NTIS PB-283090/AS

POLYCHLORINATED BIPHENYLS IN THE NEARSHORE MARINE ECOSYSTEM OFF SAN DIEGO, CALIFORNIA

David R. Young and Theadore C. Heesen
Principal Investigators
Southern California Coastal Water Research Project
1500 East Imperial Hwy.
El Segundo, CA 90245

Final Report for
San Diego Regional Water Quality Control Board
(Agreement No. W6-099-19)

1 September, 1977

SUMMARY

One-week composites of municipal wastewater effluent collected from San Diego's Point Loma (Primary) Treatment Plant in December 1976 and July 1977 contained 2.7 and 0.7 ppb (ug/l) total PCB, respectively. This compares to a value of 7.2 ppb obtained during 1974. Effluent from two smaller plants in less urbanized northern San Diego County contained 0.4 ppb and 0.02 ppb total PCB. Estimated 1977 PCB emissions for the three coastal discharges were 270, 2, and < 1 kg/yr, respectively.

The median concentration of total PCB in surficial sediments from the Point Loma discharge zone was 0.022 ppm (mg/dry kg), compared to 0.008 ppm for the control stations. Corresponding values for muscle tissue of Cancer crabs were 0.06 ppm vs. 0.04 ppm; for muscle tissue of bottom-feeding fishes, 0.13 ppm vs. 0.03 ppm. These spring 1977 values were considerably lower than those for corresponding samples collected earlier around the three major municipal outfalls in Los Angeles and Orange County. The median PCB level measured in soft tissues of intertidal mussels from San Diego Harbor (0.22 ppm) was ten times that for coastal specimens (0.02 ppm). Vessel-related activities are the suspected cause of this contamination, which has decreased several-fold since 1974.

INTRODUCTION

Polychlorinated biphenyls (PCB) are an industrially-important class of chlorinated hydrocarbons (MacArthur and Nagy, 1976; Rollins, 1976) known to be toxic to a wide variety of terrestrial and marine organisms (Dahlgren et al., 1972; Kuratsune et al., 1972; Vos, 1972; EPA, 1975; Allen et al., 1976; Kimbrough, 1976; Laughlin et al., 1977). Studies conducted since the early 1970's (Schmidt et al., 1971; Munson, 1972; SCCWRP, 1973; Young and Heesen, 1974; Hom et al.,1974; Young et al., 1975a; Young et al., 1975b; Young et al., 1976a; McDermott et al., 1976; Young et al., 1977) have shown that these synthetic organic mixtures are widely distributed throughout the Southern California Bight (Figure 1). Two of the major routes of entry apparently have been the submarine discharge of municipal wastewater and the loss of vessel-related materials such as antifouling paints and hydraulic fluids (Young et al., 1974; Young and Heesen, in press). Here we report the results of an investigation into the degree of PCB contamination in 1977 off San Diego, the second largest city in California.

PROCEDURES

Five classes of samples were included in this study. Using cleaned metal and glass containers, replicate one-week composites (4-liters) of influent and effluent were obtained from the (PLTP) Point Loma Treatment Plant (Dec. 15-21,1976), the La Salina

Treatment Plant (Jan. 26 - Feb. 1, 1977), and the San Luis Rey Treatment Plant (Jan. 26 - Feb. 1, 1977), whose locations are shown in Figure 1. PLTP effluent was resampled July 25-31, 1977. Ocean bottom sediments were collected at 17 stations around the PLTP outfall during January 1977 using a Van Veen grab sampler (Figure 2); the sediment was frozen in cleaned, foil-capped glass jars until analyzed.

Intertidal bay mussels (Mytilus edulis) were collected April 4-7, 1977 from 6 stations in San Diego Harbor, and the coastal species (Mytilus californianus) was sampled at two stations inshore of the PLTP outfall (Figure 2). During June and July 1977,16 specimens of the market crab (Cancer spp.) were trapped in the PLTP discharge zone, and 11 fish (mostly rockfish, Sebastes spp.) were collected there during the same period. The biological samples were wrapped in aluminum foil and frozen until dissected. For analysis, the whole soft tissue of five mussels (generally 4 - 6 cm in length) from each station were composited, while muscle tissue was cleanly excised from individual crabs and fish. These samples were extracted in pesticide-grade organic solvent, cleaned of interfering compounds on a Florosil column concentrated, and analyzed by electron-capture gas chromatography. Procedural details are described elsewhere (Young et al., 1975b; Young et al., 1976b). Blank and recovery corrections were secondary, and intercalibration exchanges of wastewater, sediment, and tissue samples with other laboratories have generally demonstrated agreement within about 20 percent. (SCCWRP, 1973; Young et al., 1975b; Pavlou and Hom, 1976; Young et al., 1976b).

