of tourism and to encourage them to act responsibly.
  - Taketomi Town will establish a Taketomi Town Visitor Tax (provisional name) to equitably collect from tourists a fee for entering Iriomote Island. The tax collected will be used to pay for operating various systems for tourism management, monitoring activities and improving infrastructure to reduce the impact of tourism, and so on.
  - Okinawa Prefecture will introduce and utilize an Eco-certification System (provisional name), under which government agencies and others certify, award, and advertise tourism operators and local people who are operating ethical tours with smaller environmental loads and/or who conduct environmental conservation activities. The system will be used as an incentive to promote the reduction of tourism's environmental load. The prefectural government is going to consider toward the establishment of the system and preparation of a budget.

(4) Integration with and revision to the Iriomote Island Tourism Management Plan

- To systematically implement the tourism management methods presented in (3) above, based on the evaluation of the island's tourism carrying capacity and so on described in (2), Okinawa Prefecture is revising its Basic Visitor Management Plan for a Sustainable Iriomote Island established in January 2020, to create the Iriomote Island Tourism Management Plan as a comprehensive plan having various concepts, plans, and systems related to Iriomote Island tourism which have so far been discussed separately.
- In order to securely implement projects based on the plan and confirm outcome, the Iriomote Island Tourism Management Plan will grant the Iriomote Island Sub-local Meeting under the Regional Liaison Committee the function to review and update the plan based on continuous monitoring and objective evaluations.
- Revision to create the Iriomote Island Tourism Management Plan began in August 2021 with the establishment of a task force consisting of experts, relevant local groups and businesses, and administrative organs. The task force examined the plan and a draft plan was approved by the Iriomote Island Sub-local Meeting in July 2022. Presently, hearings of opinions and adjustments to details are taking place with respect to the draft plan. The Iriomote Island Tourism Management

Plan is scheduled to be finalized at the Iriomote Island Sub-local Meeting in February 2023. An outline of the draft Iriomote Island Tourism Management Plan as of July 2022 is attached to this report. (Annex a-1)

2.1.2 Report on other three regions

- With respect to Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island, we have not seen any rapid increase in tourists at present and have not confirmed any problem that requires urgent actions, partly due to the impact of the movement restrictions in response to COVID-19. We will continue to closely monitor the actual status of tourism uses both within and outside the property.
- Further efforts will be made based on the Master Plan of the Amami Island Group Sustainable Tourism and the Master Plan of the Northern Part of Okinawa Island Sustainable Tourism. Confirmation and coordination is to be carried out in the relevant Sub-local Meetings and expert committees to ensure that the plan is appropriately operated, reviewed, and updated in accordance with the actual situation in each region.
- An overview of tourism management on Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island is attached to this report. (Annex a-2)

2.2 Traffic management to reduce road fatalities

b) Urgently reviewing the effectiveness and strengthening if necessary the traffic management measures designed to reduce road fatalities of endangered species (including but not limited to Amami Rabbit, Iriomote Cat, and Okinawa Rail)

2.2.1 Status of roadkills and their impact on the species survival and the ecosystem functions

- Roadkill incidents of threatened species, the causes, and the impact on their populations on the four islands have been reviewed based on the information obtained to date. For all species, roadkill incidents have been on the rise or have remained at high levels over a long time. The potential causes of this situation are changes in tourism dynamics and a recovery in, and greater distribution of, the populations of threatened species in recent years due to measures taken against alien species (pp. 3–9 of Annex b-1).
- With regard to the Iriomote cat, which is the top predator with a small population, roadkills are considered to have a material impact on the species population and on the ecosystem of Iriomote

Island. As for the Amami rabbit and the Okinawa rail, it is estimated that the population and distribution of both species are on a recovery trend. Nonetheless, given their high rankings on the IUCN Red List, it is necessary to continue reducing the impact of roadkills on these species. For the Amami rabbit on Tokunoshima Island, the habitat is fragmented between the southern and northern parts of the island, and the impact of roadkill is of greater concern (pp. 10–12 of Annex b-1).

- In addition to these three species, an analysis was conducted on the roadkill trend of the Ryukyu long-haired rat. Furthermore, roadkills of animals on Iriomote Island, including common species, were analyzed. In addition, roadkill data for other endangered species are being collected, including the Okinawa robin, Okinawa woodpecker, Ryukyu black-breasted leaf turtle, and spiny rats. The collected data will be analyzed further (pp. 12–13 of Annex b-1).

2.2.2 Review of the effectiveness of traffic management measures and future approach

- To review the effectiveness of traffic management measures, a list of the existing measures was organized and examination results of the effectiveness of some of these measures in reducing roadkills were compiled. The results showed that many of the measures were effective, but that in some areas the measures were not fully implemented despite the high risk of roadkill. In response to these results, the enhancement of existing measures and implementation of additional measures are under consideration. These include the installation of animal blocking fences on Amami-Oshima Island and Tokunoshima Island, and an examination of the construction of new underpasses and further traffic surveys on Iriomote Island (pp. 14–28 of Annex b-1).
- The roadkill prevention measures will be enhanced, including the installation of additional structures and raising driver awareness on the four islands, while maintaining a collaborative relationship with various entities, such as relevant government organizations, interested parties, and experts, bearing in mind that roads are essential to the livelihoods of local people (p. 29 of Annex b-1).
- In enhancing roadkill prevention measures, the identification of the locations and content of measures that require such enhancement will continue, based on the status of roadkill incidents, traffic conditions, and road structures, in order to adopt the optimal measures for each of these locations. In addition, the effectiveness of the measures taken will be examined through, for instance, an analysis of their degree of impact on threatened species. Furthermore, studies such as an examination of the mechanism of roadkill occurrence will be facilitated to develop more effective countermeasures and approaches (p. 29 of Annex b-1).

2.3 River restoration

c) Developing a comprehensive river restoration strategy in order to transition wherever possible from hard, engineered infrastructure to employ nature-based techniques and rehabilitation approaches such as replenishment, vegetation, and the formation of different habitat types;

2.3.1 Formulation of river restoration strategy

- The Task Force for River Restoration has developed a comprehensive river restoration strategy that indicates the basic approach and process of river restoration on the property, based on discussions and reviews from a scientific perspective among relevant government organizations and six experts in river engineering, disaster prevention engineering, and biology.

- The river restoration strategy developed is as follows:

River Restoration Strategy of Amami-Oshima Island, Tokunoshima Island, Northern Part of Okinawa Island, and Iriomote Island

1. Background to Strategy Formulation

(1) Significance of rivers on the property and background to the installation of river structures

The property contains the most important and significant remaining natural habitats for the in-situ conservation of the unique and rich biodiversity of the central and southern parts of the Ryukyu Chain (Central and Southern Ryukyus) and is of high value for the protection of numerous endemic species and globally threatened species. The species representing the Outstanding Universal Value (OUV) of the property, such as the Amami rabbit, Okinawa rail, and Iriomote cat, mainly inhabit forests. A characteristic of the property is the subtropical marine climate greatly influenced by the warm Kuroshio Current and monsoons. It is an area of abundant water with an annual rainfall of over 2,000 mm, resulting in the formation of small and large river systems within the subtropical rainforest of the property. These river systems provide water and feeding grounds for the species representing the OUV, as well as stable habitats for inland water fish and rheophytes.

In the four regions that comprise the property, the habitats of the threatened and endemic species representing the OUV are close to areas where local people live and industrial activities take place. Over many generations, the regions' natural environment has been used sustainably based

on traditional lifestyles and beliefs so as to support people's livelihoods. Water resources in particular are essential to the livelihoods of the local people. The topography in the four regions are steep, with rivers running a short distance. Because of this, rainwater flows out to the ocean in a relatively short time. In addition, due to the topography with few flat areas, settlements and agricultural lands are concentrated in the flat areas alongside rivers or near the river mouths. As a result, it creates conditions unique to the regions: a relatively high incidence of water shortages and the frequent occurrence of floods in the flat areas. It is therefore very important for people living in the regions to use the limited water resources effectively and to protect their livelihoods from floods and other events that have caused deaths and injuries in the past.

Furthermore, geologically the regions are mainly composed of old sedimentary rocks such as sandstones, shales, and clay-slates from between the Paleozoic and the Mesozoic eras. Many sections are fractured by faults and the surfaces are weathered and vulnerable. In addition, the regions are often struck by typhoons, causing landslides and mudslides in the mountainous areas and floods in downstream river basins. With future climate change, such phenomena could escalate in scale. For these reasons, river structures, including multipurpose dams for water use and control, intake weirs, check dams, and *sabo* check dams have been built since long ago in order to secure water resources for the livelihoods of the local people and to protect themselves and their properties from disasters. The river structures have been regarded as essential.

There has not been clear evidence-based finding on the impact of river structures on wild plants and animals in the property and buffer zones. Because relevant studies have been so few, their impact is currently unknown. In response to the request of the World Heritage Committee (Decision 44 COM 8B.5), a study on river restoration has been initiated in order to maintain and enhance the value of the property. To begin with, the study will be carried out to determine the impact of the river structures on the property and to verify causal relationships.

(2) Basic concept of river management in Japan

As an effort to conserve and restore riverine environments in Japan, the River Act was revised in 1997. The revised River Act added the improvement and conservation of riverine environments as its objective, together with water control and use which were already stipulated. In addition, the Government of Japan established a Basic Policy on Nature-Oriented River Management in 2006 to conserve and create diverse river landscapes, habitats, and breeding environments for wild plants and animals. Furthermore, the Basic Environment Plan approved by the cabinet in 2018 for the conservation of environment prescribes the promotion of green infrastructure projects designed to create sustainable and attractive national lands and local

communities by utilizing the diverse functions of the natural environment (e.g., providing habitats, forming healthy landscapes, controlling temperature rises, preventing and mitigating disasters) in terms of both tangible and intangible aspects, such as the improvement of social overhead capital and land use. The plan also includes the promotion of ecosystem-based disaster risk reduction (Eco-DRR) by identifying the function of the ecosystem which reduces disaster risks and by proactively conserving and restoring the ecosystem.

In keeping with these concepts, Okinawa Prefecture stated its intent to promote the adoption of environmentally-friendly construction methods in the Biodiversity Strategy of Okinawa (2013), announcing that the prefecture would manage its rivers based on the Nature-Oriented River Management concept that advocates river improvements with consideration to biodiversity and the conservation, restoration and creation of diverse river environments as well as habitats and breeding environments for wild plants and animals. For instance, a riverine environment restoration project was implemented on the Oku River in the northern part of Okinawa Island from 2008 to 2018, improving drop structures and restoring riffles and pools by re-establishing the former river channel. This led to the recovery of diverse river flows and habitats, resulting in the sightings of migratory fish such as *Mugil* and *Kuhlia* swimming upstream from the ocean.

Furthermore, the Biodiversity Strategy and Action Plan of Kagoshima Prefecture (2014) positions the promotion of public works with consideration to biodiversity as one of the items of its action plan, requiring that Nature-Oriented River Management be the basis of river improvements and advocating for the establishment of fishways and other measures as well as conservation of diverse waterfront environments, such as riffles and pools which are valuable habitats for fish. Moreover, the Amami Island Group Promotion and Development Plan (2019) lists the implementation of nature restoration-type public works to conserve and restore habitats for animals and plants, such as Ryukyu ayu-fish, as an effort to conserve the value of the world natural heritage.

(3) Establishment of a task force for scientific review on river restoration strategy

At the extended 44th session of the World Heritage Committee held in July 2021, the decision was made to inscribe the property on the World Heritage List and to make four requests to Japan. One of the requests was to develop “a comprehensive river restoration strategy in order to transition wherever possible from hard, engineered infrastructure to employ nature-based techniques and rehabilitation approaches such as replenishment, vegetation, and the formation of different habitat types.” In response to this request, the Government of Japan established a task force comprising six experts in river engineering, disaster prevention engineering, and

biology, as well as relevant administrative organs, discussed the request from scientific perspectives, and formulated the river restoration strategy.

2. Aim of the strategy

This strategy sets out an approach to river restoration for the entire four regions to understand the impact of river structures on the OUV and to consider the actions to be taken for the existing river structures that impact the OUV.

3. Goal

The strategy aims to achieve the following two goals.

- Conduct an assessment to evaluate the impact of river structures on the OUV.
- Take actions wherever possible to mitigate the impact on the OUV identified in the above assessment while ensuring the livelihoods of local people (lives and properties), monitor and assess the impacts of these actions, and achieve river restoration.

4. Basic approach to river restoration

River restoration in this strategy means to restore the natural flows of rivers, including their continuity and disruptions, to improve the diverse habitats of the endemic and threatened species which constitute the OUV in rivers and rely on the natural freshwater process and habitats. Currently, there is a lack of detailed scientific knowledge about the impact of river structures on the OUV and specific causal relationships. As the first step, it is necessary to review literature, monitor the impact of river structures on diadromous fish, rheophytes, amphibians, and so on, and conduct analyses and examinations.

After identifying the specific causal relationships of the impact of river structures, improvement measures will be examined to mitigate such impact, while bearing in mind a transition from hard, engineered infrastructure to employ nature-based techniques and restoration approaches. In considering improvement measures, the local peoples' livelihoods (lives and properties) must be preserved, taking into account the functions the structures play in, for instance, preventing forest deterioration and other disasters. In addition, sufficient consideration must be given to factors such as the stress that might be placed on the current ecosystem from new disruptions caused by the implementation of improvement measures and the impact of incidental actions (e.g., construction of temporary roads, felling of trees, and invasion of alien species). Furthermore, collaboration with the local people, their consensus, and transparency of the process must be ensured.

In recognition that river restoration based on this strategy will be a long-term endeavor, river restoration must take place adaptably while keeping up to date with progress in nature-based river restoration techniques, and carefully considering changes to conditions affecting rivers such as the escalation of disasters due to climate change and population changes in the affected river basins.

5. River restoration process

River restoration will be implemented in the following four phases: impact comprehension phase, restoration policy examination phase, countermeasure implementation phase, and effectiveness examination and monitoring phase.

5.1 Impact comprehension phase

5.1.1 Scope of impact assessment

An impact assessment will be conducted for the list of existing river structures (Annex c-1) standing against the flow of major rivers in the property and its buffer zones provided to IUCN by the Government of Japan as supplementary information in November 2019.

5.1.2 Selection of target species subject to the impact assessment in each river in which the assessed river structures exist

The species to be assessed will be selected from the species (taxonomic groups) representing the OUV in each river in which the assessed river structures exist. These species will be mainly diadromous fish, rheophytes, and amphibians. When selecting the species to be assessed, the reason for their selection must be clearly stated.

5.1.3 Impact comprehension study

After clarifying the impact the assessed river structures have had on the assessed species using existing research papers, interviews with experts, and other means, monitoring will be conducted to evaluate their impact where information is lacking and necessary information will be collected to determine their impact. In evaluating the impact, attention must be paid to understanding which stages of the life history of the species being assessed are affected.

5.1.4 Compiling the results of the impact assessment

The information collected will be sorted based on advice from experts and so on, and the results of the impact assessment of the river structures on the target species will be compiled.

5.2 Restoration policy examination phase

Based on the results of the impact assessment, the specific causal relationships of the impact of the river structures on the OUV will be analyzed and examined, and improvement measures for the river structures will be discussed to remove the factors causing the impact. A study and evaluation of potential risks due to adopting the improvement measures, such as the risks to disaster prevention, will also be conducted and restoration policy will be discussed based on the results of such study and evaluation. In the long term, restoration policy will be reviewed flexibly as changes in the conditions affecting rivers are comprehended. Restoration policy must be examined based on "4. Basic approach to river restoration" mentioned above.

5.3 Countermeasure implementation phase

Countermeasures will be implemented based on the restoration policy discussed. In implementing countermeasures, sufficient attention must be paid to preventing negative impacts on the heritage value, such as the invasion of alien species.

5.4 Effectiveness examination and monitoring phase

After implementing countermeasures, their effectiveness will be monitored and examined. If no improvement is seen, further countermeasures will be implemented, and their effectiveness will be monitored and examined as needed based on the PDCA cycle.

6. Evaluation of river restoration strategy

The strategy will be subject to a review approximately five years after its formulation based on the progress and results of the impact comprehension study.

2.4 Forest management

d) Capping or reducing logging operations in the buffer zones from current levels, both in number and combined size of individual harvesting areas, and ensuring that any logging remains strictly limited to the buffer zones.

2.4.1 Introduction

Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island (hereinafter, the "Three Regions") have a long-standing practice of logging and using forest resources to produce wood products and for other purposes (pp. 123-124 of the nomination document). Forests in these regions demonstrate rapid regrowth and have a high regeneration capacity (Box 5 on pp. 113-114 of the

nomination document). Wild animals and plants, including rare species, also use the secondary natural environment that emerges after logging as habitat (p. 1 of the Supplementary information of February 2020).

After peaking in the 1970s, logging operations in the Three Regions have been on a declining trend due to a combination of factors. These include the changing demand for timber and cooperative conservation efforts by local communities, forestry operators, administrations, and others.

As the request made by the World Heritage Committee is related to the future of the forestry industry, the administrative organs of the property again had discussion with and interviewed forestry operators about the future of logging activities after receiving the request. Such conversations and interviews confirmed the desire of forestry operators to continue practicing sustainable forestry operations that respect the natural environment of the area into the future. In addition, forestry operators raised a concern about the report submitted in February 2020 which presented an overview of the latest status of logging operations in the buffer zones of the Three Regions (Appendix 1-2-2 on pp. 9-12 of the Supplementary information of February 2020). They were apprehensive about the use of the report as a standard of future harvesting areas because the harvested area presented in that report was based on data from a period of stagnant demand for timber; hence the use of the report as a benchmark may cause problems for the future of the forestry industry. While receiving such views, discussions also took place on further initiatives that should be taken in response to the request.

Based on the results of these discussions with forestry operators and the status of systems concerning logging operations, with advice from experts, the administrative organs examined and organized responses to the request made on logging operations in the buffer zones.

For Amami-Oshima Island, Tokunoshima Island and Northern part of Okinawa Island, in order to achieve both biodiversity conservation and sustainable forestry in accordance with the issues raised in the request, in addition to the measures under the existing system described in 2.4.2, the voluntary measures by forestry operators on forestry operations described in 2.4.3 will be implemented. In the buffer zones on Iriomote Island, no large scale forestry operations have taken place except that island residents used timber in their daily lives in the past. There is also no plan for future logging.

2.4.2 Status of systems concerning logging operations

The property and buffer zones in the Three Regions are designated as National Park (Amami-Oshima Island and Tokunoshima Island: designated in 2017, Northern part of Okinawa Island: designated in 2016 and expanded in 2018). Regulations on logging/timber extraction activities have become effective by these designations, requiring prior approval from the Japanese Government (Ministry of the Environment) for any logging operations under the Natural Parks Act (pp. 1-3 of the Supplementary information of February 2020).

The property is strictly protected as Special Protection Zone and Class I Special Zone of the national parks through the prohibition, in principle, of various acts that impact the preservation of evergreen broadleaved forests as these forests provide important habitats for wildlife, which characterize the nature of the said area. Most of the buffer zones are designated as Class II or III Special Zone of the national parks; actions taken there are hence subject to regulation. To obtain approval, it is necessary to satisfy the approval standards stipulated in the Natural Parks Act.

In the buffer zones on Tokunoshima Island and in Northern part of Okinawa Island, the size of individual harvesting areas is restricted up to 2 ha, in principle. An application must be made to the Ministry of the Environment before logging starts (p. 12 of the Supplementary information of February 2020).

As for Amami-Oshima Island, a special provision to the standards prescribed in the Natural Parks Act was introduced in March 2020, following the exchange of opinions and liaising with forestry operators, experts, and other parties. This special provision was designed to enable sustainable forestry operations which would conserve biodiversity and the habitats of rare species, while considering economic rationales, based on scientific insights into the high regeneration capacity of subtropical laurel forests (Box 5 on pp. 113-114 of the nomination document). Due to this special provision, the size of individual harvesting areas on Amami-Oshima Island is greater than those on Tokunoshima Island and Northern part of Okinawa Island, with a maximum of 10 ha. The provision, however, also sets out in detail matters requiring consideration. These include the establishment of the reserved belts of forests (e.g., no logging in the forests within 20 m from a Special Protection Zone and Class I Special Zone and within 20 m on each side of major ridges, and so on) and the use of the skyline logging method as the basic method so as not to cause soil damage. Logging operations will not be permitted unless these rules are observed. In addition, forestry operations are conducted in consideration of the natural environment and ecosystem; for instance, no logging around user facilities and the adoption of a logging method with less disturbance to forest land (e.g., use of chainsaws instead of heavy harvesting machineries)(pp. 4-5 of Annex d-1).

In addition to the Natural Parks Act, the Forest Act prescribes matters such as a notification system for logging and post-logging reforestation. Notification of logging and other such acts must be submitted to the municipality in which the forest is located.

Local forestry operators conduct forestry operations in compliance with the afore-mentioned regulations. They have also begun to play proactive roles for the conservation of biodiversity in local forests through conducting activities outsourced by relevant government organizations, such as anti-poaching patrols to protect rare species and the monitoring of rare and alien species. They are willing to continue to conduct sustainable forestry operations that takes into consideration the local natural environment.

A report by Mr. Bastian Bertzky, who was invited to the site in 2018, pointed out that forestry

operations conducted under the above-mentioned regulations falls under sustainable use (pp.1-17 of Annex 1 to the nomination document).

2.4.3 Approach to logging operations in the buffer zones

In cooperation with forestry operators, the following initiatives will be taken based on the results of discussions with forestry operators following the receipt of the request, the status of systems concerning logging operations, and expert advice.

- First, continuous efforts will be made to ensure compliance with the approval standards and the matters requiring consideration explained in 2.4.2, such as the rule on the size of individual harvesting areas under the Natural Parks Act. These are established from the viewpoints of both forestry operations and the inhabitation of rare species, endemic species and so on.
- Next, given that the buffer zones have the function to support the protection of the property, the maximum annual volume of timber harvested in the buffer zones shall be set. Specifically, this should be within the range of annual forest growth while maintaining the standing stock necessary to maintain the forests' function to preserve biodiversity and to produce timber, as calculated for each municipality.
- Furthermore, the newly developed "Forestry Operation Policy in Consideration of the Natural Environment on Amami-Oshima Island and Tokunoshima Island", which includes two points mentioned above, and the "Policy for the Promotion of the Yambaru Model Forestry" (pp. 151-163 of Annex 2 to the nomination document) were prepared for each region as voluntary regulations to show the basic direction of forestry operation that respects forests' dual function of preserving biodiversity and producing timber. Based on these, forestry operations will be carried out with consideration for the natural environment (Annex d-1, d-2).
- Relevant government organizations will continue monitoring and managing the logging and regeneration of forests through systems such as the prior permission application procedure under the Natural Parks Act and the notification system requiring the submission of reports on logging and the status of post-logging reforestation under the Forest Act.
- Lastly, as an important initiative, a forum will be provided every year for forestry businesses, relevant government organizations, etc. to share information, such as location and area of scheduled logging sites. In this forum, adjustments may be made as needed by, for instance, requesting a forestry operators to change its logging plan from the viewpoint of conserving biodiversity and important habitats of rare species based on the impact to the property. This will make logging operations better aligned with conservation efforts.

Furthermore, in response to the request, a new survey will be conducted in logged areas, scheduled sites of future logging, and their surroundings on Amami-Oshima Island. The survey is designed to

comprehend the regeneration process of forests and the relationship between logging operations and the status of wild fauna and flora. It will cover themes such as forest composition, vegetation, soil, and the habitat of wild animals and plants. Using the results of this survey and regular monitoring (to be explained below), the degree of the impact of logging operations in buffer zones on the OUV of the property will be assessed. These results will be shared with forestry operators and relevant government organizations at the afore-mentioned information-sharing forum on Amami-Oshima Island and Tokunoshima Island so that they can be utilized for future initiatives and adjustments. In Northern part of Okinawa Island, surveys have already been conducted on forest composition, vegetation, soil, status of wild animals and plants, and other matters. The results of these surveys will likewise be shared with forestry operators and relevant government organizations at the information-sharing forum, and will be utilized for future efforts.

In the property, the administrative organs conduct annual monitoring on the status of species representing the conservation status of diverse habitats required to maintain various endemic species and/or threatened species which represent the OUV, and on changes to the total forested area, based on the “Monitoring Plan for Amami-Oshima Island, Tokunoshima Island, Northern Part of Okinawa Island and Iriomote Island nominated for Inscription on the World Heritage List ” (pp. 101-122 of the Supplementary information of November 2019).

In conclusion, logging operations in the property are strictly prohibited, while logging operations in the buffer zones are managed in collaboration between forestry businesses and relevant government organizations through, for instance, information sharing and liaising, while making efforts to ensure strict compliance with various regulations and voluntary regulations. In addition, measures will be implemented where necessary based on surveys and monitoring, as well as seeking expert opinions when needed.

3. Other current conservation issues identified by the State Party which may have an impact on the property's Outstanding Universal Value

There are no other conservation issues identified by Japan which may impact the OUV of the property.

4. In conformity with Paragraph 172 of the Operational Guidelines, describe any potential major restorations, alterations, and/or new construction(s) intended within the property, the buffer zone(s) and/or corridors or other areas, where such developments may affect the Outstanding Universal Value of the property, including authenticity and integrity.

There are no development projects in and around the property which may affect the OUV of the property.

5. Public access to the state of conservation report

Japan accepts upload of full reports for public access on the World Heritage Centre's State of Conservation Information System.

Outline of the Draft Iriomote Island Tourism Management Plan

1. Background of the Iriomote Island Tourism Management Plan

To realize sustainable tourism on Iriomote Island and to respond to the requests from the World Heritage Committee, which were presented at the time of World Heritage inscription, the Basic Visitor Management Plan for a Sustainable Iriomote Island, which was formulated by the Iriomote Island Subcommittee in January 2020, will be revised, and the Iriomote Island Tourism Management Plan (hereinafter referred to as the "Plan") will be formulated.

Requests

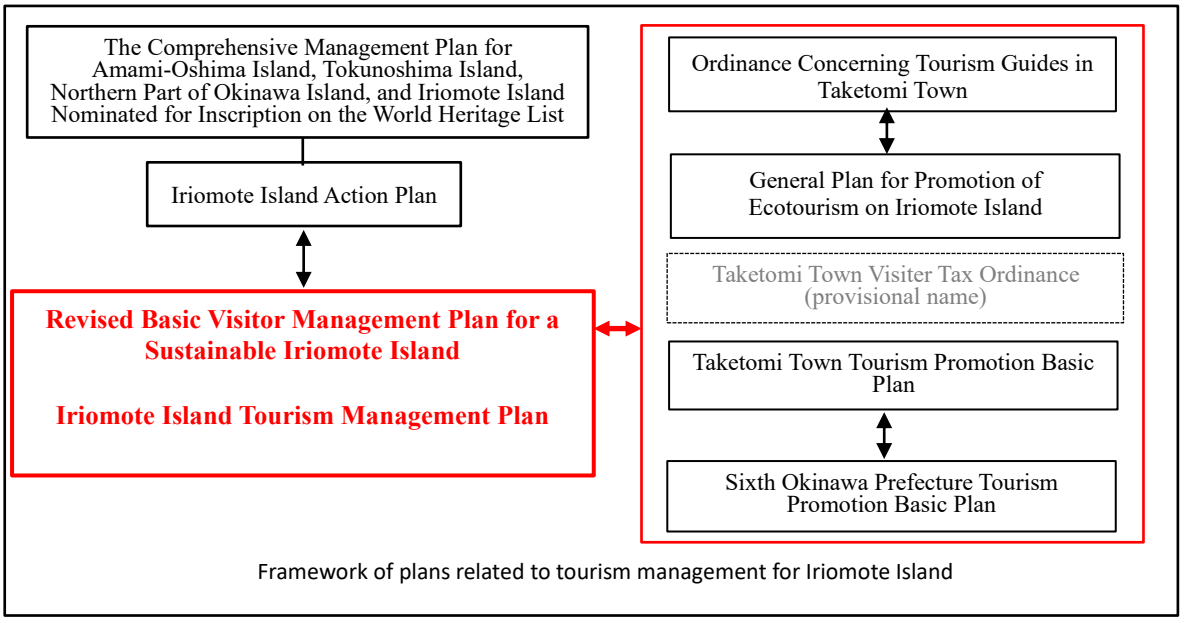
a) Capping or reducing levels of tourist visitation from current levels, especially on Iriomote Island, until a critical evaluation of tourism carrying capacity and impacts can be conducted and integrated into a revised tourism management plan.

The Iriomote Island Tourism Management Plan is a tourism management plan that covers the entire Iriomote Island, both the heritage area and outside the heritage area, and integrates various visions, plans, and systems related to the tourism of Iriomote Island that have so far been developed individually.

In the Plan, the current status of tourism on Iriomote Island and its impact will be thoroughly evaluated. Also, to realize sustainable tourism on Iriomote Island, the objectives that Iriomote Island tourism should aim at will be set forth, together with the basic policies and criteria for tourism management in and outside the heritage area; concrete measures to implement appropriate management, monitoring methods, and management systems to confirm and evaluate its effectiveness will be presented in the Plan.

The Iriomote Island Subcommittee will ensure consistency between the basic policies and criteria for tourism management of the Plan and the policies and standards of the relevant individual visions, plans, and systems to avoid contradiction. The respective visions, plans, and systems will be revised to be consistent with the Plan, as necessary.

The relationship between superordinate plans and related visions, plans and systems is as follows:



Framework of plans related to tourism management for Iriomote Island

2. Current Status of Tourism and Issues

2.1 Current status and trends of tourism on Iriomote Island

- The annual number of tourists to Iriomote Island has risen and fallen repeatedly, peaking at 406,000 people in 2007. Since 2015, it has declined gradually, and since 2020, it has fallen by 50% or more of the pre-2019 level due to the impact of movement restrictions in response to the COVID-19 pandemic. Before 2019, the 10-year average number of tourists entering the region was 330,000 (excluding 2011 data, which was affected by the Great East Japan Earthquake).
- In 2019, the annual number of tourists entering the region was 290,313, with 224,493 from Ohara Port in the east and 65,820 from Uehara Port in the west.

