

Yasuyuki Kaneko

Japan Fisheries Resource Conservation Association,

Tokyo Suisan Bldg. 6F, 4-18 Toyomi-cho Chuo-Ku, Tokyo 104, Japan.

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Present Status of Eel Research in Japan

Abstract

A county wide eel research project was initiated by the Fisheries Agency of Japan in 1999. The primary objective of this project is to reveal the status of Japanese eels *Anguilla japonica* in freshwater habitats. Biological and environmental data are being collected from more than 15 rivers or lakes in 9 prefectures throughout the year. Two studies focused on: (1) development of stock management systems of glass eels; and (2) establishing eel stocking methods in selected rivers or estuaries. Monitoring of glass eel catch, release-recapture experiments and tracking of adult eel migration were conducted as the first step of these studies.

Key words: Eel research, Japanese eel, Stock management

Commercial eel culture is dependent entirely on the supply of glass eel caught in coastal waters. In recent 30 years, the glass eel catch in Japan showed a drastic decrease (Fig. 1). The development of artificial seed production is progressing to secure stable eel culture production, but it has not been successful yet. Thus, it is an urgent issue to assess, control and protect the eel stocks in freshwater habitats to increase the number of spawners that go back to the sea.

So far, ecological research for eel stock management had been few and sporadic in Japan, while reproductive physiology for artificial maturation and seed production is popular. Thereupon, the Fisheries Agency initiated a project for surveying the present status of the Japanese eel *Anguilla japonica* in freshwater and developing stock management systems for a 5 - year plan that started from 1999. Japan Fisheries Resource Conservation Association (JFRCA) entrusted by the Agency is implementing the project cooperating with the

Ocean Research Institute of The University of Tokyo, Prefectural Fisheries Experimental Stations, and eel culture co-operative associations. To evaluate the output from the project, the examination committee was established with JFRCA that acts as the secretariat to reflect the opinions from various sectors and also, discuss technical problems.

Items of the project

The project consists of three research items as follows:

Eel researches in freshwater

Collect biological and environmental information on young-adult eels and develop the long-term monitoring systems for their stock dynamics.

- Excavation of the old catch statistics
- Analysis of the catch statistics obtained
- Biological studies (e. g., age/ maturity/ species identification)

- Environmental research (e. g., temperature/salinity)

More than 15 rivers or lakes in 9 prefectures

(Fig. 2; A to J) around the Pacific coast are the research fields, which are the major eel producing districts.

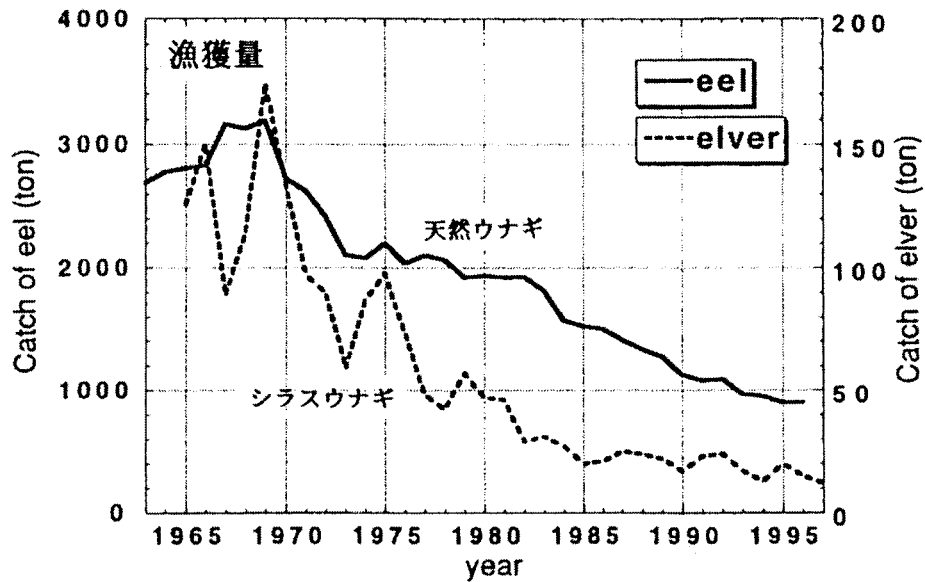


Fig. 1. Eel catch in Japan.

