

impaired in fish from this contaminated region.

White croaker were collected from outer Los Angeles Harbor, a contaminated area in San Pedro Bay, and from Dana Point, a reference site 80 km southeast of San Pedro Bay. After the fish were collected, they were taken to the laboratory, where the females were induced to spawn with the

that they were maturing and spawning would occur soon. However, the non-spawning fish from San Pedro Bay had only yolky oocytes and remained unresponsive to the hormone injections.

Table 1 shows that white croaker from San Pedro Bay had higher concentrations of chlorinated hydrocarbons in their livers and gonads than the fish from Dana Point did. The San Pedro fish also produced fewer eggs and had lower fertilization rates.

At the beginning of the reproductive season, numbers of early oocytes were compared among females to account for potential differences in the timing of oocyte maturation at the two locations. Fish from San Pedro Bay produced fewer oocytes and had a greater number of these cells degenerating than the fish from Dana Point did (Table 1).

Concentrations of polychlorinated biphenyls (PCBs) were not significantly different between spawning fish from San Pedro Bay and the general population in that area. DDT concentrations in the ovaries of spawning fish from San Pedro Bay averaged 2.1 ppm (mg/kg wet weight), which was significantly less than the ovarian DDT concentrations (4.2 ppm) of fish from the general population in that area. None of the spawning fish from San Pedro Bay had ovarian DDT levels greater than 3.8 ppm, but in the general

hormone human chorionic gonadotropin. The resulting eggs were fertilized with sperm that was pooled from at least three males from the same locations as the females.

Statistical analysis showed that there was not a significant difference in the proportion of spawning females between the two locations. The ovaries from non-spawning fish were examined under a microscope, and the scientists found that non-spawning fish from Dana Point had hydrated oocytes, which indicates



Impaired Reproduction in White Croaker off Southern California

The coastal waters off Los Angeles have received thousands of tons of domestic and industrial contaminants during the past 40 years. Exposure to these contaminants has been implicated in a decrease in catches of several species of sport and commercial fish. In this study, Jeffrey N. Cross of SCCWRP and Jo Ellen Hose of Occidental College examined white croaker (*Genyonemus lineatus*), an important sport and commercial fish inhabiting the coastal waters off Los Angeles, to determine if reproduction was

Table 1. Contaminant body burdens and reproductive success of female white croakers collected during December and January (1985-86) and spawned between January and March (1986). Data are mean \pm standard deviation (sample size).

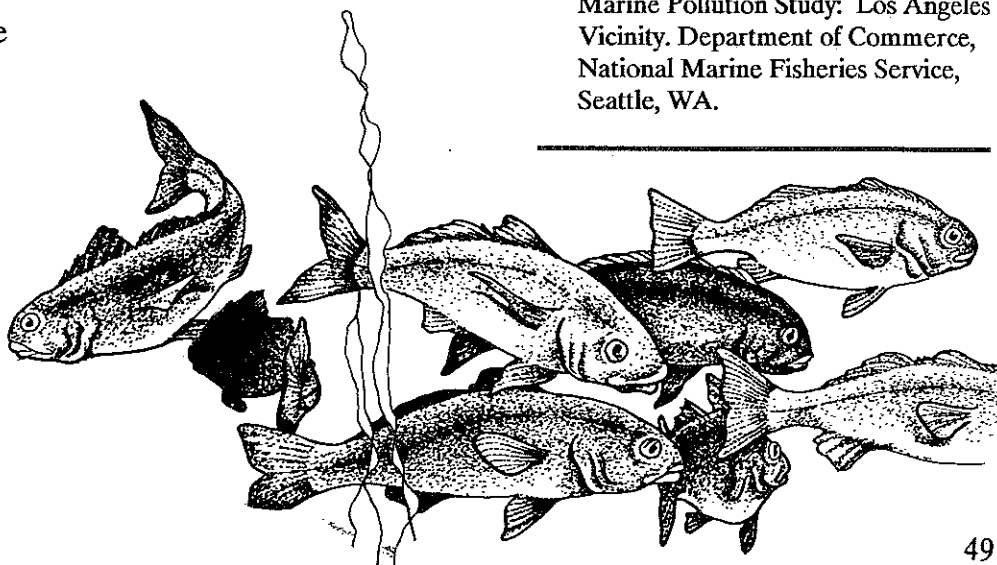
Measurement	San Pedro Bay	Dana Point
Body burdens^a		
DDT - Liver (mg/kg wet)	1.52 \pm 0.77 (19)	0.17 \pm 0.07 (8)
DDT - Ovary (mg/kg wet)	2.10 \pm 0.85 (19)	0.31 \pm 0.18 (8)
PCB - Liver (mg/kg wet)	1.35 \pm 1.34 (19)	0.03 \pm 0.06 (8)
PCB - Ovary (mg/kg wet)	1.67 \pm 1.02 (19)	0.16 \pm 0.08 (8)
Reproductive success		
No. eggs spawned/female	67400 \pm 62800 (21)	104500 \pm 32000 (9)
%Fertilization	80 \pm 16 (21)	93 \pm 3 (6)
No. early oocytes/field	1.5 \pm 0.6 (6)	2.7 \pm 0.8 (6)
%Degenerated	15.0 \pm 8.8 (6)	2.1 \pm 2.4 (6)

^aAbbreviations: DDT, total DDT (sum of DDD, DDE, and DDT); PCB, total PCB (sum of Aroclors 1242 and 1254).

population 38% of the fish had DDT levels greater than 3.8 ppm. Apparently, white croaker with ovarian DDT levels greater than 4 ppm do not spawn. In salmonid hatchery studies, Burdick and co-workers (1964, 1972) found there was a 3-ppm threshold for spawning. Although DDT concentrations are correlated with reproductive impairment, they are probably not the only cause of the effects found in this study. It has previously been found (Malins et al. 1986) that other contaminants (polynuclear aromatic hydrocarbons and trace metals) occur at high concentrations in sediments and fish from San Pedro Bay.

This study by Cross and Hose shows that white croaker inhabiting contaminated areas near Los Angeles have higher chlorinated hydrocarbon body burdens, greater early oocyte destruction and preovulatory

degeneration, lower fertilization rates, and decreased egg production than do fish from the reference location. The mechanisms for reproductive impairment similar to that found in this study are not completely understood but may include a change in essential hormone levels, toxicity to developing gametes or nutritive cells, and generalized stress responses.



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