NOAA Technical Memorandum NOS OMA 32

A CATALOG OF BIOLOGICAL EFFECTS MEASUREMENTS ALONG THE PACIFIC COAST

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Rockville, Maryland
February 1987

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A CATALOG OF BIOLOGICAL EFFECTS MEASUREMENTS ALONG THE PACIFIC COAST

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ABSTRACT. This report provides a catalog of measurements of biological effects of pollutants along the Pacific Coast. Information reported includes the types of tests performed, sampling dates, locations, number of stations, amounts of data generated, and bibliographic citations for published results. This catalog is part of a task of the National Status and Trends Program (NS&TP) to review and evaluate historical measurements of biological effects and to help identify candidate measures for possible use in future NS&TP monitoring of marine environmental quality. The information portrayed in this catalog was generated from an on-line data base established for this task. This catalog includes 170 studies or surveys conducted from 1951 to the present, in which some 59,000 samples were tested or analysed using various methods. Most studies were conducted between 1972 and 1985. The most frequently studied areas were near the metropolitan areas bordering Puget Sound, the Southern California Bight, and San Francisco Bay. About 305 different types of tests were identified, based on evaluations of the details of methodological protocols. A total of 107 species and 16 communities were used as biological indicators. Most of the available data exist for just 26 of the 305 tests grouped in 9 major categories: (1) acute lethal bioassays of receiving water with bivalve embryos; (2) acute lethal bioassays of sediment, primarily with the amphipod Rhepoxynius abronius or bivalve larvae; (3) tests of cytotoxicity and genotoxicity in fish cells exposed in vitro to sediment extracts; (4) tests with sublethal endpoints among a variety of species exposed to sediments, notably, sublethal bioassays of sediment elutriates on respiration of the oligochaete worm, Monopylephorus cuticulatus; (5) surveys for reproductive condition (nine fish species) and fertilization success (three fish species); (6) tests of cytotoxicity of receiving water; (7) tests of sublethal responses to receiving water, (8) surveys of fish histopathology, principally of liver lesions in English sole, Parophrys vetulus, and of fin and skin lesions in Dover sole, Microstomus pacificus; and (9) surveys of benthic communities near point sources of pollution or in areas of potential future impact. Of the 305 tests, 10 appear to have fully standardized protocols. Five tests (mussel growth, bivalve larva bioassays, Rhepoxynius bioassays, Microtox bioassays, and benthic community analyses of 0.1m^2 Van Veen grab samples) have been applied using identical methods at many sites in more than one region along the coast. Other tests are restricted in geographic as well as temporal application.

1. INTRODUCTION

The goal of NOAA's National Status and Trends Program is to characterize the status of and trends in environmental quality of selected portions of the nation's coastal and estuarine environments. This catalog

is one of a series of review reports in which the marine environmental quality of the nation's coastal and estuarine environments will be examined by evaluation of existing data. In this report studies in which the toxic effects of marine waters and sediments upon marine biota of the Pacific Coast have been measured will be documented.

This effort complements other NS&TP tasks currently underway: a review of historical concentrations of organic contaminants in fish and shellfish from United States waters; annual monitoring of contaminants in bivalves and sediments at selected locations along the United States coast; annual monitoring of contaminants in benthic fish tissues and sediments, and of prevalence of histopathological disorders in benthic fish tissues; and a comparison of the performance of various measures of biological responses to contaminant exposure in field trials.

Complex mixtures of natural and anthropogenic chemicals may exert far different effects in concert than single toxicants acting alone (Rhodes, et al., 1985). This report will focus upon an evaluation of measures of effects made in the field where mixtures of toxicants predominate. Data generated from analyses of effluents and single chemicals will not be included.

This catalog and its bibliographic material are organized in an on-line data base written in PRIME INFORMATION to make the information accessible and to encourage selective or exploratory analyses. Also, this data base was established to accommodate newly-acquired data gathered under the NS&TP or other programs.

2. SCOPE

The geographic scope of this catalog is the Pacific Coast of the United States and Canada: estuarine, nearshore, and shelf waters of Alaska, British Columbia, Washington, Oregon, California, and Hawaii. Entries were made for nine general geographic subareas, that correspond roughly with political boundaries and hydrographic regimes (figure 1). Studies of effects of exposure to ambient water or sediment from specific locations are of primary interest. Included are acute toxicity of and sublethal responses to water and sediment samples in laboratory bioassays, tests of impaired reproductive success among feral biota, tests or surveys of fish and invertebrate health and condition, and surveys of benthic infaunal community structure. Laboratory studies of the effects of effluents and single toxicants are not included. Stock assessments, landings data, plankton community data, bird and mammal data are not included. Some "baseline" biological studies in which no pollution gradient was anticipated at the time of the survey are omitted (e.g., outer continental shelf benthic community studies). The period from 1951 to the present is covered. Duration of individual studies was not a criterion in selecting data for inclusion.

3. METHODS

3.1 Search Methods

Potential catalog entries were identified through traditional literature searches and personal contacts with Pacific Coast scientists. Data and reports were found in scientific journals, non-refereed publications, books, contractors' reports, progress reports, and symposia proceedings. On-line searches of National Technical Information Service (NTIS) and Aquatic Sciences abstracts were performed. Published searches for studies of effects of dredging, sewer effluents, and oil spills upon resident biota were also examined.

3.2 Information Extracted

Six main classes of information were noted for each study: 1) test types (including end-points), species tested, sampling locations, and number of stations, samples and data points for each; 2) details of test and survey methods; 3) names and affiliations of investigators and sponsors; 4) publications or reports resulting from the study; 5) availability of synoptically collected chemical analyses of substrates; and 6) ancillary-related measures or studies (such as laboratory tests of model mixtures, tissue contaminant levels, and fish population surveys). Criteria used for inclusion of studies in the catalog were availability of information for the first four of these classes and compatibility of the study with the scope of the catalog.

The information was entered into a PRIME INFORMATION data base and subsequently retrieved to produce the tables for this catalog. This data base is organized by study, rather than by test or endpoint. Therefore, data are identified by a unique assigned study code. Codes were devised to allow sorting by major category of test or by geographic location (as opposed to alphabetical sorting of locations or tests). Most codes are unique to the data base; however, access to data for individual tested species is possible, using National Oceanographic Data Center (NODC) taxonomic codes when a test involved just one species. Bibliographic information is linked to the study data by unique reference numbers. This data base was developed solely to produce this catalog and subsequent iterations of it: there is no provision to add actual biological data to it. A new data base would be necessary to accept the data from those types of measures found appropriate for detailed quantitative analysis. The unique study identifier would be used to maintain a link between the catalog and the data being analyzed.

The organization of data and code reference tables in the integrated data base is represented in a schematic diagram (figure 2). Only the most critical parts of this data base have been completely populated: the basic information for studies by test and location (STUDY), details of test methods (PROBES), bibliographic information (REFS), and all the necessary codes (i.e., the files enclosed in ellipses: LOC ENDPT, TAXON, etc.). The information on form of data (SENDPT) and number of tests by detailed location (DETAIL) is not available on-line. Standard tables available from this data base are listed in table 1. Details of data base design and capabilities (dictionaries, code lists, etc.) are available upon request.

3.3 Request for Information on Additional Studies

Readers are encouraged to review the catalog and provide information on additional studies that may have been missed. Please send copies of reports or reprints to:

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4. RESULTS

4.1 Overview of Studies Cataloged to Date

A total of 170 studies were identified and included in the data base and in this report. Over 59,000 samples collected at about 7,000 stations were analyzed or tested in these studies. This estimate is based on counts of the total number of stations per study; the number of unique stations is unknown. The number of stations occupied for each individual test is the value used to compare testing effort by type of test, because in studies where several tests were run it was rare for all tests to be run at all stations.

Each of the studies is listed in table 1. The studies are listed by geographic location, by general category of study or survey performed, and by the year sampling occurred. For each state, the studies are sorted by study identifier, a seven-digit code that includes a one-digit code for the general type of surveys performed, a two-letter state code, a two-digit indication of the year sampling was initiated (all since 1951), and a two-digit sequence number. The table can be scanned quickly for general types of information by state; but, to find data for a particular test or year, it is necessary to refer to additional tables in this catalog.

Summary information in table 1 includes:

a) the Study Identifier (study ID);
b) A title (Project Title), which may be abbreviated from a publication or report;
c) the duration of sampling (Duration), as beginning and ending year;
d) Frequency of sampling (Freq), as total number of dates, and number of times per year;
e) a list of locations (Location), and the number of stations at each (LNSta);
f) an abbreviation or acronym for Performing Agency (Prf.Ags.);
g) the name of the Principal Investigator (P.I.);
h) the specific Code for the types of tests performed (PCodes), and a brief description of the Test (Probes);
i) the End points, or actual category of observations reported (End points);
j) the Species used in the test or targeted in the survey (Taxon); and

k) the Number of Stations sampled in the particular survey for each type of test (PNSta).

The first digit of the Study ID code, a number from 1 to 7, indicates the category into which the methods in the study were placed (table 2). Agency acronyms and abbreviations are defined in Appendix I. Literature in which the study results are published is listed in table 3, according to study identifier and in the same order as for the studies listed in table 1.

4.2 Geographic Coverage

The numbers of stations sampled for bioassays, fish and invertebrate health surveys, and benthic surveys are shown, by major geographic region, in figure 3. Studies in all three categories have been conducted in most of the nine regions. The Puget Sound, San Francisco Bay, and Southern California Bight regions have been studied most frequently and thoroughly. These are the regions nearest major urban/industrial centers where greatest impact might be expected because of past, present, or potential contamination. Few studies have been concerned with open coastal waters or areas away from major population centers, except as reference areas for comparison with more highly contaminated locations. Another exception is a survey of the relatively pristine Columbia River outflow.

The region with the most stations sampled is Puget Sound. More tests of the community structure benthos have been performed in the Southern California Bight than elsewhere, but few bioassays of sediments or receiving waters have been conducted there. Fish and invertebrate health tests have been performed mostly in Puget Sound and the Southern California Bight. All three major categories of tests are well represented in Puget Sound.

4.3 Temporal Coverage

A summary of coverage since 1951 for the major types of tests is shown in table 4. There was a maximum of 30 new or ongoing studies of biological effects in progress in 1975. Most of the data have been collected since 1970 though surveys have been cataloged in every year from 1960 to 1986. A maximum of about 819 stations was surveyed in 1975.

Time series data are available for each major category of test. Bioassays have been conducted since 1961 in 1-8 studies per year. However, only one study per year was conducted from 1962 through 1969: a survey of toxicity of receiving waters to oyster larvae in Puget Sound. Since 1980, three to eight bioassay studies using a variety of tests were performed, concentrated in Puget Sound. Nearly all of these more recent studies lasted for one year or less.

Fish and invertebrate health surveys began in 1962. Between 1969 and 1973 several surveys of external disease in demersal fishes near sewer outfalls were begun in the Southern California Bight. These studies continue to the present. Surveys that included internal pathology, and metabolic and reproductive condition as end points have been initiated since 1974 and range in duration from one to five years.

Major benthic surveys were initiated in the 1950s. From one to eighteen studies have been conducted per year. Three monitoring studies in Southern California have been continuous or nearly so since their inception in 1971-1974. Major studies from Alaska, British Columbia, Puget Sound, Oregon, and San Francisco Bay include a time series of 1-3 years for any one set of stations. Long-term studies of an intertidal mudflat in South San Francisco Bay and of deep benthos in Puget Sound have extended for at least 10 years and are ongoing, though few stations have been sampled.

4.4 Test and Survey Characteristics

Based upon an examination of methodological details, 305 different tests were identified in the cataloged studies. These tests and the species or communities used in them are listed in table 5. These tests include bioassays of sediment extracts, microlayers, water, sediment elutriates, sediment particulates; in situ bioassays; colonization/ recruitment tests; various macroinvertebrate and fish health tests; various tests of reproductive success; and tests of the structure of resident communities.

A total of 107 individual species and 16 communities (defined judgmentally) were used as biological indicators in these tests. The tests of 96h acute toxicity of sediment, sediment particulates, and sediment elutriates have been run with 8-20 or more species each. This suite of tests is suggested for use in testing toxicity of dredged sediments (EPA/COE, 1977). As a result these tests have been used in many applications (although with relatively few samples per site). Most other tests involved use of five or fewer species or defined communities.

Table 6 shows the number of stations sampled and number of samples tested for species and communities studied at 1% or more of the total stations or samples. Just 20 species and 10 communities met these criteria. Relatively few of the total number of individual taxa tested along the Pacific Coast are represented in the data, but a majority of the defined communities are.

The larvae of the oyster Crassostrea gigas has been tested in water and sediment bioassays at 17.8% of the stations with 56% of the samples. The other frequently used bioassay organism, the amphipod, Rhepoxynius abronius, has been used at 17.3% of the stations with 6.0% of the samples (table 6). Histopathological analyses of many species of fish have been performed; most data are for the English sole, Parophrys vetulus. Most studies of communities have been performed with benthos 1 mm or larger (59% of the stations, 53.3% of the samples). Macroflora have been observed in situ by divers at only 3.6% of the stations, but with 17.2% of the samples; indicative of the availability of data from repeated observations at selected stations.

Based on a review of the numbers of stations and samples examined (tables 5 and 6), most data have been generated for tests in 9 major categories: (1) acute lethal bioassays of receiving water with bivalve embryos; (2) acute lethal bioassays of sediment, primarily with the amphipod Rhepoxynius abronius or bivalve larvae; (3) tests of cytotoxicity and genotoxicity in fish cells exposed in vitro to sediment extracts;

(4) tests with sublethal end points among a variety of species exposed to sediments, notably, sublethal bioassays of sediment elutriates on respiration of the oligochaete worm, Monopylephorus cuticulatus; (5) tests indicative of reproductive condition (nine fish species) and fertilization success (three fish species); (6) tests of cytotoxicity of receiving water; (7) tests of sublethal responses to receiving water, (8) surveys of fish histopathology, principally of liver lesions in English sole, Parophrys vetulus, and of fin and skin lesions in Dover sole, Microstomus pacificus; and (9) surveys of benthic communities near point sources of pollution or in areas of potential future impact. There are fully standardized protocols for, perhaps, ten of the tests (i.e., references in American Society for Testing Materials publications or in the Environmental Protection Agency/Corps of Engineers testing protocols). Five tests (mussel growth, bivalve larva bioassays, Rhepoxynius bioassays, Microtox(R) bioassay, and benthic community analyses of 0.1m^2 Van Veen grab samples) have been applied in more than one geographic area using identical methods. Other tests have been restricted in geographic as well as temporal application.

A summary by geographic area of the number of stations sampled with these 9 major categories of tests is given in table 7. Bioassays are categorized by the medium tested (sediment or receiving water) and by major classes of end points measured: acute tests, cytoxicity/genotoxicity tests, and sublethal tests. Benthos surveys are categorized by the community targeted. Although bioassays have been performed with both sediment and receiving water, sediment bioassays have been performed at more stations and over a wider geographic region than those with receiving water. The vast majority of stations sampled for sediments are from Puget Sound, allowing both temporal and spatial trends to be portrayed. Most whole-sediment bioassay data are for acute lethality (10-day exposure) to the amphipod Rhepoxynius abronius. Data for various versions of this test (tests 1301, 1302, 1303, 1304, 1305, 1307, 1308, 1312 in table 5) are available for 560 stations in the Puget Sound region, 12 stations off British Columbia, 33 in San Francisco Bay, 6 in Oregon bays, and 7 off Southern California. Data are also available for sediment bioassays performed with oyster larvae in 222 stations in Puget Sound for 1972-73 and 1982-85. However, different sampling stations were occupied in each of the two periods.

Data are available for San Francisco Bay, the Southern California Bight (off Palos Verdes), and parts of Puget Sound in which the Sediment Quality Triad approach (Long and Chapman, 1985) was performed. The Triad consists of synoptic measures of sediment contamination, toxicity and macroinvertebrate community composition.

Other bioassays for which relatively large amounts of data are available include cytotoxicity and chromosomal aberrations in trout cells exposed to organic extracts of sediments, and sublethal effects of sediment elutriates on oligochaete respiration. Nearly all of these data are from Puget Sound. A wide variety of other sediment bioassays have documented survival of gametes, eggs, and larvae; hatching success; brood size; embryonic development; and morphological abnormalities of larvae. Sublethal effects have been measured by bioluminescent response (i.e., the

Microtox (R) test), mixed-function oxidase activity, and behavioral cues such as emergence from sediments, reburial and righting response.

A small number of caged animal studies have been conducted to determine the effects of in situ exposures to polluted water or sediment. These have included measurements of growth rates and scope for growth of mussels in San Francisco Bay and the Southern California Bight; fouling community growth in Pearl Harbor, Puget Sound, and Southern California; induction of neoplasms in caged oysters, mussels and flatfish; and survival of both demersal and midwater fish in cages and liveboxes, respectively. Exposures of flatfish eggs to in situ microlayers have been conducted at a small number of stations in Puget Sound, as well.

About 75% of the data for animal health concern demersal fishes. A much smaller amount of data exists for health of crustacean or mollusc populations. The most frequent determinants of fish health have been surveys of the prevalence of external skin and fin diseases, internal tissue diseases or abnormalities (histopathological disorders), and a condition index based upon the ratio of length to weight. Liver to body weight ratios have been measured as well, primarily for flatfishes (Dover sole, rock sole, sand sole, and starry flounder).

Epidermal papillomas and/or fin erosion were surveyed in demersal fishes from the Bering Sea, near Seattle in Puget Sound, and from the Southern California Bight. One or a few species of fish were targeted for studies of external disease in surveys of flathead sole in the San Juan Islands (Puget Sound), starry flounder in Bellingham Bay (Puget Sound), and English sole in San Francisco Bay. Over 350 stations have been sampled to determine the prevalence of epidermal papillomas or fin erosion in marine fish: 115 in the Bering Sea, 71 from Puget Sound, 18 from San Francisco Bay, and 177 from the Southern California Bight.

The prevalence of histopathological lesions in livers and other organs of demersal fishes have been surveyed in 395 samplings in Puget Sound, 11 in San Francisco Bay, and 64 in the Southern California Bight. Most of the data from Puget Sound and San Francisco Bay pertain to English sole, while those for the Southern California Bight are for several species, including white croaker, scorpionfish, kelp bass, and various rockfish species. Lesions of kidneys and gills have often been surveyed along with livers, because they are the tissues most directly involved in metabolism or excretion of potential toxicants. In a few studies, most major organs and tissues were surveyed.

Other fish health surveys are designed to show the relationships between toxicant uptake and impaired reproductive success and/or hepatic condition. Though conducted at few stations and representing little of the total data, they are sources of information on possible processes and consequences of intoxication for field-exposed fish. Included are determinations of the activity of mixed-function oxidases (MFO) in fish livers in conjunction with studies of reproductive condition, fecundity, hatching success, and measurements of the concentration of aromatic hydrocarbon metabolites in bile of fish surveyed for liver disorders.

Surveys of invertebrate health have been conducted in Puget Sound and Yaquina Bay. In Puget Sound, histopathological disorders of pandalid shrimps and of crabs (Cancer spp.) were surveyed. The Oregon surveys were of a proliferative disorder of the blue mussel, Mytilus edulis, and of native and introduced oysters.

Benthic community surveys cataloged to date are primarily those concerned with point sources of pollution such as municipal and industrial effluent discharge, or with potential disturbance and contamination from dredging operations. The baseline studies that have been identified but not entered in the data base are more comprehensive in coverage, and show the status of relatively pristine areas in the Southern California Bight (cf. Outer Continental Shelf Baseline and Allan Hancock surveys), Puget Sound (cf. Marine Ecosystems Analysis Puget Sound surveys), and the Alaskan continental shelf (cf. Outer Continental Shelf Environmental Assessment Program surveys). Cataloged benthic surveys are from three main areas: Puget Sound, San Francisco Bay, and the Southern California Bight (table 7). On the coast of the continental U.S., most of the data are for macroinvertebrates sampled with Van Veen, Smith-McIntyre, or Petersen grabs and retained on a 1 mm screen (table 5). The degree of processing of these samples varied: in most all species were fully identified, but for about 30% of the samples, only major taxon groups or Infaunal Trophic Index (ITI) species (Word, 1979) were identified and enumerated. Most of the latter type of data are from the Southern California Bight, where the ITI concept was developed and applied. In studies where all the species were fully identified, measures included species counts, weights, and accumulated data for dominant or sensitive species, or for higher level taxon groups. For the tests with full species identification listed, species counts were always taken, but the other types of measures taken varied from study to study.

Benthic surveys in Hawaii were primarily for either micromolluscan or foraminiferan fauna, rather than for benthic macrofauna as a whole. These groups were used as indicators of sediment movement after dredged material disposal, and of overall sediment quality.

Benthic surveys typically have been of a much longer duration in the Southern California Bight than elsewhere. Each of the three monitoring studies near the major sewer outfalls of the Los Angeles area have been conducted quarterly or semiannually for over ten years each. In other regions, only two studies--on an intertidal mudflat in San Francisco Bay and in the central basin of Puget Sound--have continued for 10 years or more. Most other benthic surveys range from 2-4 years in duration.

5. CONCLUSIONS

A very wide variety of tests of pollutant effects upon resident biota have been performed along the Pacific Coast. No internally-consistent data set exists for the length of the coast. Therefore, it is not possible to determine temporal and spatial trends in biological effects for the entire coast.

However, there are data that can be used to determine temporal trends within each of the three data-rich areas: Southern California Bight, San Francisco Bay, and Puget Sound. Also, there are data that could be used to compare conditions among these three areas and, possibly, others.

Temporal trends in soft-bottom benthic community structure could be evaluated with data from much of Southern California Bight, parts of San Francisco Bay and a few sites in Puget Sound. There are sediment quality triad data from 1980, 1983, and 1986 from part of the Bight. There are data from analyses of epidermal lesions in fish for many years in the Bight. In addition to the benthic community structure data for soft-bottom habitats, there are temporal records of kelp and kelp communities for the Bight. Temporal trends in mussel growth could be determined at some sites in San Francisco Bay. It may be possible to piece together a temporal record of fish health measurements from various studies in Puget Sound. Similarly, it may be possible to identify temporal trends in sediment toxicity in Puget sound using data from a variety of surveys.

The identification of geographic trends may be possible for sediment bioassays performed with Rhepoxynius abronius exposed to samples from many parts of Puget Sound, a few sites in British Columbia, a few sites in San Francisco Bay, Yaquina Bay and sites in Southern California Bight. Data from the analyses of fish for liver neoplasms (and putative preneoplasms) are available from the three data-rich areas. Data from recent surveys in these three areas and elsewhere along the coast are being generated through the National Status and Trends Program. Benthic community data exist for nearly all the regions. Most have been collected using a 1 mm sieve. However, the feasibility of comparing communities in widely varying habitats (i.e., shallow estuary, marine fjord, riverine delta and continental shelf) is questionable.

