

Ecosystem Dynamics In Tokyo Bay: focus On High Trophic Level Organisms

Kunio SHIRAKIHARA⁽¹⁾ and Ayaka SAKAMOTO^(1,2)

(1) university of Tokyo, 2778564 Kashiwa, Japan

Telephone: 0471366250 Email: shirak@aori.u-tokyo.ac.jp

(2) Telephone: 0471366256 Email: arsenic-ayaka09a@nenv.k.u-tokyo.ac.jp

Tokyo bay is an enclosed bay, surrounded by Boso Peninsula and Miura Peninsula. During the economic growth following World War II, a large number of people, industries and government offices were concentrated in Tokyo. That brought many problems such as eutrophication, red tide, hypoxia, offensive odor and landscape. From 1993, Ministry of the Environment introduced a new system to control displacement measured by phosphorus and nitrogen to depress eutrophication. As a result water quality has been improved little but, many organisms have been decreased. Ecosystem model is a useful tool to analyze historic dynamics. There are several modeling studies on the ecosystem in Tokyo Bay. Sohma et al. (2008) focuses on oxygen consumption, to estimate estuary's role to depress hypoxia using benthic-pelagic coupled ecosystem model, and considers material flows on lower trophic levels (up to zooplankton). The objectives of this study were to clarify the trophic structure and analyze the biomass changes of organisms with high trophic levels (up to fish) in Tokyo Bay. The trophic model of Tokyo Bay was constructed using Ecopath with EcoSim (EwE) software system of Christensen and Pauly (1992), Christensen et al. (2004). There are many species in Tokyo Bay, which were classified into functional groups (algae, phytoplankton, zooplankton, herbivore benthos, other benthos, polychaete, small demersal fish, small pelagic fish and carnivore fish) according to Shimizu (1993). For each group, the input parameters were biomass in the initial year for simulation, production-biomass ratio, consumption-biomass ratio and the diet composition of all consumers. Biomass data of all groups in 1960 were given from Shimizu (1993). Other data of all groups were obtained from many published documents. The model calculated dynamics of the Tokyo Bay ecosystem from 1960 to 2010. To evaluate environmental factor, the model contains phytoplankton dynamics and mortality by hypoxia for each component. Model results suggest that hypoxia has impacts on not only benthos but also animals eating benthos. And if hypoxia continued at the present levels, ecosystem in Tokyo Bay is becoming poorer?