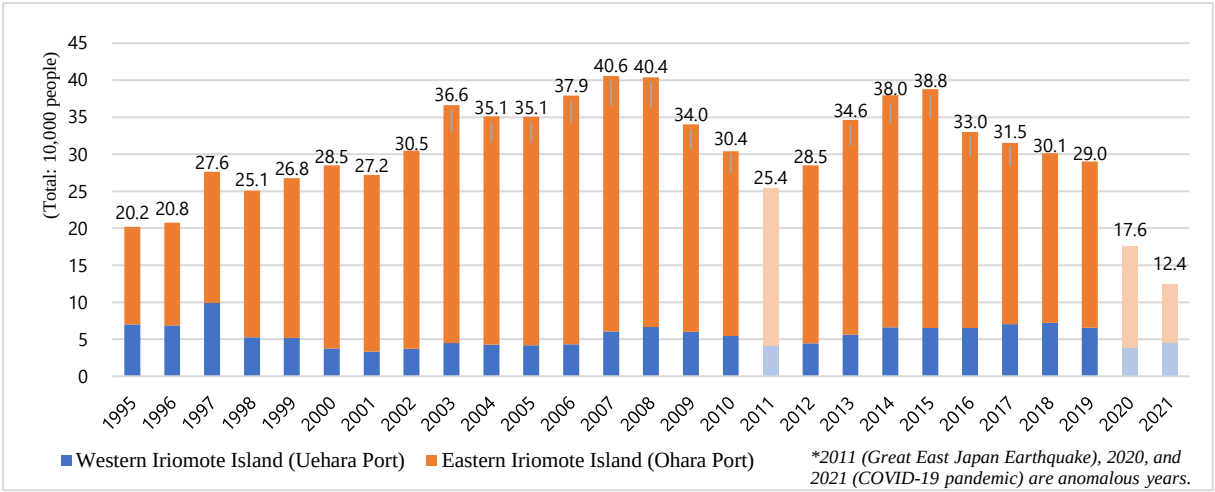


Figure: Annual changes in the number of tourists to Iriomote Island (Source: Taketomi Town website)

- Tourism on Iriomote Island can be generally divided into the following two types: circular tours, using a relatively large field for large buses or motorboats and nature experience-oriented tours (often accompanied by guides and instructors), involving activities such as canoeing and trekking in the sea area. Each type has variable trends in the number of visitors, places of activity, and styles of tourism.
- The number of tourists to Iriomote Island varies greatly seasonally, and the peak periods are different between the eastern and western parts of the island. The number of tourists entering from the eastern part of the island is concentrated in winter, with the peak in March; that from the western part is concentrated in summer, with the peak in August. In addition, tourists in the eastern part tend to take circular tours , while those in the western part tend to take nature experience-oriented tours.
- The annual changes in the number of same-day visitors to Iriomote Island in 2019 show that the number of same-day visitors was 1,543 people per day at the peak day, with its peak rate of 0.49%. In addition, the average is 862 visitors per day, and the standard deviation is 250 visitors per day, which is highly variable. The top 30 days account for 12.2% of the annual number of visitors to the region.
- The number of tourists who visited Iriomote Island in 2019 was 290,000. Of these, a cumulative total of approximately 70,000 people (24%) participated in canoeing, trekking and other eco tours led by tour guides to visit fields within the property. A cumulative total of approximately 150,000 people (52%) participated in sightseeing tours using motor-driven vessels on the Nakama and Urauchi Rivers. In addition, tourists also used facilities and fields in the Surrounding Conservation Area and marine areas.
- The fields used for nature experience-oriented tours and/or ecotourism are widely distributed throughout Iriomote Island, where, as a whole, 27 places on land and the whole sea area are used, of which 20 places are located in the heritage area.
- In recent years, while the number of motorboat users for circular tours has been on a decreasing trend, the number of users for nature experience-oriented tours appears to be on an increasing trend, and there has been an increase in the number of operators providing guidance on nature experiences.

- According to a survey conducted between 2015 and 2016, about 23% of tourists visiting Iriomote Island stayed overnight, but the average number of nights spent on the island was only about 0.36, indicating that many tourists stayed on Ishigaki Island and visited Iriomote Island on a day trip.

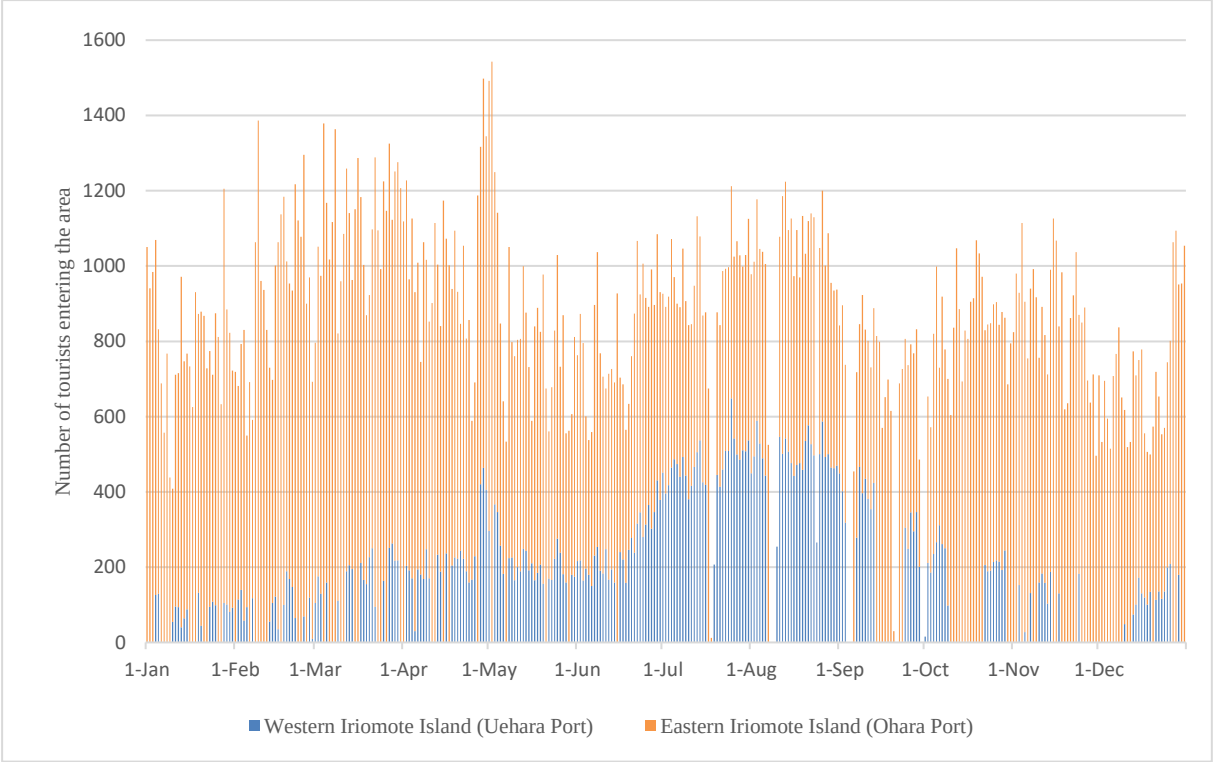


Figure: Daily numbers of tourists entering the Island in 2019
(Source: Compiled from data provided by shipping companies)

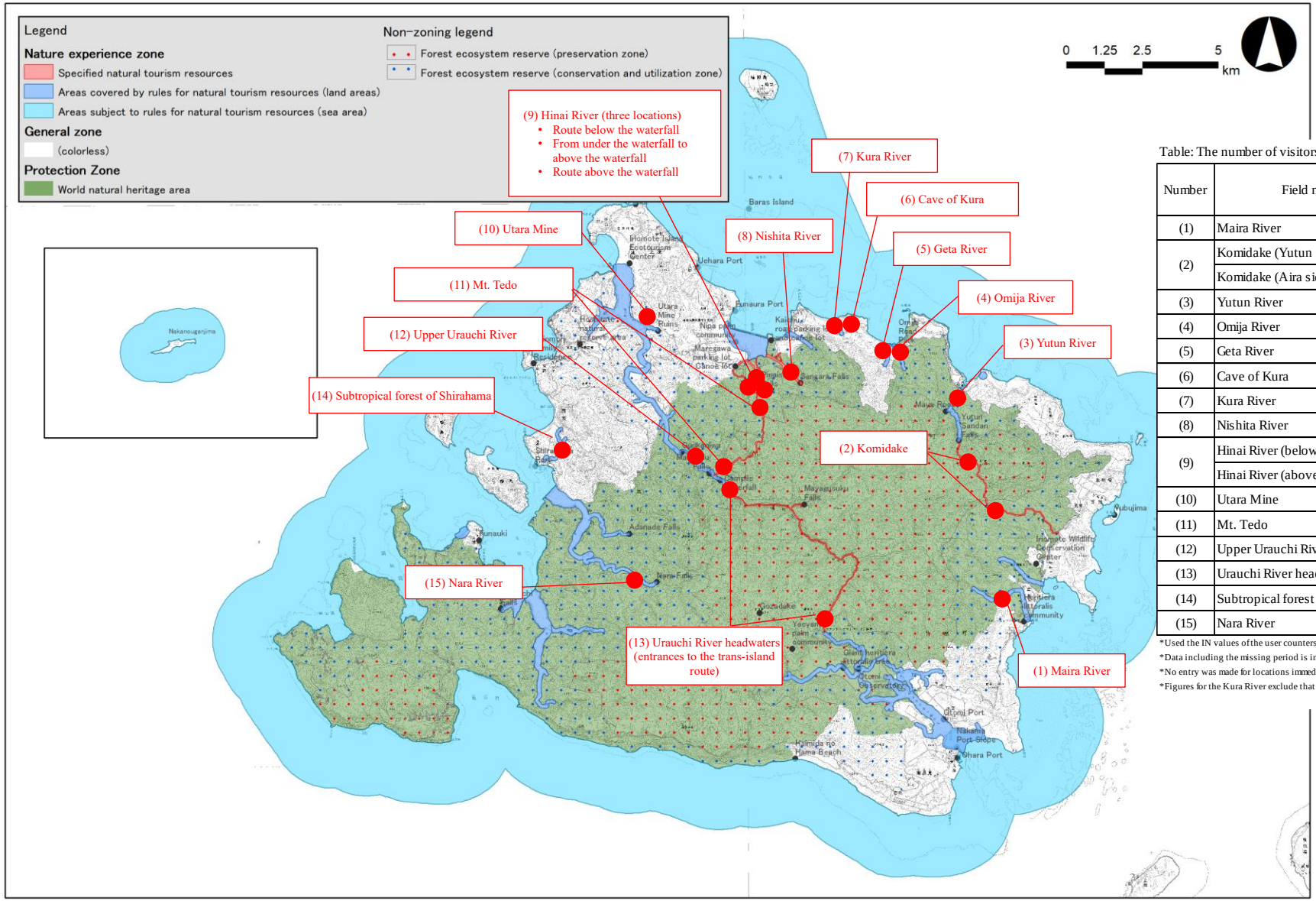


Table: The number of visitors to nature experience-based tourism

Number	Field name	Number of users	
		2019	2020
(1)	Maira River	1683	1109
(2)	Komidake (Yutun side)	25	664
	Komidake (Aira side)	–	212
(3)	Yutun River	5319	4240
(4)	Omija River	8326	2882
(5)	Geta River	–	3539
(6)	Cave of Kura	–	–
(7)	Kura River	–	2249
(8)	Nishita River	7882	2991
(9)	Hinai River (below the waterfall)	29666	18212
	Hinai River (above the waterfall)	–	2093
(10)	Utara Mine	–	–
(11)	Mt. Tedo	–	779
(12)	Upper Urauchi River	–	–
(13)	Urauchi River headwaters	752	1960
(14)	Subtropical forest of Shirahama	–	–
(15)	Nara River	2966	3596

*Used the IN values of the user counters installed by the Ministry of the Environment
*Data including the missing period is indicated by gray text.
*No entry was made for locations immediately after installation or for a limited time.
*Figures for the Kura River exclude that for canoe users

Figure: Distribution of fields for nature experience-oriented tours, locations of user counters, and number of users on Iriomote Island

2.2. Impacts of tourism on Iriomote Island and their assessment

The foreseeable impacts (threats) of tourism assumed inside and outside the heritage area on Iriomote Island have been identified as comprehensively as possible, and each impact has been assessed as to the magnitude of current risk and trends of change in consideration of the importance and carrying capacity of the area that may be affected. The assessment results are shown in the table on the next page. It has been decided that it is necessary to establish management criteria and consider measures to strengthen management with regard to the following tourism impacts.

On the other hand, with regard to the tourism outside the heritage area, the diversification of tourists' behaviors and values may bring about positive effects on the environment, society, economy, etc. of Iriomote Island. Therefore, this plan looked into actions that would contribute to the creation of multifaceted values through tourism; their effects need to be verified when the verification of the effectiveness of this plan is conducted.

(1) Impacts of tourism for which management within the heritage area needs to be strengthened

(i) Impact of increasing places that are used as the fields for nature experience

With regard to the impact of an increasing number of places that are used as the fields for nature experience, it is necessary to curb the increase at or below the current level, which is used as the allowable limit, assuming as a precaution that any act could have impact in light of the importance of the heritage area conservation.

(ii) Impact of increasing visitors who seek nature experience-oriented tours and concentrated tourism use

With regard to impact of increasing tourists who visit places that are used as the fields for nature experience and concentrated tourism use of these places, it is necessary to determine the allowable limit in consideration of carrying capacity and current conditions and limit the number of visitors below it at places where there is a particular concern about the impact in light of the importance of the heritage area conservation. In other places, it is also necessary to strengthen management by continuously monitoring the number of visitors and the indicators of environmental load associated with use, while suppressing the increase in the number of visitors.

(iii) Impact of irresponsible actions of visitors and guide operators and impact due to activity characteristics

To prevent impact of irresponsible actions of visitors and guide operators and impact due to activity characteristics, it is necessary to establish rules for nature experience-oriented use to reduce environmental load and secure the safety of visitors, based on experience, and put in place an institutionalized mechanism to ensure compliance with these rules.

(2) Impacts of tourism for which management outside the heritage area needs to be strengthened

(i) Impact of the total number of visitors to Iriomote Island

With regard to the impact of the total number of visitors to Iriomote Island, in recent years the number of tourists entering the region every year has been rising and falling alternately. Moreover, it is difficult to set the standard figure for the annual number of tourists who can visit the region by evaluating the relation between it and foreseeable impacts from the viewpoint of carrying capacity. Therefore, for the time being, it is necessary to monitor carefully the total number of visitors, so that it will stay within the range of the last 10 years or so.

(ii) Impact of concentrated tourism use at specific times

With regard to the impact of concentrated tourism use at specific times, there are concerns that it causes congestion on regular liner ships and that the infrastructure of the island could be affected. It is therefore necessary to set the standard figure in consideration of carrying capacity and control the number of visitors below it to the extent possible.

(iii) Impact of increasing individual tourists

An increase in the number of individual tourists cannot necessarily be considered to be a foreseeable impact factor. It would be possible to avoid or reduce the impact that could occur if visitors and guide operators who do not behave properly increase. Therefore, it is necessary to monitor the impact carefully and continuously, while ensuring thorough compliance with traffic rules and strengthening public awareness-raising activities.

(iv) Impacts of irresponsible actions of visitors and guide operators and activity characteristics

Same as the description for the impact within the heritage area.

Table: Assumed impacts and assessment for Iriomote Island tourism

Impact category	Impact factors		Foreseeable impacts (threats)	Assessment of impacts	
				Risk assessment	Trend assessment
Impact within the heritage area	Increase in the number of places that are used for tourism within the heritage area		Reduced primeval areas free of human impact Wider, accumulative, and compound human impact Inhibited growth of highly rare species	**High**	↗
	Increase in the number of visitors entering the heritage area Concentrated tourism use at specific locations and times		Damage to places vulnerable to human activities and environmental degradation Inhibited growth of rare species Decreased visitor safety Decreased quality and satisfaction of visitor experience	**High**	↗
	Irresponsible conduct of visitors and guide operators	Capture of rare animals and picking of rare plants	Decreased population of rare species that have been captured or picked Increased risk of extinction	**High**	↗
		Dumping of garbage	Deterioration of water quality and habitat environment		
		Human waste in the field	Deterioration of water quality and habitat environment		
		Invasive alien species and pets	Deteriorated conditions for native species due to competition and predation		
			Spread of infection among wild animals such as wildcats		
		Feeding of wild animals	Behavioral change of wild animals		
		Disorderly abandonment of canoes etc.	Impact on mangroves etc. and landscape disturbance		
	Load caused by activities	Trekking	Soil hardening, soil denudation, expanded erosion, damaged trees due to trampling and treading by visitors / vegetation change around trails / invasion and spread of alien species / accidents of stray visitors		
		Canoe, kayak, etc.	Trunk and root damage due to intrusion into the mangroves Disturbance of vegetation and wildlife habitat around coasts and rivers		
		Activities at streams and waterfalls, canyoning	Inhibited inhabitation and reproduction of fish etc. due to evasion and water quality deterioration / riverbed disturbance and damage to attached algae due to trampling / disturbance to benthic organisms and detritus		
		Wildlife watching, fishing, collection, etc.	Declined population of animals and plants that have been fished, captured, and/or picked Behavioral change of wild animals as they evade or get used to people		
	Motorboat tours		Soil erosion and impact on mangroves due to ship waves of motorboats	**Low**	↘
Impact outside the heritage area	Development for tourism	Facility construction, landform change, cutting of trees, etc.	Habitat loss and habitat environment change Invasion of alien species / landscape disturbance	**Low**	→
	Total number of visitors to Iriomote Island, concentrated tourism use at specific times, increase in the number of individual tourists	Use of the liner by visitors Occupation of parking lots by tourism operators etc.	Congestion on the liner ships and at the ports / decreased comfort and satisfaction of visitors (crowded toilets, bad atmosphere, hurried tour, etc.) / disturbance to local residents' life (for example, local people cannot board the liner or park vehicles at the port).	**Medium**	→
		Load on the island's infrastructure by visitors	Water supply restriction to local people due to shortage of water resource Increased load and cost of sewage and waste treatment	**Medium**	→
		Increase in accidents caused by visitors	Increased burden on local fire brigades and residents for transport and search activities	**High**	↗
		Increased traffic and excessive speed on roadways	Traffic accidents and roadkill of wild animals such as wildcats Occurrence of traffic accidents and decreased safety of local residents' life	**High**	↗
	Irresponsible conduct of visitors and tourism operators	Capture of rare animals and picking of rare plants	Declined population of rare species that have been captured or pickeed / increased risk of extinction	**Medium**	↗
		Visitation and use of the local clinic for minor medical treatment	Increased burden on the local clinic		
		Peeping into private houses in the local villages	Violation of local residents' privacy		
		Entry into sacred places such as Utaki and places of festivals	Disturbance to local culture and customs		
		Walking around in swimsuits in the local villages	Deteriorated public morals and increased discomfort to local residents' life		
	Load caused by activities	Trekking and walking	Disturbance to commercial hunting and agricultural activities due to visitors entering hunting grounds and/or farmland / damaged hunting tools and agricultural tools		
		Wildlife watching	Disturbance to turtles' spawning due to lighting on facilities and flashlights in the coastal area		
			Deteriorated habitat environment of fireflies due to disorderly use of flashlights		
		Insect collection and fishing	Declined population of insects and/or fish that have been caught		
		Swimming, diving, snorkeling, and fishing	Disturbance to fisheries due to tourists swimming and/or boats at anchor in the fishing grounds		
			Deteriorated water quality and habitat environment of marine life due to the use of chemical substances such as sunscreen and detergent		
			Coral damage due to anchoring		
			Coral damage due to low-skill swimming		
		Cave exploration and caving	Disturbance to the habitation of bats etc. due to tourists entering caves and using flashlights		

3. Tourism Management Goals and Policies

3.1 Overall goals of tourism management

In revising the Basic Visitor Management Plan for a Sustainable Iriomote Island, the following goals have been set for Iriomote Island tourism in consideration of consistency with superordinate plans and related plans.

Protect the nature and life of the island that we are proud of
and pass them on to future generations,
controlling the impact of tourism on the environment and people's lives
and promoting responsible tourism that contributes to local society.

3.2 Stakeholders' roles and action guidelines

To achieve the overall goals of tourism management on Iriomote Island, it is necessary for each stakeholder involved in tourism management on Iriomote Island, i.e., the government, tourism operators, visitors, and islanders, to have accurate understanding of the role it should play and the impact and effect of their actions and then promote the actions for tourism management that are set forth in this plan. The stakeholders' roles and action guidelines are described below. They are presented, will continue to be presented, to the attention not only of stakeholders and visitors both inside and outside the island, but also of the rest of the world, through appropriate measures, by the Taketomi Town Iriomote Island Ecotourism Promotion Council in coordination with the industry, government, academia, and citizens.

Government

The government bodies concerned with the tourism management on Iriomote Island should always assess and monitor the current status and trends of tourism on Iriomote Island and foreseeable impacts of tourism. They are responsible for taking necessary measures to preserve the value of the World Heritage property and reduce the impact of tourism on the natural environment, culture and life on Iriomote Island.

In addition, the relevant government bodies shall endeavor to share information with each other and shall endeavor to promptly implement necessary measures, fully mobilizing their resources under their jurisdiction in coordination and cooperation with each other.

Tourism operators

Operators engaged in tourism on Iriomote Island should be fully aware that their business activities may have an impact on the natural environment of Iriomote Island and the culture and life of the local community. They should make efforts to reduce the load that is caused by their activities. They are responsible for promoting tourism business that contributes to local society as well as the preservation of the World Heritage value as well as cultural value of Iriomote Island.

Visitors

People who visit and stay on Iriomote Island for sightseeing and other purposes should be fully aware that their activities may affect the natural environment of Iriomote Island and the culture and life of the local community. They should make efforts to control their activities in accordance with established rules and requirements. They should understand the value of Iriomote Island's World Heritage as well as local culture, respecting the lives of local residents and act responsibly.

Islanders

The islanders of Iriomote Island should be fully aware that the island's life and culture are supported by the rich natural environment and should maintain good relations on their own to pass them on to future generations. They are responsible for cooperating with the government bodies' legitimate measures for conservation of the island's nature and culture.

In addition, local residents should make efforts to warmly welcome responsible tourism by operators and visitors that contribute to the local community and make better use of the profit and benefit of tourism.

3.3 Basic policies for tourism management

To achieve the aforementioned overall goal of tourism management on Iriomote Island in light of the impacts of tourism and their assessment that were addressed in Chapter 2, Iriomote Island is divided into the areas within the heritage area and outside the heritage area, and basic policies of tourism management are presented for each area.

The basic policies for tourism management on Iriomote Island and management items for each area are shown in the figure below. For each management item, management criteria have been set up; management tools have been selected and management methods have been examined that are necessary to ensure effective management. As a result, it has been decided that tourism management is to be implemented on Iriomote Island in accordance with the framework shown in the table on the next page.

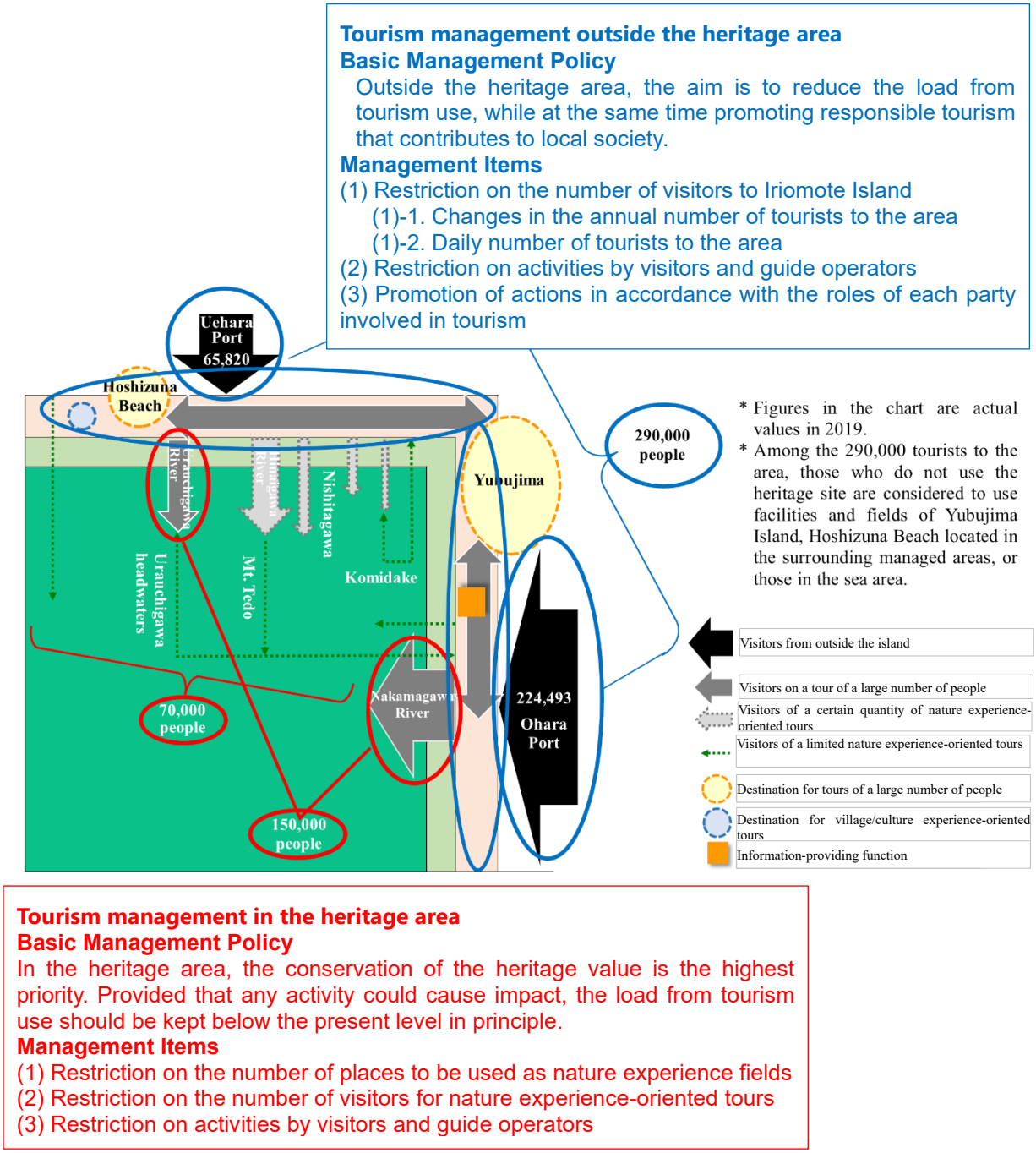


Figure: Framework and basic policies for tourism management on Iriomote Island

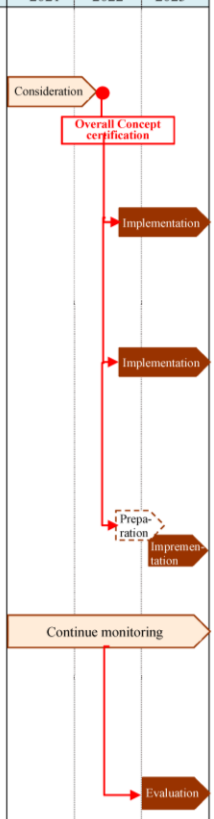
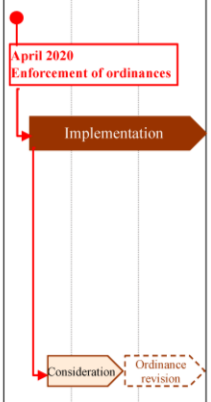
Table: Tourism management framework for Iriomote Island

Management area	Management items	Management criteria	Management method
Heritage area	Restricting the number of places that are used as nature experience fields	No increase in the number of places in the heritage area from the number of places that were actually used in 2019 (20 places)	To restrict tourism use based on the rule of the Overall Concept for Promoting Ecotourism (Ecotourism Promotion Act) providing that the protection zone "cannot be used for tourism in principle".
	Restricting the number of visitors who seek nature experience-oriented tours	i. The number of visitors at places where concentrated tourism use occurs does not exceed: A. Hinai River: 200 people/day; B. Nishita River: 100 people/day.	To designate the relevant areas as specified natural tourism resources under the Overall Concept for Promoting Ecotourism (Ecotourism Promotion Act) and limit the number of people who enter the designated areas by introducing a prior approval procedure for entry to these areas.
		ii. The number of visitors to important habitats for rare plants and.or animals does not exceed: C. Komidake: 30 people/day; D. Urauchi River headwaters: 50 people/day; E. Mt. Tedo: 30 people/day	
		iii. The number of visitors to other fields for nature experience-oriented tours does not exceed: F. One operator per location/activity The maximum number of visitors per guide is to be decided	To require compliance with tourism use rules of the Overall Concept for Promoting Ecotourism (Ecotourism Promotion Act) in the provisions of the Tourist Guide Ordinance, which makes violators subject to administrative penalties, and thereby restrict guide operators' conduct and obligate guide operators to manage visitors' conduct.
	Restricting activities by visitors and guide operators	The general rules for guide operators and specific rules for individual areas or activities specify what are banned or restricted.	
Outside the heritage area	Restricting the number of visitors to Iriomote Island	The annual number of tourists to the region does not increase by 10% or more as compared to that of the previous year.	To calculate the allowable limit for the following year based on the annual number of tourists to the region in the previous year, inform tourism stakeholders about the limit, and request necessary measures. When a large increase exceeding the allowable limit is ascertained or is likely to happen, the Iriomote Island Subcommittee examines and re-evaluates the magnitude of foreseen impact. The subcommittee make arrangements and requests for necessary measures to be taken.
		The number of visitors per day to the region does not exceed 1,200 people/day. *The standard figure is to be reviewed in light of the fluctuation in the ratio of overnight visitors.	To create and publish the Ethical Tourism Calendar, which forecasts congestion on Iriomote Island based on the most recent daily number of visitors. To encourage tourists to plan their visits during low seasons by strengthening information transmission. To organize liaison and coordination meetings with tourism-related business operators who transport visitors to Iriomote Island for coordination to stabilize the number of visitors and mitigate congestion.
	Restricting activities by visitors and guide operators	The speed of vehicles that run on the island is limited to 40 km/h or less.	To continue patrols and surveillance by management organizations, NPOs, etc., in addition to patrols and enforcement by the police, and conduct awareness-raising activities for visitors, tourism operators, and islanders.
		The tourism use rules for general visitors specify what are banned or restricted. The general rules for guide operators and specific rules for individual areas or activities specify what are banned or restricted.	To require compliance with tourism use rules of the Overall Concept for Promoting Ecotourism (Ecotourism Promotion Act) in the provisions of the Tourist Guide Ordinance, which makes violators subject to administrative penalties, and thereby restrict guide operators' conduct and obligate guide operators to manage visitors' conduct.
	Promoting actions in accordance with the roles of stakeholders involved in tourism	Target actions to be promoted by stakeholders involved in tourism are determined in accordance with their roles. i. Government: Infrastructure development that contributes to reducing tourism impact ii. Tourism operators: Provision of tourism products and services that contribute to reducing burden and enhancing social benefit iii. Visitors: Payment for the social costs associated with tourism activities iv. Islanders: Minimization of environmental load associated with daily life and industry	To introduce and utilize user-pays mechanisms and other programs, such as recognition and support to good practices, and promote the action of the relevant stakeholders through the operation of these mechanisms and programs, to ensure consistency and coherence among the different stakeholders. To make use of tourism to enhance the environmental, social, and economic values of Iriomote Island.