6. REFERENCES

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Word, J. Q. 1978. The infaunal trophic index. Southern California Coastal Water Research Project (W. Bascom, ed.) Annual Report. pp. 19-39.

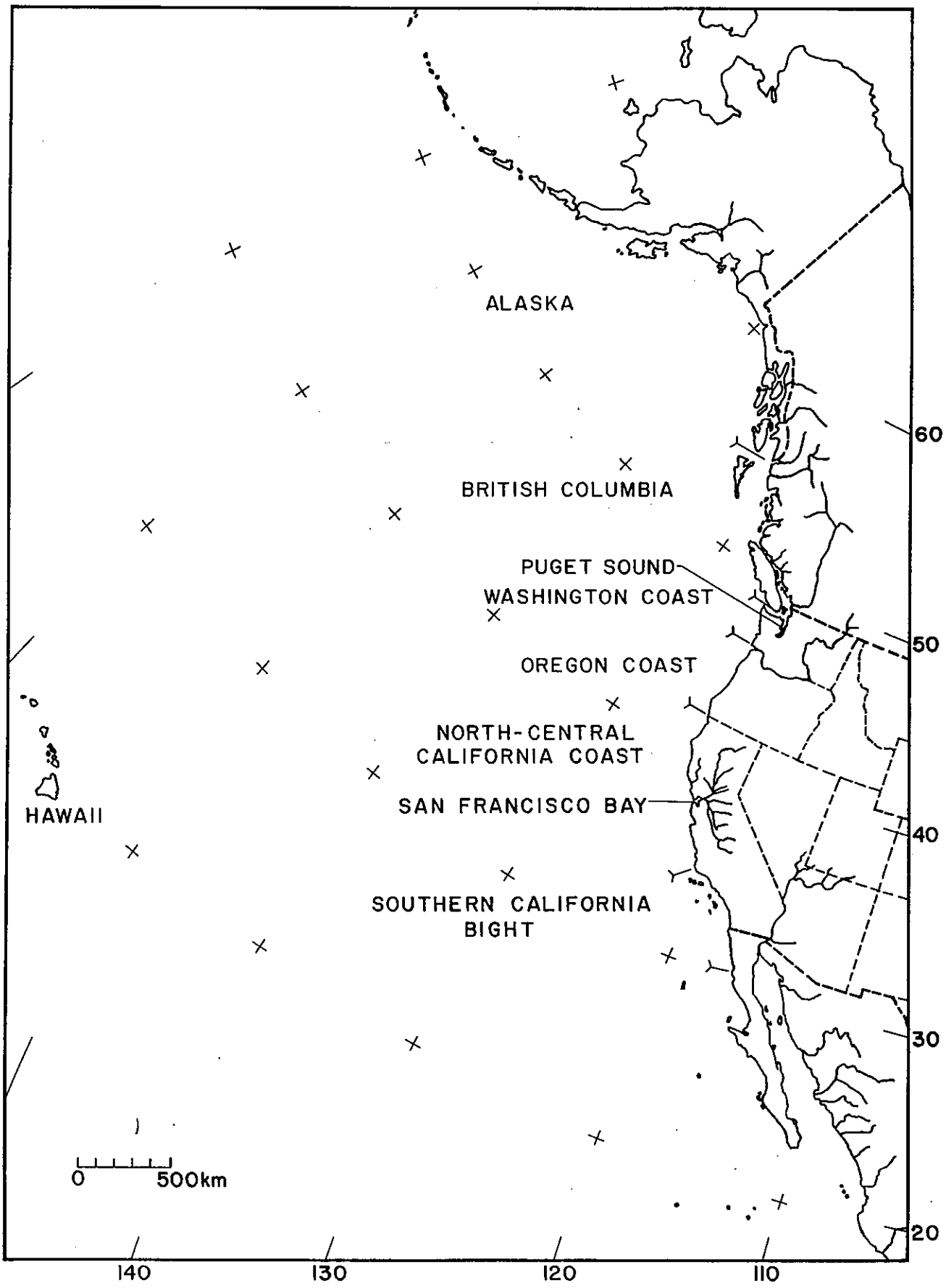

Figure 1. Study area: nearshore and continental shelf waters of Alaska, British Columbia, Washington, Oregon, California, and Hawaii.

DBMS for EFFECTS CATALOG

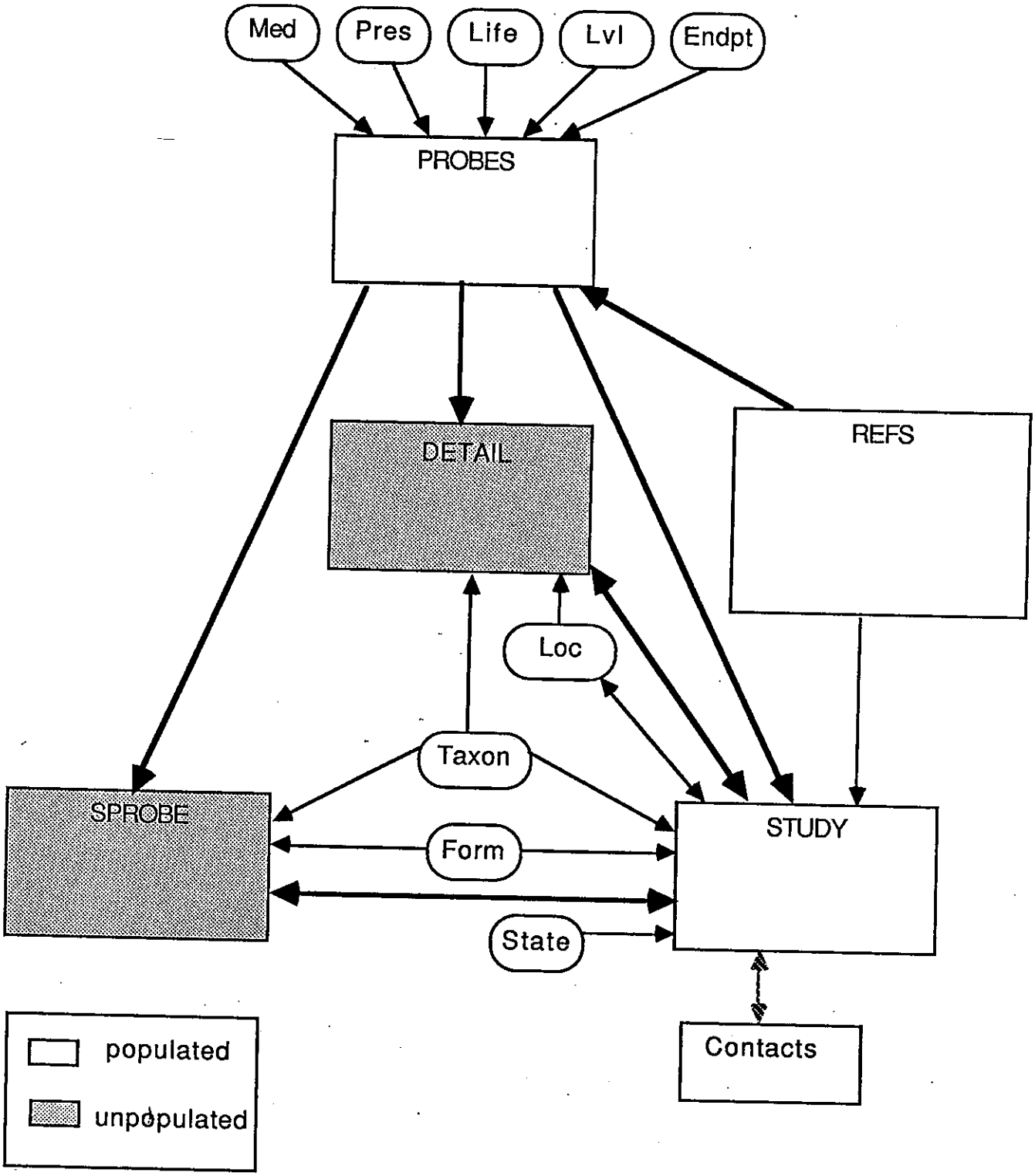

Figure 2. Schematic of data base management system: organization of data and code reference tables.

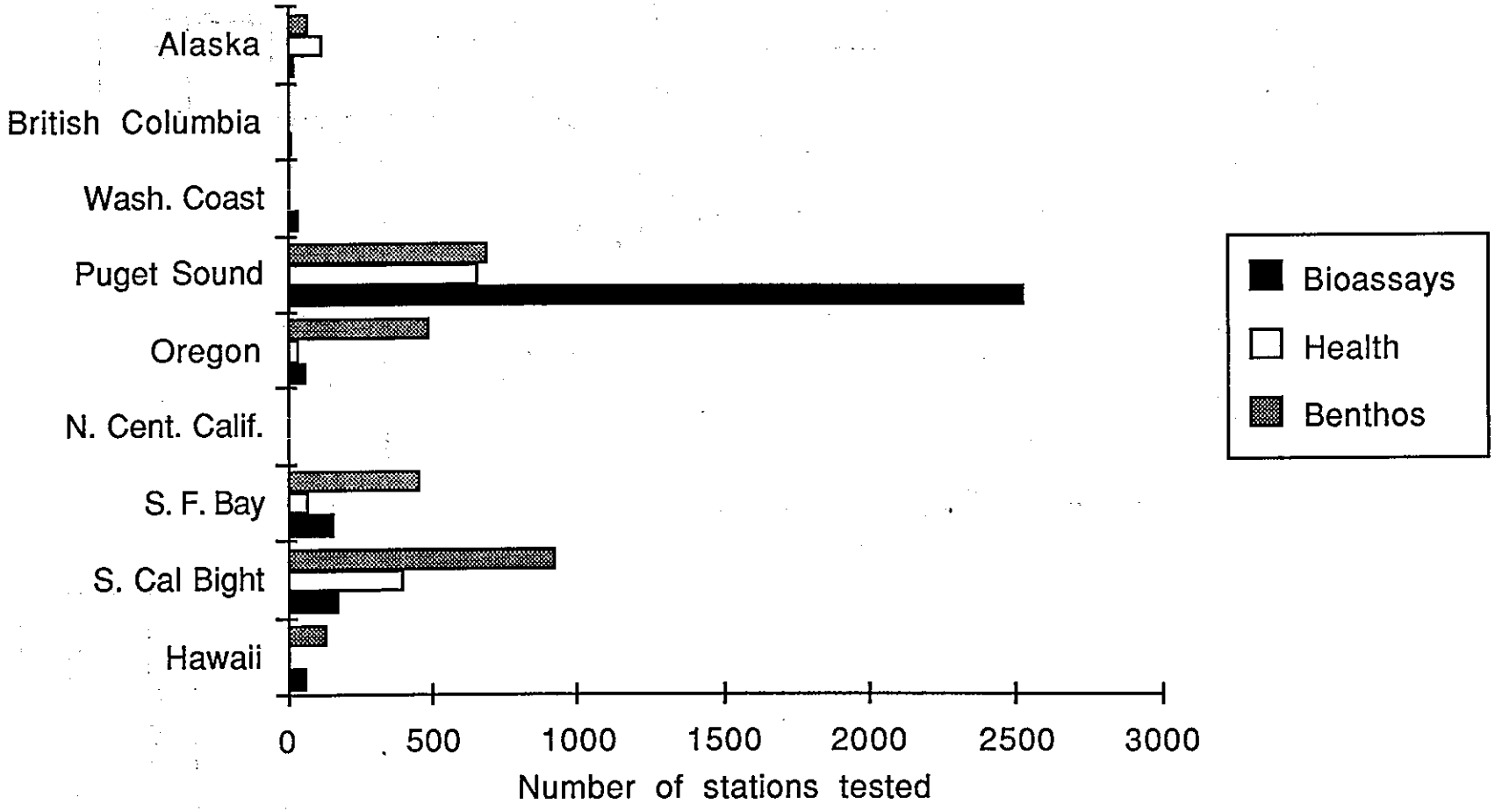

Fig. 3. Number of stations tested with bioassays, fish and invertebrate health surveys, and benthos surveys by geographic region.

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 1 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
1AK8201	Toxicity of drilling muds to larval shrimp and crabs.	1982-1982	once	Cook Inlet	1	NWAFC - Rice, S. Auke Bay	1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Paralithodes camtschatica	1
									Cessation of swimming		
				Homer	1		1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Chionoecetes bairdi	1
									Cessation of swimming		
				Prudhoe Bay	1		1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Cancer magister	1
									Cessation of swimming		
							1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Pandalus hypsinotus	1
									Cessation of swimming		
							1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Pandalus danae	1
									Cessation of swimming		
							1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	Survival	Eualus suckleyi	1
									Cessation of swimming		
							1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Paralithodes camtschatica	1
							1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Chionoecetes bairdi	1
							1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Cancer magister	1
							1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Pandalus hypsinotus	1
							1246	Sed. Partic.: 96h Toxicity to adults	Survival	Pandalus danae	1

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 2 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									(LC50)			
								1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Eualus suckleyi	1
1AK8401	Survival, feeding, and fecundity of Dungeness crabs exposed to bark deposits.	1984-1984	once	Chichagof I.	3	NMFS - Auke Bay	O'Clair, C.	1540	Receiving water: 90d survival, growth, & fecundity: adults	Survival	Cancer magister	4
				Baranof I.	1					Growth rate Eggs produced Ovary size		
3AK7501	Epidermal pathology of demersal fishes, Bering Sea.	1975-1975	once	Bering Sea	115	NWAFC	McCain, B.	2110	Fish health - skin papillomas, size	Epidermal papillomas	Demersal fishes	115
										Size		
6AK7101	Environmental studies of Port VCaldz: Benthos.	1971-1972	1-2x	Port Valdez	61	UA - IMS	Feder, H.	2218	Community status: Macrobenthos >1mm: 0.1m2 grab: Species abundance, biomass	Species Abundance	Macroinfauna >1mm	66
				Valdez Arm	5					Species Biomass Dom.Sp. Abundance Dom. Spec. Biomass		
3NA7601	National Mussel Watch	1976-1978	annual	Birch Bay	1	US EPA	Reynolds, B.	2164	Invert health - histopathology	Histopathology	Mytilus californicus	30
				Puget Sound - South Basin	1							
				C. Flattery	1							
				Grays Harbor	1							
				Willapa Bay	1							
				Columbia R.	1							
				Tillamook Bay	1							
				Yaquina Bay	1							
				Coos Bay	1							
				Gold Beach	1							
				Pt. St. George	1							
				Humboldt Bay	1							
				C. Mendocino	1							
				Pt. Arena	1							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 3 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Bodega Head	1							
				Farallone I.	1							
				San Pablo Bay	1							
				South S.F. Bay	1							
				Santa Cruz	1							
				Soberanus Pt.	1							
				Diablo Canyon	1							
				San Simeon	1							
				Pt. Arguello	1							
				Ricon Cliffs	1							
				Santa Catalina I.	1							
				Palos Verdes - Pt. Fermin	1							
				San Pedro Harbor	1							
				Oceanside	1							
				La Jolla	1							
				San Diego	1							
1WA6101	Water quality compendium for Wash. State: Bivalve larva bioassays.	1961-1976	varies *	Puget Sound & Straits of Juan de Fuca	388	WDF	Cardwell, R.D.	1201	Receiving water: 48h bivalve embryo bioassay	Abnormal Shell	Crassostrea gigas	417
				Grays Harbor	13			1201	Receiving water: 48h bivalve embryo bioassay	Abnormal Shell	Protothaca staminea	64
				Willapa Bay	22			1201	Receiving water: 48h bivalve embryo bioassay	Abnormal Shell	Tresus capax	5
1WA7201	Toxicity of bottom sediments of Olympia Harbor.	1972-1972	once	Olympia Harbor	7	WDF	Westley, R.	1215	Sed.Slurry: 9h Bivalve veliger bioassay	Abnormal Shell	Crassostrea gigas	9
				Oro Bay	1			1223	Sed. Slurry: 48h Toxicity, Juveniles	Survival	Oncorhynchus gorbuscha	5
								1603	Sed. Slurry: 48h Photosynthesis	Chlorophyll a production	Skeletonema sp.	4
1WA7301	Oyster larva bioassays of sediments from Washington.	1973-1973	once	Grays Harbor	3	WDF	Schink, T.	1215	Sed.Slurry: 9h Bivalve veliger bioassay	Abnormal Shell	Crassostrea gigas	15
				Bellingham Bay	3							
				Duwamish R.	3							
				Henderson Inlet	1							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 4 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Eld Inlet	1							
				Liberty Bay	1							
				Oro Bay	1							
				Budd Inlet	1							
				Pt. Whitney	1							
1WA7401	Sediment and elutriate toxicity to oyster larvae: Grays Harbor	1974-1975	once	Hoquiam - Aberdeen	13	WDF	Cardwell, R.	1211	Sed.Slurry: 48h bivalve embryo bioassay	Mortality	Crassostrea gigas	13
								1212	Sed. Elutriate: 48h bivalve embryo bioassay	Abnormal Shell Mortality	Crassostrea gigas	13
										Abnormal Shell		
1WA7402	ECOBAM: Pt. Gardner livebox bioassays	1974-1981	6x (1/yr)	Port Gardner	6	WDOE	Clark, D.K.	1750	Rec. Water: caged fish exposure in situ	Distress	Juvenile salmon (5 spp.)	6
										Survival		
1WA7501	Chemical and biological survey of Liberty Bay, WA.	1975-1975	1x	Liberty Bay, WA.	5	EPA-Manchester	Cummins, J.M.	1202	Receiving water: 48h bivalve embryo bioassay	Mortality	Crassostrea gigas	7
										Abnormal Shell		
				Hood Canal	1			1221	Sed. Slurry: 48h bivalve embryo bioassay. (LC50)	Abnormal Shell	Crassostrea gigas	7
				Clam Bay	1							
1WA7601	Sediment bioassays: Duwamish R. (and East Coast rivers)	1976-1976	once	Duwamish R.	1	WES-COE	Shuba, P.J.	1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Acartia sp.	2
				Elliott Bay dumpsite (water only)	1			1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Acartia sp.	2
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Tigriopus californicus	2
								1310	Sed.: 14d Tox. to adults	Survival	Rangia cuneata	2
								1310	Sed.: 14d Tox. to adults	Survival	Palaemonetes pugio	2
1WA8101	Puget Sound	1981-1981	once	Birch Bay	5	EVS	Chapman, P.	1300	Sed.: 96h-10d Acute	Mortality to 96h	Gasterosteus	97

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 5 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	broad-scale toxicity survey. (OMPA-25)					Cons.			Tox. to adults		aculeatus	
				Port Madison	6	URS Co.	Dexter, R.	1300	Sed.: 96h-10d Acute Tox. to adults	Mortality Mortality to 96h	Eogammarus confervicolus	97
				West Pt.	1	FW Health	Kocan, R.	1300	Sed.: 96h-10d Acute Tox. to adults	Mortality Mortality to 96h	Monopylephorus cuticulatus	97
				Elliott Bay - Outer	1			1208	Rec. Water: 96h-10d toxicity, adults	Mortality Survival	Gasterosteus aculeatus	7
				Elliott Bay	14			1208	Rec. Water: 96h-10d toxicity, adults	Survival	Eogammarus confervicolus	7
				Duwamish R. - Lower	18			1208	Rec. Water: 96h-10d toxicity, adults	Survival	Monopylephorus cuticulatus	7
				Duwamish R. - Upper	3			1610	Sed. Elutriate (H2O): Adult Respiration Rate	Respiration	Monopylephorus cuticulatus	97
				Browns Pt.	1			1601	H2O(centr.): Adult Respiration Rate	Respiration	Monopylephorus cuticulatus	7
				Ruston (ASARCO)	2			1003	Sed. Extract: Gonad cell prolif. in vitro	Cell Proliferation	Rainbow trout gonad (Salmo gairdneri): cell line 2	97
				Commencement Bay - Outer	3			1005	Microlayer Extract: Gonad cell prolif. in vitro.	Cell Proliferation	Rainbow trout gonad (Salmo gairdneri): cell line 2	7
				Hylebos Waterway	13			1050	Sed. Extract: Genotoxicity in vitro	Anaphase Aberration	Rainbow trout gonad (Salmo gairdneri): cell line 2	97
				Blair Waterway	9			1051	H2O Extract: Genotoxicity in vitro	Anaphase Aberration	Rainbow trout gonad (Salmo gairdneri):	7

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 6 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
											cell line 2	
				Sitcum & Puyallup Waterways	5							
				City Waterway	4							
1WA8201	Survey of biological effects of toxicants upon Puget Sound Biota. II. Tests of reproductive impairment.	1982-1982		Elliott Bay - Outer	4	EVS Consultants	Chapman, P.M.	1220	Sed. Slurry: 48h bivalve embryo bioassay.	Mortality	Crassostrea gigas	22
				Duwamish R. - Upper	2	FW Health Cons	Kocan, R.M.	1510	Sed.: Development to Hatching	Abnormal Shell Survival to Hatching	Hypomesus pretiosus	22
				Duwamish R.	2			1306	Sed.: 10d Acute Tox. to larvae	Optic Development Survival	Hypomesus pretiosus	22
				Port Madison	1			1501	Sed. Elutriate (H2O): 50d Tox.: Larva-Adult.	Survival to 26d Growth rate to 26d Growth rate to 29d Eggs released Time to oogenesis Time to oviposition Survival to Settlement Survival to Metamorphosis Survival	Capitella capitata	22
				Sinclair Inlet	2			1500	Sed.+Sed.Elut.(H2O): 35d Tox. to adults	Survival Size Segmentation Ripe females	Capitella capitata	22
				Commencement Bay - Outer	1			1004	Sed. Extract: Juv. cell prolif. in vitro	Cell Proliferation	Bluegill fry (Lepomis macrochirus) : cell line 2	22

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 7 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Commencement Bay - Waterways	9			1003	Sed. Extract: Gonad cell prolif. in vitro	Cell Proliferation	Rainbow trout gonad (Salmo gairdneri): cell line 2	22
				Alki Pt.	1							
1WA8202	Bioassays: Commencement Bay, WA.	1982-1982	once	Blair Waterway	6	UW- FRI	Pierson, K.	1205	Receiving water: 96h Acute Toxicity: Juveniles	Survival	Oncorhynchus tshawytscha	10
				Sitcum Waterway	3			1210	Sed. Elutriate: 48h bivalve embryo bioassay EC50	Abnormal Shell	Crassostrea gigas	10
				Wollochet Bay	1			1309	Sed.(Flow Th.): 9+d Acute Tox. to adults	Survival Reburial	Grandifoxus grandis	10
1WA8203	Renton - Seahurst Baseline project: Toxicology (bioassays)	1982-1984	5x - monthly	Seahurst Park	27	UW - FRI	Dinnel, P.A.	1202	Receiving water: 48h bivalve embryo bioassay	Mortality Abnormal Shell	Crassostrea gigas	12
								1203	Receiving Water: 15 min sperm cell fertilization capacity	Fertilization efficiency	Dendraster excentricus	12
								1312	Sed.(Recirc.): 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	12
								1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	26
								1302	Sed.: 10d Tox. to adults	Survival Emergence	Rhepoxynius abronius	26
1WA8301	Effects of Toxicants: Everett Harbor, Samish, and Bellingham Bays.	1983-1983	once	Bellingham Bay	10	EVS Cons.	Chapman, P.	1220	Sed. Slurry: 48h bivalve embryo bioassay.	Mortality Abnormal Shell	Crassostrea gigas	23
				Samish Bay	2	FW Health	Kocan. R.	1302	Sed.: 10d Tox. to adults	Survival Emergence	Rhepoxynius abronius	23
				Everett Harbor	6			1610	Sed. Elutriate (H2O): Adult	Respiration	Monopylephorus	23

