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PAH exposure and DNA damage in flatfish from southern California bays and harbors, and the Channel Islands

Jeffrey S. Brown and Scott A. Steinert¹

¹Computer Sciences Corporation, San Diego, CA

ABSTRACT

Southern California bays and harbors have been shown to contain high concentrations of a variety of contaminants, including polycyclic aromatic hydrocarbons (PAHs), metals, and pesticides. Conventional monitoring tools do not assess exposure to PAHs in fish, or sublethal effects, which can be more sensitive indicators of stress than traditional methods. This study was conducted to evaluate PAH exposure and DNA damage (a sublethal effect) in flatfish from southern California bays and harbors, and the Channel Islands. California halibut (*Paralichthys californicus*) were collected from eight bays and harbors (Ventura Harbor, Channel Islands Harbor, Marina del Rey, King Harbor, Alamitos Bay, Long Beach Harbor, Newport Bay, San Diego Bay), and a reference site off Camp Pendleton. Pacific sanddab (*Citharichthys sordidus*) were collected near four of the Channel Islands (San Miguel Isle, Santa Cruz Isle, Anacapa Isle, Santa Barbara Isle). PAH metabolites in fish bile were characterized using a semi-quantitative technique that measures fluorescent aromatic compounds (FACs) in fish bile. DNA damage in fish blood cells was assessed by measuring the amount of single-strand breaks in stained DNA using the Comet assay. Among the bays and harbors, average FAC concentrations varied by a factor of three. The concentration of FACs in fish from all bays and harbors was elevated, with average concentrations ranging from three to ten times greater than FACs in reference fish. PAH exposure was elevated in Pacific sanddabs from a Channel Islands station located between Santa Cruz Isle and Anacapa Isle. DNA damage varied by a factor of five among California halibut from bays and harbors, with significant damage occurring in fish from Alamitos Bay. There was a significant association between FAC concentrations and DNA damage in California halibut at Marina del Rey and Ventura Harbor, but not at other locations. While DNA damage and PAH exposure were elevated in fish from bays and harbors, these indicators were not significantly related to sediment contaminant concentrations.

Full Text

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