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San Diego Bay Bibliography

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Publication Date

1994-12-31

San Diego Bay Bibliography

The San Diego Bay Bibliography references the scientific & gray literature on the Bay up through 1994 and it is NOT current. Compiled from numerous resources (including Hubbs-Sea World Research Institute, Regional Water Quality Control Board, & local library catalogs), it is not comprehensive since so the Bay literature is elusive. In addition, there can be duplicate references varying in completeness.

The San Diego Bay Bibliography is the outcome of discussion and networking within the San Diego Oceans Foundation's Ocean Resources Committee. Produced at Scripps Institution of Oceanography Library by Peter Brueggeman.

The port of San Diego, CA.
United States. Board of engineers for rivers and harbors.
1978. 61 pages + 3 folded maps in pocket.
SERIES: Port series no. 27, revision 1978;
DESCRIPTORS: Ports-- San Diego; San Diego Bay

San Diego Dredging Project Replenishes Beaches
World Dredging and Marine Construction 14(2):7-8, 1978.
ABSTRACT: The U.S. Army Corps of Engineers in cooperation with the San Diego Unified Port District and the U. S. Navy contracted to dredge nearly eight million yards of sand from the harbor and turning basins at San Diego Harbor. The material was used to replenish the beaches and reclaim an area for a new small boat marina. Material was pumped to Imperial Beach, and to replenish the US Navy's training area at Delta Beach.
KEY WORDS : beach nourishment/dredging, Silver Strand Cell; San Diego Bay

Runup Characteristics of Explosion-Generated Waves in Major Harbor Areas, Report 2
Bucci, DR; Whalin, RW.
U. S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Miss., WES Tech. Report N-69-4, 86 pp.
ABSTRACT: Methodology for conducting runup tests in a distorted model for wave intrusion into San Diego Bay, California.
KEY WORDS : wave transformation, institutions/planning/mgmt. Silver Strand Cell, San Diego Bay

Longshore Sediment Transport Rates; A Compilation of Data
Das, M. M.
U. S. Army Corps of Engineers, Coastal Engineering Research Research Center, Vicksburg, Miss., CERC Misc. Paper 1-71
ABSTRACT: Compilation of data on longshore sediment transport and associated wave and sediment characteristics from six laboratory studies and four field studies. Laboratory observations include water depth, wave height, wave period, sand size, generator angle with toe of the beach, and longshore transport rate. The maximum transport rate near Anaheim Bay is 2130 cubic yds/day north; estimated transport rate at Silver Strand is 3400 cubic yds/day south.
KEY WORDS : littoral sediment, longshore transport

Integrated Management of San Diego Bay: A Socio-Economic Challenge
Firle, T. E.
Coastal Zone '83, Symposium, San Diego, California, June 1-4, 1983; ASCE, N. Y., Vol. II, pp. 1714-1733

ABSTRACT: This paper discusses the management of a complex geopolitical and natural resource. The Port District was assembled by consolidating the California tidelands surrounding San Diego Bay. This required removing control of the land and water areas from the mean high tide line to the pierhead line (or beyond) from the five surrounding cities, and appointing Port Commissioners as policy makers.

KEY WORDS : environmental constraints, planning. Silver Strand Cell

San Diego Bay Model Study, Final Report

Fisackerly, G. M.

Hydraulic Model Investigation, U. S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Miss.,

WES Tech. Report H-74-12, 21 pp.

ABSTRACT: Study to determine the effects of a second entrance into the Bay on the hydraulic and flushing characteristics of the Bay. Includes data.

KEY WORDS : wave climate, tidal inlets, tides, Silver Strand Cell

The Statistical Description of Average Wave Conditions Near the Entrance of San Diego Bay

Groves, G. W.

SIO Reference 53-63, Wave Report No. 102, Scripps Institution of Oceanography, La Jolla, California, 18 pp. 1953.

ABSTRACT: The average ocean wave conditions at two locations near the entrance of San Diego Bay are described in terms of the frequencies, in percentage of time, that the height, period, and direction of the 'significant' waves lie within various ranges of values. The bottom pressure, bottom orbital velocity and displacement due to the surface waves are described at the two locations in the same manner as the wave height. The seasonal and other variations of the wave characteristics are shown. Includes data.

KEY WORDS : wave climate, Silver Strand Cell

Nearshore Processes Along the Silver Strand Littoral Cell

Intersea Research Corporation, La Jolla, California, 100+ pp. 08/15/74.

ABSTRACT: Examines the problem of beach erosion on a 14-mile segment of the California coastline from the International Boundary north to the entrance of San Diego Bay. Study included sources, littoral transport paths, transport rates, and depositional sinks of beach sand in terms of the physical processes active in the nearshore environment.

KEY WORDS : coastal erosion problems, longshore transport, beaches, coastal structures, littoral sediment, wave climate Silver Strand Cell, S. Silver Strand Reach

Coastal Erosion in San Diego County, California

Kuhn, G. G.; Shepard, F. P.

Coastal Zone '80, Symposium, Hollywood, Florida, November 17-20, 1980; ASCE, N. Y., Vol. III, pp. 1899-1918

ABSTRACT: History and examples of coastal erosion in the San Diego coastal region.

KEY WORDS : beaches, coastal erosion, coastal erosion problems, geomorphic processes, storm damage, Silver Strand Cell

Sea Cliffs, Beaches and Coastal Valleys of San Diego County

Kuhn, G. G.; Shepard, F. P.

University of California Press; Berkeley and Los Angeles, California; London, England; 193 pp. 1984.

ABSTRACT: Examines and analyses threats to coastal stability in

a detailed study of the coastal area of San Diego County from the 19th century to the present: weather, erosion, landslides, flooding, and currents.

KEY WORDS : coastal erosion, coastal erosion problems, beaches, climatology, geomorphic processes, storm damage, Silver Strand Cell

Sea Cliff Erosion in Southern California

Lee, L. J.

Coastal Zone '80, Symposium, Hollywood, Florida, November 17-20, 1980; ASCE, N. Y., Vol. III, pp. 1919-1938

ABSTRACT: A study of a portion of the coastline in San Diego County, California has provided insight into erosional processes of sea cliffs. Results and review of literature suggest methods for monitoring erosion in the future.

KEY WORDS : coastal erosion, coastal erosion problems, geomorphic processes, cliff sediment, Silver Strand Cell

The San Diego Regional Coastal Access Study

Prescott, D. A.

Coastal Zone '80 Symposium, Hollywood, Florida, November 17-20, 1980, Vol. II; ASCE, N. Y., pp. 1662-1683

ABSTRACT: A discussion of the study which was to develop a new element of the Regional Transportation Plan to comply with new policy direction. Subsequent to investigations of case studies, an analysis was conducted to determine types and magnitudes of recreational access problems for each site.

KEY WORDS : growth potential/recreation, shoreline use, planning, Silver Strand Cell

Erosion and Sedimentation in San Diego Watersheds

Ryono, T.; Kanga, F.; Qazi, I.

State of California, Dept. of Water Resources, Sacramento, California, 61 pp. 1977.

ABSTRACT: Contains sediment yield estimates for San Marcos Creek, Escondido Creek, San Dieguito River, San Diego River, and Sweetwater River.

KEY WORDS : river sediment discharge, Silver Strand Cell

Erosion and Sedimentation in San Diego Watersheds

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State of California, Dept. of Water Resources, Sacramento, California, 61 pp. 1977.

ABSTRACT: Contains sediment yield estimates for San Marcos Creek, Escondido Creek, San Dieguito River, San Diego River, and Sweetwater River.

KEY WORDS : river sediment discharge, Silver Strand Cell

Beach Erosion Problems Within the City of San Diego

City of San Diego

Engineering Dept., City of San Diego, California. 06/01/70.

KEY WORDS : beaches, coastal erosion, coastal erosion problems
Silver Strand Cell

Mechanics of Sediment Transport by Waves and Currents, Quarterly Progress Report No. 10, January 1 - March 30, 1968

Scripps Institution of Oceanography

SIO Reference 68-10, Contract DA-49-055-CIVENG-66-1, Mod. 2,

Scripps Institution of Oceanography, La Jolla, California, 5 pp. 1968.

ABSTRACT: Research efforts are directed primarily towards processing data collected in the field last summer and fall, and comparing with laboratory experiments. The field data include measurement of the relation between the character and energy of

waves, and 1) the longshore transport of sand, 2) the generation of longshore currents, and 3) the shoaling and breaking of waves and the resulting set-up and run-up on the beach.

KEY WORDS : beaches, longshore current, longshore transport, wave climate, wave transformation, Silver Strand Cell

Mechanics of Sediment Transport by Waves and Currents, Quarterly Progress Report No. 11, April 1 - June 30, 1968

: Scripps Institution of Oceanography

SIO Reference 68-26, Contract DA 49-055-CIVENG-66-1, Mod. 2, Scripps Institution of Oceanography, La Jolla, California, 8 pp. 1968.

ABSTRACT: Emphasizes the field measurement of sand transport and wave set-up and run-up along the barrier beaches of the Gulf of California, Scripps Beach, Silver Strand Beach, and Mission Bay.

KEY WORDS : beaches, longshore transport, wave climate, wave transformation, Silver Strand Cell

Deepwater Wave Direction From an Intensity Array

Seymour, R. J.; Higgins, A. L.

In: Proceedings of 16th Coastal Engineering Conference, August 27-September 3, 1978, Hamburg, Germany; ASCE, N. Y., pp. 305-311, 1979.

ABSTRACT: Details of the relationship between deepwater directional spectrum and nearshore energy spectra are discussed. Intensity array data are applied to detection of waves incident within a narrow directional interval. Describes the application of an intensity array to detection of long period southern swell in San Diego. Comments regarding relative merits of method used are included. The four-gage intensity array used is in the County of San Diego at Oceanside, La Jolla, Ocean Beach and Imperial Beaches.

KEY WORDS : wave climate, wave transformation, Silver Strand Cell

Distinguishing Between Beach and Dune Sands

Shepard, F. P.; Young, R.

Journal of Sedimentary Petrology, 31(2):196-214, June 1961.

ABSTRACT: Roundness, percent silt, phi median diameter, sorting, skewness, and Kurtosis data values are given for beach and dune sands collected at ... and Coronado California.

KEY WORDS : dunes, geomorphic processes, grain size, littoral sediment, geology, Silver Strand Cell,

Dredging and Spoil Disposal - Major Geologic Processes in San Diego Bay, California

Smith, D. D.

IN: Estuarine Processes, Vol. II, Circulation, Sediments and Transfer of Material in the Estuary, Academic Press, San Francisco, California, pp. 150-166. 1977.

ABSTRACT: Investigation of the importance of dredging and spoil disposal as estuarine geological processes that are substantially more important than all other erosional and depositional processes presently operating in San Diego Bay. Includes data.

KEY WORDS : estuarine sediment storage, littoral sediment, longshore transport, mining, sedimentation, sand entrapment Silver Strand Cell

A Summary of Knowledge of the Southern California Coastal Zone and Offshore Areas, Vol. I and III

Southern California Ocean Studies Consortium

Dailey, MD, Hill, B, Lansing, N, Eds. For: US

Dept of Interior, Bureau of Land Management, Washington,

DC, 500+ pp. each volume. 09/01/74.

ABSTRACT: This report describes the economic and physical forces, and biological and social resources existing in the Southern California continental borderland area, including 18 lagoons and harbors.

KEY WORDS : climatology, geology, growth potential/recreation, wind, population, coastal currents, San Diego Bay

Navigation Improvement, GDM No. 1 for San Diego Harbor, San Diego County, California, Draft

US Army Corps of Engineers, Los Angeles District; San Diego County

US Army Corps of Engineers, Los Angeles District, 50+ pp. 03/01/74.

ABSTRACT: General design memorandum draft pursuant to recommendation of a plan of improvement for San Diego Harbor. Includes data in separate volume of appendices.

KEY WORDS : coastal structures, environmental constraints, grain size, growth potential/recreation, institutions/planning/mgmt. Silver Strand Cell, San Diego Bay

Navigation Improvement, GDM No. 1 for San Diego Harbor, San Diego Harbor, California

US Army Corps of Engineers, Los Angeles District; San Diego County

US Army Corps of Engineers, Los Angeles District, 50+ pp. 02/01/75.

ABSTRACT: General design memorandum pursuant to recommendation of a plan of improvement for San Diego Harbor. Includes data in separate volume of appendices.

KEY WORDS : coastal structures, environmental constraints, grain size, growth potential/recreation, institutions/planning/mgmt. Silver Strand Cell, San Diego Bay

Second Entrance, San Diego Harbor, California, Draft Report
US Army Corps of Engineers, Los Angeles District; San Diego County

US Army Corps of Engineers, Los Angeles District, 55+ pp. 12/01/80.

ABSTRACT: Review report for second entrance at San Diego Harbor. Includes data in appendices.

KEY WORDS : environmental constraints, San Diego Bay, growth potential/recreation, institutions/planning/mgmt., shoreline changes, coastal structures, Silver Strand Cell,

Geomorphology Framework Report, Dana Point to the Mexican Border
US Army Corps of Engineers, Los Angeles District; Southern California

Ref. CCSTWS 84-4; U. S. Army Corps of Engineers, Los Angeles District, 75+ pp. 09/01/84.

ABSTRACT: Basic data on the geomorphology, the physical characteristics, and processes of sediment transport along the coast of California (Dana Point to the Mexican Border). Includes maps.

KEY WORDS : geomorphic processes, littoral sediment, longshore transport, mining, neotectonics, geology, Silver Strand Cell,

San Diego Bay Model Study, Summary Report

US Army Corps of Engineers, Waterways Experiment Station. Hydraulic Model Study for Los Angeles District, California; US Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, 120 pp. 06/01/71.

ABSTRACT: Study was performed February 1967 - October 1968. Model was carefully adjusted to accurately reproduce observed

prototype tides, tidal current directions and velocities, and dispersion of dye tracers. The purpose of the model study was to determine the effects of a proposed second entrance on the hydraulic and flushing characteristics of the bay. Includes dye concentration data.

KEY WORDS : environmental constraints, nearshore currents, tidal inlets, tides, Silver Strand Cell

Watersheds of San Diego County Draining into the Pacific Ocean, California

US Department of Agriculture

Preliminary Examination Report, US Department of Agriculture, Bureau of Agricultural Economics, 58 pp. 05/01/42.

ABSTRACT: Survey report of San Diego coastal watersheds.

Includes hydrology data (discharge), precipitation, sedimentation estimates, and flood history (to 1942)

KEY WORDS : precipitation, river discharge, storms/floods, watershed sediment, Silver Strand Cell

Watersheds of San Diego County Draining into the Pacific Ocean, California

US Department of Agriculture

US Department of Agriculture, Preliminary Examination Report, Bureau of Agricultural Economics, 58 pp. 05/01/42.

ABSTRACT: Survey report of San Diego coastal watersheds.

Includes data.

KEY WORDS : precipitation, river discharge, storms/floods, watershed sediment, Silver Strand Cell

Predicted Extreme High Tides for California, 1983-2000

Zetler, BD; Flick, RE.

Journal of Waterways, Port, Coastal, Ocean Div., ASCE, N. Y., 14 pp. (In Press) 1985.

ABSTRACT: Standard harmonic tide predictions have been prepared for San Diego, Los Angeles, San Francisco and Humboldt Bay to the year 2000.

Tributyltin in Bay Mussels (*Mytilus edulis*) of the Pacific Coast of the United States.

Short, J. W.; Sharp, J. L.

Environmental Science and Technology 23(6):740-743, June 1989.

ABSTRACT: Tissue concentrations of tributyltin (TBT) were measured by graphite furnace atomic absorption spectrophotometry (GFAA) and by gas chromatography coupled with an atomic absorption spectrophotometer as the detector (GCAA) in bay mussels (*Mytilus edulis*) collected from San Diego Bay and other sites in 1986 and 1987. Results from both methods were not significantly different ($P < 0.871$). Concentrations of TBT on mussels ranged from less than 0.005 microg of TBT/g of wet tissue weight to 1.08 microg/g of wet tissue weight.

Concentrations of TBT in mussels sampled from Puget Sound were significantly lower ($P < 0.033$) in March 1987 than in June 1986, possibly due to the influence of boats freshly painted with marine antifoulants launched during the spring. The results may be useful as a benchmark to gauge the efficacy of recently enacted legislation restricting the use of marine antifoulants containing TBT on the Pacific coast of the United States.

Marine Hydrocarbon-Degrading Microorganisms: Community Structure and Biomass Determination.

Carpenter, M.; Robertson, J.

Water Science and Technology 20(11/12):433-435, 1988.

ABSTRACT: Microorganisms collected from the Navy (San Diego Bay) were monitored in a test system containing oily bilge waste from ships in

order to determine if waste degradation could be enhanced. Wastes contained kerosene, bromoform, tetrachloroethylene, toluene, benzene, methylene chloride and phenol. Communities containing algae, fungi, and bacteria appear capable of growth on the bilge waste.

Portable Environment Test System: A Field Assessment of Organotin Leachates. Test and Evaluation

Salazar, SM; Salazar, MH; Davison, BM; Stang, PM.; Meyers-Schulte, K. Available from National Technical Information Service as AD-A192 119. Technical Report 1202, November 1987.

ABSTRACT: A Portable Environmental Test System (PETS) was evaluated with tributyltin (TBT) antifouling leachates in San Diego Bay over a 7-month period. Overall mean test concentrations were 0.065, 0.077 and 0.193 micrograms/L TBT. Treatments were tested against ambient seawater controls with three replicates of each using 340-L tanks. Unfiltered seawater was pumped over a TBT-coated panel, creating a TBT-leachate diluted with ambient seawater in dilution/mixing units and distributed to test tanks. The following parameters were measured: abundance and species diversity on fouling panels; condition and gonad indices, and bioaccumulation in adult mussels; condition indices and bioaccumulation in clams; and growth rates in juvenile mussels and juvenile oysters. There appeared to be several indications of effects at the highest concentration tested, although statistically significant differences were not consistently measured. At all TBT concentrations, adult mussels and clams accumulated TBT and juvenile mussel growth was reduced. However, growth of juvenile mussels and oysters in PETS tanks was significantly slower than growth of control animals held in the bay near the system seawater intake. These results suggest test animals in PETS tanks may have been under stress from the test system. It is not clear whether results represent effects to be expected in nature; the particular bioindicators selected may have been resistant to TBT and insensitive to measuring significant effects, or variability and system inadequacies reduced the ability to measure significant effects.

Marine Pollution Problems, North American West Coast

McCain, BB; Brown, DW; Krahn, MM; Myers, MS; Clark, RC.

Aquatic Toxicology 11(Special Issue 1/2):143-162, 1988.

ABSTRACT: Sediments and fish were studied in the marine waters at San Diego and other cities. Highest mean concentrations of aromatic hydrocarbons were measured in sediments from San Diego Bay and other sites..... Polychlorinated biphenyl levels in sediments were highest in San Diego Bay and other sites. Copper concentrations were highest in San Diego Bay (where an ore loading facility exists) and another site. Concentrations of other metals such as cadmium and lead were not appreciably different from control sites. A variety of pollution-associated diseases (liver lesions and fin erosion) were found in bottomfish from San Diego Bay and other sites.

Ecological Evaluation of Organotin-Contaminated Sediment

Salazar, MH; Salazar, SM.

IN: Management of Bottom Sediments Containing Toxic Substances, Proceedings of the 10th U.S./Japan Experts Meeting, October 30-31, 1984, Kyoto, Japan. October 1985. pp 127-149.

ABSTRACT: A standard dredged material bioassay was conducted on sediment with high levels of organotins to (1) assess the toxicity and bioavailability of organotins associated with sediment, and (2) determine if this sediment would qualify for ocean disposal. Particulate-phase tests were conducted with *Acanthomysis sculpta* (mysid), *Citharichthys stigmaeus* (flatfish), and *Acartia tonsa* (copepod). Solid-phase tests were conducted with *A. sculpta*, *Macoma nasuta* (clam), and *Neanthes arenaceodentata* (polychaete worm). The bioassay also included an estimate of the potential for bioaccumulation of cadmium, chromium, copper, mercury, silver, pesticides, PCBs, petroleum hydrocarbons, and organotins. The concentration of tributyltin-oxide (TBTO) in sediment

collected from Commercial Basin, San Diego Bay, California, was measured to be 780 ppb. Initial concentrations of TBTO in particulate phase test water was 0.49 ppb, and in solid phase test water 0.20 ppb. Butyltins measured in test water and test sediments demonstrate that monobutyl-, dibutyl-, and tributyltin were all leached off Commercial Basin sediments. Treatment clams accumulated organotins to a concentration on an order of magnitude above control clams (2.82 ppm TBTO vs. 0.26 TBTO), and a factor of four above treatment sediments. Survival was high in all particulate phase and solid phase tests. There were no statistically significant differences in survival when controls were compared to treatments. As demonstrated for other contaminants in other studies, high levels of organotins in sediments do not a priori indicate a significant adverse impact on the marine environment after ocean disposal. The sediment tested would qualify for ocean disposal under the present guidelines administered by EPA and the Army Corps of Engineers.

California State Mussel Watch: 1980-81, Trace Metals and Synthetic Organic Compounds in Mussels from California's Coast, Bays, and Estuaries.

Coale, SL; Smith, D; Armbrust, E; Stephenson, MD; Martin, M.

Water Quality Monitoring Report 81-11-TS, California State Water Resources Control Board, Sacramento, May 1982. 177 p.

ABSTRACT: Since 1977 the State Mussel Watch has monitored the accumulation of trace metal and synthetic organic compounds in marine mussels since they are good indicators of spacial and temporal distributions of toxicants. Part I of this report gives an overview of statewide conditions and a regionalized summary of the 1980-81 results. Silver, lead, zinc, PCBs and DDE were selected for comparison. Part II provides additional information on long-term trends of trace metals using baseline data from prior studies. The metals analyzed in mussel tissues included silver, aluminum, arsenic, cadmium, chromium, copper, mercury, manganese, lead, selenium and zinc. Mussels were transplanted to two open coast stations and 34 bay station during two time intervals. Aluminum, cadmium, copper, chromium, manganese, mercury and zinc appear to be detrimental to mussel reproduction as measured by the gonad index. Based on correlation analyses, aluminum, cadmium, copper, chromium, manganese, lead and zinc are suspected of having adverse affects on incremental growth. Part III is a follow-on analysis to the 1979 survey of synthetic organic compounds in mussels which showed substantial amounts of DDT compounds, PCBs, chlordane, dieldrin, heptachlor and endosulfan in certain areas. The 1980 study included intensive site surveys in and San Diego Bay where higher trace metals and synthetic organic compounds had previously been measured. PCBs, dieldrin and endosulfan levels were about the same as in 1979. Chlordane levels were generally higher in urban areas. There is a greatly reduced rate of loss of DDT compounds as compared to the rate of decline in the early 1970s.

Seabed Drifter Movement in San Diego Bay and Adjacent Waters

Hammond, R. R.; Wallace, W. J.

Estuarine, Coastal and Shelf Science 14(6):623-634, 1982.

ABSTRACT: In San Diego Bay, and the adjacent ocean 500 seabed drifters were released to study bottom flow patterns. The crescent shaped 20 km long and 4 km wide bay has a narrow channel through which tides and river water flow. The distinct bottom drift regimes and their mean residual bottom drifts (in km per day) were: 0.02 in the docking basins, 0.03 in the open bay, 0.11 in the main channel, 0.17 off the coast, and 0.44 in the surf-dominated water. Two trends were observed in the southern bay. The first is movement north towards the central part; the second is movement towards the south toward the South Bay powerplant, which uses and discharges considerable quantities of cooling water. In the main channel and northern rim the bottom current moves inward and meets the opposing northward current, forming a null zone at the Silver Gate power station. In summer practically no fresh water dilution takes place in the bay, which is classified as an inverse embayment where evaporation

exceeds fresh water input. The powerplants' use of 5% or more of the maximum tidal prism for cooling has significant, as yet unquantitated, effect on the bay's circulation. This information is useful in hydrodynamic models and for an understanding of the transport of bottom debris, sludge, and sediment.

Measurement of Cu and Zn in San Diego Bay by Automated Anodic Stripping Voltammetry.

Zirino, A; Lieberman, SH; Claveli, C. Environmental Science and Technology 12(1):73-79, January 1979.

ABSTRACT: Cu and Zn values were measured in San Diego Bay by anodic stripping voltammetry with a specially built, automated instrument. During 1975-1977, trace metal surveys were conducted in the bay from a small vessel. Samples were collected and analyzed aboard the craft while underway. Cu and Zn concentrations were less than 0.1 and 0.6 micro g/L, respectively, at the mouth of the bay and increased toward the center of the bay to approximately 2.5 and 2.9 micro g/L, respectively. Also, synoptic measurements made at a stationary pier location showed that Cu and Zn concentrations coincided precisely but inversely with tidal cycles. Cu and Zn measurements made by automated anodic stripping voltammetry were compared to measurements made by extraction of Chelex 100 followed by analysis by flame atomization atomic absorption spectrophotometry. The two methods produced values that were indistinguishable within experimental error.

Marine Inputs of Polychlorinated Biphenyls and Copper from Vessel Antifouling Paints.

Young, DR; Heesen, TC; McDermott, DJ; Smokler, PE.

Southern California Coastal Water Research Project, Report No TM 212, May 1974. 23 pages.

Available from the NTIS as PB-275 412.

ABSTRACT: During 1973 an estimated 37,000 recreational vessels (5-21 m long) were docked within 14 major marinas in Southern California. Detailed surveys of major brands and quantities of antifouling paint applied to such craft and to commercial and naval vessels in Los Angeles/Long Beach and San Diego harbors were conducted. These studies revealed that approximately 300,000 liters of antifouling paint are applied annually to vessels in southern California. Only 7 of the 28 paints most commonly used yielded detectable CPB levels. Median concentrations of mixtures resembling Aroclor 1242 and 1254 were less than 0.3 and 0.1 mg/l, respectively, and the maximum PCB concentration measured was 40/mg/l. However, the median copper concentration in these paints was estimated to be 600 g/l, corresponding to an annual copper application rate of about 180 metric tons. This copper, which is designed to be available and toxic to marine organisms, may have a larger environmental impact than the 600 metric tons of copper discharged annually via municipal wastewaters.

Model Studies of Outfall Systems for Desalination Plants, Part II. Tests of Effluent Dispersion in Selected Estuary Models, Volume I. Main Text.

Bobb, WH; Boland, RA, Jr; Herrmann, FA.

Available from NTIS as ADA-032 710,

Research Report H-71-2, September, 1971. Part II of II, 183p.

ABSTRACT: The dispersion of heated waste brine from desalination plant outfalls, the dynamic equilibrium distribution of the waste after sustained plant operation, and the effects of freshwater inflow on dispersion rates and equilibrium values were studied. The comprehensive fixed-bed models of San Diego Bay, are typical of estuaries on which salt-water conversion facilities are frequently located; therefore, test results can be applied to other similar estuaries. Heated effluent from 10-million gallon per day (mgd) plant models was introduced into the water. In estuaries such as San Diego Bay, where minimal tidal current velocities and fresh water discharge exist, dispersion and flushing rates are slow and the time required to reach dynamic equilibrium is long.

Proceedings of the Ninth Dredging Seminar.
Texas A and M Univ., College Station. Center for Dredging Studies.
Sea Grant Report No. TAMU-SG-77-115, October 1977. 267 p.

Also as CDS Report No. 206. J. B. Herbich (Ed.).

ABSTRACT: The following papers were presented at the Ninth Dredging Seminar sponsored by the Center for Dredging Studies at Texas A&M University, College Station, Texas: Selected environmental aspects of dredging in San Diego Bay, California....

Relative Significance of Contemporary Dredging Impacts in San Diego Bay, an Historically Stressed Environment.
Smith, DD; Graham, KF.

IN: Time-Stressed Coastal Environments: Assessment and Future Action, Proceedings of 2nd Annual Conference of The Coastal Society, held New Orleans, LA, November 17-20, 1976. p 3-30.

ABSTRACT: The significance of contemporary dredging impacts in San Diego Bay, in light of the heavily stressed environmental conditions which obtained in the bay for nearly a century prior to 1963 are qualitatively examined. The complex procedural mechanisms for regulating contemporary dredging work, using San Diego Bay as an example is reviewed. The major time and cost consequences of these regulatory controls by means of a current San Diego Bay case history is illustrated. The stresses to San Diego Bay were caused by four types of man's activities: diversion and damming of all principal tributary drainages with virtual elimination of fresh water input to the bay; dredging and filling; discharge of sewage and primary effluent, industrial wastes, and powerplant cooling water to the bay; and intensive urbanization of adjacent lands.

Impact on Marine Benthos of Waste Water Discharge
Orlob, GT; O'Leary, DA.

Journal of the Environmental Engineering Division-ASCE 103(E2):307-320, April, 1977.

ABSTRACT: Results were presented from recent investigations on the effects of waste water discharge from Point Loma into San Diego Bay. This plant began operation in 1963 and has been successful in restoring the Bay as a community asset. This review emphasized the response of marine benthos, including benthic animal populations, to changes occurring during the life of the outfall. At the time of this study, 1974, mean daily discharge was slightly less than 40% above hydraulic design capacity. Wastes treated were primarily domestic, with contributing industrial and commercial wastes. Most discharge regulations, except suspended solids removal, are being met even with this low efficiency operation. High BOD content in sediments on the ocean floor have not produced detrimental effects in marine organisms. The distinctive BOD pattern around the outfall has shrunk in recent years, creating an equilibrium with organic sediments from the outfall. The changes in benthic populations due to the changing organic content of the sediments appeared to be a response to the change in nutrient supply. Polychaetes and mollusks were stimulated by the outfall. Enchinoderms and crustaceans were less adaptable to the outfall environment, but were still prominent. The extreme resilience of the Bay environment, demonstrated by the recovery from high loadings of the 1960s, indicates that present load levels can be accepted without environmental deterioration. Increasing the plant's treatment efficiency was thought to be the key to increasing total flow treated and delivered to the Bay beyond present levels.

Feasibility of Transplantation, Revegetation, and Restoration of Eelgrass in San Diego Bay, California.

Boone, CG; Hoepfel, RE.

Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Environmental Effects Lab. Miscellaneous Paper Y-76-2, February 1976. 47 pages. Available from NTIS as AD/A021 484.

ABSTRACT: Eelgrass (*Zostera marina* L.) revegetation methodologies were

evaluated in order to examine the possibility of preserving or replacing the eight-acre Delta Beach eelgrass bed programmed to become a dredged material disposal site. Feasibility of various transplantation and revegetation methods were considered along with site selection criteria, substrate-nutrient effects, temperature, light, and salinity effects, and eelgrass productivity and nutrient recycling. Eelgrass turions should be harvested during the winter months prior to filling the dredge disposal site and broadcast into other areas of south San Diego Bay where patchy eelgrass beds already exist. Replanting of the Delta Beach areas should be postponed for a minimum of a year after filling, to allow the substrate to become stabilized and consolidated. The plug method, an alternative approach to the turion method of transplantation, would likely be more productive, but being more labor-intensive would also be more costly. A comparison of the respective costs of these two methods is appended. A pilot study should be undertaken to more accurately determine the most cost effective and productive procedures.

Seabed Drifter Movement in San Diego Bay and Adjacent Waters.

Hammond, RR.

Naval Undersea Center, San Diego, Report NUC TP 507, February 1976. 55p.

Available from NTIS as AD-A022 604.

ABSTRACT: Of vital importance in achieving effective control of pollution in estuaries near dense population centers is a detailed knowledge of the water circulation and flushing mechanisms. Although several experimental and hydrodynamic-numeric studies have been made of the San Diego estuarine system, no information existed on net bottom water movement which affects the flushing of solid waste and sediment transport. Since the . has been used successfully to provide valuable information in many estuarine and open sea environments, it was selected for use in the San Diego area. Five hundred drifters were released in the bay and adjacent ocean waters to delineate bottom flow patterns. Four significant bottom drift regimes were discussed: off coastal, main bay channel, open bay, and semi-enclosed docking basins. Mean residual bottom drift ranged from 0.17 kilometers per day off the coast to essentially zero in the docking basins. This compared favorably with results of similar studies of other California estuarine systems. Contrary to expectations, off coast drifter results (31% recovery) showed a persistent north moving bottom current with shallow near coast drift distances between 4 and 25 kilometers. In the open bay a reverse trend was observed from the 16% of the drifters recovered. At the head of the estuary, evaporative densification was believed to occur, with the heavier water sinking and moving outward toward the estuary mouth, resulting in an area of opposing bottom water currents.

BENEFITS FROM WATER POLLUTION ABATEMENT ON PROPERTY VALUES.

DORNBUSCH, DM; FALCKE, CO; GELB, PM; KOZIMOR, LW. [DORNBUSCH (DAVID M) AND CO., SAN FRANCISCO]

NATIONAL COMMISSION ON WATER QUALITY, WASHINGTON, DC. REPORT NCWQ 75/21, DECEMBER 1975. 326 P. AVAILABLE FROM NTIS AS PB-248 805.

ABSTRACT: INCREASES IN PROPERTY VALUES RESULTING FROM WATER POLLUTION ABATEMENT PROGRAMS DEPEND ON HOW CHANGES ARE PERCEIVED, THE TYPE AND SIZE OF THE WATER BODY, AND VISUAL AND PHYSICAL ACCESS TO THE WATER BODY. LAY PERSONS RELATE TO QUALITY OF WATER IN TERMS OF ITS (1) WILDLIFE SUPPORT CAPACITY, (2) RECREATIONAL OPPORTUNITIES AND (3) AESTHETIC ASPECTS. RESIDENTS NEAR LARGE LAKES WITH GOOD OR UNLIMITED PUBLIC ACCESS RECEIVE THE LARGEST BENEFITS, WHILE THOSE LIVING BY SMALL RIVERS WITH LIMITED PUBLIC ACCESS DERIVE SMALLER BENEFITS. MAGNITUDE OF BENEFITS IS ALSO INFLUENCED BY THE TYPE OF COMMUNITY, ESPECIALLY ITS TRADITIONAL RELATION TO WATER. SEVENTEEN SITE DESCRIPTIONS ARE PRESENTED: AND SAN DIEGO BAY.

COMPARISON OF HYDRAULIC AND NUMERICAL TIDAL MODELS

THORNTON, EB; ROMER, LS.

IN: SYMPOSIUM ON MODELING TECHNIQUES, VOLUME II; 2ND ANNUAL SYMPOSIUM OF

THE WATERWAYS, HARBORS AND COASTAL ENGINEERING DIVISION OF ASCE (2 VOL.),
SAN FRANCISCO, CALIFORNIA, SEPTEMBER 3-5, 1975. AMERICAN SOCIETY OF CIVIL
ENGINEERS, NEW YORK, pp1311-1328, 1975.

ABSTRACT: A COMPARISON WAS MADE OF THE MERITS AND LIMITATIONS OF
HYDRAULIC AND NUMERICAL MODELS. THE DISCUSSION WAS LIMITED TO MODELS
HAVING UNIFORM DENSITY OVER DEPTH AND THE DRIVING FORCE IS THE TIDE ONLY.
THE MODEL COMPARISON WAS FOR SAN DIEGO BAY. PROTOTYPE MEASUREMENTS WERE
USED TO CALIBRATE BOTH MODELS. COMPARABLE RESULTS WERE OBTAINED FROM THE
HYDRAULIC AND NUMERICAL MODELS DEPENDENT ON HOW WELL THEY WERE
CALIBRATED. TECHNIQUES WERE DESCRIBED TO DIVIDE LARGE ARRAYS
REPRESENTING EMBAYMENTS IN THE NUMERICAL MODEL INTO SMALLER SEGMENTS THAT
ARE HANDLED MORE EASILY AND FASTER IN THE COMPUTER. THIS TECHNIQUE CAN
ALLOW USING FINER MESH LENGTHS TO OBTAIN BETTER SPATIAL RESOLUTION.

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL. 5. A
COMPARATIVE ANALYSIS OF CONCEPTUAL SYSTEM PLANS FOR THE SURVEYED PORTS
UNDER THE 'NO DISCHARGE', '1969 AMENDMENTS' AND 'NO SHEEN' CRITERIA

FORSTER, RL; MOYER, JE; PAPACOSTA, CG.

HARRIS (FREDERICK R), INC., NEW YORK. REPORT MA-RD-900-74010,
AUGUST 1973. 463p. AVAILABLE FROM NTIS AS COM74-10012

ABSTRACT: THE TYPES OF OIL WASTES BROUGHT INTO PORTS AS EXEMPLIFIED BY
.... SAN DIEGO, BY NON-MILITARY SHIPPING WERE IDENTIFIED AND
ESTIMATES MADE OF QUANTITIES, BASED ON TOTAL PROHIBITION OF OVERBOARD
DUMPING, THE 1969 AMENDMENTS TO THE 1954 IMCO CONVENTION, AND THE NO
SHEEN CRITERIA, ANTICIPATED FOR 1975 AND 1980. SYSTEMS FOR COLLECTING,
TREATING, AND DISPOSING OF OIL WASTES WITH NO ADDITIONAL ENVIRONMENTAL
DEGRADATION WERE EVALUATED TO DETERMINE IF THEY COULD BE USED WITH THE
NEW WASTE LOADS, OR IF THEY COULD BE MODIFIED TO SUIT THE NEW LOADS, OR
IF NEW SYSTEMS HAD TO BE DEVELOPED. COST ESTIMATES WERE ALSO MADE FOR
THE SELECTED PORTS. THE ENTREPRENEURIAL POTENTIAL FOR PRIVATE INDUSTRY TO
OPERATE THE REVISED OILY WASTE HANDLING SYSTEMS IS DISCUSSED. THE
GOVERNMENT'S ROLE WITH RESPECT TO THE DIFFERENT OPERATIONS, THE SHIP
OPERATOR, AND THE BUILDER IS DESCRIBED. THE IMPACT ON SHIPPING COSTS IS
EVALUATED. A SHORESIDE OIL/WATER SEPARATOR PROCESS FACILITY WHICH COULD
BE USED IN SMALL PORTS HAVING AN OILY WATER WASTE LOAD OF 1.4 MILLION
GALLONS PER YEAR OR LESS IS DESCRIBED.

SHIPS WASTE OFFLOAD SYSTEM STUDY. PHASE I REPORT. PRELIMINARY CONCEPT
DEVELOPMENT AND ECONOMIC COMPARISONS

DAVIS, EJ; SYLVA, C.

AVAILABLE FROM NTIS AS AD-763 454.

US NAVY NAVAL FACILITIES ENGINEERING COMMAND, WASHINGTON, DC. MAY 1973.
145p. REPORT N00025-72-C-0042.

ABSTRACT: THIS STUDY DEVELOPED THE MOST COST EFFECTIVE SYSTEM OF
OFFLOADING SANITARY, HOTEL, OILY, INDUSTRIAL, AND SOLID WASTES FROM NAVAL
SHIPS TO SHORE FACILITIES TO BE PLACED INTO OPERATION BY FY 1976.
ALTERNATIVE SOLUTIONS WERE CONCEIVED, COMPARED, AND A SYSTEM WAS SELECTED
FOR FURTHER DEVELOPMENT. THE PROBLEM WAS DEFINED IN TERMS OF SHIPS
PRESENCE, SHIPS WASTE GENERATION RATES, EXISTING SHORE FACILITIES, AND
FIELD CONDITIONS OF PERFORMANCE BASED ON DATA COLLECTED FROMAND
SAN DIEGO NAVAL COMPLEXES. FIFTEEN DIFFERENT CONCEPTS WERE DEVELOPED AND
ARE PRESENTED IN SKETCHES AND VERBAL DESCRIPTIONS. IT IS CONCLUDED THAT
THE SHIPS' WASTE OFFLOAD SYSTEM NEEDS COULD BE BEST SATISFIED IN TERMS OF
PERFORMANCE AND COST EFFECTIVENESS BY A COMBINED SYSTEM OF FLOATING
PIPELINES & BARGES AS THE PRIMARY AND SECONDARY SYSTEMS RESPECTIVELY. THE
PRIMARY SYSTEM WOULD OPERATE IN THE VICINITY OF DOCKS AND PIERS WITH
PIERSIDE COLLECTION SYSTEMS FOR SANITARY, HOTEL, AND OILY WASTES. SOLID
WASTE WOULD CONTINUE TO BE OFFLOADED DIRECTLY FROM SHIPS ONTO THE PIER
USING EXISTING METHODS. INDUSTRIAL WASTE WOULD BE CONTAINERIZED AND
OFFLOADED TO THE PIER IN A MANNER SIMILAR TO SOLID WASTE. THE SECONDARY
SYSTEM WOULD OPERATE AT ANCHORAGES AND REMOTE BERTHING POSITIONS WHERE
PIERSIDE COLLECTION SYSTEMS WERE UNAVAILABLE.

A PROXIMATE BIOLOGICAL SURVEY OF SAN DIEGO BAY, CALIFORNIA.

PEELING, T. J.

NAVAL UNDERSEA CENTER (SAN DIEGO) REPORT NO. NUC TP 389, REVISION 1,
JANUARY 1975. 85p. AVAILABLE FROM NTIS AS AD-A007 469.

ABSTRACT: THE RESULTS OF A SURVEY OF SAN DIEGO BAY CONDUCTED FROM 12/72 TO 6/3 ARE PRESENTED, INCLUDING DATA ON THE HISTORICAL USES OF THE BAY, CHANGES IN WATER QUALITY, AND PAST AND PRESENT BIOLOGICAL CONDITIONS. ON THE BASIS OF THESE DATA THE FOLLOWING CONCLUSIONS MAY BE DRAWN: AFTER A PERIOD OF DECLINE, WATER QUALITY IN SAN DIEGO BAY IS IMPROVING; DOMESTIC AND INDUSTRIAL DISCHARGES INTO THE BAY HAVE BEEN VIRTUALLY ELIMINATED, EXCEPT FOR RAW SEWAGE ORIGINATING ABOARD MILITARY AND CIVILIAN VESSELS AND LIMITED AMOUNTS OF COOLING AND THAWING WATERS; STATE AND LOCAL WATER QUALITY REQUIREMENTS ARE STRINGENT AND WELL ENFORCED, AND IT IS ESTIMATED THAT MOST WASTE DISCHARGES INTO THE BAY, INCLUDING ALL THOSE FROM MILITARY SOURCES, WILL BE ELIMINATED BY 1980; AND A NUMBER OF MARINE ORGANISMS, INCLUDING COMMERCIAL AND RECREATIONALLY IMPORTANT SPECIES, ARE ABUNDANT IN THE BAY.

A FAIL-SAFE SUBAQUEOUS CONCRETE SEWER
EMERSON, G. G.

CIVIL ENGINEERING-ASCE 45(9):77-78, SEPTEMBER 1975.

ABSTRACT: TO IMPROVE COLLECTION SYSTEM FOR THE CITY OF SAN DIEGO, IT WAS NECESSARY TO ADD A SECOND FORCE MAIN. BECAUSE THE NEW PIPELINE WOULD TRAVEL TWO MILES SUBAQUEOUSLY ALONG THE FLOOR OF THE SAN DIEGO BAY, VERY STRINGENT SPECIFICATIONS FOR A LEAK-PROOF SEWER FORCE MAIN WERE REQUIRED. A CONCRETE AND STEEL JOINT WAS DEVELOPED OF A DESIGN USING THREE O-RING GASKETS AND BOTH BELL AND SPIGOT ELEMENTS AT EACH END OF EACH PIPE SECTION. THE PIPE ITSELF IS MADE OF A ROD-WRAPPED STEEL CYLINDER AND CAGE AND IS ENCASED IN A 13-INCH WALL OF VERTICALLY CAST CONCRETE. THE CONFIGURATION OF A DOUBLE MATED JOINT SYSTEM WITH A SINGLE O-RING GASKET AROUND A STEEL SPIGOT AND TWO O-RING GASKETS AROUND A DOUBLED GROOVED CONCRETE SPIGOT PROVIDES A WATER-TIGHT SEAL, PROTECTING THE STEEL JOINT RINGS FROM THE EFFECTS OF SALT WATER. A UNIQUE MINUS-PRESSURE TECHNIQUE IS USED TO JOIN THE TWO PIPE SECTIONS UNDER WATER DURING INSTALLATION. TO PLACE THE PIPELINE IN ITS LOCATION AT SAN DIEGO BAY, MATERIAL WAS DREDGED FROM THE BAY FLOOD AND RELEASED AS NATIVE BACKFILL OVER THE PIPE; THE TRENCH CREATED WAS GRADED FOR PIPE INSTALLATION, AND THE PIPE WAS SUBMERGED. WHEN ALL THREE O-RINGS WERE IN PROPER CONTACT, AS DETERMINED WITH A GAGE, A VACUUM LINE WAS APPLIED BETWEEN THE BELLS TO PULL THE JOINT INTO A TOTAL, WATER-TIGHT SEAL. AN AVERAGE OF FOUR 57-TON PIPE SECTIONS WERE INSTALLED PER DAY. INTERNAL TESTING OF EACH PIPE JOINT PLUS CLEANING OF THE ANNULAR SPACE BETWEEN O-RING GASKETS WERE ALSO PERFORMED.

SAN DIEGO BAY MODEL STUDY; HYDRAULIC MODEL INVESTIGATION.

FISACKERLY, GM.

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS. TECHNICAL REPORT H-74-12, NOVEMBER 1974. 144p.