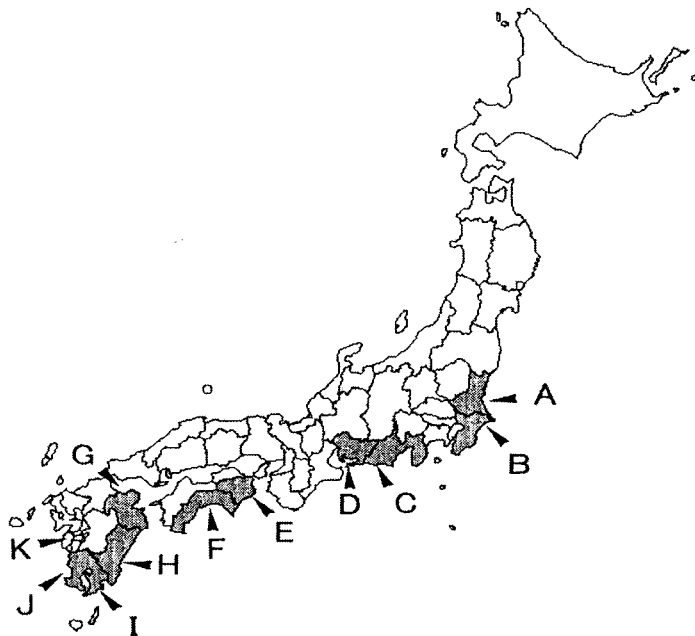


Fig. 2. Research fields. A: Ibaraki B: Chiba, c: Shizuoka, D: Aichi, E: Tokushima, F: Kochi, G: Iota, H: Miyazaki, I & J: Kagoshima, K: Kumamoto.

Stock management systems of glass eels

Development of appropriate management method of glass eel catches to sustain river stocks.

- Monitoring and data analysis of glass eel catches
- Examination of the effect of glass eel catches on wild stocks.

For this project, the catch of glass eels is carried out systematically as planned in Miyazaki Prefecture. (Fig. 2; H)

Development of the eel stocking methods

- Release and recapture experiments of tagged or fin clipped eels (Fig. 2; F, I, K)

- Study on migration route of adult eels using acoustic tracking method at estuaries (Fig. 2; E, J)

Summary of latest results

Statistics of fishing data and of stocking data

The catch statistics of eels are summarized in terms of some main rivers in each prefecture, though fishing methods and fishing efforts are variable depending on the districts. Fig. 3 shows the catch of eels during 44 years in Ibaraki Prefecture (statistics by prefectural government). In this project, detailed catch quantity were obtained from regional freshwater fishery co-operative associations or from fishermen in some research fields.

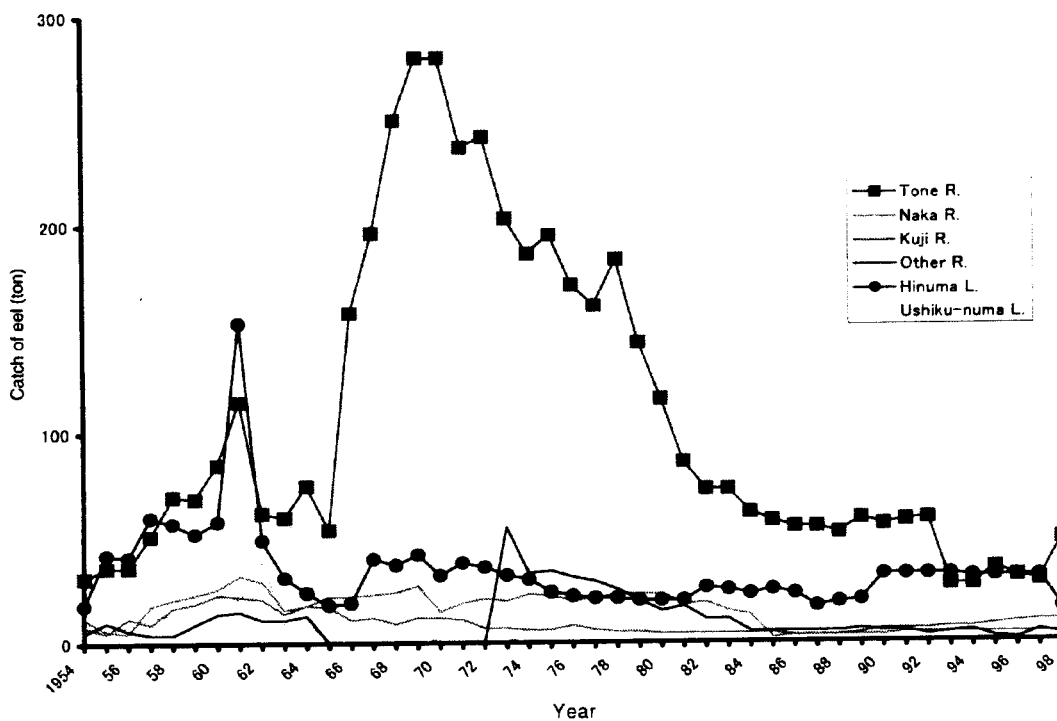


Fig. 3. Catch of eels in Ibaraki Prefecture, 1954-1998.