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 8 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									Respiration Rate		cuticulatus	
				Port Gardner	5			1003	Sed. Extract: Gonad cell prolif. in vitro	Cell Proliferation	Rainbow trout gonad (Salmo gairdneri): cell line 2	22
								1004	Sed. Extract: Juv. cell prolif. in vitro	Cell Proliferation	Bluegill fry (Lepomis macrochirus) : cell line 2	22
								1050	Sed. Extract: Genotoxicity in vitro	Anaphase Aberration	Rainbow trout gonad (Salmo gairdneri): cell line 2	22
1WA8401	Bioavailability and Toxicity: Final Report	1984-1984	once	Hood Canal	1	NWAFC	Malins, D.	1615	Sed. Extract: Microtox	Bioluminescence (491nm)	Photobacterium phosphoreum	7
				Duwamish R.	1			1550	Sed.(>69u): 4wk Reproduction & Survival	Survival	Tigriopus californicus	2
										Larvae released		
										Larval release rate		
										Developmental Disorders		
										Larval Devel. Rate		
				Useless Bay	1			1211	Sed.Slurry: 48h bivalve embryo bioassay	Mortality	Crassostrea gigas	7
										Abnormal Shell		
				West Pt.	1			1020	Sed. Partic. : 15 min sperm cell fertilization capacity	Fertilization efficiency	Strongylocentrotus droebachiensis	2
				Port Madison	1			1225	Sed. Slurry: 7-d Larval mortality	Mortality	Hypomesus pretiosus	7
				Everett Harbor	1			1307	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	7
										Reburial		
				Eagle Harbor	1							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page 9 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
1WA8402	Interlab comparison of Rhepoxynius bioassay.	1984-1984	once	Puget Sound - Central Basin	1	EVS	Chapman, P.	1302	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	3
				Sinclair Inlet	1	NWAFC (Mukilteo)	Plesha, P.			Emergence		
				City Waterway	1	UW - FRI (West Point)	Dinnel, P.A.					
						US EPA (Manchester)	Cummins, J.					
						US EPA (Newport)	Swartz, R.					
1WA8403	Comparative evaluation of three bioassays (Microtox, Rhepox, oyster larva).	1984-1984	once	Commencement Bay	46	EVS	Chapman, P.	1616	Sed. Elutriate: Microtox	Bioluminescence (491nm)	Photobacterium phosphoreum	51
				Carr Inlet	4	Tetra-Tech	Williams, L.	1220	Sed. Slurry: 48h bivalve embryo bioassay.	Mortality	Crassostrea gigas	51
				West Beach	1			1302	Sed.: 10d Tox. to adults	Abnormal Shell Survival Emergence	Rhepoxynius abronius	51
1WA8601	Oak Harbor marina expansion: sediment bioassays.	1986-1986	once	Oak Harbor marina	5	Battelle - MRL	Anderson, J.W.	1307	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	7
				Sequim Bay	1			1615	Sed. Extract: Microtox	Reburial Bioluminescence (491nm)	Photobacterium phosphoreum	6
3WA6201	Epidermal tumors in flathead sole	1962-1967		Orcas I. - Eastsound	3	UW	Miller, Bruce	2101	Fish health - external pathology	Fin Erosion Epidermal papillomas	Hippoglossoides elassodon	3

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page10 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
										Size		
3WA7301	Demersal fish: West Pt, Alki Pt., Seattle.	1973-1973	12x (monthly)	West Pt. (STP)	1	UW - FRI	Miller, B.S.	2101	Fish health - external pathology	Fin Erosion	Demersal fishes	2
				Alki Pt.	1					Epidermal papillomas Size		
3WA7401	Fin erosion: starry flounder and English sole in the Duwamish R.	1974-1975	20X	Duwamish R.	8	UC Davis	Wellings, S.	2100	Fish health - fin erosion	Fin Erosion	Demersal fishes	8
						UW FRI	Miller, B.			Size		
3WA7501	Puget Sound Interim Studies: Demersal fish Disease studies.	1975-1975	10 monthly	Duwamish R.	8	UW- FRI	Miller, B.	2104	Fish health - Reproductive condition, morphometrics, MFO activity.	Fecundity	Fishes	26
										Size Tissue Wt:Body Wt. MFO Activity Atresia: incidence		
				West Pt.	8			2110	Fish health - skin papillomas, size	Epidermal papillomas Size	Demersal fishes	16
				Alki Pt.	4							
				Pt. Pully	6							
3WA7502	Diseases and condition of English sole and starry flounder in Puget Sound.	1975-1976	once ?	West Pt.	1	UW - FRI	Pierce, K.	2120	Fish health - external pathology, liver histopathology, size.	Fin Erosion	Parophrys vetulus	5
										Epidermal papillomas Size Histopathology		
				Duwamish R. - Lower	1			2120	Fish health - external pathology, liver histopathology,	Fin Erosion	Platichthyes stellatus	5

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page11 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									size.			
										Epidermal papillomas Size Histopathology		
				Alki Pt.	1							
				Pt. Pully	1							
				McAllister Creek	1							
3WA7801	Pathology of 2 species of flatfish from Puget Sound, WA.	1978-1980	5x	Snohomish R.	2	NWAFC	McCain. B.	2102	Fish health - histopathology	Histopathology	Parophrys vetulus	12
				Lk. Wash. Ship Canal	1			2102	Fish health - histopathology	Histopathology	Platichthyes stellatus	12
				Duwamish R. - Lower	2							
				Duwamish R. - Upper	5							
				McAllister Creek	2							
3WA7901	Skin tumors and mortality in Starry flounder, Bellinghm Bay, WA.	1979-1981	monthly	Nooksack R. flats	?	UBC	Campana, S.	2110	Fish health - skin papillomas, size	Epidermal papillomas	Platichthyes stellatus	3+
				Nooksack R. offshore	3					Size		
3WA8001	Sister chromatid exchange in English sole.	1980-1980	once	Agate Pass	1	UW-Fish	Stromberg, P.	1053	Sed. Extract: Sister Chromatid Exchange: Kidney Tissue.	Sister Chromatid Exchange	Parophrys vetulus	2
				Duwamish R.	1							
3WA8102	Contaminants and morphometrics of edible fish and crabs from Commencement Bay. (WA-08 in 1202 file)	1981-1982	varies	Hylebos Waterway	1	EPA	Gahler, A.	2121	Fish health - Liver-somatic index.	Size	Demersal fishes	5
				Tacoma Waterfront	2					Tissue Wt:Body Wt.		
				Pt. Defiance	1							
				Discovery Bay	1							
3WA8201	Liver lesions and bile metabolites in English sloe	1983-1984	once	Eagle Harbor	1	NWAFC	Krahn, M.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	11

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page12 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	from Puget Sound, WA.											
				Duwamish Waterway	1							
				Clinton	1							
				Everett Harbor - Inner	1							
				Everett Harbor - Outer	1							
				Richmond Beach	1							
				West Pt.	1							
				Carkeek Park	1							
				President Pt.	1							
				Edmonds	1							
				Useless Bay	1							
3WA8202	Liver lesions and bile metabolites in English Sole, Puget Sound, WA.	1982-1982	once	Duwamish R. - Lower	1	NWAFC	Krahn, M.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	4
				Lk. Wash Ship Canal	1							
				Port Madison	1							
				Meadow Pt	1							
3WA8203	Liver disease: Everett Harbor	1982-1982	once	Everett Harbor	2	NWAFC	Malins, D.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	4
				Port Gardner	2			2103	Fish health - liver pathology	Histopathology	Lepidopsetta bilineata	1
3WA8204	Multiyear comparison of disease prevalence in English sole from Puget Sound.	1982-1983	once/yr	Port Madison	1	NWAFC	Malins, D.	2111	Fish health - liver, kidney, fin histopathology	Histopathology	Parophrys vetulus	8
				Sinclair Inlet	1			2111	Fish health - liver, kidney, fin histopathology	Histopathology	Lepidopsetta bilineata	8
				Elliott Bay - Seattle Waterfront,	2			2111	Fish health - liver, kidney, fin histopathology	Histopathology	Platichthyes stellatus	8
				Duwamish R. - Lower	1							
				Duwamish R. - Upper	1							
				Commencement Bay - Inner	2							
3WA8205	Liver lesionsand	1982?	once	Port Susan	1	NWAFC	Malins, D.	2103	Fish health - liver	Histopathology	Parophrys	4

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page13 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	organic free radicals in microsomes, Puget Sound.								pathology		vetulus	
				Meadow Pt.	1							
				Duwamish R.	1							
				Commencement Bay - Outer	1							
3WA8206	Pathology of Dungeness crab : Everett Harbor, WA.	1982-1982	once	Everett Harbor	2	NWAFC	Malins, D.	2163	Invert. health - histopathology	Histopathology	Cancer magister	2
3WA8207	Renton - Seahurst Baseline: Fish health	1982-1984	7x	Seahurst Park	3	UW - FRI	Stober, Q.J.	2102	Fish health - histopathology	Histopathology	Demersal fishes	7
				Saltwater Park	2	FW Health	Landolt, M.	2102	Fish health - histopathology	Histopathology	Pelagic fishes	3
				Pt. Pully	2							
3WA8301	Liver lesion in English sole from Mukilteo, WA.	1983-1983	once	Mukilteo	1	NWAFC	Malins, D.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	2
				President Pt.	1							
3WA8302	Liver lesion in English sole from Eagle Harbor.	1983-1984	once	Eagle Harbor	3	NWAFC	Malins, D.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	4
				President Pt.	1							
3WA8303	Bile metabolites and liver lesions in English sole - Puget Sound, WA.	1983-1984	once	Everett Harbor	2	NWAFC	Krahn, M.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	10
				Clinton	1							
				Useless Bay	1							
				President Pt.	1							
				Edmonds	1							
				Richmond Beach	1							
				Carkeek Park	1							
				West Pt.	1							
				Duwamish R. - Lower	1							
3WA8401	Bile metabolites	1983 ?	once	Duwamish R.	1	NMFS	Krahn, M.	2103	Fish health - liver	Histopathology	Parophrys	4

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page14 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	and liver lesions in English sole - Puget Sound.								pathology		vetulus	
				Lk. Wash. Ship Canal	1							
				Meadow Pt.	1							
				Port Madison	1							
3WA8501	Survey of sediment toxicity in Port Angeles and Anacortes, WA.	1985-1985	once	Anacortes Harbor	2	NWAFC	Malins, D.	2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	1
				Anacortes - Texaco	2			2103	Fish health - liver pathology	Histopathology	Myoxocephalus polyacanthocephalus	1
				Port Angeles	3			1615	Sed. Extract: Microtox	Bioluminescence (491nm)	Photobacterium phosphoreum	7
6WA6301	A quantitative study of benthic infauna in Puget Sound.	1963-1964	6x	Puget Sound - Central Basin	4	UW - FRi	Lie, U.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	8
				Case Inlet	4					Total Species Richness Taxon Group Abundance RT Total Total Abundance		
6WA6501	Benthic infauna of Port Madison, WA.	1965-1965	once	Port Madison	12	UW - Ocean.	Nichols, F.	2262	Community status: Polychaetes >1mm: 0.1m2 grab.	Species Abundance	Polychaetes >1mm.	12
										Total Abundance Taxon Group Species Richness Total Species Richness		
6WA7401	ECOBAM: Benthos monitoring near pulp mill, Everett, WA.	1974-1976	40x (2yr)	Everett - Port Gardner	39	UW - Oceanog.	Kisker, D.	2214	Community Status: Macrobenthos>1mm: 0.1m2 grab.: Taxon groups only	Taxon Group Abundance	Macroinfauna >1mm	39
6WA7402	Intertidal	1974-1976	8x	Richmond Beach	1	UW -	Chew, K.	2420	Community status:	Species Abundance	Macroflora	5

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page15 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	macrofauna at 5 Seattle beaches.		(quarterly)			FRI			Macrobenthos; subsampled 0.25m2 quadrat; in situ		in situ	
				Carkeek Park	1			2220	Community status: Macroinfauna >1mm; 0.05m2 x 15cm subsample	Species Abundance	Macroinfauna >1mm	5
				West Pt.	1			2263	Community status: Polychaetes and bivalves >6mm; 0.25m2 x 25cm subsample	Species Abundance	Macroinfauna >6mm; live sieved	5
				Alki Pt.	1							
				Lincoln Park	1							
6WA7501	ACOE Elliott Bay disposal site.	1975-1976	7x (max.5/y)	Elliott Bay dumpsite	75	SCC	Harman, R.A.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	95
				Duwamish R.	20					Total Species Richness Taxon Group Abundance RT Total Total Abundance		
6WA7701	Subtidal macrobenthos in Elliott Bay, near the Denny Way CSO.	1977-1977	once	Elliott Bay - Denny Way CSO	13	UW - FRI	Chew, K.	2218	Community status: Macrobenthos >1mm: 0.1m2 grab: Species abundance, biomass	Species Abundance	Macroinfauna >1mm	13
										Species Biomass Dom.Sp. Abundance Dom. Spec. Biomass		
6WA8201	Renton ST Project: Seahurst Baseline: Subtidal Benthos	1982-1983	quarterly	Puget Sound - East Passage(mainly)	126	UW - FRI	Word, J.	2216	Community Status: Macrobenthos>1mm: 0.1m2 grab.: All species; ITI species abundance	Species Abundance	Macroinfauna >1mm	126
										Infaunal Index		
6WA8301	Effects of toxicants on biota: Relationships	1983-1983	once	Samish Bay	2	EVS Cons.	Chapman, P.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	12

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page16 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	among sediment, infauna, bioassay data.											
				Elliott Bay - Seattle Waterfront.	1	Infomet rix	Erickson, G.			Total Species Richness		
				Duwamish R.	3					Taxon Group Abundance RT Total		
				Commencement Bay - Inner	3					Total Abundance		
				Case Inlet	1							
				Sinclair Inlet	2							
6WA8302	Bellingham, Samish Bay macrobenthos.	1983-1983	once	Bellingham Bay	22	WWU - Huxley	Broad, A.C.	2202	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Total Species Richness	Macroinfauna >1mm	24
				Samish Bay	2					Total Abundance Taxon Group Abundance RT Total Dom.Sp. Abundance		
6WA8401	Alki Wastewater TP: 301(h) Benthos.	1984-1984	once	Pt. Williams	4	Paramet rix	Osborne, J.	2204	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	11
				Alki Pt.	7					Total Species Richness Total Biomass Infaunal Index		
7WA7401	Attached marine flora: Seattle area.	1974-1976	1-8x	Richmond Beach	1	UW -FRI	Thom, R.	2410	Community status: Macroalgae in 0.25m2 quadrats, in situ photos.	Species Frequency	Macroflora in situ	5
										Species Abundance RT Total		
				Carkeek Park	1			2264	Community status: Macroalgae in 0.25m2 quadrats, scraped.	Species Biomass	Macroflora; scraped	5
				West Pt.	1			1924	Diatom growth on Mylar plates in situ.	Species Abundance	Aufwuchs-fouling community	5
				Alki Beach	1			1640	Rec. Water: 2wk Growth in situ: Laminaria.	Growth rate	Laminaria spp.	2

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page17 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Lincoln Park	1			1641	Rec. Water: 4mo Growth in situ: Fucus.	Growth rate	Fucus distichus	2
										No. of mature branches		
								2404	Community status: Belt transects: Kelp, epibenthos abundance.	Species Abundance	Nereocystis luetkeana	2
								2264	Community status: Macroalgae in 0.25m2 quadrats, scraped.	Species Biomass	Nereocystis luetkeana	2
								1642	Rec. Water: 3mo Growth in situ: Nereocystis stipe elongation.	Growth rate	Nereocystis luetkeana	2
										Stipe elongation		
7WA7901	Chemical contaminants and biological abnormalities in Puget Sound fish, invertebrates, and benthos.	1979-1979	4x	West Pt.	1	NWAFC	Malins, D.	2107	Fish health - liver, kidney, gill histopathology	Histopathology	Parophrys vetulus	34
				Elliott Bay - Outer	2			2107	Fish health - liver, kidney, gill histopathology	Histopathology	Lepidopsetta bilineata	34
				Elliott Bay - Seattle Waterfront	3			2107	Fish health - liver, kidney, gill histopathology	Histopathology	Leptocottus armatus	34
				Duwamish R.	4			2107	Fish health - liver, kidney, gill histopathology	Histopathology	Microgadus proximus	34
				Alki Pt.	1			2107	Fish health - liver, kidney, gill histopathology	Histopathology	Sebastes maliger	34
				Browns Pt.	1			2163	Invert. health - histopathology	Histopathology	Crustacea: Caridea	34
				Pt. Defiance	1			2217	Community Status: Macrobenthos>1mm: 0.1m2 grab.: ITI species abundance, richness	Infaunal Index	Macroinfauna >1mm	34
				Tacoma Waterfront	3							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page18 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Hylebos Waterway	4							
				Commencement Bay – Other Waterways	4							
				Sinclair Inlet	3							
				Budd Inlet	3							
				Case Inlet	2							
				Port Madison	2							
7WA8001	Chemical contaminants and biological abnormalities in Puget Sound – 1980.	1980–1980	2x	Port Susan	2	NWAFC	Malins, D.	2102	Fish health – histopathology	Histopathology	Parophrys vetulus	28
				Elliott Bay – Seattle Waterfront	3			2102	Fish health – histopathology	Histopathology	Lepidopsetta bilineata	28
				Duwamish R. – Lower	5			2102	Fish health – histopathology	Histopathology	Leptocottus armatus	28
				Duwamish R. – Upper	3			1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	Histopathology	Cancer gracilis	7
				Pt. Defiance	1			1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	Histopathology	Macoma nasuta	7
				Tacoma Waterfront	2			1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	Histopathology	Macoma nasuta	7
				Hylebos Waterway	4			1926	Sed.: Recruitment (duration?)	Total Abundance Infaunal Index	Macroinfauna >1mm	7
				Commencement Bay – Other Waterways	4			2217	Community Status: Macrobenthos>1mm: 0.1m2 grab.: ITI species abundance, richness		Macroinfauna >1mm	7
				Sinclair Inlet	2			2163	Invert. health – histopathology	Histopathology	Cancer gracilis	28
				Discovery Bay	1							
7WA8101	Benthos, bioassays in Commencement Bay.	1981–1981	1–2x	Commencement Bay – Inner	9	EPA–Newport	Swartz, R.	1303	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	175
				Commencement Bay –	37			2250	Community status:	Taxon Group	Amphipods	48

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page19 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Outer					Amphipods >1mm: 0.1m2 grab.	Frequency Taxon Group Species Richness Sens. Group Species Richness Sens Group Abundance		
				Hylebos Waterway	66							
				Blair Waterway	27							
				Sitcum Waterway	15							
				Commencement Bay - Other Waterways	10							
				City Waterway	11							
7WA8102	TPPS: Puget Sound benthic studies.	1981-1982	1-2x	West Pt.	44	SAI	Comiskey, C.	2204	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance Total Species Richness Total Biomass Infaunal Index	Macroinfauna >1mm	121
				Meadow Pt.	5	METRO	Romberg, G.	1303	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	50
				Elliott Bay - Denny Way CSO	20			1610	Sed. Elutriate (H2O): Adult Respiration Rate	Respiration	Monopylephorus cuticulatus	26
				Port Madison	4			1050	Sed. Extract: Genotoxicity in vitro	Anaphase Aberration	Rainbow trout gonad (Salmo gairdneri): cell line 2	26
				Edmonds	2			2213	Community Status: Macrobenthos>1mm: 0.1m2 grab.ITI, T# only	Total Abundance Infaunal Index	Macroinfauna >1mm	26
				Pt. Orchard	1							
				Shilshole Bay	1							
				Elliott Bay - Outer	2							
				Duwamish R. - Harbor I.	4							
				Elliott Bay - Inner	3							
				Brace Pt.	3							
				Quartermaster Harbor	1							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page20 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
7WA8301	Eight-Bays: Sediment toxicity, Benthos.	1983-1984	1-2x	Bellingham Bay	26	Battelle - MRL	Strand, J.	1303	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	181
				Everett - Port Gardner	25	EPA		2107	Fish health - liver, kidney, gill histopathology	Histopathology	Parophrys vetulus	10
				Elliott Bay - 4mi Rock.	25	NWAFC	Cummins, J.	2107	Fish health - liver, kidney, gill histopathology	Histopathology	Platichthyes stellatus	10
				Sinclair Inlet	25		Malins, D.	2164	Invert health - histopathology	Histopathology	Cancer magister	14
				Samish Bay	20			2164	Invert health - histopathology	Histopathology	Cancer gracilis	9
				Case Inlet	20			2164	Invert health - histopathology	Histopathology	Pandalus platyceros	3
				Dabob Bay	20			2164	Invert health - histopathology	Histopathology	Pandalopsis dispar	3
				Sequim Bay	20			1221	Sed. Slurry: 48h bivalve embryo bioassay. (LC50)	Abnormal Shell	Crassostrea gigas	6
				Dungeness Spit	1			1222	Sed. Slurry (100g/l): 48h bivalve embryo bioassay.	Abnormal Shell	Crassostrea gigas	48
								2211	Community Status: Macrobenthos>1mm: subsampled 0.1m2 grab.	Total Species Richness	Macroinfauna >1mm	48
										Total Abundance		
										Dom.Sp. Abundance		
7WA8401	Commencement Bay nearshore surveys.	1984-1984	1-2x	Hylebos Waterway	14	Tetra-Tech.	Ginn, T.	2209	Community Status: Macrobenthos>1mm: 0.06m2 grab.	Total Species Richness	Macroinfauna >1mm	48
										Species Abundance		
										Total Abundance		
				Blair Waterway	6			1220	Sed. Slurry: 48h bivalve embryo bioassay.	Mortality	Crassostrea gigas	50
										Abnormal Shell		
				Sitcum Waterway	3			1221	Sed. Slurry: 48h bivalve embryo bioassay. (LC50)	Abnormal Shell	Crassostrea gigas	6
				Milwaukee Waterway	3			1302	Sed.: 10d Tox. to	Survival	Rhepoxynius	50