RESULTS AND DISCUSSION

The polychlorinated biphenyl profiles obtained in this survey,"PCB 1242" and"PCB 1254", most closely resembled those of the standard PCB mixtures Aroclor 1242 and Aroclor 1254 (42 percent and 54 percent chlorination, respectively); these standards were used for quantification. The only other chlorinated hydrocarbons generally detected were the DDT residues, which have been summed to provide "total DDT" values. Our PCB and DDT results are presented in Tables 1-5.

The data presented in Table 1 indicate considerable differences between the levels of total PCB in the municipal wastewater effluents discharged during 1977 from the three treatment plants studied in San Diego County. Mean values for the first and second PLTP composites were 2.7 ± 1.3 and 0.7 ± 0.2 ppb (ug/l), respectively. The average concentration of total PCB for this period (1.7 ppb) was an order of magnitude above that for total DDT (0.14 ppb), and levels of these contaminants in PLTP influent and effluent did not appear to be significantly different. PCB values for the La Salina (0.4 ppb) and San Luis Rey (0.02 ppb) treatment plant effluents were considerably lower than those for the PLTP effluent. This is consistent with the high level of industrialization found in the vicinity of San Diego City served by PLTP, compared to the more rural nature of the regions served by the other two treatment plants.

Combination of the average value for total PCB in the PLTP effluent during the study period (1.7 ppb) with the estimated

discharge rate (160 x 10^9 liter/year for 1976) yields an approximate mass emission rate of 270 kg/year. Corresponding estimates for the relatively minor discharges from the La Salina and San Luis Rey plants (5 x 10^9 and 4 x 10^9 liters/year, respectively) are 2 and <1 kg/yr. In contrast, the 1976 emission rates of total PCB for the Los Angeles City 5-mile, Los Angeles 7-mile (sludge), Los Angeles County, and Orange County outfall systems (the other major municipal discharges to the Bight) were 110, 120, 1320, and 990 kg/yr, respectively (Young and Heesen, in press).

Comparison of the PLTP results with those of our earlier studies indicates that emissions of polychlorinated biphenyls via this source have decreased significantly in recent years. For example, the average concentration of total PCB which we measured in 1974 PLTP composite samples was 7.2 $\pm$ 2.4 ppb, compared to the value of 0.7 $\pm$ 0.2 ppb obtained for the July 1977 composite. We have observed similar decreases in other municipal wastewater discharged off southern California (Young and Heesen, in press). This appears to reflect the industry-imposed restriction of PCB to "closed"systems in 1971 (Durfee, 1976).

The concentrations of chlorinated hydrocarbons measured in surficial sediments from the PLTP discharge zone (Table 2) show low although somewhat enhanced levels of total PCB relative to controls. The median value for the thirteen "A" stations located within 3 km of the diffuser was 0.022 ppm (mg/dry kg); the range was 0.013 - 0.038 ppm. The corresponding median and range values for the four "B" (control) stations were 0.008 (0.000 - 0.010) ppm.

(Total DDT values in these zones generally did not exceed 0.001 ppm). In comparison, the medians and ranges we have measured (unpublished data) for total PCB in surficial sediments from the Los Angeles City "7-mile" discharge zone (30 sq km; n=35), Los Angeles County discharge zone (40 sq km; n = 40), and Orange County discharge zone (35 sq km; n = 25) in 1975-76 were 0.73 (0.11 - 5.1), 1.1 (0.27 - 13), and 0.12 (0.04 - 0.30) ppm, respectively.

The median concentrations of total PCB measured in muscle tissue of nine Cancer crabs collected from stations A-15 and A-16 (located at the end of the PLTP outfall diffuser) was 0.06 ppm (mg/wet kg), and the range was 0.04 - 0.19 ppm. (The median total DDT value was 0.008 ppm). Corresponding PCB values for the five control (B-1, B-3) specimens were 0.04 (0.02 - 0.18) ppm (Table 3). In comparison, the values for five Cancer crabs collected during 1976 from the Los Angeles County discharge zone were 0.23 (0.12 - 0.98) ppm, respectively (unpublished data).

As seen from the data listed in Table 4, the median level of total PCB measured in muscle tissue of the eight fish specimens from the PLTP discharge zone was 0.13 ppm, and the range was 0.01 - 1.08 ppm. Corresponding values for the three control specimens were 0.05 (0.01 - 0.22) ppm. The median level of total DDT found in the discharge zone specimens was 0.03 ppm. These values (and also those for the crabs) are well below the U.S. Food and Drug Administration guidelines of 5 ppm total DDT and 2 ppm* total PCB in seefood intended for interstate commerce.

