MERCURY LEVELS IN HAWAIIAN PREDATORY PELAGIC FISHES AND THEIR PREY AS A FUNCTION OF DEPTH AND ECOLOGY

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ABSTRACT

Mercury is distributed throughout the Earth's physical and biological systems, where through complex biogeochemical cycles it is retained in trace amounts in plants and animals. Inter- and intra-specific variations in mercury levels of predatory pelagic fish have been previously linked to size, age, trophic position, physical and chemical environmental parameters, and location of capture, however, details regarding the nature of mercury bioaccumulation are incomplete. Ingestion of mercury from food has been confirmed as the dominant pathway of mercury uptake in fish, thus recording the integrated feeding behavior of the consumer. Furthermore, biogeochemical studies of mercury in the ocean report that low-oxygen, deeper waters are sites for enhanced mercury methylation, and thus have higher concentrations bioavailable to organisms inhabiting and foraging in these deeper waters. Focusing on differences in ecology and depth of occurrence this study examines total mercury levels in six species of commercially important pelagic fish (*Thunnus obesus*, *T. albacares*, *Katsuwonus pelamis*, *Xiphias gladius*, *Lampris guttatus*, and *Coryphaena hippurus*) and in numerous representatives (fishes, squids, crustaceans) of their lower trophic level prey sampled from waters surrounding Hawaii. Stable carbon and nitrogen isotopes and stomach content analyses are also used to provide further trophodynamic insight. Results from this study indicate that total mercury levels of predatory pelagic fishes and their prey increase with average depth of occurrence in the water column. Stomach content analysis results from this study and others indicate a greater occurrence of higher-mercury containing deeper-water prey organisms in the diets of the deeper-ranging predators, *X. gladius*, *T. obesus*, and *L. guttatus*. Predator and prey isotopic data were also influenced by depth of occurrence, which appears to be an oceanic variable critical to understanding the ecology and associated physiology of pelagic animals. Results warrant future sampling over a larger depth gradient and offer an underutilized trace element technique to study commercially important pelagic ecosystems.