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page21 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									adults		abronius	
				St. Paul Waterway	5			1308	Sed.: 10d Tox. to adults (LC50)	Emergence Survival	Rhepoxynius abronius	6
				Middle Waterway	1			2120	Fish health - external pathology, liver histopathology, size.	Reburial Fin Erosion	Parophrys vetulus	17
										Epidermal papillomas Size Histopathology		
				City Waterway	6							
				Tacoma Waterfront	1							
				Ruston/Pt. Defiance	8							
				Carr Inlet	4							
7WA8501	Puget Sound Sea surface contaminants.	1985-1985	1-5	Sequim Bay	3		Battell Hardy, J. e - MRL	2253	Community status: Flatfish egg density	Total Abundance	Fishes	4
				Puget Sound - Central Basin	1			1551	Microlayer - egg viability	Survival to Hatching	Psettichthyes melanostictus	11
				Elliott Bay	1			1752	Microlayer: Egg viability in situ	Survival to Hatching	Psettichthyes melanostictus	3
				Magnolia Bluff	1			1552	Microlayer: egg viability (LC50)	Survival to Hatching	Psettichthyes melanostictus	4
				Elliott Bay - Seattle Waterfront	1			1041	Microlayer Extract: Genotoxicity in vivo. 4 dil.	Anaphase Aberration	Psettichthyes melanostictus	5
				Duwamish R.	1			1005	Microlayer Extract: Gonad cell prolif. in vitro.	Cell Proliferation	Rainbow trout gonad (Salmo gairdneri): cell line 2	10
				Commencement Bay	1			1043	Microlayer Extract: Genotoxicity in	Anaphase Aberration	Rainbow trout gonad	10

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page22 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									vitro.		(Salmo gairdneri): cell line 2	
				Hylebos Waterway	1							
				Outer Commencement Bay	2							
				Tacoma Waterfront	2							
				West Pt.	1							
				Port Angeles	1							
7WA8502	Contaminant exposure and reproductive success.	1985-1985	once	University Pt.	1	NWAFC	Malins, D.	2050	Fecundity, fertilization success	Eggs produced	Parophrys vetulus	2
										Fertilization efficiency		
				Elliott Bay	1			2103	Fish health - liver pathology	Histopathology	Parophrys vetulus	3
				Duwamish R.	1			2056	Fish health - Reproductive condition, Atresia	Maturity	Parophrys vetulus	2
										Atresia: incidence		
				Eagle Harbor	1			1753	Sed. Extract: 1 Injection: Fish liver metabolism, fertilization, egg viability.	Histopathology	Parophrys vetulus	3
										Survival		
										MFO Activity		
				Dosewallips R.	1			1754	Sed. Extract: 12d Inj.Schedule: Fish liver metabolism, fertilization, egg viability.	Histopathology	Parophrys vetulus	1
										Survival		
										MFO Activity	_	
7WA8601	Effects of Sea-Surface Contaminants in Puget Sound.	1986-1986	once	Elliott Bay	20	Battell e - MRL	Hardy, J.	1551	Microlayer - egg viability	Survival to Hatching	Psettichthyes melanostictus	24
				Commencement Bay	8			1751	Sed. Extract: Disease Induction, fish livers.	Histopathology	Psettichthyes melanostictu	12

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page23 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
											s	
										Survival		
				Puget Sound - Central Basin	4			1040	Microlayer Extract: Genotoxicity in vivo.	Anaphase Aberration	Psettichthyes melanostictus	20
				Sequim Bay	2			1551	Microlayer - egg viability	Survival to Hatching	Engraulis mordax	10
								1551	Microlayer - egg viability	Survival to Hatching	Strongylocentrotus droebachiensis	10
								1551	Microlayer - egg viability	Survival to Hatching	Mytilus edulis	10
1WO7601	Sediment toxicity bioassays.	1976-1977	once	Elliott Bay dumpsite	1	EPA - Newport	Swartz, R.	1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Protothaca staminea	11
				Duwamish R.	3			1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Macoma inquinata	11
				Coos Bay	4			1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Glycinde picta	11
				Yaquina Bay	1			1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	11
				Skipanon R.	1			1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Cumacea	11
				Puget Sound (?)	1							
2OR7201	Neoplasms in oysters caged in Oregon estuaries.	1972-1976	once	Yaquina Bay	6	OSU	Mix, M.	1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	Histopathology	Ostrea lurida	9
				Alsea Bay	1							
				Tillamook Bay	1							
				Puget Sound - Olympia Oyster Co.	1							
6OR7401	Columbia River Disposal Site, Mouth of the Columbia River: Macrobenthos.	1974-1976	11 dates	Columbia R. Mouth	260	OSU	Richardson, M.	2206	Community Status: Macrobenthos>1mm: 0.1m2 Smith-McIntyre grab.	Taxon Group Biomass	Macroinfauna >1mm	260
										Species Abundance		
3OR6801	Proliferative	1968-1969	2x	Yaquina Bay	1	US FWS-	Farley, C.A.	2162	Invert. health -	Histopathology	Mytilus	1

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page24 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	disease in mussels.					Oxford, Md.			histopathology		edulis	
3OR7201	Response of polychaete worms to dredging and disposal.	1972-1972	3-6X	Coos Bay: dredged	6	OSU	McCauley, J.	1927	Sed.: 8 wk Recolonization in situ.	Total Abundance	Capitella capitata	9
				Coos Bay: spoil area	3			1927	Sed.: 8 wk Recolonization in situ.	Total Abundance	Polydora ligni	9
								1927	Sed.: 8 wk Recolonization in situ.	Total Abundance	Pseudopolydora kempi japonica	9
								1927	Sed.: 8 wk Recolonization in situ.	Total Abundance	Streblospio benedicti	9
3OR7601	Proliferative disorders of Mytilus edulis, Yaquina Bay, Ore.	1976-1981	4-9x per yr.	Yaquina Bay	4	OSU	Mix. M.	2162	Invert. health - histopathology	Histopathology	Mytilus edulis	4
6OR7201	Effects of hopper dredging and in-channel spoiling: Coos Bay, OR.	1972-1972	twice	Coos Bay - Isthmus Slough (dredged)	6	OSU	Slotta, L.S.	2205	Community Status: Macrobenthos>1mm: 0.04m2 grab.	Total Abundance	Macroinfauna >1mm	9
				Coos Bay disposal	3							
7OR7901	Coos Bay offshore disposal.	1979-1982	3-4x/year	Coos Bay entrance	164	OSU	Hancock, D.	2233	Community Status: Macrobenthos>0.5mm:0.09m2 box core	Species Abundance	Macroinfauna >0.5mm	164
				Coos Bay - Isthmus Slough	4			1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Macoma inclusa	5
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Acila castrensis	5
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Cancer magister	5
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Dendraster excentricus	5
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Abarenicola pacifica	5
								1305	Sed.: 10d Acute Tox. to adults	Survival	Macoma inclusa	5
								1305	Sed.: 10d Acute Tox.	Survival	Crangon	5

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page25 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									to adults		nigricauda	
								1305	Sed.: 10d Acute Tox. to adults	Survival	Crangon stylirostris	5
								1305	Sed.: 10d Acute Tox. to adults	Survival	Crangon franciscorum	5
								1305	Sed.: 10d Acute Tox. to adults	Survival	Citharichthyes sordidus	5
								1305	Sed.: 10d Acute Tox. to adults	Survival	Abarenicola pacifica	5
								1305	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	5
1CA7501	Hatching success of grunion eggs in power plant effluent.	1975–1975	Once	"A harbor" in the SCB.	1?	Occ.Col 1.	Ehrlich, K.	1451	Receiving water: hatching success	Survival to Hatching	Leuresthes tenuis	1
1CA7502	Fin erosion disease induced in the laboratory, in Dover sole.	1975–1976	once	Palos Verdes shelf	1	SCCWRP	Sherwood, M.	1756	Sed.: 1yr Disease induction (lab), fish		Microstomus pacificus	1
1CA7503	Effect of Oakland Inner Harbor dredged material on juvenile Cancer magister.	1975	once	Oakland Inner Harbor	1	BML	Peddicord, R.	1351	Sed. 21d Toxicity, Juveniles	Survival	Cancer magister	1
										Abnormal molting		
1CA7801	Sediment bioassays: NAVSTA San Diego dredging.	1978–1979	Once	NAVSTA Docks	14	NOSC	Salazar, M.H.	1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Neanthes arenaceodentata	14
								1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Macoma nasuta	1
								1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Protothaca staminea	13
								1304	Sed.(Flow Th.): 10d Acute Tox. to adults	Survival	Metamysidopsis elongata	14
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Acartia tonsa	14
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Acanthomysis macropsis	14
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Metamysidopsis elongata	14

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page26 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Citharichthys stigmaeus	14
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Acartia tonsa	14
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Acanthomysis macropsis	14
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Metamysidopsis elongata	14
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Citharichthys stigmaeus	14
1CA8001	Oakland Army Base bioassays.	1980-1980	once	Oakland Outer Harbor	1 MBL	?		1245	Sed. Partic.: 96h Toxicity to juveniles (LC50)	Survival	Microstomus pacificus	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Crangon nigricauda	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Acartia tonsa	1
1CA8301	Bioassays: Toxicity of San Luis drain waters.	1983-1983	once	San Luis Drain	1 MBL	Hansen, J.C.		1602	Rec. Water: 96h Productivity	Cell Proliferation Cell density Chlorophyll a production	Thallassiosira decipiens	1
								1207	Receiving water: 96h Acute Toxicity: Adults	Survival	Eurytemora hirudinoides	1
								1207	Receiving water: 96h Acute Toxicity: Adults	Survival	Acartia clausa	1
								1202	Receiving water: 48h bivalve embryo bioassay	Mortality Abnormal Shell	Mya arenaria	1
								1202	Receiving water: 48h bivalve embryo bioassay	Mortality Abnormal Shell	Crassostrea virginica	1
								1401	Receiving water: 28d Tox. to adults	Survival	Crassostrea virginica	1
								1207	Receiving water: 96h Acute Toxicity: Adults	Survival	Neomysis integer	1
								1207	Receiving water: 96h	Survival	Palaemon	1

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page27 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									Acute Toxicity: Adults		macrodactylus	
								1205	Receiving water: 96h Acute Toxicity: Juveniles	Survival	Oncorhynchus tshawytscha	1
								1205	Receiving water: 96h Acute Toxicity: Juveniles	Survival	Menidia audens	1
								1207	Receiving water: 96h Acute Toxicity: Adults	Survival	Hysterocarpus traski	1
								1204	Receiving water: 48h hatching success	Survival to Hatching	Morone saxatilis	1
								1206	Receiving water: 96h Acute Toxicity to eggs and larvae	Survival	Morone saxatilis	1
										Survival to 96h post-hatching		
								1205	Receiving water: 96h Acute Toxicity: Juveniles	Survival	Morone saxatilis	1
								1420	Receiving water: 28d survival & growth: juveniles	Survival	Morone saxatilis	1
										Growth rate		
1CA8401	San Pablo Bay (Petaluma R.) bioassays: Cancer magister.	1984-1984	once	Petaluma R.	1	MBL	?	1311	Sed. Slurry: 10d Toxicity to juveniles	Survival	Cancer magister	1
										Molting frequency		
										Righting response		
1CA8501	Bioassays of Alcatraz disposal site (DMP program)	1985-1985	once	Alcatraz disposal	1	ENSECO	?	1301	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	2
										Emergence		
										Reburial		
				South Tower	1			1350	Sed. 20d Tox. to adults	Survival	Citharichthyes stigmaeus	2
								1350	Sed. 20d Tox. to adults	Survival	Macoma nasuta	2
1CA8601	SF Bay: Richmond Harbor bioassay	1986-1986	once	Richmond Harbor	1	EVS	Chapman, P.	1302	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	1

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page28 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
										Emergence		
2CA7101	Growth rate in Egregia as a measure of pollution.	1971-1971	once	Leo Carillo beach	1	CSULB	Widdowson, T.	1643	Rec. Water: 3mo. growth in situ: algal blade elongation, (cm per 2wks).	Growth rate	Egregia sp.	8
				Santa Monica Bay	3							
				Palos Verdes shelf	2							
				Laguna Beach area	2							
2CA7401	Algal succession near a sewer outfall, Wilson Cove, San Clemente I.	1974-1977	monthly (3-30x)	San Clemente I. - Wilson Cove	2	CSUF	Murray, S.	1910	Rec. Water: 3-30mo. algae succession in situ.	Species Frequency	Macroflora in situ	2
										Species Abundance RT Total		
2CA7601	Mussel growth in power plant effluent plume.	1976-1977	Twice	SONGS		USC-LA	Kastendiek, J.	1620	Rec. Water: 1mo Growth in situ: caged mussels	Growth rate	Mytilus edulis	8
										Survival		
								1621	Rec. Water: 2mo Growth in situ: caged mussels	Growth rate	Mytilus edulis	8
										Survival		
								1622	Rec. Water: 4mo Growth in situ: caged mussels	Growth rate	Mytilus edulis	8
										Survival		
2CA8001	Mussel scope for growth - San Francisco Bay.	1980-1981	once	Tomales Bay	1	Cal F&G	Martin, M.	1680	Scope for growth.	Scope for Growth	Mytilus edulis	6
				Ft. Baker	1					Maturity		
				Treasure I.	1					Ovary size		
				Hunters Point	1					Tissue Wt: Body Len.		
				San Mateo - Bridge	1							
				Redwood Creek	1							
2CA8201	Demonstration study: aufwuchs growth in EBMUD	1982-1982	Once	Berkeley - EBMUD	7	SEEHRL	Roth, J.C.	1611	Sed. Elutriate: 96h Plankton growth (mgC/ml)	Cell Proliferation	Aufwuchs-fouling community	7

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page29 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	outfall			San Pablo Bay	7							
2CA8202	Demonstration study: caged mussel growth.	1982-1983	2-3x	Berkeley - EBMUD	17	UCB - SEEHRL	Roth, J.C.	1624	Rec. Water: 2wk Growth in situ: caged mussels	Growth rate Survival	Mytilus edulis	5
								1625	Rec. Water: 6wk Growth in situ: caged mussels	Growth rate Survival	Mytilus edulis	17
								1626			Mytilus edulis	5
3CA6501	Epidermal papillomas in English sole of S.F. Bay.	1965-1966	monthly, 1yr.	San Pablo Bay	2	UC Berk.	Cooper, R.	2101	Fish health - external pathology	Fin Erosion Epidermal papillomas Size	Parophrys vetulus	13
				San Rafael Bay	1							
				Richardson Bay	1							
				Berkeley flats	2							
				Golden Gate - entrance	1							
				San Francisco Waterfront	1							
				Hunters Point	1							
				Hayward	1							
				South S.F. Bay	2							
3CA6701	Deformities in sand bass (Paralabrax nebulifer), from Southern California.	1967-1968	once	Laguna Beach area	1	UCSD - Biol	Valentine, D.W.,	2112	Fish health - external deformity	Growth Disorders	Paralabrax nebulifer	2
				Mexico (loc?)	1			2113	Fish health - spinal deformity	Developmental Disorders	Paralabrax nebulifer	1
3CA6901	Orange Co. outfall monitoring: Fish health	1969-1985	59x quarterly	OrCoSan outfall	8	OrCoSan		2101	Fish health - external pathology	Fin Erosion Epidermal papillomas Size	Demersal fishes	8

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page30 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
3CA6902	Epidermal papilloma in the English sole Parophrys vetulus, from San Francisco Bay.	1969–1970	5–7x	North Bay (San Rafael)	1	UCB	Kelly, D.	2110	Fish health – skin papillomas, size	Epidermal papillomas	Parophrys vetulus	2
				Berkeley – EBMUD	1					Size		
3CA7001	LACSD Demersal fish surveys.	1970–present	50 (quarterly)	Palos Verdes shelf	21	LACSD		2101	Fish health – external pathology	Fin Erosion	Demersal fishes	21
						SCCWRP?				Epidermal papillomas Size		
3CA7201	Diseases and anomalies in Southern California demersal fishes.	1972–1975	2x yearly (approx)	Santa Monica Bay	1?	SCCWRP	Sherwood, M.J.	2120	Fish health – external pathology, liver histopathology, size.	Fin Erosion	Demersal fishes	6
										Epidermal papillomas Size Histopathology		
				Palos Verdes shelf	1?			2121	Fish health – Liver–somatic index.	Size Tissue Wt:Body Wt.	Microstomus pacificus	5
				San Pedro Bay	1?							
				Santa Catalina I.	1?							
				Pt. Loma	1							
3CA7202	Diseases and anomalies in Southern California demersal fishes: Pismo Beach, San Miguel I.	1972–1972	once	Pismo Beach	1	SCCWRP	Gammon, R.	2101	Fish health – external pathology	Fin Erosion	Demersal fishes	5
				San Miguel I.	1					Epidermal papillomas Size		
3CA7301	So. Cal. Bight:	1973–1973	once	Santa Monica Bay	9	SCCWRP	Mearns. A.	2120	Fish health –	Fin Erosion	Demersal	27

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page31 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	SCCWRP synoptic trawl survey.								external pathology, liver histopathology, size.		fishes	
				Palos Verdes shelf	9					Epidermal papillomas Size Histopathology		
				San Pedro Bay	9							
3CA7302	A trawl survey off Laguna Beach and Dana Pt.:	1973-1974	8x (quarterly)	Laguna Beach area	9	SCCWRP	Mearns, A.	2120	Fish health - external pathology, liver histopathology, size.	Fin Erosion	Demersal fishes	9
										Epidermal papillomas Size Histopathology		
3CA7601	Histopathology of bivalve molluscs: Southern California Bight: OCS Intertidal surveys.	1976,1978	2x	Goleta Pt.	1	SCCWRP	Mearns. A.	2163	Invert. health - histopathology	Histopathology	Mytilus californicus	1
				Palos Verdes shelf	1	NMFS - Oxford	Farley, A.	2163	Invert. health - histopathology	Histopathology	Macoma carlottensis	1
3CA7701	Anchovies in the Southern California Bight: starving larvae.	1977-1977	once	Southern Cal. Bight offshore	64	NOAA-SWFS-La Jolla	O'Connell, C.	2055	Fish health - starving larvae	Emaciation	Engraulis mordax	64
3CA7702	Demersal fish health: So. California oil drilling areas.	1977-1977	once	Pt. Conception	6	SCCWRP	Mearns, A.	2101	Fish health - external pathology	Fin Erosion	Demersal fishes	32
				Coal Oil Pt.	7					Epidermal papillomas Size		
				Tanner Bank	9							
				San Miguel I.	10							
3CA7901	Hepatic MFO in California flatfishes.	1979-1980	2x	Monterey Canyon	1	UC- LIV	Spies, R.	2104	Fish health - Reproductive condition,	Fecundity	Citharichthyes sordidus	4

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page32 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									morphometrics, MFO activity.			
										Size Tissue Wt:Body Wt. MFO Activity Atresia: incidence		
				Santa Barbara Channel	1			2104	Fish health - Reproductive condition, morphometrics, MFO activity.	Fecundity	Citharichthyes stigmaeus	2
										Size Tissue Wt:Body Wt. MFO Activity Atresia: incidence		
				Santa Monica Bay - Hyperion	1							
				Palos Verdes shelf	1							
3CA8101	Histopathology of sea urchins, mussels in the So. California Bight.	1981-1981	Once	Dana Pt.	1	Cal. State U.	Jenkins, K.	2160	Invert. health - gonad histopathology	Histopathology	Strongylocentrotus purpuratus	3
				Redondo Beach	1	SCCWRP	Brown, D.	2161	Invert health - histopathology	Histopathology	Mytilus californicus	3
				Palos Verdes - Whites Pt.	1	USC	Perkins, E.					
3CA8102	Histopathology: white croaker	1981-1981	once	Dana Pt.	1	USC - LA	Perkins, E.	2108	Fish health - liver, muscle pathology	Histopathology	Genyonemus lineatus	2
				Palos Verdes shelf	1	SCCWRP CalState - L.Bch.	Brown, D. Jenkins, K.				—	
3CA8201	Starry flounder reproductive success and MFO activity.	1983-1985	3 yr	Moss Landing	1	UC - LL	Spies, R.	2104	Fish health - Reproductive condition, morphometrics, MFO activity.	Fecundity	Platichthyes stellatus	7

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page33 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
										Size Tissue Wt:Body Wt. MFO Activity Atresia: incidence		
				Santa Cruz	1			2102	Fish health - histopathology	Histopathology	Platichthyes stellatus	5
				San Pablo Bay	1			2122	Fish health - MFO activity	MFO Activity	Lepidopsetta bilineata	5
				Berkeley Flats	1							
				Oakland/Alameda	1							
				South S.F. Bay	1							
3CA8301	Histological condition of fish livers.	1983-1984	once	Palos Verdes shelf	1	SCCWRP	Rosenthal, K.	2103	Fish health - liver pathology	Histopathology	Icelinus quadriseriatus	3
				Santa Monica Bay	2			2103	Fish health - liver pathology	Histopathology	Symphurus atricauda	5
				San Clemente I.	1			2103	Fish health - liver pathology	Histopathology	Citharichthyes sordidus	3
				Cortes Bank	1			2103	Fish health - liver pathology	Histopathology	Zaniolepis latipinnis	4
				Pt. Loma	1			2103	Fish health - liver pathology	Histopathology	Scorpaena guttata	3
				Mission Bay	1			2103	Fish health - liver pathology	Histopathology	Paralabrax clathratus	2
				Torrey Pines	1							
				San Mateo Pt.	1							
3CA8302	Histopathology in Cd-exposed scorpionfish.	1983-1983	once	Anacapa I.	1	UCLA	Perkins, E.	2102	Fish health - histopathology	Histopathology	Scorpaena guttata	1
3CA8303	Histopathology, Cyt-P450, metallothionens in scorpionfish caged near Palos Verdes.	1983-1983	once	Palos Verdes shelf	1	SCCWRP	Gossett, R.	1755	Rec. Water: caged fish exposure in situ: Histopath, metallothionens, Cyt. P450	Survival	Scorpaena guttata	1
										Histopathology Metallothionen Induction Cytochrome P-450		