4. Major Initiatives to Realize Sustainable Tourism

In accordance with the aforementioned framework of tourism management, specific initiatives and projects to be implemented have been identified: the table below lists them together with information about the implementing entities, outlines of the content, and years for implementation.

Major Initiatives and Projects Based on the Tourism Management Plan (Heritage Area)

Management area	Management items	Initiatives and project names	Implementing entity	Outline of initiatives and projects	Year - 2021 / 2022 / 2023 -
Heritage area	Restricting the number of sites used as a nature experience field Restricting the number of visitors through nature experience-oriented tours Restrict activities by visitors and guide operators	Operation of the Overall Concept for Promoting Ecotourism of Iriomote Island	Taketomi Town Iriomote Island Ecotourism Promotion Council	In order to realize the orderly use of fields for nature experience-oriented tours with little impact on the natural environment, we **formulated the Overall Concept for Promoting Ecotourism of Iriomote Island (hereinafter referred to as the "Overall Concept")**, which describes the rules and control methods for proper tourism use as follows. **Following the approval by the national government in ● 2022, we established an enforceable mechanism for proper use based on the Ecotourism Promotion Act.** In addition, we will make the rules, etc. known through the website of the Taketomi Town Iriomote Island Ecotourism Promotion Council to operate the Overall Concept properly. **(i) Limiting the tourism use of sites by zoning** We divided Iriomote Island into a "nature experience zone," "general zone" and "protection zone," and established usage policies for each zone. As a general rule, the protection zone will not be available for tourism. **(ii) Restricting the number of sites and visitors under the designation of natural tourism resources and management of activities** We designated a field for nature experience-oriented tours on Iriomote Island as a "natural tourism resource," and specified restrictions on the available areas, the number of people who can be guided by one operator or one guide, and prohibitions and activity restrictions for the conservation of the natural environment and safety management as a rule for general users and guide operators. In addition, the Ordinance Concerning Tourism Guides in Taketomi Town stipulates the duty to comply with the rules to ensure their effectiveness. **(iii) Pre-entry application and limit on visitors under the designation of the specified natural tourism resources** Designated the five fields (Hinaigawa, Nishitagawa, Komidake, Urauchigawa headwaters, and Mt. Tedo), for which it is necessary to take measures for protection owing to particular concerns about the impact of tourism use, as specified natural tourism resources, set the maximum number of visitors per day in accordance with the Ecotourism Promotion Law to ensure compliance with the limitation and the rules. **(iv) Monitoring and evaluation of utilization impacts** In order to confirm and improve the effectiveness and validity of the Overall Concept, monitoring will be conducted on the status of tourism use and the natural environment, the quality of tourism use, and relationships with local communities. ○ **Monitoring method:** In addition to detailed monitoring that regularly identifies and evaluates scientific and objective impacts, a simplified monitoring about once a year will be conducted in cooperation with guide operators. ○ **Implementation system:** Administrative organizations, local related organizations, guide operators, etc. divide their roles to conduct monitoring surveys in cooperation with local researchers and experts. ○ **Evaluation methods and reflection of the results:** The Monitoring and Evaluation Committee composed of experts, researchers, administrative organs, etc. are established within the Promotion Council, and the Committee appropriately evaluates the monitoring results and reports the evaluation results to the Promotion Council every year. Based on the evaluation reports from the said Committee, the Promotion Council will examine and coordinate the implementation of concrete conservation measures to conserve natural tourism resources.	
		Operation of the Ordinance Concerning Tourism Guides in Taketomi Town	Taketomi Town	**The Ordinance Concerning Tourism Guides in Taketomi Town (and its enforcement regulations) came into effect in April 2020, imposing on guide operators who conduct tourist guide businesses utilizing natural resources in the land area of Iriomote Island (including river and coastal areas) the duty for obtaining a license from the mayor of Taketomi Town.** As a result, a system was established to secure and develop high-quality guides rooted in the region. **Provisions of Ordinance Concerning Tourism Guides in Taketomi Town (Excerpt)** • **Requirements for applying for a license:** Business performance on Iriomote Island, certification of emergency life-saving training, certification of membership of community centers on Iriomote Island (or prima facie showing of results of regional development, etc.), and training, etc. specified in regulations • **Rules and obligations to be observed by tourist guides:** Explanation of precautions for use to users, carrying and presenting licenses, reporting on destruction of the natural environment, etc. • **Guidance, recommendations, etc.:** Guidance, recommendations, orders and public announcement measures for violators • **Administrative action:** If a tourist guide violates this ordinance or related laws and regulations, it is possible to order the guide to suspend its business for a certain period of time or revoke the license. ***As of 2022, coordination with the Public Prosecutor's Office is ongoing toward the revision of the ordinance, including the addition of penal provisions.**	
		Enhance measures to reduce impacts and public awareness activities	Ministry of the Environment Forestry Agency Okinawa Prefecture Taketomi Town Relevant organization	The following projects and initiatives will be implemented to develop fields and raise public awareness necessary to reduce loads on the natural environment caused by tourism in the heritage site. **(i) Maintenance and improvement of sidewalks, decks, toilets, mooring facilities, parking lots, etc.** **(ii) Installation of explanatory plates, signs, gates, etc., indicating area designations, action restrictions, etc.** **(iii) Efforts to establish portable toilet booths, maintain them, and promote their use** **(iv) Raising awareness of preventing collection of rare species and invasion of alien species** **(v) Dissemination and enlightenment of usage rules in ports, base facilities, websites, etc.**	

Major Initiatives and Projects Based on Tourism Management Plans (Outside the Heritage Area)

Management area	Management items	Initiatives and project names	Implementing entity	Outline of initiatives and projects	Year - 2021 / 2022 / 2023 -
Outside the heritage area	Restricting the number of visitors to Iriomote Island	Building a public-private partnership system based on an agreement	Ministry of the Environment Okinawa Prefecture Taketomi Town Private businesses	**The Ministry of the Environment Okinawa Amami Nature and Environment Office, Okinawa Prefecture, Taketomi Town, and three shipping companies concluded the Agreement on Sustainable Tourism Management on Iriomote Island in March 2020, and established a system to implement the following measures toward the realization of sustainable tourism management under public-private partnership.** • Efforts to achieve the standard value of visitor capacity on Iriomote Island • Efforts to encourage tourists to come to Iriomote Island in order to disperse and equalize the timing of their visits • Efforts to secure sea routes for life and eliminate congestion on Iriomote Island • Efforts to disseminate and enlighten tourist rules and manners on Iriomote Island • Efforts related to information sharing and monitoring of the number of tourists to Iriomote Island • Other matters consistent with the objectives of the Agreement	March 2020 Conclusion of the Agreement
		Preparation and publication of the Ethical Tourism Calendar	Okinawa Prefecture Taketomi Town Ministry of the Environment Taketomi Town Iriomote Island Ecotourism Promotion Council Private businesses	In order to disperse and equalize the timing of visits by suppressing the number of tourists entering the area during peak hours, **we will create and publish the Ethical Tourism Calendar (tentative name) to make visitors aware of the information on the times of congestion and encourage them to take actions of avoiding the concentration of tourism use and of restraining from going voluntarily.** **(i) Study on methods for creating and publishing the Ethical Tourism Calendar** The Okinawa prefectural government will study ways to create and publish the Ethical Tourism Calendar and coordinate and reach an agreement with relevant parties. **(ii) Tabulation and reporting of daily traffic data** Shipping companies operating regular routes will compile data on the daily number of passengers and report the data to Taketomi Town every month. **(iii) Tabulation and provision of data on daily number of visitors** Taketomi Town will compile daily data on the number of regular route users of the islanders and town office staff, and (i) subtract this from the data to compile the number of daily tourists and provide it monthly to the Taketomi Town Iriomote Island Ecotourism Promotion Council. **(iv) Tabulation and provision of daily number of visitors by nature experience field** The Ministry of the Environment will collect counter data for each field of nature experience, tabulate the daily number of visitors for each field, and provide it to the Taketomi Town Iriomote Island Ecotourism Promotion Council every month. **(v) Creation and publication of the Ethical Tourism Calendar** The Taketomi Town Iriomote Island Ecotourism Promotion Council creates and updates the Ethical Tourism Calendar every month, which predicts the congestion situation of excursion-based tourism and nature experience-oriented tours on Iriomote Island using the most recent data of daily visitors and of daily visitors by field provided by Taketomi Town and the Ministry of the Environment, and publicizes it through the websites of the Council and shipping companies to make it known to tourists.	Consideration Implementation Implementation Implementation Tentative Impremen-tation
		Operator adjustment to disperse and equalize the number of tourists entering the area	Okinawa Prefecture Private businesses	In order to limit the number of tourists to Iriomote Island per day to the standard value, business operators such as shipping companies, travel agents, and airlines that are responsible for transporting tourists to Iriomote Island will cooperate and hold regular meetings to consider and coordinate specific measures for mass tour tourists during the period when a high concentration of tourism use is expected, based on information in the Ethical Tourism Calendar and advance reservation information by each operator.	Conside-ration Impremen-tation
	Restrict activities by visitors and guide operators	Operation of the Overall Concept for Promoting Ecotourism of Iriomote Island	Taketomi Town Iriomote Island Ecotourism Promotion Council	(Reshown) The details of the projects and initiatives are as described in the same item in the heritage area.	Consideration Overall Concept certification Implementation
		Operation of the Ordinance Concerning Tourism Guides in Taketomi Town	Taketomi Town	(Reshown) The details of the projects and initiatives are as described in the same item in the heritage area.	April 2020 Enforcement of ordinances and enforcement regulations Implementation
		Attention to reduce vehicle speed	Yaeyama Police Station	Under the Road Traffic Law, the police control the speed limit of 40 km/h or less for vehicles on the Island and apply punitive provisions to offenders.	Implementation
			Ministry of the Environment Okinawa Prefecture Taketomi Town NPO Private businesses	Management organizations, NPOs and companies will work together to encourage tourists and others to reduce vehicle speeds by continuing to implement the following operations. **(i) Implementation of patrols and monitoring activities** **(ii) Installation of warning signs and posters** **(iii) Installation of road markings, speed reduction zones, speed warning devices, etc.** **(iv) Raising awareness of rules through handouts, SNS, etc.** **(v) Explanation of rules and precautions when renting a car**	Implementation
		Understanding of actual driving conditions of rental cars	Okinawa Prefecture	Transmission devices are installed in vehicles owned by rental car companies on Iriomote Island, and the number of cars running, sections, speeds, etc. of the rental cars are measured by using receivers installed on roads in the island in order to assess the data on sections, time, etc. of excessive speed and reflect it in the methods for effective operations.	Consideration Implementation

Management area	Management items	Initiatives and project names	Implementing entity	Outline of initiatives and projects	Year - 2021 / 2022 / 2023 -
Outside the heritage area	Promote actions in accordance with the responsibilities of each party involved in tourism	Enhance measures to reduce impacts	Ministry of the Environment Forestry Agency Okinawa Prefecture Taketomi Town Private businesses Relevant organization	The following operations and efforts are implemented to reduce loads on the natural environment caused by tourists' stay and activities and the lives and industries of residents, and to improve facilities, expand functions, and strengthen maintenance and management necessary to mitigate the impact on residents' lives. **(i) Maintenance and enhancement of toilet facilities and purification functions at ports and sites** **(ii) Developing and encouraging utilization of tourist reception facilities in the surrounding management areas** **(iii) Securing a means of transportation within the island with less environmental load and roadkill** **(iv) Efforts to reduce congestion in liner ships and harbor parking lots** **(v) Strengthening the functions of waste, sludge, and sewage treatment facilities** **(vi) Reduction of waste such as PET bottles** **(vii) Promotion of cleanups and beautification of coastal debris** **(viii) Disaster and accident prevention measures (installation of warning signs, establishment of rescue and communication systems, etc.)**	Consideration Implementation as needed
		Establishment and operation of the **Taketomi Town Visiter Tax Ordinance** (tentative name) on taxes to be borne by users	Taketomi Town Ministry of the Environment Okinawa Prefecture	The Taketomi Town Visiter Tax (tentative name) shall be established and properly operated as a system to collect revenue for the costs necessary for the development of infrastructure and environmental conservation projects that contribute to the reduction of loads and impacts from tourism on the natural environment as the responsibility and burden of tourists.	Consideration Impremen-tation
		Use of Good Practice **(Eco-Certification) System** (tentative name)	Relevant organization	We will promote activities that contribute to the promotion of responsible tourism and to the region by providing incentives to tourism operators and islanders by utilizing a system that evaluates the state of efforts to reduce loads on the natural environment and contribute to the local community for guide operators, tourism operators such as lodging businesses, restaurants, and transportation businesses, and islanders, and certifies, awards, and publicizes qualified business operators who meet certain standards and those who implement excellent activities.	Consideration Impremen-tation
		Establishment and operation of the **Iriomote Foundation,** a regional management organization responsible for tourism management	Relevant organization	In order to preserve the natural environment of Iriomote Island and protect the island's culture and operations, the Iriomote Foundation was established as a dedicated organization for local residents to take the lead in solving Iriomote Island's problems. • Implementation of projects, such as operation of the license system for guides based on the Tourist Guide Ordinance and human resource development • Implementation of management projects to enforce entry regulations and rules based on the Overall Concept for Promoting Ecotourism • Constant management of the secretariat of the Promotion Council based on the Overall Concept for Promoting Ecotourism • Implementation of conservation projects through the use of funds under the user contribution system • Implementation of monitoring of utilization impacts and results of conservation projects	**November 2021 Iriomote Foundation established** Consideration Implementation as needed
		Development of facilities for dissemination and enlightenment: Wildlife Conservation Center	Ministry of the Environment Okinawa Prefecture	The Ministry of the Environment will renew the content of the exhibition through a major renovation of the Iriomote Wildlife Conservation Center, while Okinawa prefectural government will strengthen its human resources to provide guidance for and explain the exhibition, thereby enhancing public awareness on the protection of wild animals, such as a Iriomote wildcat, and proper tourism.	Conside-ration Implementation
		Development of facilities for dissemination and enlightenment: Heritage Center	Taketomi Town	The World Heritage Center, which will function to provide exhibitions and explanations, education and learning, information dissemination, and conservation management related to Iriomote Island's World Natural Heritage, will be established in the eastern area, which is the gateway to Iriomote Island.	Consideration Impremen-tation
		Development of facilities for dissemination and enlightenment: Field Center	Ministry of the Environment	Establish a field center in the western area of Iriomote Island with functions such as informing users of rules, bases for field management activities, and disseminating and raising awareness of heritage values.	Consideration Impremen-tation
		Dissemination of rules and manners	Ministry of the Environment Forestry Agency Okinawa Prefecture Taketomi Town Private businesses	In order to reduce loads on the natural environment and give appropriate consideration to local communities and residents, the following measures will be implemented on an ongoing basis to disseminate the rules and manners to be observed by tourists and to promote responsible behavior. **(i) Distribution of pamphlets, etc. at ports, base facilities, accommodation facilities, restaurants, etc.** **(ii) Screening of educational videos on airplanes and liner ships, etc.** **(iii) Posting rules and manners on websites, SNSs, etc.**	Consideration Implementation
		Centralization of collection and dissemination of various information related to tourism	Ministry of the Environment Forestry Agency Okinawa Prefecture Taketomi Town Relevant organization Private businesses	In order to collect various kinds of information on Iriomote Island tourism (tourism management conditions, current status of tourism resources, actual conditions and trends of utilization, etc.) from various directions, and to organize and integrate them into a form that is easy to use, and to disseminate it to a wide range of targets, strengthen cooperation among the parties, and build a platform for centralized management and the dissemination of information.	Conside-ration Impremen-tation

The tables below are checklists, which have been used to ensure that tourism management measures to be implemented based on this plan appropriate management tools address the foreseeable tourism impacts.

Table: Tourism impacts on Iriomote Island and the checklist of management tools (within the heritage area)

Manage-ment area	Impact factors		Foreseeable impacts (threats)	Impact assessment		Management tools										
				Risk assessment	Trend assessment	Natural Parks Law	Protected forest system	Ecotourism Promotion Act	Taketomi Town Tourist Guide Ordinance	Road Traffic Act	Maintenance measures and infrastructure development	User fees (Visiting Tax Ordinance)	Good practices (eco-certification system)	Public-private sector agreement and coordination meetings Management organization	Promotion and enlightenment (including establishment of bases)	Information dissemination (including tourism calendars)
Impact within the heritage area	Increase in the number of places that are used for tourism within the heritage area		Reduced primeval areas free of human impact / Wider, accumulative, and compound human impact / Inhibited growth of highly rare species	**High**	↗		✓	✓	✓					✓	✓	✓
	Increase in the number of visitors entering the heritage area Concentrated tourism use at specific locations and times		Damage to places vulnerable to human activities and environmental degradation / Inhibited growth of rare species / Decreased visitor safety / Decreased quality and satisfaction of visitor experience	**High**	↗			✓	✓					✓	✓	✓
	Irresponsible conduct of visitors and guide operators	Capture of rare animals and picking of rare plants	Decreased population of rare species that have been captured or picked / Increased risk of extinction	**High**	↗			✓	✓					✓	✓	✓
		Dumping of garbage	Deterioration of water quality and habitat environment													
		Human waste in the field	Deterioration of water quality and habitat environment													
		Invasive alien species and pets	Deteriorated conditions for native species due to competition and predation													
			Spread of infection among wild animals such as wildcats													
		Feeding of wild animals	Behavioral change of wild animals													
		Disorderly abandonment of canoes etc.	Impact on mangroves etc. and landscape disturbance													
	Load caused by activities	Trekking	Soil hardening, soil denudation, expanded erosion, damaged trees due to trampling and treading by visitors / vegetation change around trails / invasion and spread of alien species / accidents of stray visitors													
		Canoe, kayak, etc.	Trunk and root damage due to intrusion into the mangroves / Disturbance of vegetation and wildlife habitat around coasts and rivers													
		Activities at streams and waterfalls, canyoning	Inhibited inhabitation and reproduction of fish etc. due to evasion and water quality deterioration / riverbed disturbance and damage to attached algae due to trampling / disturbance to benthic organisms and detritus													
		Wildlife watching, fishing, collection, etc.	Declined population of animals and plants that have been fished, captured, and/or picked Behavioral change of wild animals as they evade or get used to people													
	Motorboat tours		Soil erosion and impact on mangroves due to ship waves of motorboats	**Low**	↘	✓								✓		

Table: Tourism impacts on Iriomote Island and the corresponding checklist of management tools (outside the heritage area)

Manage-ment area	Impact factors		Assumed impacts (threats)	Assessment of the impacts		Administrative tools										
				Risk assessment	Trend assessment	Natural Parks Law	Protected forest system	Ecotourism Promotion Act	Taketomi Town Tourist Guide Ordinance	Road Traffic Act	Maintenance measures and infrastructure development	User fees (Visiting Tax Ordinance)	Good practices (eco-certification system)	Public-private sector agreement and coordination meetings Management organization	Promotion and enlightenment (including establishment of bases)	Information dissemination (including tourism calendars)
Impact outside the heritage area	Development for tourism	Facility construction, landform change, cutting of trees, etc.	Habitat loss and habitat environment change Invasion of alien species / landscape disturbance	Low	→	✓										
	Total number of visitors to Iriomote Island, concentrated tourism use at specific times, increase in the number of individual tourists	Use of the liner by visitors Occupation of parking lots by tourism operators etc.	Congestion on the liner ships and at the ports / decreased comfort and satisfaction of visitors (crowded toilets, bad atmosphere, hurried tour, etc.) / disturbance to local residents' life (for example, local people cannot board the liner or park vehicles at the port).	Medium	→									✓	✓	✓
		Load on the island's infrastructure by visitors	Water supply restriction to local people due to shortage of water resource Increased load and cost of sewage and waste treatment	Medium	→						✓	✓				
		Increase in accidents caused by visitors	Increased burden on local fire brigades and residents for transport and search activities	High	↗										✓	✓
		Increased traffic and excessive speed on roadways	Traffic accidents and roadkill of wild animals such as wildcats Occurrence of traffic accidents and decreased safety of local residents' life	High	↗					✓	✓			✓	✓	✓
	Irresponsible conduct of visitors and tourism operators	Capture of rare animals and picking of rare plants	Declined population of rare species that have been captured or pickeed / increased risk of extinction	Medium	↗			✓	✓				✓	✓	✓	✓
		Visitation and use of the local clinic for minor medical treatment	Increased burden on the local clinic													
		Peeping into private houses in the local villages	Violation of local residents' privacy													
		Entry into sacred places such as Utaki and places of festivals	Disturbance to local culture and customs													
		Walking around in swimsuits in the local villages	Deteriorated public morals and increased discomfort to local residents' life													
	Load caused by activities	Trekking and walking	Disturbance to commercial hunting and agricultural activities due to visitors entering hunting grounds and/or farmland / damaged hunting tools and agricultural tools													
		Wildlife watching	Disturbance to turtles' spawning due to lighting on facilities and flashlights in the coastal area													
			Deteriorated habitat environment of fireflies due to disorderly use of flashlights													
		Insect collection and fishing	Declined population of insects and/or fish that have been caught													
		Swimming, diving, snorkeling, and fishing	Disturbance to fisheries due to tourists swimming and/or boats at anchor in the fishing grounds													
			Deteriorated water quality and habitat environment of marine life due to the use of chemical substances such as sunscreen and detergent													
			Coral damage due to anchoring													
			Coral damage due to low-skill swimming													
		Cave exploration and caving	Disturbance to the habitation of bats etc. due to tourists entering caves and using flashlights													

5. Implementation of Monitoring and Progress Management of the Plan

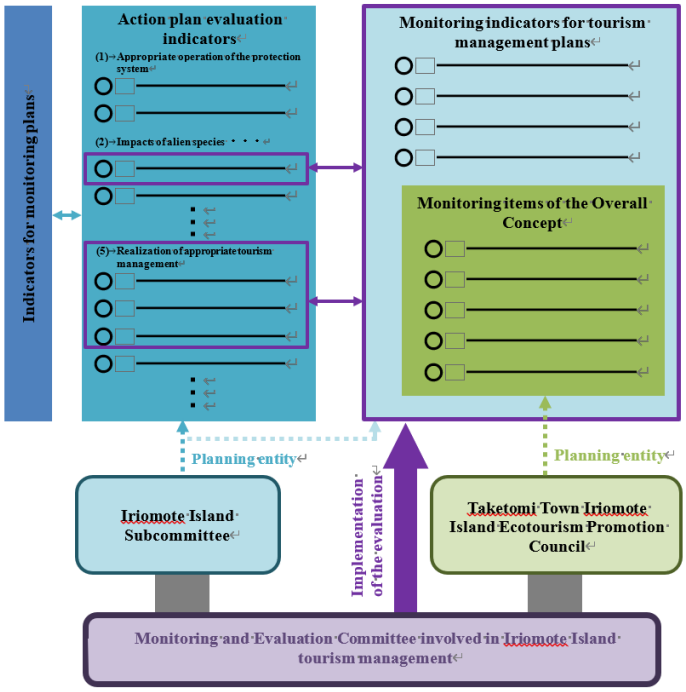
5.1 Monitoring and evaluation system

To achieve the overall goals of tourism management of this plan, the status of achievement of management criteria will be periodically monitored and evaluated together with the magnitude of tourism impact on the natural environment and local communities and the status of implementation of the related actions and projects. Based on the results, adaptive responses will be made, for example revising management criteria and strengthening measures to address issues.

Indicators for monitoring and evaluation have been set out in the monitoring plans related to the World Natural Heritage Amami-Oshima Island, Tokunoshima Island, the northern part of Okinawa Island, and the Iriomote Island, and the Iriomote Island Action Plan, which is superordinate to this plan, also has indicators to evaluate the effectiveness of management. In addition, the Overall Concept for Promoting Ecotourism of Iriomote Island, which is a related plan of this plan, has its monitoring items. Many of them overlap with the monitoring indicators to be set forth in this plan. Therefore, this plan aims to achieve efficient monitoring and evaluation in consistency with these indicators.

In consideration of the relationship between this plan and other plans, monitoring indicators have been set up for this plan to cover the monitoring items of the Overall Concept for Promoting Ecotourism of Iriomote Island. In addition, for consistency, some of the monitoring indicators of this plan have been chosen, so that the evaluation indicators of the monitoring plan for the entire heritage area and the Iriomote Island Action Plan can be used.

To monitor and evaluate this plan, the Committee for Monitoring and Evaluation of Tourism on Iriomote Island (hereinafter referred to as "Monitoring and Evaluation Committee") has been jointly established under the Iriomote Island Subcommittee, which is responsible for formulating and managing this plan and the Iriomote Island Action Plan, and the Taketomi Town Iriomote Island Ecotourism Promotion Council, which is responsible for formulating and managing the Overall Concept for Promoting Ecotourism of Iriomote Island as a Whole. The Monitoring and Evaluation Committee will periodically check and evaluate the monitoring indicators for both plans and report and provide advice to the Iriomote Island Subcommittee.



5.2 Management of the progress of plan

After the completion of this plan, the Monitoring and Evaluation Committee will be organized periodically to check and evaluate monitoring indicators, and report and provide advice to the Iriomote Island Subcommittee on the evaluation results. Based on the report and advice of the Monitoring and Evaluation Committee, the Iriomote Island Subcommittee will revise and update, as necessary, the content of major actions that are contained in this plan.

This plan will be reviewed five years after the completion of this plan. The Monitoring and Evaluation Committee will review the content of the plan in general and make recommendations and requests of revisions to management methods, management criteria, etc. as necessary. The Iriomote Island Subcommittee will review and revise this plan, as necessary based on the recommendations and requests from the Monitoring and Evaluation Committee.

After that, this plan will be continuously checked and reviewed every five years. In the meantime, the Iriomote Island Subcommittee will periodically check data on monitoring indicators, and if there is any matter of concern, it will seek opinions and advice from the Monitoring and Evaluation Committee.

5.3 Monitoring indicators

The monitoring indicators in the Plan are classified into “management indicators” for achieving management criteria, “impact indicators” for evaluating the magnitude of tourism impact on the natural environment and local communities, and “related indicators” for monitoring the progress of related actions and projects, as follows:

■ Management indicators

- In accordance with the management criteria of the Plan itself, the implementation status and the degree of achievement of the Tourism Management Plan will be verified quantitatively by means of specified measurement methods.
- The Iriomote Island Subcommittee will consider measures to be taken in the event that the management criteria set in this plan are exceeded.

■ Impact indicators

- To ascertain the extent to which major negative impacts that are assumed to have resulted from tourism have occurred.
- If the Monitoring and Evaluation Committee has determined that a serious impact has occurred, the Iriomote Island Subcommittee will consider measures to be taken.

■ Related indicators

- To monitor not tourist management itself, but changes in tourism that occur as a result of tourism management measures, such as the ripple effects of tourism on local economy and the quality of tourism.
- To keep data on the latest situation up to date continuously based on monitoring indicators and share the results with relevant organizations through the Iriomote Island Subcommittee.