ABSTRACT: THE SAN DIEGO BAY MODEL WAS A FIXED-BED MODEL CONSTRUCTED OF CONCRETE TO SCALES OF 1:500 HORIZONTALLY AND 1:100 VERTICALLY. THE MODEL WAS EQUIPPED FOR THE ACCURATE REPRODUCTION OF TIDES, TIDAL CURRENTS, AND OTHER SIGNIFICANT PROTOTYPE PHENOMENA. THE PURPOSE WAS TO DETERMINE THE EFFECTS OF A SECOND ENTRANCE INTO THE BAY ON THE HYDRAULIC AND FLUSHING CHARACTERISTICS OF THE BAY. MODEL VERIFICATION TESTS INDICATED THAT HYDRAULIC PHENOMENA REPRODUCED IN THE MODEL WERE IN SATISFACTORY AGREEMENT WITH THOSE OF THE PROTOTYPE FOR COMPARABLE CONDITIONS. TESTS WERE CONDUCTED WITH PLANS FOR TWO DIFFERENT SECOND ENTRANCE LOCATIONS NEAR THE SOUTH END OF THE BAY INSTALLED IN THE MODEL. MAXIMUM CURRENT VELOCITIES THROUGHOUT THE NORTHERN HALF OF THE BAY WERE GENERALLY REDUCED BY ABOUT 70 PERCENT BY BOTH PLANS. THE RESULTS OF DYE TRACER TESTS SHOWED THAT BOTH PLANS WOULD APPRECIABLY IMPROVE THE OVERALL FLUSHING CHARACTERISTICS OF THE BAY, WITH THE NORTHERN MOST SECOND ENTRANCE PRODUCING THE MOST IMPROVEMENT IN FLUSHING. WITH EITHER SECOND ENTRANCE IN THE MODEL, THE NODAL POINT OF THE INCOMING TIDE WAS SOMEWHAT TO THE SOUTH OF THE NODAL POINT OF THE OUTGOING TIDE, THUS CREATING A

CIRCULATION PATTERN WITH A NET FLOW INTO THE BAY THROUGH THE EXISTING ENTRANCE AND A NET OUTFLOW THROUGH THE PROPOSED SECOND ENTRANCE.

INDUSTRIAL WASTEWATER SAMPLING METHODS AT NORTH ISLAND.

LONGLEY-COOK, B. A.; LONGLEY-COOK, M. T.

NAVAL AIR REWORK FACILITY, SAN DIEGO.

IN: PROCEEDINGS OF NAVAL ENVIRONMENTAL PROTECTION DATA BASE

INSTRUMENTATION WORKSHOP, JULY 11-12, 1972, CHANNEL ISLANDS HARBOR: NAVAL CIVIL ENGINEERING LABORATORY PUBLICATION, p38-39, 1972.

ABSTRACT: NORTH ISLAND NAVAL AIR STATION WAS SELECTED TO BE ONE OF THE PILOT TEST SITES OF THE ENVIRONMENTAL PROTECTION DATA BASE. THESE TESTS ARE CONDUCTED BY THE NAVAL AIR REWORK FACILITY AT NORTH ISLAND IN THE AREAS OF WATER POLLUTION, TOXIC CHEMICAL SEEPAGE, AIR POLLUTION, NOISE POLLUTION, AND MATHEMATICAL MODELING. IN THE AREA OF WATER POLLUTION, THE SOURCES OF POLLUTANTS ARE CHIEFLY THE MANY INDUSTRIAL COMPLEXES OF THE REWORK FACILITY. MAJOR SOURCES INCLUDE PLATING SHOPS, JET ENGINE TEST CELLS, AND PAINT AND STRIP OPERATIONS. ALMOST ALL OF THE INDUSTRIAL WASTES ARE DISCHARGED INTO SAN DIEGO BAY VIA THE STORM DRAINAGE SYSTEM. AN ESTIMATED ONE MILLION GALLONS A DAY OF INDUSTRIAL WASTE IS DISCHARGED FROM 18 OUTFALLS.

REVERSE OSMOSIS MEMBRANE FILTERS FOR SEAWATER PRETREATMENT.

FOREMAN, GE; KREMEN, SS.

GENERAL ATOMIC CO., SAN DIEGO, OFFICE OF WATER, REPORT INT-OSW-RDPR-74-926, FEBRUARY 1974. 47p. OSW CONTRACT 14-30-3094.

AVAILABLE FROM NTIS AS PB-227 802/AS.

ABSTRACT: THE OBJECTIVE WAS TO ESTABLISH THE TECHNICAL AND ECONOMIC FEASIBILITY OF TWO-STAGE SEAWATER SYSTEMS UTILIZING LOW PRESSURE SPIRAL ELEMENTS IN A COMBINED PRETREATMENT/FIRST-STAGE DESALTING STEP. SPIRAL-WOUND ELEMENTS CONTAINING SELECTED MEMBRANES WERE FABRICATED AND TESTED ON SAN DIEGO BAY WATER, AND THE EFFECTIVENESS OF LOW-PRESSURE PRETREATMENT ELEMENTS WAS EVALUATED BY TESTING HIGH-PRESSURE SPIRAL ELEMENTS. LOW PRESSURE ELEMENTS PROVIDED NOMINAL WATER FLUXES OF 13 GAL/FT²-DAY WITH NEGLIGIBLE SALT REJECTION AT 50 TO 180 PSI, 20% REJECTION AT 250 PSI, AND 50% REJECTION AT 500 PSI. THESE ELEMENTS RESPONDED WELL TO THE CHEMICAL FLUSHING TECHNIQUES USED DURING TESTING. ECONOMIC ANALYSIS BASED ON A PLANT HAVING A SIZE IN THE MILLION GALLON PER DAY SCALE INDICATED THAT POTABLE WATER COULD BE OBTAINED FROM SEAWATER AT AN INITIAL COST RANGING BETWEEN \$1.25 AND \$1.50/1000 GALLONS.

BENEFIT OF WATER POLLUTION CONTROL ON PROPERTY VALUES.

DORNBUSCH, DM; BARRAGER, SM. from DORNBUSCH (DAVID M.) AND CO., SAN FRANCISCO.

ENVIRONMENTAL PROTECTION AGENCY, SOCIOECONOMIC STUDIES

SERIES REPORT, EPA-600/5-73-005, OCTOBER 1973. 148p.

Government Printing Office Superintendent of Documents

EP1.23:600/5-73-005. Microfiche from NTIS as PB-228 590.

ABSTRACT: THIS STUDY WAS UNDERTAKEN TO DETERMINE THE CURRENT STATE-OF-KNOWLEDGE CONCERNING THE MEASUREMENT OF THE POTENTIAL BENEFIT OF WATER POLLUTION CONTROL ON PROPERTY VALUES, AND TO ANALYZE THE RELATIONSHIP BETWEEN WATER QUALITY PARAMETERS AND PROPERTY VALUES AT SEVERAL SITES WHERE WATER POLLUTION HAS BEEN SUBSTANTIALLY REDUCED IN RECENT YEARS. MULTIPLE-REGRESSION ANALYSIS AND AN INTERVIEW TECHNIQUE WERE EMPLOYED TO STUDY THE RELATIONSHIP BETWEEN RESIDENTIAL AND RECREATIONAL PROPERTY VALUES AND WATER QUALITY COMPONENTS. STUDY SITES WERE LOCATED ON SAN DIEGO BAY AND IT WAS FOUND THAT EFFECTIVE POLLUTION ABATEMENT ON BADLY POLLUTED WATER BODIES CAN INCREASE THE VALUE OF SINGLE-FAMILY HOMES SITUATED ON WATERFRONT LOTS BY 8 TO 25 PERCENT, AND THAT THESE WATER QUALITY IMPROVEMENTS CAN AFFECT PROPERTY VALUES UP TO 4000 FEET AWAY FROM THE WATER'S EDGE. THE MEASURABLE WATER QUALITY PARAMETERS WHICH HAVE THE GREATEST INFLUENCE ON PROPERTY VALUES ARE DISSOLVED OXYGEN CONCENTRATION, FECAL COLIFORM CONCENTRATIONS, CLARITY, VISUAL POLLUTANTS (TRASH AND DEBRIS), TOXIC CHEMICALS, AND PH. CASE STUDY RESULTS WERE COMBINED WITH A 1971 EPA WATER POLLUTION SURVEY TO ESTIMATE THE NATIONAL BENEFIT

EXPRESSED IN INCREASED RESIDENTIAL, RECREATIONAL AND RURAL WATERFRONT PROPERTY VALUES, TO BE GAINED FROM WATER POLLUTION ABATEMENT. THE ESTIMATED CAPITAL VALUE OF THE BENEFIT RANGES FROM .6 TO 3.1 BILLION DOLLARS, WITH A MOST LIKELY BENEFIT OF 1.3 BILLION DOLLARS.

INVESTIGATION OF SEICHE ACTIVITY IN WEST COAST HARBORS.
ELLIS, GE; COLLINS, JL.

IN: PROCEEDINGS OF EIGHTH CONFERENCE ON COASTAL ENGINEERING,
MEXICO CITY, NOVEMBER 1962, AMERICAN SOCIETY OF CIVIL
ENGINEERS, PART 1, CHAP 8, pp114-126, 1963.

ABSTRACT: THE SEICHE ACTIVITY IN SEVERAL WEST COAST HARBORS HAS BEEN INVESTIGATED. THIS INVESTIGATION HAS BEEN ORIENTED MAINLY AS AN EXPERIMENTAL PROBLEM IN WHICH A NEW OCEANOGRAPHIC INSTRUMENT, THE SOLION INFRASONIC HYDROPHONE IS USED TO DETECT BOTTOM PRESSURE FLUCTUATIONS OVER A RANGE OF 5 SEC TO 1800 SEC PERIODS. A LIMITED THEORETICAL CONSIDERATION OF THIS PROBLEM IS PRESENTED IN AN ATTEMPT TO CORRELATE THE SEICHE PHENOMENON TO THE HARBOR GEOMETRY. THE DATA PRESENTED ARE FOR SAN DIEGO BAY AND THIS ANALYSIS CONSISTS OF PREWHITENING THE DATA WITH BANDPASS FILTERS AND THEN COMPUTING THE POWER SPECTRA BY THE METHOD OF BLACKMAN AND TUKEY. A SHORT DISCUSSION IS PRESENTED TO RELATE THE USE OF THIS TYPE OF DATA TO THE STUDY OF TWO HARBOR ENGINEERING PROBLEMS, SHIP MOORING AND CLOSE QUARTER NAVIGATION.

WATER DISTRIBUTION AND SANITARY SEWERAGE SYSTEMS BACKGROUND AND POLICY STUDY.

SAN DIEGO COUNTY PLANNING DEPT. TECHNICAL REPORT, FEBRUARY 1972. 75p.
HUD CALIFORNIA P-294(G).

ABSTRACT: THE FUTURE DEVELOPMENT OF THE SAN DIEGO REGION WILL DEPEND CONSIDERABLY ON THE FUTURE SUPPLY OF WATER AND THE SEWAGE SERVICE AVAILABLE. A SURVEY OF BOTH SERVICES WAS UNDERTAKEN FOR THIS REGION WHICH IS ESTIMATED TO GROW TO 2.35 MILLION BY 1990. MAJOR RECOMMENDATIONS INCLUDE: (1) ESTABLISHMENT OF LAND-USE POLICIES AND POPULATION GOALS, (2) REGIONAL WATER RESOURCE MANAGEMENT, PREFERABLY A DRAINAGE BASIN APPROACH, AND (3) COOPERATIVE PLANNING BY LOCAL UNITS OF GOVERNMENT. THE SAN DIEGO REGION USES 254 MGD OF MUNICIPAL WATER, OF WHICH 84 PERCENT IS IMPORTED FROM THE COLORADO RIVER THROUGH THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA. WITH THE USE OF COLORADO RIVER WATER BY ARIZONA, THE SUPPLY TO CALIFORNIA WILL BE DRASTICALLY CUT AND OTHER WATER SOURCES HAVE BEEN CONTRACTED FOR. WATER TREATMENT AND DISTRIBUTION IN THE SAN DIEGO REGION BOTH NEED IMPROVEMENT, REQUIRING LARGE CAPITAL EXPENDITURES. SEWAGE TREATMENT IS SIMILARLY INADEQUATE, WITH COLLECTION SYSTEMS NEEDING EXPANSION AND TREATMENT FACILITIES OFTEN OPERATING AT OR NEAR CAPACITY. POLLUTION EXISTS FROM SEPTIC TANKS AND ALSO EXISTS IN COASTAL LAGOONS, ALTHOUGH SAN DIEGO BAY ITSELF IS FREE OF POLLUTION EXCEPT FROM SHIPS. FUTURE WATER SUPPLY DEVELOPMENT WILL INCLUDE WASTE WATER RECLAMATION AND DESALINATION.

TEMPERATURE FLUCTUATIONS AT A FIXED POSITION IN SAN DIEGO BAY.
SMITH, EL.

NAVAL UNDERSEA RESEARCH AND DEVELOPMENT CENTER (San Diego) REPORT NUC TP 298, JULY 1972. 28p. AVAILABLE FROM NTIS AS AD-744 921.

ABSTRACT: THE THERMAL STRUCTURE OF SAN DIEGO BAY AND THE MECHANISMS THAT SIGNIFICANTLY INFLUENCE IT WERE INVESTIGATED. THERE ARE OSCILLATIONS IN THE THERMAL STRUCTURE THAT ARE RELATED TO TIDAL FORCES WITH PERIODS OF 24.6, 12.3, 8.3, AND 6.2 HR. A TWO-LAYER SYSTEM DEVELOPS IN THE SPRING AND REMAINS UNTIL AUTUMN. THE SURFACE LAYER RESPONDS IN PHASE TO THE SURFACE TIDES, AND THE BOTTOM LAYER FOLLOWS THE PHASE OF THE SURFACE TIDE IN TIME FROM 0.5 TO 1.5 HR. TEMPERATURE INVERSIONS OCCUR IN THE SPRING AND AUTUMN, AT NIGHT, AND ONLY DURING THE LOW-WATER PHASE OF SPRING TIDES. THE BAY HAS AN ANNUAL TEMPERATURE CYCLE: THE MAXIMUM TEMPERATURES OCCUR IN JULY AND AUGUST AND THE MINIMUM IN JANUARY AND FEBRUARY. THE ANNUAL TEMPERATURE CHANGE FOR SURFACE AND BOTTOM WATER IS 17.4 DEG C. THE VERTICAL TEMPERATURE GRADIENT IS MAXIMUM DURING THE SUMMER AT ABOUT 0.5 DEG C/M.

WATER AND WASTEWATER RESEARCH IN SAN DIEGO.

CROSSLEY, EI; CONN, WM.

THE AMERICAN CITY 84(10):91-93, 95, OCTOBER 1969.

ABSTRACT: THE SAN DIEGO UTILITIES DEPARTMENT HAS THREE RESEARCH PROGRAMS UNDERWAY; ONE DEALING WITH WATER RECLAMATION (DESALTING ALSO REUSE), ANOTHER WITH SEWAGE ODORS, AND THE THIRD WITH THE EVALUATION OF MATERIALS AND COATINGS FOR STORING AND CONVEYING PRODUCT AND BLENDED WATER. A PILOT UNIT IS USED AS A CONTROL TOOL TO STUDY KNOWN ODOR-CONTROL AGENTS. OTHER APPROACHES SUCH AS CHELATED METAL COMPOUNDS AND PHASE CHANGES BY OXIDATION, ADSORPTION AND PHOTO-CHEMICAL REACTIONS WERE STUDIED ALSO. SAN DIEGO HAS TWO TRADITIONAL DESIGN PLANTS THAT PRODUCE WATER FOR IRRIGATION OF LAWNS AND ORNAMENTAL SHRUBS. THE PLANTS REDUCE BOD WITH NO ATTEMPT TO REDUCE DISSOLVED SOLIDS. THE FEDERAL GOVERNMENT TRANSFERRED THE DESALTING PLANT AT POINT LOMA TO CUBA BUT LATER BUILT A SECOND PLANT (CLAIR EAGLE) ON SAN DIEGO BAY. MEANWHILE THE CITY PURCHASED TWO 1,000 GPD TUBULAR CONFIGURATIONS FOR TESTING. THEY HAVE OPERATED 380 HOURS ON RAW SEWAGE AND ARE GIVING 70 PERCENT RECOVERY FROM A STREAM CONTAINING AN AVERAGE OF 2,000 PPM DISSOLVED SOLIDS AND 300 PPM SUSPENDED SOLIDS. THE PRODUCT FROM LOW-REJECTION MEMBRANES CONTAINS ABOUT 500 PPM TOTAL DISSOLVED SOLIDS, WHILE THAT FROM OTHER MEMBRANES CONTAINS 10 TO 50 PPM. TRANSFER OF DESALTED WATER IN CEMENT LINED PIPES SHOWED THAT CHANGES IN CHEMICAL COMPOSITION WERE OCCURRING, (INCREASE IN DISSOLVED SOLIDS) ALSO THAT PIPE INTERIOR WAS SOFTENED. PRESENT TESTS INVOLVE DIFFERENT PIPES, METAL ALLOYS AND PAINTS.

OIL SPILL CHARACTERISTICS AND STATISTICS.

LACEY, JM.

IN: IMMEDIATE COST-EFFECTIVE ABATEMENT OF WATER POLLUTION FROM NAVY SHIPS, NAVAL POSTGRADUATE SCHOOL, pp211-231, MARCH 1972.

ABSTRACT: BETWEEN JULY 1, 1966, AND SEPTEMBER 30, 1971, THERE WERE 593 OIL SPILLS REPORTED IN SAN DIEGO BAY. THE ESTIMATED COST OF CLEANING UP THESE SPILLS IS \$256,187. 64% OF THESE SPILLS AND 67% OF THE TOTAL COSTS OCCURRED IN THE AREA OF THE NAVAL STATION. DESTROYER-TYPE SHIPS WERE RESPONSIBLE FOR ABOUT 32% OF THE TOTAL SPILLS AND 24% OF THE COSTS. TENDERS AND REPAIR SHIPS INCURRED THE HIGHEST AVERAGE COST OF \$1,381 FOR EACH SPILL, WHILE THE FUELING PIER AVERAGED \$587 PER SPILL. A LINEAR REGRESSION BETWEEN CLEANUP COST AS THE DEPENDENT VARIABLE AND THE FREQUENCY OF OIL SPILLS AS THE INDEPENDENT VARIABLE GENERATED AN AVERAGE FREQUENCY OF OIL SPILLS OF 9.4, AN AVERAGE CLEAN-UP COST OF \$4,066, AND A CORRELATION COEFFICIENT OF 0.73. THE DATA FURTHER INDICATES THAT A HIGH MONTHLY CLEAN-UP COST TENDS TO BE FOLLOWED BY DOWNWARD SLOPING COSTS FOR THE NEXT ELEVEN MONTHS AFTER WHICH COST STARTS TO SHARPLY INCREASE AGAIN. ONE POSSIBLE EXPLANATION FOR THIS PHENOMENON IS THE TRADITIONALLY HIGH SUMMER PERSONNEL TURNOVER RATES IN THE NAVY. REGRESSIONS OF COST ON TIME AND FREQUENCY ON TIME PRODUCED LOW CORRELATION COEFFICIENTS.

CHARACTERIZATION AND TREATMENT OF BILGE AND BALLAST WATER.

HATLEBERG, C. J.

IN: IMMEDIATE COST-EFFECTIVE ABATEMENT OF WATER POLLUTION FROM NAVY SHIPS, NAVAL POSTGRADUATE SCHOOL, pp180-210, MARCH 1972.

ABSTRACT: THE PROBLEM OF CONTROLLING OIL POLLUTION CREATED BY THE DISCHARGE OF BILGE WATER FROM US NAVY SHIPS WAS INVESTIGATED. THE INVESTIGATION WAS BASED ON SAMPLES OF BILGE WATER OBTAINED FROM SHIPS IN THE SAN DIEGO AND LONG BEACH HARBORS. OIL IN BILGE WATER WAS FOUND TO RANGE IN CONCENTRATION FROM 100 PPM TO 100 PERCENT AND TO BE OF THE SAME TYPE AS FOUND IN THE PIPING SYSTEM OF THE SPACES ABOVE THE BILGES. SUCH OIL CONCENTRATIONS ARE ABOVE NAVY EFFLUENT STANDARDS; CONSEQUENTLY, THE PUMPING OF UNTREATED BILGE WATER FROM ANY SHIP LEVEL IS NOT AN ACCEPTABLE PROCEDURE. IT IS THUS NECESSARY TO TREAT THE BILGE WATER IN SOME MANNER IN ORDER TO REDUCE THE OIL CONCENTRATION PRIOR TO DISCHARGE. OF THE MANY OIL REMOVAL METHODS EXAMINED, ONLY THREE WERE APPLICABLE AS TEMPORARY SOLUTIONS FOR CONTROLLING BILGE WATER POLLUTION. THESE METHODS WERE BIOLOGICAL DEGRADATION, BILGE BALLAST TRANSFER, AND USAGE OF A HARBOR

DONUT. MECHANICAL SEPARATION SYSTEMS SUCH AS CENTRIFUGES AND COALESCERS WERE DISCARDED AS SOLUTIONS BECAUSE OF THEIR COST, INSTALLATION TIME, AND FAILURE TO MEET EFFLUENT SPECIFICATIONS. BIOLOGICAL DEGRADATION APPEARED TO BE THE MOST ATTRACTIVE TEMPORARY SOLUTION BECAUSE OF LOW COST, RAPID IMPLEMENTATION, AND TOTAL OIL REMOVAL POTENTIAL.

THE POTENTIAL OF PHYSICAL MODELS TO INVESTIGATE ESTUARINE WATER QUALITY PROBLEMS.

IN: TECHNICAL CONFERENCE ON ESTUARIES OF THE PACIFIC NORTHWEST 1971.

OREGON STATE UNIVERSITY, CORVALLIS. ENGINEERING EXPERIMENT STATION CIRCULAR, Number 42, pp4-28.

ABSTRACT: PHYSICAL MODELS FOR WATER QUALITY INVESTIGATIONS ARE DESCRIBED. POSSIBLY BECAUSE THE PACIFIC NORTHWEST WAS DEVELOPED AND EXPLOITED AT A MUCH LATER DATE THAN WERE THE ATLANTIC AND GULF COASTS AND CONSEQUENTLY HAS BEEN EXPOSED TO MANMADE POLLUTANTS FOR A LESSER PERIOD OF TIME, GREATER USE WAS MADE OF PHYSICAL MODELS FOR WATER QUALITY STUDIES IN THE ATLANTIC AND GULF REGIONS THAN IN THE PACIFIC NORTHWEST, THUS EMPHASIZING THAT MORE INVESTIGATIONS SHOULD BE CONDUCTED BEFORE ESTUARINE POLLUTION BECOMES CRITICAL IN THIS AREA ALSO. THE FUNCTIONS OF FOUR PHYSICAL MODELS OF ... (none San Diego Bay) ... ARE DISCUSSED. THEY HAVE BEEN VERIFIED TO REPRODUCE TIDES, TIDAL AND RIVER CURRENTS, AND SALINITIES FOR PROTOTYPE CONDITIONS. TESTS OF POLLUTANT RELEASE AND DISPERSION HAVE BEEN CONDUCTED TO SIMULATE FLUSHING CAPABILITIES. SALINITY INTRUSION, NAVIGATION, DREDGING, AND SHOALING PROBLEMS ARE TYPICAL OF THE STUDIES CONDUCTED ON THESE MODELS. SCOPE OF UTILIZATION OF THESE AND THE MODELS OF SAN DIEGO BAY, AND ARE POINTED OUT.

WATER POLLUTION BY SEWAGE FROM WATER CRAFT.
SEABLOOM, RW.

IN: COLLOQUE INTERNATIONAL SUR L'EXPLOITATION DES OCEANS, BORDEAUX, FRANCE, MARCH 1971. THEME I, TOME I. 13 P.

ABSTRACT: THE POLLUTION BY WATER CRAFT WASTE DISCHARGES IN AND SAN DIEGO BAY WAS INVESTIGATED. BACTERIAL COUNTS WERE TAKEN AND THE ECOLOGY OF THE AREAS STUDIED. POLLUTION CONTROL DEVICES MACERATOR-DISINFECTORS, SELF CONTAINED RECIRCULATING FLUSH TOILETS, INCINERATORS, AND HOLDING TANKS ARE SOME OF THE POSSIBILITIES CONSIDERED TO AID IN ABATEMENT OF THIS POLLUTION PROBLEM. INTERNATIONAL LEGISLATION AND ADDITIONAL RESEARCH TO IMPROVE THE TECHNOLOGY FOR HANDLING VESSEL WASTES ARE SUGGESTED FOR IMPROVEMENT OF THE PRESENT MINIMALLY ADEQUATE SYSTEMS.

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS (PART II - ESTUARY MODELS).

BOBB, WH; BOLAND, RA, JR; HERMANN, FA, JR.

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.

OFFICE OF SALINE WATER RESEARCH AND DEVELOPMENT PROGRESS REPORT NO. 736, OCTOBER 1971. 183p.

ABSTRACT: MODEL STUDIES WERE CONDUCTED TO STUDY THE DISPERSION OF HEATED WASTE BRINE FROM A DESALTING PLANT OUTFALL. THE EXISTING FIXED-BED MODELS OF SAN DIEGO BAY WERE CHOSEN AS TYPICAL ESTUARIES. THE OBJECTIVES OF THE TESTS WERE TO DETERMINE DISPERSION RATES OF THE BRINE WASTE, TO DEFINE THE DYNAMIC EQUILIBRIUM DISTRIBUTION OF THE WASTE AFTER A PERIOD TIME. RESULTS INDICATE: (A) IN ESTUARIES SUCH AS SAN DIEGO BAY, WITH LOW TIDAL CURRENT VELOCITIES AND VERY LITTLE FRESH WATER FLOW INTO THE SYSTEM, DISPERSION AND FLUSHING RATES WILL BE EXTREMELY SLOW, AND THE TIME TO REACH DYNAMIC EQUILIBRIUM WILL BE COMPARATIVELY LONG;

THE POTENTIAL OF PHYSICAL MODELS TO INVESTIGATE ESTUARINE WATER QUALITY PROBLEMS.

SIMMONS, H.

IN: PROCEEDINGS OF 1971 TECHNICAL CONFERENCE ON ESTUARIES OF THE PACIFIC NORTHWEST, OREGON STATE UNIVERSITY ENGINEERING EXPERIMENT STATION CIRCULAR NO 42, P 4-28, 1971.

ABSTRACT: HYDRAULIC MODELS WERE MADE OF THE IN ADDITION SOME DISCUSSION IS GIVEN OF SAN DIEGO BAY THESE MODELS HAVE BEEN

VERIFIED TO REPRODUCE TIDES, TIDAL AND RIVER CURRENTS, AND SALINITIES FOR PROTOTYPE CONDITIONS. TESTS OF POLLUTANT RELEASE AND DISPERSION HAVE BEEN CONDUCTED TO SIMULATE FLUSHING CAPABILITIES ON THESE AND OTHER MODELS. SALINITY INTRUSION, NAVIGATION, DREDGING AND SHOALING PROBLEMS ARE TYPICAL OF THE STUDIES THAT MAY BE MADE USING THESE MODELS.

PREDICTING CONSTRUCTION EFFECTS BY TIDAL MODELING.

SIMMONS, HB; HARRISON, J; HUVAL, CJ.

WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS. MISCELLANEOUS PAPER H-71-6, APRIL 1971. 37 P.

ABSTRACT: TIDAL MODELING IS DIVIDED INTO TWO AREAS: PHYSICAL SCALE MODELING AND MATHEMATICAL MODELING. PHYSICAL MODELING ENTAILS DEVELOPING, CONSTRUCTING, VERIFYING, AND TESTING A SCALE MODEL OF A PROTOTYPE. MATHEMATICAL MODELING ENTAILS THE SAME STEPS FOR A SET OF MATHEMATICAL AND/OR LOGICAL EXPRESSIONS WHOSE SOLUTION, USUALLY ON A DIGITAL COMPUTER, YIELDS THE DESIRED PARAMETERS. THE MODELING TECHNIQUE AND SOLUTION METHOD FOR A SPECIFIC PROBLEM ARE DETERMINED BY THE PROBLEM ITSELF, THE TYPE AND PRECISION OF DESIRED RESULTS, AND AVAILABLE PERSONNEL AND PHYSICAL RESOURCES. THREE SPECIFIC APPLICATIONS OF PHYSICAL MODELS ARE DISCUSSED: A STUDY OF FLUSHING CHARACTERISTICS OF SAN DIEGO BAY WITH VARIOUS SECOND ENTRANCE PLANS, MATHEMATICAL MODELS ARE DISCUSSED, WITH EMPHASIS ON MATHEMATICAL MODELS FOR PREDICTING ONE- AND TWO-DIMENSIONAL TIDAL FLOWS. SPECIFIC EXAMPLES ARE AND A GENERAL SURGE STUDY. PHYSICAL AND MATHEMATICAL MODELING TECHNIQUES EACH HAVE CERTAIN ADVANTAGES. EXTENSIVE EMPLOYMENT OF BOTH TECHNIQUES SHOWS CONCLUSIVELY THAT COMPLEMENTARY USE TO RESOLVE DIFFERENT ASPECTS OF A COMPREHENSIVE TIDAL PROBLEM USUALLY PROVIDES OPTIMUM RESULTS.

DOCUMENTATION REPORT--FWQA DYNAMIC ESTUARY MODEL.

FEIGNER, KENNETH D.; HARRIS, HOWARD S.

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. WATER QUALITY OFFICE.

JULY 1970. 248p. Available from NTIS as PB-197 103.

ABSTRACT: THE NECESSARY THEORY, BACKGROUND, AND GUIDELINES FOR APPLYING THE FWQA DYNAMIC ESTUARY MODEL TO AN ARBITRARY ESTUARY WAS PRESENTED. THE DISCUSSION REFLECTED FWQA EXPERIENCE IN APPLYING THE MODEL TO AND SAN DIEGO BAY ESTUARIES. THE MODEL WAS UTILIZED TO SIMULATE A WIDE VARIETY OF HYDRAULIC AND WATER QUALITY CONDITIONS IN THESE TWO SYSTEMS, AND THROUGH THE COURSE OF ITS DEVELOPMENT, TESTING, AND USE, UNDERWENT SIGNIFICANT CHANGE. THE MODEL REPRESENTED THE TWO-DIMENSIONAL FLOW AND DISPERSION CHARACTERISTICS OF AN ESTUARY AND COULD BE APPLIED TO ANY ESTUARY WHEREIN VERTICAL STRATIFICATION WAS EITHER ABSENT OR LIMITED TO RELATIVELY SMALL AREAS WITHIN THE ESTUARY. THE MODEL COULD ACCOMMODATE BOTH CONSERVATIVE CONSTITUENTS INCLUDING THE INTERRELATIONSHIP BETWEEN BIOCHEMICAL OXYGEN DEMAND (BOD) AND DISSOLVED OXYGEN (DO). TWO SEPARATE, BUT COMPATIBLE COMPONENTS WERE DEVELOPED: A HYDRAULIC PROGRAM (DYNHYD) AND A QUALITY PROGRAM (DYNQUA). A THIRD PROGRAM, A HARMONIC REGRESSION ANALYSIS (REGAN) WAS UTILIZED TO REDUCE INPUT REQUIREMENTS FOR SPECIFYING THE TIDAL CONDITIONS IMPOSED ON THE SYSTEM. A HYDRAULIC EXTRACT PROGRAM (HYDEX) SUMMARIZED THE HYDRAULIC OUTPUT WHILE A QUALITY EXTRACT PROGRAM (QUALEX) SUMMARIZED THE OUTPUT FROM THE QUALITY PROGRAM. A FINAL PROGRAM (DATAP) WAS DEVELOPED TO PREPARE BASIC INPUTS TO THE HYDRAULIC PROGRAM.

ESTUARINE CLEAN WATER COST-BENEFIT STUDIES.

STONE, R; FRIEDLAND, H.

FIFTH INTERNATIONAL WATER POLLUTION RESEARCH CONFERENCE, SAN FRANCISCO, JULY 26-AUGUST 1, 1970. PREPRINT, PAPER III-17. 8 pages.

ABSTRACT: A SOCIOECONOMIC ANALYSIS WAS MADE OF THE BENEFICIAL USES OF SAN DIEGO BAY IN RELATIONSHIP TO THE IMPROVEMENT OF THE BAY'S WATER QUALITY FOLLOWING DIVERSION OF SEWAGE FROM THE BAY TO THE PACIFIC OCEAN IN 1963. AN INITIAL APPROACH BASED UPON LAND VALUES FOUND THAT AREAS WITHIN 8 MILES OF THE BAY INCREASED 27% MORE THAN LAND VALUES OF A ZONE UP TO 15 MILES MORE DISTANT. APPROXIMATE COSTS ARE TABULATED OF SEVERAL ALTERNATIVES INCLUDING 3 DEGREES OF TREATMENT AND DIVERSION OF EFFLUENTS TO THE OCEAN. ECONOMIC BENEFITS ARE STATED FOR VARIOUS RECREATIONAL USES

WITH ALTERNATIVE TREATMENT PROGRAMS. (NO BASIS IS GIVEN FOR THESE BENEFITS). AN 'ALGORITHM' WAS DERIVED TO EVALUATE INTANGIBLE SOCIAL COSTS AND BENEFITS. THIS CONSISTS OF MEAN WEIGHTING OF SOCIAL VALUES ON A NON-MONETARY SCALE BY A NUMBER OF INDIVIDUALS, AND THE FURTHER ASSUMPTION THAT THE SOCIAL INTANGIBLES THUS EVALUATED SHOULD BE GIVEN A MONETARY VALUE OF 60, 80 OR 100% OF THE OVER ALL ECONOMIC BENEFITS. WITH THESE SOCIO-ECONOMIC VALUES AND VARIOUS ASSUMPTIONS, OPTIMUM COURSES OF ACTION WERE DERIVED.

THE USE OF REMOTE SENSING IN WATER RESOURCE MANAGEMENT AUTHOR:
WELCH, ROBIN I.

PROCEEDINGS OF THE EUTROPHICATION-BIOSTIMULATION ASSESSMENT WORKSHOP, JUNE 19-21, 1969, CALIFORNIA UNIV, BERKELEY, SANITARY ENGINEERING RESEARCH LAB AND NATIONAL EUTROPHICATION RESEARCH PROGRAM, CORVALLIS, ORE, PACIFIC NORTHWEST WATER LABORATORY, pp227-242.

ABSTRACT: BECAUSE PROBLEMS OF WATER QUALITY MANAGEMENT ARE DIVERSE AND COMPLEX, DATA MUST BE UTILIZED FROM MANY SOURCES, RANGING FROM SYNOPTIC AERIAL SURVEYS BY REMOTE SENSING TO PAINSTAKING LABORATORY ANALYSIS. REMOTE SENSING ACQUIRES INFORMATION ABOUT AN OBJECT WHICH IS NOT IN INTIMATE CONTACT WITH THE INFORMATION-GATHERING DEVICE. APPLICATION OF REMOTE SENSING TECHNIQUES, PRINCIPALLY PHOTOGRAPHIC, TO VARIOUS MARINE AND FRESHWATER RESOURCES IN CALIFORNIA ARE DESCRIBED, INCLUDING MAPPING OF WATER MOVEMENTS, DETECTION OF GENERAL POLLUTANTS, DETECTION OF OIL POLLUTION, AND INVENTORY OF KELP BEDS. EXTENSIVE INFORMATION TABULATED IN THE REPORT INCLUDES PHOTOGRAPHIC SPECIFICATIONS FOR VARIOUS APPLICATIONS, FILM-FILTER COMBINATIONS FOR DETECTION OF RHODAMINE AND POLLUTANTS IN SAN DIEGO BAY, AND RELATIVE UTILITY OF SPECTRAL BANDS IN MULTIBAND DETECTION OF OIL POLLUTION. BENEFITS OF REMOTE SENSING INCLUDE: IMPROVED ANALYSIS AND INVENTORY OF AQUATIC ENVIRONMENTS; MORE EFFECTIVE MONITORING OF SELECTED WATER MASSES; COMPREHENSIVE EVALUATION OF AQUATIC COMMUNITIES AND ASSOCIATED TERRESTRIAL RESOURCES; TIMELY EVALUATION OF POLLUTIONAL SOURCES AND EFFECTS; AND IMPROVED DATA ACQUISITION ON RESOURCE DEVELOPMENT FOR MAXIMAL BENEFIT AND MINIMAL ENVIRONMENTAL DAMAGE. IMAGE INTERPRETATION REQUIRES CAREFUL COMPARISON WITH GROUND TRUTH IN A GIVEN AREA BEFORE MEANINGFUL EXTRAPOLATIONS TO NEW SITUATIONS CAN BE MADE.

The natural resources of San Diego Bay: Their status and future.

Browning, BM; Speth, JW. Calif Dept of Fish and Game, Coastal Wetlands Series #5, 1973.

Descriptors: Text; birds

The accumulation and significance of sludge near San Diego outfall /
Chen, CW.

Journal of the Water Pollution Control Federation 44(7):1362-1371, July 1972.

Descriptors: outfalls sludge disposal marine organisms sewage anthropogenic San Diego Bay benthic animals patterns of accumulation Point Loma

A statistical description of average wave conditions near the entrance of San Diego Bay. Wave Report No. 102.

Groves, GW. Scripps Institution of Oceanography Reference No. 53-63, 30p, 1953. La Jolla : Scripps Institution of Oceanography.

Proceedings of the dredging seminar (9th) / Herbich, J.B. Available from NTIS as PB-275-723-5 282 pp, 1978.

Descriptors: water pollution. marine microorganisms. San Diego Bay. benthos. chemical oceanography.

South bay power plant receiving water monitoring program.

Kinnetic Laboratories, Inc. Prepared for San Diego Gas & Electric Co. 52p, 1986. Kinnetic Laboratories, Oceanside.

Descriptors: Physical oceanography; chemical oceanography;

benthic; invertebrates; San Diego Bay

South bay power plant receiving water monitoring program.

Kinnetic Laboratories, Inc. Prepared for San Diego Gas & Electric Co.
68p, 1987. Kinnetic Laboratories, Oceanside.

Descriptors: Physical and chemical oceanography; benthic
infauna; sediment; San Diego Bay

South Bay Power Plant receiving water monitoring program. KLI-R-88-14

Kinnetic Laboratories, Inc. Prepared for San Diego Gas & Electric
Company, San Diego, CA. Kinnetic Laboratories, Carlsbad. 21 October
1988.

Descriptors: San Diego Bay

The distribution of heat in south San Diego Bay and its effects on
inlet temperature at SDG&E.

Marine Advisors, Inc., Technical Report for San Diego Gas & Electric,
39p, 1968. La Jolla : Marine Advisors, Inc.

Composition, distribution, and seasonality of ichthyoplankton populations
near an electricity generating station in south San Diego Bay,
California.

McGowen, G.E.

Rapp. P.-V. Reun. Conseil Int. Explor. Mer 178:112-114, 1981.

A survey of the coastal wetland vegetation of San Diego Bay.

Mudie, PJ.

California Dept of Fish and Game No. W26 D25-51, 79p, 1970.

Descriptors: ALGAE, MARINE SPERMATOPHYTES, birds

Antifouling paint use in San Diego bay: A data report.

Nichols, JA.

Center for Coastal Studies and the State Dept of Boating and Waterways.
Scripps Institution of Oceanography Reference No. 87-26, 60p, 1987.

La Jolla : Scripps Institution of Oceanography.

Descriptors: Shipping; anthropogenic; human inputs

Reproduction and organochlorines in terns at San Diego Bay.

Ohlendorf, HM; Schaffner, FC; Custer, TW; Stafford, CJ. Pacific
Seabird Group Bulletin 10(2):49 (abs.), 1983.

A proximate biological survey of San Diego Bay, California. Research
and development report, Dec 72 - Jun 73.

Peeling, TJ. Available from: NTIS as AS-782-576-3. 87 pp , 1974.

Descriptors: water pollution. San Diego Bay. marine
biology.

Sediment bioassays for NAVSTA San Diego dredging project. Final report.
Mar 78-Jan 80.

Salazar, MH; Uren, SC; Steinert, SA. Available from NTIS as AD-A088-
216-7. 49 pp, 1980.

Descriptors: sediments. bioassay. San Diego Bay. harbors.
piers. dredging.

Butyl tin compounds in the sediment of San Diego Bay, California.

Stang, PM. Master's Thesis, San Diego State Univ, 61 pp, 1985.

Descriptors: geochemistry and chemical oceanography
sediments transport pollution butyl tin Shelter

Review of Regional Water Quality Control Board's cleanup and abatement
order requirements for commercial basin boatyards, San Diego Bay
(Latham and Watkins Commercial Basin Contaminant Assistance).

Subcontract no. 8853235T. Draft report.

Thum, AB; Shaner, SW; Parr, TD; Newton, FC, III. Prepared for

Woodward-Clyde Consultants, San Diego. Prepared by Kinnetic Laboratories, Inc., Carlsbad, September 1988.

Review of Regional Water Quality Control Board's cleanup and abatement order requirements for commercial basin boatyards, San Diego Bay (Latham and Watkins Commercial Basin Contaminant Assistance). Subcontract no. 8853235T. Addendum report. Thum, AB; Shaner, SW; Parr, TD; Newton, FC, III. Prepared for Woodward-Clyde Consultants, San Diego. Prepared by Kinnetic Laboratories, Inc., Carlsbad, September 1988.

Vessel pollution study San Diego Bay, California. US Dept of Interior, 66 pp, June 1969. US Dept of Interior, Federal Water Pollution Control, San Francisco. Descriptors: anthropogenic, physical oceanography, chemical oceanography

South Bay Marine Biology Program. May 4 1970. Innis-Tennebaum Architects
KEYWORDS: San Diego Bay; resource utilization; bay
ABSTRACT: Objectives were to determine resources available in the South Bay, to determine how these resources might be used, and to develop a plan for utilization.

Plankton and selected environmental data in San Diego Bay during and after a plankton bloom in August 1962. Marine Advisors, Inc. La Jolla : California State Water Pollution Control Board, Sept 1962. 6p.

NOTES: Prepared for [Board] by Marine Advisors, Inc.
KEYWORDS: plankton; San Diego Bay; chemical; phosphates, nitrates; waste discharge; water quality
ABSTRACT: Purpose was to provide data on selected physical and chemical conditions and biological populations during and immediately following an intense plankton bloom in San Diego Bay, wherein a sizeable metropolitan waste discharge exists.
Call numbers: UCSD Scripps DOC 1 M3381 P7125

Ecology of the microbiota of San Diego Bay, California. Lackey, JB and KA Clendenning. Transactions of the San Diego Society of Natural History 14(2):10-40, Aug 4 1965.

KEYWORDS: San Diego Bay; description -plant; bay
ABSTRACT: Study prompted by recession of kelp beds. Objective was to explore the factors which are attributed to the cause of the recession.

From feasibility study to construction: a dredged material wildlife reserve in San Diego Bay, California. Oceans 7(3):1-10, 1977.

KEYWORDS: San Diego Bay; planning; bay
ABSTRACT: Discusses design costs, technical information, and projected costs.

Ecological effects of power station cooling water discharge in South San Diego Bay during August 1970. Ford, RF, RL Chambers and J Merino. Environmental Engineering Lab Technical Report on Contract C-821. Prepared for San Diego Gas and Electric Co. Dec 21 1970. San Diego : Environmental Engineering Laboratory, San Diego State University.

KEYWORDS: San Diego Bay; plant, description - animal, thermal; bay

ABSTRACT: Primary purposes of study: 1) to provide additional baseline information on hydrographic and biological conditions in South San Diego Bay during August 1970, using standard methods established during the July-August 1968 study, 2) to assess the ecological effects of the thermal discharge through consideration of indicator organisms, species diversity, and the distribution, abundance, and biomass of invertebrates and algae taken in grab samples, and 3) to evaluate similarities and differences in hydrographic and biological conditions noted in July-August 1968 and Aug. 1970.

Ecological effects of power station cooling water discharge in South San Diego Bay during Feb - March 1971. Ford, RF, RL Chambers and J Merino. Environmental Engineering Laboratory Technical Report on Contract C-821 for San Diego Gas and Electric Co. July 22 1971. San Diego : Environmental Engineering Laboratory, San Diego State University.

KEYWORDS: San Diego Bay; description - plant, description - animal, thermal, description - water,; bay

San Diego Bay - an evaluation of the benthic environment, October, 1967.

Parrish, LP and KM MacKenthun. Prepared for the US Dept of the Interior, 1968. 31p.

KEYWORDS: San Diego Bay; chemical, sewage, thermal, organochemical; carbon, nitrogen, warm water discharge; steam electric plant; bay

ABSTRACT: Survey assessed the effects of pollution from ships and industries on the biota of San Diego Bay.

Report and recommendations to the California Legislature on use of state tide and submerged lands in South San Diego Bay pursuant to Ch. 1114,

San Diego Bay Tidelands Task Force. Jan 1978.

KEYWORDS: San Diego Bay (south); resource utilization; bay

An investigation of water mixing in North San Diego Bay. Stoklosa, R. Prepared for JS Bradshaw and Lockheed Aircraft Service Co. Apr 29 1974.

KEYWORDS: San Diego Bay; description - water; bay

ABSTRACT: An investigation of water mixing and current movements in North San Diego Bay, done without the aid of conventional scientific apparatus.

San Diego Bay model study: hydraulic model study.

June 1971. Vicksburg, Miss. : US Army Corps of Engineers Waterways Experiment Station.

KEYWORDS: San Diego Bay; description - water, manipulation; bay

ABSTRACT: This is a summary of the pertinent results of hydraulic model studies to determine the effects of a proposed navigational opening through Silver Strand on the hydraulic and flushing characteristics of San Diego Bay.

Final environmental impact statement; San Diego Harbor, San Diego County, California.

Feb 1975. Los Angeles : U.S. Army Corps of Engineers, Los Angeles District.

KEYWORDS: San Diego Bay; sewage, oil, thermal, chemical; 1) human waste, 2) oil and petroleum products, 3) heated water, 4) hypersaline; 1) ships (private, commercial and naval), 2) not given, 3) SDG&E power; bay

Design memorandum No. 1: general design for San Diego Harbor, San Diego County, California.
Draft March 1974. US Army Corps of Engineers, Los Angeles District.

KEYWORDS: San Diego Bay; planning; bay

A bacteriological survey of the Pacific Ocean, San Diego Bay, and Mission Bay.
9pp, 1957. State of Calif Dept of Public Health, San Diego County Dept of Public Health.

KEYWORDS: San Diego Bay, Mission Bay, Pacific Ocean; sewage, other; E. coli; Navy, other; bay, bay, ocean
ABSTRACT: Pollution type is biological, and the other source is sewage.

The natural resources of San Diego Bay: their status and future.

Browning, BM, Speth, JW and W Gayman. California Dept of Fish and Game, Coastal Wetlands Series #15. Oct 1973 : Cal. Dept. of Fish & Game.