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page34 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
3CA8401	Fish histopathology - Los Angeles area.	1984-1984		San Pedro Bay	3	NMFS	Malins, D.	2102	Fish health - histopathology	Histopathology induction	Fishes	6
				Palos Verdes - Whites Point	1							
				Santa Monica Bay	1							
				Dana Pt.	1							
3CA8501	Contaminants and Reproduction, S. Cal. Bight.	1985-1986		San Pedro Bay	1	SCCWRP	Cross, J.	2105	Fish health - reproductive condition, morphometrics, histopathology.	Size	Genyonemus lineatus	2
										Atresia: incidence		
										Ovary size		
										Testis size		
										Tissue Wt:Body Wt.		
										Histopathology		
				Dana Pt.	1	VANTUNA	Hose, J.E.	2010	Fish health - egg and larval viability	Survival to Hatching	Genyonemus lineatus	2
										Survival to 96h post-hatching		
								1052	Genotoxicity in vivo - 12 h fish gastrulae	Anaphase Aberration	Genyonemus lineatus	2
3CA8502	Histopathology of 3 Fish species: Southern California Bight.	1985-1985	once	Santa Catalina I.	2	UCLA MBR	Perkins, E.	2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	Size	Genyonemus lineatus	1
										Tissue Wt:Body Wt.		
										Histopathology		
										Maturity		
				Santa Barbara I.	1			2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	Size	Paralabrax clathratus	6
										Tissue Wt:Body Wt.		
										Histopathology		

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page35 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Pt. Dume	1			2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	Maturity Size Tissue Wt:Body Wt. Histopathology Maturity	Sebastolobus altivelis	2
				Palos Verdes shelf	1							
				Santa Monica Bay - Hyperion	1							
				Anacapa I.	1							
5CA8201	SoCal outfalls: fish reproduction.	1982-1983	11 (monthly)	Palos Verdes - Whites Pt.	1	SCCWRP	Cross, J.	2105	Fish health - reproductive condition, morphometrics, histopathology.	Size Atresia: incidence Ovary size Testis size Tissue Wt:Body Wt. Histopathology	Zaniolepis latipinnis	3
				Santa Monica Bay - Hyperion	1			2105	Fish health - reproductive condition, morphometrics, histopathology.	Size Atresia: incidence Ovary size Testis size Tissue Wt:Body Wt. Histopathology	Icelinus quadriseriatus	3
				Santa Monica Bay	1						--	
6CA1101	Ecology of kelp beds in the Southern California Bight.	1911-1970	34X (annual)	San Mateo	1	MLML	Foster, M.S.	2412	Community status: Areal extent of kelp bed canopies.	Species Stocks	Macrocystis pyrifera/sp.	3
				San Onofre	1							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page36 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Barn Kelp	1							
6CA5101	Benthic fauna of the Castro Creek area.	1951–1952	once	Castro Creek area	36			2207	Community Status: Macrobenthos>1mm: Petersen grab.	Species Abundance	Macroinfauna >1mm	36
6CA5501	A historical overview of kelp in southern California.	1955–1979	8x (at least)	San Diego	8	Neushul Mariculture	Harger, B.	2412	Community status: Areal extent of kelp bed canopies.	Species Stocks	Macrocystis pyrifera/sp.	33
				Los Angeles	11							
				Santa Barbara	13							
				Santa Catalina I.	1							
6CA6001	Water and sediment quality, and pollutional characteristics in 3 areas in San Francisco Bay.	1960–1961	6x	Suisun Bay	10	SERL	McCarty, J.C.	2221	Community status: Macrobenthos >1mm: 0.05 – 0.08m2 orange peel grab.	Species Abundance	Macroinfauna >1mm	28
				San Pablo Bay	9							
				South Bay	9							
6CA6101	A comprehensive study of San Francisco Bay.	1961–1962	6x	Suisun Bay	10	SERL	Storrs, P.N.	2237	Community status: Macrobenthos >0.5mm: 0.07m2 orange peel grab.	Species Abundance	Macroinfauna >0.5mm	28
				San Pablo Bay	9							
				South Bay	9							
6CA6201	A comprehensive study of San Francisco Bay, 1962–63.	1962–1963	6x	Suisun Bay	10	SERL	Storrs, P.N.	2238	Community status: Macrobenthos >0.6mm: 0.085m2 orange peel grab.	Species Abundance	Macroinfauna >0.6mm	28
				San Pablo Bay	9							
				N. Central Bay	9							
6CA6301	A comprehensive study of San Francisco Bay, 1963–64.	1963–1964	6x	N.Central Bay	6	SERL	Storrs, P.N.	2238	Community status: Macrobenthos >0.6mm: 0.085m2 orange peel grab.	Species Abundance	Macroinfauna >0.5mm	18
				Central Bay	6							
				South S.F. Bay	6							
6CA6801	Changes in the	1968–1970	2–3x	Santa Monica Bay –	6	CSULB	Widdowson,	2406	Community status:	Species Frequency	Macroflora	15

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page37 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	intertidal algal flora of the Los Angeles area.			Malibu			T.		Macroalgae in situ: line transects		in situ	
				Palos Verdes shelf	5							
				Dana Pt.	4							
6CA6901	LACSD benthos monitoring: Palos Verdes.	1969-1981	29 (2/yr)	Palos Verdes shelf	44	LACSD	Garrison, W.E.	2210	Community Status: Macrobenthos>1mm: 0.04m2 grab.	Species Abundance	Macroinfauna >1mm	44
								2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	18
										Total Species Richness Taxon Group Abundance RT Total Total Abundance		
								2402	Community status: Macrobenthos: Quadrat observations.	Species Frequency	Biota in situ: (photos)	16
6CA6902	Palos Verdes shelf: Rocky subtidal monitoring.	1969, 1977	2x	Palos Verdes shelf	6	SCCWRP	Grigg, R.	2405	Community status: Macrobenthos >1cm; 1.0m2 quadrat in situ	Species Abundance	Macroflora in situ	8
				La Jolla	2							
6CA7001	Benthos; Orange Co. Sewer outfall.	1970-1972	12x	OrCoSan outfall	6	UC- SD	Smith, G.B.	2207	Community Status: Macrobenthos>1mm: Petersen grab.	Species Abundance	Macroinfauna >1mm	6
				Dana Pt.	2							
6CA7002	Toxicity and biostimulation in San Francisco Bay - Delta waters.	1970-1971	once	Suisun Bay	?			2239	Community status: Macrobenthos >0.6mm: 0.05m2 Ponar grab.	Species Abundance	Macroinfauna >0.6mm	50
				San Leandro Bay	?							
				South S.F. Bay	?							
6CA7101	Long Beach Generating Station: Benthos.	1971-1971	once	Long Beach Harbor	9	Battell e - MRL	Karr, M.H.	2210	Community Status: Macrobenthos>1mm: 0.04m2 grab.	Species Abundance	Macroinfauna >1mm	9

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page38 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
6CA7102	City of L.A. - Hyperion outfall monitoring.	1971-1985	30x (2/yr)	Santa Monica Bay - Hyperion	25	L.A. City		2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	23
										Total Species Richness		
										Taxon Group Abundance RT Total		
										Total Abundance		
								2216	Community Status: Macrobenthos>1mm: 0.1m2 grab.: All species; ITI species abundance	Species Abundance	Macroinfauna >1mm	25
										Infaunal Index		
6CA7103	Wave disturbance and zonation of subtidal benthos: Monterey Bay, CA.	1971-1975	to 12X	Monterey Bay N. sandflat	5	MLML	Oliver, J.	2234	Community Status: Macrobenthos>0.5mm: Shipek	Species Abundance	Macroinfauna >0.5mm	11
				Monterey Bay S. sandflat	6					Total Abundance		
										Total Species Richness		
6CA7104	Effect of temperature on distribution and biomass of Mytilus edulis in the Alamitos Bay area.	1971-1971	once	Alamitos Bay	3	ClColl	Feldmeth, C.R.	2254	Population status: Abundance, size structure; scraped samples.	Species Abundance	Mytilus edulis	6
				San Gabriel R.	3					Size		
6CA7301	Macrobenthos >1mm, Palos Verdes shelf. L.A. County monitoring.	1973-1973	Once	Palos Verdes shelf	40	USC-LA	Smith, R.	2209	Community Status: Macrobenthos>1mm: 0.06m2 grab.	Total Species Richness	Macroinfauna >1mm	40
						SCCWRP	Greene, C.			Species Abundance Total Abundance		
6CA7302	S. F. Bay: Dredge disposal study: macrobenthos	1973-1974	5x	Mare I. Strait	2	SRI	Liu, D.H.W.	2207	Community Status: Macrobenthos>1mm: Petersen grab.	Species Abundance	Macroinfauna >1mm	11
				Oakland Inner Harbor	1							
				Redwood City Harbor	2							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page39 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Carquinez Strait	2							
				Alcatraz disposal	1							
				Hunters Point disposal	1							
				South Bay disposal	2							
6CA7303	Changes in intertidal flora of Southern California.	1973-1974	1-3x	Santa Barbara area	12	CSULB	Thom, R.	2406	Community status: Macroalgae in situ: line transects	Species Frequency	Macroflora in situ	72
				Ventura area	14							
				Santa Monica Bay	14							
				Palos Verdes shelf	3							
				San Pedro Bay	2							
				Orange County	9							
				San Diego area	9							
6CA7304	Bottom sediment sampling and analysis program: San Bruno shoreline.	1973-1978		San Bruno shoreline	6	Eng.Sci Inc.		2239	Community status: Macrobenthos >0.6mm: 0.05m2 Ponar grab.	Species Abundance	Macroinfauna >0.6mm	6
6CA7401	South San Francisco Bay mudflat: macrobenthos.	1974-1983	quarterly-monthly	South S.F. Bay mudflat	3	USGS	Nichols, F.	2209	Community Status: Macrobenthos>1mm: 0.06m2 grab.	Total Species Richness Species Abundance Total Abundance	Macroinfauna >1mm	3
								2232	Community Status (Intertidal): Macrobenthos>0.5mm:0.17m2 core	Species Abundance Total Abundance Total Species Richness	Macroinfauna >0.5mm	1
6CA7402	Benthic survey near new U.S. Army Corps of Engineers base yard, Richardson Bay.	1974-1974		Richardson Bay	7	Mar.Ecol.Inst.		2219	Community status: Macrobenthos >1mm: 0.05m2 Ponar grab.	Species Abundance	Macroinfauna >1mm	7
6CA7403	Semi-annual monitoring,	1974-1974	2x	Redwood City	10			2240	Community status: Macrobenthos >0.6mm:	Species Abundance	Macroinfauna >0.6mm	10

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page40 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	southern San Mateo county, California.								0.06m2 Ponar grab.			
6CA7501	Orange County outfalls: benthos monitoring.	1975–1985	30x (1–2x/y)	OrCoSan outfall	42	OrCoSan SCCWRP	Greene, C.	2207	Community Status: Macrobenthos>1mm: Petersen grab.	Species Abundance	Macroinfauna >1mm	42
6CA7502	Kelp monitoring: Palos Verdes.	1975–1986	quarterly	Palos Verdes shelf	5	Cal F&G	Wilson, K.	2404	Community status: Belt transects: Kelp, epibenthos abundance.	Species Abundance	Macrocystis pyrifera/sp.	5
						Kelco	McPeak, R.	2412	Community status: Areal extent of kelp bed canopies.	Species Stocks	Macrocystis pyrifera/sp.	1
6CA7503	Sacramento–San Joaquin Delta water quality surveillance program: data.	1975–1982	2–12x	Suisun Bay	1–2			2240	Community status: Macrobenthos >0.6mm: 0.06m2 Ponar grab.	Species Abundance	Macroinfauna >0.6mm	1–2
6CA7504	Macroinvertebrate surveys: waste discharge requirements for the City and County of San Francisco, southeast plant.	1975–1976	2x	San Francisco	4	Env.Qual.Analysts		2239	Community status: Macrobenthos >0.6mm: 0.05m2 Ponar grab.	Species Abundance	Macroinfauna >0.6mm	4
6CA7505	Macroinvertebrate surveys: EBMUD : Oakland.	1975–1975	once	Oakland – Bay Bridge	12	EQA		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	12
6CA7506	Macroinvertebrate survey: Oakland outer Harbor.	1975–1976	2x	Oakland – Outer Harbor	6	Leighton & Assoc.		2241	Community Status: Macrobenthos>0.5mm: 0.15m2 core	Species Abundance	Macroinfauna >0.5mm	6
6CA7507	South Bay dischargers: Benthic surveys	1975–1976	4x	South S.F. Bay	15–30	Smith, E.H. & Assoc.		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	15–30
6CA7601	Waste discharge	1976–1976	2x	Martinez	4	PEL		2236	Community Status:	Species Abundance	Macroinfauna	4

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page41 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	permit (NPDES) for Shell Oil Co., Martinez: benthic surveys.								Macrobenthos>0.5mm: 0.05m2 Ponar grab		>0.5mm	
6CA7602	Waste discharge permit (NPDES) for City of Richmond, CA: benthic surveys.	1976-1976	2x	Richmond	4	PEL		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	4
6CA7603	East Bay Dischargers Authority predischarge monitoring: benthic surveys	1976-1976	2x	East Central Bay	10	Kin Lab		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	10
6CA7701	Petaluma River: Benthic surveys	1977-1978	4x	Petaluma R.	3	Anatec		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	3
6CA7702	EBMUD diffuser: preconstruction study: benthic surveys.	1977-1977	once	Oakland shoreline	12	B&C Eng.		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	17
				Oakland - Bay Bridge	5							
6CA7703	Benthic survey - San Pablo Bay dredge sites.	1977-1978	4x	San Pablo Bay	3	UBResea rch		2242	Community Status: Macrobenthos>0.5mm: 0.18m2 core	Species Abundance	Macroinfauna >0.5mm	3
6CA7801	So. Cal. Bascom survey.	1978-1978	once	Sant Monica Bay	144	SCCWRP	Bascom, W.	2215	Community Status: Macrobenthos>1mm: 0.1m2 grab.: Taxon Group biomass, ITI species abundance	Taxon Group Biomass	Macroinfauna >1mm	300
				San Pedro Bay	102					Infaunal Index		
				Palos Verdes shelf	14							
				San Diego area	40							
6CA7802	San Pablo Bay field studies: benthic surveys.	1978-1979	4x	Pt. Richmond	5	Anatec Labs		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	20
				San Pablo Bay	10							

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page42 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Pt. San Quentin	5							
6CA7901	Changes in intertidal algae at Palos Verdes.	1979-1979	once	Palos Verdes shelf	5	SCCWRP	Harris, L.	2406	Community status: Macroalgae in situ: line transects	Species Frequency	Macroflora in situ	5
6CA7902	San Francisco Bayside overflows study.	1979-1979	5x	San Francisco	16	CH2M Hill		2219	Community status: Macrobenthos >1mm: 0.05m2 Ponar grab.	Species Abundance	Macroinfauna >1mm	16
6CA8101	KELCO Monitoring: Annual benthic surveys.	1981-1986	annual	Pt. Loma kelp bed	60	KELCO	Barilotti, C.	2403	Community status: Macrocystis, sea urchins; 1.0m2 quadrat, in situ photos.	Species Abundance	Macrocystis pyrifera/sp.	60
6CA8102	Equivalent protection study to Chevron, USA.	1981-1981	4x	Castro Creek	12	CH2M Hill		2236	Community Status: Macrobenthos>0.5mm: 0.05m2 Ponar grab	Species Abundance	Macroinfauna >0.5mm	28
				Corte Madera Creek	8							
				Gallinas Creek	8							
6CA8401	S.F. Bay: Dredged Material Disposal Site survey: Golden Gate area.	1984-1984	once	Bonita Cove	6	Kin. Lab	Carpenter, P.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	3
				South Tower	6					Total Species Richness Taxon Group Abundance RT Total Total Abundance		
				Alcatraz disposal	6							
7CA6201	Pt. Loma ocean outfall monitoring program.	1962-1986	annual -quarterly	Pt. Loma	23	San Diego: City	Hamilton, S.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	15
										Total Species Richness Taxon Group Abundance RT Total Total Abundance		
								2101	Fish health - external pathology	Fin Erosion Epidermal	Demersal fishes	7

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page43 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
										papillomas Size		
								2412	Community status: Areal extent of kelp bed canopies.	Species Stocks	Macrocystis pyrifera/sp.	1
7CA7401	City of Oxnard outfall monitoring: benthos, fish surveys.	1974-1974	4	Oxnard-Port Hueneme	19	MBC, Inc.		2234	Community Status: Macrobenthos>0.5mm: Shipek	Species Abundance	Macroinfauna >0.5mm	19
										Total Abundance Total Species Richness		
						EQA		2101	Fish health - external pathology	Fin Erosion	Demersal fishes	14
										Epidermal papillomas Size		
7CA7601	Marina del Rey baseline survey.	1976-1979	quarterly-monthly	Marina del Rey	8	HEP	Soule, D.	1923	Fouling community: glass slide growth racks.	Species Frequency	Macroinfauna >0.5mm	8
								2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	11
										Total Species Richness Taxon Group Abundance RT Total Total Abundance		
								1750	Rec. Water: caged fish exposure in situ	Distress	Paralichthyes californiensis	1
										Survival		
								1750	Rec. Water: caged fish exposure in situ	Distress	Hypsopsetta guttulata	1
										Survival		
								1750	Rec. Water: caged fish exposure in situ	Distress	Phanerodon furcatus	1
										Survival		

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page44 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
7CA7701	60-m control survey.	1977-1977	once	So. Calif. Bight	71	SCCWRP	Word, J.Q.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance	Macroinfauna >1mm	71
										Total Species Richness		
										Taxon Group Abundance RT Total		
										Total Abundance		
								2101	Fish health - external pathology	Fin Erosion	Demersal fishes	53
										Epidermal papillomas		
										Size		
7CA7801	SW Ocean Outfall Monitoring	1978-1983	3x/yr	SW Ocean Outfall	20	CH2M Hill	Wilson, D.	2213	Community Status: Macrobenthos>1mm: 0.1m2 grab.ITI, T# only	Total Abundance	Macroinfauna >1mm	20
										Infaunal Index		
								2110	Fish health - skin papillomas, size	Epidermal papillomas	Demersal fishes	12
										Size		
7CA8001	Sediment toxicity and macrobenthic communities: Palos Verdes.	1980-1980	once	Palos Verdes shelf	6	EPA-New port	Swartz, R.C.	2203	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Total Abundance	Macroinfauna >1mm	7
										Total Biomass		
										Total Species Richness		
										Taxon Group Abundance		
										Taxon Group Biomass		
										Dom.Sp. Abundance		
										Sens.Sp. Abundance		
										Dominance		
										Infaunal Index		
				Santa Monica	1			1303	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	7
7CA8002	East Bay Municipal	1980-1981	up to	Pt. Isabel	5	Kinneti		2236	Community Status:	Species Abundance	Macroinfauna	25

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page45 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	Utilities District local effects monitoring.		3x			c Labs			Macrobenthos>0.5mm: 0.05m2 Ponar grab		>0.5mm	
				Berkeley Flats	5	Anatec Labs		2101	Fish health - external pathology	Fin Erosion Epidermal papillomas Size	Demersal fishes	3
				San Leandro Bay	5							
				Berkeley offshore	5							
				Berkeley - EBMUD	5							
7CA8101	CSDOC, Pt. Dume: benthos, fish surveys.	1981-1983	5x (2/yr)	OrCoSan outfall	49	SCCWRP	Thompson, B.	2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Species Abundance Total Species Richness Taxon Group Abundance RT Total Total Abundance	Macroinfauna >1mm	57
				Pt. Dume	8			2101	Fish health - external pathology	Fin Erosion Epidermal papillomas Size	Demersal fishes	57
7CA8301	Sediment toxicity and macrobenthic communities: Palos Verdes.	1983-1983		Palos Verdes shelf	7	EPA-New port	Swartz, R.C.	2203	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Total Abundance Total Biomass Total Species Richness Taxon Group Abundance Taxon Group Biomass Dom.Sp. Abundance Sens.Sp. Abundance Dominance Infaunal Index	Macroinfauna >1mm	8
				Santa Monica Bay	1			1303	Sed.: 10d Acute Tox. to adults	Survival	Rhepoxynius abronius	8

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page46 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
7CA8501	A field trial of the sediment quality triad in San Francisco Bay.	1985-1985	once	San Pablo Bay N.	10	EVS Consultants	Chapman, P.M.	1302	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	30
				Oakland/Alameda	10			1220	Sed. Slurry: 48h bivalve embryo bioassay.	Emergence Mortality Abnormal Shell	Mytilus edulis	9
				Islais Creek Waterway	10			1810	Sed.: 48h adult survival & reburial	Survival Reburial	Macoma balthica	9
								1550	Sed.(>69u): 4wk Reproduction & Survival	Survival Larvae released Larval release rate Developmental Disorders Larval Devel. Rate	Tigriopus californicus	9
								2202	Community Status: Macrobenthos>1mm: 0.1m2 grab.	Total Species Richness Total Abundance Taxon Group Abundance RT Total Dom.Sp. Abundance	Macroinfauna >1mm	9
3CA7801	Cooperative Striped Bass Survey.	1978-1983	monthly - quarterly		1	NMFS-SW FS	Whipple, J.	2050	Fecundity, fertilization success	Eggs produced	Morone saxatilis	6
					1					Fertilization efficiency	_	
					1 1 1 1							
1HI7901	Sediment bioassays, Pearl	1979-1979	once	Pearl Harbor, West Loch	1	HIMB	Brock, R.E.	1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Sabellastarte	1

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page47 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	Harbor West Loch.										sanctaejosephi	
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Crassostrea virginica	1
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Dascyllus albisella	1
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Periclemenes grandis	1
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Montipora verrucosa	1
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Artemia salina	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Sabellastarte sanctaejosephi	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Crassostrea virginica	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Dascyllus albisella	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Periclemenes grandis	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Montipora verrucosa	1
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Artemia salina	1
								1305	Sed.: 10d Acute Tox. to adults	Survival	Sabellastarte sanctaejosephi	1
								1305	Sed.: 10d Acute Tox. to adults	Survival	Dascyllus albisella	1
								1305	Sed.: 10d Acute Tox. to adults	Survival	Quadrans palatum	1
								1305	Sed.: 10d Acute Tox. to adults	Survival	Saron marmoratus	1
1HI8201	Sediment bioassays, Nawiliwili Harbor, Kauai.	1982-1982	once	Nawiliwili Harbor	3	Oceanic Inst.	Magarelli, P.	1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Penaeus stylirostris	4
				Kaneohe Bay	1			1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	Survival	Chelon engeli	4
								1251	Sed.Elut. (H2O): 96h	Survival	Artemia	4

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page48 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
									Acute Tox. to adults		salina	
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Penaeus stylirostris	4
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Penaeus japonicus	4
								1250	Sed. Partic.: 96h Acute Tox. to adults	Survival	Artemia salina	4
								1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	Survival	Chelon engeli	4
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Tapes japonica	4
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Penaeus stylirostris	4
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Penaeus japonicus	4
1HI8202	Honolulu Harbor: dredging in Pier 16 area.	1982?-1982?	once	Honolulu Harbor	3	Oceanic Inst.	Szyper, J.P.	1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	Survival	Chelon engeli	3
								1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	Survival	Penaeus japonicus - vannamei (juv)	3
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Artemia salina	3
								1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Chelon engeli	3
								1246	Sed. Partic.: 96h Toxicity to adults (LC50)	Survival	Penaeus japonicus	3
								1245	Sed. Partic.: 96h Toxicity to juveniles (LC50)	Survival	Artemia salina	3
								1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	Survival	Tapes japonica	3
								1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	Survival	Penaeus japonicus - vannamei (juv)	3
6HI7201	Pearl Harbor	1972-1972	once	Pearl Harbor	18	NUC- HL	Evans, E.C.	2208	Community status:	Species Abundance	Macroinfauna	10

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page49 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
	Biological Survey								Macrobenthos > 420u: 0.3ft grab (SCUBA)		>1mm	
										Taxon Group Biomass Dom.Sp. Abundance		
								2251	Community status: Micromollusks >0.062 mm.	Total Species Richness	Micromollusc s >62u	18
										Total Abundance Dom.Sp. Abundance RT Total		
								2402	Community status: Macrobenthos: Quadrat observations.	Species Frequency	Biota in situ: (photos)	9
6HI7301	Micromollusc monitoring: Barber's Pt., HI.	1973-1983	6x (3 yr)	Barbers Pt. (POTW)	19	UH-WRRC	Kay, E.A.	2251	Community status: Micromollusks >0.062 mm.	Total Species Richness	Micromollusc s >62u	19
										Total Abundance Dom.Sp. Abundance RT Total		
6HI7601	Pearl Harbor disposal site: monitoring.	1976-1977	2x (1/yr)	Pearl Harbor Disposal		UH Env.Ctr.	Chave, K.	2252	Community status: Foraminifera >0.062 mm.	Total Abundance	Foraminifera	18
								2251	Community status: Micromollusks >0.062 mm.	Total Species Richness	Micromollusc s >62u	18
										Total Abundance Dom.Sp. Abundance RT Total		
								2401	Community status: Macrobenthos: Transect observations.	Species Frequency	Demersal fishes	8
6HI7801	Assessment at three sites: Pearl Harbor, Oahu, HI. Aug-Oct. 1978.	1978-1978	once	Pearl Harbor - Power plant 2	2	NOSC - Hawaii Lab.	Grovhoug, J.	2350	Community Status: Plankton	Taxon Group Abundance RT Total	Aufwuchs-fouling community	5
										Species Abundance RT Total Cell volume		
				Pearl Harbor - Power	2			1940	Fouling community	Species Frequency	Aufwuchs-	2

Table 1. Summary of biological effects studies. Study description, originator, tests and surveys, and number of stations tested. Studies are listed by state, general type of test conducted, year, and accession number. (Page50 of 50)

Study ID	Project Title.....	Duration ..	Freq..	Location:.....	LNSta	Prf.Ags	P.I.....	PCodes	Probes.....	Endpoints.....	Taxon.....	PNSta
				Plant 3					growth in situ: 2-3 wks		fouling community	
				Pearl Harbor - Sub. Training Ctr.	1			2212	Community Status: Macrobenthos>1mm:11 scoops.	Species Frequency	Macroinfauna >1mm	3
1BC8401	Sediment bioassays: B.C. coast.	1984-1984	once	Pt. Alberni	2	EVS Cons.	Chapman, P.	1302	Sed.: 10d Tox. to adults	Survival	Rhepoxynius abronius	12
				Powell R.	2					Emergence		
				Victoria Harbor	2							
				Howe Sound	2							
				Vancouver - False Cr., Van. Harbor	4							

170 records listed.

