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Abstract

In an inner bay ecosystem, benthic macrofauna (macrobenthos) plays such important roles as purifier of the sea water and as food source for higher trophic levels predators. The ecosystem model is an effective method to predict the standing stock of macrobenthos that fluctuated drastically associated with dynamics of hypoxic water in the inner bay. Most of the models to date, however, are involved in some shortcomings. First, categorization of feeding type of macrobenthos in the numerical models does not reflect the hypoxic tolerance of species. Secondly, neither cumulative effects of water temperature nor those of hypoxia are taken into consideration in formulating the mortality rate against hypoxia. In addition, recovery of standing stock of macrobenthos due to recruitment of the young population is not considered. In this study, the feeding type of macrobenthos on the numerical models is redefined according to the hypoxic tolerance of each species. The mathematical expression of mortality rate under the hypoxic condition is also renewed by means of the *improved Oxygen-deficient Sensitivity Index* (*iOSI*), which is calculated from dissolved oxygen (DO) concentration and water temperature. Moreover recruitment is given by the amount of young population estimated from field observation and DO concentration in the bottom water. The standing stock of macrobenthos predicted by the improved ecosystem model accurately reproduced observed value in Mikawa Bay, Jun. to Nov in 2014. In addition, the improved ecosystem model makes it possible to predict changes in the structure of macrobenthic communities that linked to the dynamics of hypoxia. The model is expected to serve as effective and practical tool for various environmental policies and measures.