Activities

of the Committee for

Ecosystem

Management

The Ecological Society of Japan

What is the Committee for Ecosystem Management, the Ecological Society of Japan?

The "Law for the Promotion of Nature Restoration" was enforced in January 2003 in Japan to promote projects to restore natural environments damaged by past human activities. Upon the establishment of this law, nature restoration projects were initiated in several regions.

Many members of the Ecological Society of Japan have collaborated and contributed to the projects by providing advice for developing targets as well as plans and methods of action for ecosystem management. To share the targets, methods, results and challenges of each project and to provide feedback for other ecosystem management projects, the Ecological Society of Japan organized the Committee for Ecosystem Management in 2003.

The Committee for Ecosystem Management examined principles of nature restoration that should be considered before starting a nature restoration project, and the findings were summarized and published within the "Guidelines for Nature Restoration Projects" in May 2005.

Next, the committee evaluated the results and challenges of the projects that have been conducted in several regions and ecosystems of Japan. The outcomes will be published as the "Handbook for Nature Restoration" in December 2010. The handbook will provide tips to the public, policy makers and researchers for times when they wish to apply the principles described in the "Guidelines for Nature Restoration Projects" to actual tasks.

The committee has taught courses to promote the principles and methods of ecologically sound nature restoration and ecosystem management by providing guidelines and handbooks such as "Nature Restoration for Everyone—From an Ecological Point of View" (in August 2009 in Tokyo) and "Nature Restoration of Rivers and Wetlands—Principles and Methods" (in preparation for December 2010 at Shizuoka).

I Outline of the "Guidelines for Nature Restoration Projects"

Focus of nature restoration projects

The following entities and interactions that constitute ecosystems should be included in nature restoration projects as much as possible:

1. Species and their habitats
2. Community structure and interspecific relationships
3. Ecosystem functions
4. Relationships between ecosystems
5. Sustainable relationships between humans and nature

Clarification of aims and sharing of information

Before nature restoration measures are carried out, the following actions should be taken at the project planning stage, and relevant information should be shared with all stakeholders:

6. Investigate the current situation of flora, fauna and habitats according to scientific standards and examine the necessity of restoration measures.
7. Project future development under the assumption that no action is taken, and if restoration measures are carried out; make the reasons for doing so clear.
8. Clarify the characteristics of the ecosystem that is to be restored, taking into consideration its spatial and temporal dimensions as well as the regional context.
9. Consider the extent to which natural succession should be controlled.

Principles for nature restoration projects

The following principles should be strictly adhered to when carrying out nature restoration projects:

10. Conserve plants and animals indigenous to a particular region (principle of conserving regional races).
11. Conserve all species constituting the typical biological diversity for a certain region (principle of conserving species diversity).
12. Conserve the genetic variability of the population in a certain region (principle of conserving genetic variability).
13. Rely on natural recovery wherever possible, and avoid interference with natural processes (principle of natural recovery).
14. Co-operate with researchers from different disciplines (principle of multidisciplinary co-operation).
15. Respect traditional techniques of natural resource management and their cultural background (principle of respect for traditions).
16. Assess the feasibility of restoration goals (principle of feasible goals).

Adaptive management

The following adaptive management methods should be employed in nature restoration projects to account for the unpredictability of ecosystem development:

17. Ensure the transparency of the project process through evaluations by third parties.
18. Employ the precautionary principle to avoid irreversible damage to ecosystems.
19. Set a concrete target that can be evaluated in the future.
20. Indicate the degree of uncertainty in the predictions of the management plan.
21. Use monitoring to test the hypotheses on which the management plan is based, and adjust management measures according to the observed ecosystem changes.
22. Improve management measures or stop the project if the initial hypotheses prove to be wrong.

Guidelines for consensus building and cooperation

Nature restoration projects should be carried out according to the following rules and procedures:

23. Ensure that scientists play a sufficient role.
24. Educate future generations who will bear the responsibility for the project.
25. Build trust and consensus among stakeholders in the project area.
26. Establish links with other projects working for environmental conservation.

II Outline of the "Handbook for Nature Restoration"

Chapter 1 What is nature restoration?