* Proposed guideline (Federal Register, 1977).

In comparison, the median and range of total PCB average values obtained for ten fish species collected during 1975-77 in the Los Angeles County discharge zone was 0.52 (0.30 - 2.8) ppm (unpublished data). The highest single muscle tissue PCB concentration measured there was 29 ppm observed in a kelp bass specimen.

Table 5 lists the average PCB and DDT concentrations measured in the Mytilus specimens collected during 1977 inshore of the PLTP outfall and within San Diego Harbor. The total PCB values also are illustrated in Figure 3. In addition, this figure illustrates corresponding data for the bioindicator collected three years earlier from the same general area. These data suggests that there has been a distinct decrease in the level of PCB contamination of San Diego Harbor and the Point Loma coastline since January 1974. However, levels in the Harbor specimens collected in April 1977 were still an order of magnitude above those measured inshore of the coastal outfall. The highest values occurred near the vessel repair yards in the commercial basin, supporting our hypothesis that vessels have been a significant source of nearshore PCB contamination in the Southern California Bight (Young et al., 1974; Young and Heesen, 1974; Young et al., 1975a).

ACKNOWLEDGEMENTS

The wastewater and biological samples analyzed and reported here were obtained under the direction of P. Michael of the San Diego Regional Water Quality Control Board; we also acknowledge

the assistance of Dr. A. Yang and L. DeLaney of the Board in this study. Sediment samples were provided by W. Conn and his staff at the Point Loma Treatment Plant. R. Gossett, P. Hershelman, and M. Moore of this Project contributed to the processing and analysis of samples and data. Measurements were conducted using equipment provided by the U.S. Environmental Protection Agency (Grant R803707); we thank Dr. D. Baumgartner for useful advice. Contribution Number 109 of the Southern California Coastal Water Research Project.

REFERENCES

Allen, J.R. and D.H. Norback (1976). Pathobiological Responses of Primates to Polychlorinated Biphenyl Exposure. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975. Chicago, IL., pp. 43-49. EPA Report 560/6-75-004.

Dahlgren, R.B., R.L. Linder, and C.W. Carlson (1972). Polychlorinated Biphenyls: Their Effect on Penned Pheasants. Environmental Health Perspectives 1:89-101.

Durfee, R.L. (1976). Production and Usage of PCBs in the United States. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975. Chicago, IL., pp. 103-107. EPA Report 560/6-75-004.

EPA (1975). Supplement to Development Document Harzardous Substances Regulations Federal Water Pollution Control Act as Amended 1972. EPA Report 440/9-75-009.

Federal Register (1977). "Polychlorinated Biphenyls (PCBs): Unavoidable Contaminants in Food and Food Packaging Materials; Reduction of Temporary Tolerances." FR 42, No. 63, p. 17487.

Hom, W., R.W. Risebrough, A. Soutar, and D.R. Young. (1974). Deposition of DDE and Polychlorinated Biphenyls in Dated Sediments of the Santa Barbara Basin. Science 184:1197-1199.

Kimbrough, R.D. (1976). Pathological Findings Associated with Chronic Experimental Exposure to PCBs. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975. Chicago, IL, pp. 30-42. EPA Report 560/6-75-004.

Kuratsune, M., T. Yoshimura, J. Matsuzaka, and A. Yamaguchi (1972). Epidemiologic Study on Yusho, A Poisoning Caused by Ingestion of Rice Oil Contaminated with a Commercial Brand of Polychlorinated Biphenyls. Environmental Health Perspective 1:119-128.

Laughlin, R.B., Jr., J.M. Neff, and C.S. Giam (1977). Effects of Polychlorinated Biphenyls, Polychlorinated Naphthalenes, and Phthalate Esters on Larval Development of the Mud Crab Rhithropanopeus harrisii. In: Pollutant Effects on Marine Organisms, C.S. Giam (ed.), Lexington Books, D.C. Heath and Company. Lexington, MA; Toronto, Canada.

Mac Arthur, D. and S.F. Nagy (1976). The Economic Impact of a Ban on Polychlorinated Biphenyls. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975, Chicago, IL, pp 309-311. EPA Report 560/6-75-004.

McDermott, D.J., D.R. Young and T.C. Heesen (1976). PCB Contamination of Southern California Marine Organisms. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975, Chicago. IL, pp. 209-217. EPA Report 560/6-75-004.

Munson, T.O. (1972). Chlorinated Hydrocarbon Residues in Marine Animals of Southern California. Bulletin of Environmental Contamination and Toxicology, 7:223-228.