Table: Tourism management plan monitoring items

Management category	Type	Monitoring indicators	Implementing entity	Frequency	Monitoring method	Monitoring plan*	Action plan indicator*	Overall Concept*
Heritage area	Management indicators	The number of sites in the heritage area	Iriomote Island Ecotourism Promotion Council	Every year	The Iriomote Island Ecotourism Promotion Council ascertains the exact number of fields within the heritage area with the natural tourism resources listed in the Overall Concept and that have at least the same level of tourism use.	–	–	–
	Management indicators	Number of visitors entering areas of specified natural tourism resources	Iriomote Island Ecotourism Promotion Council	Every year	The Iriomote Island Ecotourism Promotion Council ascertains the exact number of visitors through a pre-entry approval system managed by the council. Until the system is introduced, the Council ascertains the exact number of visitors in the same manner as other natural tourism resources.	4-(1)-17(vi)	–	○
	Management indicators	Number of visitors entering other natural tourism resources	Ministry of the Environment Taketomi Town	Every year	The entities ascertain the exact number of visitors using user counters installed by the Ministry of the Environment or receiving reports from guides based on the Ordinance Concerning Tourism Guides in Taketomi Town.	4-(1)-17(vi)	–	○
	Management indicators	Compliance with rules by guide operators and users	Iriomote Island Ecotourism Promotion Council	Every year	The Iriomote Island Ecotourism Promotion Council ascertains the exact number of penalties to guide operators and users based on the Ordinance Concerning Tourism Guides in Taketomi Town or the Ecotourism Promotion Act.	–	Short-term (ix)	○
	Impact indicators	Status of alien species invasion	Ministry of the Environment	Every year	The Ministry of the Environment collects information obtained through surveys conducted by government agencies and research institutions and information confirmed by guides at sites to ascertain the status of alien species invasion, etc.	3-(1)-16 (i)	Short-term (ii)	○
	Impact indicators	Vegetation conditions along routes	Ministry of the Environment	Every year	The Ministry of the Environment takes fixed-point photographs and measures sidewalk widths along major routes to monitor changes in the natural environment around the routes.	4-(2)-18 (ii)	Short-term (xi)	○
	Impact indicators	Vegetation conditions along routes (details)	Ministry of the Environment / University of the Ryukyus Iriomote Station	Once every five years	The Ministry of the Environment and the Iriomote Station of University of the Ryukyus jointly conduct plant surveys in fixed-point study areas along major routes of tourism use to understand the conditions of treading on vegetation, the extent of roads, and changes in vegetation around the sites.	4-(2)-18 (ii)	Short-term (xi)	○
	Impact indicators	Water quality in major waterfall basins	Ministry of the Environment	Every year	The Ministry of the Environment conducts water quality surveys (numbers of BOD, SS, and fecal coliforms) at major waterfall basins and other sites in use.	–	–	○
	Impact indicators	Habitat of fish in major waterfall basins	Ministry of the Environment	Once every 1-3 years	The Ministry of the Environment conducts a visual survey of fish species and populations in major waterfall basins by skin diving.	–	–	○
	Impact indicators	Habitat of fish in major rivers	Ministry of the Environment / University of the Ryukyus Iriomote Station	Once every five years	The Ministry of the Environment and the Iriomote Station of the University of the Ryukyus work together to sample water from major rivers in use and analyze the environmental DNA contained in these samples to identify living species and taxa.	–	–	○
Outside the heritage area	Management indicators	Annual number of tourists to Iriomote Island	Taketomi Town	Every year	The Taketomi Town compiles and ascertains the number of tourists who entered Iriomote Island throughout the year based on the daily number of passengers, etc. reported by shipping companies and data on the daily number of regular route users of islanders and town office staff.	4-(1)-17(i)	Short-term (viii)	○
	Management indicators	Daily number of tourists to Iriomote Island	Taketomi Town	Every year	The Taketomi Town compiles and ascertains the number of tourists who entered Iriomote Island throughout the year based on the daily number of passengers, etc. reported by shipping companies and data on the daily number of regular route users of islanders and town office staff.	–	Short-term (viii)	○
	Management indicators	Vehicle speed on the island	Okinawa Prefecture	Every year	The prefectural government collects data from Bluetooth sensors installed along prefectural roads on Iriomote Island to monitor the traffic volume and vehicle speed of all vehicles and rental cars.	–	–	–
	Management indicators	(Reshown) Compliance with rules by guide operators and users	Iriomote Island Ecotourism Promotion Council	Every year	(Reshown) The Iriomote Island Ecotourism Promotion Council ascertains the number of penalties to guide operators and users based on the Taketomi Town Tourist Guide Ordinance or the Ecotourism Promotion Act.	–	Short-term (ix)	○
	Impact indicators	Traffic accidents involving Iriomote wildcats	Ministry of the Environment	Every year	The Ministry of the Environment conducts autopsies on dead or injured animals found through patrols and reports from municipalities and local residents to monitor trends in traffic accident damage.	2-(1)-11	Short term (iv)	–
	Impact indicators	(Reshown) Status of alien species invasion	Ministry of the Environment	Every year	(Reshown) Regarding the status of alien species invasion, the Ministry of the Environment will collect and assess information obtained through surveys by government agencies and research institutions and information confirmed by guides at sites.	3-(1)-16 (ii)	Short term (iii)	○
	Impact indicators	The number and rate of visits to medical institutions by tourists	Okinawa Prefecture	Every year	The Okinawa prefectural government compiles data on medical examinees at clinics on Iriomote Island to ascertain the number and percentage of people who live outside the island.	–	–	–
	Impact indicators	The number of distress calls and accidents on the island and of personnel who responded	Taketomi Town	Every year	Taketomi Town ascertains the exact number of rescue operations and the number of rescuers involved in mountain rescues in the town (i.e., rescue of disaster victims in mountains or rivers on Iriomote Island).	–	–	–
	Impact indicators	Congestion of liner ships	(TBD)	Every year	(To be announced) ○○○ compiles and assesses data on congestion rates based on the data on the daily number of passengers and capacities of operated ships collected from shipping companies.	–	–	–
	Impact indicators	Amount of waste discharged	Taketomi Town	Every year	(To be announced) Taketomi Town assesses data on the amount of waste by item generated on Iriomote Island.	–	–	–
	Impact indicators	Water quality in major ports	Okinawa Prefecture	Every year	(To be announced) The Okinawa prefectural government monitors the results of a water quality surveys of public waters conducted at major ports on Iriomote Island.	–	–	–
	Related indicators	User awareness (satisfaction, understanding of heritage value, etc.)	Okinawa Prefecture	Once every 3-5 years	The prefectural government monitors user satisfaction, thoughts of revisiting, and understanding of heritage value through questionnaire surveys, etc.	–	Mid-term D	○
	Related indicators	Occurrence of accidents during nature experience-oriented tours	Taketomi Town	Every year	(To be announced) Taketomi Town ascertains the number of accidents in nature experience-oriented tours in accordance with the details of reports from guide operators.	–	Short-term (x)	–
	Related indicators	Population and occupancy rate of Iriomote Island's tourism industry workers (accommodation, transportation, food and beverage, goods sales, guides) living on the island	Taketomi Town	Once every five years	The Taketomi Town ascertains the number of people working in the tourism industry on Iriomote Island based on census data. In addition, the Town ascertains the number of people living on the island and the rate of residence of the islands guides based on the license information in the Tourist Guide Ordinance.	–	Mid-term C	–
	Related indicators	Average number of guests	Taketomi Town	Once every five years	Taketomi Town ascertains the rate of tourists staying on Iriomote Island based on data from statistical surveys of tourist arrivals.	–	Mid-term E	–

* The Monitoring Plan column indicates the index number of the monitoring index that is similar in content to the monitoring index of Amami-Oshima Island, Tokunoshima Island, Northern Okinawa Island, and Iriomote Island World Natural Heritage Site Monitoring Program

* Action plan indicator column shows the item numbers of the management evaluation indicators whose content is similar to that of the Iriomote Island Action Plan.

* A circle (○) in the Overall Concept column indicates an item set as a monitoring item in the Overall Concept for Promoting Ecotourism of Iriomote Island

Overview of Tourism Management on Amami-Oshima Island, Tokunoshima Island, and the Northern Part of Okinawa Island

1. Northern Part of Okinawa Island

(1) Current state and issues of tourism

With regard to the state of tourism use of the northern part of Okinawa Island, the annual numbers of visitors to major tourist facilities and popular spots are individually counted at each facility etc., but no statistical figures are available to show the change in number of visitors to the entire region. It is necessary to discuss how to obtain data in the future that can be used as indicators to monitor tourism trends in the northern part of Okinawa Island accurately.

The table below shows the major points of tourism use, both within and outside the World Heritage property area (hereinafter referred to as "heritage area") in the northern part of Okinawa Island, for which the status of tourism use has been obtained; the status of tourism use in 2019, before the impact of the spread of COVID-19, is shown. Since 2020, the number of visitors has declined significantly due to COVID-19, but it is necessary to continue the current work and keep track of the trends, since the number of visitors may increase after COVID-19.

In the northern part of Okinawa Island, the number of users is considered to be at a low level, because there are not many points of tourism use within the heritage area at present. However, there are not enough data on the actual status of tourism use when it comes to the extensive heritage area covering three villages in the northern part of Okinawa Island; it is necessary to establish a system that can accurately ascertain the number of visitors, mainly at the existing points of tourism use. Particular attention should be paid to the relative ease of access to forest roads and the possibility of vehicles use off public roads.

Table: Status of tourism use in the northern part of Okinawa Island in 2019

Entire region	Inside the heritage area	Outside the heritage area
*How to monitor the tourism use trends of the entire region is an issue.	[1] Mt. Yonaha (about 2,500 people) [2] Mt. Ibu (about 500 people) [3] Mt. Tamatsuji (* not counted; installation of counters under preparation)	[1] Cape Hedomisaki (380,424 people) [2] Kunigami-son Shinrin-koen Park (14,032 people) [3] Hiji Otaki Waterfall (31,047 people) [4] Yambarukuina Ecology Exhibition and Learning Facility (19,801 people) [5] Okuyambaru no Sato (4,226 people) [6] Yambaru Manabi no Mori (Forest of Learning in Yambaru) (18,894 people) [7] Yambaru Wildlife Conservation Center (11,702 people) [8] Yambaru Forest Visitor Center (*counted from FY2020, as tourism use started in February 2020) [9] Ta Falls (33,989 people) [10] Museum of Mountain and Water Life (12,401 people) [11] Villagers' Forest Azalea Eco Park (51,024 people) [12] Fukujigawa Seaside Park (15,934 people) [13] Fureai Hirugi Park (88,009 people)

(2) Basic policy on tourism management

In the northern part of Okinawa Island, the Master Plan of the Northern Part of Okinawa Island Sustainable Tourism was formulated in February 2020 by the Northern Part of Okinawa Island Sub-local Meeting, based on the basic policy of "formulating a tourism management plan that takes into account the actual situation of tourism in each region", which was set forth in the comprehensive management plan.

In the northern part of Okinawa Island, multi-faceted efforts are currently being made in accordance with the basic policy of the plan as described below. In particular, visitor management based on zoning of the heritage area, buffer zone, and surrounding management area is being implemented in accordance with the policies described in [3] and [4].

○ Basic policy on tourism management in the Master Plan for Sustainable Tourism in the Northern Part of Okinawa Island

[1] Fostering local residents' understanding of sustainable tourism

[2] Creating a system in which World Heritage inscription contributes to sustainable development of the local economy and resolution of local community issues

[3] **Realizing appropriate visitor management in heritage areas and buffer zones centering on Yambaru Forest Tourism**

[4] Providing **planned guidance for sightseeing and three village excursions focusing on the surrounding management area**

[5] Developing human resources to promote sustainable tourism and strengthen the general management and tourism management capacities of organizations (tourism associations etc.)

So far, visitor management in the heritage area and buffer zone has been conducted based on the Yambaru Forest Tourism Promotion Plan as a Whole formulated by the Yambaru Three Village World Natural Heritage Promotion Council in March 2019. However, it is now necessary to revise its content partly in light of the policy change regarding the guide system and the inscription as a World Natural Heritage property.

With regard to the guide system, work to revise it is already underway in consideration of operation under the specific circumstances of the individual villages under the common rules that apply to the three villages. In Kunigami Village, the Ordinance for Promotion of Use of Official Guide of Kunigami Village was enacted in FY2020, and it has been enforced since FY2021. Ogimi Village and Higashi Village are also examining their own institutionalization.

After the World Natural Heritage inscription, the name of the body that formulated this plan was changed to the Yambaru Three Village World Natural Heritage Council in May 2022; at the same time, the Forest Tourism Subcommittee, which implements this plan, also changed its structure, so that the Yambaru Three Village Tourism Council works as the secretariat.

In light of the aforementioned situation, the Forest Tourism Subcommittee began in June 2022 to review and reorganize the fields of use, based on the data from survey on the actual status of tourism use, and re-examine an effective visitor management system according to the zoning of the heritage area, buffer zone, and surrounding management area, with a view to reflecting the current status of the guide system in the plan and taking into consideration the possible increase in the number of visitors and changes in the style of use that are anticipated to occur once COVID-19 has settled down.

(3) Major actions

[1] Control and optimization of tourism use in the heritage area and buffer zone (by the three villages in coordination)

- Study on the proper use of night roads
  Verify the effectiveness of nighttime road closures on forest roads conducted in the previous years and study the methods and operation of nighttime road closures to implement more effective anti-poaching and roadkill measures etc.
- Review of the Yambaru Forest Tourism Promotion Plan as a Whole
  The Forest Tourism Subcommittee will review the Yambaru Forest Tourism Promotion Plan as a Whole with a view to reconstructing the guide system and effective visitor management system in line with the zoning and actual status of tourism use after World Heritage inscription.
- Implementation of surveys to ascertain the actual status of tourism use
  The Yambaru Three Village World Natural Heritage Council will conduct surveys to ascertain the actual status of tourism use, mainly in the heritage area and buffer zone, taking into consideration the possible increase in the number of visitors and changes in the style of tourism use that might occur once COVID-19 has settled down.
- Model project to enhance sustainable tourism content
  With the aim of deterring and preventing poaching and illegal excavation, forest road patrols and biological surveys have been continuously carried out by local volunteers of the three villages in the northern part of Okinawa Island and the Kunigami Village Forest Association in coordination and cooperation with the Ministry of the Environment. These activities will be provided to visitors as new tourism content, thereby linking tourism to forest conservation activities.

[2] Guide system and guide training (by the individual villages)

○ Kunigami Village: Enforcement of the Ordinance for Promotion of Use of Official Guide of Kunigami Village.
Continual implementation of registration, accreditation and training of guides under the 2021 ordinance.

○ Ogimi Village: Consideration of preparation and certification of the Ogimi Village Ecotourism Promotion Plan as a Whole.
Establishment of rules for use, including restrictions on the number of people entering Ta Falls, where users are concentrated, and establishment of a system to ensure compliance with the rules.
Promotion of the Ogimi Village Kuganinchu Project
Creation of a human resource development system for guides who interpret the value of natural and cultural resources that exist in Ogimi Village

○ Higashi Village: Consideration of the enactment of the Higashi Village Guide Ordinance (provisional name)
Examination of a registration and certification system for guides in Higashi Village, aiming to pass the ordinance by the end of FY2022.

[3] Encouraging the tourism use of the surrounding management areas (by the three villages in coordination + by the individual villages)

- World Natural Heritage Branding Project

○ Kunigami Village: Development of SDGs-compatible experience as tourist products targeting vacation rental users and their expansion to Ogimi Village and Higashi Village; outreach to schools outside the prefecture for school trips.

○ Ogimi Village: Development of guidance methods that make use of tourism resources

that exist in the Yambaru area, learning from good examples of more experienced places, and tools to guide visitors to the surrounding areas.

○ Higashi Village: Development of digital brochures to encourage visitors to move around the three villages

2. Amami-Oshima Island and Tokunoshima Island

(1) Current state and issues of tourism

The table below shows the major points of tourism use, both within and outside the heritage area on Amami-Oshima Island and Tokunoshima Island, for which the status of tourism use has been obtained; the status of tourism use in 2019, before the impact of the spread of COVID-19, is shown. Although the number of visitors to the whole region increased from 2015 to 2019, efforts are being made to reduce the load of tourism use on the natural environment and to disperse tourism use in accordance with the Master Plan of the Amami Island Group Sustainable Tourism (Page 204 of the nomination dossier, Annex 5-40).

Since 2020, the number of visitors has decreased significantly due to COVID-19, but we will continue the current work and monitor the trends, since the number of visitors might increase after COVID-19.

Table: Status of tourism use on Amami-Oshima Island in 2019

Entire region	Inside the heritage area	Outside the heritage area
The number of visitors increased approximately 1.3 times between 2015 and 2019. (Approximately 423,000 to 530,000) *314,000 visitors in 2020	[1] Yuwandake (*Less than 3,000 *Total of the Yamato Village side and Uken Village side. Data partially missing.) [2] Kinsakubaru (1,185 vehicles *April to December) [3] Setouchi Chuo Line (* not counted; installation of counters under preparation.)	[1] Cape Ayamaru (89,309 people) [2] Amami Park (129,000 people) [3] Amami Nature Observation Forest (19,041 people) [4] Ohama Seaside Park (62,333 people *2019 figures) [5] Amami Wildlife Conservation Center (10,484 people) [6] Amami Forestpolis (14,711 people) [7] Kuroshio Forest Mangrove Park (91,931 people)

Table: Status of tourism useon Tokunoshima Island in 2019

Entire region	Inside the heritage area	Outside the heritage area
The number of visitors increased 1.1 times between 2015 and 2019 (from approximately 130,000 to approximately 144,000). *The number of visitors in 2020 was approximately 81,000.	[1] The Yamakubiri Line of the forest road (143 vehicles *May 2019 to March 2020. Night only.) [2] Mt. Inokawa [3] Mt. Amagi (visitors of [2] and [3] are not counted yet. *Counter installed in December 2020.)	Amami rabbit observation hut (209 people)

(2) Basic policy on tourism management

For Amami-Oshima Island and Tokunoshima Island, the national government, Kagoshima Prefecture, municipalities, private organizations, etc. are working in coordination to implement measures for sustainable tourism, such as the enforcement of tourism use rules and improvement of facilities, based on the Master Plan of the Amami Island Group Sustainable Tourism developed by Kagoshima Prefecture in March 2016.

The master plan aims at "systematically guiding utilization according to the characteristics of each sightseeing spot", "spreading the effect of World Heritage inscription to the Amami Island Group", and "realizing high-quality tourism and improving visitor satisfaction". The master plan was conceived to create a planned flow of tourists by properly directing them to tourist spots according to the carrying capacities and the state of the natural environment to avoid the negative impacts of the expected increase in the number of tourists.

Currently, based on the master plan, work is underway to develop and enforce the tourism use rules for areas that are important for the protection of Amami-Oshima Island and Tokunoshima Island, as is explained later. In addition, outside the heritage area, various efforts are being made to ensure proper use and decentralization of tourism use, such as the installation and utilization of facilities that can be used by a large number of people and long trails. Along with these efforts, the monitoring of the status of tourism use has been done and will be continued in the future. Based on the results, further necessary measures will be considered.

(3) Major actions

[1] Control and optimization of tourism use in the heritage area and buffer zone

In areas that are important for protection of Amami-Oshima Island and Tokunoshima Island, tourism use rules have been developed and provisionally enforced to reduce the load of tourism use by a large number of people on the natural environment and to provide high-quality nature experiences. The tourism use rules have been discussed and decided by the meetings of the relevant local government organizations, private organizations, etc. (Amami-Oshima Island: Kinsakubaru (formulated by the Amami-Oshima Utilization Optimization Liaison Conference; enforcement since February 2019), areas around the Santaro Line (formulated by the Liaison Conference for the Optimization of Night-time Use around the Amami-Oshima Santaro Line; enforcement since October 2020), Mt. Yuwandake (enforcement scheduled to start within FY2022); Tokunoshima Island: the Yamakubiri Line of the forest road (formulated by the Tokunoshima Utilization Optimization Liaison Conference; enforcement since July 2019), the Mt. Hage forest road and the Sankyo forest road (agreement signed by the Forestry Agency, Amagi Town, and the Tokunoshima Eco-Tour Guide Liaison Council; enforcement since April 2019.)) The tourism use rules include, depending on the specific local conditions, the requirement that tourists should be accompanied by certified eco-tour guides and the restriction of the number of vehicles that can be used in the same time period. Even after their enforcement started, they have been discussed periodically at the utilization optimization liaison conference etc., to revise and strengthen the content of the tourism use rules in light of the status of tourism use. The status of tourism use is monitored, based on the counting devices, on-site investigation, etc.

To raise the public awareness of the tourism use rules, awareness-raising activities for the tourism use rules are conducted, providing information on websites and distributing flyers etc., with the cooperation of tourism associations, travel agencies, and rental car companies.

Moreover, recently on Tokunoshima Island, to reduce the environmental load, such as roadkill, walk events are organized aiming at changing the style of night tours from vehicle rides to walking.

[2] Training of guides

For Amami-Oshima Island and Tokunoshima Island, the General Concept for Promotion of Ecotourism on the Amami Islands was adopted based on the Ecotourism Promotion Act in 2017; the operation of the Amami Islands ecotourism guide certification system started in the same year. The Amami Islands Ecotourism Promotion Council, consisting of the national government, Kagoshima Prefecture, and local municipalities, certifies eco-tour guides who have deep knowledge and philosophy about the nature and culture of the Amami Islands, provide safe and high-quality experiences to visitors, and are responsible for environmental conservation in the region. Since April 2020, to improve the skills, the certified eco-tour guides have been required to take a renewal training course in the third year after certification and meet certain requirements to get their certification renewed. They not only guide tourists but also work in coordination with related organizations to enforce the tourism use rules and raise public awareness for environmental conservation. Ninety-one guides on Amami-Oshima Island and 19 guides on Tokunoshima Island have been certified as of April 2022.

In addition, in accordance with the Amami Islands Local Licensed Guide Interpreters Training Program based on the amended Licensed Guide Interpreters Act, training has been provided since 2015 to Amami Islands local licensed guide interpreters, who will receive tourists from other countries. As of April 2022, 114 licensed guide interpreters have been registered (English 87, Chinese 27).

[3] Encouraging the tourism use of the surrounding management areas

To reduce the load of tourism use on the natural environment and disperse the use, measures are taken to install tourist centers.

Specifically, outside the heritage area, “World Heritage Centers” have been set up as the central facilities for awareness raising of tourist users, tourism management, and environmental conservation (Amami-Oshima Island: open since July 2022; Tokunoshima Island: under construction since FY2023 to open in FY2024 or later), and the Amami Nature Observation Forest has been renewed as a place where people can enjoy nature experiences casually (open since October 2022).

In addition, long-distance nature trails named the World Natural Heritage Amami Trail have been set up on inhabited islands of the Amami islands, such as Amami-Oshima Island and Tokunoshima Island (the entire section opened in January 2021). On Amami-Oshima Island and Tokunoshima Island, the trails basically run outside the heritage area. The trails have been routed in such manner that visitors can experience the unique nature of the Amami Islands and the culture of the harmonious relationship between people and nature. They are used for sightseeing and also local walking events in different places.

Review of Existing Measures to Reduce Roadkills and Future Approach

Table of Contents

1. Roadkills on the property and the objective of this report 2
2. Status of roadkills and their impact on the species survival and the ecosystem functions 3
Confirmation methods of roadkill incidents 4
Status of roadkills 5
Negative impact on the survival of species and the functioning of the ecosystem 10
3. Review of the effectiveness of traffic control measures and future approach 14
Amami-Oshima Island and Tokunoshima Island 15
Northern part of Okinawa Island 21
Iriomote Island 25
4. Summary of future approach 29
5. Bibliography 30

1. Roadkills on the property and the objective of this report

In parts of the property and surroundings, there have been confirmed car accidents of endemic species and rare species, such as the Amami rabbit Ryukyu long-haired rat, Okinawa rail, Iriomote cat, and crested serpent eagle. These traffic accidents include cases where it was confirmed that such species had been injured or killed by car through, for instance, statements of the parties involved, witness statements, and veterinary medical examinations of dead or injured animals, and cases where autopsy results of dead animals collected in the vicinity of roads found that the injuries or deaths were caused by traffic accidents. The dead bodies of threatened species, such as chicks of Okinawa rails, Anderson's crocodile newts, Ryukyu black-breasted leaf turtles, and Yaeyama yellow-margined box turtles and other small animals were also broadly classified as roadkill when they fell into street gutters, could not get out on their own, and died. Roadkills could have a negative impact on the survival of species. In addition, they could impede the further recovery and distribution of some rare species whose populations are on a recovery trend thanks to the various measures taken. Some of the endemic species and rare species inhabiting the property have an extremely small natural distribution area. Although main roads are built outside the property, it is necessary to pay attention to the occurrence of roadkills not only in the property but also in the Buffer Zone and Surrounding Conservation Area, from the perspective of the survival of these species. At the same time, it must be noted that the target species, status of roadkill incidents, development of countermeasures, and the types and seriousness differ from one island to another.

Meanwhile, cars and roads are essential to the livelihoods of local people. Thus far, based on discussions with local people on the need of roads for their livelihoods, measures were taken such as blocking roads with little traffic and during hours of low use. However, roadkills on roads used by various users, including tourists, remain a challenge. To promote the enhanced prevention of roadkills in the future, it is important to discuss with local people how high-traffic roads and tourism should be managed and share with them a common understanding. This is strongly related to the request on tourism management and is being discussed together.

In response to the request, this report summarizes the past occurrence of roadkills and the current effect of countermeasures in order to organize information for a review of the existing measures and more effective implementation of new measures. In addition, the report provides an update on the subsequent initiatives of the various roadkill countermeasures stated in the nomination document submitted in January 2019 (see 4.a.2.2. “Traffic accidents, etc.” on pp. 182–185) and the various measures reported to the IUCN mission in October 2019.

2. Status of roadkills and their impact on the species survival and the ecosystem functions

Overview

- Roadkill incidents of threatened species, the causes, and the impact on the populations on the four islands have been reviewed based on the information obtained to date. For all species, roadkill incidents have been on the rise or have remained at high levels over a long time. The potential causes of this situation are changes in tourism dynamics and a recovery in, and greater distribution of, the populations of threatened species in recent years due to measures taken against alien species.
- With regard to the Iriomote cat, which is the top predator with a small population, roadkills are considered to have a material impact on the species population and on the ecosystem of Iriomote Island. As for the Amami rabbit and the Okinawa rail, it is estimated that the population and distribution of both species are on a recovery trend. Nonetheless, given their high rankings on the IUCN Red List, it is necessary to continue reducing the impact of roadkills on these species. For the Amami rabbit on Tokunoshima Island, the habitat is fragmented between the southern and northern parts of the island, and the impact of roadkill is of greater concern.
- In addition to these three species, an analysis was conducted on the roadkill trend of the Ryukyu long-haired rat. Furthermore, roadkills of animals on Iriomote Island, including common species, were analyzed. In addition, roadkill data for other rare species are being collected, including Okinawa robins, Okinawa woodpeckers, Ryukyu black-breasted leaf turtles, and spiny rats. The collected data will be analyzed further.

Confirmation methods of roadkill incidents

On each island, when a veterinary investigation or autopsy result has found that a crash with an automobile resulted in the injured or dead animal collected from a road or vicinity following notification from local people or others, such an incident is counted as a roadkill. The counting of the number of roadkills began around the time when the Ministry of the Environment opened a local office or a local conservation group began its activities on an island. It has thus started in 2000 on Amami-Oshima Island and Tokunoshima Island, in 1995 on Northern part of Okinawa Island, and in 1978 on Iriomote Island. Confirmation and assessment methods of roadkills gradually became structured after data collection started. The current methods are shown in Figure 1. For many rare species with a smaller body size (e.g., reptiles and amphibians), in principle a roadkill is determined when a dead body is found run over on the road. The number of roadkills is the number that the Ministry of the Environment could confirm based on reports from local people. The actual number is considered to be higher. Dead animals are often snatched by carnivorous birds such as crows. There are hence many instances where information cannot be collected even when roadkills have occurred.

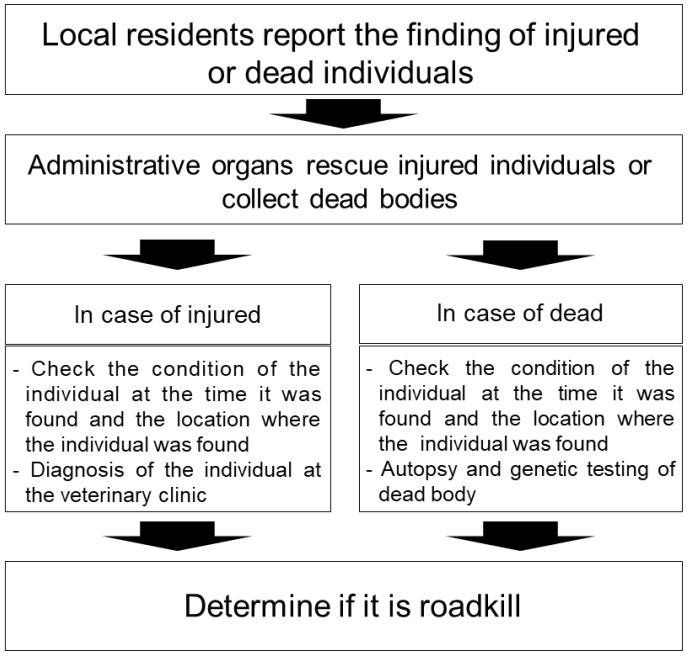


Figure 1: Flow chart from report of roadkill to determination of cause of death

Status of roadkills

The following shows the number of roadkills of flagship species in each area from the year data collection began and up to 2021 and the locations where roadkills were confirmed for the past five years. For Amami rabbits on Amami-Oshima Island however, the locations of roadkills are compiled for the past three years due to the large number of such locations. In addition, roadkills of various animals, including Ryukyu long-haired rats and common species on Iriomote Island, were compiled based on the information obtained to date.

Roadkills of Amami rabbits on Amami-Oshima Island

Data collection on the number of roadkills of Amami rabbits on Amami-Oshima Island began in 2000 when the Amami Wildlife Conservation Center opened. Thereafter, the number peaked in 2009 and subsequently remained at around 20 a year. However, the number again began to rise in 2020. In recent years, there were a few roadkill incidents within the property but these were concentrated in specific sections, such as the Aminoko Pass (municipal road) that connects Amami City and Setouchi Town. In the Buffer Zone and Surrounding Conservation Area there are confined areas where multiple roadkills were confirmed. These include Yamato Village and Uken Village where confirmed roadkill incidents coincided with a recovery in the distribution of the Amami rabbits in recent years.

