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Spatio-temporal evaluation of Japanese eel habitat using eDNA and fresh water quality in Japan

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Abstract

Japanese eel (*Anguilla japonica*) is traditional fishery resource and also significant indicator species of watershed ecosystem health in Japan. The whole life history of the eel is directly affected by watershed, estuaries and coastal sea ecosystem.

Unfortunately, critical decreasing of genius *Anguilla* resource is not only the Japanese domestic issue but also serious international concerns. In recent years, watershed fragmentation by dam, decreasing (destruction) of suitable habitats, and change of water qualities are major concerns about their habitat degradation.

In this study, we estimated spatio-temporal changes of Japanese eel distribution in whole Japan. Then we tried to find out the cause of the decreasing of the eel resource based on statistical analysis and GIS procedures. Additionally, we conducted an ecosystem monitoring by using Environmental DNA (eDNA) analysis to detect the habitat of the Japanese eel.

The objectives of our research are as follows. 1)The construction of a nationwide scale GIS database on long term eel habitat distribution, statistics of fisheries and watershed environmental parameters with freshwater quality. 2) Analysis of the spatio–temporal changes of eel habitat and its relation to the watershed characteristics. 3) GIS mapping to understand the present status of Japanese eel distribution and to visualize ideal candidate sites for the Japanese eel habitat restoration. 4) As the assessment area, we are particularly interested in “The Seto Inland Sea of Japan”. We adapted an ecosystem monitoring approach using the eDNA analysis in this area.

Through these four steps, we evaluated the changes of Japanese eel habitats, and detected some remarkable area including habitat loss and degradation. Finally, we discussed the potential of eDNA analysis on Japanese eel habitat monitoring and restoration sites for Japanese eel in an effective and efficient manner.

Keywords

Japanese eel, eDNA, Japan, GIS