KEYWORDS: San Diego Bay; thermal, chemical, oil, organochemical; 1) effluent, 2) heavy metals, toxic wastes, 3) oil and grease, 4) agricultural; 1) SDG&E, 2) runoff, navy shipyards, 3) navy ships and other vessels, 4); bay

A survey of pollution and nuisance problems in San Diego Bay. California Bureau of Sanitary Engineering. Report prepared for San Diego Regional Water Pollution Control Board. 1951 : California Department of Public Health.

KEYWORDS: San Diego Bay; sewage, other; sewage (raw and treated), coliform; industrial wastes; Cities of San Diego, navy; Kelco Co., fish canneries, American Processing; bay
ABSTRACT: Includes data on 1) sources of domestic and industrial wastes, 2) types, character, and composition of industrial wastes, 3) loading dilution, and current effects, 4) present effect of disposal, 5) public health considerations involved

Extent, effects, and limitations of waste disposal into San Diego Bay.

1952. San Diego : San Diego Regional Water Pollution Control Board

KEYWORDS: San Diego Bay; chemical, sewage; hydrogen sulfide; coliform; aircraft plants; US Navy vessels;
ABSTRACT: Separated effects into these categories:
a) appearance- was good generally with color dependent of biological activity, oil slicks found most often near piers and docks; b) bacteriological- areas of higher concentration were near places where sewage was discharged; c) dissolved oxygen- main source is photosynthesis, the central and southern end are more prone to oxygen depletion; d) bottom conditions- benthic animals were not found in any of the areas having

sludge and their effects are unknown; e) toxic wastes- cyanides, hexavalent chromium enter bay although their effects are unknown. Contains these reports also A survey of pollution and nuisance problems in San Diego Bay (ref #26), San Diego water pollution survey, The oxygen resources of S

San Diego Bay - 1966. Staff report prepared by the California Regional Water Quality Control Board, San Diego Region. Delaney, LH. April 13, 1966. San Diego Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; chemical, sewage, oil, debris; sodium, carbonate, calcium, hydrochloric acid, coliform, perlite, trash, oil; Kelco runoff, sewage outfall, Navy and other vessels; bay
ABSTRACT: Gives a history, a list of industrial activity including chemicals released, and a summary of water quality including dissolved oxygen, bacterial quality, clarity, floatables (grease, oil, etc.), temperature, and bottom deposits. Also mentions possible sources.

Marine organisms of south San Diego Bay and the ecological effects of power station cooling water discharge.

Ford, RF. Environmental Engineering Laboratory Technical Report C-188. Prepared for San Diego Gas & Electric Co. Nov 29 1968. Environmental Engineering Laboratory, San Diego State University.

KEYWORDS: San Diego Bay; thermal; warm water discharge; SDGE power plant; bay
ABSTRACT: The marine organisms of south San Diego Bay, their present natural environmental conditions, and the effects on them of power station cooling water discharge were investigated during July and August 1968.

Temperature fluctuations at a fixed position in San Diego Bay. Smith, E.A. Naval Undersea Center Technical Publication. 298p. July 1972. Naval Undersea Research and Development Center.

KEYWORDS: San Diego Bay; description - water; bay
ABSTRACT: The purposes of this report were to investigate the thermal structure of San Diego Bay and determine the mechanisms that significantly influence it.

A proximate biological survey of San Diego Bay, California. Peeling, TJ. 389pp. Jun 1974. San Diego : Biosystems Research Dept, Naval Undersea Center.

KEYWORDS: San Diego Bay; sewage; sewage; Navy; bay
ABSTRACT: The primary goal was to obtain data in the vicinity of local naval installations that could be used as a baseline in evaluating environmental conditions at other naval installations in temperate waters. A secondary goal was to document existing conditions in the bay. This report presents the results of the survey, including data on the historical uses of the bay, changes in water quality, and past and present biological conditions.

Flushing study of San Diego Bay.

Ridley, E. Oct 1959. US Navy Hydrographic Office.

KEYWORDS: San Diego Bay; description - water; bay
ABSTRACT: To remove 70% of a contaminant would require 12-20 tidal cycles using their method of

calculation.

San Diego Bay: A review of beneficial uses, disposal practices, water quality.

Terzich, IM. June 1965. US Public Health Service

KEYWORDS: San Diego Bay; sewage, chemical, oil; raw and treated sewage; fish oils; grease; San Diego and industry; bay

ABSTRACT: Untreated wastes from vessels are the only domestic wastes discharged into the bay. There is not enough data on its effects.

Vessel pollution study, San Diego Bay, California.

1967. US Dept of the Interior.

KEYWORDS: San Diego Bay; sewage; coliform; industry, and Navy; bay

ABSTRACT: A dye tracer study determined the fate of a typical waste plume originating in the U.S. Naval station. The concentrations varied considerably from point to point within the bay-areas south of release increased rapidly and areas near the Naval station and industry and there was a sharp drop in concentrations towards the west shore. This test indicates that the bay is well mixed and has no significant vertical stratification.

Water quality control policy for San Diego Bay.

Nov 17 1966. San Diego Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; sewage, pollution control; coliform; city of San Diego; bay

ABSTRACT: Establishes maximum quotas of concentration of coliform in designated parts of the bay. Outlines ten objectives for pollution control and suggests how they can be met.

Wastes associated with shipbuilding and repair facilities in San Diego Bay.

Barry, JN. Staff report to the San Diego Regional Water Quality Control Board. June 1972. San Diego Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; chemical, sewage, metal; copper, heavy metals, paints, sewage; shipyards; bay

ABSTRACT: Study determined that wastes from the shipbuilding and repair industry do enter the bay.

Comparison of hydraulic and numerical tidal studies.

Thornton, EB and LS Romer. Symposium on Modeling Techniques 2(1):1311-1328. 1975. New York : American Society of Civil Engineers.

KEYWORDS: San Diego Bay; description - water; bay

ABSTRACT: A comparison is made of the merits and limitations of hydraulic and numerical models. The discussion is limited to models having uniform density over depth and the driving force is tidal only. The model comparison is for San Diego Bay. Prototype measurements were used to calibrate both models. Comparable results were obtained from the hydraulic and numerical models dependent on how well they are calibrated.

San Diego Bay water pollution survey 1951.

Dec 14 1951. Calif Department of Fish and Game.

KEYWORDS: San Diego Bay; sediment; sludge; harbor; bay

ABSTRACT: The study determined the location and extent of sludge beds in San Diego Harbor. During a controlled experiment, three different kinds of benthic dwellings were placed in jars half full of sludge. They all died. Crabs appeared to be less resistant than mollusks and worms.

Mission Bay and coastal estuarine zone.

O'Leary, DA. Nov 17 1966. San Diego Regional Water Quality Control Board.

KEYWORDS: Mission Bay, lagoons of San Diego County; description - general; bay, lagoon

ABSTRACT: This report describes each of the coastal water bodies, existing and potential beneficial uses, and water quality problems that each may have had. Eutrophication is a problem in all lagoons, and needs to be managed.

Intertidal and subtidal eelgrass (*Zoster marina*) transplant studies in San Diego Bay, California.

Goforth, MW, Jr. and TJ Peeling. 505pp. Feb 1 1980. Naval Ocean Systems Center.

KEYWORDS: San Diego Bay; pollution control, description - plant; bay

ABSTRACT: The study attempted to determine the most effective way to transplant eelgrass using plugs, and fiber pots also helped. Transplant success after seven months varied from 10 to 70% depending on the area. Eelgrass is important because it is a primary producer; it provides protection to arthropods, mollusks, and juvenile fish, reduces turbidity, increases sedimentation rates, and stabilizes sediments.

Sedimentary and biological characteristics of San Diego Bay floor in 1958.

Newman, William A. Prepared for the California Water Pollution Control Board, Standard Agreement No. 12D-19. Sep 1 1958. La Jolla : Marine Advisors, Inc.

KEYWORDS: San Diego Bay; description - sediment, description - animal; description - plant; sludge, black mud, sediments; bay

ABSTRACT: Results of survey: 1) Sludge, black mud, and most gray mud bottom areas are relatively barren of macroscopic organisms. 2) Organic carbon content is highest in sludge and lowest in muddy sands and sands, although there was some variability. 3) Annelids and bivalve mollusks are the most numerous macroscopic benthic organisms. Annelids were found to be less sensitive to polluted areas than bivalves. The sludge areas are essentially the same as in 1951, although less extensive. Biological indicator indicated that black mud and sludge areas are rarely entirely devoid of macroscopic organisms.

1970 Beach and Bay Survey.

Melbourn, JT. June 4 1970. City of San Diego

KEYWORDS: U.S./Mexico border to Oceanside Harbor; sewage; coliform bacteria; sewage outfalls; beach, bay

ABSTRACT: Thirty eight sampling stations were

divided into north and south coast, and samples were collected twice a week for three weeks. 23% of the samples showed coliform; high coliform was collected at Oceanside Harbor during an ebb tide. Results indicate that areas are safe for ocean water contact except for Oceanside Harbor.

1977 Beach and bay survey.

Young, M, R Shoemaker and J Melbourn. June 29 1977. San Diego : San Diego City.

KEYWORDS: San Diego Bay, Mission Bay, and beach; sewage; coliform; bay, ocean inshore

ABSTRACT: Includes data. Results were: water quality is acceptable but lower in quality, intensive rain storm had adverse effect on water quality, dredge spoil discharge in the vicinity of the Imperial Beach caused a reduction in water clarity but had little effect on coliform levels.

Final environmental impact report: Master plan San Diego Unified Port District.

Feb 1980.: San Diego Unified Port District, Environmental Management.

KEYWORDS: San Diego Bay; sewage, oil, debris, EIR; sewage, oil, floating debris; US Navy, commercial, recreational vessels, US Navy; bay

ABSTRACT: Included data on air and water quality and biological considerations.

Coliform pollution in San Diego Bay (Revised executive summary) . Aug 1981. San Diego : San Diego Association of Governments.

KEYWORDS: San Diego Bay; sewage; coliform; bay

ABSTRACT: In 1981 the same problems are being addressed and they still have not been solved. The problems being the edibility of the clams on the northeastern tip of Shelter Island.

Investigation and mitigation of coliform pollution near Shelter Island in San Diego Bay.

Van Olst, JC and JM Carlberg. July 1980. San Diego : Aquafarm Company.

KEYWORDS: San Diego Bay; sewage; coliform; Navy and other vessels, storm drains, boat yards; bay

ABSTRACT: Recommends to stop the discharge of sewage into the Bay. Includes data. Draft.

Feasibility of using dredge spoil to generate a wildlife reserve and salt marsh in San Diego Bay, California.

Smith, DD, TE Firk, CT Mitchell and ML Whitt. IEEE Ocean. pp180-187, 1975.

KEYWORDS: San Diego Bay; planning

ABSTRACT: It was found feasible to use dredged sediment to build a 90-100 acre island like reserve and associated salt march, and it was considered beneficial and possible.

Dredging and soil disposal major geological processes in San Diego Bay, California.

Smith, D. Estuarine Processes 11(1):150-166, 1977.

KEYWORDS: San Diego Bay; sediment; bay

ABSTRACT: Only 17-18% of the original bottom remain undisturbed by dredging or filling. Dredging and spoil disposal as geological processes are substantially more important than all other

erosional and depositional processes presently operating in San Diego Bay.

The effects of institutional constraints on dredging projects, San Diego Bay a case history.

Smith, D. and K. Graham. Proceedings of the Seventh World Dredging Conference 1(1):119-141. Jul 1976.

KEYWORDS: San Diego Bay

ABSTRACT: Article deals with institutional constraints and their effects on dredging projects. Includes a good bibliography.

Species list and impact statement for the "J" street marsh area, South San Diego Bay.

Scott, DB, D Norris and TL Cass. Aug 1975. Environmental Studies Laboratory, University of San Diego

KEYWORDS: San Diego Bay; description - animal; bay

ABSTRACT: The Belding's savannah sparrow was the only rare bird seen, and the area was found to be a popular nesting place which could be destroyed by a flood.

San Diego Unified Port District (Master Plan).

San Diego: San Diego Unified Port District.

KEYWORDS: San Diego Bay; planning;

Paradise marina: feasibility study and plan.

Gerschler, MC. 1973. National City Planning Department.

KEYWORDS: San Diego Bay; planning; bay

ABSTRACT: city planning

San Diego Bay Toxic Contamination.

Jan 22 1988. California State Senate Committee on Toxics and Public Safety Management.

KEYWORDS: San Diego Bay; chemical, oil; toxics, oil; roads, ships; bay

ABSTRACT: Report of a public hearing; contains speeches made by the public, professors, and other concerned individuals

San Diego Bay water pollution issues. Managing Inflows to California's Bays and Estuaries.

Michael, PW. Nov 13 1986. California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; chemical, organotin, organochemical; chalcopyrite, PCB, aromatic hydrocarbons, tributyltin; spills, antifouling paints, ore-loading, storm water runoff, discharges

ABSTRACT: The abstract discusses four water pollution problems currently affecting San Diego Bay: copper, PCB, aromatic hydrocarbons, tributyltin (TBT) paints. Recommendations are made for aromatic hydrocarbons and TBT's: aromatic hydrocarbons could be reduced by increasing surveillance of "midnight dumpers" of oil and by getting adequate support for the EPA and Coast Guard to control all input. TBT levels could be reduced through various federal agencies either restricting their use or only allowing certain types of vessels to use antifouling paints.

San Diego Bay - 1985. A staff report to the regional board.

Coe, AL and PW Michael. Dec 16 1985. California Regional Water Quality Control Board, San Diego Region.

KEYWORDS: San Diego Bay; oil, chemical, sewage, metal, organotin; toxic waste, oil, human pathogens, industrial waste, copper ore, PCB's,; ore-loading operations, North Island Naval Air Station, vessels; bay

Benthonic foraminifera of three southern California lagoons: ecology and recent stratigraphy.

Scott, DB, PJ Mudie and JS Bradshaw. Journal of Foraminiferal Research 6(1):59-75, Jan 1976.

KEYWORDS: Los Pensaquitos Lagoon, San Diego Bay, Agua Hedionda Lagoon; description - animal; lagoon, bay

ABSTRACT: Foraminifera from surface sediment of San Diego Bay, Agua Hedionda Lagoon, and Los Penasquitos Lagoon, and from bore holes in Los Penasquitos Lagoon, are described and related to eco-geographical data, modern outer, middle and inner, lagoon assemblages are recognized in San Diego Bay. Outer and inner lagoon assemblages are found in Agua Hedionda Lagoon, but only an inner lagoon assemblage is found in Los Penasquitos. In general, the larger lagoons support more foraminifera species. The modern assemblages appear to be closely associated with the amount of tidal water exchange and the lagoon entrance size.

Environmental Impact Report on Master Plan.

Sept 1979. Environmental Management Dept, San Diego Unified Port District.

KEYWORDS: San Diego Bay; EIR; bay

ABSTRACT: Impact report on existing and planned developments in the San Diego Bay. Also included are land and water use policies, and management guidance.

Biological reconnaissance and sedimentary investigation: Chula Vista small boat basin.

Feb 15 1975. San Diego : Smith & Associates, Environmental Quality Analysts.

KEYWORDS: San Diego Bay; sediment, metal; dredge material, trace metals; San Diego Unified Port District; bay

ABSTRACT: Analyzed the possible effects that a proposed dredging project would have on the marine organisms. A second section includes sediment chemistry of the same area with data on the trace metals found in the area.

Analysis of select biological issues relating to the Chula Vista bayfront plan.

Sept 15 1982. San Diego : Jones & Stokes Association, Inc.

KEYWORDS: San Diego Bay; resource utilization; bay

ABSTRACT: Report on various biological aspects of the Chula Vista coast area, including marsh habitats, and human activity.

Chula Vista boat basin and wildlife reserve.

Nov 1975. San Diego : Smith & Assoc., Environmental Quality Analysts, Inc., Marine Biological Consultants.

KEYWORDS: San Diego Bay; sediment; dredge material; San Diego Unified Port District; bay

ABSTRACT: Examines effects on the marine environment due to a proposed dredging project in the Chula

Vista small boat basin. Includes the impact of using the dredged mud to construct a wildlife reserve and salt marsh.

Marsh generation program for the Chula Vista wildlife reserve. April 1976. San Diego : Smith & Assoc., Environmental Quality Analysts, Inc., Marine Biological Consultants.

KEYWORDS: San Diego Bay; planning; bay

ABSTRACT: Gives guidelines in setting up a program to generate a salt marsh on the Chula Vista wildlife reserve spoil island.

An investigation of wastewater discharges from vessels in San Diego, California.

De Beves, A.B. 1987. Masters Thesis at SDSU.

KEYWORDS: San Diego Bay; sewage; sewage; sewage pump station, storm drains; bay

ABSTRACT: During a three month period (October '86 to January '87) samples were collected. Three types of bacteria tests were run for sewage contamination total coliforms, fecal coliforms, and fecal streptococcus. Other factors were studied such as the effects of rainfall and tidal flushing, pH, biochemical oxygen demand, turbidity, salinity, dissolved oxygen, and nitrate-nitrogen levels. PH varied from 7.80 to 9.23 with 50% of the values between 7.80 to 8.30. Rainfall and tidal flushing decreased pH levels. The salinity ranged from 1 to 36ppt. The dissolved oxygen levels at the surface were all above those necessary for the support of marine organisms. All mean BOD values did not meet standards necessary for secondarily treated effluent.

An investigation of the water quality of the San Diego Bay. Walter, J.S. 1987. Masters thesis at SDSU.

KEYWORDS: San Diego Bay; sewage; sewage; vessels;

ABSTRACT: Shelter Island was the site of the study. Total and fecal coliform levels were measured at each station. Enterococcus densities, and BOD concentrations were determined also. All samples had total coliform densities below the California Ocean Water-Contact Sports. Standard of 1000/100ml. The fecal coliform densities were below EPA standards. Enterococcus densities were acceptable in most samples. The BOD mean values were 1.5mg/l to 47.4mg/l.

Population dynamics of *Ciona intestinalis* in Mission and San Diego Bay.

Brabon, AC. Master's Thesis at SDSU. 1976.

KEYWORDS: Mission Bay, San Diego Bay; description - animal; bay

ABSTRACT: The *Ciona intestinalis* population was most influenced by interspecific competition for space. The effect of temperature, dissolved oxygen, salinity, available food, interspecific competition, intraspecific competition and predation on density, growth rate, and small scale distribution were determined.

1977 beach and bay survey.

Young, M, R Shoemaker and J Melbourn. June 29 1977. San Diego : San Diego County, Division of Environmental Health.

KEYWORDS: Mission Bay, San Diego Bay, Pacific Ocean; sewage; coliform bacteria; sewage; ocean inshore
ABSTRACT: 45 stations, located in bays and off beaches, were sampled for the content of coliform bacteria in the water. The conclusion of the study was that the water quality of San Diego county was acceptable, but lower than it had been in the past 10 years.

Marine Service Center site: Convair lagoon (draft). Final Environmental Impact Report.
Report prepared for the San Diego Unified Port District. Jan 1985. Keith B. MacDonald and Associates, Inc.

KEYWORDS: San Diego Bay (Convair Lagoon); chemical, organochemical, metal; PCB, copper, zinc, silver; bay

Ecological evaluation of dredged sediments for Navsta S.D. Med Moor facility.

Salazar, MH and SM Salazar. Oct 1983. Naval Ocean Systems Center.

KEYWORDS: San Diego Bay; chemical, organochemical, metal; cadmium, chromium, copper, mercury, pesticides, PCB; bay

ABSTRACT: Two separate bioassays were done: 1) particulate phase used *Metamysidopsis elongata* (mysid), *Cithorichthys stigmacus* (flatfish) and *Acortia nasuta* (clam). 2) solid phase test used the mysids *Macoma nasuta*, *Neanthes arenaceodentata* and *Nephtys caecoides*. These assays included an estimate of the potential for bioaccumulation of the chemicals listed above. They found that the sediments are not toxic to marine organisms, and that these organisms do not show any significant bioaccumulation of specific contaminants.

Health risk study: an evaluation of the nature and magnitude of risk to human health from fish and shellfish caught and consumed from San Diego Bay. June 7 1988. San Diego County Dept of Health Services.

KEYWORDS: San Diego Bay; chemical, organochemical, metal, organotin; PCB, polynuclear aromatic hydrocarbons, trace metals, tributyltin; Teledyne Ryan Aeronautical; fossil fuels, antifouling paints; bay

ABSTRACT: The PCB concentrations have been elevated but are not in excess of the U.S. FDA tolerance. PAH's tend to accumulate in bottom sediments, and are quite persistent and affect benthic environments. There is little data on PAH's in San Diego bay. Gives EPA classification for the trace metals.

An evaluation of the impact of copper ore in the marine environment in the vicinity of Paco Terminals, Inc. March 1986. Westec Services.

KEYWORDS: San Diego Bay; chemical, metal; copper, antifouling paint; Paco Terminals, Inc.; bay

ABSTRACT: This study concluded that the presence of inorganic copper ore does not create a significant adverse impact on the beneficial uses of San Diego Bay, while recognizing the need for more studies, and that the conclusions may be limited and the conditions vary with time. It was also thought that dredging the sediments would not produce a significant change in the benthic environment since

the area is a disturbed habitat, although it would increase the amount of copper in the water column.

San Diego Bay - 1985. Staff report to California Regional Water Quality Control Board.

Coe, AL and P Michael. Dec 16 1985. San Diego: Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; sewage, chemical, organochemical, metal; domestic and toxic waste, PCB's, copper, oil, hydrocarbons, organotin; paint, vessels, sewage outfall, non-point; bay

ABSTRACT: San Diego Bay was severely affected by man's activities through the mid-1960's, but with the termination of domestic waste discharges into the bay it has recovered dramatically. However, toxic waste, oil, and human pathogens still present problems for the bay. Staff recommends the Regional Board sponsor a joint study among responsible agencies to identify problems and suggest solutions to protect San Diego Bay.

Scientific panel explores San Diego Bay pollution.

Anderson, J, P Michael and J Duffy. San Diego and the Sea Seminar. March 13 1988.

KEYWORDS: San Diego Bay; sewage, chemical, oil, organochemical; hydrocarbons, petroleum products; discharge, vessels; bay

ABSTRACT: Report given at the San Diego and the Sea seminar. Topic: San Diego Bay pollution. Anderson suggested that the fish in San Diego Bay not be eaten more than once per week. John Duffy claims that conditions in San Diego Bay are relatively good according to his studies. Duffy also suggests what should be done in the future to preserve the bay.

Study the bay.

San Diego Union. Jan 11 1987.

KEYWORDS: San Diego Bay; metal, chemical; copper, aromatic hydrocarbons, PCB's, DDT's; port district; bay

ABSTRACT: Pollutants have been discovered and the source of these contaminants will be searched.

Investigation of polychlorinated biphenyls (PCB's) in the Convair lagoon portion of San Diego Bay.

Barker, DT and D Davis. 1986. California Regional Water Quality Control Board San Diego Region.

KEYWORDS: Convair lagoon; San Diego Bay; chemical; polychlorinated biphenyls (PCB's); bay, lagoon

Background. San Diego Health Risk Study.

1988. San Diego County Dept of Health Services, Environ. Health Services.

KEYWORDS: San Diego Bay; chemical, metal, organochemical; toxic chemicals, polyaromatic hydrocarbons, PCB's, silver, copper, cadmium; paint; bay

ABSTRACT: The study of contaminants and their locations in San Diego Bay. Also information on the State Mussel Watch program and fish populations.

Agenda. San Diego Bay Health Risk Study.

Mar 21 1988. San Diego County Dept of Health Services, Environ. Health Service.

KEYWORDS: San Diego Bay; chemical, metal; PCB, trace metals; bay

ABSTRACT: Fish species from San Diego Bay, fish location on sample site, criteria for target species, public fishing areas. State Mussel Watch sampling program locations and identified hot spots. Also potential sampling locations.

Summary of meeting, the health risk study plan. San Diego Bay Health Risk Study.

Mar 21 1988. San Diego County Dept of Health Services, Environ. Health Service.

KEYWORDS: San Diego Bay; chemical, organochemical, organotin; PCB's, tributyltin; bay

ABSTRACT: Survey of human consumption patterns, identification of chemical contaminants to be analyzed, determination of species to be sampled and sampling locations.

Summary of meeting #2. San Diego Bay Health Risk Study.

April 11 1988. San Diego County Dept of Health Services, Environ. Health Service

KEYWORDS: San Diego Bay; metal, organochemical, organotin; metals, organotin, organic chemicals; bay

ABSTRACT: Tests for contaminants in various fish were positive.

Attachment 2 - health risk study. San Diego Health Risk Study.

April 25 1988. 19-32pp. San Diego County Dept of Public Health Services, Environ. Health Service

KEYWORDS: San Diego Bay; chemical, metal; PCB, trace metals; bay

ABSTRACT: In Appendix E chemical hot spot locations were determined in San Diego Bay.

An evaluation of the nature and magnitude of risk to human health from recreationally caught and consumed fish and shellfish from San Diego Bay. San Diego Bay Health Risk Study.

May 1 1988. 37-59pp. San Diego County Dept of Public Health Services, Environ. Health Service

KEYWORDS: San Diego Bay; chemical, organochemical, metal, organotin; PCB's polynuclear aromatic hydrocarbons, trace metals, tributyltin; bay

ABSTRACT: Determination of contaminant concentrations in frequently consumed species caught in San Diego Bay, their hot spot locations, type of contaminant and risk assessment.

Summary of objectives, issues, and accomplishments.

San Diego Bay Cleanup Project.

Nov 30 1987. California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; chemical, oil, metal, organochemical, radioactive waste, sewage, organotin; PCB's, tributyltin, aromatic hydrocarbons, lead, mercury, copper, DDT,; runoff, storm drains, vessels, industry, shipyards; bay

ABSTRACT: The RWQCB proposal for a 5 year cleanup project in San Diego Bay. Objectives are to locate problem areas and identify source(s). Identified sources will be referred to the Regional Board's (RB) regulatory staff for appropriate action. Findings as of 11/30/87: 1) copper ore loading and

storage at Paco Terminals Inc. resulted in spillage of copper ore into the bay at levels that could adversely affect marine life. On 12/12/85 the RB issued a Cleanup and Abatement Order, directing Paco to reduce the copper concentrations to a level unthreatening to biological communities. On 11/3/87, the RB ammended the Cleanup and Abatement Order requiring completion of cleanup actions by 1/3/89. 2) the State Mussel Watch Program revealed PCB concentrations in m ussels transplanted to Convair lagoon portion of San Diego Bay in excess of the U.S. Food and Drug Administration's Action Level. The sampling program implicated Teledyne Ryan Aeronautical as a

January 22 Hearing on San Diego Bay toxic contamination. Public Testimony January 22, 1988.

California State Senate Committee on Toxics and Public Safety Management.

KEYWORDS: San Diego Bay; chemical, organochemical, metal, sewage, organotin; aromatic hydrocarbons, chlorinated hydrocarbons, PCB's, tributyltin, copper,; untreated municipal and industrial waste discharge; bay

ABSTRACT: Copper ore loading; PCB runoff from industrial sources, naval aircraft ?????, military and civilian vessel waste, and antifouling marine paints (tributyltin) have been linked to numerous industrial and marine practices. This report shows actual concentrations of various pollutants and their locations.

Water quality issues of the California-Baja California border region.

Marquez, F., V. Gray, A. Jacobson, N. Gunaji, A. Herrera, P. Silva, et al. Jan 1989. Border Issues Series 4. San Diego : Institute for Regional Studies of the Californias, SDSU.

KEYWORDS: saline entities of California, Baja California border area; sewage, chemical, metal, organochemical; sludge, fecal matter, solids, metals, PCB's, DDT; municipal and industrial sludge, nonpoint; estuary, bay, river, ocean inshore

ABSTRACT: Border water quality issues including wastewater pollution.

Action requested on bay pollution.

VandeBerg, M. San Diego Union Jun 21 1987.

KEYWORDS: San Diego Bay; chemical, organochemical; tributyltin, polychlorinated biphenyls (PCB's); paint, vessels; bay

ABSTRACT: Studies will conducted beginning July 1, 1987 to determine whether there is cause to issue warnings against fishing in some areas of San Diego Bay, or against eating certain kinds of fish or shellfish taken from the bay. Hot spots of certain pollutants have been isolated. The Mussel Watch program is in effect here. TBT's and PCB's are in high concentrations in the bay and cause damage to marine life.

An evaluation of the nature and magnitude of risk to human health from fish and shellfish caught and consumed from San Diego Bay. Work Program for the San Diego Bay Health Risk Study. June 7 1988. San Diego Dept of Health Services, Environmental Health Services.

KEYWORDS: San Diego Bay; chemical, oil, metal, organotin, organochemical; PCB's, polynuclear aromatic hydrocarbons, arsenic, cadmium, chromium, copper,
ABSTRACT: This report gives a general background of San Diego Bay's geography, history and current contamination issues, along with specifics concerning PCB's, polynuclear aromatic hydrocarbons, trace metals and organotin compounds found in the bay. Also describes a proposed San Diego Bay health risk study protocol.

Report to the Congress on ocean pollution monitoring and research. Verity, CW, WE Evand, PM Wolff. June 1988. Washington, DC : US Dept of Commerce, NOAA.

KEYWORDS: San Diego Bay, Pacific Ocean, ocean off La Jolla, CA; organochemical, metal; polynuclear hydrocarbons, lead; bay, ocean inshore
ABSTRACT: This report is submitted in compliance with Sections 201 and 202, Title II of the Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532). Page 36 lists summary rankings of NS&T Mussel Watch Sites for total polynuclear aromatic hydrocarbons (tPAH) in bivalve tissue, including in San Diego Bay. Page 37 lists summary rankings of NS&T Mussel Watch Sites for lead (Pb) in bivalve tissue, including San Diego Bay and ocean inshore at La Jolla.

Pollution contingency plans. San Diego Unified Port District Port Master Plan.

Jan 1980. 53pp. San Diego: San Diego Unified Port District Planning Dept.

KEYWORDS: San Diego Bay; planning; bay
ABSTRACT: This is a master plan of how San Diego Bay will be developed, with pollution contingency plans found on p. 53. The plan was revised Feb 1987.

Part I Summary and overview of the results for cycles I to III (1984-86). National Benthic Surveillance Project: Pacific Coast. Varanasi, U., S.L. Chan, B. McCain, et al. NOAA Technical Memorandum NMFS F/NWC-156. Dec 1988. Washington, DC:U.S. Dept. of Commerce, NOAA, NMFS.

KEYWORDS: San Diego Bay; oil, chemical, metal, organochemical; aromatic hydrocarbons, PCB's, organochlorine insecticides, copper, lead,; bay
ABSTRACT: The highest levels of pollution were found in San Diego Bay, etc. Both sampling sites in San Diego Bay had sediment concentrations of AH's and copper which were among the highest of all sampling sites. Also, the site in south San Diego Bay had some of the highest sediment concentrations of PCB's, chlordanes, lead, mercury of any of the west coast sites. Barred sand bass from the south bay site and white croaker from the North Bay site showed concentrations of AH metabolites in bile and PCB's in liner tissue that were among the highest found so far in this study.

A summary of selected data on chemical contaminants in sediments collected during 1984, 1985, 1986, and 1987.

National Status and Trends Program for Marine Environmental Quality. NOAA Technical Memorandum NOS OMA 44. Nov 1988. Rockville, MD: US Dept of Commerce, NOAA.

KEYWORDS: San Diego Bay, Mission Bay, Pacific Ocean;

chemical, metal, oil, organochemical; DDT, PCB, arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver,; bay, ocean inshore
ABSTRACT: Program objective is to define the geographic distribution of contaminant concentrations in tissues of marine organisms and in sediments, and document biological responses to contamination. Areas included San Diego Bay, Imperial Beach, San Diego Bay, Harbor Island, Point Loma, Mission Bay, Point La Jolla, Oceanside, outside San Diego Bay.

Progress report and preliminary assessment of findings of the benthic surveillance project. National Status and Trends Program for Marine Environmental Quality.

1984. Rockville, MD : US Dept of Commerce, NOAA.

KEYWORDS: San Diego Bay, Pacific Ocean; metal, oil, organochemical, chemical, sewage; chromium, copper, lead, silver, cadmium, mercury, aromatic hydrocarbons, DDT,; bay, ocean inshore

ABSTRACT: The National Status and Trends Program is a nationwide monitoring and assessment program that utilizes a uniform approach to quantify a set of toxic chemicals in sediment, bivalve mollusc, and benthic fish samples from over 150 sites around the U.S. coastline, including San Diego, and to detect biological response to these chemicals.

California state mussel watch ten year data summary 1977-1987. Phillips, PT. Water Quality Monitoring Report No. 87-3. May 1988. State Water Resource Control Board, Division of Water Quality.

KEYWORDS: San Diego Bay, Pacific Ocean; metal, organochemical; aluminum, arsenic, cadmium, chromium, copper, lead, manganese, mercury,; bay, ocean inshore

Characteristics and effects of contaminated sediments. Coastal Water Research 2(1):1-4. 1989.

Long Beach:Southern California Coastal Water Research Project.

KEYWORDS: San Diego Bay; sewage, metal, oil, organochemical; sewage, chlorinated hydrocarbons, polynuclear hydrocarbons, dissolved sulfide; bay

ABSTRACT: SCCWRP completed a multidisciplinary study of sediments from ten coastal cities, including three sites in San Diego Bay. The most toxic sites were at Santa Monica Bay sludge outfall, LA County outfall, and Seventh Street Channel in San Diego Bay.

The filthy seas (or The Dirty Seas).

Toufexis, A., McManus, J., Muller, H. TIME pp44-50. Aug 1 1988.

KEYWORDS: San Diego Bay; sewage, chemical, organochemical; PCB; Point Loma outfall; bay

ABSTRACT: An overview of the nation's coastal, estuary, bay, lagoon, etc. pollution caused by agricultural runoff, legal and illegal dumping of waste, sewage outfall etc., and their effects upon the ecosystem.

Environmental Health Coalition's petition for review of NPDES permit issued to boat repair facilities in San Diego Bay.

Haynie, A.D. State Water Resources Control Board. Nov 20 1987.

KEYWORDS: San Diego Bay; chemical, organotin; tributyltin (TBT); paint, vessels; bay

ABSTRACT: The Environmental Health Coalition recommended that the State Water Control Board rescind the recently issued NPDES permits of two boat repair facilities and establish discharge standards and monitoring requirements for TBT. This letter indicates a number of boat repair facilities in San Diego Bay who are concerned about the recommendation. The EHC relies on the following statement in the Bay Water Quality Control Policy to support its argument: "It is the policy of the State Board that the discharge of municipal wastewaters and industrial process waters to enclosed bays and estuaries . shall be phased out at the earliest practicable date." Boatyards claim the policy only applies to municipal wastewaters and industrial process waters and has no application to boat repair facilities, but it is unclear whether or not storm water discharge from these facilities constitute industrial process waters.

Environmental Health Coalition Petition and State Legislation Concerning TBT. Mr Tom Fetter, Kettenburg Marine. Haynie, A.D. Nov 4 1987. San Diego: Latham and Watkins.

KEYWORDS: San Diego Bay; chemical, organotin; tributyltin (TBT); paint, vessels, runoff from boatyards; bay

ABSTRACT: Issues discussed in the letter include: - the issuance of permits to boatyards to discharge water into San Diego Bay, their objections to Regional Water Quality Control Board recommendations that they be required to monitor water in front of their facilities for TBT. - proposed regulations by the Dept. of Food and Agriculture which will restrict use of TBT paints to aluminum boats, boats over 65 ft in length, or 16 oz spray cans referred to as outboard or lower unit paint. - federal govt. is considering restricting use of TBT paints. House passed a bill, H.R. 2210, that would eliminate use of TBT paints on boats shorter than 65 ft.

Environmental Health Coalition concerns about recently adopted NPDES permits for ship and boat repair facilities in San Diego Bay.

Executive Officer Summary Report. Nov 16 1987. San Diego: California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; organotin, chemical; tributyltin (TBT); paint, vessels; bay

ABSTRACT: EHC petitions contend that: 1) the issuance of the 2 new NPDES permits is contrary to the State Board Water Quality Control Plan for the enclosed bays and estuaries of California, and the objective of phasing out the discharge of industrial process waters to enclosed bays and estuaries; 2) monthly monitoring of tributyltin (TBT) should be required in all permits for industries which may have TBT in their discharge; and 3) a discharge limit of two parts per trillion TBT should be set in the permits. The Regional Board reviewed the EHC petitions and discussed the issues with State Board staff, representatives of the Department of Fish and Game and EPA.

Water Quality Control Policy for the Enclosed Bays and Estuaries of California. Dendy, BB. May 16 1974. State Water Resources Control Board.

KEYWORDS: San Diego Bay, Mission Bay; sewage, chemical; wastewater discharge; industrial process waters and municipal wastewater; bay, estuary
ABSTRACT: This policy states the principles for management of water quality in enclosed bays and estuaries, quality requirements for waste discharges, discharge prohibition, and general provisions.

Cleanup and Abatement Order No. 89-18 to Eichenlaub Marine. Delaney, LH. Feb 16 1989. California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; metal, organotin, chemical; copper, tributyltin, mercury, paint; Eichenlaub Marine; bay
ABSTRACT: This is a Cleanup and Abatement Order to Eichenlaub Marine for polluting San Diego Bay. Eichenlaub Marine is alleged to be in violation of discharge prohibitions adopted by the Regional Board pursuant to Section 13243 of the California Water Code discharged waste, or to have caused or permitted waste to be deposited where was discharged, into waters of the state and created a condition of pollution. Boat work performed at Eichenlaub Marine include vessel repairs and modifications, vessel cleaning, sanding, painting, and vessel washing to remove loose paint and fouling organisms. (More on data form about prohibitions.)

Addendum No. 1 to Cleanup and Abatement Order No. 88-70 to Shelter Island Boatyard. Delaney, LH. Dec 1 1988. San Diego : California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; organotin, chemical; tributyltin, paint; Shelter Island boatyard; bay
ABSTRACT: This is an addendum to cleanup and abatement order to the Shelter Island boatyard for alleged polluting of San Diego Bay with TBT.

Cleanup and Abatement Order No. 88-70 to Shelter Island Boatyard. Delaney, L. Jun 30 1988. San Diego: California Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; metal, oil, other, organotin; paint, tributyltin, copper, mercury, oil, suspended solids; Shelter Island

Cleanup and Abatement Order No. 88-79 to Bay City Marine, Inc. Delaney, L.H. June 30 1988. California Regional Water Quality Control Board

KEYWORDS: San Diego Bay; metal, chemical, organotin; copper, mercury, tributyltin, paint; Bay City Marine; bay
ABSTRACT: This is a cleanup and abatement order to Bay City Marine, Inc. located in San Diego Bay.

Cleanup and Abatement Order No. 88-86 to Mauricio and Sons, Inc. Delaney, LH. July 5 1988. San Diego: California Regional Water Quality Control Board

KEYWORDS: San Diego Bay; metal, chemical, organotin; copper, mercury, tributyltin; Mauricio and Sons,

Inc.; bay
ABSTRACT: This is a cleanup and abatement order to
Mauricio and Sons located in San Diego Bay.

Cleanup and Abatement Order No. 88-78 to Kettenburg Marine
Corporation. Delaney, LH. Jun 30 1988. San Diego: California
Regional Water Quality Control Board

KEYWORDS: San Diego Bay; metal, chemical, organotin;
paint, copper, mercury, tributyltin; Kettenburg
Marine Corporation; bay

ABSTRACT: This is a cleanup and abatement order to
Kettenburg Marine Corporation in San Diego Bay

Agreement between pollutant sources and the California Regional
Water Quality Control Board.

Sept 29 1988. San Diego: California Regional Water Quality Control
Board.

KEYWORDS: San Diego Bay; metal, chemical, organotin;
paint, copper, mercury, tributyltin; Dettenburg
Marine Corporation, Mauricio and Sons, Inc.,
BayCity Marine,; bay

ABSTRACT: This is the agreement between the
pollutant sources and the California Regional Water
Quality Control Board.

Past commercial basin boatyard owners may face charges.
Guerra, O. The Log, Feb 3 1989. 2pp.

KEYWORDS: San Diego Bay; metal, chemical, organotin;
tributyltin, copper, mercury, paint; Shelter Island
Boatyard, Kettenbutg Marine, Mauricio and Sons,
Inc., Bay City; bay

ABSTRACT: Pollutant sources and Regional Water
Quality Control Board have productive meeting.

Receiving Water Monitoring Program.

Kinnetic Laboratories Report KLI-R-88-14. Dec 15 1988.
Carlsbad : Kinnetic Laboratories.

KEYWORDS: San Diego Bay; thermal; warm water
discharge; South Bay Power Plant; bay

ABSTRACT: This receiving water monitoring study is
being conducted in compliance with specifications
set forth by Paragraph 6 of the CRWQCB, Monitoring
and Reporting Program Order No. 85-09(NPDES Ca
0001368). It is designed to monitor changes in the
benthic infauna and selected physical/chemical
parameters of the sediments and water column in
South Bays at yearly intervals.

Cooling water intake system demonstration. Silvergate Power Plant.
Project manager - J.F. Dietz. 2 volumes, Dec 1980. San Diego :
San Diego Gas and Electric

KEYWORDS: San Diego Bay; thermal; warm water
discharge; Silvergate Power Plant; bay; Intake environmental
studies.

ABSTRACT: The purpose of this report is to provide
the 316(B) demonstration required by the CRWQCB,
S.D. Region, under the Federal Water Pollution
Control Act, as ammended 1972, for the cooling
water intake of the Silver Gate Power Plant in San
Diego, operated by the San Diego Gas and Electric
Co.

Statement of Congressman Jim Bates on the Clean-up
San Diego Bay Project, San Diego, California . July 31

1987. Washington, DC : Congress of the United States, House of Representatives.

KEYWORDS: San Diego Bay; chemical, organochemical, metal, oil, radioactive waste; biocides, PCB's, heavy metals, DDT; bay

ABSTRACT: Bates proposes a clean-up San Diego Bay with the assistance of federal funding under the Water Quality Act of 1987, the Environmental Protection Agency and the State Water Quality Control Board. He describes the problems and outlines a five point plan: appointment of a task force; campaign to clean up the bay; implementation of a comprehensive monitoring program on an annual basis; increased enforcement of existing laws and fines; and initiate litigation to force compliance by state and local water quality control boards.

New warning sounded on pollution of bay.

La Rue, S. San Diego Union B1, B8. Dec 1 1988.

KEYWORDS: San Diego Bay; metal, organochemical; PCB, DDT, aromatic hydrocarbons, mercury, copper; industry, shipping areas; bay

ABSTRACT: Pollution levels off the 28th Street pier are among the six highest in the country. The Federal study found: PCB's found in liners and stomachs of bottom feeders; high concentrations of mercury in bay floor sediments; high levels of copper in bay bottom sediment; high levels of aromatic hydrocarbons; barred sand bass had high incident of fin erosion and deformity related to aquatic pollution; barred sand bass caught in the bay also have moderately high levels of DDT and its breakdown products in their tissues.

National Benthic Surveillance Project: Pacific Coast. Part I. Summary and overview of the results for cycles I-III (1984-1986). Varanasi, U. et al.

NOAA Technical Memorandum NMFS F/NWC-156, Dec 1988.

KEYWORDS: San Diego Bay; organochemical, metal; aromatic hydrocarbons, BCB's, organochlorine insecticides, metals; bay

ABSTRACT: This report summarizes and interprets the results of the first three years of the Pacific Coast phase of the National Benthic Surveillance Project (NBSP), a component of NOAA's National Status and Trends Program. San Diego Bay was one of the most polluted sites sampled.

Ecological evaluation of organotin - contaminated sediment.

Salazar, MH and SM Salazar. NOSC Technical Report 1050. July 1985. San Diego : Naval Ocean Systems Center

KEYWORDS: San Diego Bay; organotin; naval fleet, commercial boats; bay

ABSTRACT: A standard dredged material bioassay was conducted on sediment with high levels of organotins to 1) assess the toxicity and bioavailability of organotins associated with sediment, and 2) to determine if this sediment would qualify for ocean disposal. Since the Navy is considering fleetwide implementation of organotin coatings and some commercial fleets are currently using them, the effects of organotins on the dredging process must be evaluated.

Tributyltin and mussel growth in San Diego Bay.
Salazar, M.H. and S.M. Salazar. Proceedings, Oceans '88
Conference, Baltimore, Maryland, 10/31-11/2 1988, Organotin
Symposium. 1988. Baltimore, MD:

KEYWORDS: San Diego Bay; organotin; tributyltin
(TBT); vessels; bay

ABSTRACT: During three field tests in San Diego Bay
(1987-1988), juvenile mussels were exposed to mean
ambient tributyltin concentrations from 7-500 ng/l
for 12 weeks. Mussel lengths and weights, seawater
TBT, and various physical/chemical parameters were
measured weekly. TBT bioaccumulation was measured
at the end of each test. Mussel growth rates were
observed and reduction had occurred at mean
seawater >200 ng/l. Other environmental factors
appear to modify the effects of TBT on juvenile
mussel growth below 100 ng/l TBT. No clear
relationship between growth rate and TBT in mussel
tissues at concentrations below 1.5 ng TBT/g tissue
was found. Although there appears to be a linear
relationship between TBT bioaccumulation and
seawater TBT, the relationship between
bioconcentration factors and seawater TBT appears
to be inverse and exponential. No dose related
mortality was observed.

Effects of TBT on marine organisms: field assessment of
a new site-specific bioassay system.

Salazar, SM et al. Organotin Symposium - Proceedings, Ocean '87
Conference 4: 1461-1470pp. 1987. Halifax, Nova Scotia.

KEYWORDS: San Diego Bay; organotin; tributyltin (TBT)

ABSTRACT: A portable Environmental Test System
(PETS) was evaluated in San Diego Bay over a 7
month period using TBT concentrations and tested
against seawater control with 3 replicates of each
using 340-1 tanks. There were no significant
effects attributed to TBT at all test
concentrations. Although mussels accumulated more
TBT at higher test concentrations, there was an
inverse relationship between dose and
bioconcentration factors.

Tributyltin effects on juvenile mussel growth.

