



Eels in Japan; Habitat status, aquaculture and trade in Japan

November 2017

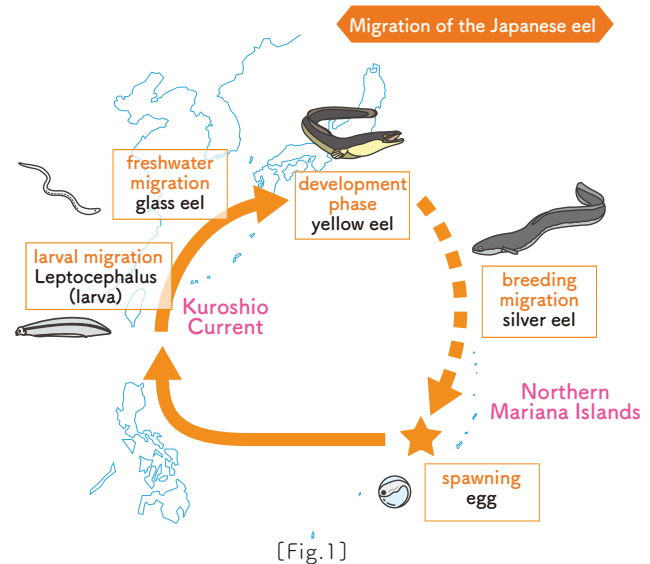
- The Japanese eel (*Anguilla japonica*) is designated an endangered species by both the IUCN and Japan's Environment Ministry (MoE). Though distributed throughout eastern Asia, it is nevertheless genetically a single panmictic population and consequently requires international resource management.
- Continual anthropogenic change is affecting its natural habitat in rivers and coastal waters. Over 70% of viable habitat is reported to have been lost in the past 40 years.
- The trade in glass eels for input to the aquaculture industry in eastern Asia includes IUU (Illegal, Unreported and Unregulated) fishing and the media report that organized crime is involved.
- No major Japanese supermarkets currently source European eels. On the other hand, no major Japanese supermarket has stopped sourcing Japanese eels since they were declared endangered.

Inadequate resource management

About the endangered Japanese eel

The Japanese eel is found throughout eastern Asia; Japan, the People's Republic of China, the Republic of Korea and Chinese Taipei. Like other species of the genus *Anguilla*, the Japanese eel spawns in the open ocean and grows in freshwater and estuaries. The larvae make their way to coastal regions and develop in rivers and estuaries. On maturity they descend the rivers and migrate to their oceanic spawning grounds to breed and die (See Fig.1, Tesch 2003). The entire species is thought to be one panmictic population (Han et al.2010).

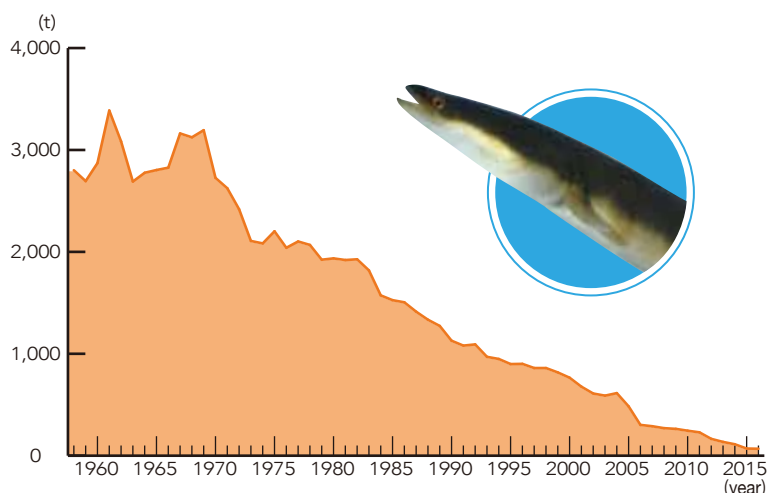
Though distributed throughout eastern Asia, the entire population of Japanese eels breeds in one location and does not belong to any one nation, making it a shared resource of the whole region.



The risk of extinction

The annual catch of the Japanese eel is falling drastically. Ministry of Agriculture, Forestry and Fisheries (MAFF) figures show that the catch of yellow- and silver-phase eels in Japanese waters^[1] fell from around 3000 tonnes in the 1960s to a mere 68 tonnes in 2016 (MAFF 1956-2017)(Fig.2). This change prompted Ministry of the Environment to designate the species Endangered (EN) in February 2013 (MoE 2015). In June 2014, the IUCN too designated the species Endangered (EN) (Jacoby & Gollock 2014). Like many other species, the causes of decline are complex. The following three are considered the most significant.

