Development of a population dynamics model for Dark chub (Candidia temminckii) in a small spring-fed river using habitat suitability

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Understanding the dynamics of biological populations in response to changes in their habitat is important for conducting effective conservation management of ecosystems. Influences of microhabitat conditions and its dynamics are the key factors controlling the dynamics of fish populations. In this study, we used an integrated approach of a population dynamics model and a species distribution model (SDM) based on abiotic environmental variables with high spatiotemporal resolution to simulate dark chub (*Candidia temminckii*) population in a small spring-fed river in Japan. In the population dynamics model, the waterway was divided into multiple meshes, and the growth of individuals in each mesh and their movement between meshes were calculated on a monthly time step to simulate time series changes in both the distribution and the number of individuals in the population. The habitat suitability calculated by an SDM is used as a parameter to represent growth and as a trigger of fish migration. Random Forests (RF) was applied as an SDM tool based on the species distributions and physical habitat data observed once a month for five years, based on which spatiotemporal dynamics of the habitat suitability in each mesh were calculated. The validity of the proposed method was verified by comparing the results of the population dynamics model with field observation data. Further study is needed to examine the applicability of this method as a decision-making tool for environmental management.