Pavlou, S.P. and W. Hom (1976). Interlaboratory Calibration Results from Chlorinated Hydrocarbon Analyses in Marine Sediments. Marine Chemistry 4:155-163.

Rollins, R.L. (1976). PCB's in Capacitor Applications. In: Proceedings of the National Conference on Polychlorinated Biphenyls, Nov. 19-21, 1975, Chicago, IL, pp. 306-308. EPA Report 560/6-75-004.

SCCWRP (1973). The Ecology of the Southern California Bight: Implications for water quality management. TR 104, Southern California Coastal Water Research Project, El Segundo, CA. NTIS No. PB2774462/AS, U.S. Dept. of Commerce, Springfield, VA, 22161.

Schmidt, T.T., R.W. Risebrough, and F. Gress (1971). Input of Polychlorinated Biphenyls into California Coastal Waters from Urban Sewage Outfalls. Bulletin of Environmental Contamination and Toxicology, 6:235-243.

Vos, J.G. (1972). Toxicology of PCBs for Mammals and Birds. Environmental Health Perspectives 1:105-117.

Young, D.R., and T.C. Heesen (1974). Inputs and Distributions of Chlorinated Hydrocarbons in Three Southern California Harbors. TM 214, Southern California Coastal Water Research Project, El Segundo, CA. NTIS No. PB275413/AS, U.S. Dept. of Commerce, Springfield, VA,22161.

Young, D.R., T.C. Heesen, D.J. McDermott, and P.E. Smokler (1974). Marine Inputs of Polychlorinated Biphenyls and Copper from Vessel Antifouling Paints. TM 212, Southern California Coastal Water Research Project, El Segundo, CA. NTIS No. PB275412/AS, U.S. Dept. of Commerce, Springfield, VA, 22161

Young, D.R., D.J. McDermott, T.C. Heesen, and T.-K. Jan (1975a) Pollutant Inputs and Distributions off Southern California. In: Marine Chemistry in the Coastal Environment, pp. 424-439. T.M. Church (ed.) American Chemical Society, Washington, D.C.

Young, D.R., D.J. McDermott, and T.C. Heesen (1975b). Polychlorinated Biphenyl Inputs to the Southern California Bight. TM 224, Southern California Coastal Water Research Project, El Segundo, CA., NTIS No. PB274466/AS. U.S. Dept. of Commerce, Springfield, VA, 22161.

Young, D.R., D.J. McDermott, and T.C. Heesen (1976a). Marine Inputs of Polychlorinated Biphenyls off Southern California. In: Proceedings of the National Conference of Polychlorinated Biphenyls, Nov. 19-21, 1975, Chicago, IL., pp. 199-208. EPA Report 560/6-75-004.

Young, D.R., D.J. McDermott, and T.C. Heesen (1976b). DDT in Sediments and Organisms around Southern California Outfalls. Journal of Water Pollution Control Federation 48:1919-1928.

Young, D.R., D.J. McDermott-Ehrlich, and T.C. Heesen (1977). Sediments as Sources of DDT and PCB. Marine Pollution Bulletin 8:254-257.

Young, D.R. and T.C. Heesen (in press). DDT, PCB and Chlorinated Benzenes in the Marine Ecosystem of Southern California. In: Water Chlorination: Environmental Impact and Health Effects, Ann Arbor Science Publishers, Ann Arbor, MI.

Table 1. Concentrations (ug/l) of PCBs and Total DDT in one-week Composites of Influent and Effluent from three Municipal Wastewater Treatment Plants in San Diego County.

Plant and Coll. Date	PCB 1242	PCB 1254	Total PCB	Total DDT
Point Loma Dec. 15-21, 1976				
Influent = R-1	0.88	2.7	3.6	0.11
" = R-2	0.71	1.9	2.6	0.15
Ave. ± S.E.	0.80	2.3	3.1 ± 0.5	0.13 ± 0.02
Effluent = R-1	0.97	0.38	1.4	0.11
" = R-2	2.5	1.5	4.0	0.11
Ave. ± S.E.	1.8	0.9	2.7 ± 1.3	0.11 ± 0.00
Point Loma July 25-31, 1977				
Effluent = R-1	0.71	0.18	0.89	0.15
" = R-2	0.34	0.16	0.50	0.17
Ave. ± S.E.	0.52	0.17	0.70 ± 0.2	0.16 ± 0.01
San Luis Rey Jan. 26- Feb. 1,1977				
Influent = R-1	0.00	0.06	0.06	0.08
" = R-2	0.01	0.11	0.12	0.04
Ave. ± S.E.	0.01	0.08	0.09 ± 0.03	0.06 ± 0.02
Effluent = R-1	0.01	0.01	0.02	0.005
" = R-2	0.00	0.02	0.02	0.005
Ave. ± S.E.	0.01	0.02	0.02 ± 0.00	0.005 ± 0.00
La Salina Jan. 26 - Feb. 1, 1977				
Influent = R-1	0.13	0.80	0.93	0.99
" = R-2	0.13	0.84	0.97	0.97
Ave. ± S.E.	0.13	0.82	0.95 ± 0.02	0.98 ± 0.01
Effluent = R-1	0.35	0.10	0.45	0.06
" = R-2	0.25	0.09	0.34	0.07
Ave. ± S.E.	0.30	0.10	0.40 ± 0.06	0.06 ± 0.01

