Raman Spectroscopic Detection of Microplastics in Fish Gills Around O'ahu

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Microplastics, degraded from plastic products, have become a pervasive pollutant that severely impacts marine ecosystems and public health. This issue is especially critical in Hawaii, where the ocean is an integral part in the environment and culture of the local community. This study examines the accumulation of microplastics in fish gills, a key pathway for pollution to infiltrate marine ecological networks, posing a direct threat to human and environmental health. Fish samples from various species around O?ahu were collected and analyzed using Raman spectroscopy, a technique that accurately identifies and quantifies microplastics based on their unique vibrational signatures. The results showed that polypropylene and polyethylene were the most prevalent plastics found in fish, highlighting the widespread contamination in local waters. Fish from the northern and eastern regions influenced by the North Pacific Gyre and trade winds had significantly higher microplastic concentrations ($p<0.05$). Additionally, bottom-dwelling species exhibited elevated microplastic levels due to their feeding behaviors and proximity to the ocean floor ($p<0.05$). These findings emphasize the alarming scale of the microplastic problem which extends beyond environmental pollution to pose a serious public health risk, especially for communities in Hawaii who rely on fish as a dietary staple. Identifying these patterns of microplastic infiltration in our environments shows the urgent need for policy changes, improved waste management, and more solutions to reduce pollution. This study provides crucial data to inform conservation efforts and guide local and global actions to protect marine biodiversity and safeguard public health.

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