(1) Oceanographic changes: Larvae of the Japanese eel hatch around the Mariana islands and are carried westward by currents to their nursery grounds in east Asia. Variation in currents and other parameters can affect the population (e.g. Kimura 1994).



[Fig.2] Annual eel catch from freshwater (tonnes)

(2) Overfishing: Throughout eastern Asia, eel larvae (glass eels) are intensively captured for use in aquaculture. The cost of artificial incubation and nurture is high, and a commercially viable system has yet to be developed. Consequently, the supply of eels for aquaculture for food depends entirely on the harvesting of wild-born stock (Fig.3).



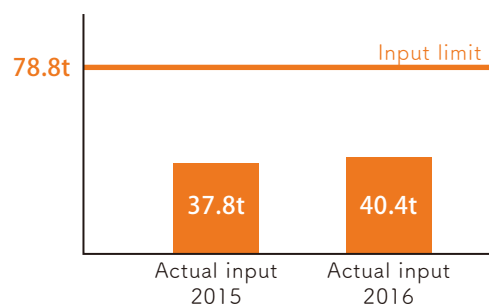
[Fig.3]



(3) Environmental changes in the juvenile growth region: A research team from Chinese Taipei and Hong Kong using satellite photos estimated that in 16 river systems in Japan, China, Korea and Chinese Taipei, 76.8% of viable juvenile growth habitat had been lost between 1970 and 2010 (Chen et al. 2014).

Resource Management

In order to manage eel resources, the four major countries and regions using the Japanese eel (China, Japan, Korea and Chinese Taipei) have adopted quantity restrictions on the input of “eel seeds” into aquaculture ponds. “Eel seeds” refers to the initial input of glass eels and eel fries taken from the wild. Since 2015, these four major countries/territories have specified limits to the total amount of glass eels used, and each country or territory’s quota. Though the limit set for the four countries/territories was 78.8 tonnes, the actual quantity of eel seeds captured in the 2015 season (end of 2014 to 1st half of 2015) was only 37.8 tonnes, and in the 2016 season 40.4 tonnes; respectively 48.0% and 51.3% of the limit (Fig.4). That the limit is far higher than the actual input of eel seeds implies that the resource is not being managed properly^[2].



[Fig.4] The limit set for the four countries/territories and the actual quantity of eel seeds

[1] In Japan, “inland fisheries” carried out on inland waters such as rivers and lakes are treated separately from those carried out at sea.

[2] It is suggested that one of the reasons that the limit on eel seeds is not set properly is that, because of smuggling of glass eels and other undeclared dealings, analysis of the resource is next to impossible. If annual variation in the resource cannot be assessed, it is impossible to set proper limits on use.

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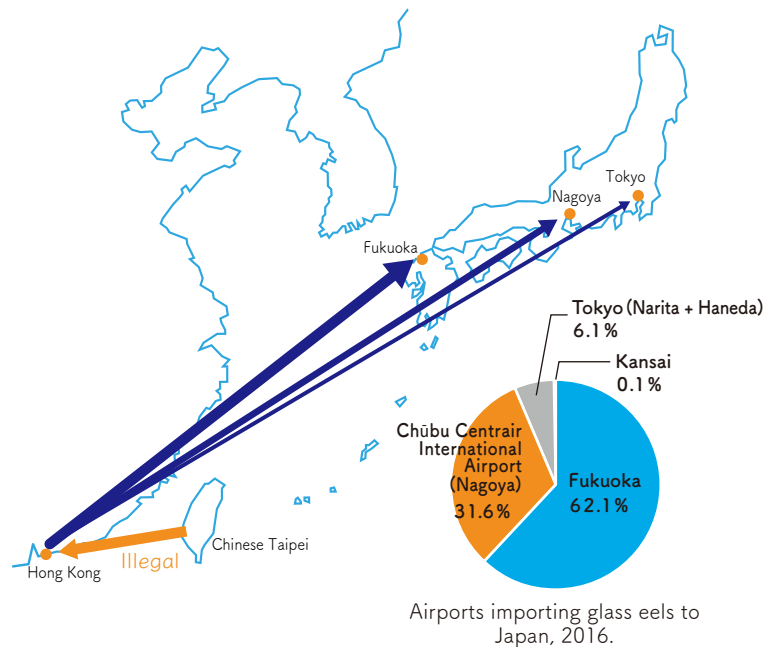
IUU (Illegal, Unreported and Unregulated) fishing and illegal trading

