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Distribution of contamination above predator-risk guidelines in flatfishes on the southern California shelf in 1998

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ABSTRACT

Most studies of fish contamination in southern California have focused on human healthrisk concerns, health- risks to individual fish, or assessment of changes in contaminant levels over time. These studies have not been able to assess the extent of fish on the southern California shelf with contamination levels of concern because of limited distributions of individual species and/or lack of appropriate contaminant-risk guidelines. By shifting focus to a foraging guild of species with a broader distribution and to predator-risk concerns, such an assessment becomes possible. The objective of this study was to determine the spatial extent of fish on the southern California shelf with contamination levels of potential risk to bird and mammal predators. We used the sanddab guild rather than individual species to get better spatial coverage. Members of this guild have been shown to have similar contaminant uptake with similar contaminant exposure. Sanddab-guild species were collected at 225 sites on the southern California shelf (depth 2-202 m) in summer 1998. Sites were selected from a stratified random sampling design, which provided a basis for assessing spatial extent of variables of concern. Whole fish composites of sanddab-guild species were analyzed for DDTs, PCBs, and chlordane. Levels of contaminants in these composites were compared to predator-risk guidelines of Environment Canada (for DDT, PCB) and the National Academy of Sciences (for chlordane). The spatial extent of contamination was determined for the shelf as a whole and for subpopulations of interest (e.g., wastewater discharge areas, harbors, etc.). DDT in sanddab guild species exceeded the predator-risk guideline (14 µg/kg ww) in 71% of the area on the southern California shelf. PCB exceeded the guideline (0.79 ng TEQ/kg) in 8% (mammals) and 5% (birds) of the area. Chlordane was below the guideline (50 ppb) at all sites sampled. Percent area above the guideline for DDT was highest on the southeastern Channel Islands and mainland ports. Tissue concentrations in fish were correlated with sediment concentrations. Historically deposited sediments are the presumed source of most DDT and PCB contamination on the southern California shelf, as discharge of both were banned three decades ago. Previous studies have shown that contaminant levels in these fishes have decreased more than an order of magnitude during that period, and presumably effects on birds and mammals also decreased during this period. Nevertheless, results of this study suggest that potential risks to upper food-chain predators still exist and should be a focus of future fish contamination assessments of the southern California shelf.

Full Text

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