Table 2. Concentrations (mg/dry kg) of PCBs and Total DDT in Surficial Sediments from the PLTP Discharge Zone (A) and Control Zone (B), January 1977.

Station	PCB 1242	PCB 1254	Total PCB	Total DDT
A 2	0.006	0.016	0.022	<0.003
A 3	0.002	0.011	0.013	0.000
A 4	0.005	0.008	0.013	<0.001
A 5	0.006	0.019	0.025	0.003
A 8	0.004	0.015	0.019	0.000
A 9	0.012	0.026	0.038	<0.003
A 10	0.011	0.011	0.022	<0.002
A 11	0.005	0.012	0.017	0.001
A 12	0.006	0.019	0.025	0.000
A 13	0.010	0.019	0.029	<0.001
A 14	0.003	0.013	0.016	0.000
A 15	0.005	0.014	0.019	0.000
A 16	0.011	0.024	0.035	0.000
Ave. ± S.E.	0.007	0.016	0.025 ± 0.002	0.001 ± 0.0003
Median	0.006	0.015	0.022	0.000
B 1	0.000	0.010	0.010	<0.001
B 2	0.000	0.000	0.000	0.000
B 3	0.002	0.007	0.009	0.000
B 4	0.001	0.006	0.007	<0.002
Ave. ± S.E.	0.001	0.006	0.006 ± 0.002	0.001 ± 0.0005
Median	0.000	0.006	0.008	0.000

Table 3. Concentrations (mg/wet kg) of PCBs and Total DDT in Muscle Tissue of Rock Crabs (*Cancer* spp.) from the PLTP Discharge Zone (A) and Control Zone (B), June-July, 1977.

Station	PCB 1242	PCB 1254	Total PCB	Total DDT
A 15	0.046	0.067	0.11	0.008
A 15	0.032	0.037	0.069	0.020
A 15	0.019	0.023	0.042	0.008
A 15	0.012	0.030	0.042	0.005
A 15	0.025	0.092	0.12	0.001
A 15	0.070	0.12	0.19	0.014
A 15	0.025	0.032	0.057	0.003
A 16	0.015	0.034	0.049	0.002
A 16	0.012	0.034	0.046	0.033
Ave. $\pm$ S.E.	0.028	0.052	0.081 $\pm$ 0.017	0.010 $\pm$ 0.003
Median	0.025	0.034	0.057	0.008
B 1	0.008	0.012	0.020	0.028
B 1	0.012	0.027	0.039	0.064
B 3	0.006	0.039	0.045	0.010
B 3	0.016	0.16	0.18	0.006
B 3	0.015	0.047	0.062	0.015
Ave. $\pm$ S.E.	0.011	0.057	0.069 $\pm$ 0.028	0.025 $\pm$ 0.011
Median	0.012	0.039	0.045	0.015

Table 4. Concentrations (mg/wet kg) of PCBs and Total DDT in Muscle Tissue of Bottom-Feeding Fishes from the PLTP Discharge Zone (A) and Control Zone (B), June-July 1977.

Station	Sp.[1]	PCB 1242	PCB 1254	Total PCB	Total DDT
A 5	1	0.016	0.066	0.082	0.040
A 15	2	0.062	0.55	0.61	0.50
A 15	2	0.004	0.002	0.006	0.018
A 16	3	0.013	0.055	0.068	0.015
A 16	3	0.041	0.13	0.17	0.036
A 16	4	0.000	0.045	0.045	0.000
A 16	5	0.024	0.45	0.47	0.071
A 16	6	0.18	0.90	1.08	0.99
Ave. ± S.E.		0.042	0.28	0.32 ± 0.13	0.21 ± 0.13
Median		0.020	0.098	0.13	0.038
B 1	4	0.014	0.21	0.22	0.28
B 2	4	0.000	0.014	0.014	0.030
B 3	7	0.003	0.046	0.049	0.030
Ave. ± S.E.		0.006	0.090	0.094 ± 0.064	0.11 ± 0.083
Median		0.003	0.046	0.049	0.030

---

1 Sp.1: Big-mouth sole (*Hippoglossina stomata*);
Sp.2: Brown rockfish (*Sebastes auriculatus*);
Sp.3: Calico rockfish (*Sebastes dallii*);
Sp.4: Whitebelly rockfish (*Sebastes vexillaris*);
Sp.5: Cabezon (*Scorpaenichthys marmoratus*);
Sp.6: White croaker (*Genyonemus lineatus*);
Sp.7: Vermilion rockfish (*Sebastes miniatus*).