1.1 NECESSITY OF NATURE RESTORATION
1.2 SYSTEM, TREND AND CHALLENGES IN NATURE RESTORATION

Chapter 2 Explanation of the "Guidelines for nature restoration projects"

2.1 FOCUS OF NATURE RESTORATION PROJECTS
2.2 CLARIFICATION OF AIMS AND SHARING OF INFORMATION
2.3 PRINCIPLES FOR NATURE RESTORATION PROJECTS
2.4 GUIDELINES FOR ADAPTIVE MANAGEMENT
2.5 GUIDELINES FOR CONSENSUS BUILDING AND CO-OPERATION
2.6 PRINCIPLES AND GUIDELINES FOR PLANNING

Chapter 3 Examples of nature restoration projects

3.1 NATURE RESTORATION PROJECT AT KUSHIRO MIRE

BACKGROUND Kushiro Mire, the largest wetlands complex in Japan, has lost more than 20% of its area over the past 50 years. The wetlands dried and became eutrophic due to the accumulation of sediments and nutrients that are produced by the degradation of riverbeds, as well as fertilization and soil erosion in agricultural lands. Ecosystem degradation has increased since 1980, when the wetlands were added to the list of the Ramsar Convention.

GOAL A "Comprehensive Plan for Nature Restoration of Kushiro Marsh" was established. The entire watershed was designated as an objective area for restoration, and a goal was set to maintain current wetland areas and to restore them to conditions similar to those in 1980.

RESULTS AND CHALLENGES The progress of restoration projects is very slow, and projects sometimes conflict with the plans for land use development. A challenge is to redirect such conflict to drive collaborations among stakeholders in this region.

◀ The severe degradation of a channel bed at a straightened section. A large amount of sediment was produced and transported to the mire.

3.2 THE RESTORATION OF THE KUSHIRO RIVER

BACKGROUND An area of alder woodland has increased to 2.4 times that in 1974, which subsequently decreased the area of Kushiro Marsh. This was the result of artificial channel straightening. Sediments removed from the channel were deposited on the right bank, which prevented water from flowing into the marsh, thus drying it out and allowing alders to colonize. The area that was formerly channel changed to pasture.

GOAL To restore the marsh environment, the Plan for Restoration of the Kushiro River was established. With the exception of a pool in which endangered water plants grow, the lower part of the former channel is slated for restoration.

RESULTS AND CHALLENGES Restoration will raise the water level and should not affect agriculture that has been established along the upper regions of the target area. As this nature restoration project has not been of great concern to local people, the challenge is to publicise and share the aims and goals of the mission with farmers and other sectors of the population.

▼ Straightened Kushiro River

Alders have colonized into Kushiro marsh ▲

3.3 RESTORATION OF THE SHORE VEGETATION ALONG LAKE KASUMIGAURA

BACKGROUND The shore vegetation of Lake Kasumigaura has been badly degraded due to complex factors such as water pollution, built embankments and the alteration of water levels after the 1960s. A project to recover lakeshore vegetation using the existing soil seed bank was launched in 2002.

GOAL Restoration of species-rich lakeshore vegetation and a self-sustainable population of endangered or vulnerable plant species including the yellow floating heart (*Nymphoides peltata*).

RESULTS AND CHALLENGES In total, 180 species, including six endangered or vulnerable plants and 12 native submerged plants that had disappeared from the aboveground vegetation of the lake, were recorded in five re-created lakeshores during the first year of the restoration project. The venture should be regarded as a pilot project. The methods established through this endeavour should be applied to other attempts at lakeshore restoration.

▲Before the restoration

After 5 years ▼

3.4 PRESENT STATUS AND PERSPECTIVE OF NATURE RESTORATION PROJECT AT LAKES SHINJI AND NAKAUMI

BACKGROUND A desalinization and land reclamation project was conducted at the coastal lagoon lakes Shinji and Nakaumi largely for the purpose of agricultural use. Reclamation work was officially discontinued in 2000 due to political objection to reducing rice acreage, and shortly thereafter, the desalinization project was also terminated. Significant damage has occurred to the lake system, and large artificial structures wall off one-third of the lake area and have modified the topography and circulation of Lake Nakaumi.