The growth of the Hong Kong trade in glass eels from IUU fishing in Chinese Taipei

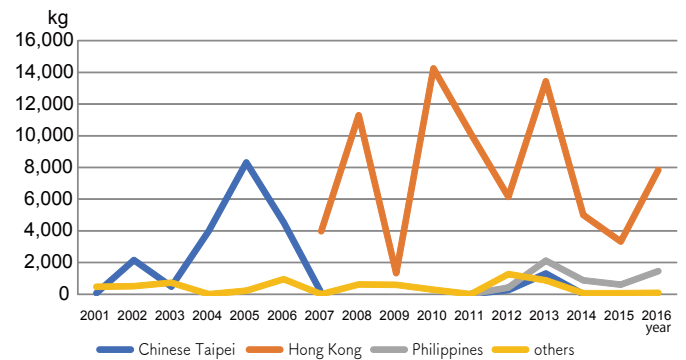
Because techniques to sustain the complete breeding cycle of eels have not been mastered, eel aquaculture requires the input of wild-sourced “glass eels” (eel larvae). However, the domestic catch of glass eels could not keep pace with the demand, so Japan used to import them from Chinese Taipei. However, since 2007, when Chinese Taipei banned the export of glass eels from November to March (the season when glass eels are harvested to become eel seeds in Japan) the recorded quantity imported to Japan from Chinese Taipei has fallen dramatically. Since the legal export of eel seeds to Japan has been blocked, glass eels from Chinese Taipei have, since 2007, been smuggled into Hong Kong and then legally exported from Hong Kong to Japan (Fig. 1, 2). As the leading representative of Japan’s eel aquaculture industry has openly admitted, “imports from Hong Kong of glass eels smuggled from Chinese Taipei are supporting a black market”.

Currently (2016 figures), over 80% of Japan’s glass eel imports come from Hong Kong, which has no glass eel fishery of its own.

Even in the latest research, the eel industry has the highest likelihood, among all Japanese fisheries, of being illegal, unreported or unregulated (IUU). WWF assessed on a scale of 0.0 to 3.0 the risk that seafood imported to the Japanese market may be IUU^[2]. With a score of 2.78 out of a maximum of 3.0, eel scored the highest of Japan’s seafood imports. Unlike the EU, Japan does not have a system for traceability, and as long as it does not require exporting countries to provide certification such as fishery permits, there is no effective way to control the IUU fishing industry.



[Fig. 1]



[Fig. 2] Annual imports of glass eels (kg) (Ministry of Finance)

International gridlock on controls

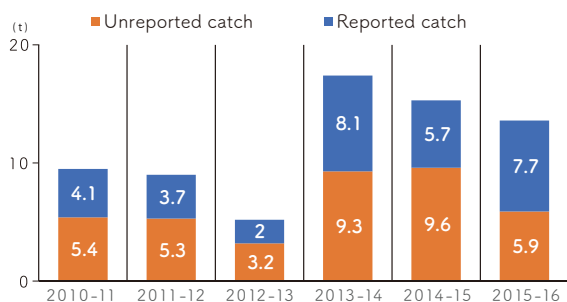
In September 2012, China, Japan, and Chinese Taipei began the “Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species” to discuss preventing the growth of IUU fishing, and at their 7th meeting, in September 2014, released a joint statement announcing that the three countries/territories, as well as Korea, were discussing the possibility of creating a legally binding framework. As a result, further meetings were held in February and June 2015 but no progress at all has been announced by any of the participants regarding the establishment of a legally binding framework. The process of talks between the concerned countries/territories appears to have stalled.

In addition, since China is currently not attending the informal talks, which have been running since 2012, discussions on real controls can make little progress. Moreover, unlike the CITES process, the meetings are not reported on or even open to the press; a total lack of transparency.

On July 19th 2017, Chinese Taipei announced that it will designate the Japanese eel an endangered species^[3]. However, instead of announcing a crackdown on glass eel smuggling, Japan started negotiations to allow imports directly from Chinese Taipei^[4], prompting criticism from experts that this was contradictory to the goal of resource conservation^[5].