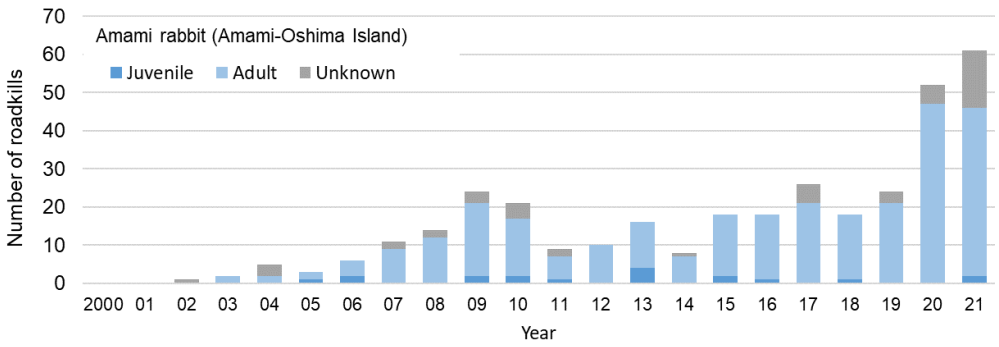


Figure 2: Number of roadkills of Amami rabbits on Amami-Oshima Island (2000–2021)

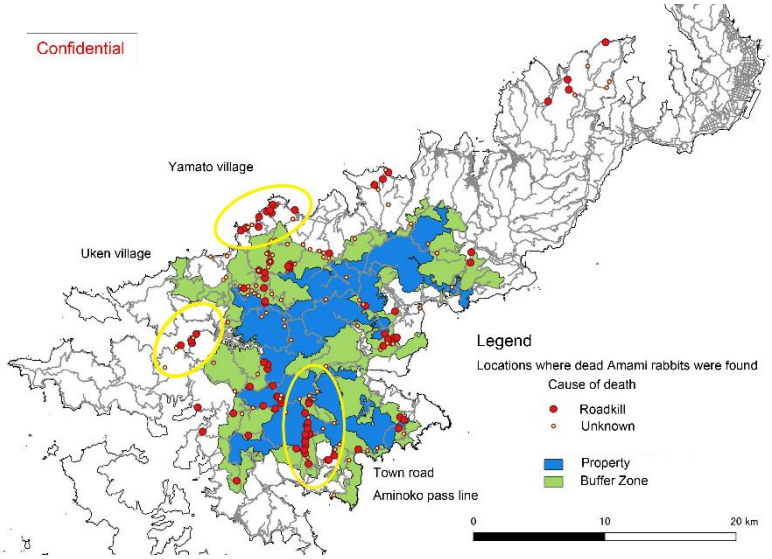


Figure 3: Locations of roadkills of Amami rabbits on Amami-Oshima Island (2019–2021)

*The areas circled by yellow lines are locations where attention should be paid.

Roadkills of Amami rabbits on Tokunoshima Island

Data collection on the number of roadkills of Amami rabbits on Tokunoshima Island began in 2000 when the Amami Wildlife Conservation Center opened. The data collection system has been strengthened since the opening of the Tokunoshima Ranger Office for Nature Conservation (currently, Tokunoshima Ranger Station) in 2013. Nearly twenty roadkills, more than double previous numbers, were confirmed since 2018. In recent years, a very small number of roadkills were confirmed within the property. On the other hand, roadkills were concentrated in the Surrounding Conservation Area, such as Prefectural Road No. 618 between Matsubara and Todoroki, and Prefectural Road No. 629 between Tete and Kanami.

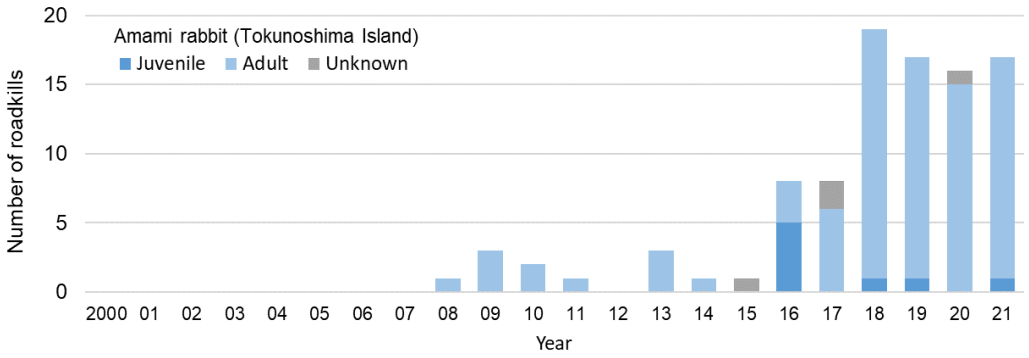


Figure 4: Number of roadkills of Amami rabbits on Tokunoshima Island (2000–2021)

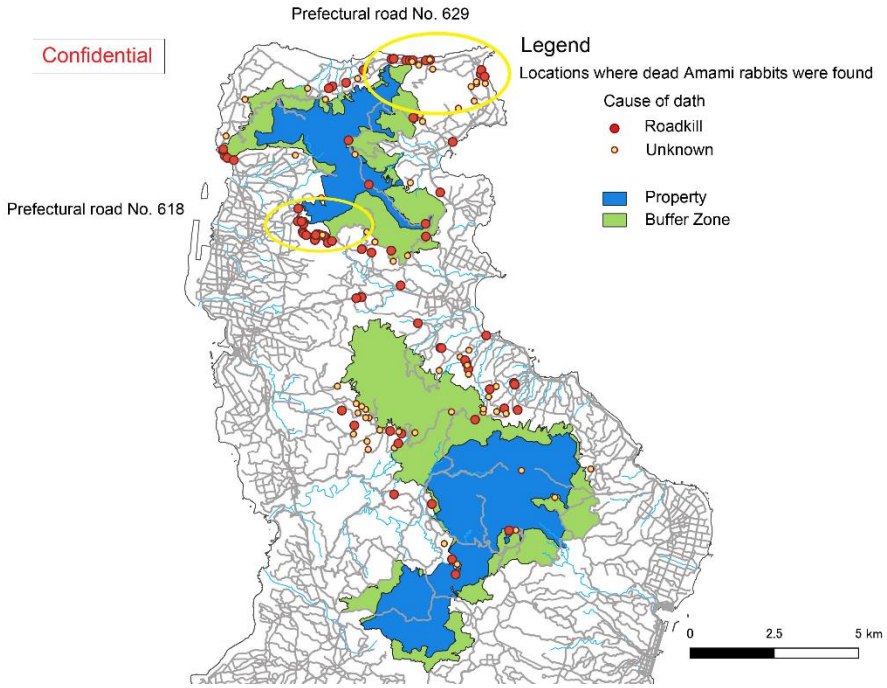


Figure 5: Locations of roadkills of Amami rabbits on Tokunoshima Island (2016–2021)

*The areas circled by yellow lines are locations where attention should be paid.

Traffic accidents of Okinawa rails in Northern part of Okinawa Island

The number of roadkills of Okinawa rails has increased over the long term. While it declined between 2014 and 2018, it has again been increasing slightly in recent years. In recent years roadkills often occurred on Prefectural Road No. 2 that extends across the property and in the eastern part of the property.

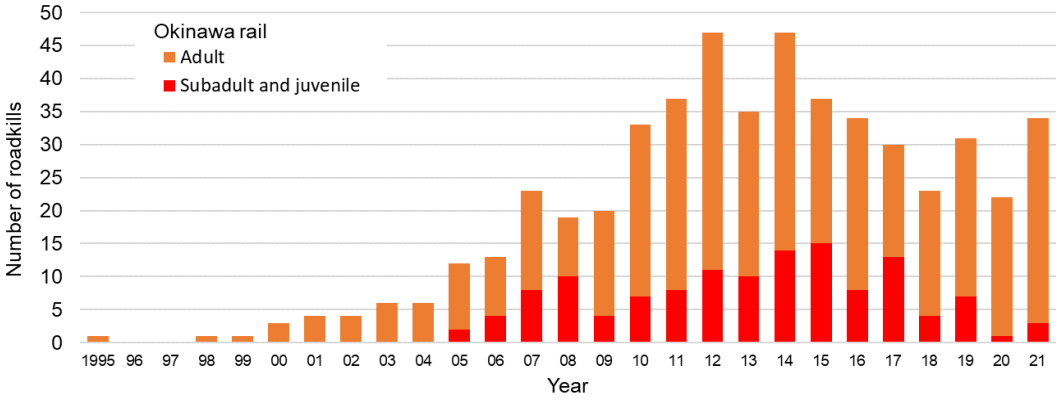


Figure 6: Number of roadkills of Okinawa rails (1995–2021)

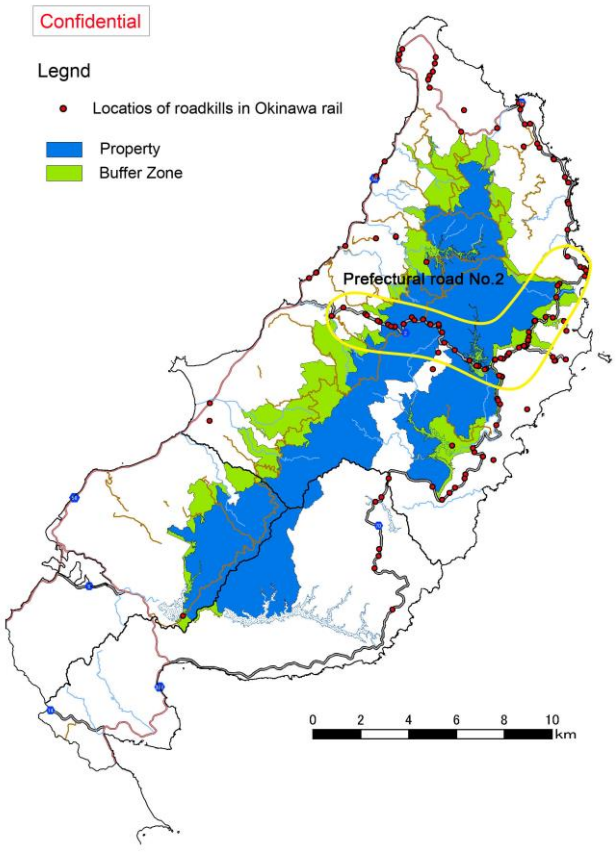


Figure 7: Locations of roadkills of Okinawa rails (2017–2021)

*The area circled by a yellow line is the location where attention should be paid.

Traffic accidents of Iriomote cats on Iriomote Island

The number of roadkills of Iriomote cats was one or two in most years between 1978 and 2010, but began to show a clear rising trend from around 2010. In recent years slightly more incidents have occurred in the western part.

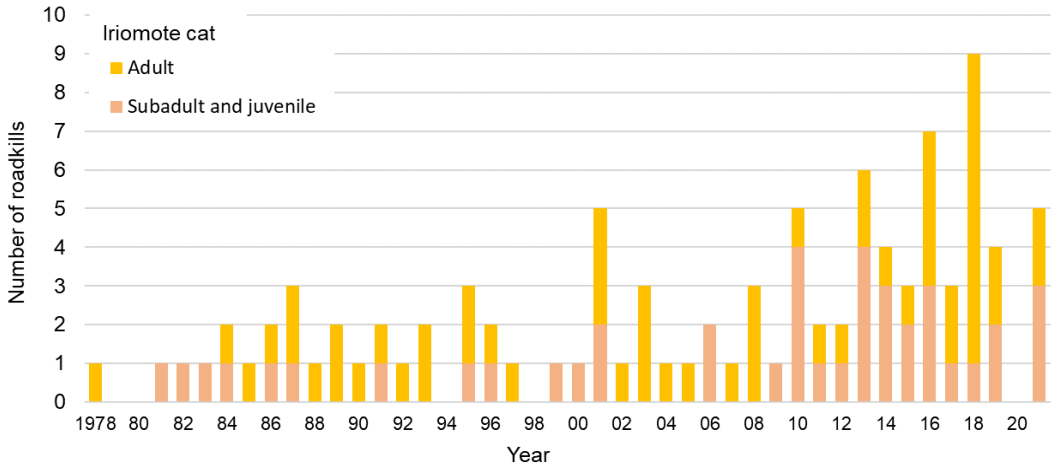


Figure 8: Number of roadkills of Iriomote cats (1978–2021)

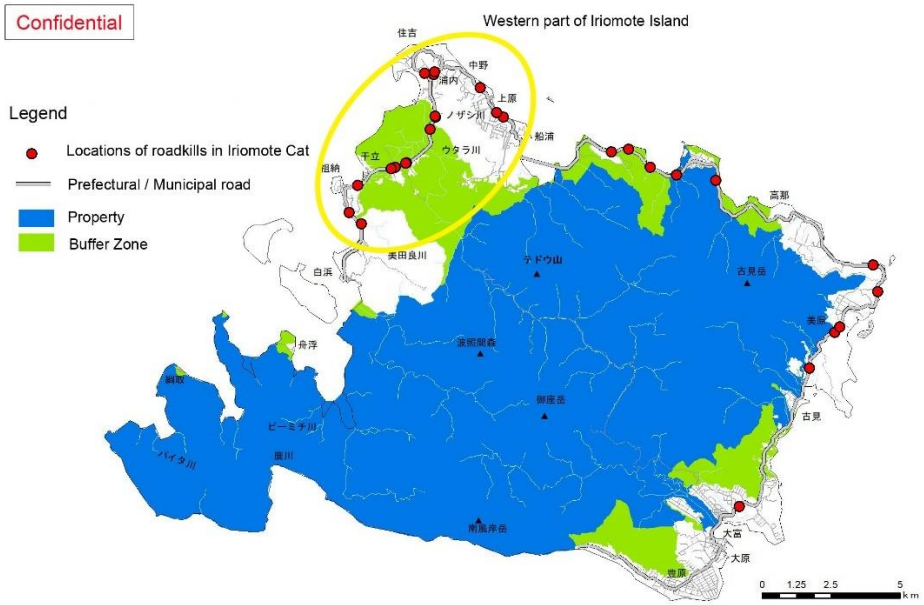


Figure 9: Locations of roadkills of Iriomote cats (2016–2021)

*The area circled by yellow line is the location where attention should be paid.

Traffic accidents of other rare species

The number of roadkills of Ryukyu long-haired rats has been smaller when compared to Amami rabbits and Okinawa rails. However, it is characterized by extremely large fluctuations from one year to another (Figure 10). This may be attributable to the strong influence that fluctuations in population size have on the number of roadkills, as it was observed that the population size of long-haired rats may be related to the yield of Castanopsis nuts, which is known to fluctuate very widely. A survey of night roadkills of various animals, including common species, in JFY2020 and JFY2021 on the main roads of Iriomote Island, revealed that most roadkills were frogs and crabs (Figure 11).

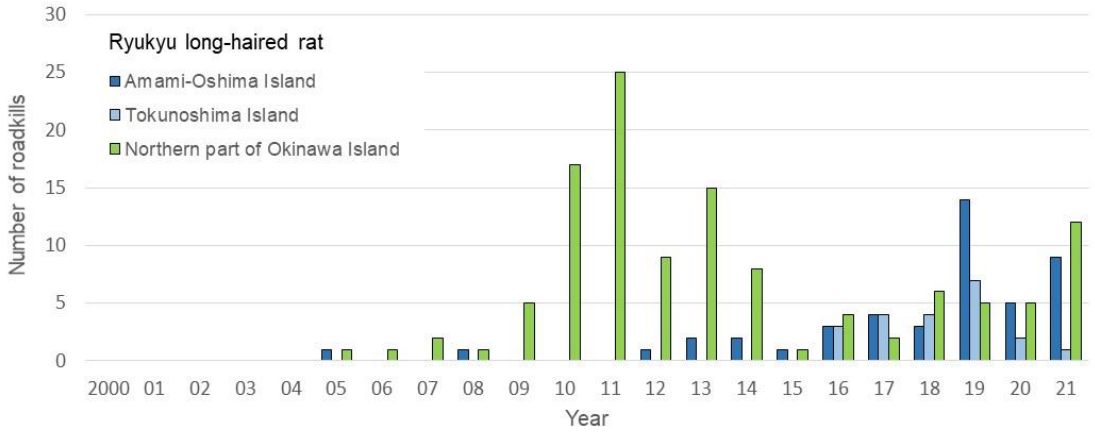


Figure 10: Number of roadkills of Ryukyu long-haired rats on Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island (2000–2021)

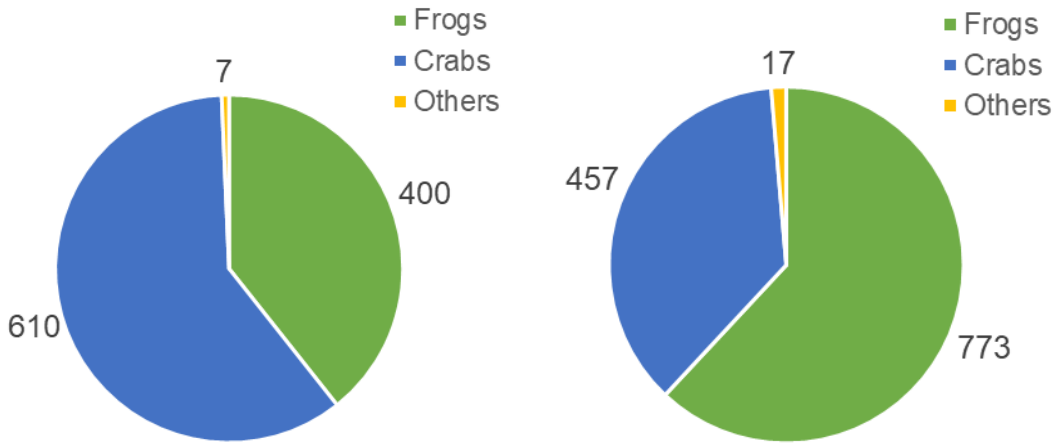


Figure 11: Number of roadkills by taxon on Prefectural Road 215, Shirahama Haemi Line, on Iriomote Island in JFY2020 (left) and JFY2021 (right)

*Census surveys were conducted approximately 80 times between 20:00 and 23:00 from July to February of each fiscal year.

Negative impact on the survival of species and the functioning of the ecosystem

The number of roadkills is influenced by various factors, including the frequency that local people, etc. provide information, the volume of traffic in a particular year, the population and distribution of rare species, changes to road structures, and the impact of various roadkill prevention measures. For this reason, sufficient attention must be paid to correlations with these factors when assessing the trend in the number of roadkills. The following are examples where these factors might have impacted the number of roadkills.

One of the reasons for the rising number of roadkills among the Amami rabbit population on Amami-Oshima Island could be the recovery trend of its population and distribution area achieved by progress in control of the small Indian mongoose, an alien species that had a material impact on the habitat of endemic species. While an accurate population is unclear, one estimate placed the population of Amami rabbits between 2,000 and 4,800 in 2004 (Sugimura and Yamada, 2004). Although the Ministry of the Environment's protection and recovery project for the Amami rabbit is currently re-estimating their population using multiple analysis techniques and due to complete calculations by the end of fiscal year 2022, past monitoring and survey results of this species indicate a clear growth trend in its population (Figure 12). However, the Amami rabbit is assessed as "EN" by the IUCN and MOEJ Red Lists. To facilitate further recovery of this species, roadkill prevention measures will continue to be enhanced.

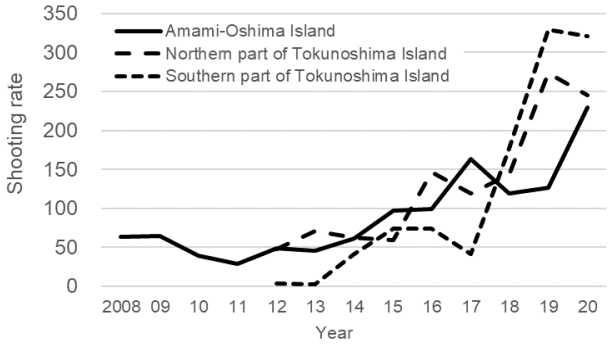


Figure 12: Change in the shooting rate of Amami rabbits by automatic cameras (number of photos taken/number of days when cameras were installed x 1000)

*Number of cameras installed: approx. 400 on Amami – Oshima Island, approx. 9 on northern Tokunoshima Island, approx. 20 on southern Tokunoshima Island

With respect to the Amami rabbit population on Tokunoshima Island, the population and distribution area are also recovering due to the effect of the feral cat control project. This is considered one of the reasons for the increase in the number of roadkills of this species in recent years. While an accurate population count is unclear, one estimate placed the population of Amami rabbits at around 200 in 2004 (Sugimura and Yamada, 2004). As in the case of the population in Amami-Oshima Island, the population on Tokunoshima Island is currently being re-estimated using multiple techniques. Meanwhile, there is a concern that the impact of roadkills on the species survival may be relatively greater on Tokunoshima Island compared with Amami-Oshima Island as the former's area is smaller and the habitats of Amami rabbits are divided into north and south.

Table 1: Number of roadkills and estimated population for each species

Species	Number of annual roadkills for the past 3 years	Estimated population	IUCN Red List	Area (property+ buffer zones)
Amami rabbit (Amami-Oshima Island)	22–59	Approx. 2,000–4,800 (2004)	EN	26,145 ha
Amami rabbit (Tokunoshima Island)	16–17	Approx. 200 (2004)	EN	5,327 ha
Okinawa rail (Northern part of Okinawa Island)	22–34	Approx. 1,500 (2021)	EN	11,119 ha
Iriomote cat (Iriomote Island)	0–5	Approx. 100※ (2008)	CR	24,416 ha

※Estimated population of resident adults

Although it is not as apparent as Amami rabbits, the population and distribution area of Okinawa rails have also been recovering due to the control project of the small Indian mongoose, an alien species (see p. 169 of the nomination document). A feature that differs from Amami rabbits is that the number of roadkills of Okinawa rails fell temporarily up to 2020 after peaking in 2014 (Figure 6). This temporary decline could be attributable to factors such as: the designation of locations with frequent traffic accidents as the priority areas for roadkill countermeasures and the introduction of speed limits to these areas; the potential contribution of the seven underpasses constructed at the time; and a potential link to changes in the population (Figure 13). Unlike other species, a population estimate survey of Okinawa rails using the playback method is conducted every year in approximately 250 locations in Northern part of Okinawa Island. Currently, a more detailed analysis taking into account the expert opinions is being conducted on the relationship between the population size and roadkill incidents on a more local level. As for Iriomote cats, four surveys have been carried out in the past to estimate the population. Each of these surveys estimated the population of resident adults at around 100. Due to the small size of the estimated population and the lack of alternative populations on other islands, there is great concern about the negative impact of roadkills on the species survival. Furthermore, being the top predator, the impact of the extinction of this species on the overall ecosystem of Iriomote Island is immeasurable. This is why roadkill prevention initiatives for this species have been promoted as priority. While there could be many different factors behind the rise of roadkills in recent years, one of the factors may be that the form of tourism on Iriomote Island has changed in recent years, with an increase in nature

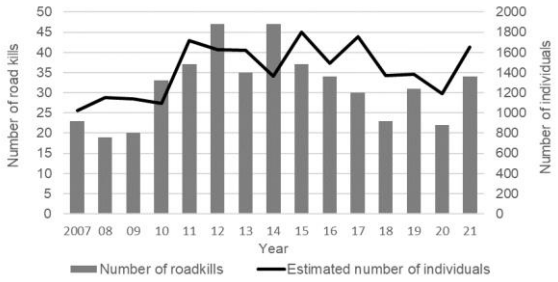


Figure 13: Relationship between the number of roadkills and estimated population of the Okinawa rail

*95% confidence interval for estimated population is omitted.

*Figures for 2021 are preliminary.

experience-oriented tours using rental cars and eco-tour operators which has led to a shift away from circular tours using large buses.

Roadkills of Ryukyu long-haired rats are thought to occur as this species enter roadways to collect food or when they are on the move. The number of roadkills of Ryukyu long-haired rats (Figure 10) shows particularly large fluctuations compared with other species. Concerned experts and locals have made empirical observations that the particularly large fluctuations in Northern part of Okinawa Island could be explained by changes in the population of Ryukyu long-haired rats depending on the yield of Castanopsis nuts, the main food for this species during the breeding period (Figure 14). To date, no survey has been conducted on the population of this species, but an ongoing survey is being conducted on the density of nuts on Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island. In addition, research was undertaken on the feeding habits of this species (Kudaka and Kudaka, 2017). Future analyses will be conducted bearing in mind that the population of this species could increase in the year following a good yield of nuts, which may also increase the number of traffic accidents. In addition to Ryukyu long-haired rats, roadkill data is collected for each species, such as Okinawa robins, Okinawa woodpeckers, Ryukyu black-breasted leaf turtles, Anderson's crocodile newts, and spiny rats. The data will be individually analyzed and countermeasures are examined as necessary.

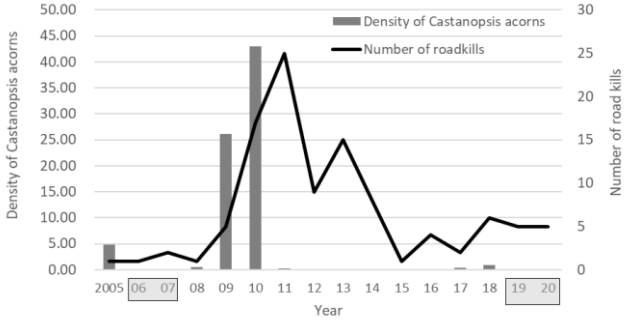


Figure 14: Relationship between the number of roadkill of Ryukyu long-haired rats and density of acorns in Northern part of Okinawa Island (conducted at Yona Field, University of the Ryukyus)

*No data available for 2006 and 2007

*Data are being compiled for 2019 and 2020

According to the results of a survey on roadkills of various animals, including common species on Iriomote Island (Figure 11), roadkills have often occurred on sections of roads flanked by forests or adjacent to ponds, swamps or paddy fields. The survey did not identify the species of all roadkills, but many cases were confirmed of Sakishima rice frogs (common species) and Owston's green treefrogs (NT on the IUCN Red List) among frogs, and *Sesarmops intermedia* (common species) among crabs. The threatened species that experts are concerned about population reduction due to roadkills include: Sakishima beauty snakes (VU); Yaeyama yellow-margined box turtles (EN); Yaeyama pond turtles (CR); and *Birgus latro* (VU); in addition to the above-mentioned Iriomote cats (CR). Much effort was made to identify these species, but only one roadkill incident of *Birgus latro* was confirmed in JFY2021. Iriomote Island abounds with frogs and crabs which perform the ecological role of

supporting diverse rare species, such as Iriomote cats (Watanabe and Izawa, 2005; Watanabe et al., 2005; Nakanishi and Izawa, 2016). For this reason, a reduction in these small animals has an indirect negative impact on rare species. It is also pointed out that roadkills of these small animals have a direct impact as the bodies of frogs and crabs killed by traffic accidents attract rare species to the roads, thereby causing secondary roadkill. There are no research results or expert opinions suggesting a clear declining trend in the populations of Sakishima rice frogs, Owston's green treefrogs, and *Sesarmops intermedia*, for which many roadkills were confirmed in the survey. From the viewpoint of conserving the ecosystem, however, attention must be paid to the impact of roadkills of these species. Furthermore, given that new species and newly recorded species of crabs are frequently discovered even now, it is necessary to consider collecting data based on the identification of species.

3. Review of the effectiveness of traffic control measures and future approach

Overview

- To review the effectiveness of traffic management measures, a list of the existing measures was organized and examination results of the effectiveness of some of these measures in reducing roadkills were compiled. The results showed that many of the measures were effective, but that in some areas the measures were not fully implemented despite the high risk of roadkill. In response to these results, the enhancement of existing measures and implementation of additional measures are under consideration. These include the installation of animal blocking fences on Amami-Oshima Island and Tokunoshima Island, and an examination of the construction of new underpasses and further traffic surveys on Iriomote Island.
- The roadkill prevention measures will be enhanced, including the installation of additional structures and raising driver awareness on the four islands, while maintaining a collaborative relationship with various entities, such as relevant government organizations, interested parties, and experts, bearing in mind that roads are essential to the livelihoods of local people.
- In enhancing roadkill prevention measures, the identification of the locations and content of measures that require such enhancement will continue, based on the status of roadkill incidents, traffic conditions, and road structures, in order to adopt the optimal measures for each of these locations. In addition, the effectiveness of the measures taken will be examined through, for instance, an analysis of their degree of impact on threatened species. Furthermore, actions such as an examination of the mechanism of roadkill occurrence will be facilitated to develop more effective countermeasures and approaches.

The existing roadkill countermeasures comprise diverse initiatives implemented by various organizations. The organizations implementing these initiatives form a conference body which meets annually to ensure collaboration and to share the progress of their roadkill countermeasures (Table 2). The following section lists measures that have so far been implemented on each island and provides an overview of measures that are large in scale, measures whose impact has been assessed, and the results of the newly conducted impact studies in response to the request. A higher level of expertise is ensured when implementing various measures by obtaining outside expert advice, such as from universities, where needed (see p. 264 of the nomination document on expert meetings).