Salazar, M.H. and S.M. Salazar. Organotin Symposium - Proceedings,
Oceans '87 Conference. 4: 1504-1510pp. 1987. Halifax, Nova Scotia,

KEYWORDS: San Diego Bay; organotin; tributyltin (TBT)

ABSTRACT: Juvenile mussels were exposed to three
concentrations of TBT in two specific flow-through
bioassays with unfiltered seawater. The data
suggested that test animals were probably under
significant stress induced by the bioassay test
system. The data also suggest that the effects of
TBT on juvenile mussel growth may have been
overestimated in this and other studies.

The effects of sediment on the survival of mysids exposed to
organotins.

Salazar, MH and SM Salazar

Proceedings of the U.S./Japan Experts Meeting, Management of
Bottom Sediment Containing Toxic Substances. 176-192pp.
1985. Seattle, WA.

KEYWORDS: San Diego Bay; organotin; tributyltin (TBT)

ABSTRACT: A ten day flow-through toxicity test was
conducted by exposing mysids (*Acanthomysis sculpta*)

to organotin antifouling leachates. After ten days control survival was 100% with sediment and 95% without sediment. TBT treatment survival was 46% with sediment and 30% without sediment.

Addendum No. 2 to Cleanup and Abatement Order No. 88-70. Delaney, LH, Feb 2 1989. San Diego : Regional Water Quality Control Board.

KEYWORDS: San Diego Bay; sewage; Shelter Island Boatyard; bay

Four boatyards get '89 deadlines to reverse bay pollution. Michels, S.R. Los Angeles Times PII p3. Jul 8 1988.

KEYWORDS: San Diego Bay; metal, chemical, organotin; mercury, copper, tributyltin (TBT); Kettenburg Marine, Bay City Marine, Shelter Island Boatyard, Mauricio and; bay

ABSTRACT: The Regional Water Quality Control Board has ordered four boatyards to stop polluting San Diego Bay and has given them until May 1989 to clean up contaminants, which are not threatening to humans but are toxic to aquatic life.

South Bay water reclamation project.

June 2 1983. Rancho Santa Fe : South Bay Water Reclamation and Energy, Inc.

KEYWORDS: San Diego Bay; sewage; Mexico; bay
ABSTRACT: The raw sewage problem in San Diego Bay is immense; a proposed reclamation project has been submitted.

Environmental impact report. Nov 16 1987.

City of San Diego Planning Dept., Environmental Quality Division

KEYWORDS: San Diego Bay; South Bay; sewage; Mexico - Tijuana; bay
ABSTRACT: South Bay land outfall Phase I. Council approval of construction of a land outfall sewer pipe in the South Bay area of the City of San Diego to be used in conjunction with other projects to convey raw sewage flows crossing the U.S./Mexico border from Tijuana to an acceptable discharge location.

Environmental Impact Report (EIR). Jan 1988.

San Diego : The Butler Roach Group, Inc.

KEYWORDS: San Diego Bay; South Bay; sewage; bay
ABSTRACT: The Environmental Impact Report/Environmental Information document (EIR/EIO) for the proposed Southbay land outfall - phase 5.

Candidate findings and statement of overriding considerations for the proposed South Bay land outfall Phase I.

KEYWORDS: San Diego Bay; South Bay; sewage; Mexico; Tijuana; bay
ABSTRACT: Findings are that the Final (EIR/EID) for the proposed South Bay Land Outfall Phase I and the public record, finds that changes have been incorporated into the project which mitigate, avoid or substantially lessen the significant environmental impacts thereof, as identified in the final EIR/EID.

Clean up sewage - or else.

Neil Morgan. The Tribune . B-6. Oct 7 1986. San Diego:
KEYWORDS: Pacific Ocean, Penasquitos lagoon, Mission Bay; sewage; Point Loma sewage treatment plant; ocean inshore, lagoon, bay
ABSTRACT: San Diego's ability to treat sewage has not kept pace with the region's growth and the coast is becoming polluted. Point Loma sewage treatment plant is inadequate for the task. Sewage pump at Sorrento Valley breaks down often causing spills into Penasquitos Lagoon. 2000 gallons of black sewage sludge leaked from Fiesta Island into Mission Bay.

Beach-goers face health threat.

La Rue, GS. The San Diego Union, Aug 26 1984. San Diego:
KEYWORDS: Pacific Ocean, San Diego Bay; sewage; Tijuana, Mexico; ocean inshore, bay
ABSTRACT: Officials see problems if Tijuana sewage spills increase. Lifeguards are getting sinus, ear and eye infections and diarrhea due to Mexico sewage spills.

Cooling water intake system demonstration .. SDG&E Station B Power Plant Demonstration Summary . Dec 1980. Project Manager - J.F. Dietz. San Diego : San Diego Gas and Electric
KEYWORDS: San Diego Bay; thermal; warm water effluent; SDG&E Station B Power Plant; bay
ABSTRACT: Demonstration summary cooling water intake system demonstration (in accordance with Section 316(b) Federal Water Pollution Control Act Ammendment of 1972).

Cooling water intake system demonstration - Summary. San Diego Gas & Electric Station B Power Plant. Dec 1980. Project Manager -J.F. Dietz. SDG&E
KEYWORDS: San Diego Bay; thermal; warm water effluent; SDG&E Station B Power Plant; bay
ABSTRACT: Purpose of report is to provide the 316(b) demonstration required by the California Regional Water Quality Control Board, San Diego Region (RWQCB-SD), under the Federal Water Pollution Control Act, as ammended 1972, for the cooling water intake of the Station B Power Plant in San Diego, California, operated by the San Diego Gas & Electric Co.

Cooling water intake system demonstration - summary. San Diego Gas & Electric South Bay Power Plant, Dec 1980. Project Manager J.F Dietz. San Diego : SDG&E
KEYWORDS: San Diego Bay; thermal; warm water effluent; South Bay Power Plant; bay

An evaluation of the nature and magnitude of risk to human health from fish and shellfish caught and consumed from San Diego Bay. Jun 7 1988. San Diego : San Diego County Depart. of Health Services
KEYWORDS: San Diego Bay; organochemical, organotin, metal; PCB's, trace metals, organotin; bay
ABSTRACT: Work program for the San Diego Bay Health Risk Study.

Abstract .. Comprehensive Water Quality Control Plan for the San Diego Basin . Apr 1974. San Diego : James M. Montgomery Consulting Engineers, Inc.

KEYWORDS: San Diego Bay, Pacific Ocean; planning, conservation; bay, ocean inshore

ABSTRACT: The purpose of this abstract is to provide the public a concise description of the Comprehensive Water Quality Control Plan for the San Diego Region in a manner that will enable understanding of the plan without requiring a reading of the entire plan.

Broadway Complex Issues Reports . Mar 1986.

San Diego: Association of Governments

KEYWORDS: San Diego Bay; structure; Navy; bay

ABSTRACT: The department of the Navy requested the San Diego Association of Governments' (SANDAG) assistance in evaluating the impacts associated with the development of the Broadway Complex in downtown San Diego. SANDAG has provided planning assistance to the Navy on a variety of topics. Although a large part of the early efforts dealt with housing issues, the assistance has been extended to criminal justice, airport land use, traffic (including a study of the traffic impacts of the Broadway Complex), fiscal analysis, and market analysis.

The National Status and Trends Program for Marine Environmental Quality .. Progress Report. NOAA Technical Memorandum NOS OMA 38 . Jun 1987.:NOAA

KEYWORDS: San Diego Bay; chemical, metal, oil, sewage, organochemical; PCB, DDT, copper, hydrocarbon, sewage; bay

ABSTRACT: A summary of select data on chemical contaminants in tissue collected during 1984, 1985, and 1986.

U.S. Mussel Watch: 1977-1978 results on trace metals and radionuclides.

Goldberg, E. et al. Estuarine, Coastal and Shelf Science (1983), Volume 16,69-93pp. 1983.

KEYWORDS: San Diego Harbor; metal, oil, radioactive waste, chemical, organochemical; plutonium, americium, silver, copper, zinc, chlorinated hydrocarbons; bay; San Diego Bay

ABSTRACT: The U.S. Mussel Watch Program began in 1976 with the overall aim of providing strategies for pollutant monitoring in coastal waters. Mussels and systems collected on the west, east and Gulf Coast during 1976-78 were analysed for four classes of pollutants: trace metals, chlorinated hydrocarbons, petroleum, hydrocarbons and radionuclides.

Investigation of polychlorinated biphenyls (PCB's) in the Convair Lagoon portion of San Diego Bay.

Davis, D. and V. Noyes. Jul 29 1986. California Regional Water Quality Control Board

KEYWORDS: Convair Lagoon, San Diego Bay; organochemical; PCB; Teledyne Ryan, General Dynamics; lagoon

ABSTRACT: Convair Lagoon is a portion of San Diego Bay located northeast of Harbor Island and immediately west of the U.S. Coast Guard station. Since as early as 1979, the Regional Board staff has been receiving evidence that the lagoon sediment

contained the toxic substance polychlorinated biphenyls (PCB's). Evidence of contamination in the lagoon was gathered by the State Mussel Watch Program and the Regional Board staff.

Saving our Bays, Sounds, and the Great Lakes.
Providence, RI : Save the Bay, Inc.

KEYWORDS: includes San Diego Bay; resource utilization, conservation; bay

ABSTRACT: This publication presents the specific recommendations which evolved from each of the three conference work groups: water quality, land use management, and coastal habitat protection. As these groups worked to solve the problems facing America's lakes and estuaries from differing perspectives, it was necessary to merge the 5 viewpoints in order to present a more readable and useful tool. Thus, this document addresses the wide range of threats facing coastal waters by viewing them from 2 new perspectives: how to prevent future coastal land abuses, and how to correct current misuses of the coastal zone.

Functional equivalent document: Amendment of the Water Quality Control Plan for Ocean Waters of California .. The California Ocean Plan . Jun 5 1988.

Sacramento:State Water Resources Control Board

KEYWORDS: Pacific Ocean, San Diego bays, lagoons, and estuaries; planning, pollution control; ocean inshore, bay, lagoon, estuary

ABSTRACT: This report contains staff recommendations for modification of some portion of the California Ocean Plan.

Report on TBT in San Diego Harbor.

Stephenson, M, L. et al. Report to California State Regional Water Quality Control Board. 1988. Cal. Dept. of Fish and Game, Moss Landing Marine Laboratories

KEYWORDS: San Diego Bay; organotin; tributyltin; bay

Eichenlaub, 2 other boatyards to be named in bay cleanup.

Guerra, O. San Diego Log 17pp. Mar 3 1989.:

KEYWORDS: San Diego Bay; chemical, metal, organotin; TBT, wastewater, copper, tin, mercury; Eichenlaub, Bay City Marine, Kettenburg Marine, Mauricio and Sons, Shelter; bay

Water board names Port District in bay cleanup order.

Guerra, O. San Diego Log 1pp. Mar 3 1989.:

KEYWORDS: San Diego Bay; pollution control, metal; copper; Port District, Paco Terminal; bay

Port approves modified Kona Kai redevelopment proposal.

Guerra, O. San Diego Log 40pp. Mar 17 1989.:

KEYWORDS: San Diego Bay; structure; bay

Waterfront restaurant starts construction in South Bay.

San Diego Log 20pp. Mar 17 1989.:

KEYWORDS: San Diego Bay - South Bay; structure; bay

Port may fund entrance study despite doubts.

Guerra, O. San Diego Log, 1pp. Mar 17 1989.:

KEYWORDS: San Diego Bay; structure; bay

Marinas may lose lease if no action taken on ocean dumping. San Diego Log . 1pp. Mar 17 1989.:

KEYWORDS: San Diego Bay, Pacific Ocean; chemical, debris, fishing equipment, organotin; TBT, plastic, nets; marinas; bay, ocean inshore

Port to monitor bay pollution.

Brenner, R.B. San Diego Union B1, Mar 28 1989.:

KEYWORDS: San Diego Bay; pollution control, metal, chemical, organochemical; copper, PCB's; Paco Terminal, Teledyne Ryan; bay

City officials reveal Navy plan for waterfront redevelopment.

Schmidt, S. San Diego Union B1, Mar 2 1989.:

KEYWORDS: San Diego Bay; structure; Navy; bay

Teledyne firm faces toxics fine.

La Rue, S. San Diego Union B1, Mar 2 1989.

KEYWORDS: San Diego Bay; chemical; chromic acid; Teledyne Ryan; bay

Teledyne Ryan told to pay 106,000 in fines in waste case.

Fritsch, J. Los Angeles Times PII p1. Mar 2 1989.

KEYWORDS: San Diego Bay; chemical; chromic acid; Teledyne Ryan; bay

Navy unveils new plan to redevelop downtown base.

Acuna, A. Los Angeles Times . PII p1. 1989.:

KEYWORDS: San Diego Bay; structure; Navy; bay

Port must help pay for cleanup.

Brenner, R.B. San Diego Union B1. Feb 28 1989.:

KEYWORDS: San Diego Bay; metal; copper; Paco Terminal; bay

Toxic gas leak closes landfill in South Bay.

Rowland, B. San Diego Union 1989.

KEYWORDS: San Diego Bay - South Bay; chemical; gas, chlorine; Appropriate Technologies II; bay

Major oil spill is not likely here.

Wilkins, J. San Diego Union B1. Apr 10 1989.:

KEYWORDS: Pacific Ocean, San Diego Bay; oil; oil; ocean inshore, bay

Port District must consider the environment, and resources too.

Powell, J. and P. Kruer . San Diego Union . B13. Feb 2 1989.

KEYWORDS: San Diego Bay; sewage, structure, chemical; bay

Company is fined \$75,000 for dumping toxics in bay.

Bean, J. Los Angeles Times . PIIp12. Feb 11 1989.:

KEYWORDS: San Diego Bay; chemical, organotin; TBT; Zarcon Corp.; bay

Firm that removes paint from ship fined for pollution. Ott, B.

San Diego Union . B7pp. Feb 11 1989.:

KEYWORDS: San Diego Bay; chemical, organotin; TBT; Zarcon Corp.; bay

State holds port liable in copper pollution. Fremmolino, R. Los Angeles Times PII p1. Feb 28 1989.:

KEYWORDS: San Diego Bay; metal; copper; Paco
Terminals; bay

San Diego Bay toxic hot spots. Environmental Health Coalition.
Clean Bay News 2-3pp. Spring 1989. San Diego : Environmental
Health Coalition.

KEYWORDS: San Diego Bay, Convair Lagoon, Pacific
Ocean; organochemical, organotin, metal, chemical,
oil; PCB, TBT, DDT, aromatic hydrocarbons, oil,
pesticides, copper; Paco Terminal, boatyards,
Southwest Marine, Teledyne Ryan Aerospace, Pacific;
bay, lagoon, ocean inshore

ABSTRACT: Newsletter describes San Diego Bay
pollution problem and pollutants that have been
identified at hot spots in the bay. Also mentions
that there is currently no San Diego Bay-specific
monitoring program for mussels.

Response of marine fouling communities to a pollution gradient in San Diego
Bay, California. Johnston, R.K. Thesis presented to San Diego State
University . 1989. San Diego:San Diego State University

KEYWORDS: San Diego Bay; description - animal,
pollution - general; bay

Biocycle usage .. Coronado, City of Re: Coronado
1975 Census . Oct 1975.:

KEYWORDS: San Diego Bay; resource utilization;
biocycle; bay

Coronado .. Coronado - 1990, The General Plan
. Mar 1971.:

KEYWORDS: San Diego Bay; structure; bay

Coronado .. Environmental Resource Management Element of the
General Plan, City of Coronado . Jun 28 1973.:City of
Coronado

KEYWORDS: San Diego Bay; structure; bay

Coronado... Noise Element and Appendix . Sep 17
1974.:City of Coronado

KEYWORDS: San Diego Bay; noise; bay

Coronado .. Ordinance No. 1252, Coronado
Environmental Design Commission . Mar 21 1972.:

KEYWORDS: San Diego Bay; bay

Coronado .. Resource Report, Environmental
Resource Management Element of the General Plan, City of
Coronado . Apr 1973. Coronado:City of Coronado

KEYWORDS: San Diego Bay; structure; bay

Coronado .. Environmental Impact Report Guidelines
. Aug 6 1974.:

KEYWORDS: San Diego Bay; EIR; bay

Coronado .. Technical Report, Environmental
Resource Management Element of the General Plan, City of
Coronado . Apr 20 1973. Coronado:

KEYWORDS: San Diego Bay; planning; bay

Coronado .. Zoning Ordinance . Jun 28 1973.:

KEYWORDS: San Diego Bay; planning; bay

California small craft harbors and facilities plan.

March 1964 : State of California Department of Parks
and Recreation

KEYWORDS: Mission Bay, San Diego Bay; structure;
harbors; bay

Staff report on wastes associated with shipbuilding and repair
facilities in San Diego Bay. Jun 1972.:Regional Water Quality
Control Board, San Diego Region

KEYWORDS: San Diego Bay; structure, debris;
shipbuilders, repair operations; bay

San Diego Unified Port District preliminary Embarcadero
development plan . Oct 1975.:

KEYWORDS: San Diego Bay; structure; Embarcadero
Development Plan; bay

Annual Report 1975-1976. San Diego Unified Port District

KEYWORDS: San Diego Bay; bay

Chula Vista boat basin: wildlife reserve, final
EIR . Feb 1976.:David D. Smith & Ass., WESTEC
Services, Inc., SDUPD Environ. Mgmt.

KEYWORDS: San Diego Bay; description - animal; bay

Ecological resource inventory of the Cabrillo
National Monument intertidal zone . 1976.:U.S.
National Park Service

KEYWORDS: Pacific Ocean, San Diego Bay; description
- general; ocean inshore, bay

San Diego Unified Port District: Annual Report 74-75 .

KEYWORDS: San Diego Bay

Feeding ecology and growth of white sea bass larvae.

Dutton, P.H. thesis submitted to San Diego State University, Spring
1989. Aug 1989. San Diego : San Diego State University

KEYWORDS: Agua Hedionda Lagoon, Mission Bay;
description - animal; white seabass; lagoon, bay

Heavy metal concentrations in San Diego Bay sediments and marine life.

/ Barry, J.N./ 1972 : San Diego Regional Water Quality Control Board

KEYWORDS: San Diego Bay; metal; heavy metal; bay

Feasibility of transplantation, revegetation, and restoration
of eelgrass in San Diego Bay / Boone, C.G. and R.E. Hoepfel/
California Environmental Effects Lab. U.S. Army Corps of
Engineers Waterways Experiment Station. Contract No.
DACW09-75-B-0026 . 1976.:

KEYWORDS: San Diego Bay; restoration, description -
plant; revegetation, eelgrass; bay

South Bay Ocean Outfall Study . CH2M Hill w/Lowry & Associates,
Boyle Engineering Corporation, John Carollo Engineers, and Rick
Engineering. Prepared for City of San Diego . 1982.

Laboratory Report No. SO-1243: Three sediment samples from Harbor
Cove Marina Site (heavy metals, oil and grease).

1986. Clarkson Laboratory & Supply, Inc.

KEYWORDS: San Diego Bay; metal, oil; heavy metal,
oil, grease; Harbor Cove Marina; bay

Appendix B. An Interim Report on the Foraging Activity of the California
Least Tern in North San Diego Bay. San Diego Unified Port District 1986.
Final Environmental Impact Report: Sunroad Marina, Harbor Island. Copper,

E. Prepared for Phillips, Brandt and Reddick. 1986.

KEYWORDS: San Diego Bay; description - animal;
California Least Tern; bay

A study of the breeding biology of the California least tern at
Coronado and the foraging ecology of the California least tern at
Navy bases on San Diego Bay.

Copper, E. Prepared for Western Division, Naval Facilities
Engineering Command, San Bruno, contract no. N62474-85-5587. 1985.

KEYWORDS: San Diego Bay; description - animal;
California Least Tern; Navy bases; bay
ABSTRACT: Delta Beach, Naval Amphibious Base,

Appendix B: A Supplemental Report on the Foraging Activity of the
California Least Tern in North San Diego Bay 2 July-10 September
1986.

Copper, E. San Diego Unified Port District 1986. Final
Environmental Impact Report: Sunroad Marina, Harbor Island. 1986.
Phillips, Brandt and Reddick

KEYWORDS: San Diego Bay; description - animal;
California Least Tern; bay

A Report on the Results of Bird Surveys Conducted in the Vicinity
of Harbor Island, San Diego Bay 14 May - 10 September 1986.

Copper, E. Appendix B In: San Diego Unified Port District 1986.
Final Environmental Impact Report: Sunroad Marina, Harbor Island .
1986.:Prepared by Phillips, Brandt and Reddick

KEYWORDS: San Diego Bay; description - animal;
bird; bay

San Diego Bay Sportfish Study.

1987, County of San Diego Department of Health Services

KEYWORDS: San Diego Bay; resource utilization;
sportfish take; bay

Environmental Features of Lockheed Cove, Harbor Island, San Diego
Bay, California.

Eberhardt, R.L. Lockheed Corp., Oceanic Technical Manuscript 1.
1967. Lockheed Corporation

KEYWORDS: San Diego Bay; description - geographic;
Lockheed Cove; bay

Tidal Currents in San Diego Harbor.

Falter, DH. MS Thesis, San Diego State University, 1971.

KEYWORDS: San Diego Harbor, San Diego Bay;
description - water; tidal currents; harbor, bay

Vessel Pollution Study, San Diego Bay, California.

1969. Federal Water Pollution Control Administration

KEYWORDS: San Diego Bay; pollution - general;
vessels; bay

NASSCO Outfitting Pier, San Diego Industrial Area,
EIR. Prepared for the San Diego Unified Port District,
Environmental Management Dept. 1973. Ferver
Engineering Company

KEYWORDS: San Diego Bay; description - structure;
bay

NASSCO Shipways No. 1, San Diego Industrial Area,
Final EIR .. Prepared for the San Diego Unified Port
District, Environmental Management Dept. .

1973.:Ferver Engineering Company

KEYWORDS: San Diego Bay; Environmental Impact

Report; bay

NASSCO Shipbuilding Dock, San Diego Industrial Area, Final EIR. March 1974 .. Prepared for the San Diego Unified Port District, Environmental Mangement Dept. . 1974.:Ferver Engineering Company

KEYWORDS: San Diego Bay; Environmental Impact Report; bay

Integrating Environmental Management with Port Planning, San Diego Bay, California.

Firle, T.E. and M.V. Needham. Proceedings of Sixth Annual Conference of the Coastal Society I: 81-92pp. 1980.

KEYWORDS: San Diego Bay; planning; bay

Biological Studies of Portions of the Eastern Shoreline of Grand Caribe Isle, Coronado Cays, San Diego Bay.

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Prepared for the California Regional Water Quality Control
Board, San Diego Region. 1982.:Woodward-Clyde
Consultants

KEYWORDS: San Diego Bay; description - structure;
South Bay Power Plant; bay

In Valdez's wake: where's rest of Bay oil coming from?

Grange, L. Los Angeles Times. CC1-7pp. Aug 20 1989.

KEYWORDS: San Diego Bay; oil; oil; Exxon Valdez,
ships, shipyards; bay

ABSTRACT: The article discusses the intensified
awareness of the oil problem in San Diego Bay since
public scrutiny focused on the Exxon Valdez and its
entrance into the bay for cleanup. The Coast Guard
is responsible for monitoring records of ship cargo
contents, and discharge and dumping of oily
substances. However, budget restrictions have
limited the Coast Guard's monitoring efforts, and
they devote most of their efforts to law

enforcement and search-and- rescue.

California State Mussel Watch Marine Water Quality Monitoring Program 1986-87.

Stevens, T.P. Water Quality Monitoring Report 88-3. California State Mussel Watch. Compiled Data for San Diego Bay. 1988. State Water Resources Control Board

KEYWORDS: San Diego Bay, California coastline; chemical, metal, organochemical, organotin; silver, PCB, TBT; bay, ocean - inshore

ABSTRACT: Includes results from the SMW program during the 1986-87 monitoring year. Information on San Diego Bay includes very high values for silver (to 39.5 ppm dry wt.), PCB's (5400 ppb dry wt.), and TBT (>19,000 ppb dry wt.) in the mussels north of Pt. Loma.

California State Mussel Watch Marine Water Quality Monitoring Program 1985-86.

Hayes, S.P. Water Quality Monitoring Report No. 87-2WQ. California State Mussel Watch. Compiled Data for San Diego Bay. 1988. State Water Resources Control Board

KEYWORDS: San Diego Bay, Pacific Ocean; organochemical; PCB's; Teledyne-Ryan Aeronautical; bay, ocean - inshore

ABSTRACT: Seaward shore of Pt. Loma Pen. north of the mouth of San Diego Bay has California mussel silver levels that are among the highest ever measured by SMW. The highest levels of total PCBs measured in the history of the SMW Program continue to be measured in mussels transplanted to Convair Lagoon (East Basin). Levels are as follows: 1985-86: 2.21 mmp wet wt.; 1984-85: 2.41; 1983-84: 2.01. Teledyne-Ryan Aeronautical is a major source of these PCBs.

California State Mussel Watch Marine Water Quality Monitoring Program 1984-85.

Hayes, S.P. and P.T. Phillips. Water Quality Monitoring Report No. 86-3WQ. California State Mussel Watch. Compiled Data for San Diego Bay. 1988. State Water Resources Control Board

KEYWORDS: San Diego Bay, Pacific Ocean; organochemical, metal; PCB's, silver; bay, ocean - inshore

ABSTRACT: Concentration of PCBs in East Basin (Convair Lagoon) exceeded the USFDA tolerance of 2.0 ppm wet weight, and the Dept. of Health Services has posted the area warning against consumption of shellfish. Higher than normal concentrations of PCBs and trace metals were also found in samples from the North Island area. Silver levels in Pt. Loma area are high. Trace metal concentrations are high near the 24th Street Marine Terminal area. Freshwater clams from San Diego River indicate trace metals and synthetic organic compounds due to point and nonpoint discharges to the drainage area.

California State Mussel Watch: 1981-1983 Biennial Report. Tracemetals and synthetic organic compounds in mussels from California's coast, bays and estuaries. Water Quality Monitoring Report No. 83-6TS.

Ladd, JM, SP Hayes, M Martin, MD Stephenson, SL Coale, J Linfield. California State Mussel Watch. Compiled Data for San Diego Bay.

1988. State Water Resources Control Board.

KEYWORDS: San Diego Bay; organochemical, metal; silver, zinc, copper, PCB's; 24th Street Marine Terminal, other; bay

ABSTRACT: In San Diego Bay, sufficient information has been developed to conclude that the ore handling facility at the 24th Street Marine Terminal is a major source of copper and zinc which were found in high concentrations. The San Diego Bay Regional Board should continue to work with the Port District to investigate the problem. In addition, the Regional Board, Port District, and State and local health agencies should investigate probable discharges of PCBs near the East and Commercial Basins of north Bay. State Mussel Watch and the Regional Board should continue to monitor the Bay to trace the effects of the abatement actions, to further define the silver distribution, and to locate previously undetected problem areas.

California State Mussel Watch Marine Water Quality Monitoring Program 1983-84.

Hayes, SP and PT Phillips. Water Quality Monitoring Report No. 85-2 WQ. California State Mussel Watch. Compiled Data for San Diego Bay. 1988. State Water Resources Control Board

KEYWORDS: San Diego Bay; organochemical, metal; copper, lead, mercury, zinc, PCB's; 24th Street Marine Terminal, other; bay

ABSTRACT: Information for San Diego Bay indicates high levels of PCB (2 ppm wet weight, equal to USFDA tolerance limit), high silver levels, elevated levels of copper, lead, mercury, zinc, and PCB 1248.

California Mussel Watch: 1977-1978. Volume III - Organic pollutants in mussels (*Mytilus californianus*) and (*M. edulis*) along the California coast. Water Quality Monitoring Report No. 79-22.

Risebrough, RW et al. California State Mussel Watch. Compiled Data for San Diego Bay. 1988. State Water Resources Control Board.

KEYWORDS: San Diego Bay; organochemical; hydrocarbon, heptachlor; bay

San Diego Interagency Water Quality Panel/ San Diego Bay 1988 Annual Report.

Report prepared for The California State Water Resources Control Board and The California Legislature. Feb 1989.

KEYWORDS: San Diego Bay; organochemical, metal, chemical, erosion, organotin, oil, sewage,; PCB's, PAH, arsenic, cadmium, oil, sewage, TBT, zinc, silver, chromium,; bay

ABSTRACT: The San Diego Interagency Water Quality Panel was created in January 1988 by Assemblywoman Lucy Killea to provide technical and advisory input to the State Water Resources Control Board and the San Diego Regional Water Quality Control Board concerning water quality problems in the Bay. It was also charged with assisting the Regional Board to identify all sources of information related to water quality, developing a framework for rapid identification of potential water quality problems, and making recommendations concerning changes to legislation to improve the quality of the waters of

the Bay. It is made up of representatives of governmental agencies having jurisdiction over various activities involving the Bay, along with other interested parties. The San Diego Bay Cleanup Project, a responsibility of the Regional board, is a 5-year effort to identify and cleanup known sources of contamination in the Bay. Funding for the Project comes from the State Board.

National Benthic Surveillance Project: Pacific Coast. Part I Summary and Overview of the Results for Cycles I to III (1984-86).

Varanasi, U., S-L. Chan, B.B. McCain, M.H. Schiewe, R.C. Clark, D.W. Brown. NOAA Technical Memorandum NMFS F/NWC-156 . Dec 1988. Seattle:NMFS Northwest Fisheries Center Environmental Conservation Division

KEYWORDS: San Diego Bay, West Coast; chemical, organochemical, metal; AHC, PCB, organochlorine, copper, lead, mercury, cadmium; bay, ocean-inshore
ABSTRACT: This report summarizes and interprets the results of the first 3 years of the Pacific Coast phase of the National Benthic Surveillance Project (NBSP), a component of NOAA's National Status and Trends Program. Employing highly uniform sampling protocols and state-of-the-art analytical methods, a comprehensive database has been developed, which includes detailed information on the distribution of a variety of chemical contaminants. These contaminants include selected aromatic hydrocarbons, PCB's, organochlorine insecticides and metals in surficial sediments and in liver tissue, bile, and stomach contents of selected bottom-feeding fish. Also documented were the prevalences of a variety of presumptive pollution-related liver and kidney lesions in the same target fish species. Of the 31 sites sampled in Alaska, Washington, Oregon, and California, 22 were located in or near urban centers. The results from individual sites should not be viewed as

Crystallizing support for a crystal-clear bay.

Wallace, A. Los Angeles Times - San Diego County . B1, B5. Feb 18 1990.

KEYWORDS: San Diego Bay; oil, chemical, organotin; diesel oil, lube oil, PCB's; boaters, shipyards;
ABSTRACT: A local couple who run an oil-changing and recycling business from their 27-foot boat, the "Lil Sucker", have become Baywatchers, joining the Environmental Health Coalition's Clean Bay Campaign to encourage San Diego Bay users to become environmental watch-dogs. Members of the campaign learn how to prevent and report oil spills on the bay and upstream.

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

Young, DR; Heesen, TC

Southern California Coastal Water Research Project, El Segundo; Sep 1977
21p REPORT NO: SCCWRP-109

ABSTRACT: Municipal wastewater effluent from three treatment plants in San Diego County averaged 1.7, 0.4, and 0.02 micrograms/l total PCB. Corresponding estimates for 1977 PCB emissions via the three coastal discharges were 270, 2, and 1 kg/yr, respectively. The median concentration of total PCB in surficial sediments around the largest (San Diego City) discharge 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 vs. 0.04 ppm (mg/wet kg); for muscle tissue of bottom-feeding fishes, 0.13 vs. 0.05 ppm. 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.

INPUTS AND DISTRIBUTIONS OF CHLORINATED HYDROCARBONS IN THREE SOUTHERN CALIFORNIA HARBORS

Young, DR; Heesen, TC

Southern California Coastal Water Research Project, El Segundo.

Jun 1974 31p REPORT NO: SCCWRP-TM214-74

ABSTRACT: Input rates of total DDT and PCB 1254 were surveyed in and San Diego harbors. The routes investigated were municipal and industrial wastewaters, surface runoff, dry aerial fallout, and vessel antifouling paints. Present usage of vessel paints contribute less than 1 kg/yr of these chlorinated hydrocarbons. High PCB concentrations (up to 10% dry weight) were measured in scrapings of old antifouling paints, suggesting that, in the past, thousands of kilograms of PCB may have been applied annually to vessel bottoms in southern California harbors. DDT residues (discharged via Los Angeles County municipal outfalls) in mussels from the Los Angeles/Long Beach harbor region (1 mg/wet kg) were 30 times those in and around San Diego harbor. In contrast, mussels from all three harbors had similar PCB 1254 levels. Values ranged up to about 1 mg/wet kg near vessel repair yards.

MARINE INPUTS OF POLYCHLORINATED BIPHENYLS AND COPPER FROM VESSEL ANTIFOULING PAINTS

Young, DR; Heesen, TC; McDermott, DJ; Smokler, PE

Southern California Coastal Water Research Project, El Segundo.

May 1974 23p REPORT NO: SCCWRP-TM212-74

ABSTRACT: During 1973 an estimated 37,000 recreational vessels (5-21 m long) were docked within 14 major marinas in southern California. Detailed surveys of major brands and quantities of antifouling paint applied to such craft and to commercial and naval vessels in Los Angeles/Long Beach and San Diego harbors were conducted. These studies revealed that approximately 300,000 liters of antifouling paint are applied annually to vessels in southern California. Only 7 of the 28 paints most commonly used yielded detectable PCB levels. Median concentrations of mixtures resembling Aroclor 1242 and 1254 were less than 0.3 and 0.7 mg/l, respectively, and the maximum PCB concentration measured was 40/mg/l. The median copper concentration in these paints was estimated to be 600 g/l, corresponding to an annual copper application rate of about 180 metric tons. This copper, which is designed to be available and toxic to marine organisms, may have a larger environmental impact than the 600 metric tons of copper discharged annually via municipal wastewaters.

POLYCHLORINATED BIPHENYL INPUTS TO THE SOUTHERN CALIFORNIA BIGHT

Young, DR; McDermott, DJ; Heesen, TC

Southern California Coastal Water Research Project, El Segundo.

Nov 1975 54p REPORT NO: SCCWRP-TM224-75

ABSTRACT: Rates of polychlorinated biphenyl (PCB) transport via several routes to the coastal waters off southern California have been quantified. Submarine discharge of municipal wastewater was the single largest source, contributing 5,400 kg of these synthetic organics in 1974. Inputs via this route appear to be decreasing, as the corresponding estimate for 1971 exceeded 19,000 kg. One result of this continuing discharge is that bottom sediments around the largest outfalls contain up to 10 ppm PCB. Aerial fallout also appears to be an important source; the estimated deposition rate of 1254 PCB onto the coastal waters during 1973-74 was 1,800 kg/yr--highest inputs were measured off Los Angeles. This region also contributed the most PCB in surface runoff, although less than 800 kg were discharged annually during 1972-73 via storm and

dry-weather flow. Direct industrial discharges to San Pedro and San Diego Harbors did not appear to be a major PCB source, totaling less than 250 kg/yr. Although antifouling paints may have been an important source in the past, present inputs are negligible.

COASTAL WATER PROTECTION THE NAVY WAY

Hura, M; Evans, EC III; Wood, FG (Naval Material Command Headquarters) Environmental Science and Technology 10(12):6pp. Nov 1976.

ABSTRACT: Since 1971, the Naval Undersea Center has been conducting a long-range program to develop reliable methods of surveying, analyzing, and predicting the general quality of marine environments, with special emphasis on harbors, focusing upon community response as a sensitive and integrative measure of general environmental quality. Major surveys have been conducted of the following harbors: San Diego Bay. . . . A data bank has been set up, containing data from San Diego Bay, and other locations. Microcosm experiments and field survey can be used: to quantify functional interrelationships between organisms; to determine aggregate response of a community as a whole to environmental stresses; to identify and calibrate potential bioindicators; and to quantify biological detoxification capacities of a given marine community. Microcosm facilities can simulate: thermal pollution; fresh water dilution; silt exposure; heavy metals; other chemical exposures; and combinations of the above.

SHIPBUILDING DOCK FOR NASSCO

Dahlin, RA (Ferver Engineering Company)

ASCE Journal of Waterways, Harbors & Coast Eng Div 103(1):pp Feb 1977

ABSTRACT: This semi-relieved shipbuilding drydock with tied back steel pile walls has recently been completed on San Diego Bay. Pressure relief is accomplished by cutoff walls and an underdrain system with continuous pumping. Substrata pressure is monitored by piezometers set in deep pipes with remote reading dials at the surface. The underdrain system is separate from the main dock dewatering system. The gate is floated by dewatering flotation chambers with compressed air.

TFB: A TRANSPORTABLE OPEN OCEAN BREAKWATER

Essoglou, ME; Seymour, DRJ; Berkley, JB (Naval Facilities Engineering Command; California Department of Navigation; Naval Undersea Center)

Paper from Proceedings of the 1975 IEEE Conference on Engineering in the Ocean Environment.

Institute of Electrical and Electronics Engineers; Sep 1975 pp 723-725

ABSTRACT: The paper describes a unique floating breakwater under joint development by California and the Navy. The transportability of the system makes it applicable for temporary protection of offshore construction projects, as well as for a number of permanent installations where conventional breakwaters are not feasible. The results of the development program are described, including the successful demonstration of limited fetch breakwater in San Diego Bay. Plans for an ocean scale experiment during the next year are outlined. Recommendations are presented for the commercial development of the system to meet national needs-both commercial and military.

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOLUME I: COLLECTION, TREATMENT AND DISPOSAL OF OIL WATER WASTES FROM SHIPS

Forster, RL; Moyer, JE; Firstman, SI

Harris (Frederic R), Incorporated; 300 East 42nd Street; New York; 10017 Mar 1973 Final Report 236pp

ABSTRACT: The types of oil wastes brought into selected ports by non-military shipping are identified. Estimates of quantities, based on total prohibition of overboard dumping, brought in during 1970 and anticipated for 1975 and 1980 are made. Conceptual designs for collecting, treating and disposing of the oil wastes with no additional environmental degradation along with cost estimates were made for the selected ports. The roles of Government are explored, the impact on shipping is evaluated

and the overall entrepreneurial viability of the concept discussed. It is intended that this report serve as a guide for any US port contemplating a Port Collection and Separation Facility.

SHIP WASTE OFFLOAD SYSTEM STUDY. PHASE 1 REPORT. PRELIMINARY CONCEPT DEVELOPMENT AND ECONOMIC COMPARISONS

Davis, EJ; Sylva, C

Johnson (Bernard), Incorporated; Houston; Texas

May 1973 146 pp CONTRACT NO: N00025-72-C-0042; Contract

ABSTRACT: The purpose of the study is to develop the most cost effective system of offloading sanitary, hotel, oily, industrial and solid wastes from ships to shore facilities. The studies presented herein represent Phase 1 of the study which addressed itself to defining the problem, conceiving alternative solutions, performing comparative analysis of the alternatives and selecting a system for further development. The problem was defined in terms of ships presence, ships waste generation rates, existing shore facilities and field conditions of performance based on data collected in the field from ... San Diego Naval complexes. Fifteen different concepts were developed for consideration as the ships' waste offload system and were presented in the form of sketches and verbal descriptions. The concepts were compared in terms of technical, operating and economical considerations.

PORT ANALYSIS REPORT: SAN DIEGO, CALIFORNIA

Sharp (George G) Incorporated; 100 Church Street; New York; 10007

Dec 1962 64 pp REPORT NO: 970/5339

ABSTRACT: The port of San Diego is evaluated for N.S. Savannah use in terms of AEC regulations. The site itself is described, including physical characteristics, seismology, hydrology, climatology, population, water supply, and marine foods. A preliminary port analysis considers berthing facilities, preliminary port arrangements (such as administrative control, tug availability, port services, local and emergency assistance, public health, and traffic control), and recommendation for specific sites. Site hazards evaluation is made along with procedures for port operations and visitor control. Further consideration is given to interim emergency procedures: interim emergency evacuation plan, ship removal plan, and practice of emergency procedures.

A STUDY OF THE TEMPERATURE TOLERANCES OF ADULT SOLEN ROSACEUS AND TAGELUS CALIFORNIANUS IN SOUTH SAN DIEGO BAY: THE EFFECTS OF POWER PLANT COOLING WATER DISCHARGE.

MERINO, JOSE-MARIA. PH.D. 1981 UNIV OF CALIF RIVERSIDE AND SAN DIEGO STATE UNIVERSITY

ABSTRACT: The evidence presented in this study indicates that elevated water temperatures in the vicinity of the South Bay Power Plant are important in determining the large-scale distribution patterns and population characteristics of *S. rosaceus* and *T. californianus*. While the temperature buffering ability of the sediments offers some protection from upper lethal water temperatures, *S. rosaceus* appears to be restricted in distribution to areas where sediment temperatures rarely exceed 28(DEGREES)C. On the other hand, *T. californianus* are found where sediment temperatures approach 34(DEGREES)C. Although densities of *S. rosaceus* at the outer test stations are significantly less than densities of *S. rosaceus* at the control station, individuals grow faster but reach a smaller maximum size. Similarly, densities of *T. californianus* within the cooling water channel are affected by the heated [...text missing...] are less than densities of *T. californianus* at the control and outer test stations. The growth of *T. californianus* within the cooling water channel is also faster than growth of *T. californianus* beyond the channel, and a smaller maximum size is attained. What is observed here at South San Diego Bay within a distance of 5 kilometers is reported in the literature for distances of hundreds of miles in latitude. Reproduction of *S. rosaceus* and *T. californianus* may be enhanced in the vicinity of the South Bay

Power Plant. The weight gain of individuals of both species suggests that spawning may be extended into the late summer months. Indirect evidence for this extension of the spawning period is also supported by juvenile *S. rosaceus* as small as 1.4 mm in length being present in grab samples during winter months, and the presence of juvenile *T. californianus* in samples throughout much of the year. Annual mortality rates of *S. rosaceus* were significantly higher at the test stations than at the control station, presumably due to higher water temperatures at test stations D-7. The annual mortality rate of *T. californianus* was highest at test station D-2, the point nearest the discharge of thermal effluent. At this location *T. californianus* became an annual species: recruitment into that population occurred in later summer/early fall, and the cohort died during the next summer. An analysis of size-frequency distribution histograms suggests that *S. rosaceus* populations are characterized by one and possibly two recruitment waves per year. The apparent 2nd wave is likely an extension of the spawning season near the cooling water channel. A similar analysis for *T. californianus* indicates these populations are characterized by constant recruitment, exponentially decaying growth, & increasing mortality.

The predominant random small-scale dispersion pattern of *S. rosaceus* and *T. californianus* in a fairly homogeneous environment, and the strongly size-class dominant populations suggests insignificant adult-adult and significant adult-larval interactions, a possible regulating factor in their populations. Regulations may occur by adults filtering spat and recently settled juveniles from the water column or resuspended sediments and causing recruitment failures.

Thermal tolerance and resistance studies indicate that *T. californianus* can withstand higher water temperatures than *S. rosaceus*. The data on resistance or "effective time" predicts that *S. rosaceus* should not occur much closer to the point of thermal discharge than test station D-7 and D-5. This was verified through the field study. On the other hand, the higher resistance to thermal effluent by *T. californianus* allowed this species to occur well within the South Bay Power Plant cooling channel.

Life history traits differ between control and test station locations because of the influence of elevated water temperatures of the latter. Individuals from test station locations are characterized by more variable reproductive effort, fewer young, (as determined by juvenile densities) and shorter life span, while individuals from the control station locations are characterized by a more predictable breeding cycle resulting in numerous young. A longer life span, and larger size and presumably iteroparity, is also characteristic of the populations unaffected by the increased temperatures due to coolant discharge.

Return of the giant seahorse

Jones, Tony

Underwater Naturalist 18(4):31, 1990.

DESCRIPTORS: San Diego Bay

Reoccurrence of the Pacific seahorse, *Hippocampus ingens*, in San Diego bay.

Jones, Anthony T.; Dutton, Peter; Snodgrass, Robert E.

California Fish and Game 74(4):236-238, October 1988.

Seabed drifter movements in San Diego Bay and adjacent waters

Hammond, R. R.; Wallace, W. J.

Estuarine, Coastal and Shelf Science, June 1982. 14(6):623.

CHANGES IN HARD BOTTOM COMMUNITIES RELATED TO BOAT MOORING AND TRIBUTYL TIN IN SAN DIEGO BAY CALIFORNIA USA A NATURAL EXPERIMENT LENIHAN H S; OLIVER J S; STEPHENSON M A

MARINE ECOLOGY PROGRESS SERIES 60 (1-2):147-160, 1990.

ABSTRACT: San Diego Bay contains a number of harbors and other similar-sized embayments. Some contain many boats and others relatively few, providing an unique natural experiment where the ecological impact of mooring many boats was evaluated. Back-bay areas with many boats

contained depauperate hard-bottom or fouling communities (less cover, biomass, and fewer species) compared to similar areas in embayments with few boats. Embayments with many boats were characterized by serpulid polychaete worms, filamentous algae, and a solitary tunicate, *Ciona intestinalis* L. These groups apparently tolerated the physical and chemical stress associated with many boats, but were replaced by other sessile invertebrates, such as mussels, sponges, bryozoans, and other tunicates, in embayments with few boats. These groups are more characteristic of hard bottom communities on many natural reefs. Unlike the sessile organisms, the motile crustaceans and polychaetes that nestled among the sessile groups were strongly associated with microhabitats, such as patches of algae and dense serpulid mats, rather than the presence of many or few boats. However, there were more species of nestling invertebrates in embayments with few boats. In comparing embayments with many and few boats, sampling was confined to back-bay areas. Hard bottom communities at the front of embayments were similar to back-bay areas where there were few boats. The concentration of tributyltin (TBT, a toxic additive to paint) was also higher in embayments with many boats. We hypothesize that TBT is a cause of the changes in hard bottom communities. Hydrographic variations among embayments with many and few harbors could not explain the consistent community patterns.

PARASTEPHOS-ESTERLYI NEW-SPECIES OF COPEPOD STEPHIDAE CALANOIDA CRUSTACEA FROM SAN DIEGO BAY CALIFORNIA USA

FLEMINGER A

PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON 101(2):309-313, 1988.