Table 5. Concentrations (mg/wet kg) of PCBs and Total DDT in Whole Soft Tissues of Intertidal Mussels (Mytilus edulis) from San Diego Harbor and Point Loma Coast, April 1977.

Station	PCB 1242	PCB 1254	Total PCB	Total DDT
1	0.035	0.17	0.20	0.022
2	0.000	0.20	0.20	0.022
3	0.026	0.20	0.23	0.027
4	0.024	0.21	0.23	0.025
5	0.048	0.29	0.34	0.046
6	0.014	0.087	0.10	0.020
Ave. ± S.E.	0.024	0.19	0.22 ± 0.03	0.027 ± 0.004
Median	0.025	0.20	0.22	0.022
7*	0.000	0.027	0.027	0.029
8*	0.000	0.021	0.021	0.021
Ave. ± S.E.	0.000	0.024	0.024 ± 0.003	0.025 ± 0.004
Median	0.000	0.024	0.024	0.025

* Mytilus californianus

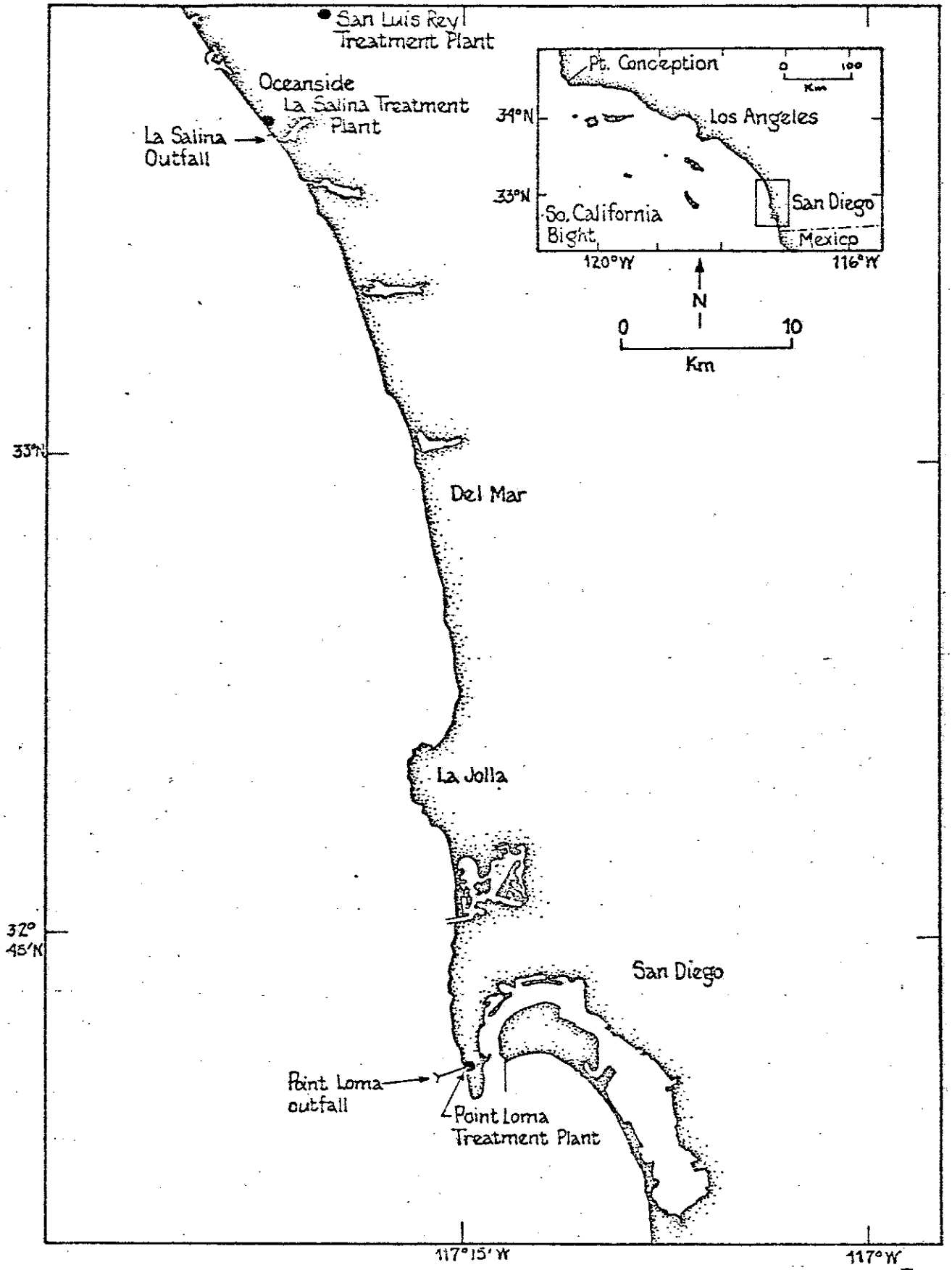


Figure 1. Study area in San Diego County.