Table 2: List of meetings responsible for coordination among organizations implementing roadkill prevention measures

Region	Name of the meeting	Constituent Organizations	Period
Amami-Oshima Island and Tokunoshima Island,	Amami Island Group Rare Wildlife Protection Program Council	Ministry of the Environment, Forestry Agency, Kagoshima Prefecture, municipalities, police	2010–Present
Northern part of Okinawa Island	Liaison Meeting on Yambaru Region Roadkill Prevention	Ministry of the Environment, Forestry Agency, Cabinet Office Okinawa General Bureau, Okinawa Prefecture, municipalities, police, NPOs	2004–Present
Iriomote Island	Liaison Meeting on Prevention of Traffic Accident Occurrences Involving Iriomote Cats	Ministry of the Environment, Forestry Agency, Okinawa Prefecture, Taketomi Town, Police, NPOs, private companies	2013–Present
Iriomote Island	Liaison Meeting on the Iriomote Cat 10-Year Conservation Plan	Ministry of the Environment, Forestry Agency, Okinawa Prefecture, Taketomi Town, NPOs	2022–Present

Amami-Oshima Island and Tokunoshima Island

Tables 3 and 4 show the objectives, targets (drivers or animals), and the implementing entities of various roadkill countermeasures that have been implemented on Amami-Oshima Island and Tokunoshima Island.

Table 3: Measures implemented to date to reduce roadkills on Amami-Oshima Island

Measure	Purpose	Target	Implementing body
Underpass (1 unit)	Prevention of entry	Animals	Kagoshima Prefecture
Improvement of gutters	Prevention of entry	Animals	Kagoshima Prefecture
Animal blocking fences (1 location)	Prevention of entry	Animals	Yamato Village
Improvement of viewing distance	Visibility improvement	Driver	Kagoshima Prefecture
Grass cutting	Visibility improvement	Driver	Road management departments of the relevant organizations
Restrictions on passage through forest roads	Impact mitigation	Driver	Ministry of the Environment, Forestry Agency, Kagoshima Prefecture, 5 municipalities
Rescue of injured/sick animals and their return to	Impact mitigation	Others	Ministry of the Environment

Measure	Purpose	Target	Implementing body
the wild			
Signage	Call for attention	Driver	Ministry of the Environment, Kagoshima Prefecture, 5 municipalities
Mobile signage	Call for attention	Driver	Ministry of the Environment
Road markings and deceleration zones	Call for attention	Driver	Kagoshima Prefecture, 5 municipalities
Public awareness activities	Call for attention	Driver	Relevant organizations
Identification and trend analysis of traffic accidents	Study and evaluation of measures	Others	Ministry of the Environment
Examination of cause of death	Study and evaluation of measures	Others	Ministry of the Environment

Table 4: Measures implemented to date to reduce roadkills on Tokunoshima Island

Measure	Purpose	Target	Implementing body
Animal blocking fences (2 locations)	Prevention of entry	Animals	Amagi Town, Tokunoshima Town
Grass cutting	Visibility improvement	Driver	Road management departments of the relevant organizations
Restrictions on passage through forest roads	Impact mitigation	Driver	3 towns※, Forestry Agency, Ministry of the Environment, Kagoshima Prefecture
Rescue of injured/sick animals and their return to the wild	Impact mitigation	Others	Ministry of the Environment
Signage	Call for attention	Driver	Ministry of the Environment, 3 Towns※
Mobile signage	Call for attention	Driver	Ministry of the Environment, 3 towns※
Road markings and deceleration zones	Call for attention	Driver	Kagoshima Prefecture, 3 towns※
Public awareness activities	Call for attention	Driver	Relevant organizations
Identification and trend analysis of traffic accidents	Study and evaluation of measures	Others	Ministry of the Environment
Examination of cause of death	Study and evaluation of measures	Others	Ministry of the Environment

※Measures taken by the three towns include activities by the Tokunoshima District Nature Protection Council (a council formed by the three towns and local experts).

Concerned parties, including management organizations, are severely concerned about the rapid increase in recent years of roadkills of Amami rabbits on Amami-Oshima Island. Ongoing countermeasures are made to continue or scale up many of the efforts, with a focus on implementing measures in cooperation with local people, such as the installation of new speed bumps with local middle school students (Figure 15). Animal blocking fences are a new measure started in 2020/2021 in response to the rapid increase in recent years of roadkills of Amami rabbits. To assess their effectiveness and impact on the target species and ecosystem, the fences are being monitored using automatic cameras. In addition, discussions are underway on the installation of new fences. Consideration will be given to expand these measures in the future based on assessment results and expert opinions. With respect to traffic control, night-time usage regulations of the Santaro Line on Amami-Oshima Island were agreed upon after the exchange of opinions with local people and tourism businesses. Following this, the operation began in October 2021 (Figure 16). The regulations restrict the number of vehicles driving on the Santaro Line at night by allowing only one vehicle to enter the Santaro Line from its eastern and western entrances respectively every 30 minutes. Drivers need to make a booking in advance using a website (https://coubic.com/santaro). In addition, a device that detects the speed of vehicles and displays a warning on an electronic noticeboard is installed at each entrance. The past traffic management measures on the property were all permission-based traffic management based on the applicants' purpose of road usage (Amami-Oshima Island, Tokunoshima Island, and Northern part of Okinawa Island). The measure on the Santaro Line is the first booking-based traffic management on the property to set the ceiling of traffic volume on a public road that is also used for the livelihoods of local people. The rules will be improved based on the usage status and the occurrence of roadkills.

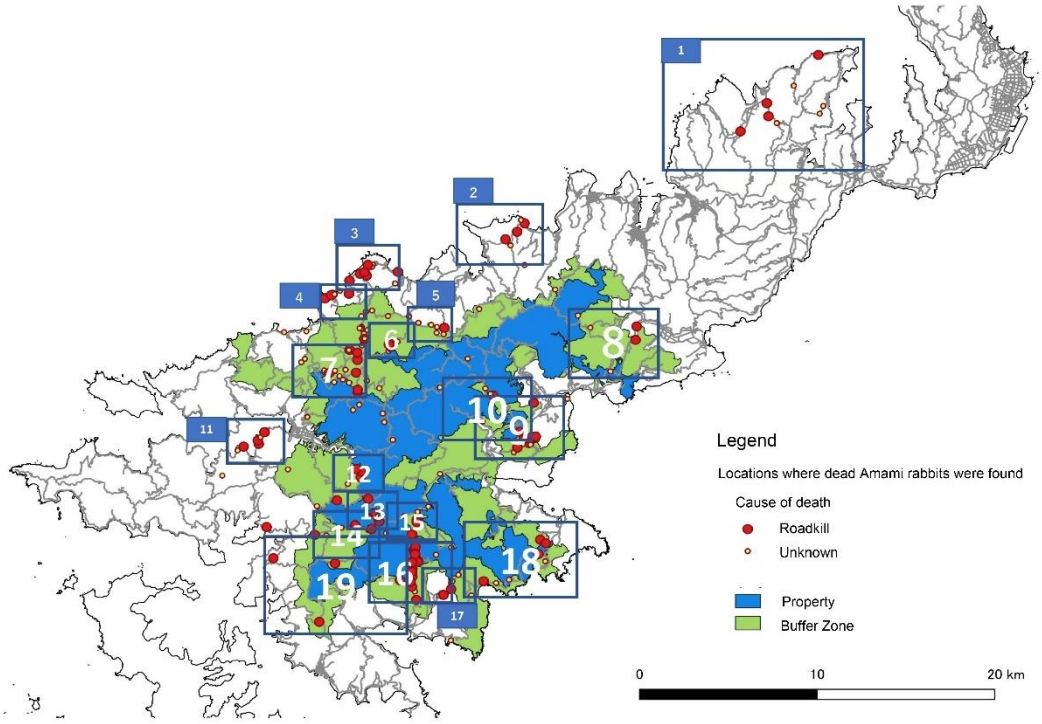
Figure 15: Installation of speed bumps by Ryukoku Junior High School in Tatsugo Town (April 2022)

Figure 16: Entrance to the Utilization Management Zone
*A sign stating rules and a device that detects the passage of vehicles have been installed.

In response to the request, an analysis was conducted on Amami rabbits to select the areas that should be prioritized for the future expansion of measures to reduce roadkills. Hiragi et al. (2017) already analyzed the locations with frequent roadkills and the seasonal variations for this species, and other issues, regarding the tendency of roadkill incidents of Amami rabbits. This time, a risk map was prepared to identify the locations that should be prioritized to implement measures. To conduct an analysis, the locations of roadkills over the past three years on Amami-Oshima Island, and over the past five years on Tokunoshima Island, were mapped and empirically classified into different areas based on the situation of roadkills and the degree of their concentration. Each area was further broken down as necessary into sections of roads that were subject to assessment. Each location was then

assessed on a three-point scale (A: 3 points; B: 2 points; C: 1 point) based on two perspectives: the degree of urgency and the ease of assessment. The total score, ranging from 2 to 6, determined the priority of each location in terms of implementing roadkill countermeasures.

As a result of the area classification, Amami-Oshima Island had 46 road sections in 20 areas, while Tokunoshima Island had 16 road sections in 10 areas. Figure 17 shows the classified areas.



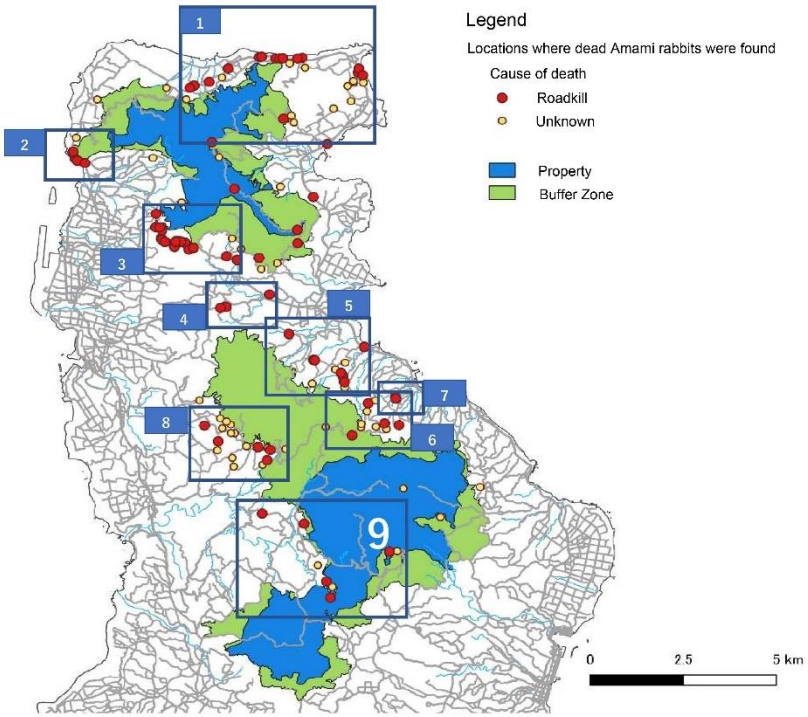


Figure 17: Classified areas of traffic accidents on Amami-Oshima Island (top) and Tokunoshima Island (bottom)

*The numbered boxes indicate the areas extracted as a result of the analysis.

The areas with a high total score (higher priority for the implementation of measures) on Amami-Oshima Island were: the area around Mt. Yuwandake (Area 7); the area around Aminoko Pass (Areas 15 & 16); the area of Prefectural Road No. 85 connecting Mt. Yuwandake and Aminoko Pass (Areas 12 & 13); Prefectural Road No. 612 extending from Prefectural Road No. 85 through the community of Shinokawa (Area 14); Santaro Line (Area 9); and Prefectural Road No. 79 through Yamato Village and Uken Village (Areas 4 & 11).

The area extending from Mt. Yuwandake to Aminoko Pass on Amami-Oshima Island is a major habitat for rare species, such as the Amami rabbit. It is an area where rare species are frequently sighted on the roads. At the same time, it is a road used by local people to travel to and from Amami City, Yamato Village, Uken Village, and Setouchi Town. This condition is likely to be conductive to roadkill for both drivers and animals. Given that the road is built through many parts of the property, it is assigned the highest priority in implementing measures. Based on this result, animal blocking fences were installed in some sections of roads near Mt. Yuwandake (7) in September 2021, and monitoring to assess their effectiveness were initiated (Figure 18). The installation of additional fences will be considered based on the assessment result. Prefectural Road No. 79 through Uken Village (Area 11) is an area where roadkills were often confirmed in recent years. With the frequent sighting of this species along the road, it is deemed desirable to promptly comprehend the current status and implement measures for both drivers and animals. The Santaro Pass (Area 9) is an area known for frequent sightings of Amami rabbits. As a result, in recent years many tours were conducted to see the rabbits. For this reason, the usage of the Santaro Pass has been regulated under the afore-mentioned night-time usage regulations to reduce negative impacts on rare species, including Amami rabbits, and their habitats.

Figure 18: Animal blocking fence installed on the road in the vicinity of Mt. Yuwandake (7) on Amami-Oshima Island

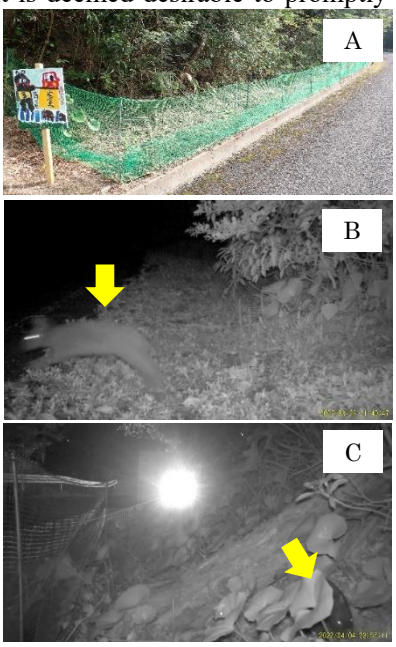


Figure 19: A: Animal blocking fence installed on Prefectural Road 618 (3) on Tokunoshima Island.
B and C: Examples of photos of the Amami rabbit taken during monitoring (left side of the photo: road, right side of the photo: forest). (B: unfenced section, C: fenced section. Arrows indicate Amami rabbits.)

On Tokunoshima Island, the areas with a high total score (higher priority for the implementation of measures) were: Prefectural Road No. 629 in the Tete Kanami district, along the northern edge of the island (Area 1); Prefectural Road No. 629 in the Yonama district of the northwestern part of the island (Area 2); Prefectural Road No. 618 in the southern part of Mt. Ogusuku (Area 3); the Omo-Asahigaoka-Todoroki Line in the Boma district (Area 5); and the agricultural side road in the Boma district (Area 7). All these roads are in the Surrounding Conservation Area. It is thought that accidents on these roads are increasing due to the expansion of Amami rabbit habitat in recent years. Of these roads, Prefectural Road No. 618 near the foot of Mt. Ogusuku (Area 3) is a section where roadkill frequency is especially high with a total of 18 between 2016 and 2021. As Amami rabbits are often spotted on this road, the road's priority in terms of implementing roadkill

countermeasures is deemed highest. Road markings were already painted and warning signage installed in this section. Based on the result of this analysis, however, it was determined that further enhancements to measures were needed, resulting in the installation of animal blocking fences in November 2021 (Figure 19) and the monitoring commenced. Traffic management on the Yama Kubiri Line of forest roads (Areas 1 & 10) started in July 2019. Since its implementation, roadkills declined from five to zero.

Based on the analysis result, discussions are currently taking place to install animal blocking fences in the areas around Aminoko Pass (Areas 15 & 16) and on Prefectural Road No. 85 that connects Mt. Yuwandake and Aminoko Pass (Areas 12 & 13) on Amami-Oshima Island. The locations and structure of the new fences to be installed will be discussed based on monitoring results of fences already installed and on expert opinions.

Northern part of Okinawa Island

Table 5 shows the various roadkill countermeasures that have been implemented to date in Northern part of Okinawa Island.

Table 5: Measures implemented to date to reduce roadkills in Northern part of Okinawa Island

Measure	Purpose	Target	Implementing body
Underpasses (10 units)	Prevention of entry	Animals	Okinawa Prefecture
Animal blocking fence (1 location)	Prevention of entry	Animals	North National Road Office
Improvement of gutters	Prevention of entry	Animals	North National Road Office, Okinawa Prefecture
Cleaning of gutters	Prevention of entry	Animals	Ministry of the Environment
Putting cement on the surface of roadside slopes	Visibility improvement	Drivers	Okinawa Prefecture
Grass cutting	Visibility improvement	Drivers	Road management departments of the relevant organizations
Restrictions on passage through forest roads	Impact mitigation	Drivers	Okinawa Prefecture, Kunigami Village
Establishment of speed limit sections	Impact mitigation	Others	Liaison Meeting on Yambaru Region Roadkill Prevention
Rescue of injured/sick animals and their return to the wild	Impact mitigation	Others	Ministry of the Environment, NPOs
Warning signage	Call for attention	Drivers	North National Road Office, Okinawa Prefecture, private companies, etc.
Mobile signage	Call for attention	Drivers	Ministry of the Environment

Measure	Purpose	Target	Implementing body
Road markings and deceleration zones	Call for attention	Drivers	North National Road Office, Okinawa Prefecture
Public awareness activities	Call for attention	Drivers	Relevant organizations
Identification and trend analysis of traffic accidents	Study and evaluation of measures	Others	Ministry of the Environment
Examination of cause of death	Study and evaluation of measures	Others	NPOs, etc.

Figure 20: Magnet sticker to promote awareness of daytime lighting and low-speed driving (left) and magnet sticker to promote awareness of preventing roadkill of Ryukyu long-haired rats (right)
*Daytime lightning has been suggested to have a certain effect by a local NPO.

It is recognized that in Northern part of Okinawa Island, it is especially important to implement measures for Prefectural Road No. 2 with a total length of approx. 17 km. It is the only main road across the property where roadkill incidents of Okinawa rails and Ryukyu long-haired rats have often been confirmed. This road is also important for the livelihoods of local people. For this reason, roadkills of flagship species are shared real time among relevant organizations using a mailing list. Furthermore, the Yambaru Wildlife Conservation Center and local NPOs implement activities focusing on education and raising awareness as well as grass cutting in cooperation with local municipalities. These educational and awareness raising activities include: distributing flyers and magnetic stickers (Figure 20); raising awareness at meetings of district heads, etc.; and when necessary declaring states of emergency. Unlike Amami rabbits and Iriomote cats which are nocturnal, Okinawa rails are diurnal. Many local residents and tourists thus encounter this species on the road during the daytime. It is therefore deemed especially important to conduct continuous educational activities, bearing in mind the need for measures targeting inbound tourists, such as offering multilingual information.

In 2015, a speed limit section of approximately 1.5 km on Prefectural Road No. 2 was established as a traffic management measure, recommending driving at 30 km/h or less. There was research on the effectiveness of this measure (Tamanaha et al., 2017). Regarding Prefectural Road No. 2, this measure covers 33% of the section with higher incidents of roadkill and sightings of Ryukyu long-haired rats. In addition, an underpass was built in this section. Additional measures will be implemented based on insights into the mechanism of various types of roadkills mentioned above and the effectiveness of the measures taken. A similar speed limit measures was implemented on Prefectural Road No. 70, a main road extending north/south in the eastern section of Northern part of Okinawa Island. In addition,

night-time traffic has been banned since 2016 on Kunigami Village forest roads to prevent roadkill and the illegal collection of various threatened species, including reptiles and amphibians, on many forest roads on the island, which are of less importance to the livelihoods of local people. For prefectural forest roads, a proof-of-concept experiment for night-time traffic ban concluded in 2021. Based on the results, more effective road management methods will be examined starting 2022. These initiatives may be revised in the future based on the latest data.

As an infrastructure measure, a total of 10 underpasses were constructed on Prefectural Road No. 2 and Prefectural Road No. 70 between 2008 and 2020. A monitoring survey conducted over a few years using automatic cameras has confirmed that these underpasses are used by animals, such as Okinawa rails. Currently, their effect on reducing the number of roadkills is being examined. On National Route No. 58, animal blocking fences were installed intermittently over an approximately 3 km long section. It has been confirmed that these fences stop Okinawa rails from entering the road. The challenges with the fences are their ineffectiveness due to breakages caused by typhoons and the labor needed to repair them. Future modifications to the fences is thus under consideration.

In addition, as an action targeting drivers, concrete has been laid on roadside slopes to control weeds on the roadsides, which will alert drivers to wildlife entering the road. Putting cement on the surface of the slopes where plants normally grow on the exposed soil prevents the growth of vegetation and is expected to reduce roadkill by improving the driver's viewing distance. On this slope, the surface was roughened with a broom to create bumps and dips to offer footing to animals to climb the slope. There have been confirmed sightings of animals using them to climb up the slope (Figure 21). In addition, there have been cases where small animals, such as baby Okinawa rails, Anderson's crocodile newts, and Ryukyu black-breasted leaf turtles, had fallen into gutters, were unable to get out on their own, and died. To address these cases, gutters have been modified to have a slope on one side or to have small side steps, taking into account the target species' ability to climb slopes (Figure 22).

Figure 21: Concrete slopes with roughened surfaces. Okinawa rails and Ryukyu black-breasted leaf turtles have been confirmed climbing up the improved slopes. (Maintenance and Management Section, Okinawa Prefecture Hokubu Regional Public Works Office, 2010)

Figure 22: Improvements to single-slope gutter and gutter with steps (Maintenance and Management Section, Okinawa Prefecture Hokubu Regional Public Works Office, 2010)

*Both types of gutters have been modified to allow animals to escape to the forest side. Ryukyu black-breasted leaf turtles and sword-tailed newts have been observed climbing up the slopes.

While no specific examination has been conducted on the effectiveness of these measures to reduce roadkill, this work has been incorporated as basic construction methods to mitigate small animal deaths by traffic accidents or falls into gutters. It is thought these measures will become more effective to reduce roadkill through the regular cleaning of gutters, cutting the grass near them, and educational activities such as roadkill prevention campaigns. Relevant organizations will promote various efforts, including the examination of their impact in reducing roadkill.

Iriomote Island

The following shows the various roadkill countermeasures that have been implemented on Iriomote Island to date.

Table 6: Measures implemented to date to reduce roadkills on Iriomote Island

Measure	Purpose	Target	Implementing body
Underpasses, etc. (123 units)	Prevention of entry	Animals	Okinawa Prefecture, Taketomi Town
Animal blocking fence (1 location)	Prevention of entry	Animals	Okinawa Prefecture
Mobile animal blocking fence	Prevention of entry	Animals	Ministry of the Environment
Improvement of gutters	Prevention of entry	Animals	Okinawa Prefecture
Grass cutting	Visibility improvement	Drivers	Okinawa Prefecture, Taketomi Town
Gathering information on sightings	Prediction of occurrence	Others	Ministry of the Environment, Okinawa Prefecture
Speed warning system	Call for attention	Drivers	Ministry of the Environment
Laser sensor system	Call for attention	Drivers	Ministry of the Environment
Warning signage	Call for attention	Drivers	Taketomi Town
Mobile signage	Call for attention	Drivers	Ministry of the Environment
Road markings and deceleration zones	Call for attention	Drivers	Okinawa Prefecture
Rescue of injured/sick animals and their return to the wild	Impact mitigation	Others	Ministry of the Environment, NPOs
Public awareness activities	Call for attention	Drivers	Relevant organizations
Identification and trend analysis of traffic accidents	Study and evaluation of measures	Others	Okinawa Prefecture
Traffic survey	Study and evaluation of measures	Drivers	Okinawa Prefecture
Information gathering after an accident (on-site inspection, interviews)	Study and evaluation of measures	Others	Ministry of the Environment
Examination of cause of death	Study and evaluation of measures	Others	Kagoshima University

On Iriomote Island there is a concern about the impact of roadkills on Iriomote cats. Data collection of roadkills of this species began in 1978, and the trend analysis has been conducted based on factors, such as the effectiveness of various measures, seasonal variability, hour of the day, local characteristics, gender and age of animals involved in the accident, analyses of sighting information immediately before the accident, examination of accident scene, autopsies of animals involved in the accident, changes in traffic volume and car speed by season and time of day, and distribution of prey on the road and surroundings. The results of the analysis were compiled in the "Basic Plan for Traffic Accident Prevention Measures for Iriomote Cats" prepared by Okinawa Prefecture in 2018 to present basic data to discuss future measures. A total of 11 specific factors are identified which led to traffic accidents involving Iriomote cats. These include factors attributable to drivers/roads, such as locations where it is difficult for drivers to spot cats; excessive speeding; and factors arising from ecological features, including use of the environment by cats and the location of their home range. An example of the latter is a reduction of suitable feeding sites around roads resulting in Iriomote cats being led to the corpses of small animals killed by traffic accidents. A survey of traffic conditions using Bluetooth scanners is scheduled to continue in cooperation with research institutions to gain a more accurate understanding of the causes of roadkills of this species and to comprehend changes in tourism dynamics before and after the COVID-19 pandemic.

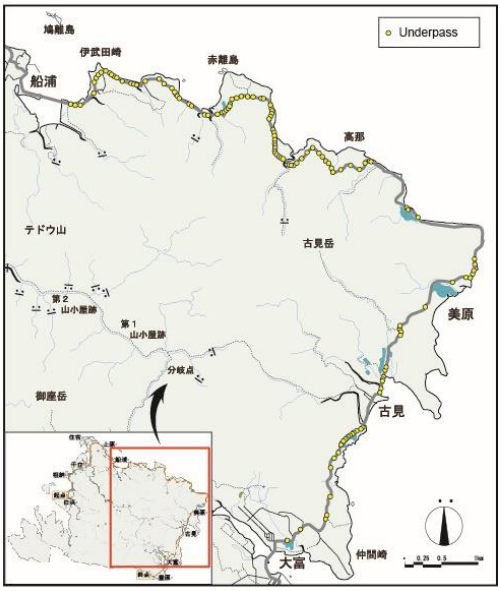


Figure 23: Location of 123 underpasses on Iriomote Island

Of the measures taken so far, the construction of a total of 123 tunnel underpasses and a total of 16 passes under bridge beams are the largest in scale. For most of these structures, usage by wildlife was monitored using automatic cameras for about a year. After detailed analysis of usage frequency of each underpass during the breeding, parenting, and dispersing periods of Iriomote cats, causes were examined for underpasses which were not frequently used and improvement measures were implemented. In addition, on the main road animal blocking fences designed to stop Iriomote cats from entering the road by guiding them to underpasses were built, and since 2017 an approximately 600-m section was completed on the eastern side of the island. Monitoring confirmed that Iriomote cats and other animals moved alongside the fence, were led to the exit/entrance of the underpass, and frequently used it. Furthermore, after installation of the fences, no roadkill of this species has been confirmed in the said section. In response to the request, the examination of a construction plan began in 2021 for the construction of multiple underpasses in the western area where underpasses are few

and many traffic accidents have occurred in recent years. There is a concern that fences might divide the habitats of various animals that are difficult to guide to the underpass, such as reptiles and amphibians. The examination will therefore progress cautiously based on expert opinions.

Surveys using automatic cameras have confirmed that usage frequency of these underpasses by wildlife declines if their exits/entrances are covered with vegetation or piles of driftwood due to typhoons or heavy rain. To maintain the effectiveness of underpasses, certain levels of cost and labor are required for their cleaning and maintenance, which includes pruning and grass cutting. Accordingly, discussions are underway on how to maintain underpasses more efficiently using a fund or volunteers. To obtain a broader understanding of the function of underpasses, an actual underpass will be displayed at the Iriomote Wildlife Conservation Center to educate and raise the awareness of tourists and to enhance local environmental studies. The number of roadkill incidents of Iriomote cats reached a record high of nine in 2018. In response, in addition to existing measures, roadkill countermeasures using new method were looked into in an effort to explore more fundamental solutions. These include the trial introduction of a warning device for exceeding the speed limit and the examination of its effects; examination and development of mobile animal blocking fences for specific individuals frequently crossing roads; and a trial application of a system that warns drivers when the appearance of this species on the road is detected using a laser sensor.

On Iriomote Island, sighting information of Iriomote cats on roads is efficiently collected using every possible means including telephone and SNS. The collected data is used to evaluate the risks of individual cases. Concretely, if reports of Iriomote cats sightings on a specific road keep coming in, action will be taken in real time, such as warning drivers and local people about that location or specific individual, putting up a signboard, and/or patrolling the site. In many cases, these actions have prevented accidents. Because sighting information is effective, continuous efforts will be made to collect them.

As educational and awareness-raising activities, various measures were taken together with local communities. These include in-class lessons at local primary schools; installation of mobile signboards in places with a high risk of traffic accidents based on sighting information; preparation of maps to raise awareness of drivers; distribution of flyers to local people and tourists; raising awareness through websites and SNS; art competitions with the theme of roadkill prevention; and real time sharing of roadkill information with relevant local organizations. According to the results of surveys conducted in recent years, the percentage of respondents who felt that roadkills of Iriomote cats was a problem stood at 90% among local people, but only 40% among tourists. Based on this result, efforts are currently made to enhance the understanding of tourists and improve multilingual information.
The above measures mainly target Iriomote cats. Given that the Iriomote cat is at the apex of the food

chain on Iriomote Island and has adapted to the island by preying on various animals, it is deemed necessary to also reduce traffic accidents involving other animal species. Traffic accidents involving small prey animals not only decrease animal species but also cause secondary accidents as their dead bodies entice other animals to enter roads. The same can be said about the impact on crested serpent eagles, which is a rare species. Accordingly, Iriomote Island considers the entire group of animals, including common species, to formulate measures to reduce traffic accidents.

4. Summary of future approach

All four islands have the need to reduce the impact of roadkill incidents involving rare species. In particular, the impact of roadkills is material for Iriomote cats whose population is small and for Amami rabbits on Tokunoshima Island whose habitat is divided into north and south. Based on this understanding, the existing measures will continuously be examined and enhanced.

In enhancing measures to reduce roadkills, the identification of the locations and efforts that require such enhancement will continue based on the status of roadkill incidents, traffic conditions and road structures, and optimal measures will be adopted for each location where efficient and effective measures should be implemented. In addition, the effectiveness of the measures taken will be examined through, for instance, an analysis of their degree of impact of roadkill incidents on threatened species. Furthermore, actions such as the examination of the mechanism of roadkill occurrence, which is necessary to develop more effective countermeasures and approaches, will be facilitated.