GOAL To restore the severely degraded environments of Lake Nakaumi, the "Council for Nature Restoration of Nakaumi" was established in 2007 under the initiative of a nonprofit organisation (NPO). The goals and intended activities of the council are now being established with the involvement of a council member.

RESULTS AND CHALLENGES Among the councils established under the provision of the Law for the Promotion of Nature Restoration, only the Council for Nature Restoration of Nakaumi is administrated by a NPO. The other 18 councils are governed under the initiative of ministries and/or local governments. Thus, the challenge for this particular project is to run it smoothly and successfully to create a framework of a governance model for other projects.

3.5 NATURE RESTORATION PROJECT AT YAWATA MARSH

BACKGROUND Most marshes in the Yawata basin have vanished due to the development of drainage works, with only a few remaining. Kirigatani is one of the remnant marshes, although its area has decreased. The main factor in reducing marsh areas is the descent of the underground water level caused by stream alteration; i.e., streams have been straightened, deepened and covered with concrete.

Goal In response to the restoration activities of the public, the Hiroshima Prefectural Government started the Nature Restoration Project in 2003. The goals of the project include restoration of marsh using flooding and spring water, conservation of endangered plants and animals and easy access for tourism and environmental education.

Results and Challenges Channel improvement, installation of channels and tree felling were conducted by the prefecture. As a result, the marsh is recovering and the spawning of salamanders and frogs, immigration of aquatic insects and flowering of aquatic plants have been observed. Establishing financial and organisational bases for ongoing monitoring, as well as a local community that can support tourism and education, is imperative.

▲ Channel improvement and installation of channels

Recovered marsh from overflowing water ▼

3.6 Nature Restoration Project at Mt. Odaigahara

Background At Odaigahara, a coniferous forest of spruce and fir that existed in the 1960s has since changed to *Sasa* grassland. No seedlings of the former trees exist, thus preventing natural recovery of the forest.

Goal A nature restoration project was planned to help with the natural recovery process of the forest. Given that seedling grazing by Sika deer as well as the dense *Sasa* cover inhibit natural recovery, the project has focused on population control of the deer and monitoring the dynamics of Sika deer and *Sasa* populations.

Results and Challenges The population density of Sika deer has decreased every year and is approaching the tentative target density. The monitoring results indicate setting a target density for the deer is necessary to promote and sustain the regeneration and biodiversity of the forest.

3.7 NATURAL FOREST RESTORATION PROJECT IN CO-OPERATION WITH THE LOCAL PEOPLE OF MT. TAKAMARU

BACKGROUND Throughout Japan, natural forest has been fragmented and its area decreased due to intensive plantation efforts during the era of rapid economic growth. Conifer plantations for timber production replaced broad-leaved natural forest. However, decreased demands for domestic timber caused by imports of cheap timber, as well as the depopulation of mountainous villages, have forced people to neglect management of coniferous plantations. Large areas of forest are now devastated, and thus developing a vision for forest restoration with the co-operation of the public is necessary.

GOAL 1) Reforestation based on an ecologically testable plan, 2) using seeds and seedlings collected only from areas nearby the project site to avoid genetic contamination, 3) recruiting the participation of local people and volunteers to the project, 4) establishing governance self-supported by a consortium composed of local people, volunteers and local administration, 5) public exposure of the project so that it can be used as a model for nature restoration.

RESULTS AND CHALLENGES Since the project was initiated 10 years ago, a framework has been established for the project model. Local individuals and public groups organised a consortium trust and have committed to governing the project. The next challenge is to establish a reasonable and effective method of adaptive management, as well as to make the project financially self-supporting.

▼ Knowledge sharing between local people and experts

Grass mowing by volunteers ▲

3.8 NATURE RESTORATION PROJECT ON THE OGASAWARA ISLANDS

BACKGROUND The Ogasawara Islands harbour many endemic species because they have never been connected with the main islands of Japan. However, introduced species have threatened the endemic species since human settlement in 1830. For example, naturalized goats caused the extinction of the Ogasawara wood pigeon; the green anole has threatened the Ogasawara gossamer-winged butterfly; and an introduced tree, *Bischofia javanica*, is invading and dominating the native forest. Thus, taking measures is necessary to protect endemic species from extinction.