Table 2. Interpretation of the test type code (the first digit of the study identifier).

Type Code	Explanation
1	Laboratory bioassay
2	Field (in situ) bioassay
3	Fish or invertebrate health survey
4	(unassigned)
5	Survey of reproductive effects
6	Community survey
7	Any combination of surveys and bioassays

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page 1 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
1AK8201	Carls, M.G., and S.D. Rice.	1984	Toxic contributions of specific dfrilling mud components to larval shrimp and crabs.	Mar. Env. Res. 12:45-82.	000274
1AK8401	O'Clair, C.E., and L. Freese.	1985	Responses of Dungeness crabs, Cancer magister, exposed to bark debris from benthic deposits at log transfer facilities: Survival, feeding, and reproduction.	IN: Proceedings of the Symposium on Dungeness crab management, Oct. 9-11, 1984. Anchorage, Ak. Alaska Sea Grant Report no. 85-3:401-417. April 1985.	000275
3AK7501	McCain, B.B., M.S. Myers, W.D. Gronlund, S.R. Wellings, And C.E. Alpers.	1978	The frequency, distribution, and pathology of three diseases of demersal fishes in the Bering Sea.	J. Fish. Biol. 12:267-276.	000083
	Wellings, S.R., C.E. Alpers, B.B. McCain, and M.S. Myers.	1977	Fish disease in the Bering Sea.	Ann. N.Y. Acad. Sci.298:290-304.	000346
6AK7101	Feder, H.M., G.J. Mueller, M.H. Dick, and D.B. Hawkins.	1973	Environmental studies of Port Valdez: Preliminary benthos survey.	IN: Environmental Studies of Port Valdez. D.W. Hood, W.E. Sheils, and E.J. Kelley, eds. V. 1: pp.305-391, and Data vol.1, data section 9, pp665-800.	000392
3NA7601	Reynolds, B.H., C.A. Barszcz, D.K. Phelps, and J. Heltshe.	1981	Mussel watch - correlation of histopathology and chemical bioaccumulation in mussels (Mytilus edulis and Mytilus californianus) and oysters (Crassostrea virginica).	Unpub. Contrib. no. 228, EPA Environmantal Research Laboratory, Naragansett, R.I. 22 p.	000324
1WA6101	Cardwell, R.D., and C.E. Woelke.	1979	Marine water quality compendium for Washington State. V1. Introduction, and V2. Data.	Wash. State Dept. Fish., Olympia, Wash. March 1979. V1:75p, V2:528p.	000071
1WA7201	Westley, R.E., T. Schink, A.J. Scholz, C.L. Goodwin, R. Gerke, and M. Tarr.	1972	A preliminary evaluation of the toxicity of the bottom sediments of Olympia Harbor.	Unpub. Report: Wash. State Dept. Fish. April 1972. 52p.	000068
1WA7301	Schink, T.D. and R.E. Westley.	1974	Pacific oyster embryo bioassays of bottom sediments from Washington waters.	Unpub. Rep. Wash. State Dept. Fish. May, 1974. 24p.	000013
1WA7401	Cardwell, R.D., C.E. Woelke, M.I. Carr, and E.W. Sanborn.	1976	Sediment and elutriate toxicity to oyster larvae.	Unpub. Rep. Wash. State Dept. Fish., Jan. 1976. 44p.	000028
1WA7402	Clark, D.K.	1986	Ecological Baseline and Monitoring Project: Final Report. Part 1. Livebox bioassay studies in Port Gardner, Washington.	Report to Washington State Dept. of Ecology, WQ Investigations Section. Olympia WA. May, 1986. 25p.	000362
1WA7501	Cummins, J.M., R.R. Bauer, R.H. Reick, W.B. Schmidt, and J.R. Yearsley.	1976	Chemical and biological survey of Liberty Bay, Washington.	EPA-910/9-76-029. Sept. 1976. 145p. from Surveillance and Analysis Div., EPA, Seattle, Wa.	000199

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page 2 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
1WA7601	Shuba, P.J., H.E. Tatem, and J.H. Carroll.	1978	Biological assessment methods to predict the impact of open-water disposal of dredged material.	Report no. WES-TR-D-78-50, on the Dredged Material Research Program. Army Engineer Waterways Experiment Station, Vicksburg, Miss. Aug. 1978. 167p.	000258
1WA8101	Chapman, P.M., G.A. Vigers, M.A. Farrell, R.N. Dexter, E.A. Quinlan, R.M. Kocan, and M.L. Landolt.	1982	Survey of biological effects of toxicants upon Puget Sounbd biota. I. Broad-scale toxicity survey.	NOAA Tech. Memo. OMPA 25. 98 p. + Appendices A-E(microfiche).	000066
1WA8201	Chapman, P.M., D.R. Munday, J. Morgan, R. Fink, R.M. Kocan, M. Landolt, and R.N. Dexter.	1983	Survey of biological effects of toxicants upon Puget Sound biota. II. Tests of reproductive impairment.	NOAA Tech. Rep. NOS 102 OMS 1. 58p.	000050
	Chapman, P.M., and J.D. Morgan.	1983	Sediment bioassays with oyster larvae.	Bull. Environ. Contam. Toxicol. 31:438-444.	000074
1WA8202	Pierson, K.B., B.D. Ross, C.L. Melby, S.D. Brewer, and R.E. Nakatani.	1983	Biological testing of solid phase and suspended phase dredged material from Commencement Bay, Tacoma, Washington.	Report to U.S. Army Corps of Engineers, on Contract no. DACW67-82-C-0038. Univ. Wash. Fisheries Research Institute. April 1983. 71p.	000067
1WA8203	Dinnel, P.A., F.S. Ott, and Q.J. Stober.	1984	Seahurst Baseline Study (Apr 1982- Dec 1984): Marine Toxicology.	IN: Renton Sewage Treatment Project: Seahurst Baseline Study. Vol. X. Section 12. Marine Toxicology. Draft Final Report for the period 1 April 1982 to 31 December 1984 to the Municipality of Metropolitan Seattle. Seattle, Wa. 192 p.	000103
1WA8301	Chapman, P.M., R.N. Dexter, J. Morgan, R. Fink, D. Mitchell, R.M. Kocan, and M.L. Landolt.	1984	Survey of biological effects of toxicants upon Puget Sound biota. III. Tests in Everett Harbor, Samish and Bellingham Bays.	NOAA Tech. Mem. NOS OMS 2. 48p. + Appendices A-F(microfiche). Rockville, Md.	000056
1WA8401	Malins, D.C., S.Chan, U. Varanasi, M.H. Schiewe, J.E. Stein, D.W. Brown, M.M. Krahn, and B.B. McCain.	1985	Bioavailability and toxicity of sediment-associated chemical contaminants to marine biota.	Final Report(Activities 1 and 4) to NOAA-OAD. Feb. 1985. 16p + Tables, Figures.	000245
1WA8402	Mearns, A.J., R.C. Swartz, J.M. Cummins, P.A. Dinnel, P. Plesha, and P.M. Chapman.	1986	Interlaboratory comparison of a Sediment toxicity test using the marine amphipod, Rhepoxynius abronius.	Mar. Environ. Res. 19:13-37.	000462
1WA8403	Williams, L.G., P.M. Chapman, and T.C.	1986	A comparative evaluation of marine sediment	Mar. Env. Res. 19:225-249.	000391

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Study ID	Authors	Year	Title	Publication	Refs..
	Ginn.		toxicity using bacterial luminescence, oyster embryo and amphipod sediment bioassays.		
1WA8601	Anderson, J.W., and E.A. Crecelius.	1986	Physical, chemical, and biological analysis of sediments proposed to be dredged for the Oak Harbor marine expansion project, Oak Harbor, Whidbey Island, Washington.	Unpub. Rep. to the U.S. Army Corps of Engineers, Seattle District, contract DE-AC06-76RL0 1830, from Battelle Marine Research Lab., Sequim, Wash. 28pp.	000277
3WA6201	Miller, B.S., and S.R. Wellings.	1971	Epizootiology of tumors on flathead sole(Hippoglossoides elassodon) in East Sond, Orcas Island, Washington.	Trans. Am. Fish. Soc. 100:247-266.	000088
3WA7301	Miller, B.S.	1976	Demersal fish.	IN: Puget Sound Studies: Interim reports for the Municipality of Metropolitan Seattle. Washington Sea Grant Report (WSG-MR 76-3). A. Duxbury, ed. Sept 1976.	000381
3WA7401	Wellings, S.R., C.E. Alpers, B.B. McCain, and B.S. Miller	1976	Fin erosion disease of starry flounder(Platichthyes stellatus) and English sole(Parophrys vetulus) in the estuary of the Duwamish River, Seattle, Washington.	J. Fish. Res. Bd. Can. 33:2577-2586.	000091
3WA7501	Miller, B.S., B.B. McCain, R.G. Wingert, S.F. Borton, and K.V. Pierce.	1976	Puget Sound interim studies: Ecological and disease studies of demersal fishes near Metro-operated sewage treatment plants on Puget Sound and the Duwamish River. One-year Progress Report, Feb. - Dec. 1975.	Unpub. Rep. FRI-UW-7608 to the Municipality of Metropolitan Seattle for contract #CR2231. Fisheries Research Institute, UW. Seattle, WA. 135 p.	000337
3WA7502	Pierce, K.V.	1976	Description and incidence of abnormal livers and other organs in starry flounder and English sole from the Duwamish River, Seattle, Washington, and other nearby Puget Sound sites.	Unpub. MS Thesis, Univ. of Washington, Seattle.	000172
	Pierce, K.V., B.B. McCain, and S.R. Wellings.	1980	Hostopathology of abnormal livers and other organs of starry flounder Platichthyes stellatus (Pallas) from the estuary of the Duwamish River, Seattle, Washington, USA.	J. Fish Dis. 34(2);81-91.	000139
3WA7801	McCain, B.B., M.S. Myers, U. Varanasi, D.W. Brown, L.D. Rhodes, W.D. Gronlund, D.G. Elliott, W.A. Palsson, H.O. Hodgins, and D.C. Malins.	1982	Pathology of two species of flatfish from urban estuaries in Puget Sound.	NOAA/EPA Report EPA-600/7-82-001. 100p.	000101
3WA7901	Campana, S.E.	1983	Mortality of starry flounders(Platichthyes	Can. J. Fish. Aquat. Sci.	000343

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page 4 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
			stellatus)with skin tumors.	40:200-207.	
3WA8001	Stromberg, P.M., M.L. Landolt, and R.M. Kocan.	1981	Alterations in the frequency of sister chromatid exchanges in flatfish from Puget Sound, Washington, following experimental and natural exposure to mutagenic chemicals.	NOAA Tech. Mem. OMPA-10. NOAA-OMPA. Boulder, Co. June 1981. 43p.	000341
3WA8102	Gahler, A.		Contaminants and morphometrics of edible fish and crabs from Commencement Bay, Washington.	Unpublished data; CEAB-Seattle, Project no. 1202-2, WA-08.	000463
3WA8201	Krahn, M.M., L.D. Rhodes, M.S. Myers, L.K. Moore, W.D MacLeod, Jr., and D.C. Malins.	1986	Associations between metabolites of aromatic compounds in bile and the occurrence of hepatic lesions in English sole(Parophrys vetulus) from Puget Sound, Washington.	Arch. Environ. Contam. Toxicol. 15:61-67	000092
3WA8202	Krahn, M.M., M.S. Myers, D.G. Burrows, and D.C. Malins.	1984	Determination of metabolites of xenobiotics in the bile of fish from polluted waterways.	Xenobiotica 14(8):633-646.	000093
3WA8203	Malins, D.C., B.B. McCain, M.S.Myers, D.W. Brown, and S. Chan.	1983	Liver diseases in bottomfish from Everett Harbor, Washington.	Coast. Ocean. Poll. Ass. News. 2(4):41-42.	000100
	D.C. Malins, B.B. McCain, D.W. Brown, S. Chan, M. Myers, J.T. Landahl, P.G. Prohaska, A.J. Freidman, L.D. Rhodes, D.G. Burrows, W.D. Gronlund, and H.O Hodgins.	1984	Chemical pollutants in sediments and diseases of bottom-dwelling fish in Puget Sound, Washington.	Environ. Sci. Tech. 18:705-713.	000098
3WA8204	McCain, B.B., D.C. Malins, S. Chan, and H.O. Hodgins.	1983	A multiyear(1979-1983) comparison of disease prevalence in English sole(Parophrys vetulus) and rock sole(Lepidopsetta bilineata) from eight selected sites in Puget Sound.	Unpub. Final Rep. for Work Unit 83-9:Monitoring of bottomfish histopathology. NWAFC/ECD 2725 Montlake Blvd E., Seattle, Wash. 98112. 9p. + Figs, Tables, and Appendices.	000094
3WA8205	McCain, B.B., D.C. Malins, S. Chan, and H.O. Hodgins.	1983	A multiyear(1979-1983) comparison of disease prevalence in English sole(Parophrys vetulus) and rock sole(Lepidopsetta bilineata) from eight selected sites in Puget Sound.	Unpub. Final Rep. for Work Unit 83-9:Monitoring of bottomfish histopathology. NWAFC/ECD 2725 Montlake Blvd E., Seattle, Wash. 98112. 9p. + Figs, Tables, and Appendices.	000094
3WA8206	Malins, D.C.	1982	Letter regarding histopathological abnormalitites in Dungeness crab from Everett Harbor, Washington.	Letter to Mr. Donald Moos, WDOE, Olympia, Wa., from D.C. Malins, Dec. 17, 1982.	000464
3WA8207	Landolt, M.L., D.B. Powell, and R.M.	1984	Seahurst Baseline Study (Apr 1982- Dec 1984): Fish	IN: Renton Sewage Treatment Plant	000102

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Study ID	Authors	Year	Title	Publication	Refs..
	Kocan.		Health.	Project: Seahurst Baseline Study. Vol. VII, Section 8. Final Report for the period 1 April 1982 to 31 December 1984 for the Municipality of Metropolitan Seattle. Seattle, Wa. 160p.	
3WA8301	Malins, D.C., M.M. Krahn, D.W. Brown, L.D. Rhodes, M.S. Myers, B.B. McCain, and S. Chan.	1985	Toxic chemicals in marine sediment and biota from Mukilteo, Washington: Relationships with hepatic neoplasms and other hepatic lesions in English sole(Parophrys vetulus).	J.Nat. Cancer Inst. 74(2):487-494.	000248
3WA8302	Malins, D.C., M.M. Krahn, M.S. Myers, L.D. Rhodes, D.W. Brown, C.A. Krone, B.B. McCain, ad S. Chan.	1985	Toxic chemicals in sedimetns and biota from a creosote-polluted harbor: relationships with hepatic neoplasms and other hepatic lesions in English sole(Parophrys vetulus).	Carcinogenesis 6(10)1463-1469.	000247
3WA8303	Krahn, M.M., L.D. Rhodes, M.S. Myers, L.K. Moore, W.D MacLeod, Jr., and D.C. Malins.	1986	Associations between metabolites of aromatic compounds in bile and the occurrence of hepatic lesions in English sole(Parophrys vetulus) from Puget Sound, Washington.	Arch. Environ. Contam. Toxicol. 15:61-67	000092
3WA8401	Krahn, M.M., M.S. Myers, D.G. Burrows, and D.C. Malins.	1984	Determination of metabolites of xenobiotics in the bile of fish from polluted waterways.	Xenobiotica 14(8):633-646.	000093
3WA8501	Malins, D.C.	1985	Letter regarding chemical and biological assessments of Port Angeles and Anacortes coastal waters.	Letter to Mr. Dick Bauer, U.S. EPA, Seattle, Wa., from D.C. Malins, July 22, 1985.	000249
6WA6301	Lie, U.	1968	A quantitative study of benthic infauna in Puget Sound, Washington, USA in 1963-64.	FiskDir. Skr. Ser. HavUnders. 14(5):229-556.	000369
6WA6501	Nichols, F.H.	1970	Benthic polychaete assemblages and their relationship to the sediment in Port Madison, Washington.	Mar. Biol. 6:48-57.	000414
6WA7401	Kisker, D.S.	1986	Ecological Baseline and Monitoring Project: Final Report. Part 3. Distribution and abundance of benthic macrofauna adjacent to a sulfite pulp mill discharge pipeline in Port Gardner, Washington, 1974 through 1976.	Report to Washington State Dept. of Ecology, WQ Investigations Section. Olympia WA. May, 1986. 92p.	000363
6WA7402	Armstrong, J.W., C.P. Staude, R.M. Thom, and K.K. Chew.	1976	Habitats and relative abundances of the intertidal macrofauna at five Puget Sound beaches in the Seattle area.	Syesis 9:277-290.	000409

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Study ID	Authors	Year	Title	Publication	Refs..
	Armstrong, J.W., C.P. Staude, R.M. Thom, and K.K. Chew.	1977	An assessment of the effects of subtidally discharged municipal wastewater effluent on the intertidal macrofauna of several central Puget Sound beaches.	IN: Puget Sound Interim Reports: Studies of intertidal biota at five Seattle beaches. Final Reports. K.K. Chew, ed. Aug 1977. pp1-32.	000410
	Thom, R.M., J.W. Armstrong, C.P. Staude, K.K. Chew, and R.E. Norris.	1976	A survey of the attached marine flora at five beaches in the Seattle, Washington area.	Syesis 9:267-275.	000411
6WA7501	Harman, R.A., and J.C. Serwold.	1978	Recolonization of benthic macrofauna over a deep-water disposal site.	IN: Aquatic Disposal Field Investigations, Duwamish Waterway Disposal Site, Puget Sound, Washington. Appendix F. Tech. Rep. D-77-24, U.S. Army Waterways Experiment Station, Environmental Laboratory. Vicksburg, Miss. June, 1978. 454p.	000366
6WA7701	Armstrong, J.W., R.M. Thom, and K.K. Chew.	1980	Impact of a combined sewer overflow on the abunmdance, distribution, and community structure of subtidal benthos.	Mar. Env. Res. 4:3-23.	000415
6WA8201	Word, J.Q., P.L. Striplin, K.Keeley, J. Ward, P. Sparks-McConkey, L. Bentler, S. Hulsman, K. Li, J. Schroeder, and K. Chew.	1984	Subtidal benthic ecology.	IN: Renton sewage treatment plant project: Seahurst baseline study. Q.J. Stober and K.K. Chew, Principal Investigators. Vol. V. section 6. Report FRI-UW-8413. December 1984. 413 pp.	000377
6WA8301	Chapman, P.M., R.N. Dexter, R.D. Kathman, and G.A. Erickson.	1984	Survey of biological effects of toxicants upon Puget Sound biota. IV. Interrelationships of infauna, sediment bioassay, and sediment chemistry data.	NOAA Tech. Mem. NOS OMA 9. Rockville, Maryland. 57p. + Appendices A-D(microfiche).	000053
6WA8302	Broad, A.C., A.B. Benedict, and R.J. Mayer.	1984	Infaunal macrobenthos and sediment characteristics in Bellingham and Samish Bays.	Unpub. rep. to EPA Region X., from Western Washington University, Bellingham, Wa.107 pp. + Appendices	000376
6WA8401	Osborn, J.G., D.E. Weitkamp, and T.H. Schadt.	1985	Alki wastewater treatment plant outfall improvements predesign study. Technical Report no. 6.0 Marine Biology.	Tech. Rep. to METRO Water Quality Division. July, 1985. 50p.+ Appendices.	000361
7WA7401	Thom, R.M., J.W. Armstrong, C.P. Staude, K.K. Chew, and R.E. Norris.	1976	A survey of the attached marine flora at five beaches in the Seattle, Washington area.	Syesis 9:267-275.	000411
	Mearns, A.J., and C.A. Farley.	1979	Histopathological analysis of mussels (Mytilus californianus) from Goleta Point, California.	IN: Intertidal study of the Southern California Bight. Vol. II., Report 18.0. to the Bureau of	000412