ABSTRACT: *Parastephos esterlyi*, the third species of the genus, is described from San Diego Bay. It resembles *P. occatum* Damkaer but differs in its longer body, in the symmetrical and shorter genital segment having different armament including a pair of spines flanking the genital antrum, and in the details of the fifth legs in both males and females.

ORGANOCHLORINES AND MERCURY IN EGGS OF COASTAL TERNS AND HERONS IN CALIFORNIA USA

OHLENDORF H M; CUSTER T W; LOWE R W; RIGNEY M; CROMARTIE E

COLON WATERBIRDS 11(1):85-94, 1988.

ABSTRACT: Caspian Tern eggs from San Francisco Bay had higher PCB concentrations (4.85 ppm) than did eggs of this species from San Diego Bay (1.70 ppm) or but we detected no significant differences in mean concentrations of other organochlorines.

ANTIFOULING PAINTS USE ON BOATS IN SAN DIEGO BAY AND A WAY TO MINIMIZE ADVERSE IMPACTS

NICHOLS J A

ENVIRONMENTAL MANAGEMENT 12(2):243-248, 1988.

ABSTRACT: High concentrations of copper and tributyltin, two biocides used in antifouling paints, are found in harbors. Efforts are necessary to reduce the adverse impact of biocides from antifouling paints, but little is known about the actual use of such material. I surveyed the operators of 435 boats berthed in San Diego Bay, to determine what paints and maintenance procedures were being used. More than 90% of the respondents used conventional leaching paints. These paints contain 40% to 65% copper compounds and 3% to 7% tributyltin compounds. Few respondents used copolymer paints. Those who did use copolymer paints seemed to repaint less frequently than those using conventional leaching paints. Professional maintenance companies do not initiate repainting as frequently as individuals doing their own maintenance. It appears that the input of antifouling biocides to harbor waters could be reduced by at least one-third simply by educating boat-owners about the chemical mechanisms involved in antifouling paints, by explaining the environmental and economic advantages of using slow-release paints, and by encouraging them not to repaint until their paint's useful life has expired.

DEGRADATION OF TRIBUTYLTIN IN SAN DIEGO BAY WATERS.

SELIGMAN P F; VALKIRS A O; LEE R F

ENVIRONMENTAL SCIENCE AND TECHNOLOGY 20(12):1229-1235, 1986.

ABSTRACT: Several experiments were carried out to determine the degradation rate of tributyltin (TBT) in microcosms containing harbor water. Unlabeled or ¹⁴C-labeled tributyltin was added to water samples collected from two stations in San Diego Bay. Degradation rates were determined by calculating the rate of loss of the added parent TBT compound. Calculated half-lives in water collected from a yacht harbor (ambient concentration was 0.5 .mu.g of TBT/L) were 6 and 7 days for light and dark treatments, respectively. Half-lives from a clean-water site (< 0.03 .mu.g of TBT/L) were 9 and 9 days for light and dark treatments, respectively. The principal degradation product in all experiments was dibutyltin with lesser amounts of monobutyltin. Complete mineralization, measured by the formation of ¹⁴CO₂, proceeded slowly with a half-life of 50-75 days. Tributyltin at high concentrations (744 .mu.g/L) was not degraded in sunlight, indicating that photolysis was not taking place and that biological degradation was the primary degradative process for TBT at low ambient concentrations.

MEASUREMENT OF BUTYLTIN COMPOUNDS IN SAN DIEGO BAY.

VALKIRS AO; SELIGMAN PF; STANG PM; HOMER V; LIEBERMAN SH; VAFA G; DOOLEY CA.

MARINE POLLUTION BULLETIN 17(7):319-324, 1986.

ABSTRACT: Inorganic tin and butyltin compounds were analysed in water samples collected from several areas within San Diego Bay. Highest concentrations of butyltins were detected in the Shelter Island and Commercial Basin Yacht harbours where anthropogenic inputs of butyltin from antifouling paints were probable. A distinct increase in tributyltin concentration was seen in the Shelter Island Yacht harbour over a period spanning more than 2 years, suggesting that the use of antifouling paints containing tributyltin is increasing. Samples extracted with methylisobutyl ketone and analysed by graphite furnace atomic absorption spectrophotometry consistently yielded higher tin concentrations than the same samples analysed by a hydride reduction/flame atomic absorption method, suggesting a non-hydride reducible tin fraction was present. Gas chromatography-mass spectrometry confirmed the presence of tributyltin in an environmental marine water sample following derivatization to the hydride species.

HOMING BY RELEASED CAPTIVE CALIFORNIA SEA-LIONS ZALOPHUS-CALIFORNIANUS FOLLOWING RELEASE ON DISTANT ISLANDS

RIDGWAY S H; ROBISON C C

CANADIAN JOURNAL OF ZOOLOGY 63(9):2162-2164, 1985.

ABSTRACT: Captive male Californiasea lions were twice flown to offshore breeding islands and released. Three animals returned to their pen in San Diego Bay, after discharge on San Clemente Island, about 115 km away. Two of four returned to the same facility from San Nicolas Island, about 240 km away. The fastest sea lion returned in 2 days from San Clemente and in 4 days from San Nicolas. This is the first evidence for such specific east-west navigation by sea lions and suggests that these animals are good navigators.

REPRODUCTION AND ORGANOCHLORINE CONTAMINANTS IN TERNS AT SAN DIEGO BAY.

OHLENDORF H M; SCHAFFNER F C; CUSTER T W; STAFFORD C J

COLON WATERBIRDS 8(1):42-53, 1985.

ABSTRACT: In 1981, we studied Caspian Terns (*Sterna caspia*) and Elegant Terns (*S. elegans*) nesting at the south end of San Diego Bay, California. Randomly collected Caspian Tern eggs contained significantly ($P < 0.05$) higher mean concentrations of DDE (9.30 ppm) than did Elegant Tern eggs (3.79 ppm). DDE may have had an adverse effect on Caspian Tern reproduction but the relationship between hatching success and DDE concentration was not clear. We found an unusually high incidence of chicks (4.6%) that died in hatching. Caspian Tern eggs that broke

during incubation or contained chicks that died while hatching had shells that were significantly ($P < 0.05$) thinner than eggs collected before 1947, and DDE was associated with reductions in shell thickness index (i.e., lowered eggshell density). Fish brought to Caspian Tern chicks contained up to 3.0 ppm DDE and 1.1 ppm PCBs. Organochlorine concentration brains of terns found dead were not high enough to suggest such poisoning as a cause of death.

ACUTE TOXICITY OF BIS TRI BUTYL TIN OXIDE TO A MARINE COPEPOD
U'REN S C

MARINE POLLUTION BULLETIN 14(8):303-306, 1983.

ABSTRACT: A static renewal toxicity test was conducted to evaluate the response of the copepod *Acartia tonsa* to bis(tributyltin) oxide (TBTO), the active compound of recently developed antifouling paints. Copepods were individually placed in test tubes containing 4 ml of 0.3, 0.5, 1.0, 1.7 or 3.0 $\mu\text{g/l}$ TBTO with acetone and seawater. Copepods (30) were used for each treatment and control condition and all solutions were renewed daily. The 96 h LC50 was 1.0 $\mu\text{g/l}$ with a 95% confidence interval between 0.8-1.2 $\mu\text{g/l}$ TBTO. The 144 h EC50 was 0.4 $\mu\text{g/l}$ TBTO which approached concentrations recently measured in San Diego Bay. Some copepods exposed to 0.3 $\mu\text{g/l}$ TBTO became moribund after 6 days.

PACIFIC COAST CASPIAN TERNS STERNA-CASPIA DYNAMICS OF AN EXPANDING
POPULATION

GILL R E JR; MEWALDT L R
AUK 100(2):369-381, 1983.

ABSTRACT: Nesting distribution, age-related seasonal movements, survivorship and mechanisms of population expansion in Pacific Coast caspian terns (*S. caspia*) were examined primarily through analysis of 412 recoveries of birds banded as juveniles between 1935 and 1980. Since the beginning of this century, the population has shifted from nesting in numerous small colonies associated with freshwater marshes in interior California and southern Oregon to nesting primarily in large colonies on human-created habitats along the coast. Colonies at and San Diego Bay account for 77% of the current Pacific Coast population (6000 pairs), which has breeding and wintering areas separate from those of populations east of the continental divide. There also appears to be some segregation on the wintering grounds by birds from the 3 major colonies within the Pacific population. Age-related seasonal movements in the Pacific population are characterized by a brief period of northward dispersal by newly fledged birds before migrating to the wintering grounds, a residency on the wintering grounds through their 2nd winter, a return to the breeding grounds the 3rd summer, when most birds are thought to prospect breeding sites and some may breed, and attainment of adulthood the 4th summer, with subsequent annual movements between wintering and breeding grounds. The Pacific population has increased 70% since 1960, apparently all by intrinsic growth. Over half (57%) of the fledging reach their 4th year, and they have a subsequent annual survival rate of 89% and a mean breeding life expectancy of 8.6 yr. An average annual fledging rate of 0.64 young/pair was calculated as necessary to have provided the observed growth of the population during its recent expansion. Growth of some of the individual colonies, particularly those in Washington, could only have resulted from extensive recruitment of birds from other Pacific Coast colonies. Philopatry is low in this population, and the northern colonies involved recruitment primarily of 1st-time breeders but also some older adults. Factors promoting both 1st-time breeders and older adults to join new and often distant colonies are discussed.

TIN IN MARINE ALGAE
ISHII T

BULLETIN JAPANESE SOCIETY SCIENTIFIC FISHERIES 48(11):1609-1616, 1982.
ABSTRACT: The chemical speciation of Sn in marine plants, waters and

sediments was carried out by means of an atomic absorption spectrometer with a hydride generator. Marine algae in San Diego Bay had several times higher concentrations of inorganic and organic Sn than those in Mission Bay. Little Sn was present in the supernatant of the homogenate of *Ulva* sp. The concentration of Sn in the crude residue was low in comparison with that from the residue digested by wet ashing. Over 2/3 of the dissolved forms of Sn in fresh and dried algal samples was inorganic. The results of Sn uptake and excretion experiments suggested that marine macroalgae lack the ability to substitute chloride for methyl. It was not clear whether organotin compounds were degraded by marine algae or not. Algal concentration factors for Sn decreased in the following order: $\text{SnCl}_4 > \text{CH}_3\text{SnCl}_3 > (\text{CH}_3)_2\text{SnCl}_2 > (\text{CH}_3)_3\text{SnCl} > (\text{CH}_3)_4\text{Sn}$.

DETERMINATION OF TIN IV AND ORGANO TIN COMPOUNDS IN NATURAL WATERS
COASTAL SEDIMENTS AND MACRO ALGAE BY ATOMIC ABSORPTION SPECTROMETRY
HODGE V F; SEIDEL S L; GOLDBERG E D

ANALYTICAL CHEMISTRY 51(8):1256-1259, 1979.

ABSTRACT: A method is described for the measurement of nanogram or subnanogram amounts of Sn(IV) and the halides of methyltin, dimethyltin, trimethyltin, diethyltin, triethyltin, n-butyltin, di-n-butyltin, tri-n-butyltin and phenyltin. These compounds in aqueous solution react with NaBH_4 to produce volatile hydrides which are detected by atomic absorption spectrometry. The hydrides are separated on the basis of their differing boiling points. Detection limits range from 0.4 ng for Sn(IV) to 2 ng for tri-n-butyltin chloride. Compounds yielding dimethyltin dihydride are found in San Diego Bay seawater at levels of 15 to 45 ng/l, usually exceeding the concentrations of methyltin and inorganic Sn.

A NEW AND INTERESTING BIOTOPE FOR COENOBIODISCUS-MURIFORMIS NEW-RECORD
CENTRIC DIATOM

RICARD M; MAURER D

REV ALGOL 12(1-2):9-10, 1977.

ABSTRACT: The colonial centric marine diatom, *C. muriformis* Loeblich III, was recorded for the 1st time in another biotope than that of San Diego Bay. It was found in the brackish waters of the Abidjan harbor, Ivory Coast, Africa.

SOUTHERN RANGE EXTENSIONS FOR CHUM AND SOCKEYE SALMON ONCORHYNCHUS-KETA
AND ONCORHYNCHUS-NERKA

DUFFY J M

CALIFORNIA FISH GAME 63(3):196-199, 1977.

ABSTRACT: A chum salmon *Oncorhynchus keta* taken in Sept 1974 in San Diego Bay, extends the southern range record 56.3 km (35 miles) from Del Mar.

FISH REMAINS FROM AN ARCHAEOLOGICAL SITE AT RANCHO CARRILLO ON THE SILVER
STRAND SAN-DIEGO COUNTY CALIFORNIA USA

FOLLETT W I

BULLETIN OF THE SOUTHERN CALIFORNIA ACADEMY OF SCI 75(2):131-137, 1976.

ABSTRACT: A collection of 170 fish remains from an archeological site on the Silver Strand, immediately west of San Diego Bay, represents 9 spp., all of which are edible: *Mustelus californicus*, *Sardinops sagax*, *Atherinopsis californiensis*, *Paralabrax* sp., *Roncador stearnsii*, *Genyonemus lineatus*, *Cynoscion parvipinnis*, *Sphyræna argentea* and *Pneumatophorus japonicus*. Remains of *C. parvipinnis*, a subtropical fish unknown from California in recent years, indicate the occurrence of a former warmwater fauna in this vicinity, probably during more than 2 centuries. Remains of large *S. argentea* and *P. japonicus*, probably caught in the ocean, suggest aboriginal use of the tule balsa.

Liquefaction risk analysis for a harbor fill.

Forrest, Carol L.; Noorany, Iraj

Marine Geotechnology 8(1):33-49, 1989.

ABSTRACT: Many coastal fills constructed of dredged and dumped sand are loose and may be susceptible to liquefaction. This paper describes a methodology for liquefaction risk analysis for such fills and uses Harbor Island, a hydraulic fill in San Diego Bay, as an example. The characteristics of the fill were analyzed and the liquefaction susceptibility of the soils was evaluated. These were then coupled with the results of a seismic exposure analysis for the site so that the probability of liquefaction could be evaluated.

Historical climatic fluctuations in southern California and their impact on coastal erosion and flooding. 1862 to present.

Kuhn, Gerald G.; Osborne, Robert H.

Coastal Zone '89: Proceedings of the Sixth Symposium on Coastal and Ocean Management (Charleston, SC, 1989 Jul 11-14). v 5 (of 5). Publ by ASCE, New York, NY, USA. p 4391-4405, 1989.

ABSTRACT: Flooding was of greatest importance in 1862, 1884 and intermittently through 1891. During the winter of 1861-62, extensive flooding occurred which destroyed one-quarter of the real estate in California. Mission Valley was filled with water when a severe storm backed-up water in the bay which prevented runoff of the flood waters from the San Diego River for a considerable period. Regionally, the wet year of 1884 alone may have been the most severe with respect to flooding and landslides. Rainfall from 1884 to 1891 includes rates that have not been equaled. Flooding during this period delivered enormous quantities of sediment, debris and vegetation to adjacent beaches. Although flooding has occurred during the 20th century, few events compare on a regional basis with those recorded during the latter half of the 19th century. Much of the scientific data base concerning fluvial and coastal processes in southern California accompanied rapid urbanization from 1947 to 1977. These data were collected during the most benign climatic period since the middle 1800's. Coastal planning criteria must be updated to consider the effects of great storms.

San Diego's Lindbergh Field.

Garland, Richard D.; Torma, J. Arnold

ITE Journal (Institute of Transportation Engineers) 59(5):17-20, May 1989.

ABSTRACT: The San Diego Unified Port District, which administers Lindbergh Field, Harbor Island, and other tideland property, is currently in the process of formulating long-range plans for the development of the airport complex. The primary objective of the study is to develop a total system plan for which all of the basic airport components are balanced with regard to capacity, i.e., the airside facilities (runways, taxiways, aprons), the terminal facilities (gates, counters, baggage, waiting areas), the landside facilities (parking, circulation road, terminal curbs), and regional access system (freeways, surface streets, and interchanges). Demand projections were made for each of these components based on air passenger volumes and the other airport demand components, which include vehicular traffic volumes, parking demand, linear curbside requirements, number of gates, fuel storage needs, and terminal size.

Tributyltin and mussel growth in San Diego Bay.

Salazar, Michael H.; Salazar, Sandra M.

Oceans '88: Proceedings - a Partnership of Marine Interests (Baltimore, MD, 1988 Oct 31-Nov 2) v 4. Publ by IEEE, New York, p1188-1197, 1988.

ABSTRACT: During three San Diego Bay field tests (1987-1988), juvenile mussels (*Mytilus edulis*) were exposed to mean ambient tributyltin (TBT) concentrations from 7 to 500 ng/L for 12 weeks. Mussel lengths and weights, seawater TBT concentration-- left bracket TBT right bracket -- , and various physical/chemical parameters were measured weekly. TBT bioaccumulation was measured at the end of each test. At mean seawater left bracket TBT right bracket less than equivalent to 200 ng/L, significant reductions in mussel growth rates were observed. Other environmental factors appear to modify the effects of TBT on juvenile mussel growth below

100 ng/L of TBT. No clear relationship between growth and rate and left bracket TBT right bracket in mussel tissues at concentrations below 1.5 μm TBT/g tissue was found. It is concluded that although there appears to be a linear relationship between TBT bioaccumulation and seawater left bracket TBT right bracket, the relationship between bioconcentration factor and seawater left bracket TBT right bracket appears to be inverse and exponential. No dose-related mortality was observed.

EFFECTS OF TBT ON MARINE ORGANISMS: FIELD ASSESSMENT OF A NEW SITE-SPECIFIC BIOASSAY SYSTEM.

Salazar, S. M.; Davidson, B. M.; Salazar, M. H.; Stang, P. M.; Meyers-Schulte, K. J.

Oceans 87 - Proceedings: The Ocean, An International Workplace.

(Halifax, NS, 1987 Sep 28-Oct 1) Publ by IEEE, pp1461-1470, 1987.

ABSTRACT: A portable environmental test system (PETS) was evaluated in San Diego Bay over a seven-month period using tributyltin (TBT) antifouling leachates. Three TBT concentrations (X equals 0.065, 0.077, and 0.193 $\mu\text{g/l}$) were tested against seawater controls with three replicates of each using 340-l tanks. Unfiltered seawater was pumped over a TBT-coated panel, creating a TBT-leachate which was diluted with seawater in mixing bins and distributed to test tanks. There were no significant effects attributable to TBT on fouling communities (species abundance and biomass), mussel and clam condition index, mussel gonad index, or oyster growth. TBT reduced juvenile mussel growth rate. Mussels and clams accumulated TBT at all test concentrations. There was an inverse relationship between dose and bioconcentration factor.

MATHEMATICAL MODELING OF THE TRANSPORT AND FATE OF ORGANOTIN IN HARBORS.

Walton, R.; Adema, C. M.; Seligman, P. F.

Oceans 86 - Conference Record. (Washington, DC, 1986 Sep 23-25)

Publ by IEEE, New York, pp 1297-1301, 1986.

ABSTRACT: A study was performed to model the circulation and fate of organotin in San Diego Bay. The hydrodynamics of the bay were modeled using a dynamic, pseudo-two-dimensional, link-node model known as the Dynamic Estuary Model. Contaminant fate was modeled using a logarithmic decay of organotin from the water column due to adsorption, and chemical and biological degradation processes. The impacts of continuous releases from docked ships and pulsed releases from drydocks were examined. Simulated bay concentrations, using experimentally determined degradation rates, correlated well with recent measurements of organotin in San Diego Bay.

MEASUREMENT OF BUTYLTINS IN SAN DIEGO BAY, CA: A MONITORING STRATEGY.

Seligman, Peter F.; Grovhoug, Joseph G.; Richter, Kenneth E.

Oceans 86 - Conference Record. (Washington, DC, 1986 Sep 23-25)

Publ by IEEE, New York, pp 1289-1296, 1986.

ABSTRACT: A monitoring survey of butyltin concentrations was conducted in San Diego Bay in February, 1986. Intensive sampling was designed to differentiate tidal, vertical, and regional variability components. Yacht harbors and marinas had by far the highest concentration of tributyltin within San Diego Bay, ranging from 0.027 to 0.235 $\mu\text{g/L}$. The lowest tributyltin concentrations, frequently below detection, were found in the southern part of the bay, where water residence time was longest. US Navy berthing areas and the northern part of the bay had intermediate values, usually in the range of 0.005-0.015 $\mu\text{g/L}$. Compared to data from a 1984 baseline survey, 1986 tributyltin concentrations decreased in all regions; however, total butyltin increased slightly, suggesting accumulation of degradation products. Tide and depth were important in determining tributyltin concentration variability but the degree of effect was sample station dependent. Yacht harbors and marinas can regionally be considered a tributyltin source while the southern bay can regionally be considered a sink.

DISTRIBUTION AND FATE OF BUTYLTIN COMPOUNDS IN THE SEDIMENT OF SAN DIEGO BAY.

Stang, Peter M.; Seligman, Peter F.

Oceans 86 - Conference Record. (Washington, DC, 1986 Sep 23-25)

Publ by IEEE, New York, pp 1256-1261, 1986.

ABSTRACT: Monobutyltin, dibutyltin and tributyltin compound concentrations were determined by the hydride derivatization/atomic adsorption technique for twelve sediment cores recovered from San Diego Bay. The three butyltin compounds were found to be present in significant concentrations (up to 551- MU g/kg dryweight total butyltin) in areas of restricted tidal flushing and high marine craft density as well as areas adjacent to active drydock facilities. Low to nondetectable (LESS THAN EQUIVALENT TO 2 MU g/kg each butyltin species) concentrations were found in well flushed areas (San Diego Bay entrance as well as recently dredged, newly built basin 5th Avenue Marina). Total butyltin concentrations decreased with depth in the cores. Results from a laboratory tank experiment with organotin-contaminated sediment documented that tributyltin was debutylated primarily to monobutyltin with a half-life of approximately 162 days.

GROWTH ABNORMALITIES IN MUSSELS AND OYSTERS FROM AREAS WITH HIGH LEVELS OF TRIBUTYLTIN IN SAN DIEGO BAY.

Author: Stephenson, M. D.; Smith, D. R.; Goetzl, J.; Ichikawa, G.; Martin, M.

Conference Title: Oceans 86 - Conference Record. Washington, DC, 1986 Sep 23-25.

Source: Oceans 1986. Publ by IEEE, New York, p 1246-1251

Abstract: Culched and culchless oysters (*Crassostrea gigas*) and two species of mussels (*Mytilus edulis* and *M. californianus*) were transplanted to San Diego Bay, California, along a gradient of known seawater tributyltin (TBT) concentrations. Reduced shell growth in all three species was noted at stations with the highest levels of TBT. Oysters exhibited a shell thickening response that has been identified in studies in France and England as indicative of high levels of TBT in seawater. Study results suggest that mussels and oysters can be used in routine monitoring programs to study the environmental effects of TBT in marine waters.

DEGRADATION OF TRIBUTYLTIN IN MARINE AND ESTUARINE WATERS.

Author: Seligman, Peter F.; Valkirs, Aldis O.; Lee, Richard F.

Conference Title: Oceans 86 - Conference Record. Washington, DC, 1986 Sep 23-25.

Source: Oceans (New York) 1986. IEEE, New York, pp1189-1195

Abstract: Experiments were performed to determine the rate of tributyltin (TBT) degradation in natural waters. Ambient levels of TBT and its degradation products were measured in San Diego Bay. TBT degradation rates were measured in microcosms by spiking ambient waters from San Diego Bay and ... with unlabelled and ¹⁴C-labelled TBT. Short degradation half-lives, based on TBT loss, in the range of 7-15 days were documented. Dibutyltin was the principal degradation product with lesser amounts of monobutyltin formed. Evidence for rapid TBT degradation is supported by environmental measurements which found: (1) elevated levels of monobutyltin and dibutyltin in San Diego Bay waters that tended to covary with TBT levels and (2) high percentages of butyltin degradation products in regions with long water residence times.

BUTYLTIN PARTITIONING IN MARINE WATERS AND SEDIMENTS.

Author: Valkirs, A. O.; Seligman, P. F.; Lee, R. F.

Conference Title: Oceans 86 - Conference Record. Washington, DC, 1986 Sep 23-25.

Source: Oceans 1986. IEEE, New York, pp1165-1170

Abstract: Experimental evidence indicates that a small fraction (5% or less) of measurable butyltin species is associated with the particulate fraction separated from whole seawater by filtration. Adsorption

experiments have shown that 17% or less of carbon-14 labeled tributyltin added to unfiltered seawater was taken up by suspended particles in a 10-hr period. Butyltin appears to be associated principally with the dissolved fraction of whole seawater, although some particulate-associated butyltin is present which permits butyltin transport to marine sediments via particulate settling. Environmental sediment tributyltin concentrations are approximately three orders of magnitude greater than the associated water column levels. Suspended sediment/water partition coefficients (Kp) calculated from recent environmental data are near those previously reported (3000), and are greater than sediment/water partition coefficients in some areas of San Diego Bay, California.

INTEGRATED MANAGEMENT OF SAN DIEGO BAY: A SOCIO-ECOLOGICAL CHALLENGE.

Author: Firle, Tomas E.

Conference Title: Coastal Zone '83: Proceedings of the 3rd Symposium on Coastal and Ocean Management. San Diego, 1983 Jun 1-4

Source: Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management 3rd volume II. Publ by ASCE, New York, p 1714-1733, 1983

MITIGATION MEASURES MANAGEMENT PLAN FOR COASTAL ZONES.

Author: Zada, Alan; Whaley, Michael

Conference Title: Coastal Zone '83: Proceedings of the 3rd Symposium on Coastal and Ocean Management. San Diego, 1983 Jun 1-4

Source: Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management 3rd v II. Publ by ASCE, New York, p1070-1081, 1983

SAN DIEGO BAY AREA FISHERIES MANAGEMENT.

Author: Needham, Michael V.

Conference Title: Coastal Zone '83: Proceedings of the 3rd Symposium on Coastal and Ocean Management. San Diego, 1983 Jun 1-4.

Source: Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management 3rd v 1. Publ by ASCE, New York, p496-515, 1983.

FROM FEASIBILITY STUDY TO CONSTRUCTION: A DREDGED MATERIAL WILDLIFE RESERVE IN SAN DIEGO BAY, CALIFORNIA.

Firle, Tomas E.; Smith, David D.

Oceans '77 Conf Rec, Annu Comb Conf sponsored by Mar Technol Soc and IEEE Counc on Oceanic Eng, 3rd, Los Angeles, Calif, Oct 17-19 1977. Publ by IEEE New York, and Mar Technol Soc, Washington, DC, 1977. v 2 Poster J. 1-Poster J. 10.

Abstract: Two years were required for preliminary design studies, cost tradeoff analysis, detailed engineering design, soil borings, sediment chemistry analysis, and preliminary tests of construction techniques. Construction is expected to take about two years and a salt marsh generation program may take another two to five years. The principal engineering issues related to the mode of emplacing and confining the dredged material, the fill's settling and dewatering behavior, and defining the construction technology needed to satisfy various ecological requirements of the wildlife reserve.

FEASIBILITY OF USING DREDGE SPOIL TO GENERATE A WILDLIFE RESERVE AND SALT MARSH IN SAN DIEGO BAY, CALIFORNIA.

Author: Smith, David D.; Firee, Tomas E.; Mitchell, Charles T.; Whitt, Malcolm L.

Source: IEEE Conf on Eng in the Ocean Environ and Mar Technol Soc, 11th Annu Meet, Proc, San Diego, Calif, Sep 22-25 1975 p 180-187. Publ by IEEE New York, 1975.

Abstract: The study and the proposed project together constitute a practical example of effective coastal zone multiple use planning and management.

Feasibility study of retrofitting a startup steam bypass system to San Diego Gas Electric's South Bay Unit 2

Author: Otahal, J.A. (San Diego Gas and Electric Company, Chula Vista.
Source: Proceedings: 1987 conference on fossil plant cycling. Dixon,
R.R. and Smith, L.P. (eds.) Princeton, NJ, 20-22 Oct 1987. Published Dec
1988 690p. Electric Power Research Inst. Report EPRI-CS-6048.

Abstract: The startup benefits of steam bypass systems are well documented in the literature. South Bay Unit 2, having been converted from base load operation to daily cycling service, seemed to be a good candidate for a steam bypass retrofit. In 1986 a study was initiated to quantify the generally recognized advantages of a steam bypass system, and determine if it made economic sense to install such a system on South Bay Unit 2. This paper describes the engineering study that was conducted to establish the technical and economic feasibility of installing a small (16%) startup steam bypass system on South Bay Unit 2. The study establishes the identifiable cost savings, project cost, and advisability of implementing this bypass system. Two alternate bypass schemes were considered with baseline capital cost estimates ranging from \$450K to \$600K. Study findings are that it would not be cost effective to implement a bypass system at this time, nor in the foreseeable future.

Radiological survey of San Diego Bay

Author: Semler, M.O.; Blanchard, R.L.

Source: Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility Report No.: EPA-520/5-88-019

Date: Jun 1989 25 p.

Abstract: A radiological survey of three sites in San Diego Bay provided the basis for the following conclusions: 1. Small quantities of Co-60 (0.02-0.05 pCi/g) are present in the bottom sediments in some areas of the harbor at the Submarine Base. Most, if not all, of the Co-60 contamination present probably originated prior to the earlier 1967 survey that reported Co-60 levels as much as 300 times larger than those observed in this study. The highest Co-60 concentration measured is now less than one percent of the normal background radioactivity in harbor sediment samples. 2. No tritium or gamma-ray emitters, other than trace amounts of those occurring naturally, were detected in surface water from the dock areas or in nearby drinking water supplies. 3. Only radionuclides of natural origin and trace amounts of Cs-137 from fallout of previous nuclear weapons tests were detected in samples of kelp, algae, and fish taken from the harbor at the Submarine Base. 4. Gamma-ray surveys of the harbors near the docking areas and along shorelines and beaches near the shipyards failed to detect any exposure rates above background.

Reconnaissance of geothermal resources near US naval facilities in the San Diego area, California

Author: Youngs, L.G.

Source: California State Dept. of Conservation, Sacramento, Div. of Mines and Geology. 1984 73 p. Report No.: DOE/SF/11720-T2

Contract No.: AC03-83SF11720

Abstract: A reconnaissance study has found little evidence of potential geothermal resources useful at naval facilities in the greater San Diego metropolitan area. However, there is a zone of modest elevated water well temperatures and slightly elevated thermal gradients that may include the eastern portion of the Imperial Beach Naval Air Station south of San Diego Bay. An increase of 0.3/sup 0/ to 0.4/sup 0/F/100 ft over the regional thermal gradient of 1.56/sup 0/F/100 ft was conservatively calculated for this zone. The thermal gradient can be used to predict 150/sup 0/F temperatures at a depth of approximately 4000 ft. This zone of greatest potential for a viable geothermal resource lies within a negative gravity anomaly thought to be caused by a tensionally developed graben, approximately centered over the San Diego Bay. Water well production in this zone is good to high, with 300 gpm often quoted as common for wells in this area. The concentration of total dissolved solids (TDS) in the deeper wells in this zone is relatively high due to intrusion of sea water. Productive geothermal wells may have to be drilled to depths economically infeasible for development of the resource in the area of discussion.

Instrumentation of an integrated, multi-unit process for powerplant waste treatment.

Samkoff, J.S.

Affiliation: Ecodyne Corp.

Source: AIChE Symp. Ser. (United States) v 75:190.

Date: 1979 225-231 p.

Abstract: A description is given of the treatment plants for San Diego Gas and Electric Co.'s oil-fired steam-electric stations (South Bay, Silvergate, and Encina); their pH adjustment and clarification, sludge thickening, filtering, and effluent monitoring systems, control panels and graphic panel section.;

Dredging and spoil disposal major geologic processes in San Diego Bay, California

Estuarine processes. Volume II. Circulation, sediments, and transfer of material in the estuary

Smith, D.D.; Wiley, M. (ed.)

David D. Smith and Associates, San Diego

Third International Estuarine Conference Galveston, TX, Oct 1975.

Academic Press, New York, 1977. 150-166 p.

ABSTRACT: San Diego Bay is a crescent-shaped, well-mixed estuary 22.5 km long, and initially about 55 km² in area, with depths generally less than 4.5 m except for a 7.5 to 20 m deep channel. The present bay volume is roughly 230 x 10⁶ m³. Since the early 1900's, dredging and use of spoil disposal as fill have reworked and shifted 100 to 140 x 10⁶ m³ of sediment, with a resulting 27% reduction in the bay's water area and an approximate doubling in depth of 55% of the original water area. Only 17 to 18% of the original area remains undisturbed by dredging or fill. Since the bay reached its approximate present configuration in Holocene time, the only significant sediment source has been river/stream deposition which delivered an estimated 0.8 to 1.1 x 10⁶ m³ annually, until diversion and damming of principal tributaries between 1875 and 1919 reduced sedimentation by more than 80%. For the 30 year period of maximum dredging (1940-1970), the average dredging rate was 3 to 6 times the original sedimentation rate, and roughly 17 to 34 times the sharply reduced present sedimentation rate. Thus, dredging and spoil disposal as geologic processes are substantially more important than all other erosional and depositional processes presently operating in San Diego Bay.

Dredging and spoil disposal major geologic processes in San Diego Bay, California.

Author: Smith, D.D.; Wiley, M. (ed.)

Title: Estuarine processes. Volume II. Circulation, sediments, and transfer of material in the estuary

Conference Title: 3. international estuarine conference

Conference Location: Galveston, TX, USA Conference Date: Oct 1975

Publisher: Academic Press, New York

Date: 1977 150-166 p.

Abstract: San Diego Bay is a crescent-shaped, well-mixed estuary 22.5 km long, and initially about 55 km² in area, with depths generally less than 4.5 m except for a 7.5 to 20 m deep channel. The present bay volume is roughly 230 x 10⁶ m³. Since the early 1900's, dredging and use of spoil disposal as fill have reworked and shifted 100 to 140 x 10⁶ m³ of sediment, with a resulting 27% reduction in the bay's water area and an approximate doubling in depth of 55% of the original water area. Only 17 to 18% of the original area remains undisturbed by dredging or fill. Since the bay reached its approximate present configuration in Holocene time, the only significant sediment source has been river/stream deposition which delivered an estimated 0.8 to 1.1 x 10⁶ m³ annually, until diversion and damming of principal tributaries between 1875 and 1919 reduced sedimentation by more than 80%. For the 30 year period of maximum dredging (1940-1970), the average dredging rate was 3 to 6 times

the original sedimentation rate, and roughly 17 to 34 times the sharply reduced present sedimentation rate. Thus, dredging and spoil disposal as geologic processes are substantially more important than all other erosional and depositional processes presently operating in San Diego Bay.;

Guns of Point Loma: Three Centuries of San Diego Harbor Defense, 1769-1988

Thompson, E.

National Park Service, Washington, DC. 1988 231p

ABSTRACT: The report is an historic resource study of Cabrillo National Monument with focus on harbor defenses of San Diego. Located at San Diego Bay.

Fate and Distribution of Organotin in Sediments of Four U.S. Harbors (Final rept. 1986-1988)

Kram, M. L. ; Stang, P. M. ; Seligman, P. F.

Naval Ocean Systems Center (San Diego) Report No. NOSC/TR-1280, April 1989. 88p.

ABSTRACT: Marine and estuarine sediments collected from San Diego Bay, were analyzed for grain size distribution, clay mineralogy, percent organic carbon, and concentration of organotin toxins originating from antifouling paints. Adsorption and desorption occurred rapidly and equilibrium appeared to be established within 24 hours. If sufficient binding sites were available, TBT partition coefficient values ranging from 1000 to 5000 (micrograms/kg per micrograms/l) were obtained (in agreement with literature values). For an 118-ppt TBT water concentration, 10-ng/g TBT is an approximated equilibrium sediment concentration. This value was not reached for samples without an adequate amount of available binding sites. These data will aid in the determination of the potential of bioavailability of TBT in benthic regions of waterways insulted by organotin toxins.

Distribution and Fate of Butyltin Compounds in the Sediment of San Diego Bay (Professional paper for period ending Sep 86)

Seligman, P. F. ; Stang, P. M.

Naval Ocean Systems Center, San Diego.

25 Sep 86 7p. NTIS ORDER NUMBER: AD-A191 771/5/XAB

ABSTRACT: Mono-, di- and tributyltin compound concentrations were determined by the hydride derivatization/atomic absorption technique for twelve sediment cores recovered from San Diego Bay. Tri-, di- and monobutyltin were found to be present in significant concentrations (up to 551 ug/kg dry-weight total butyltin in areas of restricted tidal flushing and high marine craft density as well as areas adjacent to active drydock facilities). Low to non-detectable concentrations were found in well flushed areas (San Diego Bay entrance as well as recently dredged, newly built basin 5th Avenue Marina). Total butyltin concentrations decreased with depth in the cores. Results from a laboratory tank experiment with organotin contaminated sediment documented that tributyltin was debutylated primarily to monobutyltin with a half-life of approximately 162 days.

Effects of TBT (Tributyltin) on Marine Organisms: Field Assessment of a New Site-Specific Bioassay System

(Professional paper for period ending Oct 87)

Salazar, S. M. ; Davidson, B. M. ; Salazar, M. H. ; Stang, P. M. ; Meyers-Schulte, K. J.

Naval Ocean Systems Center, San Diego, CA.

Dec 87 11p. NTIS ORDER NUMBER: AD-A191 576/8/XAB

ABSTRACT: A Portable environmental Test System (PETS) was evaluated in San Diego Bay over a 7-month period using tributyltin (TBT) antifouling leachates. Three TBT concentrations (x 0.065, 0.077 and 0.193 ug/l) were tested against seawater controls with three replicates of each using 340-1 tanks. Unfiltered seawater was pumped over a TBT-coated panel, creating a TBT-leachate which was diluted

with seawater in mixing bins and distributed to test tanks. There were no significant effects attributable to TBT on fouling communities (species abundance and biomass), mussel and clam condition indexes mussel gonad index or oyster growth. TBT reduced juvenile mussel growth rate. Mussels and clams accumulated TBT at higher test concentrations, there was an inverse relationship between dose and bioconcentration factor.

Polynuclear Aromatic Hydrocarbon Contamination in Sediments from Coastal Waters of Southern California (Revised March 1987)
(Final rept)

Southern California Coastal Water Research Project Authority, Long Beach.
Sponsor: California State Water Resources Control Board, Sacramento.

20 Mar 87 114p NTIS ORDER NUMBER: PB87-192662/XAB

ABSTRACT: The study was designed to sample sediment from Santa Monica Bay to San Diego Bay suspected of containing high amounts of aromatic hydrocarbons. The sites included a reference station (San Mateo Point) and several river stations to provide a wider view of the range of contaminant levels in the region. The primary objective of the study was therefore to confirm analytical data on PAH concentrations reported in previous studies at a few stations and to extend the survey to many sites receiving non-point source inputs of contaminants. These results will provide an overview of the relative nature of PAH contamination at 24 sites in southern California receiving a wide range of contaminant inputs and allow the State Water Resources Board and the Regional Water Quality Control Boards to focus their concern on sites requiring further investigation.

Interagency Workshop on Aquatic Monitoring and Analysis for Organotin Compounds

Landy, R. B. ; Holm, S. E. ; Conner, W. G.

Naval Academy, Annapolis, MD.

Sponsor: National Marine Pollution Program Office, Rockville, MD.

Jul 86 113p NTIS ORDER NUMBER: PB87-124327/XAB

ABSTRACT: A partial listing of the report includes the following
Abstracts of Presented Papers:Organotin modeling - San
Diego Bay.....

Telegraph Canyon Creek, City of Chula Vista, San Diego County, California. Detailed Report for Flood Control. Volume 1. Main Report
(Final rept)

Army Engineer District, Los Angeles, CA.

Jul 83 161p NTIS ORDER NUMBER: AD-A150 163/4/XAB

ABSTRACT: Telegraph Canyon Creek Basin is an elongated drainage area comprising about 4,800 acres, or 7.5 square miles, in San Diego County. It is located about 8 miles south of the City of San Diego. The creek flows through unincorporated County territory and the City of Chula Vista. Because of the serious potential flood hazard to a highly developed area, the County of San Diego and the City of Chula Vista have sought aid to provide improvements along Telegraph Canyon Creek to protect the area. The selected plan would consist of (1) a 0.7 mile-long rectangular concrete-lined channel from a point about 500 feet upstream from 4th Avenue (near 3rd Avenue) to 0.3- miles upstream from Interstate 5; (2) a 0.3-mile-long section comprising double 10x12-foot boxes of covered channel connecting the rectangular channel to the existing 0.2-mile culvert under Interstate 5, which would be incorporated into the project; (3) a 0.3-mile-long concrete trapezoidal channel downstream from Interstate 5; and (4) a 0.1 mile-long earth-bottom trapezoidal channel leading into the San Diego Bay. This plan would provide protection from a 100-year flood. In Reach II there would be some bridge modifications and channel clearing. Construction of Reach I improvements is not dependent upon construction in Reach II. The total cost of the selected plan in Reach I including study costs would be \$5,390,000 (April 1983 price levels) with annual charges, not including study costs,

off \$394,000 and annual benefits equal to \$430,000. The benefit-cost ratio would be 1.1.

Navigation Improvement Design Memorandum Number 1, General Design for San Diego Harbor, San Diego County, California
Army Engineer District, Los Angeles, CA.

28 Feb 75 89p NTIS ORDER NUMBER: AD-A136 682/2

ABSTRACT: Presented is a plan of improvement for the harbor at San Diego Bay, was authorized by the River and Harbor Act approved 13 August 1968 (Public Law 90-483, 90th Congress, 2d Session), to provide adequate waterways for access to newly constructed terminals and to meet the growing demand for additional marine-oriented industry. The district engineer now submits a recommended plan of improvement which consists of widening and straightening sections of the north bay channel; deeping and widening the central bay channel; deeping, widening and extending the south bay channel.

Navigation Improvement Design Memorandum Number 1, General Design for San Diego Harbor, San Diego County, California. Appendixes
Army Engineer District, Los Angeles, CA.

Feb 75 336p NTIS ORDER NUMBER: AD-A136 672/3

Contents: Geology and Soils; Removal and Relocation of Utilities; Economic Study; Commerce and Vessel Traffic; Estimate of Benefits; Resolution of Local Cooperation; Coordination with Others; Socio-Economics of the Proposed Project; Public Hearing; Draft of Section 221 Agreement.

Keywords: San Diego Bay

A Survey of the Spiny Lobster (*Panulirus interruptus*) Population in San Diego Bay, California. An Impact Study of Pier Construction Activities (Final rept. Mar-Jul 79)

Goforth, Jr., H. W. ; U'Ren, S. C.

Naval Ocean Systems Center, San Diego, CA.

Report No.: NOSC/TR-542

15 Apr 80 38p NTIS ORDER NUMBER: AD-A094 845/5

ABSTRACT: Recent pier construction activity in San Diego Bay necessitated an evaluation of its impact on the spiny lobster (*Panulirus interruptus*). Lobster movements were monitored by placing standard commercial lobster traps at sixteen selected stations in San Diego Bay. Various data were recorded and lobsters were tagged and subsequently released. This report documents the findings of the study.

Sediment Bioassays for NAVSTA San Diego Dredging Project
(Final rept. Mar 78-Jan 80)

Salazar, M. H. ; U'ren, S. C. ; Steinert, S. A.

Naval Ocean Systems Center, San Diego, CA.

Report No.: NOSC/TR-570

Apr 80 49p NTIS ORDER NUMBER: AD-A088 216/7

ABSTRACT: Bioassays were conducted on sediments from 13 sites associated with Navy activities in San Diego Bay using liquid, particulate, and solid phase test solutions. Sediments were pre-sampled to determine the most contaminated area at each site based on the relative concentration of cadmium, chromium, copper, and mercury. Five different marine species representing a variety of phylogenetic levels and feeding types were used in the toxicity tests with the most contaminated sediments including copepods, mysids, fish, clams, and worms. The results of the bioassays suggest that dredged material from Navy Piers 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, JK, and Chollas Creek Channel should not have a significantly adverse effect on the marine environment during disposal operations.

Productivity and Diversity of Phytoplankton in Relation to Copper Levels in San Diego Bay

(Final rept. Jun 78-Dec 79)

Lane, Sandra M. Krett

San Diego State Univ. Foundation, CA.

Sponsor: Naval Ocean Systems Center, San Diego, CA

Report No.: NOSC-TR-533

March 80 74p NTIS ORDER NUMBER: AD-A086 600/4

ABSTRACT: Biomass, productivity, and composition of phytoplankton communities were assessed at three sites in San Diego Bay over a period of 1 year, Phytoplankton assemblages taken from regions of low copper levels (less than 1.0 ppb) were characterized by high productivity, biomass and diversity. Samples taken from regions of high copper levels (greater than 3.0 ppb) were less diverse but maintained high biomass and productivity. Phytoplankton tolerance to various copper concentrations was demonstrated by laboratory tests. These findings suggest that the phytoplankton assemblages found in copper-contaminated regions are more tolerant to high copper levels.

Intertidal and Subtidal Eelgrass (*Zostera marina* L.) Transplant Studies in San Diego Bay, California

(Final rept. Mar 76-Oct 78)

Goforth, Jr., H. W. ; Peeling, T. J.

Naval Ocean Systems Center, San Diego, CA.

Report No.: NOSC/TR-505

1 Feb 80 29p NTIS ORDER NUMBER: AD-A084 542/0

ABSTRACT: Seagrass beds are frequently impacted by shallow water marine construction projects. A variety of seagrass transplant methods have been developed with varying degrees of success. Few studies however, have developed methods that are economical or applicable to large scale subtidal and intertidal transplants (i.e., greater than 0.5 hectare). This paper describes the development of a rapid and successful method of revegetating large areas using plugs of vegetative stock transplanted in biodegradable fiber pots. The use of fiber pots improves success by keeping the root-thizome-substrate complex intact, reducing damage during handling, providing a substrate for anaerobic sediment bacteria, and reducing the initial loss of transplants resulting from erosion. A 2.5 year pilot study involving a transplant of 46.5 sq m of subtidal vegetative stock demonstrated success of: 46% for 1,331 sq cm plugs, 35% for 410 sq cm plugs and less than 7% for 182 sq cm plugs. After 1.5 years, the number of emergent rhizomes from the two largest plugs sizes (i.e., 5.5 for 1,331 sq cm plugs and 6.3 for 410 sq cm plugs) were not significantly different ($p < 0.001$). Based upon these findings a larger transplant project was conducted in March 1978 to vegetate approximately 1.62 hectares (i.e., 0.93 subtidal and 0.69 intertidal hectare) of recently deposited dredge material in San Diego Bay. The transplant utilized 12,000 plugs (324 sq cm) planted on 0.6m centers in rows 1m apart and required 4,500 man hours. Transplant success after 7 months (one growing season) varied from 10-70% depending upon transplant site.