Goal The Ministry of Environment has established the Commission for Promotion of Ogasawara Nature Restoration, and constructed the Basic Plan for the Conservation and Restoration of Natural environments of Ogasawara. The plan focuses on measures against alien species.

Results and Challenges Activities for exterminating alien species should be undertaken based on scientific monitoring, and establishing a management method for recovering the native ecosystem is necessary.

3.9 Nature restoration project at the Sanbanse tidal flats in Tokyo Bay

Background Sanbanse is one of few shallows remaining in Tokyo Bay. It used to be a part of a tidal flat that extended 4 km from the seashore, but has become the shallow due to the subsidence of the ground caused by the use of underground water. Residential and industrial areas as well as ports have since surrounded the region, and a plan for reclamation has been proposed.

Goal The reclamation plan was withdrawn in 2001, and a subsequent restoration plan was established under the participation of the public. The targets are 1) recovering connectivity between the sea and land, 2) recovering biodiversity, 3) securing sustainability and resilience of the environment, 4) securing productivity of fishing grounds and 5) securing contact between humans and nature.

Results and Challenges Frequent conflicts among stakeholders regarding issues such as the amounts of sediment deposited into the shallow, as well as the degree of possible alterations to existing shallows and tidal flats, are preventing restoration of the tidal flat.

3.10 Nature restoration project for the coral reef at Seki-Sei Lagoon

Background The coral reef in Seki-Sei Lagoon harbours the highest species diversity in Japan. However, the condition of the reef has declined since the 1980s due to an outbreak of crown-of-thorns starfish and coral bleaching.

Goal The Ministry of the Environment has established the Master Plan for Nature Restoration of Seki-Sei Lagoon, and the Council for Nature Restoration of Seki-Sei Lagoon has been preparing a “Comprehensive Plan for Nature Restoration of Seki-Sei Lagoon”.

Results and Challenges Based on observations that immigration of coral larva to the centre of the lagoon is rare, the conclusion was made that recovery by natural processes would be difficult. Thus, a method of transplanting species has been adopted. Scientific knowledge of the natural ability of coral reefs to recover remains limited, and evaluations comparing terrestrial ecosystems are insufficient. Given the complexity of these issues, establishing a scientific committee is necessary to develop the most effective plan of action for restoring this ecosystem.

3.11 RESTORATION PROJECT OF AZAME-NO-SE FLOODPLAIN

BACKGROUND The area of the floodplain has drastically decreased with the development of paddy fields and river improvement initiatives in a watershed of the Matsuura River in Saga Prefecture as well as other regions of Japan. Thus, fish such as loach and catfish, which depend on the wetland for specific life stages, have decreased. This has also diminished opportunities for local people, including children, to interact with and learn about these fish species.

GOAL The Ministry of Land, Infrastructure, Transport and Tourism purchased a 6-ha plot of paddy fields for both flood control and nature restoration. Targets of the nature restoration project include recovering the floodplain ecosystem as well as the connectivity between humans and nature.

▼ Restored floodplain and wetland

RESULTS AND CHALLENGES

Spawning and juveniles of catfish, carp and stone moroko can be observed in the restored wetland. a NPO, Azame-no-Kai, was established and is providing opportunities for children to interact with nature. Evaluation of the project and increasing its users beyond those from the region are upcoming challenges.

3.12 PROJECT FOR RESTORING BIODIVERSITY AND SOCIETY IN RURAL REGIONS

BACKGROUND Ecosystems in many rural regions such as paddy fields, grasslands and secondary forests, have been sustained under various agricultural activities. Some ecosystems have maintained high biodiversity, but in many rural regions of Japan, numerous species are threatened with extinction due to a decline in agricultural activities as a result of ageing farmers and depopulation in these areas.

GOAL A project for both restoring biodiversity and reinstating agriculture has been conducted in rural areas of Onomichi City and Sera Town, Hiroshima Prefecture.