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Study ID	Authors	Year	Title	Publication	Refs..
				Land Management, Washington, D.C. 10 p.	
7WA7901	Malins, D.C., B.B. McCain, D.W. Brown, A.K. Sparks, and H.O. Hodgins.	1980	Chemical contaminants and biological abnormalities in central and southern Puget Sound.	NOAA Tech. Mem. OMPA-2.	000097
	Malins, D.C., B.B. McCain, D.W. Brown, A.K. Sparks, H.O. Hodgins, and S. Chan.	1982	Chemical contaminants and abnormalities in fish and invertebrates from Puget Sound.	NOAA. Tech. Mem. OMPA 19. June, 1982. Boulder, Colorado. 168p.	000095
	McCain, B.B., D.C. Malins, S. Chan, and H.O. Hodgins.	1983	A multiyear(1979-1983) comparison of disease prevalence in English sole(Parophrys vetulus) and rock sole(Lepidopsetta bilineata) from eight selected sites in Puget Sound.	Unpub. Final Rep. for Work Unit 83-9:Monitoring of bottomfish histopathology. NWAFC/ECD 2725 Montlake Blvd E., Seattle, Wash. 98112. 9p. + Figs, Tables, and Appendices.	000094
	D.C. Malins, B.B. McCain, D.W. Brown, S. Chan, M. Myers, J.T. Landahl, P.G. Prohaska, A.J. Freidman, L.D. Rhodes, D.G. Burrows, W.D. Gronlund, and H.O Hodgins.	1984	Chemical pollutants in sediments and diseases of bottom-dwelling fish in Puget Sound, Washington.	Environ. Sci. Tech. 18:705-713.	000098
7WA8001	Malins. D.C., S. Chan, B.B. McCain, D.W. Brown, A.K. Sparks, and H.O. Hodgins.	1981	Puget Sound pollution and its effects on marine biota: May 1- Sept 30 1980.	Unpub. Prog. Report: May 1 to Sept 30 1980, to MESA Puget Sound Project, OMPA. 74p.	000096
	Malins, D.C., B.B. McCain, D.W. Brown, A.K. Sparks, H.O. Hodgins, and S. Chan.	1982	Chemical contaminants and abnormalities in fish and invertebrates from Puget Sound.	NOAA. Tech. Mem. OMPA 19. June, 1982. Boulder, Colorado. 168p.	000095
	D.C. Malins, B.B. McCain, D.W. Brown, S. Chan, M. Myers, J.T. Landahl, P.G. Prohaska, A.J. Freidman, L.D. Rhodes, D.G. Burrows, W.D. Gronlund, and H.O Hodgins.	1984	Chemical pollutants in sediments and diseases of bottom-dwelling fish in Puget Sound, Washington.	Environ. Sci. Tech. 18:705-713.	000098
7WA8101	Swartz, R.C., W.A. DeBen, K.A. Sercu. and J.O. Lamberson.	1982	Sediment toxicity and the distribution of amphipods in Commencement Bay, Washington, USA.	Mar. Poll. Bull. 13(10): 359-364.	000052
7WA8102	Comiskey, C.A., T.A. Farmer, and C.C. Brandt.	1984	Toxicant pretreatment planning study (TPPS). Technical report C2: Puget Sound benthic studies and ecological implications.	METRO Toxicant Program Report No. 6B, Water Quality Division, May 1984. Seattle, Wash. 417p. + Appendices A-C.	000035
7WA8301	U.S. EPA, Region X.	1986	Detailed chemical and biological analysis of selected sediments from Puget Sound.	Final Report (Draft) for Contract DE-AC06-76R 1830 by Pacific Northwest Laboratory, Battelle Marine Research Laboratory, Sequim, Wa. 98382. V. 1 300p, and V.2(Appendices A - G).	000217

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Study ID	Authors	Year	Title	Publication	Refs..
7WA8401	Tetra-Tech, Inc.	1985	Commencement Bay nearshore/tideflats remedial investigation.	Final Report to WDOE and US EPA: Summary report EPA-910/9-85-134a, 92 p.; Vol. I - Detailed Results EPA-910/9-85-134b, about 300 p.; Vol. II - Source Evaluation; Vol. III - Appendices I-V (includes sediment chemistry data), about 200 p. VOl. IV - Appendices VI-XV (includes benthos, bioassay, fish health and station location data), about 200 p.	000345
7WA8501	Hardy, J.T., E.A. Crecelius, and R.M. Kocan.	1986	Concentration and toxicity of sea-surface contaminants in Puget Sound.	DRAFT Rep. to NOAA-OAD, Pacific Northwest Laboratory, Richland, Wa. Jan. 1986. 35p. + Appendices A & B.	000252
7WA8502	Malins, D.C., S. Chan, U. Varanasi. B.B.McCain, J.E. Stein, and E. Casillas.	1985	Effects of contaminant exposure on reproductive success of commercially important marine species.	Unpub. Annual Report (FY85), by NWAFC-ECD. Seattle. 15p. + Tables and Figures.	000246
7WA8601	Hardy, J.T.	1986	Letter of January 23, 1986. Planned work in 1986: Sea surface contaminants in Puget Sound.	Unpub. Letter of January 23, 1986, to Ed Long, NOAA-CEAB. 1p. + Table.	000342
1WO7601	Swartz, R.C., W.A. DeBen, and F.A. Cole.	1979	A bioassay for the toxicity of sediment to marine macrobenthos.	Journal WPCF 51(5):944-950.	000077
2OR7201	Mix. M.C., H.J. Pribble, R.T. Riley, and S.P. Tomasovic.	1977	Neoplastic disease in bivalve molluscs from Oregon estuaries with emphasis on research on proliferative disorders in Yaquina Bay oysters.	Ann. N.Y. Acad. Sci. 298:356-373.	000111
6OR7401	Richardson, M.D., A.G. Carey, and W.A. Colgate.	1977	Aquatic disposal field investigations, Columbia River Disposal site, Oregon; Appendix C: The effects of dredged material disposal on benthic assemblages.	Tech. Rep. D-77-30, Appendix C, U.S. Army Engineers Experiment Station, Vicksburg, Miss. Dec. 1977. 411 p.	000339
	Boone, C.G., M.A. Granat, and M.P. Farrell.	1978	Aquatic disposal field investigations, Columbia River Disposal site, Oregon; Evaluative Summary.	Tech. Rep. D-77-30, Final Report, U.S. Army Engineers Experiment Station, Vicksburg, Miss. May 1978. 100 p.	000340
3OR6801	Farley, C.A.	1969	Sarcomatoid proliferative disease in a wild population of blue mussels(Mytilus edulis).	J. Nat. Cancer Inst. 43:509-516.	000106
3OR7201	McCauley, J.E., D.Hancock, and R.A. Parr.	1976	Maintenance dredging and four polychaete worms.	IN:Proc. of the Special Conf. on Dredging and its environmental Effects, Mobile, Ala., Jan 26-28,	000416

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page 9 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
				1976. ASCE, New York. pp673-683.	
3OR7601	Mix, M.C.	1983	Haemic neoplasms of bay mussels, Mytilus edulis L., from Oregon: Occurrence, prevalence, seasonality, and histopathological progression.	J. Fish. Dis. 6(3):239-248.	000115
	Mix. M.C., S.R. Trenholm, and K.I. King.	1979	Benzo[a]pyrene body burdens and the prevalence of proliferative disorders in mussels(Mytilus edulis) in Oregon.	IN: Animals as Monitors of Environmental Pollutants. (ed ?). National Academy of Sciences, Washington D.C. pp52-64.	000332
	Mix, M.C.	1982	Polynuclear aromatic hydrocarbons and cellular proliferative disorders in bivalve molluscs from Oregon estuaries.	Tech. Rep. EPA-600/4-82-026. ERL, Gulf Breeze, Fla. Mar. 1982. 61p.	000187
	Mix, M.C.	1979	Chemical carcinogens in bivalve molluscs from Oregon estuaries. Final Report 1 Jun 76 - 30 Sept 78.	EPA-600/3-79-034. Mar. 1979. 46p.	000193
6OR7201	Slotta, S.L., C.K. Sollitt, D.A. Bella, D.R. Hancock, J.E. McCauley, and R. Parr.	1973	Final Report: Effects of hopper dredging and in-channel spoiling (October 4, 1972) in Coos Bay, Oregon.	Final Report to Portland District, Corps of Engineers, on Contract DACW57-73-C-0089, from Interdiscip. Stud. of the School of Engin. and School of Oceanography, OSU. Corvallis, Ore., July, 1973. 133p.	000338
7OR7901	Hancock, D.R., P.O. Nelson, C.K. Sollitt, and K.J. Williamson.	1980	Coos Bay offshore disposal site investigation: Interim Report, Phase I.	Interim Report to Portland District Corps of Engineers, contract No. DACW57-79-00040. approx. 150p.	000359
	Nelson, P.O., C.K. Sollitt, K.J. Williamson, and D.R. Hancock.	1981	Coos Bay offshore disposal site investigation: Interim Report, Phase II, III. April, 1980-June, 1981.	Interim Report to Portland District Corps of Engineers, contract No. DACW57-79-00040. approx. 150p.	000360
1CA7501	Ehrlich, K.F.	1977	Inhibited hatching success of marine fish eggs by power plant effluent.	Mar. Poll. Bull. 8(10):228-229.	000184
1CA7502	Sherwood, M.J.	1975	Laboratory experiments exposing Dover sole to contaminated sediments.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1975. SCCWRP, El Segundo, CA. 1975. pp 41-42.	000388
	Sherwood, M.J.	1976	Fin erosion disease induced in the laboratory.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1976. SCCWRP, El Segundo, CA. 1976. pp 149-153.	000389
1CA7503	Peddicord, R., and V. McFarland.	1976	Effects of suspended dredged material on the	IN:Proc. of the Special Conf. on	000264

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page10 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
			commercial crab, Cancer magister.	Dredging and its environmental Effects, Mobile, Ala., Jan 26-28, 1976. ASCE, New York. pp633-644.	
1CA7801	Salazar, M.H., S.C. U'ren, and S.A. Steinert.	1980	Sediment bioassays for NAVSTA San Diego Dredging Project.	Final Report: No. NOSC TR 570. Naval Ocean Systems Center, San Diego, Ca. 46p.	000054
1CA8001	Marine Bioassay Labs.	1980	Oakland Army Base bioassays: Final Report.	Report to U.S. Army Corps of Engineers, San Francisco District, fron Marine Bioassay Labs., Watsonville, CA., 10 Sept 1980. 12p. + Appendices.	000353
1CA8301	Marine Bioassay Labs.	1983	Aquatic bioassays for the San Luis Drain Central Valley Project, California.	Unpub. Rep. to U.S. Dept. of the Interior, Bureau of Reclamation. Mid-Pacific Region. Sacramento, CA. 205 p. + Appendices A - L (231 p.).	000331
1CA8401	Marine Bioassay Labs.	1984	San Pablo Bay bioassays: Cancer magister.	Report to U.S. Army Corps of Engineers, San Francisco District, from Marine Bioassay Laboratories, Watsonville, CA., Sept 1984. 15 p.	000352
1CA8501	ENSECO, Inc.	1986	Solid phase bioassay and bioaccumulation of sediment present at the Alcatraz disposal site.	Report to U.S. Army Corps of Engineers, San Francisco District, from ENSECO, Inc., Cambridge, MASS. Jan. 15, 1986.	000354
1CA8601	E.V.S. Consultants, Inc.	1986	Solid phase amphipod bioassay on one composite sample from Richmond Harbor, California.	Report to U.S. Army Corps of Engineers, San Francisco, CA. from EVS Consultants, Inc., Seattle, WA., March 1986. 5p + Appendices.	000349
2CA7101	Widdowson, T.B.	1972	Growth rate in Egregia as a measure of pollution.	IN: Proc. 7th Int. Seaweed Symp. I. Nisizawa, ed. pp.268-272.	000407
2CA7401	Littler, M.M, and S.N. Murray.	1977	Influence of domestic wastes on the structure and energetics of intertidal communities near Wilson Cove, San Clemente I.	Contrib-164; W77-10512; OWRT-A-054-CAL(4), from Cal. State U., Fullerton; to Office of Water Research and Tecnology, Wash. D.C. June 1977. 99p.	000197
	Littler, M.M., and J.M. Miller.	1975	Impact of sewage on the distribution, abundance, and community structure of rocky intertidal	Mar. Biol. 30:277-291.	000321

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page11 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
			organisms.		
	Murray, S.N., and M.M Littler.	1974	Biological features of intertidal communities near the U.S. Navy Sewage outfall, Wilson Cove, San Clemente I., California. (research Report 1971-1973).	NUC-TP-396, from the Naval Undersea Center, San Diego, Cal. July 1974. 82p.	000201
2CA7601	Kastendiek, J., S.C. Schroeder, and J.Dixon.	1981	The effect of the seawater cooling system of a nuclear generating station on the growth of mussels in experimental populations.	Mar. Poll. Bull. 12:402-407.	000230
2CA8001	Martin, M., G. Ichikawa, J. Goetzl, M. de los reyes, and M.D. Stephenson.	1984	Relationship between physiological stress and trace toxic substances in the bay mussel, Mytilus edulis, from San Francisco Bay, California.	Mar. Environ. Res. 11(2):91-110.	000022
2CA8201	Roth, J.C., D.W. Smith, and A.J. Horne.	1983	Dilution-field bioassays for local effects monitoring of wastewater discharges into San Francisco Bay.	Report to California State Water Resources Control Board, Contract no. 1-129-430-0; UCB/SEERHL Report no. 83-1. January, 1983. 34p.	000219
2CA8202	Roth, J.C., R.L. Williamson, A.J. Horne, D.W.Smith, and M.L. Commins.	1984	Dilution-field bioassays for local effects monitoring of wastewater discharges into San Francisco Bay. II. A demonstration study of toxicity based on the growth and condition of caged mussels (Mytilus edulis).	Report to California Regional Water Quality Control Board, San Francisco Bay Region, Contract no. 2-115-120-0; UCB/SEERHL Report 84-1. June, 1984.	000220
3CA6501	Cooper, R.C., and C.A. Keller.	1969	Epizootiology of papillomas in English sole, Parophrys vetulus.	IN: Neoplasms and related disorders of invertebrate and lower invertebrate animals. Nat. Cancer Inst. Monogr. 31:173-185.	000216
3CA6701	Valentine, D.W., and K.W. Bridges.	1969	High incidence of deformities in the serranid fish Paralabrax nebulifer, from Southern California.	Copeia 3:637-638.	000408
3CA6901	County Sanitation Districts, Orange County, CA.	1977-1985	CSDOC Annual Reports. 1977-1985 (8 reports).	CSDOC Annual Reports. 1977-1985.	000367
	Sherwood, M.J.	1979	The fin erosion syndrome.	IN: Southern California Coastal Water Resources Project: Annual Report for the year 1978. SCCWRP, El Segundo, CA. 1979. pp203-221.	000157
	Sherwood, M.J., and A.J. Mearns.	1977	Environmental significance of fin erosion in southern California demersal flatfishes.	Ann. N.Y. Acad. Sci. 298:177-189.	000161
	Mearns, A.J., and M. Sherwood.	1974	Environmental aspects of fin erosion and tumors in southern California Dover sole.	Trans. Am. Fish. Soc. 103:799-810.	000087
	Mearns, A.J., and M. Sherwood.	1977	Distribution of neoplasms and other diseases in	Ann. N.Y. Acad. Sci. 298:210-224.	000158

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Study ID	Authors	Year	Title	Publication	Refs..
			marine fish relative to the discharge of waste water.		
	Mearns, A.J., and M.J. Sherwood.	1977	Changes in the prevalence of fin erosion off Los Angeles and Orange Counties.	Southern California Coastal Water Resources Research Project: Annual Report for the year ending 30 June 1977. SCCWRP, El Segundo, CA. pp143-145.	000170
3CA6902	Kelly, D.L.	1971	Epidermal papilloma in the English sole, Parophrys vetulus.	PhD Dissertation, Univ. California, Berkeley.	000413
3CA7001	Cross, J.N.	1985	Fin erosion among fishes collected near a Southern California municipal wastewater outfall, (1971-1982).	Fish. Bull. 83(2):195-206.	000323
	Cross, J.N.	1984	Tumors in fish collected on the Palos Verdes shelf.		000373
	Sherwood, M.J., and A.J. Mearns.	1977	Environmental significance of fin erosion in southern California demersal flatfishes.	Ann. N.Y. Acad. Sci. 298:177-189.	000161
	Mearns, A.J., and M. Sherwood.	1977	Distribution of neoplasms and other diseases in marine fish relative to the discharge of waste water.	Ann. N.Y. Acad. Sci. 298:210-224.	00087 000158
	Mearns, A.J., and M.J. Sherwood.	1977	Changes in the prevalence of fin erosion off Los Angeles and Orange Counties.	Southern California Coastal Water Resources Research Project: Annual Report for the year ending 30 June 1977. SCCWRP, El Segundo, CA. pp143-145.	000170
	Sherwood, M.J.	1977	Fin erosion disease and liver chemistry: Los Angeles and Seattle.	Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1977. SCCWRP, El Segundo, CA. 1977. pp 213-219.	000173
	A.J. Mearns and L.S. Word.	1975	A trawl survey off Laguna Beach and Dana Point.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1975. SCCWRP, El Segundo, CA. 1975. pp 89-93.	000386
3CA7201	Mearns, A.J., and M. Sherwood.	1977	Distribution of neoplasms and other diseases in marine fish relative to the discharge of waste water.	Ann. N.Y. Acad. Sci. 298:210-224.	000158
	Sherwood, M.J., and A.J. Mearns.	1977	Environmental significance of fin erosion in southern California demersal flatfishes.	Ann. N.Y. Acad. Sci. 298:177-189.	000161
	Mearns, A.J., and M.J. Sherwood.	1977	Changes in the prevalence of fin erosion off Los Angeles and Orange Counties.	Southern California Coastal Water Resources Research Project: Annual	000170

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Study ID	Authors	Year	Title	Publication	Refs..
				Report for the year ending 30 June 1977. SCCWRP, El Segundo, CA. pp143-145.	
	Mearns, A.J., and M. Sherwood.	1974	Environmental aspects of fin erosion and tumors in southern California Dover sole.	Trans. Am. Fish. Soc. 103:799-810.	000087
	Sherwood, M.J., and A.J. Mearns.	1975	Sampling diseased fish populations.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1975. SCCWRP, El Segundo, CA. 1975. pp 27-32.	000384
3CA7202	Gammon, R.	1973	Report on a trawl survey conducted off Pismo Beach and San Miguel Island.	SCCWRP Tech. Pub. 105. Feb, 1973.	000394
3CA7301	Mearns, A.J.	1974	Standardizing sampling procedures.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1974. SCCWRP, El Segundo, CA. 1974. pp 63-68.	000383
3CA7302	A.J. Mearns and L.S. Word.	1975	A trawl survey off Laguna Beach and Dana Point.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1975. SCCWRP, El Segundo, CA. 1975. pp 89-93.	000386
3CA7601	Mearns, A.J., and C.A. Farley.	1979	Histopathological analysis of mussels (Mytilus californianus) from Goleta Point, California.	IN: Intertidal study of the Southern California Bight. Vol. II., Report 18.0. to the Bureau of Land Management, Washington, D.C. 10 p.	000412
3CA7701	O'Connell, C.P.	1980	Percentage of starving northern anchovy, Engraulis mordax, larvae in the sea as estimated by histological methods.	Fish. Bull. 78(2):475-489.	000336
3CA7702	Mearns, A.J., K.V. Pierce, and M.J. Sherwood.	1978	Health, abiundance, and diversity of bottomfish and shellfish populations at proposed and existing offshore drilling sites in the Southern California Bight.	Final Report: Histopathology contract no. 696-20, Science Application, Inc., La Jolla, CA. 31 March, 1978. (DRAFT)	000393
3CA7901	Spies, R.B., J.S. Felton, and L. Dillard.	1982	Hepatic mixed-function oxidases in California flatfishes are increased in contaminated environments and by oil and PCB ingestion.	Mar. Biol. 70:117-127.	000218

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Study ID	Authors	Year	Title	Publication	Refs..
3CA8101	Jenkins, K.D., J.Y. Palacio, E.M. Fennema, D.A. Browm, P.S. Oshida, J.F. Alfalfara, and E.M Perkins.	1981	Cytosolic metal distribution and histopathology of urchins and mussels from the Southern California Bight.	Presentation to : International Symposium on Responses of Marine organisms to Pollutants., Plymouth, England, May 18-21, 1981. 31 p. + Tables and Figures.	000223
3CA8102	Perkins, E.M., D.A. Brown, and K.D. Jenkins.	1982	Contaminants in white croakers Genyonemus lineatus(Ayres, 1855), from the Southern California Bight. III. Histopathology.	IN: Physiological mechanisms of Marine Pollution Toxicity. W.B. Vernberg, A Calabrese, F.P. Thurberg, and F.J. Vernberg, eds. Academic Press, N.Y. pp215-231.	000251
3CA8201	Spies, R., D. Rice, R. Ireland, and J. Beach.	1983	Pollutant body burdens and reproduction in Platichthyes stellatus from San Francisco Bay. Annual Progress Report, Year I.	Unpub. Annual Progress Report to NOAA-CEAB, Aug. 1983. from Lawrence Livermore National Laboratory, Environmental Sciences Division. Livermore, CA. 35p.	000279
	Spies, R.B., D.W. Rice, P.A. Montagna, R.R. Ireland, J.S. Felton, S.K. Healy, and P.R. Lewis.	1985	Pollutant body burdens and reproduction in Platichthyes stellatus from San Francisco Bay.	Unpub. Report to NOAA-CEAB, March, 1985, from Lawrence Livermore National Laboratory, Environmental Conservation Division, Livermore, CA. March, 1985. 95p.	000280
	Spies, R.B., D.W. Rice, B.D. Andersen, J.S. Felton, and M. Diaz.	1986	Developmental success and contaminant exposure in Platichthyes stellatus from San Francisco Bay.	Unpub. Report to NOAA-CEAB: Final Report, Year 3, from Lawrence Livermore National Laboratory, Environmental Sciences Division, Jan. 1986. 55p.	000281
3CA8301	Rosenthal, K.D., D.A. Brown, J.N. Cross, E.M. Perkins, and R.W. Gossett.	1984	Histological condition of fish livers.	IN: Biennial Report, 1983-1984, SCCWRP: 229-245. Long Beach, CA.	000327
	Perkins, E.M. and K.D. Rosenthal.	1984	Histopathology of cadmium-exposed scorpionfish.		000328
3CA8302	Perkins, E.M. and K.D. Rosenthal.	1984	Histopathology of cadmium-exposed scorpionfish.		000328
3CA8303	Gossett, R.W., S.R. McHugh, P Szalay, K.D. Rosenthal, and D.A. Brown.	1984	Xenobiotic organics and biological effects in scorpionfish caged near a major Southern California municipal outfall. 2. International Symposium on Responses of Marine Organisms to Pollutants. Woods Hole, Ma (USA) 27 Apr 1983.	Mar. Environ. Res. 14(1-4) : Responses of marine organisms to pollutants, J. Stegeman, ed. pp449-450.	000001
3CA8401	Malins, D.C., B.B. McCain, D.W. Brown, M.S. Myers, and S. Chan.	1986	Marine pollution study: Los Angeles vicinity.	Unpub. Report to California State Water Resources Control Board.(Revised Jan 1986).	000250
3CA8501	Cross, J.N. and J.E. Hose.	1986	Determination of assimilative capacity: impact of	Unpub. Ann. Rep., SCCWRP, May 1,	000329