Analysis of Demands on the Naval Station, San Diego
(Interim rept.)

Blanco, Thomas A. ; Rowe, Murray W.

Navy Personnel Research and Development Center San Diego Calif

Report No.: NPRDC-TR-78-7

Dec 77 26p NTIS ORDER NUMBER: AD-A048 349/5

ABSTRACT: In developing a system for allocating manpower resources in the Navy, major emphasis has been placed on the design of an input-output model to forecast the workload of shore activities, based upon the size and distribution of the fleet. To determine the feasibility of input-output analysis for operational use, a full-scale model of the 11th Naval District is being developed. The structure of input-output analysis requires data on the work output of each shore activity and its destination in the fleet and at other activities. In addition, the demands by the fleet must be disaggregated by ship type, movement, and status. A major effort underway is the collection and organization of data and the empirical analysis of the fleet-shore workload demand

network, focusing on 10 major shore activities in the 11th Naval District. This report is concerned with the analysis of workload demand on one of these activities--the Naval Station, San Diego. The structure of demands on the two major departments at NAVSTA, San Diego (Waterfront Operations and Military Personnel) was analyzed, and the differences in demand among ship types were determined. The Waterfront Operations Department primarily provides port services to ships in the harbor; and the Military Personnel Department, personnel services to fleet personnel. Keywords: San Diego Bay

San Diego Bay. An Evaluation of the Benthic Environment, October 1967
Parrish, Loys P. ; Mackenthun, Kenneth M.
Federal Water Pollution Control Administration, Cincinnati, Ohio.
Technical Advisory and Investigations Branch
1968 45p NTIS ORDER NUMBER: PB-260 257/1

ABSTRACT: The results of a biological survey of San Diego Bay to assess the effects of pollution from ships and industries on the bay's biota are presented. The survey included studies of the distribution and diversity of invertebrate organisms in or on the bottom and the depth and composition of the benthic sediments in the bay. A Peterson dredge collected bottom-associated organisms, core samples determined the extent and condition of sludge deposits, multiplate substrates collected attached benthic forms, and two SCUBA divers observed selected areas of the bay and collected representative organisms.

Model Studies of Outfall Systems for Desalination Plants. Part II. Tests of Effluent Dispersion in Selected Estuary Models. Volume I. Main Text (Research rept.)

Bobb, W. H. ; Boland, Jr, R. A.
Army Engineer Waterways Experiment Station Vicksburg Miss
Report No.: WES-RR-H-71-2-1-PT-2
Sep 71 189p NTIS ORDER NUMBER: AD-A032 710/6

ABSTRACT: The existing comprehensive fixed-bed models of San Diego Bay, ... located at the Waterways Experiment Station were chosen to study the dispersion of heated waste brine from desalination plant outfalls. The report describes 3 models which were considered to be typical of estuaries on which saltwater conversion facilities are likely to be located. The objectives of the tests were to determine dispersion rates of the brine waste, to define the dynamic equilibrium distribution of the waste after the plant being simulated has been in operation for some time.....

Feasibility of Transplantation, Revegetation, and Restoration of Eelgrass in San Diego Bay, California
(Final rept.)

Boone, Charles G. ; Hoeppe, Ronald E.
Army Engineer Waterways Experiment Station Vicksburg Miss
Report No.: WES-MP-Y-76-2
Feb 76 50p NTIS ORDER NUMBER: AD-A021 484/1

ABSTRACT: The study was conducted to evaluate the feasibility of several methods of eelgrass (*Zostera marina* L.) transplantation, restoration, and revegetation in San Diego Bay. A literature survey was conducted and current state-of-the-art eelgrass transplant methodologies are presented. Two transplant methods are recommended; however, since neither of these has been tested in a large-scale field program, a preliminary pilot transplant study is also recommended. Transplantation costs for each method have been estimated and are also presented.

Acute toxicity of bis(tributyltin) oxide to a marine copepod
U'ren, S.C.

MARINE POLLUTION BULLETIN VOL. 14, NO. 8, pp. 303-306, Publ.Yr: 1983
ABSTRACT: A static renewal toxicity test was conducted to evaluate the response of the copepod *Acartia tonsa* to bis(tributyltin) oxide(TBTO), the active compound of recently developed

antifouling paints. Copepods were individually placed in test tubes containing 4 ml of 0.3, 0.5, 1.0, 1.7 or 3.0 μ g/l super(-1) TBTO with acetone and seawater. Thirty copepods were used for each treatment and control condition and all solutions were renewed daily. The 96-h LC sub(50) was 1.0 μ g/l super(-1) with a 95% confidence interval between 0.8 and 1.2 μ g/l super(-1) TBTO. The 144-h EC sub(50) was 0.4 μ g/l super(-1) TBTO which approaches concentrations recently measured in San Diego Bay. Some copepods exposed to 0.3 μ g/l super(-1) TBTO became moribund after six days.

Water pollution by sewage from water craft.

SEABLOOM, ROBERT W.

Colloque International sur l'Exploitation des Oceans. Theme I, Volume 1. Proceedings. (held in Bordeaux, France, March 1971). Publisher: Centre National pour l'Exploration des Oceans, Paris. 1971. 14 pages.

Descriptors: SAN DIEGO BAY

Shipyards blamed for fouling sediment.

LAWRENCE, HERB

Evening Tribune: San Diego, Calif.: D24, May 30, 1972

Descriptors: SAN DIEGO BAY

Clean up of San Diego bay.

DODSON, ROY E.

Civil Engineering, 42(3): 62-63, March 1972

Deep water channel hits a new snag.

SHEPARD, TIM

San Diego Union:B1, B12, Dec. 10, 1971

Descriptors: SAN DIEGO BAY

Tougher rules proposed for boat sewage.

FARINA, JOHN

Evening Tribune. San Diego, Calif.:B4, Dec. 15, 1971

Descriptors: SAN DIEGO BAY

Help sought to stop bay pollution.

REEVES, JERRY

San Diego Union: B1, Sept. 14, 1971

Descriptors: SAN DIEGO BAY

San Diego Bay cited as model for other bay cities.

World Dredging and Marine Construction, 6(14): 23, Dec.1970

Descriptors: SAN DIEGO BAY

Port, bay cities asked for anti-dumping law.

LAWRENCE, HERB

Evening Tribune, San Diego, Calif.: B-2, Dec. 1, 1970

Descriptors: SAN DIEGO BAY

Yachting waves stirred by planned bay curbs.

FARINA, JOHN

Evening Tribune. San Diego, Calif., :B-1, B-4, Nov. 9, 1970

Descriptors: SAN DIEGO BAY

Navy proposes new weapons to combat harbor oil spills.

Navy Civil Engineer. Wash., D.C. 11(8): 1, Aug. 1970

Descriptors: SAN DIEGO BAY

How San Diego cleaned up its bay.

GREENBAUM, RICHARD N.

Ocean Industry, 4(7): 55-56, July 1969

Descriptors: SAN DIEGO BAY

American Knots on San Diego Bay, California.

Abbott, C.G. 1939. Condor 41:217.

ABSTRACT: More information demonstrating that the Red Knot is a common winter visitor around San Diego Bay. "During March 1939, Colonel Richard Meinertzhagen, eminent English ornithologist, was a visitor in San Diego where he collected a number of birds.... Among the birds taken were several American Knots (*Calidris canutus rufus*).... The birds were shot near the south end of San Diego Bay, where Colonel Meinertzhagen declared that there were 'hundreds' of them.... The twenty-eight Knots recorded from San Diego Bay by Huey (Condor, vol. 40, 1938, p.90) and the occurrences reported here lead one to question whether the Knot may not be more abundant than is generally supposed; it possibly is overlooked on account of its resemblance to certain other shore birds." Descriptor: Birds, San Diego Bay

American Birds / Audubon Field Notes.

1946 - present.

ABSTRACT: Quarterly reports of bird observations throughout California, including occasional reports from San Diego Bay, since 1963 by Guy McCaskie. Data consist almost entirely of sightings of rare birds, sufficient to track the occurrence of only a few of the more or less regular species such as the Louisiana Heron or Reddish Egret. Data from more comprehensive studies published elsewhere are sometime summarized briefly. Descriptor: Birds, San Diego Bay

Chula Vista Bayfront. "One of a series of basic studies forming a part of the precise plan development program for the San Diego Unified Port District."

1974. Planning Department, San Diego Unified Port District.

ABSTRACT: No original data. Two sentences on birds plus a very incomplete list of birds known to inhabit or visit the lower Sweetwater Marsh." Descriptor: Birds, San Diego Bay

Otay Mesa-Nestor community Plan and Environmental Impact Report.

1979. Planning Department, City of San Diego.

ABSTRACT: No original data. Simply mentions the Clapper Rail, Least Tern, and Belding's sparrow as occurring in the salt works. Descriptor: Birds, San Diego Bay

Final environmental Assessment/Initial Study. The Proposed National City Marina and Commercial Recreation Development Concept.

1988. San Diego Unified Port District.

ABSTRACT: Original data consist of a list of species and "approximate numbers" observed by Claude Edwards on 28 February 1988. Area studied was a strip extending from Sweetwater ship channel to 24th Street, west of (not including) Paradise Marsh. Descriptor: Birds, San Diego Bay

The fulmars of southern California.

Anthony, A. W. 1895. Auk 12:387.

ABSTRACT: One captured in San Diego bay "about the last of September." Descriptor: Birds, San Diego Bay

Clangula hyemalis at San Diego, California.

Anthony, A. W. 1896. Auk 13:172.

ABSTRACT: One Oldsquaw shot by Lyman Belding on 13 January 1896 "in the harbor of San Diego," constituting the first specimen for San Diego County. Descriptor: Birds, San Diego Bay

Where does the Large-billed Sparrow spend the summer?

Anthony, A. W. 1906. Auk 23:149-152.

ABSTRACT: "Anyone who has collected in the tide flats about San Diego Bay

can testify that here at least they swarm until March 5 or later." Descriptor: Birds, San Diego Bay

The raided rookeries of Laysan, a belated echo.

Anthony, A. W. 1924. Condor 26:33-34.

ABSTRACT: "As a matter of fact the writer has on one or two occasions, seen the Black-footed Albatross in San Diego Bay." Descriptor: Birds, San Diego Bay

California Least Tern Census and Nesting Survey, 1977. Job v-2.11, Job Final Report.

Atwood, JL, Jorgensen, PD, Jurek, RM, and Manolis, TD. 1977. California Department of Fish and Game.

ABSTRACT: Intensive monitoring of all colonies known in the state. Results for south San Diego Bay: Sweetwater River, estimated 40 pairs fledgling at least 20 young; Coronado Cays, 17 pairs fledgling at least 7 young; salt works, 69 pairs fledgling at least 8 young. Descriptor: Birds, San Diego Bay

California Least Tern Census and Nesting survey, 1978. Job V-2.13, Job Final report.

Atwood, JL, Erickson, RA, Kelly, PR, and Unitt, P. 1979. California Department of Fish and Game.

ABSTRACT: At least weekly surveys of all known colonies. Results for south San Diego Bay: D Street fill, estimated 43 pairs fledgling 10 young; Delta beach, 4 pairs fledgling 4 young; Crown Isle, Coronado Cays, 8 to 10 pairs fledgling 10 young; salt works, 29 pairs fledgling 2 young. Descriptor: Birds, San Diego Bay

Report of Biological resources of the Otay Mesa-Nestor Community Planning Area, Including the Egger-Ghio Properties.

Beauchamp, RM. (Pacific Southwest Biological Services). 1987. Butler/Roach Group, San Diego, CA.

ABSTRACT: Original research consisted of two visits, 24 February (1000-1420) and 15 March 1987 (1100-1210), by Keith Merkel. Area studied lies around lower Otay River on both sides of Interstate 5. Data presented are a species list only; nothing quantitative. Brief discussion of Belding's Sparrow, Least Tern, and Clapper Rail as possibly occurring on or near the area. Descriptor: Birds, San Diego Bay

Studies of California Least Terns and Water-Associated Birds at the Chula Vista Bayfront, San Diego County, California.

Beedy, EC, and Montgomery, SJ. (Jones and Stokes Assoc.,) 1988. City of Chula Vista and San Diego Unified Port District.

ABSTRACT: Forty-eight surveys for Least Terns done from late July through August 1987 and from mid-April through August 1988 by Stephen J. Montgomery and Claude Edwards. Each survey about 3-4 hours long, two surveys per day (morning and afternoon), two days per month. Observations characterized as representing foraging, transit, courtship, or roosting and summarized and expressed as "Least Tern use-minutes." Least Terns found to forage somewhat more intensively at high tide; no significant differences between morning and evening. Counts of other water birds twice per month from September through May, once per month from June through August. Species tabulated by site (10 sites), total numbers graphed by site, total numbers by date, and numbers per "guild" (six defined) graphed by season, but numbers of individuals per species not graphed or tabulated by census or date, so quality of data difficult to assess. Statement "the Dunlin was present only during fall and spring" suggests some misidentifications, as this species remains commonly through the winter and does not increase markedly during migration. At one point per season, graphs of numbers of species over time are presented at too coarse a scale

to be very informative. Among sites surveyed (did not include all of the Chula Vista bayfront), the northwest and west sides of Gunpowder Point had the most birds, the Sweetwater Marsh on the south side of the D Street fill and the freshwater marsh on the north side of F Street had the least. Numbers of birds were highest in January and February, second highest in August, and least from May to July. "There appeared to be some tendency for birds to aggregate at protected inland sites [southeast corner of Sweetwater Marsh, east end of Sweetwater ship channel, Vener Pond] during high tides.... This hypothesis requires further testing." Descriptor: Birds, San Diego Bay

Geese which occur in California.

Belding, L. 1892. *Zoe* 3:96-101.

ABSTRACT: "The Black Brant disappeared [sic] from San Diego Bay April 15, 1884, and April 7, 1885, its departure having probably been hastened by the persecution of the hunters. It was until recently abundant in San Diego Bay in winter." Descriptor: Birds, San Diego Bay

California Least Tern census and nesting survey. 1973.

Bender, K. 1974. California Department of Fish and Game, Special Wildlife Investigations, Project W-54-R-6, Progress Report, Job II-11.

ABSTRACT: Results of statewide survey. In 1973, 50 pairs nested at Lindbergh Field, 20 nested at the D Street fill (first known nesting at that site), and 35 pairs nested in the salt works. At the airport, the birds gradually shifted from near the fire tower to the ovals between the runway and taxiway. Severe disturbance by off-road vehicles at D Street. Descriptor: Birds, San Diego Bay

California Least Tern population and nesting survey, 1974.

Bender, K. 1974. California Department of Fish and Game, Special Wildlife Investigations, Project W-54-R-7, Job Final Report, Job I-1.

ABSTRACT: Estimated 60 pairs at Lindbergh Field, 36 at the D Street fill, 60 in the salt works, and 6 at Grand Caribe Isle, Coronado Cays. At Lindbergh Field, the terns moved to the west end of the runway. Severe disturbance by off-road vehicles continued at D Street. Colony at Coronado Cays represented first nesting in many years on the Silver Strand. Descriptor: Birds, San Diego Bay

Seasonal Abundances, Habitat Utilization, Feeding Strategies, and Interspecific Competition within a Wintering Shorebird Community and Their Possible Relationships with the Latitudinal Distribution of Shorebird Species.

Boland, JM. 1981. MS Thesis, San Diego State University.

ABSTRACT: Study of shore bird ecology in the Tijuana estuary, conducted from July 1980 to January 1981 by John Boland. Discusses tides (most birds feed during ebb and low tides) and diurnal cycles (long-billed species feed extensively at night). "The long-billed birds feed at their preferred tides with or without daylight and rest during unfavorable tides, while at the short-billed birds feed all day, switching between tidal and non-tidal habitats, and rest at night." Postulated a hierarchy of species based on the time when a species reaches the prey in the mud; species reaching the prey first dominate in competition over those that reach the mud later. According to this hypothesis, at the top are godwits, followed by dowitchers, Dunlins, Western Sandpipers, and finally Least Sandpipers and Semipalmated Plovers, which get the leftovers after other species have finished foraging. Descriptor: Birds, San Diego Bay

A population census of the Belding's Savannah Sparrow *Passerculus sandwichensis beldingi*.

Bradley, RA. 1973. *Western Bird Bander* 48:40-43.

ABSTRACT: San Diego Bay omitted from this first survey of the species.
Descriptor: Birds, San Diego Bay

Biological Resources of the U. S. Naval Radio Station (R), Imperial Beach, California.

Brand, MR, Wier, H, Capralis, D, Glenn, RD, and Edwards, C. (MSA, Inc.)
1982. Department of the Navy, Western Division, Naval Facilities
Engineering Command, San Bruno.

ABSTRACT: In fenced Navy property, original field work consisted of five surveys of four days each, August, November, January, March, and May, 1981-1982, in the Marine Biology Study Area and adjacent salt ponds, four surveys of one day each, October, December, February, and April. Also two high-tide surveys for Clapper Rails, 12 December and 7 January, two surveys with taped recordings for April. Marina Brand surveyed the fenced portion of the property, Claude Edwards surveyed the ocean front, salt ponds, and marsh. All data collected are presented in the report, accompanied by a qualitative analysis of birds' use of habitats. Descriptor: Birds, San Diego Bay

The Natural Resources of San Diego Bay: Their Status and Future.
Browning, B. M., and Speth, J. W. 1973. Coastal Wetlands Series
5, California Department of Fish and Game.

ABSTRACT: Only possibly original data are a tabulation of gross numbers of birds counted per month from January to October 1970, presumably taken from Jehl and Craig (1970). Otherwise data on birds consist of species lists and a largely qualitative description of various groups or species, in part excerpted from previous reports. Quantitative data consist of a repetition of Christmas Bird Count totals and :over 30,000 surf scoters have been observed in the bay during recent winters."

Descriptor: Birds, San Diego Bay

Fish, Wildlife, and Plant Species in California Designated Endangered or Rare by the California Fish and Game Commission.

California Department of Fish and Game. 1975. State of California
Resources Agency, Fish and Game Commission, and Department of Fish and
Game.

Descriptor: Birds, San Diego Bay

At the Crossroads: A Report on the Status of California Endangered and Rare Fish and Wildlife.

California Department of Fish and Game. 1980. State of California
Resources Agency, Fish and Game Commission, and Department of Fish and
Game.

Descriptor: Birds, San Diego Bay

California Least Tern census and nesting survey, 1976.

California Least Tern Recovery Team. 1977. California Department of Fish
and Game.

ABSTRACT: Estimated 114 pairs nesting at Lindbergh Field, 24 at the D Street fill, and 49 in the salt works. High mortality at the airport and salt works, continuing disturbance by off-road vehicles at D Street.

Descriptor: Birds, San Diego Bay

Some Recent Additions to the Fauna of California.

Cooper, J. G. 1868. Proc. Calif. Acad. Sci. 4:3-13.

ABSTRACT: "Black Brant--Large numbers winter in San Diego Bay, where I obtained one.... Short-tailed Albatross--...The three young in black plumage were shot by me in San Diego Bay."

Descriptor: Birds, San Diego Bay

Copper, E. 1979-1987. Unpublished reports to the California

Department of Fish and Game.

ABSTRACT: Annual reports of censuses of Least Tern colonies, nesting success, and reasons for failures. Trend over the years of irregular, gradual decline in population size, decline in number of colonies, and increase in severity of predation at remaining colonies.

Descriptor: Birds, San Diego Bay

A study of the breeding biology of the California Least Tern at Delta Beach, Naval Amphibious Base, Coronado, and the foraging ecology of the California Least Tern at Navy bases on San Diego Bay.

Copper, E. 1985.

Prepared under Contract No. N62474-85-5587 for Western Division, Naval Facilities Engineering Command, San Bruno, CA.

ABSTRACT: At Delta Beach in 1985, 20 pairs of Least Terns fledged 16-18 young; a mammalian predator killed some chicks. Foraging Least Terns dispersed widely throughout San Diego Bay, being recorded at 30 to 32 stations, and concentrating at Point Loma, at North Island, at the Naval Amphibious Base, and at the Marine Biology Study Area.

Descriptor: Birds, San Diego Bay

A study of the breeding biology of the California Least Tern at Delta Beach, Naval Amphibious Base, Coronado, and the foraging ecology of the California Least Tern at Navy bases on San Diego Bay, 1986.

Copper, E. 1986.

Prepared under Contract No. N62474-86-M-0997 for Western Division, Naval Facilities Engineering Command, San Bruno, CA.

ABSTRACT: At Delta Beach in 1986, 41 pairs of Least Terns fledged 20-30 young, predation on both eggs and young was responsible for the low success rate. The waters adjacent to the colony were those most heavily used for foraging, but Least Terns continued to forage widely throughout the bay, though in reduced numbers.

Descriptor: Birds, San Diego Bay

An interim report on the foraging activity of the California Least Tern in North San Diego Bay/A supplemental report on the foraging activity of the California Least Tern in North San Diego Bay, 2 July-10 September 1986.

Copper, E. 1986.

ABSTRACT: Fourteen stations along the north shore of San Diego Bay, including Harbor Island, surveyed twice per day, once per week, 14 May-10 September 1986. Least Terns foraged throughout the study area, but the station most heavily used was that closest to a nesting colony, at the foot of Laurel Street across Harbor Drive from the Lindbergh Field colony. The terns used the basin east of Harbor Island, where no marina had yet been constructed, more than the basin west of Harbor Island, site of an existing marina.

Descriptor: Birds, San Diego Bay

Avian censuses at Navy Bases on San Diego Bay.

Copper, E. In preparation. Western Division, Naval Facilities Engineering Command, San Bruno, CA.

ABSTRACT: Avian censuses were conducted during Least Tern foraging studies at various Navy Base sites on San Diego Bay in 1985, 1986 and 1988. These data have not currently been analyzed but were made available by the Navy and data for those stations in the Enhancement Plan study area are included in this report.

Descriptor: Birds, San Diego Bay

Survey of California Least Tern nesting sites.

Craig, A. M. 1970.

California Department of Fish and Game, Special Wildlife Investigations, Project W-54-R-4, Job Final report, II-5.1.

ABSTRACT: First statewide survey of Least Tern colonies. Twenty-five pairs reported as nesting at San Diego airport, two on south San Diego Bay in the salt works. Concerning the salt works, "This area is known to have been used for many years, but no known attempt has been made until recently to determine the total nesting population. In 1968, Evans found 60 pairs were nesting on dikes, primarily between ponds 5,7,33,34,36, and 37. Numbers have declined drastically in the last two years, and in 1970 only two pairs were found by Evans. A flock of 12 least terns, including 9 young, found near the salt pond area at the south end of the Silver Strand in early July 1970 (Kinsey), probably came from another area." Predation had been a serious problem in the colony.

Descriptor: Birds, San Diego Bay

Chula Vista Boat Basin/Wildlife Reserve. Final Environmental Impact Report (UPD #7563-EIR-15).

David D. Smith and Associates, Environmental Quality analysts, Inc., and Marine Biological Consultants, Inc. 1976.

ABSTRACT: No original data. General summary of value of south San Diego Bay to birds, based on quotations from earlier reports. Includes a list of birds breeding in "south San Diego Bay area," based on a report by J. R. Jehl and M. Kirven that is no longer available and modified according to Gerald Collier (personal communication).

Descriptor: Birds, San Diego Bay

Coronado Cays/Silver Strand Shoreline Birds Survey and South San Diego Bay Shoreline Bird Survey.

Edwards, C. 1986. David D. Smith and Associates.

ABSTRACT: Shorebird surveys were conducted at selected sites at the south end of the Coronado Cays including an area adjacent to Emory Cove and at the Chula Vista Wildlife Refuge from 1 October 1985 to 23 March 1986 (Original survey data reproduced here in Volume Four, Data Appendix).

Descriptor: Birds, San Diego Bay

Caspian Terns nesting at San Diego Bay.

Emblen, D. L. 1954. Condor 56:109-110.

ABSTRACT: First report of the species nesting in San Diego. "Rough estimate" of 100 nests and 250 adult birds on the dikes of the salt works on 18 May 1953. "Mr. Merrel A. Taylor....reported that he had seen the same species nesting at the location in 1952."

Descriptor: Birds, San Diego Bay

Coronado Bayfront Development Plan.

Environmental Management Department. 1978. San Diego Unified Port District.

ABSTRACT: Original data insignificant; extent and nature of "a preliminary biological reconnaissance: not stated. "In particular, gulls, sand pipers, terns, grebes, rails, coots, plovers, herons and egrets, have been observed in the area...No rare and/or endangered animals are known to exist within the Plan area and none were found during the preliminary reconnaissance....Although habitat suitable for the rare and endangered Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*) exists within the Tideland Park and Second Street Shoreline Subareas, none were observed."

Descriptor: Birds, San Diego Bay

Environmental Impact Report on Master Plan.

Environmental Management Department. 1980. San Diego Unified Port District.

ABSTRACT: Maps of "sightings" Least Terns, Belding's Sparrows, and Clapper Rails around the bay (source of information not specified). Brief paragraphs on these three species, summarizing habitat requirements and approximate numbers, based on earlier literature. Brief statement about diversity of birds in San Diego Bay; quotes figures from 1978 Christmas Bird Count.
Descriptor: Birds, San Diego Bay

Environmental Impact Report. MKEG Otay Mesa-Nestor Community Plan amendment.
EQD No. 87-0070, SCH No. 87032508, Environmental Quality Division. 1988. Planning Department, City of San Diego.
ABSTRACT: No original data; general discussion of birds based largely on Beauchamp (PSBS) 1987 and Montgomery (PSBS) 1987.11
Descriptor: Birds, San Diego Bay

The Reproductive Ethology of the Caspian Tern (*Hydroprogne caspia*) breeding at San Diego Bay.
Evans, MU. 1973. MS Thesis San Diego State University.
ABSTRACT: Study of the breeding behavior of the Caspian Tern in the salt works by Michael U. Evans; comparisons to Elegant and Forster's Terns.
Descriptor: Birds, San Diego Bay

Threatened, Declining, and Sensitive Bird Species in San Diego County.
Everett, W. 1979. Sketches Vol. 29, No.10. San Diego Audubon Society.
Descriptor: Birds, San Diego Bay

Marine Organisms of South San Diego Bay and the Ecological Effects of Power Station Cooling Water Discharge.
Ford, R. F. 1968.
Environmental Engineering Laboratory. San Diego Gas and Electric Company Purchase Order C-188.
ABSTRACT: Original data consist of "large area" bird population censuses made by J. R. Jehl, 15-20 August 1968. "Large area" consisted of all of San Diego Bay south Sweetwater River mouth, divided into "intake area" (SE segment, 15 Aug, 0730-1000, low tide), "discharge area" (S segment, 17 Aug, 1145-1315, incoming tide), and "control area" (SW to N segment, 20 Aug, 0830-1000, incoming tide). It is impossible that any of these large areas could have been censused completely within the time stated. Also, "small area" censuses made by "members of the San Diego Audubon society" (names not given), 13-25 August 1968. Six areas in southeastern corner of the bay, censused one to three times each. Each census two to three hours long, tide height specified in feet. Areas of both large and small censuses plotted on map (see previous Data Box).
Descriptor: Birds, San Diego Bay

Final report. Biological Studies at the South Bay Power Plant during the Period September 1972-July 1973.
Ford, R. F., and Chambers, R. L. 1974. San Diego Gas and Electric Company Purchase Order P-25072.
ABSTRACT: No original field work. Repeats a list of common birds from Ford (1968). Makes general statements about bird use of dikes of power plant and salt works, e.g., "Gulls brown pelicans, royal and elegant terns utilize the dikes of the South Bay Power Plant and those adjacent to it as roosting areas." Only quantitative data are species count and gross number of birds from 1969 and 1972 Christmas Bird Counts.
Descriptor: Birds, San Diego Bay

Biological Studies of portions of the Eastern Shoreline of Grand Caribe Isle, Coronado Cays, San Diego Bay.

Ford, R. F., and Smith, D. D. 1978. David D. Smith and Assoc., La Jolla.
ABSTRACT: Birds counted by David D. Smith, 1500-1630, 10 February 1978, and compared to an area just north of Crown Isle at north end of Coronado Cays. Very small-scale, superficial "study."
Descriptor: Birds, San Diego Bay

Southward extension of breeding range of Forster Tern on Pacific coast.
Gallup, F. Sr. 1963. Condor 65:246.
ABSTRACT: Initial discovery of species' nesting in the salt works on 5 May 1962; size of colony not stated.
Descriptor: Birds, San Diego Bay

Elegant Tern and Royal Tern nesting in California.
Gallup, F., and Bailey, B. H. 1960. Condor 62:65-66.
ABSTRACT: Initial discovery of these two species' nesting in the salt works. Thirty-one nests of the Elegant Tern and one of the Royal Tern in May 1959. "On June 6 all eggs and two banded young Elegant Terns had been destroyed by boys and thrown into a clump of salicornia."
Descriptor: Birds, San Diego Bay

Birds of Southern California: Status and Distribution.
Garrett, K., and Dunn, J. 1981. Los Angeles Audubon Soc., Los Angeles.
ABSTRACT: Summary of distribution and abundance of birds throughout southern California, based largely on previously published data (especially quarterly reports in American Birds) and the authors' experiences. Bar graphs portray migration schedules.
Descriptor: Birds, San Diego Bay

American Egret in San Diego County.
Grey, H. 1913. Condor 15:129.
ABSTRACT: By 1913 egrets had been decimated by plume hunters. "Noticing some reports regarding the [Great] Egret (*Herodias egretta*) still surviving I might say that I saw on October 13, 1912, at least twelve at one time, and on October 15 there were nine. Again on November 28, 1912, I saw five, and on December 25 I saw over twenty all in one bunch. All these birds were on the south end of San Diego Bay near the salt works. On previous years I never saw more than four at any one time on the Bay in that district; and but a single individual was to be seen once in a while at the north end of the Bay or on Mission Bay."
Descriptor: Birds, San Diego Bay

A distributional list of the birds of California.
Grinnell, J. 1915. Pacific Coast Avifauna 11:1-217.
ABSTRACT: First state wide synopsis; data for coastal southern California based largely on Willett (1912).
Descriptor: Birds, San Diego Bay

Old-squaw and American Scoter in San Diego Region.
Helmuth, W. T. III. 1939. Condor 41:167.
ABSTRACT: Sight records of Oldsquaws "on the edge of the 'Strand' in San Diego Bay near Coronado" 18-20 March 1928 and 20-21 June 1937 and of two Black Scoters 27 March-18 April 1928" in the surf just off the breakwater at Coronado.... My notes contain references to other northern ducks in the San Diego region, but none [other] seems worth giving in any detail....since they concern such species as the American Golden-eye and Red-breasted Merganser.
Descriptor: Birds, San Diego Bay

The Gulls of the Californian Coast.
Henshaw, H. W. 1885. Auk 2:231-232.
ABSTRACT: "In fall and winter the coast of California....is fairly swarming with Gulls, and it is surprising that so little has been made

known respecting the species represented and their relative numbers. A limited opportunity for collecting and making observations on the coast from Santa Barbara to San Diego during the months of November and December of 1884 yield some notes.... Larus argentatus smithsonianus [Herring Gull].--This Gull has hitherto been reported from the Pacific coast only from Alaska. It is an exceedingly abundant species from Santa Barbara to San Diego, frequenting the shore and bays in numbers second only to the Larus occidentalis. Indeed in some localities it doubtless outnumbered the latter species as a winter resident. Larus occidentalis [Western Gull].--Very numerous. This is par excellence the Gull of the Californian coast, being abundant at all seasons. Larus delawarensis [Ring-billed Gull] and Larus californicus [California Gull].--Both species are fairly numerous. Larus philadelphiae [Bonaparte's gull].--This species is not uncommon in San Diego Bay in December.... Larus canus [Mew Gull]...not uncommon along the southern coast of California, though ...perhaps, the least common of the several species mentioned."

Descriptor: Birds, San Diego Bay

Occurrence of the Least Tern at San Diego, Cal.

Holterhoff, G. 1884a. Auk 1:294.

ABSTRACT: "Quite a number of individuals of this species were shot in the summer of 1883, on the peninsula enclosing San Diego Bay. My own record of the birds is for the months of June and July, but others were reported in August and September."

Descriptor: Birds, San Diego Bay

Eskimo curlew at San Diego, Cal.

Holterhoff, G. 1884b. Auk 1:393.

ABSTRACT: An Eskimo Curlew purportedly collected, but Belding (Zoe 3:257, 1892) later discredited the identification. Also "the Hudsonian curlew [i.e., Whimbrel] has been seen quite frequently, and was in April this year, abundant in good-sized flocks, feeding on a grub-pest that pervaded the mesa slopes adjoining the Bay."

Descriptor: Birds, San Diego Bay

The Farallon Rails of San Diego County.

Huey, L. M. 1916. Condor 18:58-62.

ABSTRACT: Nesting chronology, food and habits of the Black Rail; locality "National City marsh," i.e., the Sweetwater River estuary on San Diego Bay. A Sora also captured there on 16 March 1915.

Descriptor: Birds, San Diego Bay

Midwinter records from the vicinity of San Diego, California.

Huey, L. M. 1938. Condor 40:90.

ABSTRACT: Local ornithologists discover that the Red Knot is a common winter visitor to San Diego Bay. "Frank F. Gander and James E. Crouch, who also participated in the census, confined their observations to the water front and recorded twenty-eight American Knots (Calidris canutus rufus). The large number of this species observed and the fact that the knot had not previously appeared in the San Diego census raised the question of correct identification. So the day following, December 23 [1973]. the writer and Mr. Gander again visited the beach on the bay side of the strand south of Coronado. Three knots were found and one of them [was] collected, thus establishing the bird's identity. Mr. Gander stated that in the course of the census, knots were seen in small groups of two or three birds, from the vicinity of Lindbergh Field south along the bay side of the Coronado Strand to the head of San Diego Bay."

Descriptor: Birds, San Diego Bay

Notes on four sporadic visitants in California.

Huey, L. M. 1944. Condor 46:201-203.

ABSTRACT: Status of the Louisiana Heron and Reddish Egret on San Diego Bay.

"Thus, in ten years, nineteen records of Louisiana Herons have been made. The regularity of occurrence has been broken only in the years 1941 and 1942. During those two years tremendous changes were taking place along the shore line of San Diego Bay. Dredging operations were filling in a large part of the tidal marshes, completely driving out or killing the littoral residents of the affected sections and removing any attraction to transient avian visitors. These changes had given rise to fears that the winter sojourn of Louisiana Herons might have stopped. The bird's presence, on December 22, 1943, at Mission Bay, therefore offered a ray of hope for the future.... The recent regularity of its occurrence there would indicate that the Louisiana Heron is well on its way to becoming a regular winter visitor in this portion of California, providing the havoc being wrought upon its habitat is not carried on to the complete eradication of all the salt-marsh land. Another sporadic visitor, whose possible attempts to establish a regular wintering ground in the San Diego region would also be adversely affected by alteration of the marsh lands, is the Reddish Egret."

Descriptor: Birds, San Diego Bay

The only known breeding ground of *creciscus coturniculus*.

Ingersoll, A. M. 1909. Condor 11:123-127.

ABSTRACT: "During the past four seasons, probably more, a small colony of California Black Rails have made their home on a limited area of the weed-covered tide lands of San Diego Bay. These breeding grounds are between National City and Chula Vista.... An accurate estimate of the number of birds in this colony is of course impossible; but judging from the number of floaters [i.e., eggs washed out of nests by high tides and floating in the marsh] and old nests, I should say that in 1908, thirty pairs of birds resided there at that time." Also, a description of the species' new architecture and general habits.

Descriptor: Birds, San Diego Bay

South Bay Marine Biology Program for the South Bay Union School District.

Innis-Tennebaum Architects. 1970.

ABSTRACT: Appendix includes a checklist of the birds of the south bay area (not defined), compiled by G. McCaskie and Alan Craig, numbers of some species seen in an undefined area on the San Diego Christmas Bird Count, 20 December 1969, and a list of birds seen in the present Marine Biology Study Area during high tide from 1230 to 1400 by Alan Craig.

Descriptor: Birds, San Diego Bay

Conservation Implications of Habitat Use and Behavior of Wintering Brown Pelicans.

Jacques, D. and Anderson, D. 1987. Public Research and Dissemination Program, University of California, Davis.

Descriptor: Birds, San Diego Bay

Ornithological Survey of Tijuana River Marsh, in Environmental Impact Statement for the Proposed Tijuana River Flood Control Channel.

Jehl, JR Jr. 1971. US Army Corps of Engineers Contract DACW09-71-C-0048.

ABSTRACT: Original research consisted of four censuses in December 1970 by Joseph R Jehl, but only data presented are a list of species observed in and "known to occupy" area. Brief discussion of endangered species with population estimates for the Clapper Rail (20-40 birds wintering), Least Tern (10 pairs), and Belding's Sparrow (40 pairs); bases for these estimates not stated.

Descriptor: Birds, San Diego Bay

San Diego Shorebird Study, 1969-1970.

Jehl, JR Jr., and Craig, AM.

1970. Project W-54-R, California Department of Fish and Game.

ABSTRACT: Banding study and monthly census of shorebirds from Coronado Cays around the Bay to the San Diego Gas and Electric Plant. Four Western Sandpipers banded in the Tijuana River Valley were recaptured in the Salt Works, one banded in the salt works was recaptured in the Tijuana River Valley, and one banded in the salt works was observed in the San Diego River flood control channel. Twenty observations in fall 1970 of birds that had been banded earlier in the study "strongly suggest that many birds return to the same migration stopping places or wintering ground each year." One observation of a dyed Western Sandpiper presumably marked at Humboldt Bay. Censuses consisted of both monthly counts of the entire study area (January-October 1970) and semimonthly counts of two of the salt ponds (October 1969-October 1970). "The censuses of these two ponds yielded rather misleading results....the birds were subjected to frequent human disturbance.... The monthly censuses..... provide a much more accurate picture of shorebird population fluctuations in the south San Diego Bay." substantial discussion of the Western Sandpiper; brief discussion of 11 other of the common species. Results presented for both censuses are the highest number of each species counted within a given month (see Appendix A, this volume).

Descriptor: Birds, San Diego Bay

Final analysis of Select Biological Issues Relating to the Chula Vista Bayfront.

Jones and Stokes Associates, Inc. 1983. City of Chula Vista.

ABSTRACT: Field work on birds in San Diego consisted of 105 hours in May, July, and October 1982; persons responsible not specified.

Objectives of the study, at the behest of the city of Chula Vista, included an investigation of the ecological relationship between the uplands of Gunpowder Point and the surrounding marsh and the extent of Belding's Sparrows' use of uplands and marsh/upland ecotones, both of which the investigators concluded were minimal. According to this report, shorebirds retreat at high tide to the mudflats around Vener Pond. Also included is a list of the birds of Sweetwater estuary giving seasonal occurrence and foraging habitat (source not stated).

Descriptor: Birds, San Diego Bay

Studies of California Least Terns and Water-Associated Birds at the Chula Vista Bayfront, San Diego County, California.

Jones and Stokes Associates, Inc. 1988. City of Chula Vista and San Diego Unified Port District.

ABSTRACT: A 1.5 year study was conducted of the Chula Vista Bayfront to identify significant waterbird feeding and roosting areas and a study of California Least Tern foraging was done to identify significant foraging, roosting and courtship areas during the breeding and post-breeding seasons. This is the first systematic study of its scope conducted on San Diego Bay. Bird use was found to be highest at sites along the Bay with mudflat as the dominant habitat. The majority of Least Tern activity was recorded along the Bay with the highest use near the D Street Fill. More foraging activity was noted at low tide than at high tide. The stations established for this study were used where appropriate during the Enhancement Plan study to render data as comparable as possible. The raw data gathered during this study were provided to us by Jones and Stokes.

Descriptor: Birds, San Diego Bay

Habitat preference of the Light-footed Clapper Rail in Tijuana Marsh, California.

Jorgensen, P. D. 1975. MS Thesis, San Diego State University.
ABSTRACT: Study of the ecology of the Clapper Rail in the Tijuana estuary by Paul Jorgensen. "The habitats more preferred were, in declining order, Tall spartina, Short Spartina, and Channel Edge." The data on habitat preference were gathered in spring and summer, but the distribution of the birds in winter implies that the preference is the same in winter. Nests are usually made of and anchored to Spartina but can float. The Clapper Rail feeds largely on crabs, which also prefer low marsh habitat.
Descriptor: Birds, San Diego Bay

California Shorebird Survey 1969-1974. Special Wildlife Investigations. Project Final report, Job III-1.
Jurek, R. M. 1974.

California Department of Fish and Game.
ABSTRACT: Results of shorebird counts at various sites, including three around San Diego Bay: bay shore of Coronado Municipal Golf Course (26 counts, 3 August 1972-25 August 1973; two counts per month; Martha Rosenquist and Ruth Stalnaker), three salt ponds between the Otay River and Highway 75 (21 counts, 8 August 1971-11 June 1972; two counts per month except in September; Martha Rosenquist, Ruth Stalnaker, and Janet Hatch), and two salt ponds (numbers 3 and 20) at the foot of 13th Street, Imperial Beach (27 counts, 19 October 1969-20 October 1970; usually two counts per month; Alan Craig, Jack Kinsey, Timothy Burr, Bradley Hall, and Ron LeValley). For all areas, the results presented are the maximum counted in each month (see Data Box).
Descriptor: Birds, San Diego Bay

The Breeding biology of Caspian Terns (*Hydroprogne caspia*) and Elegant Terns (*Thalasseus elegans*) at San Diego Bay.
Kirven, M. 1969. M.A. Thesis, San Diego State College.
ABSTRACT: Study of the reproductive biology Caspian and Elegant Terns in the salt works, done in (?) and 1966 by Monte Kirven. Caspian Terns have nested continuously since at least 1950 disperse widely through western North and Middle America after breeding. On the basis of number of chicks banded by Fred N. Gallup, the Caspian Tern colony increased from 1950(?) 1959, decreased slightly in the early 1960s, then stabilized during the study period at about breeding adults. The population Elegant Terns remained at approximately 75 pairs during study period.
Descriptor: Birds, San Diego Bay

An Inventory of the Avifauna of Mission Bay Park and Flood Control Channel.
Konecny, J. and Newman, J. In Progress.
ABSTRACT: A monthly inventory of birds in Mission Bay and the Flood Control Channel was begun October 1988 and is currently in progress. The data from these surveys are not yet available (as of 1994).
Descriptor: Birds, San Diego Bay

Numbers and winter distribution of Pacific Black Brant in North America.
Leopold, A. S., and Smith, R. H. 1952. Calif. Fish and Game 39:95-101.
ABSTRACT: San Diego and Missions Bays omitted from a rangewide survey of the species, as the numbers were considered too small to figure importantly in the total population. "Formerly San Diego and adjoining Mission Bays in the south were fairly important, but pollution, dredging and other developments, plus continual disturbance by boats and airplanes, have rendered this area of less use to brant."
Descriptor: Birds, San Diego Bay

The Horned grebe in Southern California.
Linton, CB. 1907. Condor 9:110.
ABSTRACT: "On the morning of November 4, 1906, while rowing in San Diego

Bay, near the Hotel Del Coronado, I heard a shot from a yacht nearby and noticed the yachtsmen put about and pick up a bird from the water, glance at it and throw it back. I was immediately upon the scene and gathered in the specimen which proved to be a beautiful adult female Horned Grebe (*Colymbus auritus*). there were several hundred American Eared Grebes in the bay, but I observed no other *C. auritus* during my four months stay at this locality."
Descriptor: Birds, San Diego Bay

Pacific Fulmar in San Diego Bay.
Linton, C. B. 1908. Condor 10:50.
ABSTRACT: One collected near the Hotel del Coronado on 4 November 1906 still represents one of only two records of this pelagic species within the bay.
Descriptor: Birds, San Diego Bay

California Least Tern census and nesting survey, 1975.
Massey, B. W. 1975. California Department of Fish and Game.
ABSTRACT: Estimated 110 pairs nesting at Lindbergh Field, 10 at D Street fill, and 45 in the salt works. Serious predation at Lindbergh Field, off-road vehicle disturbance at D Street.
Descriptor: Birds, San Diego Bay

A census of the breeding population of the Belding's Savannah Sparrow in California, 1977.
Massey, B. W. 1977.
E-1-1, Study IV, Job 1.2, Final Report, California Department of Fish and Game.
ABSTRACT: Life history, population density, and population estimates for all colonies in California. Numbers of breeding pairs estimated for San Diego Bay: Paradise Marsh, 16; Sweetwater marsh, 40; E Street Marsh, 18; salt works, 100; County Marine Study Area, 25.
Descriptor: Birds, San Diego Bay

Nesting habitat of the light-footed Clapper Rail in California.
Massey, BW, Zembal, R, and Jorgensen, PD. 1984.
J. Field Ornithol. 55:67-80.
ABSTRACT: Nesting habitat preference, clutch size, and hatching success of the Light-footed Clapper Rail, based on studies in the Tijuana River estuary and Orange County.
Descriptor: Birds, San Diego Bay

Three southern herons in California.
McCaskie, R. G. 1964. Condor 66:442-443.
ABSTRACT: Status of the Louisiana Heron, Reddish Egret, and Yellow-crowned Night Heron in southern California. "San Diego Bay still has a small area along the southern shore that is suitable for the herons.... Since 1940 there appears to have been a decline in the numbers of Louisiana Herons visiting coastal southern California, though the species continues to occur.... During the fall of 1963 there appeared to be a major influx of these birds into California.... I saw an immature bird on San Diego Bay on October 26.... On May 5, 1962, I found an adult and an immature [Reddish Egret] together on the mud-flats at the south end of San Diego Bay....last seen by Mr. R. O. Paxton on June 27, 1962.... It appears as if the Reddish Egret is becoming more regular in southern California, and recently records of this species have almost equalled those of the Louisiana Heron."
Descriptor: Birds, San Diego Bay

Supplemental list of birds of San Diego County, California.
McCaskie, R. G. and Banks, R. C. 1966. Trans. San Diego Soc. Nat. Hist. 14:157-168.
ABSTRACT: Update of Sams and Stott (1959); data for San Diego Bay are

primarily a summarization of that previously published.
Descriptor: Birds, San Diego Bay

City of San Diego and San Diego County. The Birthplace of California.
McGrew, C. A. 1922. The American Historical Society, Chicago
and New York.

