Title of Research:

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Development of a conceptual model for environmental risk assessment of microplastics and a trial risk assessment in Tokyo Bay

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Summary of Research:

The purpose of this study project is to review the existing domestic and international literature for environmental risk assessment of microplastics (MPs), to develop a conceptual model that concretely shows the risk assessment procedure of MPs, and to conduct a trial risk assessment for Tokyo Bay. In FY2021, a literature review was conducted to highlight the latest trends and parameters for emission estimation, exposure analysis, hazard assessment and risk assessment of MP. In order to conduct a trial risk assessment for Tokyo Bay, we attempted to estimate emissions from major sources, evaluate key parameters in exposure concentration analysis, gather and compile a dataset for the development of species susceptibility distributions (SSD), and calculate effect concentrations based on SSD. In addition, an online survey was conducted to investigate public perceptions of marine plastic litter and MP. In the next fiscal year, while verifying the methods and data that contribute to the environmental risk assessment of MPs studied in the current fiscal year, we will present a conceptual model (framework and approach) for environmental risk assessment and management that takes into account the characteristics of MPs by illustrating a trial risk assessment for Tokyo Bay. Furthermore, based on recent trends, we will update research issues and points in MP risk assessment and management, which are necessary for more realistic risk assessment.

Timeline:

March 2020-

Topics:

JCIA-LRI Annual Workshop “Development of a conceptual model for environmental risk assessment of microplastics and a trial risk assessment in Tokyo Bay”, August 2021 (Online)

Publications:

1. Iwasaki Y., Mano H., Lin BL, Naito W. “Current status and issues of hazard assessments focusing

on the effects of microplastic particles on aquatic organisms" Jpn. J. Environ. Toxicol. 24: 53-61, 2021.

2. Takeshita KM., Iwasaki Y, Sinclair TM, Hayashi TI, Naito W "Developing a species sensitivity distribution for nano- and microplastic particles by using Bayesian hierarchical modeling" SETAC NA 42nd Annual Meeting、Oral Presentation, Nov. 2021 (Virtual Meeting)
3. Takeshita KM., Iwasaki Y, Sinclair TM, Hayashi TI, Naito W "Illustrating a Species Sensitivity Distribution for Nano- and Microplastic Particles Using Bayesian Hierarchical Modeling" Env. Tox. Chem. doi:10.1002/etc.5295, 2022
4. Ono K, Xue M, Naito W, Tsunemi K. "Preliminary source analysis of microplastics entering Tokyo Bay", 56th Annual Meeting of Japanese Society of Water Environment, Poster Presentation, March 2022, (Univ. Toyama, On-line)