# ウナギの保全と地球化学
# Freshwater eel conservation and Geochemistry

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The Japanese eel, *Anguilla japonica*, have continued to decrease since the 1970's and appear to have reached a historically critical situation in recent years. Finally, this commercially important species was listed as endangered in the IUCN Red List of Threatened Species. Serious decline of the Japanese eel population requires feasible countermeasures for conservation and sustainable use.
The Japanese eels have been intensively stocked by the national government and fisheries cooperatives for the purpose of stock enhancement in various areas of Japan. The primary method of this is to release small yellow eels from eel farms into rivers and lakes. This stocking practice has been conducted for more than 100 years without being validated its effectiveness to enhance eel stock, while fish stocking includes several kinds of risks such as disturbances of distribution range, disturbances of genetic structures, and spreading diseases and parasites. A method to discriminate naturally recruited wild eels from stocked ones is undoubtedly important, however, no technics had been developed to our knowledge.
Because Japanese eel is a panmictic fish species consisting of a single spawning population, wild and stocked individuals cannot be discriminated genetically. Geochemistry, however, has opened up a possibility to discriminate eels of different origins recently. Oxygen and carbon stable isotope ratios of otolith (calcium carbonate crystal in the fish inner ear) basically depends on the source of environmental water. According to quadratic discriminant analysis based on otolith oxygen and carbon stable isotope ratios, 98.6% of 420 Japanese eels (106 wild and 314 cultured eels) were successfully discriminated into wild and cultured individuals.
Same as the Japanese eels, 8 of 13 freshwater eel species assessed are categorized as threatened or near threatened in the IUCN Red List of Threatened Species. The discrimination method shown above can be applied on these species such as European eel that intensively stocked under Eel Management Plans. Through otolith stable isotope analysis, geochemistry sheds light upon depletion of freshwater eel populations.

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