Wildlife crime and the domestic trade in eels

According to the Fisheries Agency of Japan, out of a total domestic catch of 15.3 tonnes of glass eels for the 2104-15 season, only 5.7 tonnes was properly documented, leaving an undeclared catch totaling 9.6 tonnes(Fig.3^[6])^[7]. Investigations by Kyodo News revealed that in 2016-17, 5.9 tonnes – 45% of the domestic catch of glass eels – derived either from poachers or from unreported catches^[8]. It has been widely noted that crime syndicates such as the Japanese mafia are involved, so much so that it was claimed, “Without the *yakuza*, they would never fill the eel ponds^[9].” However, the Fisheries Agency adopts the position that overfishing can be prevented with the current controls, and claims that, since all the black market eels eventually end up in the same ponds, the black market and conservation of resources are separate problems^[10].



[Fig.3] Japan's annual catch of glass eels (tonnes)



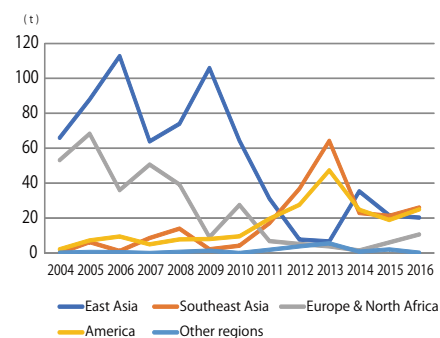
Article from the business magazine Wedge on the connection between eel smuggling and crime syndicates.



[8] Kyodo News investigation as reported by Kumamoto Nichinichi Shimbun. June 15th 2017

Origin of live eel fry after the CITES listing of *A. anguilla*

As Fig.4^[11] shows, the origin of live eel fry imported into East Asia has changed. As exports from the EU ceased after the EU banned all the exports of *A.anguilla* in December 2010, imports from North America, including Canada, the USA and the Dominican Republic (presumably American eel, *A. rostrata*) and from South East Asia, including the Philippines, Indonesia, Vietnam and Malaysia (presumably tropical eels including *A. bicolor*), have increased. However, imports from North Africa and the EU appear to have increased since 2015.



[Fig.4] Annual imports of glass eels as “eel seeds” to China, Hong Kong, Japan, Korea and Chinese Taipei, and their sources. (tonnes)

- [1] Oral statement by Yoshio Shiraishi (president of the Union of Eel Farmers Cooperatives of Japan and of the All Japan Association for Sustainable Eel Aquaculture, Inc.). Reported by Suisan-Keizai Daily News, July 11th 2017.
- [2] WWF Japan, “IUU Fishing Risk in and around Japan: Final Report,” May 2017, https://www.wwf.or.jp/activities/data/20170907_ocean02.pdf
0.0<0.6 No or minimal risk, 0.6<1.2 Very low risk, 1.2<1.8 Low Risk, 1.8<2.4 Medium risk, 2.4≤3 High risk
- [3] Reported by Tokyo Shimbun. July 25th 2017
- [4] Oral statement by Hase Shigeto (then Fisheries Agency of Japan Deputy Director-General, currently Director-General). Reported by Minato Shimbun. June 27th 2017
- [5] Reported by Tokyo Shimbun. July 25th 2017
- [6] 2010–2011 to 2014–2015 seasons: Fisheries Agency「ウナギをめぐる状況と対策について」{=Eels: Current resources and measures for conservation} (in Japanese) July 2017, p15.
2015–16 season: Reported by Kumamoto Nichinichi Shimbun (Kyodo News investigation) June 15th 2017
- [7] Nature Conservation Society of Japan, Chuo University Research Development Initiative Eel Conservation Research Unit「うなぎ未来会議 2016 レポート」{=The report of the 2016 conference on the future of the eel}(in Japanese)p.10
http://c-faculty.chuo-u.ac.jp/blog/eelunit/files/2017/03/UMK2016_0330.pdf
- [8] Reported by Kumamoto Nichinichi Shimbun (Kyodo News investigation). June 15th 2017
- [9] Interview with a person related to illegal fishery. Editorial by Tomohiko Suzuki,「ウナギ密漁: 変わらぬ業界、支える消費者」{= The illegal trade in eels: consumer demand supports a stable market} (in Japanese), Wedge, August 2015,p23.
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- [11] Statistics from the customs agencies of the People’s Republic of China, Hong Kong, Japan, the Republic of Korea and Chinese Taipei. as reported by Hiromi Shiraishi, Vicki Crook (2015) “Eel market dynamics: an analysis of *Anguilla* production, trade and consumption in East Asia TRAFFIC” p14 http://www.traffic.org/fisheries-reports/traffic_pub_fisheries17.pdf