Table 7 summarizes the measures scheduled for each island. Measures to reduce roadkills will be organized from a shared perspective of the entire area. In addition, four islands will exchange information and establish the identical factor analysis and measure evaluation methods, as needed.

Table 7: Specific actions to be taken

Amami-Oshima Island	- Improve rules for night-time use of the Santaro Line based on the status of usage and roadkill incidents. - Examine the effectiveness of animal blocking fences and consider installing new fences based on the result.
Tokunoshima Island	- Examine the effectiveness of animal blocking fences and consider installing new fences based on the result.
Northern part of Okinawa Island	- Examine more effective road management methods based on the results of nighttime traffic closure demonstration experiments on prefectural forest roads. - Examine modifications to animal blocking fences.
Iriomote Island	- Conduct a traffic survey using Bluetooth scanners in cooperation with research institutes. - Consider constructing multiple underpasses in the western part where many traffic accidents have occurred in recent years. - Examine roadkill countermeasures using new methods.
Common in 4 regions	- Continue examining and enhancing existing measures. - Continue identifying locations and measures that need to be enhanced. - Examine the mechanisms of roadkill occurrence. - Promote measures targeting inbound tourists, such as multilingual information.

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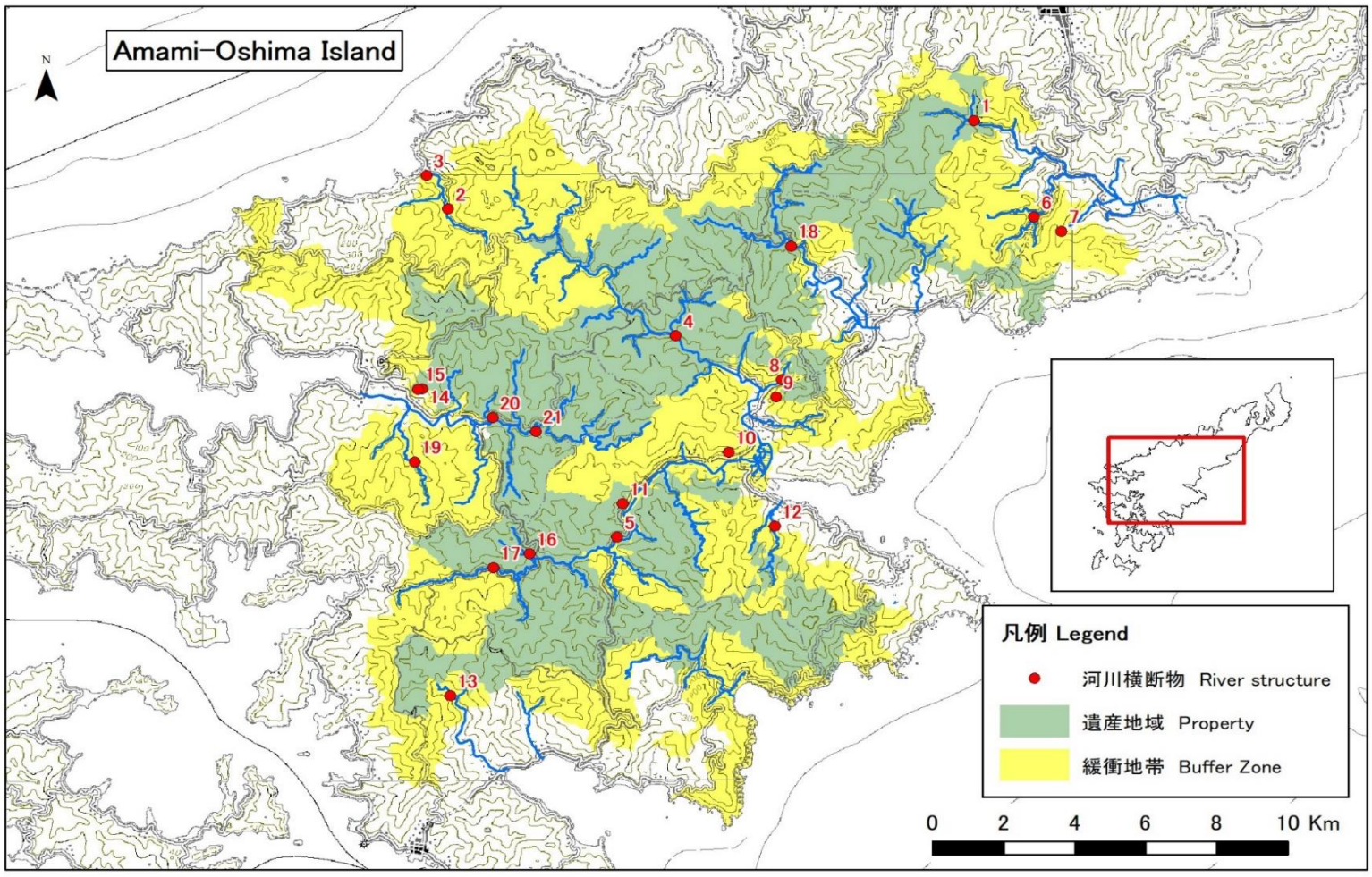
No.	Region	Property/buffer zone	River	River structure that disrupts the flow	Management body	Year of the completion
1	Amami-Oshima Island	Property and buffer zone	Okawa River	Intake weir	Amami City	1983
2	Amami-Oshima Island	Buffer zone	Naon River	Intake weir	Kyushu Electric Power Co., Inc	1956
3	Amami-Oshima Island	Buffer zone	Naon River	Intake weir	Naon Irrigation Association	Before the Meiji period (1868-1912)
4	Amami-Oshima Island	Property	Sumiyo River	Intake weir	Kyushu Electric Power Co., Inc	1959
5	Amami-Oshima Island	Buffer zone	Yakugachi River	Ground sill	Kagoshima Prefecture	Unknown
6	Amami-Oshima Island	Buffer zone	Asato River and its tributary	Sabo check dam	Kagoshima Prefecture	1961 1966
7	Amami-Oshima Island	Buffer zone	Shirinashi River	Sabo check dam	Kagoshima Prefecture	1983
8	Amami-Oshima Island	Buffer zone	Sutarumata River	Sabo check dam	Kagoshima Prefecture	1997
9	Amami-Oshima Island	Buffer zone	Kamiya River	Sabo check dam	Kagoshima Prefecture	2012
10	Amami-Oshima Island	Buffer zone	Uekawa River	Sabo check dam	Kagoshima Prefecture	1999
11	Amami-Oshima Island	Property	Honda River	Sabo check dam	Kagoshima Prefecture	2011
12	Amami-Oshima Island	Buffer zone	Yanma River	Sabo check dam	Kagoshima Prefecture	1990
13	Amami-Oshima Island	Buffer zone	Agina River	Sabo check dam	Kagoshima Prefecture	1993
14	Amami-Oshima Island	Property	Ishira River	Sabo check dam	Kagoshima Prefecture	1993
15	Amami-Oshima Island	Property	Ishira River	Sabo check dam	Kagoshima Prefecture	1985
16	Amami-Oshima Island	Property	Yakugachi River	Sabo check dam	Kagoshima Prefecture	1999
17	Amami-Oshima Island	Property	Yakugachi River	Ground sill	Setouchi Town	Unknown
18	Amami-Oshima Island	Property	Kawauchi River *1	Sabo check dam	Kagoshima Prefecture	1962 1963
19	Amami-Oshima Island	Buffer zone	Kogachi River	Ground sill	Kagoshima Prefecture	Unknown
20	Amami-Oshima Island	Property	Kawauchi River *2	Ground sill	Uken Village	1995
21	Amami-Oshima Island	Property	Kawauchi River *2	Ground sill	Uken Village	Unknown

*1: The Kawauchi River in Amami City.
*2: The Kawauchi River in Uken Village.


Amami-Oshima Island
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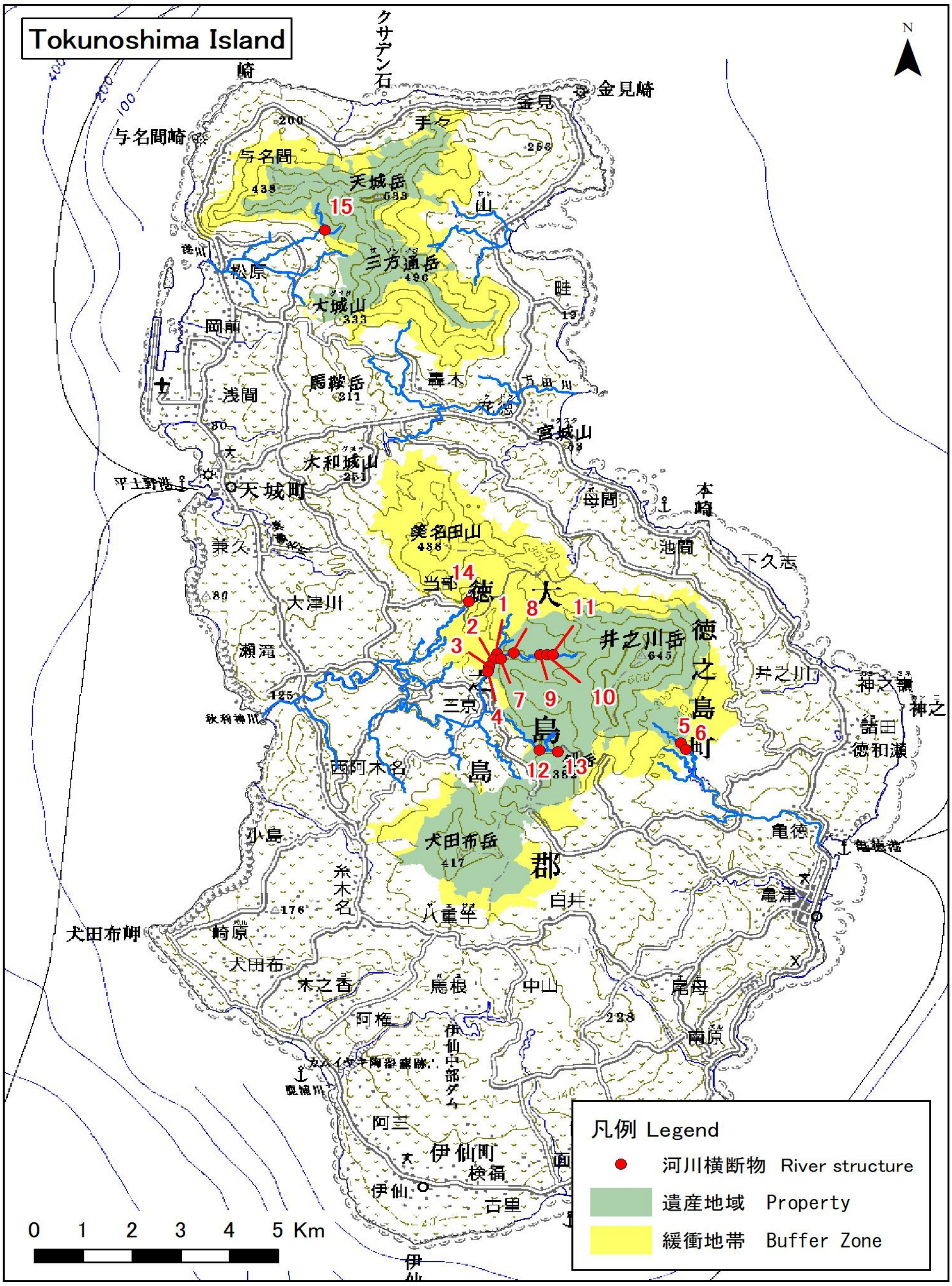
凡例 Legend
河川横断物 River structure
遺産地域 Property
緩衝地帯 Buffer Zone
0 2 4 6 8 10 Km

No.	Region	Property/buffer zone	River	River structure that disrupts the flow	Management body	Year of the completion
1	Tokunoshima Island	Buffer zone	Akirigami River	Check dam	Forestry Agency	1991
2	Tokunoshima Island	Property	Akirigami River	Check dam	Forestry Agency	1983
3	Tokunoshima Island	Property	Akirigami River	Check dam	Forestry Agency	1973
4	Tokunoshima Island	Property	Akirigami River	Check dam	Forestry Agency	1987
5	Tokunoshima Island	Property	Kametoku River	Check dam	Forestry Agency	2003
6	Tokunoshima Island	Property	Kametoku River	Check dam	Forestry Agency	1990
7	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	1988
8	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	1990
9	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	1995
10	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	1997
11	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	2009
12	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	1992
13	Tokunoshima Island	Property	Akirigami River tributary	Check dam	Forestry Agency	2006
14	Tokunoshima Island	Buffer zone	Akirigami River	Water utilization dam	Amagi Town	1968
15	Tokunoshima Island	Buffer zone	Soya River and Tari River	Sabo check dam	Kagoshima Prefecture	1982



Tokunoshima Island
N
凡例 Legend
河川横断物 River structure
遺産地域 Property
緩衝地帯 Buffer Zone
0 1 2 3 4 5 Km
天城岳
三方通岳
大城山
井之川岳
犬田布岳
美名田山
天城町
徳之島町
伊仙町
亀津
金見崎
与名間崎
犬田布岬
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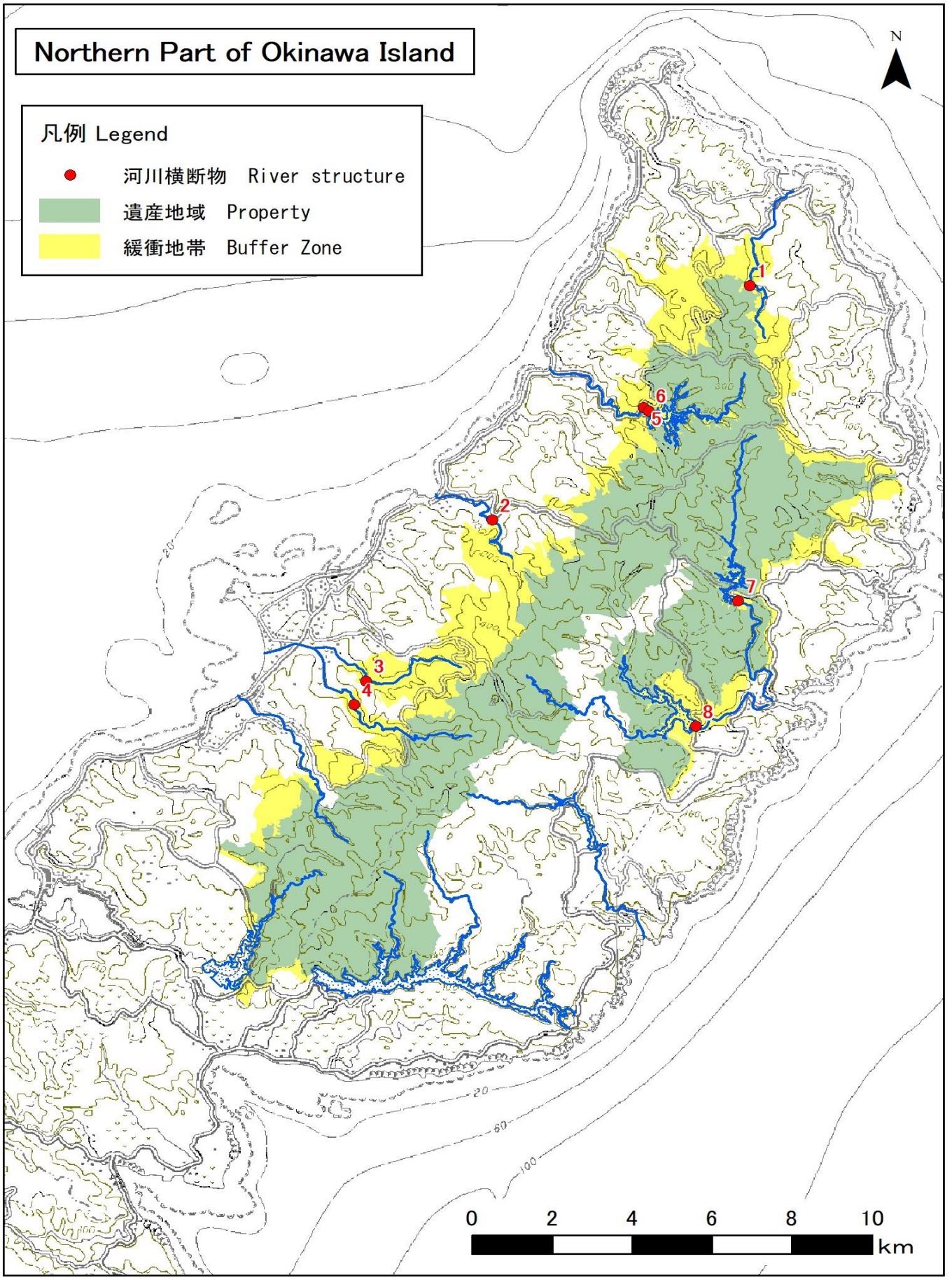
No.*1	Region	Property /buffer zone	River	River structure that disrupts the flow	Management body	Year of the completion
1	Northern part of Okinawa Island	Buffer zone	Oku River	Sabo check dam	Okinawa Prefecture	1983
2	Northern part of Okinawa Island	Buffer zone	Yona River	Sabo check dam	Okinawa Prefecture	1983
3	Northern part of Okinawa Island	Buffer zone	Okuma River	Sabo check dam	Okinawa Prefecture	1982
4	Northern part of Okinawa Island	Buffer zone	Hiji River	Sabo check dam	Okinawa Prefecture	1985
5	Northern part of Okinawa Island	Buffer zone	Benoki River	Intake weir	Kunigami Village*2	Unknown
6	Northern part of Okinawa Island	Buffer zone	Benoki River	Water utilization dam	Okinawa General Bureau, Cabinet Office	1988
7	Northern part of Okinawa Island	Buffer zone	Fungawa River	Water utilization dam	Okinawa General Bureau, Cabinet Office	1983
8	Northern part of Okinawa Island	Buffer zone	Aha River	Water utilization dam	Okinawa General Bureau, Cabinet Office	1983

Revised from supplementary information submitted in November 2019.
*1 : The check dam at Takazato River tributary (No. 6), listed in the supplementary information in November 2019, was removed from the list and map as it was found to be outside the property and buffer zone. The numbers after that have been moved up.
*2 : Corrected from "Okinawa Prefecture" to "Kunigami Village".


Northern Part of Okinawa Island
凡例 Legend
河川横断物　River structure
遺産地域　Property
緩衝地帯　Buffer Zone
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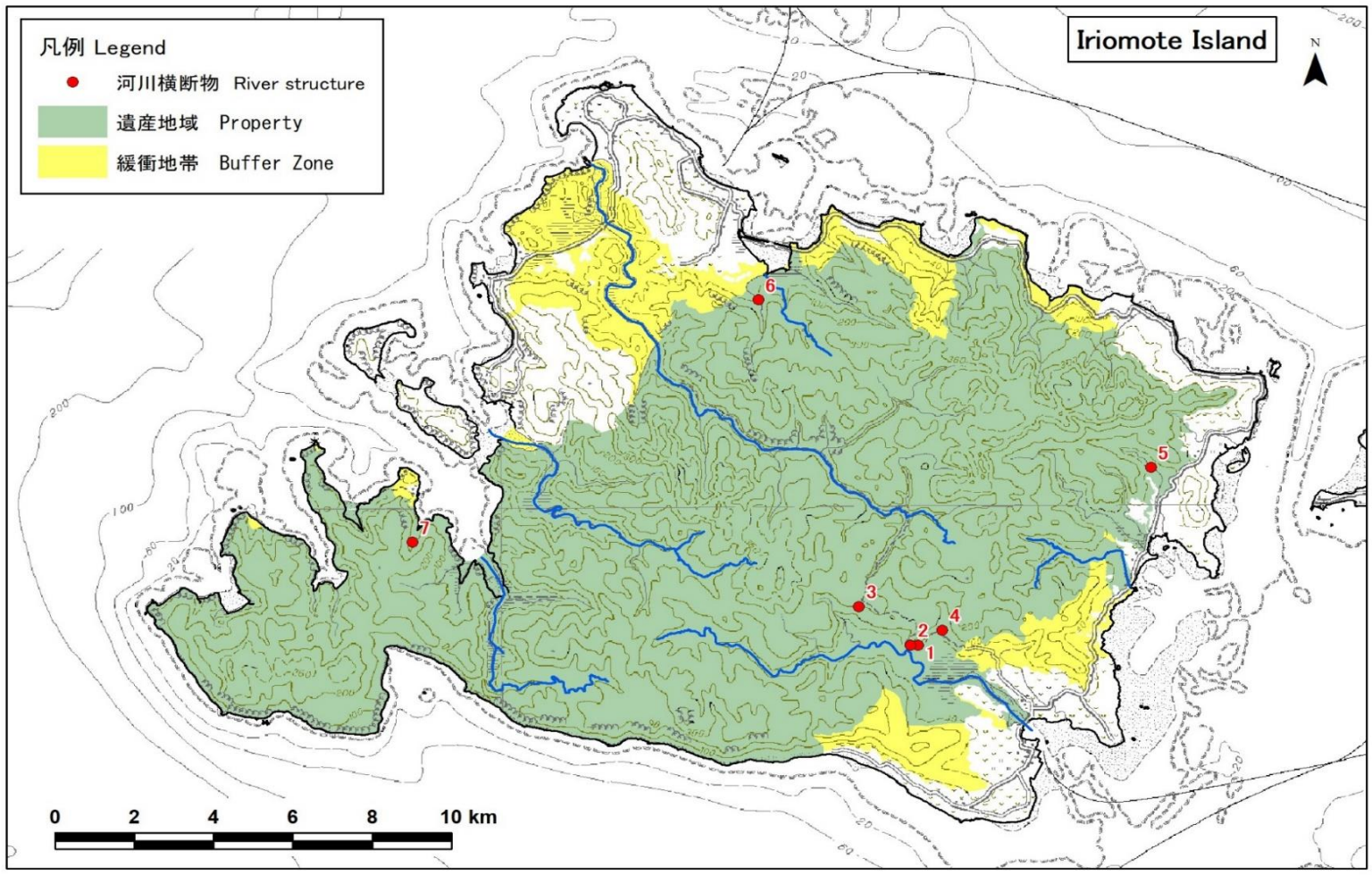
No.	Region	Property/buffer zone	River	River structure that disrupts the flow	Management body	Year of the completion
1	Iriomote Island	Property	Nakama River tributary	Check dam	Forestry Agency	1994
2	Iriomote Island	Property	Nakama River tributary	Check dam	Forestry Agency	1996
3	Iriomote Island	Property	Nakama River tributary	Check dam	Forestry Agency	2009
4	Iriomote Island	Property	Nakama River tributary	Intake weir	Taketomi Town	1975
5	Iriomote Island	Property	Aira River	Intake weir	Taketomi Town	1977
6	Iriomote Island	Property	Male River	Intake weir	Taketomi Town	1978
7	Iriomote Island	Property	Fukai River	Intake weir	Taketomi Town	1981


凡例 Legend
河川横断物 River structure
遺産地域 Property
緩衝地帯 Buffer Zone
Iriomote Island
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10 km

Forestry Operation Policy in Consideration of Natural Environment on Amami-Oshima Island and Tokunoshima Island

Prepared by Amami-Oshima Island Timber Distribution Promotion Council[*1], Tokunoshima Island Forestry Products Production and Distribution Promotion Council[*2], Kagoshima Prefecture Oshima Branch Office[*3]

Established in October, 2022

Overview

1. Introduction

This policy provides a basic direction of forestry operations in consideration of natural environment on Amami-Oshima Island and Tokunoshima Island. Relevant organizations must work closely together to promote forestry operations that take into account the natural environment so that sustainable forestry operations in these areas will be conducted in accordance with this policy.

This policy will be revised as needed in response to changes in social conditions and the accumulation of insights such as the results of forest monitoring.

2. Forest Zoning for Use

Forests play various functions such as the functions to protect watersheds, to prevent slides and other disasters, to produce timber, and to conserve biodiversity. To effectively utilize these multiple functions, it is beneficial to categorize the forest areas based on their current status, location, and social needs placed on them, and to appropriately manage them according to their classifications.

For this purpose, we establish a zoning that reflects the functions required of each forest area and conduct forestry operations under the guidelines set for each zone.

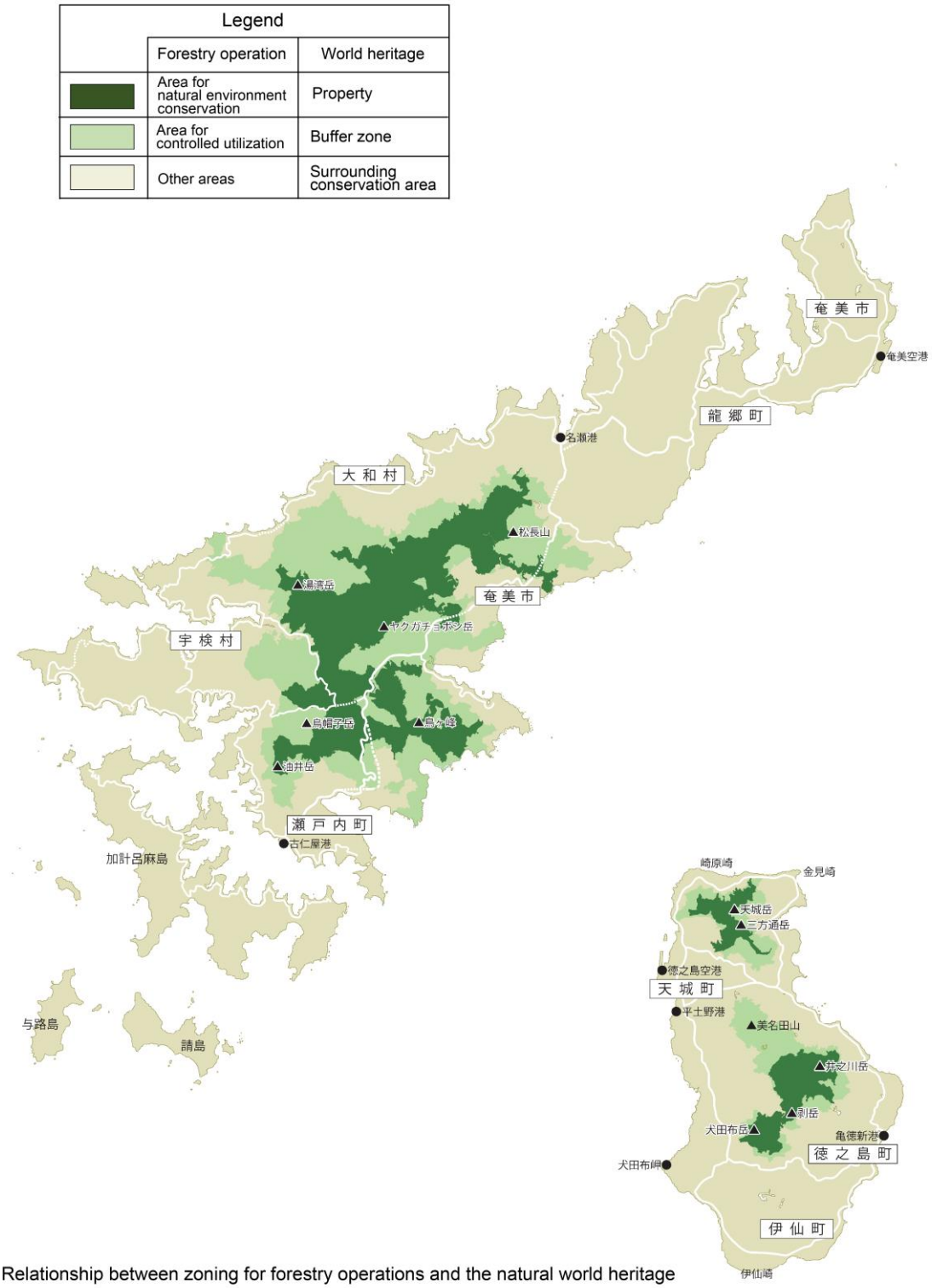
[*]1&2: The Amami-Oshima Island Timber Distribution Promotion Council is a council established to promote the production and distribution of timber produced on Amami-Oshima Island. It consists of timber businesses, administrative institutions, and others on Amami-Oshima Island. The Tokunoshima Island Forestry Products Production and Distribution Promotion Council is the Tokunoshima version of this council.
[*]3: The Kagoshima Prefecture Oshima Branch Office is a local agency of Kagoshima Prefecture and oversees the Amami Island Group which includes Amami-Oshima Island and Tokunoshima Island.

Overview of Zoning for Forestry Operations

Area	Zoning concepts
Area for natural environment conservation	Areas that have a large section of primeval nature or old growth forest remaining on Amami-Oshima Island and Tokunoshima Island. The Natural Parks Act ensures the protection of the primeval nature in these areas.
Area for controlled utilization	Areas that exist on the periphery of or nearby the area for natural environment conservation. In these areas, efforts are made to achieve both forestry operations and nature conservation under the provisions of the Natural Parks Act.
Other areas	Areas that are not subject to severe restrictions on logging but where efforts are made to conduct forestry operations by paying attention to conserving the natural environment.

