

DECREASES OF DDT AND PCB IN MUSSELS

Numerous studies by this Project and other researchers have documented the extent of marine contamination by DDT wastes off southern California. In our 1971 summer survey of this pesticide in intertidal mussels (*Mytilus californianus*), the influence of the JWPCP point discharge off Palos Verdes Peninsula was clearly detectable above baseline concentrations for over 100 km in most directions. A maximum concentration of 4,200 ug/wet kg (ppb) total DDT was found at Point Vicente on the Peninsula, a few kilometers from this discharge. In comparison, the median concentration at six island control stations in the Bight was only 70 ppb; these baseline concentrations probably also reflect other DDT inputs, such as those from aerial fallout and surface run-off. Between 1971 and 1974, the JWPCP input of DDT compounds decreased by approximately 90 percent. Thus, in summer 1974, we resurveyed the mussels—primarily to see if this decrease was reflected in their tissue concentrations of the pesticide.

In both the 1971 and 1974 surveys, analyses of chlorinated hydrocarbons in the whole soft tissues of the mussels were conducted by Brock de Lappe and Robert Risebrough at Bodega Marine Laboratory, utilizing electron-capture gas chromatography. Figures 1 and 2 illustrate the results for total DDT (the sum of p,p'-DDT, p,p'-DDE, and p,p'-DDD) and 1254 PCB, respectively. Although greatly reduced, the influence of the JWPCP discharge upon the DDT distribution in mussels was still clearly evident in 1974; concentrations in the Palos Verdes specimens were 100 times higher than baseline values at the edges of the Bight. Levels of 1254 PCB contamination in the Peninsula samples were an order of magnitude below those for DDT residues there, but concentrations of this polychlorinated biphenyl were still approximately 10 times greater than the estimated baseline (elevated levels of PCB were also found off Port Hueneme and San Diego). Last year we reported that bay mussels from certain stations within San Pedro, Newport, and San Diego Harbors contained 5 to 20 times as much 1254 PCB as did specimens from just outside these harbors. Thus, the distribution shown in Figure 2 may well reflect PCB contamination from vessel-related activities along the coast.

Table 1 compares 1974 and 1971 concentrations at stations sampled in both surveys. These data show that the degree of contamination by both types of chlorinated hydrocarbons decreased significantly in the 3-year interval. For total DDT, the median 1974-to-1971 ratio for the Bight was 0.16, corresponding to an 84 percent decrease from the 1971 level. Concentrations in both Point Vicente and San Nicolas Island mussels decreased by this amount; the former station had the highest 1971 concentration, and the latter station was typical of the island control values. Thus, it appears that DDT levels in intertidal zones of the Bight typically fell to about one-sixth of what they were in 1971.

Smaller decreases were observed in the case of 1254 PCB; the median for the Bight was 69 percent, meaning that the general level of contamination had fallen to about one-third the 1971 value. Thus, the rate of decrease of this synthetic organic in intertidal zones of the Bight has been about one-half that seen for the DDT residues. This observation is consistent with the fact that the dominant discharge of DDT has been largely controlled, whereas there are still several important inputs of PCB to the coastal ecosystem that have not undergone such large reductions since 1971.

Thus, the intertidal mussel appears to have rather accurately reflected decreases in the input of total DDT to the coastal ecosystem. These studies have further demonstrated the mussel's usefulness as an indicator organism for chlorinated hydrocarbon contamination of nearshore waters. The study results also indicate that local annual inputs and biological concentrations of PCB are decreasing less rapidly than are those for DDT.

Table 1. Percent decrease of chlorinated hydrocarbon concentrations between 1971 and 1974 in whole soft tissues of intertidal mussels (*Mytilus californianus*) collected from the southern California Bight

Station	Total DDT	1254 PCB
Coastal		
Gaviota	94	79
Santa Barbara	22	25
Port Hueneme	85	69
Point Dume	70	55
Palos Verdes Peninsula		
Point Vicente	84	73
Royal Palm	68	73
San Clemente	79	68
Point Loma	90	54
Island		
Anacapa	66	29
Santa Barbara	95	89
Santa Catalina	89	98
San Nicolas	84	72
San Clemente	76	0
Median Decrease	84	69

