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CONSERVATION AREAS CAN LOWER MICROPLASTIC EXPOSURE IN MARINE FISHERIES

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ISSUE

Microplastic pollution is an increasing concern for California marine conservation policy and federal fisheries management. California's Marine Life Protection Act established a statewide network of marine protected areas (MPAs) to protect biodiversity, biomass, and fish populations, while NOAA's National Marine Fisheries Service (NMFS) uses biological monitoring and stock assessments to manage important groundfish species such as quillback rockfish. However, relatively little is known about whether the benefits of MPAs extend to reduced exposure to pollutants such as microplastics, particularly within benthic food webs.

We tested whether marine protection status is associated with differences in microplastic accumulation in resident quillback rockfish (*Sebastes maliger*) around the Southeast Farallon Island State Marine Reserve. We also examined whether particles accumulate differently across liver and edible muscle tissue, and whether abundance varies with fish age or size. The research connects microplastic pollution, marine protection, fisheries management, and seafood safety—issues directly relevant to both California resource managers and federal fisheries agencies.

KEY RESEARCH FINDINGS

Microplastic accumulation in rockfish decreased with habitat protection. Fish from outside the reserve contained an average of 13.1 particles per sample, compared with 7.4 particles in fish from inside the reserve – approximately 44% fewer particles in protected fish. This pattern was observed in both liver and muscle tissue. There was no significant relationship between overall particle abundance and fish age or length. Notably, fish inside the reserve were older on average, yet still contained substantially fewer particles.

POLICY IMPLICATIONS

Integrate microplastic monitoring into California MPA evaluations, using resident benthic species such as rockfish as sentinel organisms for local contaminant exposure and comparing protected and adjacent unprotected sites over time.

Expand NOAA/NMFS and California fisheries monitoring beyond stock status to include contaminant exposure, particularly by leveraging biological specimens already collected through groundfish surveys and stock assessments.

Support standardized chemical verification of suspected microplastics, including FTIR or Raman spectroscopy, to strengthen confidence in particle identification and improve comparability across monitoring programs.

Expand microplastic monitoring throughout the water column and into benthic habitats, rather than relying primarily on surface-water sampling, which provides an incomplete understanding of distribution and exposure across marine ecosystems, particularly in the benthos.

Consider microplastic exposure in future MPA planning and evaluation, while expanding this work across additional species, seasons, and California MPAs.

MORE INFORMATION

This policy brief summarizes findings from the thesis “Microparticle presence within Quillback Rockfish (*Sebastes maliger*) of the Fallaron Islands” by Jordan Colby with the University of California, Davis. The full thesis can be found at the following open access link: <https://escholarship.org/uc/item/0sg1c3k4>.

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