ABSTRACT: Describes abundance of wildlife in San Diego County in 1880s and
contrasts it with a great reduction by the 1920s. "Down Spanish
Bight ... where one may watch now for a month without seeing any,
from 50,000 to 100,000 [Black Brant] could be seen coming into the
bay from the sea. Reckless, idiotic shooting ... has reft the bay
of one of its chief attractions."

Descriptor: Birds, San Diego Bay

Some maritime birds observed off San Diego, California.
Miller, L. 1936. Condor 38:9-16.

ABSTRACT: "Egretta thula brewsteri. Western Snowy Heron. These little
egrets first appeared at San Diego Bay on July 25....
Sterna maxima. Royal Tern.... Even the crowded inner harbor with
all the naval traffic of large and small craft, all the hydroplanes
from Spanish Bight, in addition to the commercial traffic seemed
much to their liking; for they were fairly abundant even there.
Sterna antillarum. Least Tern. At the San Diego Yacht Club where
our vessel generally lay while in port, birds of this species were
feeding their brown-backed young during the week of August 20 to
27. They seemingly had nested on the narrow spit that had been
thrown up by dredges in the region of Beacon 3 Shoal of my earlier
experiences. This area is now permanently above water and is
beginning to support beach vegetation. The Least Terns were
carrying fish to this spot in late July, though no nests were
discovered by me.

Descriptor: Birds, San Diego Bay

Eighth annual Black Brant census in California.

Moffitt, J. 1938. Calif. Fish and Game 24:341-346.

ABSTRACT: Results of censuses including San Diego and Mission Bays, 1931-
1938. For San Diego Bay: none in 1931, 1932, 1933, or 1936, 7 in
1934, 55 in 1935, 350 in 1937, and 397 in 1938. Figure for 1938,
at least, is for Cottonseed (i.e., Gunpowder) Point. "Believe
increase of birds during past few years may be attributed to an
earlier closed season and better food conditions as floods during
1927 deposited an untold amount of silt in bay, which covered many
acres of their principal food (eel grass) which is now coming up in
sections formerly silted over."

Descriptor: Birds, San Diego Bay

Twelfth annual Black Brant Census in California.

Moffitt, J. 1943. Calif. Fish and game 29:19-28.

ABSTRACT: Last in the series, this report includes a table with the results
of all previous years' surveys. Count for San Diego Bay increased
to 462 in 1939, decreased to 13 in 1940, increased again to 442 in
1941, and increased further to 110 in 1942, the highest figure for
any of the twelve years of the census. Numbers on Mission Bay also
increased from 1939 to 1942, the increase more than making up for
the decrease on San Diego bay in 1940. "The 1942 totals for both
bays were surprisingly large. In San Diego Bay, 750 brant were
estimated present off the mouth of Sweetwater River and 350 birds
along the bay's western shore, a mile south of Coronado.... Table
1 clearly indicates the steady and rapid repopulation of these bays
by brant since 1932, when none was reported from either locality.
Brant were abundant winter visitants on both bays 40 years ago, but
as the census results of the years 1931-1936 indicate, they
practically forsook the area for an interval. The rapid
repopulation of the bays within the past six years, during a period

of great human activity and development in the area, is one of the interesting facts that has been demonstrated by this series of censuses... In the spring of 1942, as in 1941, [game warden E. H.] Glidden was unable to find any eelgrass in San Diego Bay where the plant appears to have been completely killed out by some cause. In spite of this fact, the largest number of brant reported in any of the 12 annual censuses was recorded in 1942. In reporting this fact, Glidden commented that he wondered upon what the brant of San Diego Bay subsisted. He stated that this population and the brant of Mission Bay do not appear to change positions and that the birds of San Diego Bay seem to remain there for a considerable time. The writer believes that the brant of San Diego Bay may subsist to a large extent upon sea lettuce (*Ulva lactuca*), a great quantities of which plant he noted along the western shore of San Diego Bay in October, 1942."

Descriptor: Birds, San Diego Bay

Observations of Elegant Terns at San Diego, California.

Monroe, B. L. Jr. 1956. *Wilson Bull.* 68:239-244.

ABSTRACT: Numbers of elegant Terns on San Diego Bay in 1953, 1954, and 1955. Arrival in July, peak numbers in September, departure in November. Maximum estimate of 1500 birds on 26 September 1954, including "well over 700" at the Naval Amphibious Base on the Silver Strand.

Descriptor: Birds, San Diego Bay

A Survey of the Birds Occurring at Selected Sections of the Western Salt Company Evaporator Ponds, South San Diego Bay, Spring-Summer 1987.

Montgomery, S. J. (Pacific Southwest Biological Services). 1987.

Butler/Roach Group, San Diego, CA.

ABSTRACT: Original research consisted of three visits, 6 May (0730-1130), 26 May (0930-1215), and 24 June (1330-1515), plus conversations with Elizabeth Copper. Study area consisted of seven levees in the western half of the salt works. These levees provide nest sites for Snowy Plovers, American Avocets, Black-necked Stilts, Belding's Sparrows, Black Skimmers, and Forster's Elegant, and Caspian Terns, foraging habitat for Clapper Rails, and foraging and roosting habitat for many other water birds. Data are largely qualitative; to reduce disturbance, some levees were surveyed from a distance with a scope, no nests were not counted.

Descriptor: Birds, San Diego Bay

Nongame Bird and Mammal Section, Wildlife Management Division, California Department of Fish and Game. 1987. Five-year Status Report [Belding's Sparrow].

ABSTRACT: Summarized biology of Belding's Sparrow, lists management needs for conservation, and recommends continued listing as endangered. Refers to the three preceding population censuses of the species, 1973, 1977, and 1986. No original data.

Descriptor: Birds, San Diego Bay

The breeding status of the Snowy Plover in California.

Page, GW, and Stenzel, LE (eds). 1981. *Western Birds* 12:1-40.

ABSTRACT: Extensive survey attempted to sample all habitat suitable for the species throughout California. Results for San Diego Bay, 1978: Silver Strand, 3 pairs; salt works, 16 pairs; Sweetwater River mouth, 9 pairs.

Descriptor: Birds, San Diego Bay

Distribution of wintering Snowy Plovers in California and adjacent states. Page, GW, Bidstrup, FC, Ramer, RJ, and Stenzel, LE. 1986. *Western Birds* 17:145-170.

ABSTRACT: Results of comprehensive surveys; for San Diego Bay, North Island, 17 individuals (one survey), Silver Strand State Beach, 6 (five

surveys over four years), Delta Beach, 16 (two surveys over two years), Sweetwater River mouth, 36 (three surveys over three years). Figures are the medians of the maxima counted at each site.

Descriptor: Birds, San Diego Bay

A Proximate Biological Survey at San Diego Bay, California.

Peeling T. J. 1975. NUC TP 389.

ABSTRACT: Apparently no original data. List of species with a code for seasonal status and brief notes on abundance and habits (some inaccuracies). Based on U.S. Army Engineer District (1973).

Descriptor: Birds, San Diego Bay

Identification and distribution of Clark's Grebe.

Ratti, JT. 1981. Western Birds 12:41-46.

ABSTRACT: Numbers of Western and Clark's grebes observed on San Diego Bay in January 1977: Silver Strand, 9 Western, 27 Clark's' Harbor Island, 184 Western 10 Clark's. The only published information on the abundance, both relative and absolute, of these species in the bay.

Descriptor: Birds, San Diego Bay

Bird Species of Special Concern in California: An annotated List of Declining or Vulnerable Bird Species.

Remsen, J. State of California, the Resources Agency, Department of Fish and Game.

Descriptor: Birds, San Diego Bay

Birds of San Diego County, California: An annotated checklist.

Sams, J. R., and Stott, K. Jr. 1959.

ABSTRACT: List of the county's birds with a brief summary of relative abundance and seasonal status; little data specific to San Diego Bay, and that had been published previously. Somewhat out of date even when first published.

Descriptor: Birds, San Diego Bay

Report and Recommendation to California Legislature on Use of State Tide and submerged Lands in South San Diego Bay Pursuant to Chapter 1114.

San Diego Bay Tidelands Task Force. 1977.

ABSTRACT: General statements about birds occurring in and near the salt works; no original data.

Descriptor: Birds, San Diego Bay

A Sandwich Tern in California.

Schaffner, FC. 1981. Western Birds 12:181-182.

ABSTRACT: One seen in the Elegant Tern colony in the salt works, 11-20 May 1981, the first for California.

Descriptor: Birds, San Diego Bay

Aspects of the Reproductive Ecology of the elegant tern (*Sterna elegans*) at San Diego Bay.

Schaffner, FC. Jr. 1982. MS Thesis, San Diego State University.

ABSTRACT: Study of the reproductive biology and foraging ecology of Elegant Terns in the salt works, done in 1981, and 1982 by Fred C.

Schaffner. The size of the colony has increased since its establishment, reaching 861 pairs in 1981. Each subcolony mapped.

A few data on other species: size of Forster's Tern colony estimated at 1000 pairs, of Caspian Tern colony, 450 pairs in 1979.

Descriptor: Birds, San Diego Bay

Royal Tern nesting attempts in California: Isolated or significant incidents?

Schaffner, FC. 1985. Western Birds 16:71-80.

ABSTRACT: From the tern colony in the salt works, reports one nest

(unsuccessful) of the Royal Tern on 9 May 1980 and two nests (successful) on 8 May 1982. Suggests that the Royal tern's population fluctuations and nesting attempts are related to fluctuations in the abundance close inshore of schooling fish, especially sardines. Also, provides figures on the colony sizes of elegant Terns (607 pairs in 1980, 861 in 1981, 800 in 1982) and Caspian Terns (400 in 1980 and 1981, 350 in 1982).

Descriptor: Birds, San Diego Bay

Exhaustion of migrating sea birds.

Sefton, JW Jr. 1926. Condor 41:83.

ABSTRACT: Specimen collected on San Diego Bay on 11 November 1938. Also, "There was also at this time an unusual number of White-winged Scoters (*Melanitta deglandi*) on the bay, perhaps 500 individuals in all--more than I had ever previously observed."

Descriptor: Birds, San Diego Bay

The April 1989 Shorebird Census in the Southern California Region, Northwestern Mexico and Mono Lake.

Stenzel, L. and Kjelson, J. 1989.

Progress Report of Point Reyes Bird Observatory.

ABSTRACT: The combined counts of shorebirds in San Diego County for most species were higher than for any other coastal area in southern California.

Descriptor: Birds, San Diego Bay

Notes on the California Black Rail.

Stephens, F. 1909. Condor 11:47-49.

ABSTRACT: Observations around San Diego; those for San Diego Bay are for downtown San Diego and "near National City" presumably Sweetwater River estuary). "Many years ago Mr. H. W. Henshaw told me that he had been informed that California Black Rails (*Creciscus coturniculus*) were sometimes common in the salt marshes around San Diego Bay.... In December [1886] I drove to San Diego and spent several days looking for California Black Rails, without success. Some of the local hunters knew of them.... My next acquaintance with the species was November 16, 1902, when a young friend [i.e., Laurence M. Huey] brought me one which he said he had caught that day with his hands on the railroad track near the foot of 14th street in San Diego, at high tide. At this place the railroad tracks cross a tide marsh, which is now being filled. Last spring the manual training teacher here told me that one of his pupils had found the eggs of the California Black Rail in a marsh near National City. This lad told me about where he had found the nests and said the birds were common here.... I suspect that nests are often inundated by extra high tides.... May 28th, we tramped through [sic] the marsh two or three hours and flushed one California Black Rail which I shot.... He had done much hunting for the nests and thought he was lucky if he found a nest in half-a-day's steady search. The nest seems to be usually situated in very thick marsh vegetation (*Salicornia*, etc.) near the highest limits of the high tide.... He said he found eggs about the middle of March and about the 20th of April.... All the eggs he knew of had been found in the last four years in a tract of less than 100 acres.... I fancy that the species will be found fairly common in many localities when they are [sic] looked for carefully in the right places."

Descriptor: Birds, San Diego Bay

An Annotated List of the Birds of San Diego County, California.

Stephens, F. 1919. Transactions of the San Diego Society of Natural History 3:142-180.

ABSTRACT: General assessments of relative abundance and seasonal status of birds throughout the county; no data specific to San Diego Bay.

Changes in status noted for a few species, for example, the Black

Brant: "Formerly rather common winter residents, now rare."
Descriptor: Birds, San Diego Bay

Random notes.

Stephens, F. 1919. Condor 21:123-124.

ABSTRACT: "The big flood of January, 1916 covered most of the salt marshes near San Diego and drowned most of the Little Black Rails (*Creciscus coturniculus*). I have not been able to find one since the flood.... The long-billed Dowitchers have been common around the bays all winter. I saw several about the first of February. [At that time all dowitchers occurring in California were called "Long-billed Dowitchers."]

Descriptor: Birds, San Diego Bay

Bird surveys of South San Diego Bay.

Stewart, T. In Progress, 1994.

California Department of Fish and Game and San Diego Audubon Society.

ABSTRACT: A monthly survey of birds in south San Diego Bay was begun in February 1989 and is continuing monthly. These data have not yet been analyzed but were provided to this study in raw form. This study was set up using the monitoring stations used in the Jones and Stokes study and those used in the San Diego Bay Enhancement Plan study as well as additional stations in the Saltworks.

Descriptor: Birds, San Diego Bay

The Blue List for 1986.

Tate, J. Jr. 1986. Am. Birds 40:227-236.

Descriptor: Birds, San Diego Bay

Draft Environmental Statement Sweetwater River Channel, San Diego County, California.

US Army Engineer District, Los Angeles, Calif. 1972.

ABSTRACT: Original data consist only of a count made by an unnamed observer on 2 October 1971; and covered extended east to Edgemere Avenue. Otherwise, only a general discussion of the Sweetwater estuary's value to wildlife and the recognized endangered species occurring there.

Descriptor: Birds, San Diego Bay

Final Environmental Impact Statement. Sweetwater River Flood Control Channel, State Highway Route 54, Interstate Highway Route 5, Recreation Facilities, and Conservation of Marshlands.

U.S. Army engineer District. 1982.

ABSTRACT: No original data. General statements about the birds and endangered species of the area plus an incomplete list-of-birds known to inhabit or visit the lower Sweetwater River Valley and the Sweetwater Marsh.

Descriptor: Birds, San Diego Bay

Sensitive Bird species Region One.

U.S. Fish and Wildlife Service. 1985.

U. S. Fish and Wildlife Service Portland, Oregon.

Descriptor: Birds, San Diego Bay

50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Animal Notice of Review of Vertebrate Wildlife; Notice of Review.

U.S. Fish and Wildlife Service. 1989. Federal Register January 6, 1989.

Descriptor: Birds, San Diego Bay

The Birds of San Diego County.

Unitt, P. 1984. San Diego Society of Natural History Memoir 13.

ABSTRACT: Summary of distribution of the county's birds, including some

data specific to San Diego Bay. synthesis of data from collections of both eggs and skins in the San Diego Natural History Museum and Western Foundation for Vertebrate Zoology as well as previously published information. Original data for San Diego Bay, largely from the field notes of persons visiting the bay occasionally for recreational birdwatching or observing birds incidentally during other studies, consist of estimates of numbers used to exemplify assessments of species' relative abundance. Contains the most specific information available on migration schedules.

Descriptor: Birds, San Diego Bay

On a southern California beach.

Walker, L. W. 1935. Bird Lore 37:119-121.

ABSTRACT: Snowy Plovers and Least Terns photographed nesting on the Silver Strand. "There were a score or more of these [Least Terns.]"

Descriptor: Birds, San Diego Bay

Young California black Rails.

Walker, L. W. 1941. Condor 43:246.

ABSTRACT: Nest, eggs, and chicks photographed "in a slough near the south end of San Diego Bay" on 10 May 1941.

Descriptor: Birds, San Diego Bay

Results of the 22-23 April 1989 shorebird Census in Coastal Wetlands of San Diego County and Northern Baja California.

Warnock, N., Griffin, S., and Stenzel, L. 1989. Point Reyes Bird Observatory.

ABSTRACT: As part of the Pacific Flyway Project begun to determine the status of shorebirds in the wetlands of the Pacific Flyway the first comprehensive census of shorebirds in San Diego County was conducted in April 1989. San Diego Bay was found to host the highest number of shorebirds in the County with the Saltworks holding 44.5% of the total shorebirds found in the County. Additional surveys are to be conducted at least twice a year for an indefinite period.

Descriptor: Birds, San Diego Bay

Draft Environmental Impact Report. Crown Isle Hotel/Marina, Coronado Cays. Westec Services. 1985. San Diego Unified Port District.

ABSTRACT: Eight to ten pairs of Least Terns nested on Crown Isle in 1978; 38-40 pairs nested in 1979; information from Department of Fish and Game reports and Larry Salata (personal communication). "A sizable population of House finches inhabits the island.... The only other species observed were [a lizard] and American Kestrel." Field work on which these statements are based was not specified.

Descriptor: Birds, San Diego Bay

Effects of habitat type and human disturbance on an endangered wetland bird: Belding's Savannah Sparrow.

White, A. N. 1986. M. S. Thesis, San Diego State University.

ABSTRACT: Ecology of Belding's Sparrow at Los Penasquitos lagoon and the Tijuana River estuary. Correlations of territory size and population density with characteristics of vegetation.

Descriptor: Birds, San Diego Bay

The status of the Light-footed Clapper Rail.

Wilbur, S. R. 1974. Am. Birds 28:868-870.

ABSTRACT: One nest found in the Sweetwater Marsh on 18 April 1973. "Alan Craig reports (pers. comm.) sightings of small numbers in South San Diego Bay at Otay River Slough and the Marine Biology Study Area."

Descriptor: Birds, San Diego Bay

The Light-footed Clapper Rail: an update.

Wilbur, S. R., Jorgensen, P. D., Massey, B. W., and Basham, V. A.

1979. Am. Birds 33:251.

ABSTRACT: "The six small marshes in south San Diego Bay head an estimated five rails in November and December 1977....(Jorgensen)."

Descriptor: Birds, San Diego Bay

Birds of the Pacific slope of southern California.

Willett, G. 1912. Pacific Coast Avifauna 7:1-122.

ABSTRACT: Summary of distribution of birds throughout coastal southern California. Data for San Diego Bay are based largely on previously published reports.

Descriptor: Birds, San Diego Bay

A revised list of the birds of southwestern California.

Willett, G. 1933. Pacific Coast Avifauna 21:1-204.

ABSTRACT: An update of Willett's 1912 work; data for San Diego Bay based on previously published reports and communication with local collectors. For example, noted that J. C. von Bloeker, J. M. Dixon, and E. E. Sechrist had reported that Black Rails had returned to their "former haunts" on San Diego Bay.

Descriptor: Birds, San Diego Bay

A Preliminary Inventory of the Terrestrial Vertebrates and Flora of the Salt Marsh Area of Paradise Creek in National City, California.

Williams, B. K. 1978. Intersea Research Corp., San Diego.

ABSTRACT: Birds counted by John P. Rieger, 20-29 September 1973. The highest number of individuals of each species sighted on any one day is listed. A population of 80 plus or minus 10 Belding's Sparrows estimated; 33 was the highest number seen on any one day.

Descriptor: Birds, San Diego Bay

A census of the Light-footed Clapper Rail in California.

Zemba, R. and Massey, B. W. 1981. Western Birds 12:87-99.

ABSTRACT: Census results for 1980 based on mapping of calling birds and nest searches. Paradise Creek 0 pair; Sweetwater Marsh, 4; E Street Marsh, 4; F Street Marsh, 0; Otay River mouth, 3; South Bay Marine Reserve, 4.

Descriptor: Birds, San Diego Bay

Distribution of the Light-footed Clapper Rail in California, 1980-1984.

Zemba, R., and Massey, B. W. 1985. Am Birds 39:135-137.

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treatment prior to ocean disposal regardless of net environmental
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1935 and 1980. Since the beginning of this century, the population
has shifted from nesting in numerous small colonies associated
with freshwater marshes in interior California and southern Oregon
to nesting primarily in large colonies on human-created habitats
along the coast. Colonies at Grays Harbor, Washington and San
Francisco and San Diego bays, California account for 77% of the
current Pacific Coast population (6000 pairs), which has breeding
and wintering areas separate from those of populations east of the

continental divide. There also appears to be some segregation on the wintering grounds by birds from the 3 major colonies within the Pacific population. Age-related seasonal movements in the Pacific population are characterized by a brief period of northward dispersal by newly fledged birds before migrating to the wintering grounds, a residency on the wintering grounds through their 2nd winter, a return to the breeding grounds the 3rd summer, when most birds are thought to prospect breeding sites and some may breed, and attainment of adulthood the 4th summer, with subsequent annual movements between wintering and breeding grounds. The Pacific population has increased 70% since 1960, apparently all by intrinsic growth. Over half (57%) of the fledging reach their 4th year, and they have a subsequent annual survival rate of 89% and a mean breeding life expectancy of 8.6 yr. An average annual fledging rate of 0.64 young/pair was calculated as necessary to have provided the observed growth of the population during its recent expansion. Growth of some of the individual colonies, particularly those in Washington, could only have resulted from extensive recruitment of birds from other Pacific Coast colonies. Philopatry is low in this population, and the northern colonies involved recruitment primarily of 1st-time breeders but also some older adults. Factors promoting both 1st-time breeders and older adults to join new and often distant colonies are discussed.

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Bulk terminals from the Arctic Circle to San Diego

AUTHOR: Fred McCague.

MARINE DIGEST 71(4):29-30, Dec 1992.

DESCRIPTORS: San Diego Bay

ECOLOGICAL AND BIOGEOCHEMICAL ASPECTS OF MICROBIAL DEGRADATION OF PHENOLIC
MATERIALS IN THE CALIFORNIA COASTAL MARINE ENVIRONMENT

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PhD Dissertation 1993, UC SAN DIEGO

ABSTRACT: Phenolic materials are found in numerous environments. They are
particularly well represented in coastal environments due to anthropogenic

pollution, in situ production by marine organisms, and as a component of riverine humic materials flowing into estuaries. They were thus chosen as model compounds for the study of microbially mediated organic carbon dynamics in coastal systems. To determine the rates and utilization dynamics of phenolic materials by coastal marine bacteria, a sequential approach was used in which marine bacteria were first assayed to determine their ability to utilize phenolics, various sites in the California coastal zone were then analyzed qualitatively and quantitatively for phenolic materials, a method was developed to determine microbial utilization rates of phenolic materials using a high specific activity radiolabeled tracer and finally, utilization rates of p-cresol were determined at ambient concentrations.

Phenol, cresol isomers (o-, m-, and p-), catechols, and methoxyphenols were the predominant phenolic materials identified in several representative coastal environments off California. Concentrations ranged from about 2.5 to 370 ng \cdot l⁻¹. Biodegradation rates of p-cresol were measured in five coastal areas using high specific activity ³H-labeled p-cresol added at no more than 10% of the ambient p-cresol concentration. Rates of microbial utilization were high, up to 35.5 ng \cdot l⁻¹ \cdot hr⁻¹ in San Francisco Bay. Turnover times were calculated using the measured ambient concentration of p-cresol and ranged from 1.72 hours (San Francisco Bay) to 37 hours (at Spanish Landing in San Diego Bay). Utilization kinetics indicated microbial degradation of more complex, humic type material containing phenolic moieties.

It is concluded that biodegradation of phenolic compounds plays a major role in the biogeochemistry of organic materials in coastal marine environments. Rates determined for the breakdown of the phenolic component of humic materials in estuarine environments indicate that microbially mediated turnover times are considerably faster than for other means suggested, such as photodegradation or sedimentation.

Comparable Levels of Trace Metal Contamination in Two Semi-Enclosed Embayments: San Diego Bay and South San Francisco Bay

Flegal, A. R.; Sanudo-Wilhelmy, S. A.

Environmental Science and Technology 27(9):1934-1936, September 1993.

ABSTRACT: Parallels in the distribution of trace elements in San Diego Bay and indicate that surface water concentrations in both embayments are partially mediated by diagenic processes. These processes of remobilization of metals in contaminated sediments appear to have sustained order of magnitude enrichments in some trace element concentrations in San Diego Bay surface waters above natural levels in the northeast Pacific Ocean, in spite of the elimination of point-source discharges of wastes to the bay more than twenty years ago. In both systems, the sediments may now represent essentially infinite sources of contamination.

Seawater Desalting for Southern California: Technical and Economic Considerations

Hess, G.; Morin, O. J.

Desalination 87(1-3):55-68, September 1992.

ABSTRACT: Dual-purpose plants, combined facilities which produce both potable water and electricity, are common for large seawater desalination projects in the Middle East, and interest in these plants in the United States is growing. The San Diego County Water Authority (CWA) imports water which serves approximately 90% of the total water demand in San Diego County, California. As part of its long range planning effort to investigate various water supply alternatives to meet the County's growing demand for water, CWA is considering the use of desalination to convert seawater to drinking water. Recently, two studies of dual purpose plants were conducted for the CWA and San Diego Gas and Electric Company (SDGE). The first study explored the feasibility of installing a new combined-cycle power installation with the desalination plant. Two dual-purpose plants which would be located at two existing SDGE sites (Encina and South Bay, CA) were considered. The

second study only considered the South Bay site with a re-powered power plant in lieu of a new combined-cycle facility. Each study included only those processes that are commercially available and with proven designs. The processes included were thermal distillation (multi stage flash and multi effect), and membrane systems (reverse osmosis with motor and steam drives for high pressure pumps). It was concluded that primary energy usage could be substantially reduced through use of a dual purpose plant. For the South Bay site the most cost-effective process would include reverse osmosis using steam drives and a post-treatment system blending brackish water with the product from the desalination process.

Evidence for Rapid, Nonbiological Degradation of Tributyltin Compounds in Autoclaved and Heat-Treated Fine-Grained Sediments

Stang, P. M.; Lee, R. F.; Seligman, P. F.

Environmental Science and Technology 26(7):1382-1387, July 1992.

ABSTRACT: Sterilized sediments, high in silt and clay content, from various sites in the United States rapidly degraded added 14-C-labelled tributyltin or unlabeled tributyltin to dibutyltin, monobutyltin, and inorganic tin. This degradation was primarily abiotic, as documented by similar degradation rates between sterilized and nonsterilized sediments. Degradation occurred in two phases, with a rapid degradation phase (23-94%) after 2 days, followed by slower degradation rates of the remaining tributyltin during the next 5-7 days. Dibutyltin is the primary degradation product found when tributyltin is added to marine water, with very little production of monobutyltin. However, the primary degradation product when dissolved tributyltin is added to fine-grained sediment was monobutyltin. Monobutyltin is formed in the sediment and, because of its hydrophilic nature, enters the water shortly after its formation. It is suggested that the production of monobutyltin by bottom sediments explains the significantly higher ratios of monobutyltin to tributyltin observed in bottom water compared to surface water in a San Diego Bay marina.

Chemical Contamination and Associated Fish Diseases in San Diego Bay

McCain, BB; Chan, SL; Krahn, MM; Brown, DW; Myers, MS.

Environmental Science and Technology 26(4):725-733, April 1992.

ABSTRACT: Chemical pollution at sites in or near San Diego Bay was investigated between 1984 and 1988. The mean concentrations of selected polychlorinated biphenyls (PCBs), metals (e.g., Cu and Pb), and aromatic hydrocarbons in sediments from sites in the southern and central portions of the bay were significantly higher than those in sediment samples from nearby non-urban sites. Mean concentrations of PCBs in liver tissue and of selected aromatic compounds (e.g., aromatic hydrocarbons) and their metabolites in bile were also significantly higher in white croaker, barred sand bass, and black croaker from one or more sites within the bay compared to those from the non-urban sites. The prevalence of fin erosion in white croaker, barred sand bass, and black croaker and of liver neoplasms in black croaker from sites in the bay were significantly higher than in individuals of the same species from non-urban sites.

Process Optimization for a 6.0 MGD Seawater Reverse Osmosis Plant

Morin, O.J. ; Cappos, Steven ; Filteau, Gerry ; Perlman, John

SOURCE: 1993 Membrane Technology Conference Proceedings; American Water Works Association, Baltimore, August 1-4, 1993, p729-754, 1993.

ABSTRACT: Design studies were performed for a 6.0 MGD seawater reverse osmosis (SWRO) plant to be located at the San Diego Gas and Electric generating station at South Bay. The studies are concerned with optimization of the desalination process for the seawater conditions and economic factors prevailing at the site. The plant under consideration utilizes a single stage reverse osmosis process with seawater feed supplied from either beach wells or the power plant cooling water outlet. Composite membranes of polyamide material in a spiral wound configuration as manufactured by Fluid Systems have been assumed as the basis for performance projections. Significant seasonal variation of

seawater temperature occurs at this site, requiring that year-around performance be considered in the design. The sensitivity of consumable and capital costs to conversion rate was explored and a rate of 50 percent chosen. Several strategies for capital and operation cost reduction were evaluated, including the use of the power plant's cooling water outlet as the supply to the seawater reverse osmosis (SWRO) process. Use of the power plant cooling water outlet as the supply was found not to be beneficial, due to capital costs.

Hydrodynamic modeling of San Diego Bay

Author: Shrestha, Parmeshwar L.

Source: Proceedings of the 1994 ASCE National Conference on Hydraulic Engineering (Buffalo, NY, 1994), Part 1. ASCE, New York, 1994. pp140-144.

Abstract: A two-dimensional vertically-averaged finite element model was adapted to study the hydrodynamics of San Diego Bay. The hydrodynamic model was interfaced with pre- and post-processors to illustrate an integrated approach to modeling. Results of the hydrodynamic simulation were compared with observed data and with the results from a quasi-two dimensional hydrodynamic model. The model performed satisfactorily in predicting the velocity field and flow depths at specified locations in the bay.

Management of San Diego Bay dredged material disposal

Author: Muslin, Dan

Source: Coastal Zone '93. Coastal Zone: Proceedings of the Eighth Symposium on Coastal and Ocean Management Part 3 (of 3), New Orleans, 1993. ASCE, New York, 1993. p 3095-3109.

Abstract: This paper will discuss the Navy's efforts in the development and analysis of dredged material disposal from Navy projects within San Diego Bay. The impacts and mitigation for the alternatives will be discussed. Future environmental use of this document will also be presented.

Computer support for water quality management in San Diego Bay.

Author: Bale, A. E.; Orlob, G. T.

Source: Water Resources Planning and Management: Saving a Threatened Resource - In Search of Solutions. Proceedings of the Water Resources Sessions at the 1992 National Conference on Water Resources Planning and Management - Water Forum '92, Baltimore, 1992 Aug 2-6. ASCE, New York, 1992. p 176-181.

Abstract: A variety of computer based systems and techniques, including mathematical models, data bases, information management schemes, statistical analysis packages, and graphical displays support decision makers in their management of water quality issues. A recently developed concept, particularly suited to a future of readily accessible workstations and personal computers, defines a computer aided support system (CASS) in which a combination of these systems and techniques comprises an integrated management package. Such a package may be structured so that the end user and each package component may interact, exchanging data as well as directives. This paper describes the design and application of the San Diego Bay CASS and presents a comparison of management options illustrating its utility.

In situ measurements for monitoring the geochemical control of trace-metal release rates from San Diego Bay sediments.

Author: Reimers, C. E.; Chadwick, D. B.; Lieberman, S. H.

Source: Ocean Technologies and Opportunities in the Pacific for the 90's Proceedings of Oceans '91, volume 2, Honolulu, Oct 1-3 1991. IEEE, Piscataway, NJ, p 681, 1991.

Abstract: The authors have been investigating how sensitive benthic fluxes of trace metals are to the oxygen and pH regimes of pore waters just below the sediment-water interface in San Diego Bay. Their approach has been to use a benthic chamber device to determine in situ fluxes of Cu, Cd and Zn, and a novel in situ microelectrode-profiling instrument to determine profiles of dissolved O₂ and pH with a vertical resolution less

than equivalent to 1 mm. Results from three locations indicate that under natural conditions in the Bay, oxygen penetrates 0.4-0.5 cm into the sediments, and pH may decrease by 0.2 to 0.8 pH units in the first 1-2 cm before rising again. These surface conditions favor trace-metal mobilization, and if they are maintained within the chamber with an oxygen-replenishing system, trace-metal release rates can be measured from the sediments. If the oxygen level is allowed to decrease in the chamber, the metal fluxes decrease and ultimately reverse.

Environmental constraints associated with dredging in Southern California.

Author: Risko, Anthony J.; Chang, Mohammed N.

Source: Coastal Engineering Practice '92. Long Beach, 1992 Mar 9-11. ASCE, New York, 1992. p 975-988.

Abstract: The U.S. Army Corps of Engineers, Los Angeles District, is responsible for the maintenance dredging of twelve harbors along the Southern California coast, ranging from Morro Bay in the north to San Diego Bay in the south. Each harbor is unique in the way dredging operations are handled, the method of disposal, and environmental constraints, including endangered species. This paper presents a generic overview of the environmental concerns associated with all Corps of Engineers dredging projects in Southern California.

Identifying dredged material disposal options in San Diego Bay using specific, quick-screening toxicity analyses

Author: Snyder, B.J.; Lester, W.C.; Ashbaugh, S.L.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry (SETAC), Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 312

Abstract: Dredged material disposal options for San Diego Bay sediments are limited to beach nourishment, ocean disposal, or upland disposal. Pursuit of the ocean disposal option is made difficult by a rigorous set of required testing criteria. Although sedimentation in San Diego bay is minimal, riverine input and shoaling is sufficient to necessitate maintenance dredging of ship channels and berths every five years to ensure safe operation depth at Naval Station San Diego. A study was conducted at Naval Station San Diego Piers 2 and 3 to determine the most feasible disposal options for over 500,000 cubic yards of sediment. The study employed quick screening analyses that were cost effective and designed to identify horizontal and vertical contamination gradients and hot spots defined by toxicity. The testing program combined physical and biological analyses consisting of three components: the 10-day amphipod toxicity test, analysis of sediment grain size, and determination of total organic carbon concentrations. Results indicated that the proposed dredge site should be partitioned into three distinct areas, each with a different disposal strategy. Evaluation of disposal options was based on the presence or absence of sediment toxicity and sediment grain size assessment.

Evaluation of effects of fugitive copper ore concentrate on sediment quality and biological resources in San Diego Bay

Author: Lester, W.C.; Lees, D.C.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 312.

Abstract: During the late 1970s and early 1980s, quantities of copper ore concentrate lost episodically from a marine terminal into San Diego Bay were sufficient to cause considerable increases in copper concentrations in the bay sediments. Staff from Ogden designed and conducted studies to define and map the vertical and horizontal distribution of copper ore concentrate in bay sediments in the vicinity of the terminal in response to a cleanup and abatement order issued by the California Regional Water Quality Control Board, San Diego region.

The authors also conducted biological surveys to evaluate the condition of soft bottom benthic communities and their response to gradients in copper concentration, and bioassay studies to evaluate the toxicity of ore-contaminated sediments. While the copper distribution data were used to design the cleanup of the site, the biological data suggest that the elevated concentrations of copper were innocuous, at least up to 18,000 dry weight. This case provides an example where a valid ecological risk assessment of potential contaminants is ignored or omitted and substantial resources are expended to remediate environmental problems that are at most, minimal.

Detection of DNA damage in the hemocytes of environmentally exposed mussels using the Comet assay.

Author: Christie, M.; Sanders, B.M.; Steinert, S.A.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 68.

Abstract: Hemocytes collected from transplanted and native mussels, *Mytilus edulis*, at reference and pollutant impacted sites in San Diego Bay were examined for DNA damage using the Comet assay. Hemocytes from transplanted juvenile and adult mussels were examined at 0, 10, 30, 60 and 90 days of exposure at reference correlated with tissue burdens of priority pollutants, mussel growth rates, and tissue stress protein concentrations. In relation to reference site results evidence of significantly elevated DNA strand breaks was observed after 10 days of exposure at sites found to have moderate to high concentrations of genotoxic compounds. Comparison of native and transplant results as well as the association of DNA damage with stress protein and growth results was found to be essential in order to distinguish between physiological condition and genotoxic influences.

Evaluation of biomarkers of biological effects in *Mytilus* exposed to multiple stressors in San Diego Bay

Author: Sanders, BM; Steinert, S; Salazar, SM; Salazar, MH.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 67

Abstract: A collaborative field effort to evaluate a suite of cellular, organismal and population level biomarkers in juvenile and adult mussels in San Diego Bay was carried out to evaluate their utility as biomarkers of adverse biological effects on populations exposed to contaminant in situ. Both transplanted and resident mussels were collected at six locations that were determined to be differentially exposed to contaminants. The field experiment was designed to determine the relative degree or severity of toxicant effects at the selected sites by using stress proteins as biomarkers of proteotoxicity and the Comet assay as a measure of genotoxicity. Links were established between these cellular level biomarkers and population level parameters by monitoring growth and reproduction in mussels at each site. This paper discusses the overall experimental design and rationale and the mussel bioaccumulation data. Other talks in this session present the biomarker results and examine geographic patterns in the incidence of the measured biological effects. An integrated field approach can be incorporated into surveillance monitoring efforts to facilitate the identification of toxic hot spots which may be detrimental to aquatic life.

A biomarker, P450 RGS, for assessing exposure and potential toxicity

Author: Anderson, JW; Tukey, RH; Quattrochi, LC; Rossi, SS.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of

Abstract: The reporter gene system (RGS) use an engineered human liver cancer cell line such that the P450 1A1 site on the chromosome when activated by an inducer compound will produce luciferase instead of P450. After the reaction is stopped, the cells are lysed and the cytoplasm is measured for protein content and luminescence. Induction by such compounds as dioxin, dioxin-like PCB congeners, and polyaromatic hydrocarbons (PAH) infers these xenobiotics are present at levels that are potentially toxic, carcinogenic, or mutagenic to organisms. Solvent extracts, using standard analytical methods, of tissue, water, aquatic sediments or soils can be directly applied to the assay system. Tests results show significant P450 induction from a typical 40 g sample would be (in ng/g or ppb): 0.001 for Dioxin; 1 for a range of PCB congeners; 10 for several AROCLOR Mixtures; and 300 for a mixture of PAHS. Paper discusses the application of this approach to extracts of mussels deployed in San Diego Bay, to examine accumulated contaminants, as part of an integrated study to evaluate biomarkers.

Sigma PAH: A model to predict the toxicity of field-collected marine sediment contaminated by polynuclear aromatic hydrocarbons 2: Model verification

Author: Swartz, RC; Schults, DW; Ozretich, RJ; Lamberson, JO; Cole, FA; Ferraro, SP; DeWitt, TH; Redmond, MS.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 49

Abstract: The Sigma PAH model was used to predict the probability of significant acute toxicity to amphipods caused by sediment from four areas where PAHs are the major sediment contaminants (parts of San Diego Bay.....). Predictions were then compared with the frequency of toxicity observed in nine investigations of sediment from four areas. A total of four amphipod test species (*Rhepoxynius abronius*, *Eohaustorius estuarius*, *Leptocheirus plumulosus*, *Corophium volutator*) were used in the nine investigations. Six of the investigations were conducted in the laboratory; three were from the literature. The mean percent agreement between the predicted and observed frequency of significant toxicity was 82.5% for tests in the laboratory and 88.5% for test data taken from the literature.

Detection of proteotoxicity of environmentally exposed mussels based on the cellular stress response

Author: Sanders, B.M.; Nakagawa, P.; Steinert, S.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 68

Abstract: Organisms are often exposed to many types of stressors in their environment yet have a limited capacity to adapt to stress induced damage without adversely affecting such significant processes as growth and reproduction. Cellular level biomarkers may provide an early warning of adverse effects on populations. As part of an integrated study to evaluate biomarkers of contaminant-induced protein damage in San Diego Bay the authors examined the accumulation of the major stress proteins, stress 70 and cpn60, in gill and mantle tissue of mussels exposed to contaminants in San Diego at six locations. The expression of the response differed between tissues in terms of the specific isoforms expressed and total accumulation. When compared with the bioaccumulation on other mussels collected as part of this study, these data suggested that tissue specificity may be a function of classes of contaminants which induced the response. It appears that these tissue level responses correlate with impacts on growth and reproduction. The accumulation of stress proteins is discussed in relation to other data collected on genotoxicity and potential toxicity. The strengths and

weaknesses of this integrated study are discussed.

Mussel growth as an indicator of environmental effect: Synoptic testing of mussel biomarkers in San Diego Bay

Author: Salazar, M.H.; Salazar, S.M.

Source: Ecological risk assessment: Lessons learned. 14th annual meeting of the Society of Environmental Toxicology and Chemistry, Houston, 14-18 Nov 1993. Pensacola, Society of Environmental Toxicology and Chemistry, 1993. p 67

Abstract: A multidisciplinary study was conducted in San Diego Bay to evaluate the effectiveness of various mussel biomarkers. Caged juvenile and adult mussels were transplanted at six sites and in flow-through laboratory aquaria. Synoptic measurements of chemical exposure and biological response were made at selected intervals during the 84-day exposure period. Mussel growth was used as an indicator of environmental effects in the study. Site-specific differences in growth will be described and related to other chemical, biochemical, genetic, and reproductive markers. For growth, individual measurements of weights and lengths were made on juveniles at the beginning, middle, and end of the test. Animals were held in compartmentalized cages during the exposure period. Statistically significant differences were found in growth among sites and an inverse relationship between tissue contamination and mussel growth. By minimizing the size range of test animals, segregating and measuring individuals, and making multiple non-destructive measurements over time, the statistical power of the test is increased to detect differences that may not have otherwise been detected.

Hazardous waste reduction efforts of the Navy and DOD in the San Diego California region. Master's thesis

Author: Kane, M.W.

Masters thesis, Naval Postgraduate School, Monterey, Dec 1993. 54p.

NTIS#: AD-A-276253/2/XAB

Abstract: Investigates the hazardous waste reduction efforts of the Department of Defense and the Navy in the San Diego region. It shows that previous efforts to reduce cost and generated waste have not been successful. The study reveals that efforts by Fleet Industrial Supply Center, San Diego should reduce both costs and wastes and that the improvements in the pricing schedule used by the Public Works Center, San Diego to charge for hazardous waste processing services also should reduce costs. The research concludes that the best method to reduce costs is to reduce the waste stream. Further, more effort is needed to identify less or non-hazardous substitutes and waste treatment technologies should be investigated and implemented wherever possible.

The shallow-water flatfishes of San Diego County

Author: Kramer, S.H.

Source: California cooperative oceanic fisheries investigations reports, January 1 -- December 31, 1990. Nov 1991, p 128-142. Editor: Olfe, J.; Vernet, M.

Abstract: Seven species of flatfish live in the shallow marine waters (depth 14 m) of San Diego County: California halibut, *Paralichthys californicus*; fantail sole, *Xystreurys liolepis*; speckled sanddab, *Citharichthys stigmaeus*; spotted turbot, *Pleuronichthys ritteri*; hornyhead turbot, *Pleuronichthys verticalis*; diamond turbot, *Hypsopsetta guttulata*; and California tonguefish, *Symphurus atricauda*. Speckled sanddab was most abundant, representing 79% of the flatfish catch. California halibut had the highest biomass, and represented 46% of the catch. Only California halibut and diamond turbot used bays as nursery areas; they had distinct ontogenetic distributions, with length increasing with depth. The remaining species settled on the open coast but were not found together during early juvenile stages; they settled at different depths, and at different times of the year. Older juveniles and adults partitioned the habitat by eating different foods

and by living at different depths and locations. Life histories of nearshore flatfishes varied widely: speckled sanddab settled at a large size on the open coast and matured rapidly, whereas California halibut settled at a small size, used bays as nurseries, and delayed maturity.

Portraits of our coastal waters. Supplement to the national water quality inventory. Report from the EPA regions.

Author: Environmental Protection Agency, Office of the Assistant Administrator for Water

Publication Date: Jun 1991, 35 pages.

NTIS#: PB-93-207546/XAB; EPA#: EPA--503/2-91/004.

Abstract: includes toxic contamination in San Diego Bay.

National benthic surveillance project: Pacific coast. Fish histopathology and relationships between toxicopathic lesions and exposure to chemical contaminants for cycles 1 to 5 (1984-88).

Author: Myers, MS; Stehr, CM; Olson, OP; Johnson, LL; McCain, BB.

Source: National Marine Fisheries Service, Seattle, Northwest Fisheries Science Center. NOAA Technical Memorandum NMFS-NWFSC-6, Feb 1993, 177 pages. NTIS# PB-93-178481/XAB; see also PB--89-180632 and PB--91-172346.

Abstract: Presents and interprets histopathology studies conducted on 17 species of bottomfish captured at 45 sites between 1984 and 1988 as part of the Pacific Coast portion of the National Benthic Surveillance Program (NBSP) in conjunction with NOAA's National Status and Trends Program (NS T). Sampling sites ranged from ... to San Diego Bay. Twenty-three were located in or near urban embayments, and the 22 remaining sites were in nonurban embayments, five of which served as comparison or reference sites on the basis of minimal levels of sediment contaminants detected (Kamishak Bay, AK; Nisqually Reach, WA; and Bodega Bay, Dana Point, and outer Mission Bay). These comparison sites were selected so that the same fish species could be collected from minimally contaminated environments as opposed to those obtained at urban or more contaminated sites. Six primary target species were identified for statistical analyses that examined the relationships between occurrence of particular toxicopathic diseases or lesions in the liver and kidney and levels of potential or actual exposure to contaminants. These species were selected because they were broadly distributed geographically and were abundant among the sampling sites, they had previously documented significant prevalences of contaminant-associated diseases, or the geographic distribution of similar diseases among the sites suggested an association with contaminant exposure. These primary target species were flathead sole, English sole, starry flounder, hornyhead turbot, white croaker, and black croaker. All specimens were examined for the presence of necrotic, sclerotic and proliferative lesions in the kidney, as well as lesions.