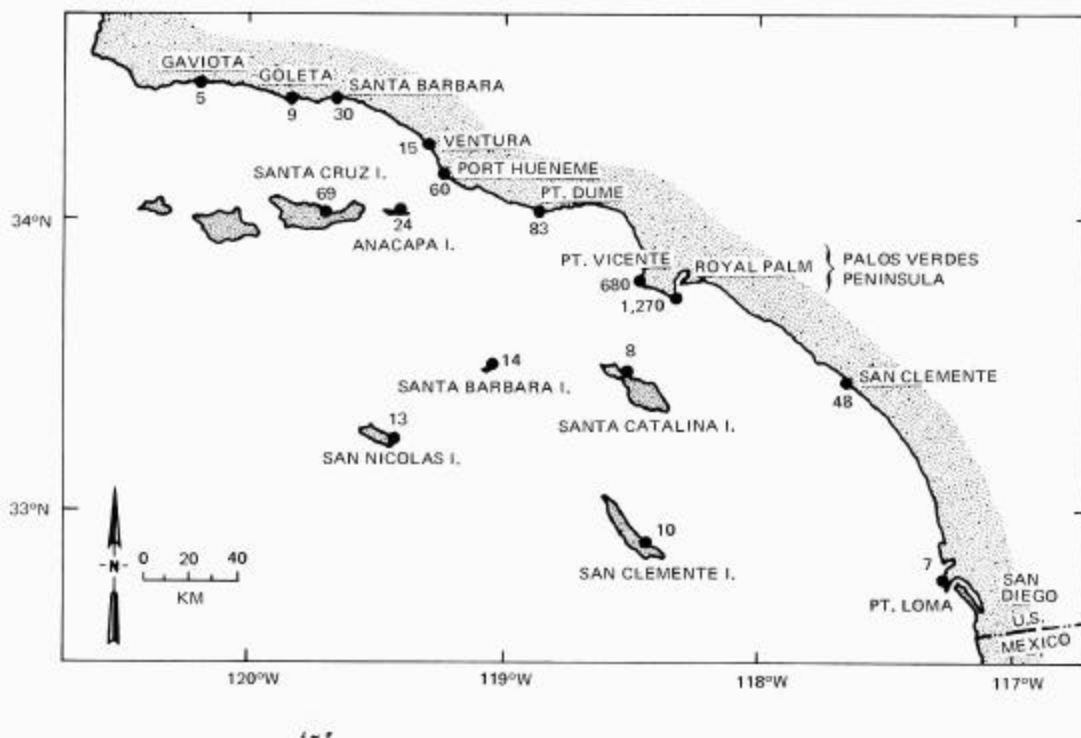


Figure 1. Concentrations of total DDT (ppb, wet weight) in whole soft tissues of the intertidal mussel, *Mytilus californianus*, collected during summer, 1974.

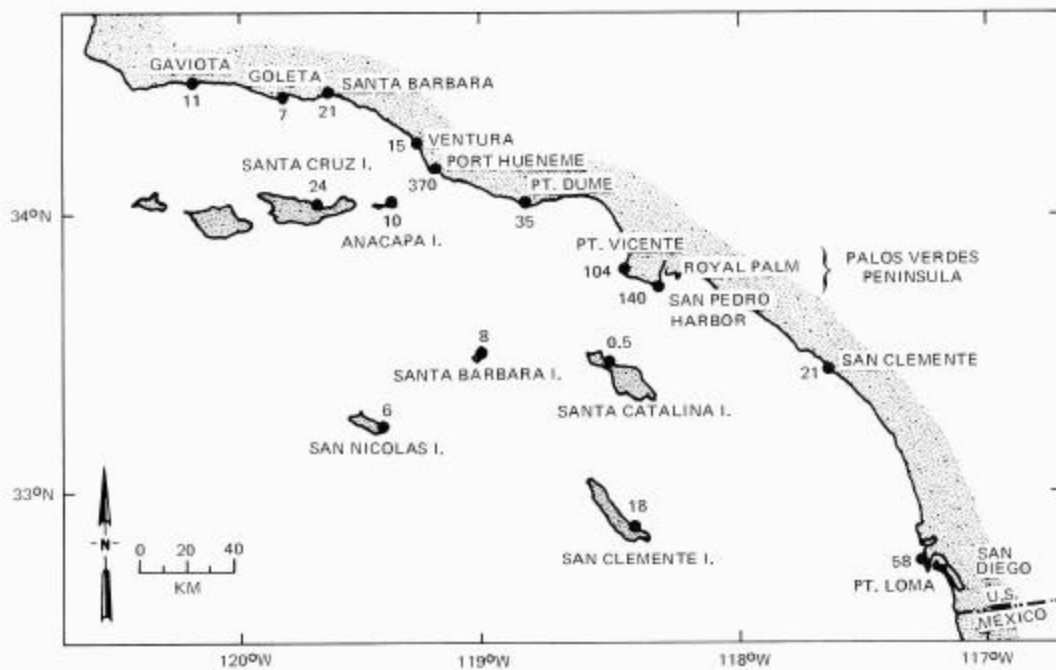


Figure 2. Concentrations of PCB 1254 (ppb wet weight) in whole soft tissues of intertidal mussels collected during summer of 1974.