RESULTS AND CHALLENGES The project has tried to establish an endangered insect that inhabits the paddy fields (the predaceous diving beetle) as a symbol of clean rice, which is rice grown using less pesticides and/or organic cultivation. The rice is sold in the market at a price 20% higher than that for common rice. The project provides incentive to the farmers for continuing agriculture and for conserving the insect, and promotes biodiversity conservation. The project is unique because it is sustained by the participation of several sectors of the population such as

farmers, consumers and the local government. This framework should adopted as a model for similar projects in other rural regions.

3.13 NATURE RESTORATION PROJECT AT YASUMURO RIVER

BACKGROUND Yasumuro River is known as a hotspot for several rare species of algae and fishes. However, an endangered red algae, *Thorea okamurae*, has not been seen in the area since 1995 by alteration of flow regime and river improvement.

Many people participated in the restoration work. ▲

GOAL The project to recover the red algae was initiated in 2002. Studies of the life cycle of the red algae revealed that disturbances such as flooding are essential to remove competitive algae from stones so that the target algae can establish. Thus, a plan was developed to restore the algae through hand-turning of stones with citizen collaboration as well as river engineering such as flush discharges from a dam and barbed digging.

▲ Endangered red algae, *Thorea okamurae*

RESULTS AND CHALLENGES Numerous local people participated in the stone-turning work, and as a result, the algae has reappeared. Ongoing monitoring and evaluation of changes in the fauna, flora and ecosystem in general, in addition to the algae, is the next challenge.

3.14 PROJECT FOR RESTORING WILDFLOWER GRASSLANDS

BACKGROUND The Koshimizu Wildflower Grassland is located along the coast in the quasi-national park of Abashiri, east Hokkaido. When it was designated as a quasi-national park in 1958, the entire area of the grassland was covered by wildflowers. Sadly, however, this beautiful scenery was lost after the 1980s due to the spread of introduced pasture. The change has been

mainly caused by the reduction of accidental fire by steam locomotive.

Goal Based on experimental burnings, the area has been divided into four sections and each section has been rotationally burnt in every 4 years to restore wildflower grassland.

Results and Challenges The wildflower grassland has recovered considerably. The next challenge is to change the differences of opinions on the goal between scientists and local people.

▼ Artificial burning to wildflower grassland

Restored grassland ▲

3.15 Working on the Conservation and Restoration of the Grassland on Mt. Aso

Background Mt. Aso harbours the largest grassland in Japan. The 23,000-ha grassland has been maintained under the influence of human activities for at least 13,000 years, which has preserved many plants and animals, including Continental Element and Red Data Book (RDB) species. However, a large area of the grassland has been lost in recent years due to the abandonment of burning, mowing and grazing.

Goal Voluntary activities in support of grass burning were initiated in 1997, after which several other activities promoting grassland restoration were introduced. Eventually, the Commission for the Restoration of Aso-Grassland was established in December 2005.