Second summary of data on chemical contaminants in sediments from the National Status and Trends Program. Progress report

Source: National Ocean Service, Rockville, MD. Office of Oceanography and Marine Assessment. NOAA Technical Memorandum NOS/OMA--59. April 1991, 155 pages.

NTIS#: PB-92-119072/XAB; see also PB89-206809 and PB90-167305.

Abstract: NOAA's National Status and Trends (NS T) Program has analyzed samples of surface sediment collected at almost 300 coastal and estuarine sites throughout the United States since 1984. When the first NS T report on sediments (NOAA, 1988) was written, only about 200 sites had been sampled. The second report is based on more data. Even with this larger data set, the original observation holds that most of the highest concentrations for any particular contaminant are found at sites near the urban areas of Boston, New York, San Diego, Los Angeles, and Seattle. The overall concentration distributions for each contaminant are approximately lognormal, allowing a definition of 'high' concentrations as those exceeding the mean plus one standard

deviation of the lognormal distribution. Those 'high' concentrations are useful for comparisons within the NS T data set and with other reports on sediment contamination. The 'high' concentrations in units of microgram/g of dry fine-grained sediment for each contaminant are (in parentheses): Ag(1.2), As(24), Cd(1.2), Cr(230), Cu(84), Hg(0.49), Pb(89), Sn(8.5), Zn(270), LMWPAH(1.0), HMWPAH(3.0), tDDT(0.037), and tPCB(0.20).

X-ray Fluorescence Spectrometry for Field Analysis of Marine Sediments
(Final rept. Aug 92-Oct 93)

Dooley, C. A. ; Stallard, M. O.

Naval Command, Control and Ocean Surveillance Center, San Diego, CA. RDT and E Div. Report No.: NCCOSC/RDT/E-TD-2629

Mar 94. 132p. NTIS#: AD-A278 964/2/XAB

ABSTRACT: The accuracy, precision, and performance of a field-portable x-ray fluorescence (XRF) spectrometer was evaluated for marine samples in San Diego Bay. The XRF spectrometer can perform well on board survey vessels and provide a precise, near-real-time determination of metals at levels indicative of pollution in marine sediments obtained by sediment grabs. The resulting capability for on-site decision-making can provide guidance for mapping strategies and detailed sampling.

Analysis of the Hazardous Material Reutilization Facilities at SUBASE Bangor and NS San Diego

Berkin, M. G.

Master's thesis, Naval Postgraduate School, Monterey, CA. Dec 1990. 120p

NTIS Accession Number: AD-A242 075/0/XAB

ABSTRACT: Analysis of the hazardous material reutilization facilities at ... and NS San Diego. The operations are described Cost benefit analyses are presented to determine which of three options is the most economical on-base activity for operating the facility and which of three options is the most economical for operating a hazardous waste minimization program. Using base supply personnel in a renovated building was found to be the most economical solution. A general eleven step hazardous waste and material management model is applied to the military.

Detection of proteotoxicity of in mussels deployed in San Diego Bay using the cellular stress response

Sanders B M; Nakagawa P; Steinert S

American Zoologist 33(5):57A, 1993.

NOTE: Abstract from Annual Meeting of the American Society of Zoologists, Los Angeles, December 26-30, 1993.

Expression of a multixenobiotic transport protein in mussels from San Diego Bay

Galgani F; Toomey B H; Cornwall R

American Zoologist 33(5):57A, 1993.

NOTE: Abstract from Annual Meeting of the American Society of Zoologists, Los Angeles, December 26-30, 1993.

Detection of DNA damage in the hemocytes of field exposed mussels using the Comet assay

Steinert S A; Lindner E; Sanders B M

American Zoologist 33(5):57A, 1993.

NOTE: Abstract from Annual Meeting of the American Society of Zoologists, Los Angeles, December 26-30, 1993.

Descriptors: Mytilus edulis; San Diego Bay

A biomarker, P450 RGS, for assessing impacts of contaminants

Anderson J W; Rossi S S; Tukey R H; Vu T; Quattrochi L C

American Zoologist 33(5):57A, 1993.

NOTE: Abstract from Annual Meeting of the American Society of Zoologists, Los Angeles, December 26-30, 1993.

Descriptors: San Diego Bay

Spatial extent of sediment toxicity in selected bays and estuaries of the USA

Long ER; Wolfe DA; Linse JC

Abstracts of Papers, American Chemical Society 207(1-2):ENVR 16, 1994.

Conference: 207th National Meeting of the American Chemical Society, San Diego, March 13-17, 1994.

Descriptors: San Diego Bay; pollution

Evaluation of the water quality significance of copper in San Diego Bay sediments

Lee AJ; Lee GF

Abstracts of Papers, American Chemical Society 207(1-2):ENVR 4, 1994.

Conference: 207th National Meeting of the American Chemical Society, San Diego, March 13-17, 1994.

Descriptors: pollution

Regulatory issues governing establishment of remediation level for copper in San Diego Bay sediment

Lee GF; Lee AJ

Abstracts of Papers, American Chemical Society 207(1-2), ENVR 2, 1994.

Conference: 207th National Meeting of the American Chemical Society, San Diego, March 13-17, 1994.

Descriptors: pollution

The development of pH and pCO₂ microelectrodes for studying the carbonate chemistry of pore waters near the sediment-water interface

Cai W-J; Reimers CE

Limnology and Oceanography 38(8):1762-1773, 1993.

ABSTRACT: We made stable and rapid-responding pH and pCO₂ microelectrodes. The pH microelectrode has approx 100- μ m-diameter half-sphere bulb tip of pH glass, and the pCO₂ sensor has a 200-300- μ m-diameter silicone-membrane covered tip. Because the pH microelectrodes have electrical resistances that are gt 10-10 ohms, all electrical connections are kept scrupulously clean and dry to prevent current leakage during in situ measurements. Suspension effects are negligible when measuring pH in marine sediments. To demonstrate the performance of the pH and pCO₂ microelectrodes, we report in situ microprofiles of pH and pCO₂ and contiguous profiles of O₂ and the formation factor from coastal sediment in San Diego Bay. A sharp pH decrease from 7.90 to 7.15 (seawater scale) and a pCO₂ increase from 578 to 3,000 μ -atm in the top 1 cm of sediment are interpreted to be primarily the result of HS⁻, Fe²⁺, and Mn²⁺ oxidation by O₂ rather than metabolic CO₂ production. The O₂, pH, and pCO₂ profiles also reveal that there was photosynthetic activity in the top 2 mm of sediment which caused an O₂ maximum and a total dissolved inorganic carbon minimum.

Tributyltin in bay mussels (*Mytilus edulis*) of the Pacific coast of the United States

Short, J.W.; Sharp, J.L.

ENVIRON. SCIENCE TECHNOLOGY 23(6):740-743, 1989.

ABSTRACT: Tissue concentrations of tributyltin (TBT) were measured by graphite furnace atomic absorption spectrophotometry (GFAA) and by gas chromatography coupled with an atomic absorption spectrophotometer as the detector (GCAA) in bay mussels (*Mytilus edulis*) collected from San Diego Bay, in 1986 and 1987; results from both methods were not significantly different ($P < 0.871$). Concentrations of TBT in mussels ranged from less than 0.005 μ g of TBT/g of wet tissue weight to 1.08 μ g/g of wet tissue weight.

Chemical contamination and associated fish diseases in San Diego Bay

McCaln, BB; Chan, Sin-Lam; Krahn, MM; Brown, DW; Myers, MS; Landahl, JT; Pierce, S; Clark, RC, Jr.; Varanasi, U.

ENVIRON. SCIENCE TECHNOLOGY 26(4):725-733, 1992.

ABSTRACT: Chemical pollution at sites in or near San Diego Bay was investigated between 1984 and 1988. The mean concentrations of selected polychlorinated biphenyls (PCBs), metals (e.g., copper and lead), and aromatic hydrocarbons in sediments from sites in the southern and central portions of the bay were significantly higher (p less than or equal to 0.05) than those in sediment samples from nearby nonurban sites. Mean concentrations of PCBs in liver tissue and of selected aromatic compounds (e.g., aromatic hydrocarbons) and their metabolites in bile were also significantly higher in white croaker (*Genyonemus lineatus*), barred sand bass (*Paralabrax nebulifer*) and black croaker (*Cheilotrema saturnum*) from one or more sites within the bay compared to those from the nonurban sites.

Long-term monitoring of tributyltin in San Diego Bay, California

Valkirs, AO; Davidson, B; Kear, LL; Fransham, RL; Grovhoug, JG;
Seligman, PF

MARINE ENVIRON. RESEARCH 32(1-4):151-167, 1991.

ABSTRACT: Tributyltin (TBT) surface water concentrations have significantly decreased in San Diego Bay following legislative restrictions on use of anti-fouling paints containing TBT in California. Current surface water concentrations in three of four regions studied in San Diego Bay are below the 6 ng liter super(-1) water quality criteria concentration adopted by the State of California for the protection of marine species. Regression analysis of surface water TBT measurements made over a 2 year period indicated that present concentrations would decrease by 50% in 8 months to approximately 2 years depending on the region studied. Tissue samples from the bay mussel, *Mytilus edulis* indicated that TBT measured in tissues generally decreased as water concentrations decreased. The majority of TBT concentrations measured in tissue samples were below levels reported to adversely affect mussel growth. Sediment TBT concentrations in San Diego Bay generally did not reflect recent decreases in water column values and were variable among stations over time.

Assessing site-specific effects of TBT contamination with mussel growth rates

Salazar, M.H.; Salazar, S.M.

MARINE ENVIRON. RESEARCH 32(1-4):131-150, 1991.

ABSTRACT: During nine field transplant tests in San Diego Bay (1987-1990), juvenile mussels were exposed to mean concentrations of tributyltin (TBT) in ambient seawater ranging from 2 to 530 ng/liter for 12 weeks under natural conditions. A total of 79 cages with 18 mussels each were monitored at 18 different sites. Growth and seawater TBT concentrations were measured weekly or on alternate weeks (biweekly). Mean growth rates ranged from 17 to 505 mg/week (0 multiplied by 2 to 2 multiplied by 5 mm/week). Accumulation of TBT in mussel tissues was measured at the end of each 12-week test exposure and ranged from 0 multiplied by 1 to 3 multiplied by 2 μ g/g TBT wet weight. The frequency of the measurements and the integration of chemical and biological measurements improved the accuracy of the assessment over more traditional approaches. Growth was significantly related to seawater and tissue TBT. The statistical relationships with growth effects were used to estimate chemical effect zones for TBT in San Diego Bay. Site-specific differences were distinguished by additional statistical analyses and consideration of environmental significance.

Distribution and abundance of juvenile California halibut, *Paralichthys californicus*, in shallow waters of San Diego County

Hendrix Kramer, S.

FISH BULLETIN CALIFORNIA DEPARTMENT FISH AND GAME, vol. 174

ABSTRACT: The size-specific distribution and abundance of juvenile California halibut, *Paralichthys californicus*, were determined for bay and open-coast habitats using a random sampling design stratified by depth. The pattern of settlement differed over the two-year study. Halibut settled in

the bays in 1987 and primarily on the open coast in 1988. Although there was settlement on the open coast in 1988, nearly all juveniles between 60 and 100 mm standard length (SL) were in the bays. This suggests that juveniles that settled on the open coast eventually moved into bays or died. The density of juvenile halibut was greatest in the bays with highest recorded densities in the shallow shoreline habitats where depth was less than or equal to 1 m. Nearly all juveniles > 220 mm SL occurred on the open coast with movement of juveniles from the bays to the open coast beginning at about 140 mm SL. These results suggest that the bays are probably essential habitats for juvenile growth and survival.

Growth and survival of *Mytilus edulis* larvae exposed to low levels of dibutyltin and tributyltin.

Lapota, D; Rosenberger, DE; Platter-Rieger, MF; Seligman, PF.

MARINE BIOLOGY, 115(3):413-419, 1993.

ABSTRACT: Two studies were conducted to observe effects of dibutyltin (DBT) and tributyltin (TBT) on larvae of *Mytilus edulis* for an exposure period of 25 d. Endpoints for evaluation were shell growth and mortality measured at 33 d. Larvae were cultured in a new laboratory assay chamber in a recirculating static test. The control, 2, 20, and 200 $\mu\text{g/l}$ DBT-treated populations had mean shell lengths of 527, 523, 417, and 180 μm , respectively. Survival was 1% for the 200 $\mu\text{g/l}$ DBT-treated population, but ranged from 73 to 83% for controls, 2, and 20 $\mu\text{g/l}$ treatments. The no-observed-effect concentration (NOEC) was 2 $\mu\text{g/l}$ for DBT, while the lowest-observed-effect concentration (LOEC) was 20 $\mu\text{g/l}$. The chronic toxicity value was 6.3 $\mu\text{g/l}$. In the TBT bioassay, mean shell lengths for the control, 0.006, 0.050, and 0.130 $\mu\text{g/l}$ -treated populations were 565, 437, 385, and 292 μm , respectively. Control survival was 74%, whereas TBT-treated populations survival ranged from 52 to 58%. The NOEC for TBT was 0.006 $\mu\text{g/l}$ TBT and the LOEC was 0.050. A chronic toxicity value of 0.017 $\mu\text{g/l}$ was calculated. Includes San Diego Bay

The Cortez grunt (*Haemulon flaviguttatum*) recorded from two embayments in southern California.

Lea, R.N.; Rosenblatt, R.H.

CALIFORNIA FISH AND GAME 78(4):163-165, 1992.

ABSTRACT: The genus *Haemulon* (family Haemulidae) is restricted to the Americas, principally to tropical and subtropical inshore waters. Courtenay reviewed Atlantic taxa and Hong treated Pacific species. Eighteen species are considered valid: 13 are Atlantic; four Pacific; and one, *H. steindachneri*, occurs in both oceans. None of the five eastern Pacific *Haemulon* (*H. flaviguttatum*, *maculicauda*, *scudderi*, *sexfasciatum*, and *steindachneri*) have heretofore been reported north of Cedros Island, Baja California, Mexico (ca. lat. 28 degree 05'N). On 4 May 1987 an unusual fish was collected in Mission Bay by personnel from Hubbs-Sea World Research Institute. The fish was turned over to the Marine Vertebrates Collection, Scripps Institution of Oceanography, and identified by RH Rosenblatt as *Haemulon flaviguttatum* Gill, 1862, the Cortez grunt; it is catalogued as SIO 88-8. This species has also been referred to as the yellowspotted grunt. In May 1991 another Cortez grunt was taken by gill net in south San Diego Bay by Mike Irely, a commercial mullet fisherman. This specimen was identified by RN Lea and is also deposited at Scripps; SIO 92-82. Counts and measurements for these two specimens are given. The prior known distribution of the Cortez grunt was from Bahia San Juanico (ca. lat. 26 degree 10'N) on the Pacific coast of Baja California and throughout the Gulf of California south to Panama.

Authenticity: comparisons of constructed and natural salt marshes of San Diego Bay

Zedler, Joy B.; Langis, Rene

Restoration and Management Notes 9(1):21+, Summer 1991.

Sweetwater River Channel Improvement Project, San Diego County, California hydraulic model investigation.

Turner, Herman O.
Technical report HL ; 88-3, 1988.
GPO#: D 103.24/2-HL-88-3; GPO Item No.: 0334-A-16

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado / Division of Highways, Department of Public Works, State of California.

PUBLISHED: Sacramento, Calif. : The Division, 1957.

Note on the medusan genus Stomolophus, from San Diego, by Henry Bryant Bigelow.

PUBLISHED: Berkeley, University of California press, 1914. p. [239]-241. SERIES: University of California publications in zoology 13(10).

SUBJECTS: San Diego Bay.

The natural resources of San Diego Bay: their status and future. Prepared by Bruce M Browning and John W Speth.

PUBLISHED: [Sacramento] State of California, Dept. of Fish and Game, 1973. 105p. SERIES: Coastal wetlands series, no. 5.

SUBJECTS: Natural history--San Diego Bay.
Natural resources--San Diego Bay.
Coastal zone management--San Diego Bay.

San Diego Bay water pollution survey.

[Sacramento?], Dept. of Fish and Game. 1951. 11p.

SUBJECTS: Water--Pollution--San Diego Bay.

Marine biology--San Diego Bay.

NOTES: Report of investigation number 52-9-1 by Bureau of Fish Conservation for San Diego Regional Water Pollution Control Board.

Progress report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado.

PUBLISHED: [Sacramento?] California. Division of Highways. July 1962. 25 p.

SUBJECTS: Toll bridges--San Diego Bay.

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado / Division of Highways, Department of Public Works, State of California. PUBLISHED: Sacramento. : Division of Highways.

May 1957. 155 p.

SUBJECTS: Toll bridges--San Diego Bay.

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado.

PUBLISHED: [Sacramento] Division of Highways. 1962. 151 p.

SUBJECTS: Toll bridges--San Diego Bay.

Hearing on San Diego Bay toxic contamination / California Legislature, Senate Committee on Toxics and Public Safety Management.

PUBLISHED: Sacramento: Joint Publications Office, [1988] 239 p.

OTHER TITLE: San Diego Bay toxic contamination.

SUBJECTS: Water--Pollution--San Diego Bay.
Water quality--San Diego Bay.
Hazardous wastes--San Diego Bay.

NOTES: Transcript of hearing held January 22, 1988, in San Diego. Joint Publications Office stock no.: 320-S.

Report and recommendation to the California Legislature on use of state tide and submerged lands in South San Diego Bay pursuant to chapter 1114 / by San Diego Bay Tidelands Task Force.

PUBLISHED: Sacramento : State of California, Resources Agency, State Lands Commission, 1978. 17p.

Report upon the extent, effects, and limitations of waste disposal into San Diego Bay.

PUBLISHED: San Diego Regional Water Pollution Control Board. 1952. 95 p.

SUBJECTS: Water--Pollution--San Diego Bay.
Sewage disposal.

Report to the legislature.

PUBLISHED: San Diego-Coronado Bridge Task Force. June, 1985, 58p.

SUBJECTS: Traffic engineering--Coronado.
Toll bridges--San Diego Bay.

City of Coronado force sewer main across San Diego Bay - W9251.

PUBLISHED: California. State Lands Commission. 1972. 3 p.

SUBJECTS: Coronado --Sewerage.
San Diego Bay

NOTES: Environmental impact report, 82.

National Steel and Shipbuilding Company dredging permit for shipway extensions, San Diego Bay, San Diego County.

PUBLISHED: California. State Lands Commission. 1972, 5 p.

SUBJECTS: Dredging.
Ship-building--San Diego Bay.
Wildlife conservation--San Diego Bay.

NOTES: Environmental impact report, 41.

Trans-bay utility conduits installed in conjunction with the Coronado sewer force main project, W 20356.

PUBLISHED: California. State Lands Commission. 1973, 4 p.

OTHER AUTHOR: San Diego Gas and Electric Company.

SUBJECTS: Cables, Submarine.
San Diego Bay

NOTES: Environmental impact report, 114.

A study of diffusion in San Diego Bay

PUBLISHED: California. State Water Pollution Control Board, March 1963. 18p.

OTHER AUTHOR: Marine Advisors, Inc.

SUBJECTS: Diffusion.
Water--Pollution--San Diego Bay
Water--Analysis.

Resolution authorizing the issuance of San Diego-Coronado Toll Bridge revenue bonds, including \$47,600,000 series A bonds : adopted November 15, 1966.

PUBLISHED: Sacramento: Toll Bridge Authority, 1966. 80p.

SUBJECTS: San Diego - Coronado Toll Bridge.
San Diego Bay

A review of the San Diego Bay striped mullet, *Mugil cephalus*, fishery.

John M Duffy.

PUBLISHED: Long Beach : Marine Resources Division, Dept. of Fish and Game, 1987. 10p.

SERIES: Marine resources technical report / California Department of Fish and Game ; no. 56.

SUBJECTS: Fisheries--San Diego Bay.

Tributyltin residues in Lake Tahoe and San Diego Bay, California,
1988 / by J.M. Harrington
PUBLISHED: Sacramento?: California Department of Fish and Game,
Pesticide Investigations Unit, 1991. 29p.
SERIES: Environmental Services Division administrative report;
91-1.
SUBJECTS: Tributyltin.
Water quality--San Diego Bay.

They came by sea; a pictorial history of San Diego Bay.
AUTHOR: MacMullen, Jerry.
PUBLISHED: [Los Angeles] W. Ritchie Press, 1969. 152 p.
SUBJECTS: San Diego Bay
Ships.

Preliminary report on the hydrographic work carried on by
the Marine biological station of San Diego.
George F McEwen.
PUBLISHED: Berkeley, The University press, 1910. pp190-204.
SERIES: University of California publications in zoology, v.6,
no.9.
SUBJECTS: Hydrography--San Diego bay.
NOTES: Contributions from the Laboratory of the Marine
biological association of San Diego, XXIX.

Summary and interpretation of the hydrographic observations
made by the Scripps institution for biological research of
the University of California 1908 to 1915.
George F McEwen.
PUBLISHED: Berkeley, University of California press, 1916.
pp255-356.
SERIES: University of California publications in zoology.
v.15, no.3.
SUBJECTS: Hydrography--San Diego Bay.

Sedimentary and biological characteristics of San Diego Bay
floor in 1958.
William A. Newman.
PUBLISHED: La Jolla, Calif. : Marine Advisors, 1958. 38p
SUBJECTS: Marine sediments--San Diego Bay.
Marine ecology--San Diego Bay.
NOTES: Prepared for California State Water Pollution Control
Board.

A proximate biological survey of San Diego Bay, California.
Thomas J. Peeling.
PUBLISHED: San Diego : Naval Undersea Center, Marine
Environmental Management Office; Reproduced by National Technical
Information Service, "AD-A007 469." 1975. 83p.
SUBJECTS: Marine biology--San Diego Bay.
Water--Pollution--San Diego Bay.
NOTES: "... performed by the Marine Environmental
Management Office of the Naval Undersea Center
between December 1972 and June 1973."

Report upon the extent, effects, and limitations of waste
disposal into San Diego Bay.
PUBLISHED: San Diego, San Diego Regional Water Pollution Control
Board. 1952. 95 p.
SUBJECTS: Water--Pollution--San Diego Bay.
Sewage disposal.

San Diego Bay - 1966 : a staff water quality report / by

Ladin H. Delaney.

PUBLISHED: Sacramento?: San Diego Regional Water Quality Control Board. April 13, 1966. 23p.

SUBJECTS: Water quality management--San Diego County.
Water--Pollution--San Diego County.
Water quality--San Diego Bay.
Marine pollution
Oil pollution

Water quality control policy for San Diego Bay.

PUBLISHED: Sacramento?: San Diego Regional Water Quality Control Board. 1966. 38 p.

SUBJECTS: Water quality management--San Diego County.
Water--Pollution--San Diego County.
Water quality--San Diego Bay.
Marine pollution
Oil pollution--San Diego Bay.

The guns of San Diego: San Diego harbor defenses, 1796-1947: historic resource study, Cabrillo National Monument.

Erwin N. Thompson ; edited by Howard B. Overton.

PUBLISHED: San Diego: National Park Service, 1991. 171 p.

SUBJECTS: Cabrillo National Monument
San Diego Bay
Point Loma--History.

Vessel pollution study, San Diego Bay, California.

PUBLISHED: San Francisco, United States. Federal Water Pollution Control Administration. Pacific Southwest Region. 1969. 66 p.

SUBJECTS: Water--Pollution--San Diego Bay.
Marine pollution--San Diego Bay.

Toxicity assessment of San Diego Bay sediments using the amphoid *Grandidierella japonica*.

Mondal, Gita. Thesis (M.P.H.)--San Diego State University, 1991. 67p.

Subjects: Marine sediments -- San Diego Bay. Heavy metals -- Environmental aspects -- San Diego Bay. Copper -- Environmental aspects -- San Diego Bay. Corophiidae -- San Diego Bay -- Effect of heavy metals on.

Susceptibility and status of west coast estuaries to nutrient discharges: San Diego Bay to Puget Sound, summary report.

Publisher: Rockville, Md. : NOAA/EPA Team on Near Coastal Waters, October 1991. 35p.

Notes: At head of title: Strategic assessment of near coastal waters.

Funding for this project has been provided, in part, by the EPA Office of Wetlands, Oceans, and Watersheds through a Cooperative agreement with the University of Delaware, College of Marine Studies

Subjects: Eutrophication -- San Diego Bay. Estuarine pollution

Other entries: Quinn, Heather.

The effects of host quality on a phytophagous insect (Homoptera : Delphacidae) and its predators in a California salt marsh system.

Johnson, Kimberly Marie. Thesis M.S. San Diego State Univ, 1991. 85p.

Subjects: Insect-plant relationships; Delphacidae -- Ecology; *Spartina* -- Ecology. Ladybugs -- Ecology. Lycosidae -- Ecology. Tidemarsch ecology -- San Diego Bay.

A comparison of the macrobenthos of transplanted and natural eelgrass (*Zostera marina* L.) beds in San Diego Bay.

Takahashi, Ema. Thesis M.S. San Diego State University, 1992. 226p.

Subjects: Zostera marina -- San Diego Bay --Ecology.
Zostera marina -- San Diego Bay --Transplanting.
Marine invertebrates --San Diego Bay --Ecology.

Five year action plan for a clean San Diego Bay.
Publisher: San Diego Unified Port District, 1992. 97p.
Notes: Presented by the Board of Port Commissioners,
Environmental Ad Hoc Committee.

Subjects: Water quality management -- San Diego Bay.
Marine pollution -- San Diego Bay --Prevention.
Other entries: Hicks, Ralph T.

Levels of polycyclic aromatic hydrocarbons and mutagenicity in
sediments from San Diego Bay.
Moskowitz, Gwendolyn Judith. Thesis (M.S.)--San Diego State
University, 1992. 90p.
Subjects: Polycyclic aromatic hydrocarbons -- Toxicology.
Mutagenicity testing.
Chemical mutagenesis.
Marine sediments -- San Diego Bay.

Bioremediation of San Diego Bay sediments contaminated with polycyclic
aromatic hydrocarbons.
Schroeder, Scott Robert. Thesis M.S. San Diego State Univ, 1993.
94p.
Subjects: Polycyclic aromatic hydrocarbons.
Hazardous wastes -- Biodegradation.
Bioremediation.
Marine sediments -- San Diego Bay.

Toxicity of stormwater runoff entering San Diego and Mission Bays,
California using the Ceriodaphnia Dubia 7-day Chronic Toxicity Test.
Colt, Kimberly Jean. Thesis M.S. San Diego State Univ, 1993. 110p.
Subjects: Water pollution -- San Diego Bay.
Water pollution -- Mission Bay.
Urban runoff -- San Diego.

Marine fouling and underwater hull cleaning in San Diego Bay.
Locke, Loren Page. Master's Project M.P.H. San Diego State
University, 1994. 151p.
Subjects: Ships -- Fouling -- Environmental aspects -- San Diego Bay.
Paint, Antifouling -- Environmental aspects -- San Diego Bay.
Copper -- Environmental aspects -- San Diego Bay.
Tributyltin -- Environmental aspects --San Diego Bay.

Toxicity identification evaluation of urban runoff entering San Diego
Bay, CA.
Nevils, Laurie Michele. Thesis M.S. San Diego State Univ, 1994. 143p.
Subjects: Water -- Pollution -- San Diego Bay.
Urban runoff -- San Diego.

Wastes associated with shipbuilding and repair facilities in San Diego
Bay : a staff report to the Executive Officer of the San Diego
Regional Water Quality Control Board.
Prepared by Joseph N Barry, under the supervision of Ladin H Delaney. San
Diego : California Regional Water Quality Control Board, San Diego Region,
June 1972. 46p.

Subjects: Factory and trade waste -- San Diego Bay.
Shipbuilding industry -- San Diego Bay.
Ships -- San Diego -- Maintenance and repair.
Call number: UCSD Central C200 C12 W33 W323 2 Documents San Diego

Baywide small craft mooring and anchorage plan, San Diego Bay : draft
environmental impact report and NEPA environmental assessment.

WESTEC Services, Inc., [for the] San Diego Unified Port District. San Diego, Calif. : The District, May 1984. 150p.

Notes: Draft environmental impact report UPD #83356-EIR-1; SCH #83122815.

Subjects: Mooring of ships -- Environmental aspects --San Diego Bay.
Environmental impact analysis -- San Diego Bay.
Harbors -- San Diego Bay --Anchorage.

Call number: UCSD Central C200 P83 B29 Documents San Diego

Note on the medusan genus Stomolophus, from San Diego.

Henry B Bigelow. Berkeley, University of California press, 1914. pp239-241. Series: University of California publications in zoology; v13, no 10.

Blueprint for a clean bay : San Diego Bay Clean Bay Campaign : 1991-96 / project director: Environmental Health Coalition ; drafted by J. Powell, L. Hunter ; drawn by A. Klay. San Diego : Environmental Health Coalition, 1991?. 1 v. (unpaged).

Subjects: Water quality management -- San Diego Bay.
Marine pollution -- San Diego Bay --Prevention.

Call number: UCSD Scripps TD224.C3 B48 1991 Floor 3 Oversize

The natural resources of San Diego Bay: their status and future. Prepared by Bruce M. Browning and John W. Speth. Special assistance: Wendal Gayman. [Sacramento] State of California, Dept of Fish and Game, 1973. 105p. Series: Coastal wetlands series ; no. 5.

Subjects: Natural resources -- San Diego Bay.
Natural history -- San Diego Bay.
Coastal zone management -- San Diego Bay.

Call numbers: UCSD Central F650 C5 no.5 California Documents
UCSD Scripps HC107.C22 S25 B75
UCSD Scripps QH105.C2 B893 1973 Reference

The effects of vessel waste discharges on the water quality in San Diego Bay.

Arthur M Caldwell and Gary L O'Neal. San Diego : 196-?. 15p.

Subjects: Boats and boating -- Waste disposal. Marine pollution

A survey of pollution and nuisance problems in San Diego Bay (Code no. 52-9-1), prepared for the San Diego Regional Water Pollution Control Board.

California. Bureau of Sanitary Engineering. Sacramento, 1951.

Subjects: Water -- Pollution -- San Diego Bay.

Call numbers: UCSD Scripps TD425 .C153

San Diego Bay water pollution survey.

Calif Dept of Fish and Game. Sacramento : Calif Dept of Fish and Game, 1951. 29p.

Notes: Report of investigation number 52-9-1 by Bureau of Fish Conservation for San Diego Regional Water Pollution Control Board.

Subjects: Water -- Pollution -- San Diego Bay. Marine biology

San Diego Bay water pollution survey; report on project no. 52-9-1, 1951.

RM Paul. California Dept of Fish and Game. San Francisco, 1951. 11p.

Subjects: Water -- Pollution -- San Diego Bay.

Call numbers: UCSD Scripps TD425 .C134 Floor 3

Progress report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado.

Sacramento : California Dept of Public Works, Division of Highways. July 1962. 25 p.

Notes: On cover: San Diego-Coronado highway toll crossing, progress report.

Subjects: Toll bridges -- San Diego Bay.

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado. Division of Highways, Department of Public Works, State of California. Sacramento : California Dept of Public Works. Division of Highways, May 1957. 155 p.

Subjects: Toll bridges -- San Diego Bay.

San Diego Bay toxic contamination : January 22, 1988, San Diego, California.

Senate Toxics and Public Safety Management Committee. Sacramento : California Legislature, Senate Toxics and Public Safety Management Committee : May be purchased from Joint Publications, [1988] 239 p.

Notes: "320-S" Cover title: Hearing on San Diego Bay toxic contamination.

Subjects: Marine pollution -- San Diego Bay.

Call numbers: UCSD Scripps KFC10.3 .T68 1988 Floor 3

Findings on beneficial uses and quality requirements of San Diego Bay waters.

Regional Water Pollution Control Board--San Diego Region, 1955.

Subjects: Water quality; Water Pollution; San Diego Bay

Water quality control policy, San Diego Bay.

San Diego : California Regional Water Quality Control Board--San Diego Region, 1966. 38p.

Notes: Prepared for the State Water Quality Control Board.

Subjects: Water quality; Water Pollution Control. San Diego Bay

Call numbers: UCSD Scripps TD224.C3 C28 1966 Floor 3

Report and recommendation to the California Legislature on use of state tide and submerged lands in south San Diego Bay pursuant to chapter 1114.

San Diego Bay Tidelands Task Force. State of California, Resources Agency, State Lands Commission, 1978. 17p.

Subjects: Submerged lands; San Diego Bay.

Call numbers: UCSD Central R960 U84 California Documents

Report to the legislature.

San Diego-Coronado Bridge Task Force. California: San Diego-Coronado Bridge Task Force, June 1985. 58p.

Subjects: Traffic engineering -- Coronado.

Toll bridges -- San Diego Bay.

San Diego-Coronado Bridge

City of Coronado force sewer main across San Diego Bay-W 9251.

Sacramento : California State Lands Commission, 1972. 3 p.

Notes: Environmental impact report, 82.

Subjects: Coronado -- Sewerage. San Diego Bay

National Steel and Shipbuilding Company dredging permit for shipway extensions, San Diego Bay, San Diego County.

Sacramento : California State Lands Commission, 1972. 5 p.

Notes: Environmental impact report, 41.

Subjects: National Steel and Shipbuilding Company.

Dredging.

Ship-building -- San Diego Bay.

Wildlife conservation -- San Diego Bay.

Trans-bay utility conduits installed in conjunction with the Coronado sewer force main project, W 20356.

Sacramento : California State Lands Commission, 1973. 4 p.

Notes: Environmental impact report, 114.

Subjects: Cables, Submarine. San Diego Bay.
Other entries: San Diego Gas and Electric Company.

Analysis of oceanographic and ecological monitoring program at the city of San Diego, Point Loma outfall.
Marine Advisors, Inc. Sacramento: California State Water Quality Control Board. November 1965. 40 p.
Subjects: Water quality management
Water -- Pollution -- San Diego Bay
Sewage disposal -- San Diego.
Water -- Analysis.
Marine ecology

Resolution authorizing the issuance of San Diego-Coronado Toll Bridge revenue bonds, including \$47,600,000 series A bonds : adopted November 15, 1966.
Sacramento : California Toll Bridge Authority, 1966. 80p.
Subjects: San Diego Bay

A study of the effects of water discharged to South San Diego Bay from the Clair Engle Desalting Plant.
Robert L Chambers and Joe Merino. San Diego : Environmental Engineering Laboratory, December 1970. 47p.
Notes: Technical report prepared for the Office of Saline Water under order SD-71-9.
Subjects: Water quality -- San Diego Bay.

Chula Vista boat basin/wildlife reserve : draft environmental impact report.
Project by San Diego Unified Port District, Engineering Department ; initial study by David D Smith and Associates, Environmental Quality Analysts, Inc., Marine Biological Consultants, Inc., a joint venture in association with WESTEC Services, Inc. San Diego, Calif. : San Diego Unified Port District, Nov 1975.
Notes: UPD #7563-EIR-15."
Subjects: Wildlife refuges -- San Diego County.
San Diego Bay

Chula Vista boat basin/wildlife reserve : final environmental impact report.
Project by San Diego Unified Port District ; initial study by David D Smith and associates, Environmental Quality Analysts, Inc. [and] Marine Biological Consultants, Inc., a joint venture in association with Westec Services, Inc. San Diego, Calif. : San Diego Unified Port District, [1976]
Notes: Project by San Diego Unified Port District, Engineering Department.
Subjects: Wildlife refuges -- San Diego County.
San Diego Bay
Call numbers: UCSD Central C200 P83 C45 Documents San Diego

The discovery of San Diego Bay.
George Davidson. Geographical Society of the Pacific. Transactions and proceedings. 1892. vol. III, p. 37-47
Subjects: San Diego Bay; History; Coronados Islands.

San Diego Bay -- the problem and a prophesy.
Davis, JR, 1962. 26p.
Notes: Prepared for the Pacific Southwest Council Convention, American Society of Civil Engineers, San Diego, California, April 6, 1962.

A review of the San Diego Bay striped mullet, *Mugil cephalus*, fishery.
John M Duffy. Long Beach : Marine Resources Division, Dept of Fish and Game, 1987. 10pm.
Series: Marine resources technical report / California Department of

Fish and Game ; no. 56.

Subjects: Fishery management -- San Diego Bay.

Fisheries -- San Diego Bay.

Call numbers: UCSD Scripps SIO 1 MA5163 v.56 Floor 2

South San Diego Bay enhancement plan : executive summary.

Prepared by Tomas E Firle. San Diego : San Diego Unified Port District :

California State Coastal Conservancy, March 1990, 39 p.

Subjects: Natural resources -- San Diego Bay.

Marine ecology -- San Diego Bay.

Birds -- San Diego Bay.

Habitat (Ecology) -- San Diego Bay -- Modification.

Call numbers: UCSD Scripps HC107.C22 S25 S682 Floor 3 Archives

Five year action plan for a clean San Diego Bay.

Prepared by Ralph T Hicks et al. San Diego : San Diego Unified Port District, 1992. 97 p.

Notes: Presented by the Board of Port Commissioners Environmental Ad Hoc Committee.

Subjects: Water quality management -- San Diego Bay.

Marine pollution -- San Diego Bay --Prevention.

Water -- Pollution -- San Diego Bay --Prevention.

Call numbers: UCSD Central C200 P83 C4 Documents San Diego

UCSD Scripps TD224.C3 F58 1992 Floor 3

Fort Guijarros : tenth annual Cabrillo Festival Historic Seminar.

[San Diego] : Cabrillo Historical Association, 1982. 83 p.

Notes: section on Underwater archaeology research in San Diego Bay offshore from Fort Guijarros / Roy Pettus

Subjects: Underwater archaeology -- San Diego Bay.

Excavations -- San Diego.

Natural physical factors of the San Diego Bay tidelands.

Gautier, Roland. Planning Dept, San Diego Unified Port District, Jan 1972. 88p.

NOTE: One of a series of basic studies forming a part of the master plan revision program for the San Diego Unified Port District."

Subjects: Natural resources -- San Diego Bay.

Coastal zone management -- San Diego Bay.

Call numbers: UCSD Central C200 P83 P712/8 Documents San Diego

Tributyltin residues in Lake Tahoe and San Diego Bay, California, 1988.

JM Harrington. Sacramento : California Department of Fish and Game, Pesticide Investigations Unit. 1991, 29 p. Series: Environmental Services Division administrative report; 91-1.

Subjects: Water quality -- Diego Bay.

Hourly temperatures of water in San Diego Bay : January 1916 to July 1919 : readings taken at entrance to San Diego Consolidated Gas and Electric Company's salt water intake tunnel at foot of Ninth Street, San Diego: readings taken two feet from below surface of bay and about two hundred feet from the mainland.

[S.l. : s.n., 1919?] 41p.

Note: handwritten manuscript and typed on graph paper.

Subjects: Ocean temperature -- San Diego Bay.

Call number: UCSD Scripps GC166 .H841 Floor 3 Archives

California State mussel watch, 1981-83 : biennial report : trace metals and synthetic organic compounds in mussels from California's coast, bays and estuaries.

Prepared by John M Ladd et al. Sacramento : State Water Resources Control Board, Surveillance and Monitoring Section, January 1984. Series: Water quality monitoring report no. 83-6 TS.

Notes: Samples were analyzed for about 55 synthetic organic compounds,

primarily chlorinated pesticides and PCB's, and about 10 trace metals. Collections from coastal and bay/estuarine areas were made at over 150 stations throughout the state during 1981-83. In addition to routine baseline monitoring, a major portion of the effort was devoted to site-specific surveys.

Subjects: Mussels
Water -- Pollution
San Diego Bay -- Pollution.

A physical study of selected areas of the San Diego Bay floor.

La Jolla : Marine Advisors, 1961.

Notes: Prepared for the State Water Pollution Control Board.

Subjects: San Diego Bay

Other entries: California. State Water Quality Control Board.

A study of temperature tolerances of adult *Solen rosaceus* and *Tagelus californianus* in south San Diego Bay : the effects of power plant cooling water discharge.

Jose-Maria Merino. PhD Thesis, San Diego State University and the University of California, Riverside, 1981. 140p.

Subjects: Clams -- San Diego Bay -- Ecology.
Thermal pollution -- San Diego Bay.
Electric power-plants -- Environmental aspects
Thermobiology; *Solen rosaceus*; *Tagelus californianus*.

The potential of San Diego Bay, today's decisions : a feasibility study for long-range development and utilization of the Bay of San Diego.

Prepared for the County of San Diego and the cities of San Diego, National City, Chula Vista, and Coronado ; by Mott of Washington and Associates. Washington, D.C. : Mott of Washington and Associates, June 1956. 130p.

Note: Authorized by the San Diego County Board of Supervisors.

MoW, Port project no. 79.

Subjects: Harbors; Economic development; Regional planning;
San Diego Bay

Call numbers: UCSD Central C600 S95 S194/2 Documents San Diego

Call numbers: UCSD Central C600 S95 S194 Documents San Diego

Sedimentary and biological characteristics of San Diego Bay floor in 1958.

William A Newman. La Jolla : Marine Advisors, September 1, 1958.

Note: Prepared for California State Water Pollution Control Board.

Subjects: Marine sediments; Marine ecology; San Diego Bay.

Antifouling paint use in San Diego Bay : a data report.

Jean A Nichols. La Jolla : Center for Coastal Studies, Scripps Institution of Oceanography, Oct 1987. 60p. Series: SIO reference series no. 87-26.

Subjects: Paint, Antifouling; Marine pollution; San Diego Bay.

Call numbers: UCSD Scripps SIO 1 SC817 v.87 no.26-31 Floor 2
UCSD Scripps REF 1 SC817 v.87 no.26-31 Floor 1

San Diego Bay : an evaluation of the benthic environment / by Loys P. Parrish and Kenneth M. Mackenthun. Cincinnati, Ohio : US Dept of the Interior, Federal Water Pollution Control Administration, 1968. 31p.

Subjects: Benthos -- San Diego Bay.

Final report : estuarine-oriented community planning for San Diego Bay.

Los Angeles : Ralph Stone & Co., 1969. 178p.

Notes: Prepared for Federal Water Pollution Control Administration.

Subjects: Estuaries; San Diego Bay

Recreational demand.

San Diego : Planning Dept., San Diego Unified Port District, September 1972. 49 p.

Note: One of a series of basic studies forming a part of the master plan revision program for the San Diego Unified Port District.

Subjects: San Diego -- Recreational use.

Call numbers: UCSD Central C200 P83 P712/12 Documents San Diego

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado. Division of Highways, Department of Public Works, State of California. Sacramento : Division of Highways, Department of Public Works, State of California, 1957.

Subjects: Toll bridges; San Diego Bay.

Call numbers: UCSD Central C200 C12 H638 H637 Documents San Diego
UCSD Central P2200 T64sd 1957 California Documents

Report to the California Toll Bridge Authority on a toll highway crossing of San Diego Bay between the cities of San Diego and Coronado. Division of Highways, Department of Public Works, State of California. Sacramento: Division of Highways, Department of Public Works, State of California, 1962. 151 p.

Subjects: Toll bridges -- San Diego Bay.

Call numbers: UCSD Central C200 C12 H638 H638 Documents San Diego

San Diego Bay bacteriological study : June 15 - July 14, 1955.

Bureau of Sanitary Engineering, State Dept of Public Health. Berkeley : Bureau of Sanitary Engineering, State Dept of Public Health, 1955. 40p.

Subjects: Water quality -- San Diego Bay.

San Diego Bay health risk study : an evaluation of the potential risk to human health from fish caught and consumed from San Diego Bay. Prepared by San Diego County Department of Health Services, Environmental Health Services. San Diego : County Dept. of Health Services, June 12, 1990.

Note: Prepared for the Port of San Diego.

Subjects: Fish; Health risk assessment; Water Pollution; San Diego Bay; Food contamination

Call numbers: UCSD Scripps SH174 .S44 1990

A bacteriological survey of the Pacific Ocean, San Diego Bay and Mission Bay, May 6 - June 7, 1957.

San Diego : San Diego County Dept of Public Health, 1957. 9p.

Note: Jointly conducted by the State of California Department of Public Health and County of San Diego Department of Public Health.

Subjects: Water Pollution -- San Diego Bay.

Report upon the extent, effects and limitations of waste disposal into San Diego Bay.

San Diego : San Diego Regional Water Pollution Control Board, 1952. 95p.

Subjects: Water Pollution -- San Diego Bay.

Call numbers: UCSD Central W525 W37 California Documents
UCSD Scripps TD425 .S194 Floor 3

San Diego Bay - 1966 : a staff water quality report.

Ladin H Delaney. Sacramento : San Diego Regional Water Quality Control Board, April 13, 1966. 36p.

Subjects: Water quality management; Water Pollution; San Diego Bay. Marine pollution; Oil pollution

Port of San Diego.

San Diego Unified Port District. San Diego : San Diego Unified Port

District, [197-]. 10p.

Subjects: Harbors; San Diego Bay

Call numbers: UCSD Central C200 P83 P839 Documents San Diego

South San Diego Bay enhancement plan.

Prepared for San Diego Unified Port District and California State Coastal Conservancy by Michael Brandman Associates, Inc. San Diego, CA : Michael Brandman Associates, March 1990. 4 volumes.

Note: Volume 1: Resources atlas: marine ecological characterization, Bay history and physical environment; Volume 2: Resource atlas: birds of San Diego Bay, historical data and 1988-89 surveys; Volume 3: Enhancement goals and concepts; Volume 4: Field data.

Subjects: Natural resources; San Diego Bay; Marine ecology; Birds Habitat (Ecology)

Call numbers: UCSD Scripps HC107.C22 S25 S68 Floor 3 Archives

South San Diego Bay Environmental Study Committee report.

San Diego : South San Diego Bay Environmental Study Committee, January 1971. 43p.

Subjects: Natural resources; San Diego Bay; Coastal zone management

Call numbers: UCSD Central C200 S72 R425 Documents San Diego

A Study of diffusion in San Diego Bay.

Conducted for the California State Water Pollution Control Board under standard agreement no. 12- 7 (Nov. 9, 1962). La Jolla : Marine Advisors, Inc., March 1963. 18p.

Subjects: Diffusion; San Diego Bay

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