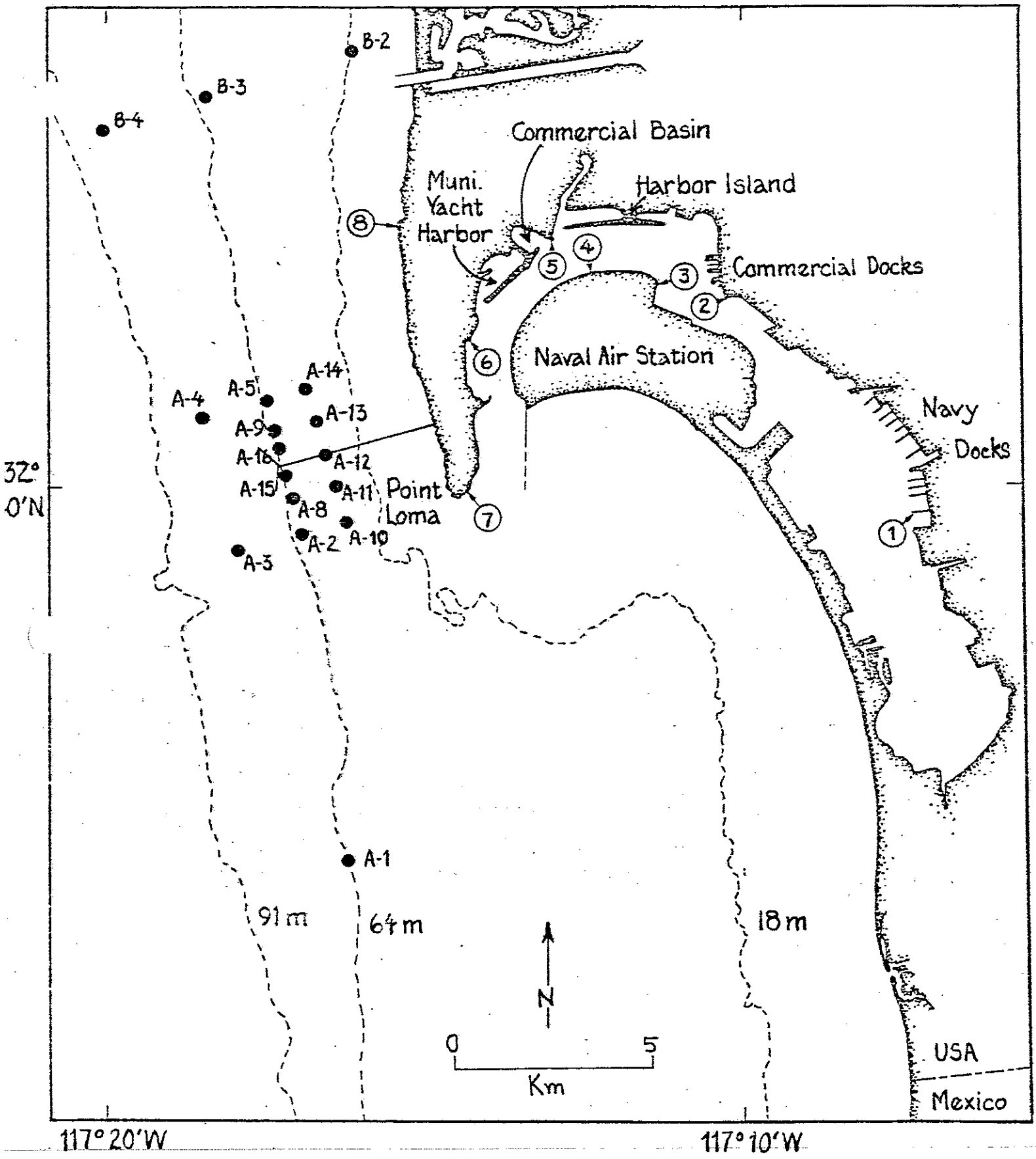
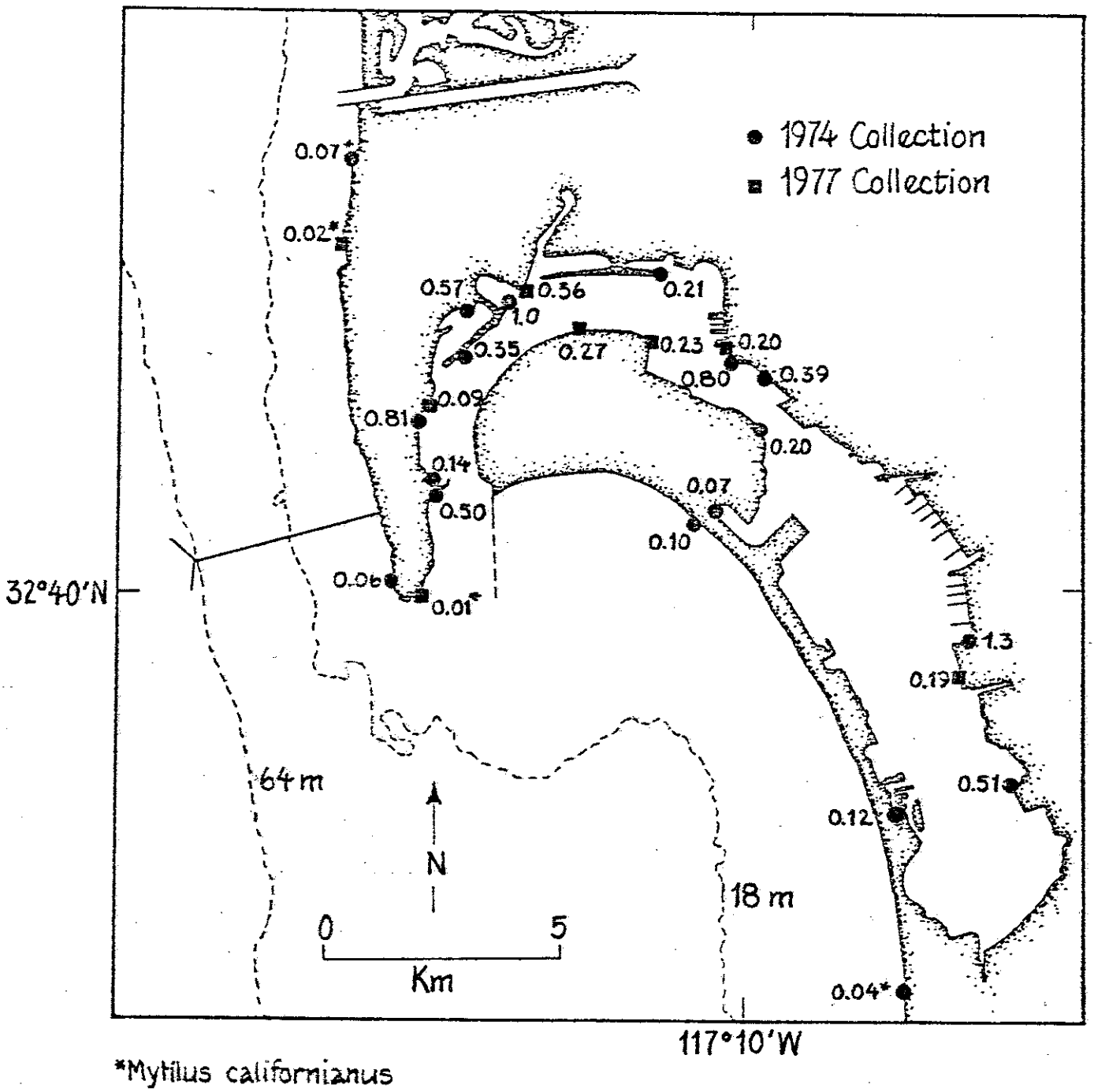


Figure 2. Benthic (A and B) stations around the Point Loma Treatment Plant submarine outfall, and intertidal mussel collection sites (1-8) in the San Diego Harbor region.



*Mytilus californianus

Figure 3. Total PCB concentrations (mg/wet kg) in whole soft tissues of the intertidal mussel Mytilus edulis collected during January 1974 and April 1977 in and around San Diego Harbor.