▲ Volunteers for grassland management

▲ Wildflowers in managed grassland

Burning of the grassland ▼

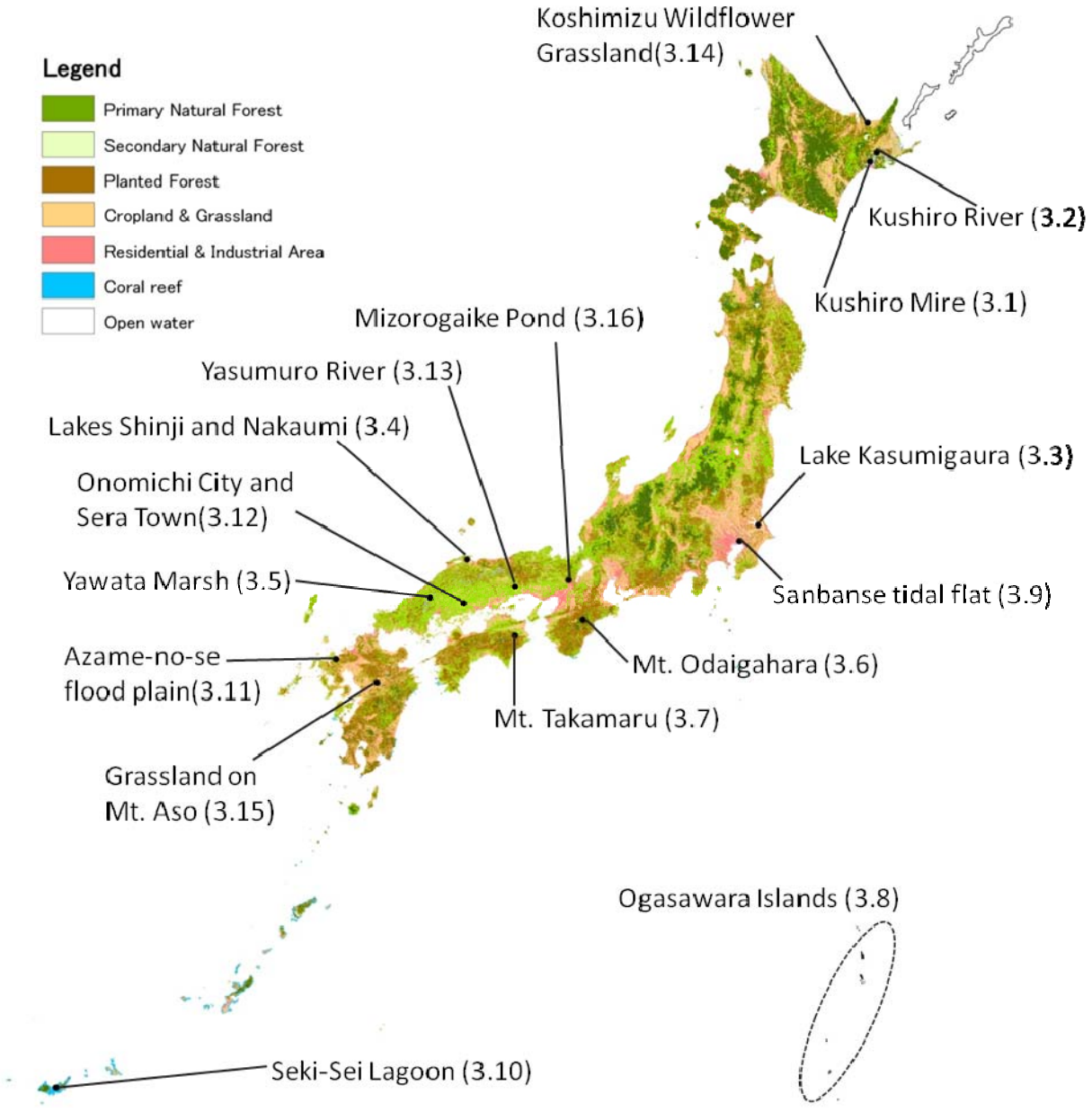
Results and Challenges The Master Plan for the Restoration of Aso-Grassland was drafted in 2007 in co-operation with volunteers from urban areas, local people and administrators. The future challenges of this movement include the adaptation of traditional practices of management such as burning, mowing and grazing into modern methods based on the plan, and the establishment of sustainable management of the grassland.

3.16 Current situation and challenges of the restoration of Mizorogaike Pond

Background Mizorogaike Pond is a hot spot for rare species and has been designated as a natural monument by the national government. However, eutrophication of water has occurred as a result of inflow of wastewater from houses, and the aquatic community has been severely altered by invasive alien fishes, black bass and bluegill.

Goal Beginning in the 1990s, Kyoto City, which governs Mizorogaike Pond, started several projects for its restoration. The goals included stopping eutrophication through management of watershed and biocoenosis of the pond, and preservation of rare species through extermination of alien species.

Results and Challenges Water quality has recovered considerably through improvement of drainage systems in the watershed. Actions for controlling the population of black bass and blue gill have been taken based on a model of population dynamics. Monitoring indicated that blocking reproduction is essential for the complete elimination of these fish species. Thus, reexamining the current plan for extermination is necessary. The next challenge is to recover native fish species such as bitterling. National, prefectural and city governments should collaborate to set up a commission for nature restoration.



MAP OF THE SITES INTRODUCED IN CHAPTER 3

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