Stocking has been carried out by freshwater fishery co-operative associations in small scale and by eel culture co-operative associations extensively in several

areas. The purpose of the stocking is to sustain fisheries or to increase parent fish. In general stocking, cultured eels are released. However, the record, such

as size and origin of the individuals hardly remain.

Eel fishing methods

Eel fishery has long history and many regional variations. Sample fish for the project are caught by various fishing methods (Table 1).

Table 1. Eel fishing methods in Japan.

<i>Fishing method</i>	<i>Aiming eels or not</i>	<i>Research field (Fig.1)</i>
Cylinder trap	○	A, B, C, E, G, H, I
Cage trap	△	B, F, G, I
Long line	△	A, D, E, H, I
Eel hook	○	B
Stone shelter	○	F, G
Brush shelter	○	B
Weir	×	D
Set net	×	A, D
Fyke net	○ (glass eels)	B, C, D, H

Cylinder trap (Fig. 4), cage trap and long line are most popular fishing methods. Eel hook fishery is operated in winter (Fig. 5). Other fisheries are operated usually from spring to fall. These fishing methods/gears have some selectivity on fish size. A of low-bias sampling under investigation for method is monitoring freshwater stock.

Biological study and environmental research

More than 50 eels (mainly 300-700 mm B. L.) were obtained from each research field per year. We are measuring and examining their morphological characters, age, growth, maturity, feeding and species. Also, temperature and salinity are measured each sampling point.

Monitoring of glass eel catches

Glass eel fishery in the estuary of Oyodo River and Hitostuse River, Miyazaki Prefecture is operated using 10-15 fyke nets, respectively. The fishery co-operative association controlled and monitored those fisheries during the permission period (from December to March). A total of catch in 1999/2000

was about 380 kg.

In Aichi Prefecture, glass eel fishery is operated using fyke net and hand net (from December to April). The catch at two fyke nets in the estuary of Yahagi River has been monitored since 1994.

Release-recapture experiments and studies on migration route

Fin clipped young eels were released in Monobe River, Kochi Prefecture. Dr. Tatsukawa reports ecological information obtained from some recaptured eels in this symposium.

With cooperation of eel culture co-operative associations, about 1,000 (500 kg) cultured eels with plastic tag were released in Kumamoto Bay and the estuary of Kimotsuki River, Kagoshima Prefecture.

The movements of yellow and silver-phase eels were tracked in the estuary of Fukui River, Tokushima and Sendai River, Kagoshima Prefecture by acoustic telemetry. Dr. Aoyama reports the results of space the study in Tokushima in this symposium.

Many specimens have been gathered continuously from selected rivers/lakes that covered main distribution of Japanese eel during two years and

sampling is still continuing. An accumulation of these data will provide useful cues for monitoring and stock assessment. The ecological experiment results, will also give the concrete suggestion of development of

stock management systems. Eel research network on various sectors such as eel culture/fisheries, researcher and government is indispensable to maintain long-term monitoring and to increase eel resources.