Sales of processed eel in Japan

GREENPEACE

In Japan, eel is usually eaten as *kabayaki*; filleted, skewered, marinated in soy sauce, and other Japanese sauce. and grilled. It is the custom to eat it on a certain day in summer known as *Do-yo-no-ushi*, when it becomes the focus of sales events at supermarkets, convenience stores and even *gyūdon* (beef bowl) restaurant chains.



A supermarket display dominated by eel for *Do-yo-no-ushi*

Greenpeace Japan investigated the sales of processed eel (*kabayaki*) at 14 major supermarkets. Greenpeace then compared the company responses with DNA analysis of the eel products themselves. Four of them gave answers that did not match the DNA tests. Three samples that were reported as European eel, *A. Anguilla*, were actually American eel, *A. rostrata*, while one sample, reported as American eel, was actually European eel. The fact that they were unwittingly selling CITES Appendix II-listed European

eel – which cannot be exported without specific permission– demonstrates the lack of transparency and traceability in the trade. Major supermarkets soon announced that they would no longer source European eel.

supermarket chain or supermarket	DNA survey (2014)			Survey of species sourced (2015)			
	sample ID	company response	DNA test result	European eel	American eel	Japanese eel	bicolor
A	a1	Did not respond	Japanese eel	Declined to participate			
B	b1	Did not respond	European eel	Declined to participate			
	b2	Did not respond	European eel				
C	c1	European eel	American eel	Not sourced	Not sourced	Sourced	Not sourced
D	d1	American eel	European eel	Not sourced	Not sourced	Sourced	Not sourced
E	e1	European eel	American eel	Not sourced	Not sourced	Sourced	Not sourced
F	f1	European eel	American eel	Not sourced	Not sourced	Sourced	Not sourced
	f2	European eel Revised response: Japanese eel	Japanese eel				
G	g1	Japanese eel Revised response: European eel	European eel	Not sourced	Not sourced	Sourced	Not sourced
H	h1	Japanese eel	Japanese eel	Not sourced	Not sourced	Sourced	Sourced
I	i1	Japanese eel	Japanese eel	Not sourced	Not sourced	Sourced	Not sourced
J	j1	Japanese eel	Japanese eel	Not sourced	Sourced	Sourced	Not sourced
	j2	Japanese eel	Japanese eel				
K	k1	European eel	European eel	Not sourced	Sourced	Sourced	Not sourced
L	l1	European eel	European eel	Not sourced	Not sourced	Sourced	Not sourced
M	m1	Japanese eel	Japanese eel	Not sourced	Not sourced	Sourced	Not sourced
N	n1	European eel	European eel	Not sourced	Not sourced	Sourced	Not sourced
O	-	Not tested.		Not sourced	Not sourced	Sourced	Not sourced

The 2015 investigation into eel product found that none of thirteen major supermarkets were selling European eel. However, despite the fact that the Japanese eel was listed IB (Endangered) by the Ministry of the Environment of Japan in 2013, and by the IUCN as Endangered (EN) in 2014, all of the companies were selling Japanese eel.

Further, there is no requirement to label the species used in *kabayaki*. Most product labels showed only the word *unagi* (eel) with no indication of species. Of 48 kinds of *kabayaki* sold at major supermarkets in September 2017, only three included the species name on the label. Moreover, though the regulations on labeling of processed eel products require declaration of the country of origin, there is no requirement to state the origin of the eel used in aquaculture.

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Man-made structures make Japan's rivers hazardous for eels: A citizens' investigation



Domestic research has shown that weirs of more than 40cm make it difficult for eels to migrate upstream (MoE 2017). Though large dams are obviously an obstacle, even a series of small weirs can affect the migration and development of eels. Research in the USA has shown that the removal of dams led to a recovery in the number of eels in rivers (Hitt et al. 2012).

In 2017, a citizens' survey initiated by The Nature Conservation Society of Japan (NACS-J) investigated the status of rivers and estuaries in Japan. With the assistance of the Zoological Society of London and Chuo University, citizens will collaborate in an eel-monitoring program scheduled to start in 2018.



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