Zoning for Forestry Operations in Relation to the Natural World Heritage and National Park

Area	World heritage	National park	Management policy	Major laws, regulations, etc.
Area for natural environment conservation	Property	Special Protection Zone and Class I Special Zone	No forestry operation is permitted.	Managed under the Natural Parks Act
Area for controlled utilization	Buffer zone	Class II Special Zone	Forestry operations are possible under certain conditions regarding consideration to the environment	Managed under the Natural Parks Act and Forest Act
Other areas	Surrounding conservation area	Class III Special Zone, Ordinary Zone, and outside parks	Forestry operations are possible under certain conditions	Managed under the Natural Parks Act and Forest Act



Relationship between zoning for forestry operations and the natural world heritage

3. Management Guidelines for Each Area

Logging operations through cutting, skidding, and regeneration in each area must comply with the following permission requirements, matters requiring consideration, notification systems, and other necessary provisions under the Natural Parks Act and Forest Act in order to maintain the diverse functions of forests that have public benefits.

<table>
<tr><th colspan="2">Area for natural environment conservation</th></tr>
<tr><td>Cutting and skidding</td><td>No forestry operation is permitted.</td></tr>
<tr><td>Regeneration</td><td>No regeneration operation will arise due to the absence of forestry operations.</td></tr>
<tr><th colspan="2">Area for controlled utilization</th></tr>
<tr><td>Cutting and skidding</td><td>Amami-Oshima Island
● Requirements
(1) The age of the trees/bamboos to be harvested must be at or above the standard rotation age.
(2) The logging unit must be no greater than 10 hectares.
(3) The logging unit must not be adjacent to a logging unit that was cut within the past three years.
(4) No cutting and skidding is carried out in the vicinity of facilities for activities, etc.

● Matters requiring consideration
(5) No cutting is carried out in the following forests.
- Forests within 20 meters on each side of a road (national road, prefectural road, municipal road, and forest road)
- Forests within 20 meters from the Special Protection Zone or Class I Special Zone of the national park
- Forests within 20 meters on each side of a major river
- Forests within 20 meters on each side of a major ridge
- Forests recognized as habitats on which rare animals, plants, and others depend*
(6) Use the skyline logging method that has minimum impact on the ground.
(7) Keep the number of cutting trees obstructing yarding to a minimum when conducting skyline logging.
(8) Take appropriate measures to prevent soil erosion.
(9) Use the existing forest roads wherever possible.</td></tr>
</table>

	(10) Appropriately take care of the roads or pathways used for logging after completing logging. (11) Spread logging units. etc.
	Tokunoshima Island ● Requirements (1) The age of the trees/bamboos to be harvested must be at or above the standard rotation age. (2) The logging unit must be no greater than 2 hectares. (3) The logging unit must not be adjacent to a logging unit that was cut within the past five years. (4) No cutting and skidding is carried out in the vicinity of facilities for activities, etc. ● Matters requiring consideration (5) Leave an unlogged space between logging units approximately as wide as the height of the surrounding forest canopy. (6) Spread logging units. (7) Take appropriate measures to prevent soil erosion. (8) No cutting is carried out in forests recognized as habitats on which rare animals, plants, and others depend*. etc.
Regeneration	Natural regeneration in principle.
Other areas	
Cutting and skidding	● Matters requiring consideration (1) The age of the trees/bamboos to be harvested must be at or above the standard rotation age. (2) The logging unit must be no greater than 10 hectares. (3) Leave an unlogged space between logging units approximately as wide as the height of the surrounding forest canopy. - Spread logging units. - Take appropriate measures to prevent soil erosion. - No cutting is carried out in forests recognized as habitats on which rare animals, plants, and others depend*. etc.
Regeneration	Natural regeneration in principle.

- For controlled utilization of Amami-Oshima Island, (1) and (4) in the area are based on the Enforcement Regulations of the Natural Parks Act; (2) and (3) are based on a special exception to the criteria based on the Natural Parks Act; (5) to (10) are based on Management and Operation Plan for the Amami Gunto National Park Amami-Oshima and Tokunoshima; and (11) is a voluntary code.
- For controlled utilization of Tokunoshima Island, (1) to (4) in the area are based on the Enforcement Regulations of the Natural Parks Act; (5) to (8) are voluntary codes.
- For other areas, (1) to (6) are voluntary codes.

*Referring to the habitats that are especially important for the survival of rare species including animals and plants or their local populations, old growth forests that are important for conservation and could become such habitats, and forests in the periphery of unique environments (e.g., rocky terrains and hollows), among others.

4. Sustainable Forestry That Co-exist with Nature

— Forestry operations in the area for controlled utilization —

To conduct forestry operations in consideration of natural environment, it is important to comply with the provisions of the Natural Parks Act and Forest Act as stated in the previous chapter. In addition, it is important that the forestry operators, relevant administrative institutions, and others share plans on logging operations and make adjustments as needed.

To this end, forestry operations in the area for controlled utilization will be carried out in compliance with the following items in addition to the requirements and matters requiring consideration described in the previous chapter.

●Rotation age

The standard rotation age of an evergreen broadleaved forests in Amami-Oshima Island and Tokunoshima Island is set at 30 years by Kagoshima Prefecture and local municipalities. This is based on the age of the forests that could maximize the average rate of growth volume and focuses on forests' function to produce timber. Meanwhile, it is pointed out that the forests' functions to maintain the environment including its biodiversity and water resources rely on the biomass volume of the forests and that these functions improve as the age of the forests increases (Fujimori, 2001). From this viewpoint, it is important to further raise the rotation age in Amami-Oshima Island and Tokunoshima Island, taking into consideration forests' economic function and environment conservation function, in order to maintain forests' biomass volume at a high level. Yoneda (2017) clarified that, if a forests' functions were evaluated as the product of their economic functions and environmental conservation functions, the rotation age that maximizes the functions would be approximately 1.5 times of the standard rotation age. He also points out that, in this case, while the economic functions (average ratio of growth) will decline by 22% compared with the standard

rotation age, the environmental conservation function will increase by 76%. Based on these, as a forestry policy in the buffer zone which is required to achieve both economic outcome and nature protection, the rotation age in the area for controlled utilization in Amami-Oshima Island and Tokunoshima Island is set at approximately 45 years or longer (30 years x 1.5).

●Maximum logging timber volume

The maximum logging timber volume in the area for controlled utilization in Amami-Oshima Island and Tokunoshima Island is set within the scope of the rate of growth while maintaining the necessary volume to constantly exercise the forests' functions to conserve biodiversity and to produce timber.

The maximum logging timber volume is calculated for each municipality. The rotation age used for its calculation here, is 1.5 times the standard rotation age normally used.

The maximum annual logging timber volume (Ew) is as shown below.

$$Ew = \left[Z + \frac{Vw - Vn}{Ta}\right]$$

Z: Annual rate of forest growth in the area for controlled utilization

Vw: Standing timber volume in the area for controlled utilization

Vn: Standing timber volume equivalent to 50% of the total standing timber volume calculated when all the trees in the area for controlled utilization reach 1.5 times of the standard rotation age (45 years old)

Ta: 1.5 times the standard rotation age stipulated for the area for controlled utilization (45 years old)

The maximum logging timber volume calculated here is not a target encouraged to be achieved; it is instead designed to regulate any logging exceeding the said ceiling.

●Sharing information on planned logging units

Logging operators prepare a list of planned logging units and maps showing the locations and so on at the end of each fiscal year (or the beginning of each fiscal year) for the forests to be harvested in the following (or current) fiscal year, and share them with administrative organs (e.g., the Ministry of the Environment, prefectures, municipalities).

The relevant organizations that have received such information should check the information

against the existing data on forests, habitats of rare wild animals and plants, the local populations and so on, that they each own, and if necessary, notify the logging operators the need to obtain a permission or approval. In addition, they ask the logging operators to consider the natural environment and make adjustments to their plan if any such consideration is necessary; for instance, when they have confirmed a habitat that is especially important for the survival of rare plant and animal species or their local population, or if the logging plan includes an old growth forest or a forest near the special environment (e.g., rocky terrain, hollow) that is important for conservation and could become such habitat.

References:

Forestry and Fisheries Department, Kagoshima prefectural government (2007) *Decision Criteria for Natural Regeneration in Kagoshima Prefecture*. (in Japanese)

Fujimori, T. (2001). *Ecological and Silvicultural Strategies for Sustainable Forest Management. Elsevier, Inc.Amsterdam.398pp.*

Yoneda, T. (2017). Diagnosis of a tropical rain forest and its forestry basing on net ecosystem productivity. *Jap. J. International Forest and Forestry* 100: 14-24. (in Japanese)

Forest Management in Buffer Zones in the Northern Part of Okinawa Island*

*Partly excerpted from the Policy for the Promotion of the Yambaru Model Forestry (Measures and Policies)

1. Background to the Development of the Policy for the Promotion of the Yambaru Model Forestry (Measures and Policies)

Forests in the northern part of Okinawa Island had historically been owned as commons known as *somayama* since the time of the Ryukyu Kingdom, and today the ratio of national forests and other public forests (owned by prefectural and municipal governments) is as high as 76%. The prefectural government of Okinawa and municipal governments of Kunigami Village, Ogimi Village, and Higashi Village (to be referred to collectively as "the three villages of Yambaru" in this document) have been working together with forestry associations that conduct forestry operations for integral forest management.

Although large-scale logging was carried out during the postwar reconstruction period after World War II, the size of logging areas in recent years has decreased to about 1/70. As trees and forests have grown over time and circular forestry, which plants trees in harvested sites, has been promoted, the total forest mass has increased to approximately three times as compared to that in 1972, when Okinawa was returned to Japan. In addition, forests have grown older, and 84% of them were 41 years old or older as of 2008. The amount of forest resource has been increasing. The present forests that exist in the northern part of Okinawa Island have already recovered from deterioration during the postwar reconstruction period and are in good condition in their long history. Clear cutting in small areas and forest-planging and forest-nursing operations are conducted on a continuous basis.

Against this backdrop, social demands for the forests of Yambaru have become diverse in recent years, including, for the forests that are distributed in the three villages of Yambaru, appropriate management to ensure a high degree of multi-functionality of these forests and maintain and enhance it, the revitalization of local forestry industries, and new uses of forests as a means to secure job opportunities. In addition, more people call for conservation of the outstanding natural environment that has rich biodiversity.

Okinawa Prefecture adopted the Vision for the 21st Century and the New General Plan for the Vision for the 21st Century of Okinawa in pursuit of sustainable development of Okinawa, based on the Act on Special Measures for the Promotion of Okinawa. This vision includes maintenance and enhancement of forests' multi-functionality and promotion of sustainable forestry operations, among others.

To strike a balance between conservation and use in light of the aforementioned basic

measures, Okinawa Prefecture adopted the Policy for the Promotion of Yambaru Model Forestry (Measures and Policies) in March 2013 to promote Yambaru Model Forestry, combining sustainable, circular forestry and forest product industries with nature-experiencing activities that are in harmony with the environment. Yambaru Model Forestry is to be promoted based on scientific information and in consultation with academic experts. Coordination is to be made among the national, prefectural, and municipal governments, forestry operators, related organizations, etc. Measures are to be taken in consideration of various opinions from residents of Okinawa Prefecture.

The same policy provided zoning regarding the protection and use of forests, which was amended in September 2019 for the purposes of ensuring consistency with the classification of Yambaru National Park.

2. Forest Initiatives and Policies for Yambaru's Three Villages

a) Forest Usage Divisions (Zoning)

Conservation and usage divisions will be established according to functions that should be emphasized from among the functions that the forest possesses. This is to allow for the forest's multi-functionality to be adequately exhibited, while promoting the planned use of the forest and appropriate forest management.

For the forests in Yambaru's three villages, four classifications will be established in order to divide up usage: "Natural environment conservation districts," "Water and soil conservation districts," "Forestry production districts," and "Forest usage districts". These accord with the multi-functionality possessed by the forest, particularly its "Biodiversity conservation function", "Water source protection function", "Function for producing lumber and other products", and "Public health and culture function". This will be done with the goals of maintaining diverse forest ecosystems, maintaining and augmenting functions that stably underpin the dams and rivers that serve as water reservoirs in regions of the main island of Okinawa, and promoting sustainable, recycling-oriented forestry. A large part of the World Heritage buffer zone is the forestry production district (emphasizing the natural environment).

● Definitions for the Usage Divisions for Yambaru's Three Villages

World Heritage property

Buffer zones

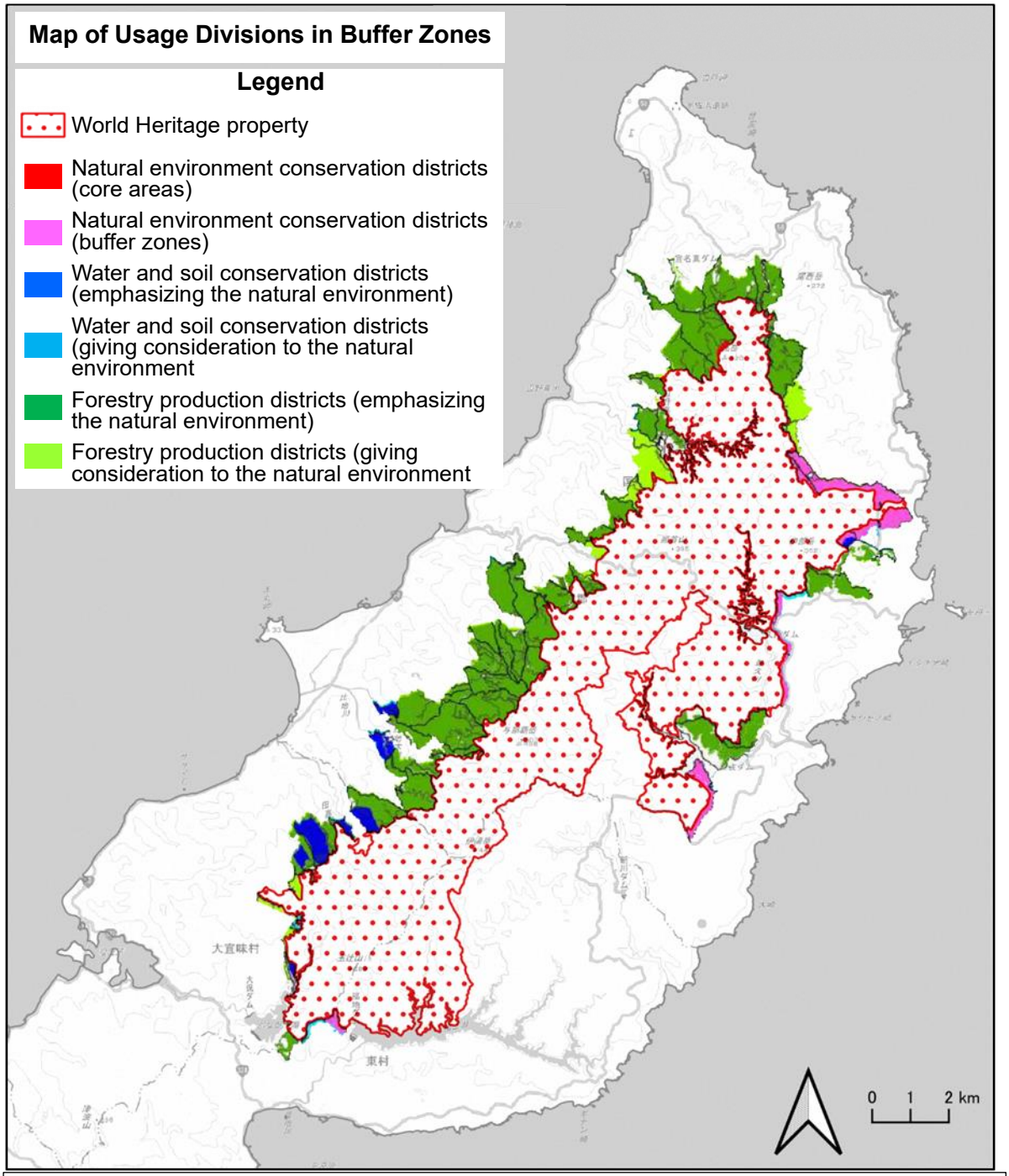
Usage divisions		Thinking behind the usage divisions
I. Natural Environment Conservation Districts		
	1) Core Areas	Districts with ecosystems that include highly endemic, rare wild creatures like the Okinawa woodpecker, Yambaru long-armed scarab beetle, Okinawa spiny rat, and other animals that only inhabit the primeval natural forest within the forests of Yambaru 【areas where primeval natural forests will be maintained and passed down (core areas)】.
	2) Buffer Zones	Districts corresponding to core areas as buffer zones with the goals of linking core areas with other districts and stably maintaining the core areas 【areas for ensuring the continuity and buffer-like characteristics of the natural environment conservation districts (buffer zones)】.
II. Water and Soil Conservation Districts		
	3) Emphasizing the Natural Environment	Water source forest districts where dams and rivers will be maintained with the goal of stably providing the water that underpins the prefectural residents' lifestyles and industry 【areas where the emphasis is on the high-level expression of water and soil conservation functions, such as water source protection and the prevention of mountain disasters, etc.】. These areas also put emphasis on conservation of natural environment.
	4) Giving Consideration to the Natural Environment	Water source forest districts where dams and rivers will be maintained with the goal of stably providing the water that underpins the prefectural residents' lifestyles and industry 【areas where the emphasis is on the high-level expression of water and soil conservation functions, such as water source protection and the prevention of mountain disasters, etc.】. These areas also include some consideration to conservation of natural environment.
III. Forestry Production Districts		
	5) Emphasizing the Natural Environment	Districts in regions where the objective is forestry production where more environmentally friendly management is to be carried out by emphasizing the conservation of the natural environment because they adjoin natural environment conservation districts and water and soil conservation districts 【areas where forestry production that emphasizes conservation of the natural environment is carried out】.
	6) Giving Consideration to the Natural Environment	Districts in regions where the objective is forestry production where logging areas are decentralized (made non-continuous), where efforts for conservation are made for the forest zones along ridges and the understory vegetation in valleys, and where management that is friendly to the natural environment is carried out while supplying lumber products in a stable manner 【areas where forestry production that is friendly to the natural environment is carried out】.
IV. Forest Usage Districts		
	7) Forest Usage Districts	Districts where the forests are used as tools to create new industries (tourism industry) by those engaged in the forestry industry and local residents, to serve as districts for deploying activities to experience nature 【areas where activities to experience nature by using forests while taking the natural environment into consideration are carried out】.

For the time being, some parts of the forestry production districts, and water and soil conservation districts (backbone mountain range areas and area surrounding Mt. Nishimedake) will be classified as "Districts requiring coordination," which require coordination between the conservation and use of the natural environment. This will be done in the interest of conserving biodiversity and securing continuity between environmental conservation

districts, as well as from the perspective of maintaining forest functions and conserving forests. Consideration will continue to be held between the concerned parties.

Furthermore, national forests will be managed based on the Regional Administration and Management Plan for Northern Okinawa, which was enacted by the national government (Forestry Agency). Part of the northern training ground, which was returned to Japan in 2016, was designated as a forest ecosystem reserve in December 2017.

As for prefectural forests, roughly 90% of these are national forests furnished with grant aid, and so therefore additional coordination with the national government will be needed for establishing the conservation and usage divisions.



*This figure overlays the World Natural Heritage Property, Buffer Zone, and Zoning under the Policy for the Promotion of the Yambaru Model Forestry (Measures and Policies).

b) Policies for Forest Management and Forest Development

Efforts will be made to improve forest management and forest development according to the usage divisions based on continuity with the environmental conservation initiatives taken to date in order to further improve environmental conservation measures and mitigate environmental impacts.

● Basic Policies for Forest Management and Management Policies for Each Usage Division

Usage Divisions	Definitions / Basic Policies / Management Policies
I. Natural Environment Conservation Districts	**[Definition] Areas Where Emphasis Is on Conservation of Primeval Natural Forests**
1) Core Areas	**[Basic Policy]** Perform no forest management to maintain and pass down primeval natural forests.
	[Management Policy] • Perform no harvest management, clearing management, or road system installation.
2) Buffer Zones	**[Basic Policy]** Perform the bare minimum forest management, while maintaining primeval natural forests.
	[Management Policy] • Perform long rotation forest management, selective cutting of individual trees, and multi-storied forest management based on the power of nature.
II. Water and Soil Conservation Districts	**[Definition] Areas Where the Emphasis Is on High-Level Realization of Water and Soil Conservation Function such as Water Source Protection and the Prevention of Mountain Disasters**
3) Emphasizing the Natural Environment	**[Basic Policy]** Basically carry out forest management to enhance water and soil conservation function.
	[Management Policy] • Basically, perform long rotation forest management as well as selective cutting for multi-storied or single-storied forest management. • When there is no impact on water and soil conservation function, perform clear-cutting of a area smaller than 1 ha.
4) Giving Consideration to the Natural Environment	**[Basic Policy]** Basically carry out forest management to enhance water and soil conservation function.
	[Management Policy] • Basically, perform long rotation forest management and make efforts to perform selective cutting for multi-storied or single-storied forest management. • When there is no impact on water and soil conservation function, make efforts to perform clear-cutting of a area smaller than 1 ha.
III. Forestry Production Districts	**[Definition] Areas Where the Emphasis Is on the Production of Lumber and Other Products, Aiming at Sustainable Forestry Production**
5) Emphasizing the Natural Environment	**[Basic Policy]** Conserve and Create the Diverse Forest Environment Through Forest Management That Emphasizes Conservation of Natural Environments.
	[Management Policy] • Perform long rotation and/or standard forest management in large part. Extend the period as much as possible to minimize impact to the environment. • In the case of clear cutting, ensure to abide by the management regulations that are based on relevant laws and regulations and perform single-storied or multi-storied forest management on a single area less than 5 ha large in order to reduce the operation area to the extent possible. • For selective cutting, perform multi-storied forest management as a general rule.

A large part of the buffer zone is the forestry production district (emphasizing the natural environment). The basic policies for forest management and management policies of each division are as follows:

Policies for Forest Management and Forest Development in Forestry Production Districts (Emphasizing the Natural Environment)

These districts are mainly engaged in forestry production while also maintaining contact with natural environment conservation districts and water and soil conservation districts, thus the districts are established with emphasis on the conservation of natural environments.

Harvest Management –Perform long rotation and/or standard rotation forest management for the most part. In some areas, perform short rotation forest management after examining the environmental characteristics.

–Perform clear cutting or selective cutting. In the case of clear cutting, ensure everyone involved abides by the management regulations that are based on relevant laws and regulations and perform the method on a single area less than 5 ha large in order to reduce the operation area to the extent that is possible. Same goes for selective cutting, requiring minimization of the operation areas as much as possible. (*1)

Clearing Management

–Regenerate via artificial clearing (germination, natural seeding according to the conditions)

–Perform single-storied or multi-storied forest management.

–Plant broad-leafed trees or evergreen trees (Okinawa pine, etc.)

Road System Installation

–Use the existing road system, install a bare minimum road system necessary (service roads etc.) by taking the environment into consideration

Environmental Conservation

–Any effort will be made to conserve the forest zone at the ridges in order to ensure security of evacuation routes for animals during logging, security of habitats during and after logging, natural restoration through natural regeneration (germination), and

mitigation of climate change within logging areas.

–Any effort will be made to conserve lower-elevation vegetation (such as underutilized small-diameter trees and ferns) in valleys in order to ensure security of evacuation routes (in upstream and downstream areas and the surrounding areas) for animals during logging, and security of habitats during and after logging.

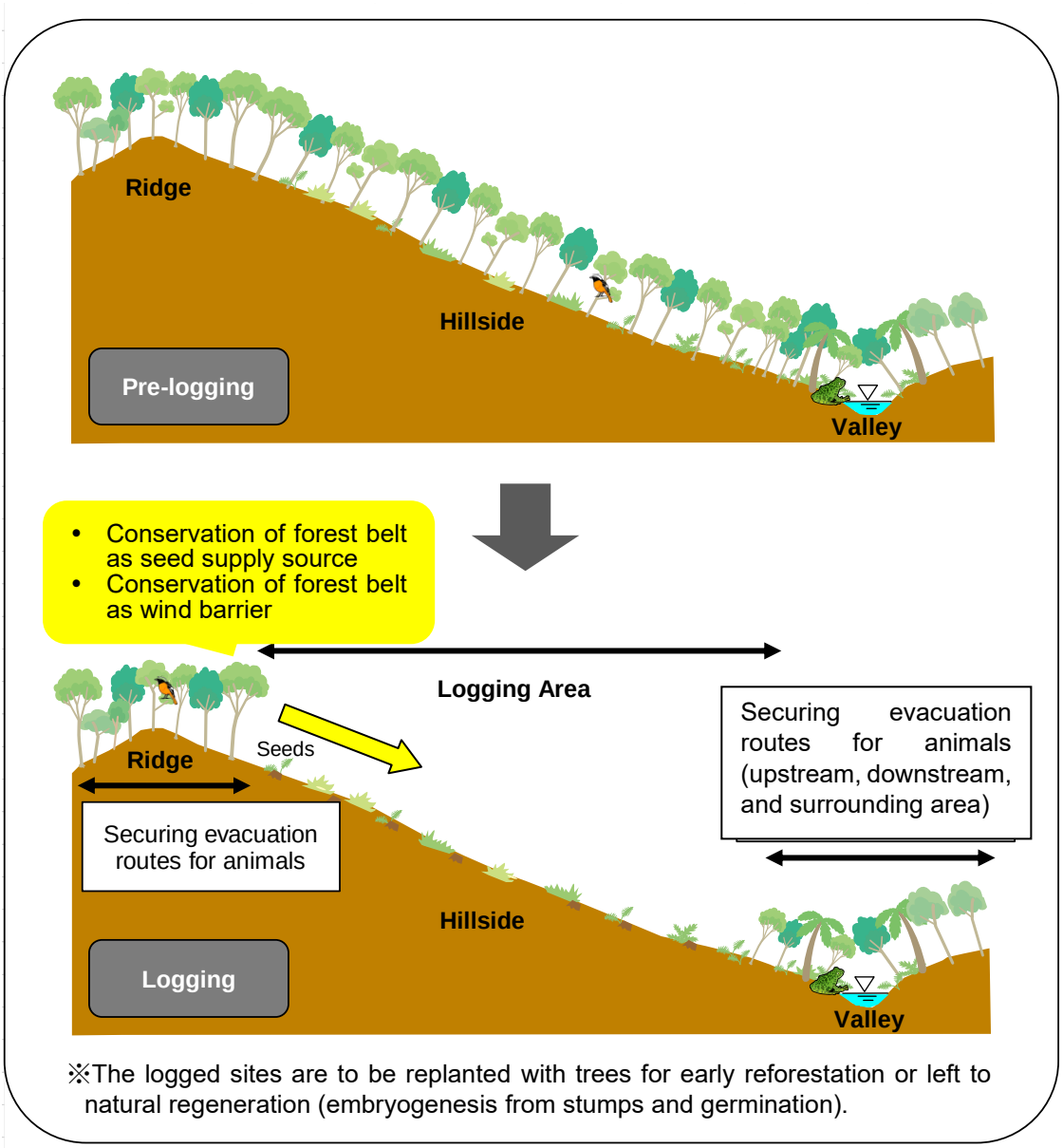
–Efforts will be made to prevent logging during the breeding season (March–June) of wildlife such as the Okinawa woodpecker.

–Partially utilize underutilized land in order to minimize logging in natural forests.

–Plant at logging sites to accelerate forest growth.

–Promote long rotation forest management in an effort to mitigate environmental impacts and serve as buffer zones for natural environment conservation districts, while pushing for long-term use of habitats and nurseries for wildlife.

*1 The limitation of the size of one tree-cutting area to less than 5 ha had been applied before national park designation. This should now read as "2 ha in principle", as the entire area in question has been designated as a Class II Special Zone of the national park.



Schematic Image of Logging Area where Forest Belts on the Ridge and Understory Vegetation in the Vally (Small-Diameter Trees that Are not Used and Ferns)

Policies for Forest Management and Forest Development in Forestry Production Districts (Emphasizing the Natural Environment)

These districts are primarily engaged through forestry production while still giving consideration to the natural environment. Examples include decentralization of logging areas, establishment of buffers (protection zones) among logging areas, and conservation of forest zones at the ridges and lower-elevation vegetation in the valleys.

Harvest Management

- Standard rotation and/or short rotation forest management are the norm. In some areas, long rotation forest management is conducted after examining the environmental characteristics.
- Perform clear cutting or selective cutting. In the case of clear cutting, ensure everyone involved abides by the management regulations that are based on relevant laws and regulations and perform the method on a single area less than 5 ha large in order to reduce the operation area to the extent that is possible. The same is true for selective cutting, requiring as much minimization of the operation areas as possible. *2

Clearing Management

- Regenerate via artificial clearing (germination, natural seeding according to the conditions)
- Perform single-storied or multi-storied forest management.
- Plant broad-leafed trees or evergreen trees (Okinawa pine, etc.)
- Perform forest management that promotes the use of underutilized land.

Road System Installation

- Use the existing road system, install a bare minimum road system necessary (service roads etc.) by taking the environment into consideration.

Environmental Conservation

- Any effort will be made to conserve the forest zone at the ridges in order to ensure security of evacuation routes for animals during logging, security of habitats during and after logging, natural restoration through natural regeneration (germination), and mitigation of climate change within logging areas.
- Any effort will be made to conserve lower-elevation vegetation (such as underutilized small-diameter trees and ferns) in valleys in order to ensure security of evacuation routes (in upstream and downstream areas and the surrounding areas) for animals during logging, and security of habitats during and after logging.
- Efforts will be made to prevent logging during the breeding season (March–June) of wildlife such as the Okinawa woodpecker.
- Utilize underutilized land in order to minimize logging in natural forests.
- Plant at logging sites to accelerate forest growth.

- Promote long rotation forest management in an effort to mitigate environmental impacts and serve as buffer zones for natural environment conservation districts, while pushing for long-term use of habitats and nurseries for wildlife.

*2 In the forestry production districts (giving consideration to the natural environment) within the buffer zones, the size of one operation area is limited to 2 ha in principle in Class II Special Zone of National Park and it should be smaller than 5 ha and minimized to the extent possible in Class III Special Zone.