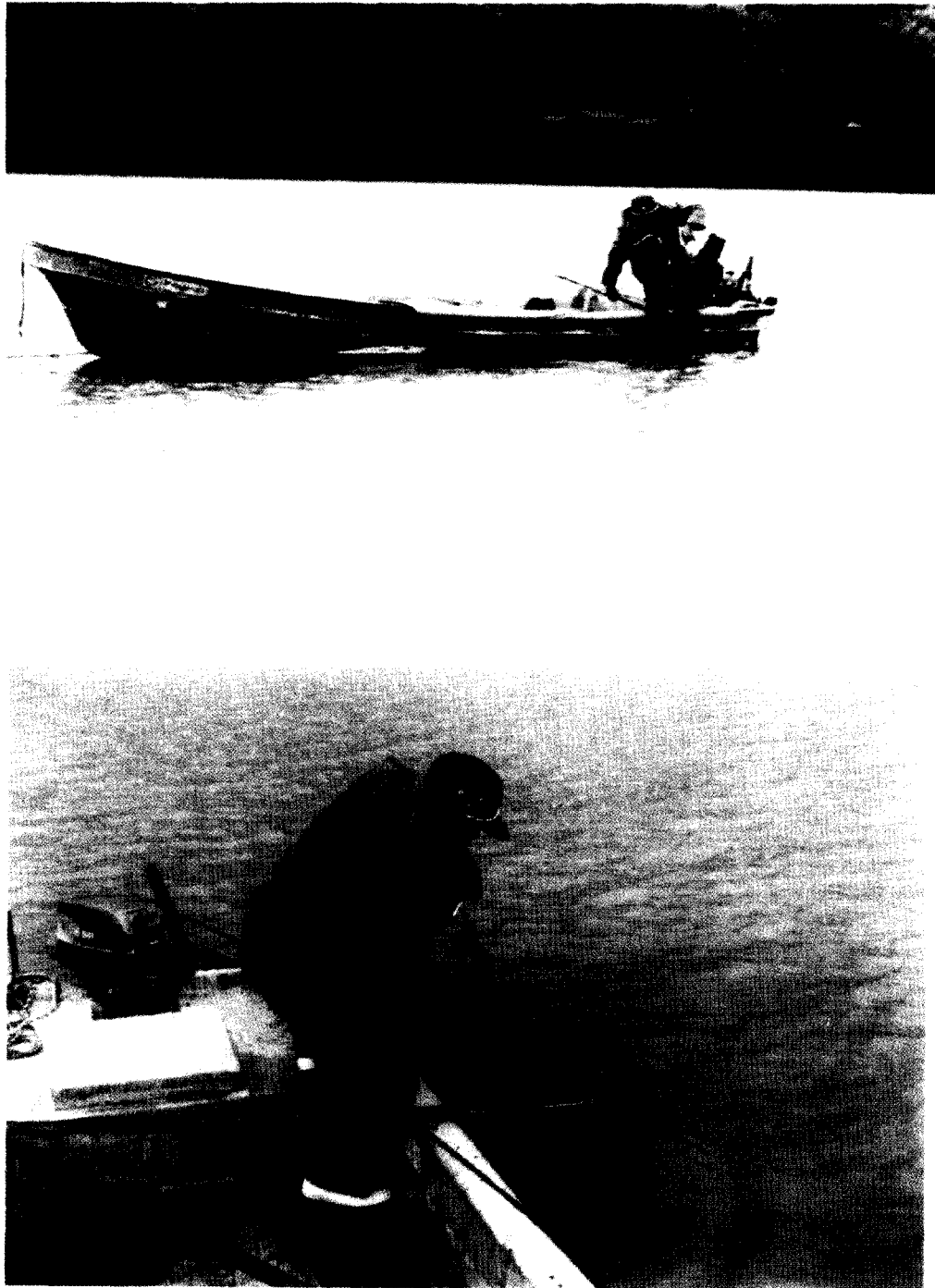


Fig. 4. Cylinder trap fishery in Tokushima Prefecture. 30-50 sets of 3 bamboo cylinders knotted to main line.

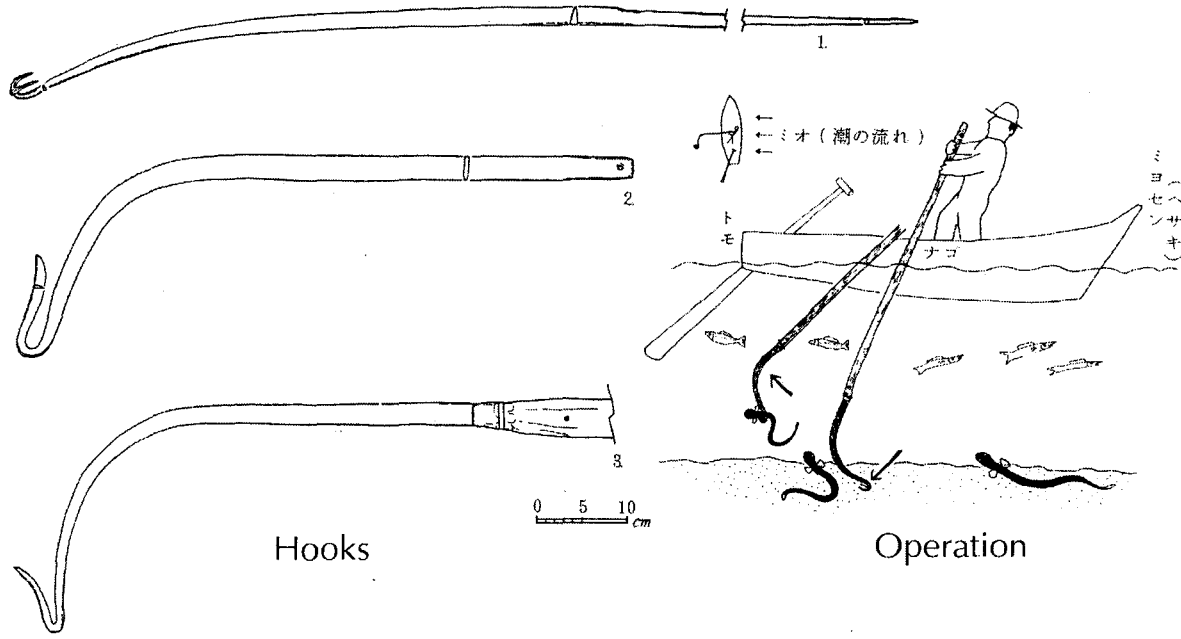


Fig. 5. Eel hook fishery. Wooden handle (about 2 m long) with sharply pointed hook.

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