TROPHIC ECOLOGY OF SARDINES: *Sardinella lemuru* feeding strategies and vulnerability to marine microplastic pollution in Northern Mindanao.

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ABSTRACT

Sardines are among the important marine resources in the Philippines. This marine resource contributes substantially to the whole economy, provides cheaper dietary protein alternative, and a primary commodity for any relief effort during calamities. In the environment, sardines function efficiently in transferring energy to higher trophic levels. We have effectively implemented closed fishing season to ensure sustainability of sardine fisheries. Such mitigating measure helps in minimizing anthropogenic pressure to sardines particularly during spawning period. Integrative approach to address sustainability of sardines would require a study on nutrition- a critical factor to growth and reproduction of fish population in the open water. Previous study linked sardines to primary producers by correlating remotely sensed chlorophyll a with landed catch data from areas in Northern Zamboanga Peninsula and found a peak to peak correspondence without any statistical inference. A snapshot of dietary composition of *Sardinella lemuru* based on gut content analysis through microscopy and isotope approaches revealed that the sardines primarily fed on copepods and other zooplankton. In Bali, population dynamics of *S. lemuru* was modelled successfully with cannibalism parameter. The assumption was based on the cannibalism behavior of its sibling species: *S. sagax, S. longiceps,* and *S. pilchardus* established by microscopic analysis of gut content. There is no study yet indicating cannibalism in *S. lemuru*. Currently, marine microplastic pollution is an emerging concern in the world's ocean. Planktivorous fishes in the North Pacific Central Gyre were already ingesting microplastics. Moreover, the Philippines is considered as one of the top contributors of microplastic pollution in the world. This paper will provide an evaluation of the natural diet, feeding strategies, and potential threat of microplastic pollution in *S. lemuru*. In particular, the objectives of this study are: to determine the direct trophic link between the remotely sensed phytoplankton pigments and ingested pigments of phytoplankton origin by *S. lemuru* (Chapter 2), to characterize the diet and other feeding strategies such detritivory, lepidophagy, and cannibalism in *S. lemuru* (Chapter 3), and finally to assess the susceptibility of *S. lemuru* to marine microplastic pollution (Chapter 4). To address these objectives, the following methods will be proposed: Application of remotely sensed data to provide insights on the synoptic environmental condition, spectrophotometer to quantify the amount of ingested phytoplankton pigments, and microscopy coupled with DNA mini barcoding to enumerate and identify food particles in adult *S. lemuru* during spawning season of 2014 to 2016. It is hoped that these investigations will provide bases in furthering the management of sardine fisheries by understanding the interaction of sardines vis-à-vis its food resources and environmental condition, improving modeling assumptions by determining its trophic position, and establishing baseline information locally on the emerging microplastic threat in marine food web with implications on human food safety.