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Study ID	Authors	Year	Title	Publication	Refs..
			contaminants on reproduction of marine fish.	1986. 44p.	
3CA8502	Perkins, E.M., D.B. Ebenstein, and A. B. Chartrand.	1986	Investigation of DDT, PCB's and other industrial wastes in coastal waters of Los Angeles and Ventura counties: Part I. Histopathology.	Draft Report to Cal. Regional Water Quality Control Board, Los Angeles Basin. Marine Biol. Research Section, Dept. Biol. Sciences, USC Los Angeles, CA., April 1986. 197p.	000347
5CA8201	Cross, J.N.	1984	Fish reproduction around outfalls.	Biennial Report 1983-1984, SCCWRP:211-227. W. Bascom, ed. Long Beach, CA.	000326
6CA1101	Foster, M.S., J.W. Carter, and D.R. Scheil.	1983	The ecology of kelp communities.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 53-69.	000396
6CA5101	Filice, F.P.	1954	An Ecological survey of the Castro Creek area in San Pablo Bay.	Wassman J. Biol. 12(1):1-24.	000438
	Filice, F.P.	1954	A study of some of the factors affecting the bottom fauna of a portion of the San Francisco Bay Estuary.	Wassman J. Biol. 12(3):257-292.	000439
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA5501	Harger, B.	1983	A historical overview of kelp in Southern California.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 70-83.	000397
6CA6001	McCarty, J.C., R.A. Wagner, M. Macomber, H.S. Harris, M. Stephenson, and E.A. Pearson.	1962	An investigation of water and sediment quality and pollutional characteristics of three areas in San francisco Bay, 1960-61.	Report from the Sanitary Engineering Research Laboratory, University of California, Berkeley. 571p.	000446
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA6101	Storrs, P.N., R.E. Selleck, and E.A. Pearson.	1963	A comprehensive study of San Francisco Bay, 1961-62.	Univ. California (Berkeley) Sanitary Engineering Research Laboratory Report 63(3): 221p.	000454
	Storrs, P.N., E.A. Pearson, and R.E.	1966	A comprehensive study of San Francisco Bay.	Univ. California (Berkeley)	000453

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Study ID	Authors	Year	Title	Publication	Refs..
	Selleck.		Volume II. Biological sampling and analytical methods.	Sanitary Engineering Research Laboratory Report 65(8): 75p.	
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA6201	Storrs, P.N., R.E. Selleck, and E.A. Pearson.	1964	A comprehensive study of San Francisco Bay, 1962-63.	Univ. of California (Berkeley) Sanitary Engineering Research Laboratory Report 63(4): p. I-1 to IX-9.	000455
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA6301	Storrs, P.N., R.E. Selleck, and E.A. Pearson.	1965	A comprehensive study of San Francisco Bay, 1963-64.	Univ. of California (Berkeley) Sanitary Engineering Research Laboratory Report 65(1): p. I-1 to VII-7.	000456
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA6801	Widdowson, T.B.	1971	Changes in the intertidal flora of the Los Angeles area since the survey by E. Yale Dawson in 1956-59.	Bull. So. Cal. Acad. Sci. 70(1):2-16.	000406
6CA6901	Garrison, W.E.	1981	Ocean Monitoring and research. Annual Report 1980-81.	Ann. Rep. , Monitoring Section, Tech. Services Dept, Los Angeles County Sanitation Districts. Whittier, CA. November, 1981. 384p.	000372
	Greene, C.S., and T.S. Sarason.	1974	Cluster analysis of benthic communities.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ending June 30, 1974. SCCWRP, El Segundo, CA. 1974. pp 23-31.	000382
	Smith, R.W. and C.S. Greene.	1976	Biological communities near a submarine outfall.	J. Wat. Poll. Contr. Fed. 48(8):1894-1912.	000146
	Mearns, A.J., and C.S. Greene.	1976	Comparison of the benthos at several wastewater discharge sites.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1976. SCCWRP, El Segundo, CA. 1976. pp 211-216.	000390
6CA6902	Grigg, R.W.	1979	Long-term changes in rocky bottom communities off Palos Verdes.	Southern California Coastal Water Research Project: Annual Report for	000153

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Study ID	Authors	Year	Title	Publication	Refs..
				the year 1978. W. Bascom, ed. SCCWRP, El Segundo, CA. 1979. pp. 157–184.	
	Grigg, R.W., and R.S. Kiwala.	1970	Some ecological effects of discharged wastes on marine life.	Cal. Fish and Game 56:145–155.	000395
6CA7001	Smith, G.B.	1974	Some effects of sewage discharge to the marine environment.	Ph.D. dissertation, U. of Calif., San Diego.	000378
6CA7002	Daniel, D.A., and H.K. Chadwick.	1972	A study of toxicity and biostimulation in San Francisco Bay–Delta waters.	California State Water Resources Control Board. Publication 44, vol. VII. 78p. + Appendices.	000431
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86–4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7101	Karr, M.H., Eliason,. J.R., and M.J. Schneider.	1972	Physical oceanography and marine biology study Long Beach Generating Station, Southern California Edison Co.	Report to Southern California Edison Co., Rosemead, CA., from Battelle Pacific NW Labs, Richland, WA. Jan. 31, 1972. 119p.	000358
6CA7102	Hyperion Treatment Plant	1983	Santa Monica Bay Monitoring Study. Annual Report for 1983.	City of Los Angeles Bureau of Sanitation, Hyperion Treatment Plant, Playa del Rey, CA. approx. 250 p.	000364
	Hyperion Treatment Plant	1982	Santa Monica Bay Monitoring Study. Annual Report for 1982.	City of Los Angeles Bureau of Sanitation, Hyperion Treatment Plant, Playa del Rey, CA. approx. 250 p.	000365
	Mearns, A.J., and C.S. Greene.	1976	Comparison of the benthos at several wastewater discharge sites.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1976. SCCWRP, El Segundo, CA. 1976. pp 211–216.	000390
6CA7103	Oliver, J.S., and P.N Slattery.	1976	Effects of dredging and disposal on some benthos at Monterey Bay, california.	Tech. Pap. for Contract no. DACW72–73–C–0010, by Moss Landing Marine Labs, CA. Oct. 1976. 84p.	000263
	Oliver, J.S., P.N. Slattery, L.W. Hulberg, and J.W. Nybakken.	1977	Patterns of succession in benthic infaunal communities following dredging and dredged material disposal in Monterey Bay.	Final Report on Dredged Material Research Program, Contract DACW39–74–C–0151. by Moss Landing Marine Labs, Calif. Oct. 1977. 192p.	000261
	Oliver, J.S., P.N. Slattery, L.W. Hulberg, and J.W. Nybakken.	1979	Relationships between wave disturbance and zonation of benthic invetebrate communities along	Fish. Bull. 78(2):437–454.	000404

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Study ID	Authors	Year	Title	Publication	Refs..
			a subtidal high-energy beach in Monterey Bay, California.		
6CA7104	Feldmeth, C.R., and M. Alpert.	1977	The effect of temperature on the distribution and biomass of Mytilus edulis in the Alamitos Bay area.	Veliger 20(1):39-42.	000175
6CA7301	Smith, R.W. and C.S. Greene.	1976	Biological communities near a submarine outfall.	J. Wat. Poll. Contr. Fed. 48(8):1894-1912.	000146
6CA7302	Liu, D.H., K.D. Martin, and C.R. Norwood.	1975	San Francisco Bay benthic community study: Technical evaluation.	Dredge Disposal Study for San Francisco Bay and Estuary: Appendix D: Biological Community. U.S. Army Engineer District, San Francisco, CA. May 1975. 244p + Appendices A-C.	000350
6CA7303	Thom, R.M.	1976	Changes in the intertidal flora of the Southern California mainland.	M.S. Thesis, Cal. State Univ, Long Beach.	000405
6CA7304	Engineering Science, Inc.	1978	South San Francisco bottom sediment sampling and analysis program.	Unpublished data, 1978.	000434
	Engineering Science, Inc.	1978	Summary of benthic identification: City of South San Francisco.	Unpublished data, 1978.	000435
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7401	Nichols, F.H., and J.K. Thompson.	1985	Persistence of an introduced mudflat community in South San Francisco Bay, California.	Mar. Ecol. PS 24:83-97	000044
	Thompson, J.K., and F.H. Nichols.	1984	Benthic macrofauna of a South San Francisco Bay, California, mudflat, 1974 to 1983.	U.S. Geol. Surv. Open File Rep. 84-759.	000348
6CA7402	Marine Ecological Institute.	1978	Results of benthic survey near new U.S. Army Corps of Engineers base yard, Richardson Bay, Sausalito, California.	IN: U.S. Army Corps of Engineers Dredge Disposal Study, San Francisco Bay and estuary. Appendix N, Addendum. 9p.	000444
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7403	Resources & Ecology Projects, Inc.	1974	Semiannual monitoring, strategic consolidated sewage plan, southern San Mateo County, California.	San Mateo County, unpublished data.	000451
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of	USGS Water Resources Investigations	000460

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page19 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
			common benthic species in San Francisco Bay, California.	Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	
6CA7501	County Sanitation Districts, Orange County, CA.	1977-1985	CSDOC Annual Reports. 1977-1985 (8 reports).	CSDOC Annual Reports. 1977-1985.	000367
	Greene, C.S.	1976	Response and recovery of the benthos at Orange County.	IN: SCCWRP Annual Report for the year ended 30 June 1976. p.197-203.	000368
	Mearns, A.H., M.J. Allen, L.S. Word, J.Q. Word, C.S. Greene, M.J. Sherwood, and B. Myers.	1976	Quantitative responses of demersal fish and benthic invertebrate communities to coastal municipal wastewater discharges.	Final Report, V.1, to US EPA, Nat. Marine Water Quality Lab. Corvallis, Ore. 179p.	000370
	Mearns, A.J., and C.S. Greene.	1976	Comparison of the benthos at several wastewater discharge sites.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1976. SCCWRP, El Segundo, CA. 1976. pp 211-216.	000390
6CA7502	Wilson, K., and R. McPeak.	1983	Kelp restoration.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 199-216.	000402
	Hamilton, S.	1983	Monitoring presently conducted at Point Loma and Palos Verdes.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 103-113.	000398
6CA7503	California Departmant of Water Resources.		Sacramento-San Joaquin Delta water quality surveillance program: unpublished data, 1975-78.	Unpublished.	000423
	California Departmant of Water Resources.	1981	Sacramento-San Joaquin Delta water quality surveillance program, 1979.	Annual report, vol. III. 118p.	000424
	California Departmant of Water Resources.	1981	Sacramento-San Joaquin Delta water quality surveillance program, 1980.	Annual report, vol. III. 185p.	000425
					426
	California Departmant of Water Resources.	1983	Sacramento-San Joaquin Delta water quality surveillance program, 1982.	Annual report, vol. III. 314p.	000427
	California Departmant of Water Resources.	1984	Sacramento-San Joaquin Delta water quality surveillance program, 1983.	Annual report, vol. III. 288p.	000428
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7504	Environmental Quality Analysts, Inc.	n.a.	Summary data sheets for macroinvertebrates: City and County of San Francisco, 1975-76.	California Regional water Quality Control Board. NPDES permit no.	000437

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page20 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
				CA0037664. Waste discharge requirements for the City and County of San Francisco, southeast plant.	
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7505	Environmental Quality Analysts, Inc. and Marine Biological Consultants, Inc.	1975	Preconstruction outfall diffuser modification: physical, chemical, and biological investigation: East Bay Municipal Utility District.		000436
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7506	Leighton and Associates.	1978	Analysis of benthic infaunal samples, Oakland Outer Harbor, September 1975-March 1976.	IN: U.S. Army Corps of Engineers Dredge Disposal Study, San Francisco Bay and estuary. Appendix N, Addendum. 109p.	000443
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7507	Smith, E.H. and Associates.	1977	South Bay Dischargers Authority wastewater disposal project, benthic survey, and water quality sampling program.	Final report to U.S. Army Corps of Engineers. 73p. + Appendices.	000452
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7601	Pacific Environmental Laboratory.	1976	Waste discharge requirements for Shell Oil Company, Martinez, Contra Costa County,, California. Summary data sheets for macroinvertebrates.	California Regional Water Quality Control Board, NPDES permit no. CA0005789	000450
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7602	Pacific Environmental Laboratory.	1976	Waste discharge monitoring for the city of Richmond, California. Summary data sheets for macroinvertebrates.	California Regional Water Quality Control Board, order no. 74-112, NPDES permit no. CA0037729	000449
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page21 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
6CA7603	Kinnetic Labs., Inc.	1981	East Bay Dischargers Authority predischarge monitoring program.	Final Report, KLI-81-11. Chapter 1. Summary; Chapter 5. Benthic community analysis; Chapter 7, V. III. Appendices.	000440
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7701	Kinnetic Labs., Inc.	1981	East Bay Dischargers Authority predischarge monitoring program.	Final Report, KLI-81-11. Chapter 1. Summary; Chapter 5. Benthic community analysis; Chapter 7, V. III. Appendices.	000440
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7702	Brown and Caldwell Engineers.	1971	Summary data sheets for invertebrates: East Bay Municipal Utility District, preconstruction outfall diffuser modification study.	Unpublished. 28p.	000422
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7703	Underwater Biological Research.	1978	Survey of benthic macrofauna at the San Pablo Bay dredge disposal site July 1977 - April 1978: Final report.	IN: U.S. Army Corps of Engineers dredge disposal study, San Francisco Bay and Estuary. Appendix N, Addendum. 66p. + Appendices.	000459
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7801	Bascom, W.	1979	Life in the Bottom: San Diego and Santa Monica Bays, Palos Verdes and Point Loma Peninsulas.	IN: Southern California Coastal Water Research Project: Annual Report for the year 1978. W. Bascom, ed. SCCWRP, Los Angeles, Ca. 1979. pp57-80.	000148
	Word, J.Q.	1979	The infaunal trophic index	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year 1978. SCCWRP, Los Angeles, CA. 1979. pp.19-39.	000150
6CA7802	Anatec Laboratories, Inc.	1980	Point Richmond outfall study, predischarge monitoring phase.	Anatec Laboratories, Inc. 78p. + Appendices.	000417
	Anatec Laboratories, Inc.	1980	San Pablo Bay field studies.	Anatec Laboratories, Inc. Phase I,	000418

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page22 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
				Novato Sanitary Component vol. I. 78p. + Appendices.	
	Anatec Laboratories, Inc.	1980	San Pablo Bay field studies: Central Marin component.	Anatec Laboratories, Inc. Central Marin Component, vol. I. 58p. + Appendices A, B, & C.	000419
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA7901	Harris, L.H.	1983	Changes in intertidal algae at Palos Verdes, California.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 274-281.	000403
6CA7902	CH2M Hill, Inc.	1979	San Francisco Bayside overflows study.	IN: San Francisco bayside overflows study, Part VI.	000429
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA8101	Hamilton, S.	1983	Monitoring presently conducted at Point Loma and Palos Verdes.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp. 103-113.	000398
	Barilotti, D.C.	1982	Monitoring San Diego area kelp beds for the effects of waste discharges from the Point Loma outfall.	Report from Kelco, Division of Merck & Co., Inc. P.O. Box 13216, San Diego, CA. 45p. + Figures	000401
6CA8102	CH2M Hill, Inc.	1982	Equivalent protection study.	Final report to Chevron, USA.	000430
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
6CA8401	Goddard, T.C., M.L. Stevenson, and G. Gillingham.	1984	San Francisco Bay dredged material disposal site survey.	Report no. KLI-R-84-15 to U.S. Army Corps of Engineers, for Contract DACW07-84-D-0015. Kinnetic Labs., Inc. Santa Cruz, CA. 28 Dec 1984. 62 p. + Appendices A-D.	000351
7CA6201	Hamilton, S.	1983	Monitoring presently conducted at Point Loma and Palos Verdes.	IN: Proceedings of a Symposium on the effects of waste disposal on kelp communities. W. Bascom, ed. La Jolla, CA., Jan 24-25, 1983. pp.	000398

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page23 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
				103–113.	
	Chen, C.W.,G.T. Orlob, and D.J. Smith.	1972	Environmental effects of ocean waste discharge: results from San Diego's monitoring program.	Report to the California State Water Resources Control Board and the San Diego Regional Water Quality Control Board from Water Resources Engineers, Inc., Walnut Creek, CA. Oct. 1972. 48p. + Appendices.	000399
	Chen, C.W., and G.T. Orlob.	1972	The accumulation and significance of sludge near San Diego.	Wat. Poll. Contr. Fed. J. 44(7):1362–1371.	000400
7CA7401	Mearns, A.H., M.J. Allen, L.S. Word, J.Q. Word, C.S. Greene, M.J. Sherwood, and B. Myers.	1976	Quantitative responses of demersal fish and benthic invertebrate communities to coastal municipal wastewater discharges.	Final Report, V.1, to US EPA, Nat. Marine Water Quality Lab. Corvallis, Ore. 179p.	000370
	Marine Biological Consultants, Inc., and Environmental Quality Analysts, Inc.	1975	Predischarge receiving water monitoring study.	Final report to the city of Oxnard. Costa Mesa, CA.	000371
	Mearns, A.J., and C.S. Greene.	1976	Comparison of the benthos at several wastewater discharge sites.	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year ended June 30, 1976. SCCWRP, El Segundo, CA. 1976. pp 211–216.	000390
7CA7601	Soule, D.F., and M. Oguri.	1977	The marine ecology of Marina del Rey Harbor, California. A baseline survey for the Count of Los Angeles Department of Small Craft Harbors – 1976–1977.	IN: Marine Studies of San Pedro Bay, California. Part 13. Report no. USC-SG-2-77: Technical Ser. 2; NOAA-78022103. Dec. 1977. 437pp.	000195
7CA7701	Word, J.Q. and A.J. Mearns.	1979	The 60-meter control survey.	IN: Southern California Coastal Water Research Project: Annual Report for the year 1978. SCCWRP, Los Angeles, CA. 1979. pp 41–56.	000147
	Word, J.Q.	1979	The infaunal trophic index	IN: Southern California Coastal Water Resources Research Project: Annual Report for the year 1978. SCCWRP, Los Angeles, CA. 1979. pp.19–39.	000150
7CA7801	CH2M Hill, Inc.	1984	Ocean outfall monitoring program: 1982–83 annual report. San Francisco Department of Public Works, Bureau of Water Pollution Control.	Report to San Francisco Department of Public Works, Bureau of Water pollution Control. May, 1984. approx. 400 p.	000355
	CH2M Hill, Inc.	1978	Southwest ocean outfall: City and county of San Francisco Wastewater management Program. Predischarge oceanographic study. Phase 1: First progress report.	Report to PBQ & D, Inc. November, 1978. approx. 300 p.	000356

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page24 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
	CH2M Hill, Inc.	1979	Southwest ocean outfall: City and county of San Francisco Wastewater Management Program. Predischarge oceanographic study. Phase 1: Second progress report.	Report to PBQ & D, Inc. February, 1979. approx. 300 p.	000357
7CA8001	Swartz, R.C., D.W. Schults, G.R. Ditsworth, W.A. DeBen, and F.A. Cole.	1985	Sediment toxicity, contamination, and macrobenthic communities near a large sewage outfall.	IN: Validation and predictability of laboratory methods for assessing the fate and effects of contaminants in aquatic ecosystems, ASTM STP 865. T.P. Boyle (Ed.), American Society for Testing and Materials, Philadelphia, 1985, pp152-175.	000059
7CA8002	Anatec Laboratories, Inc. and Kinnetic Laboratories, Inc.	1982	East Bay Municipal Utility District local effects monitoring program.	Final report, vol. 3, Biology, Part I. Benthic Studies. 137p. + Appendices.	000421
	Kinnetic Labs., Inc.	1981	East Bay Dischargers Authority predischarge monitoring program.	Final Report, KLI-81-11. Chapter 1. Summary; Chapter 5. Benthic community analysis; Chapter 7, V. III. Appendices.	000440
	Hopkins. D.R.	1986	Atlas of the distributions and abundances of common benthic species in San Francisco Bay, California.	USGS Water Resources Investigations Report 86-4003. Feb. 1986. 16 p. + Appendices I and II.	000460
7CA8101	Thompson, B.E., J.N. Cross, J.D. Laughlin, G.P. Hershelman, R.W. Gossett, and D.T. Tsukada.	1984	Sediment and biological conditions on coastal slopes.	IN: Bascom, W., ed. SCCWRP Biennial Report, 1983-1984. Long Beach, CA. p. 37-67.	000375
7CA8301	Swartz, R.C., F.A. Cole, D.W. Schults, and W.A. DeBen.	1986	Ecological changes in the Southern California Bight near a large sewage outfall: benthic conditions in 1980 and 1983.	Mar. Ecol. Prog. Ser. 31:1-13.	000461
7CA8501	Chapman, P.M., R.N. Dexter, S.F. Cross, and D.G. Mitchell.	1986	A field trial of the sediment quality triad in San Francisco Bay.	Draft Report to NOAA-CEAB from E.V.S. Consultants, 1014 Yale Ave. N., Seattle, Wa. 98109. 146p. + Appendices A-G(separate volume)	000080
3CA7801	Jung, M., J.A. Whipple, and L.M. Moser.	1984	Summary report of the Cooperative Striped Bass Study (COSBS). A study of the effects of pollutants on the San Francisco Bay-Delta striped bass fishery.	Summary Report to Cal. State Wat. Res. Cntrl. Bd., Dec 1984. Pages not numbered.	000269
	Whipple, J.A., D.G. Crosby, and M. Jung.	1983	Third Progress Report: Cooperative Striped Bass Study.	Cal. State Water Resources Control Bd. Special Projects Rep. no. 83-3SP. 208 p.	000270

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page25 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
	Whipple, J.A.	1980	The impact of estuarine degradation and chronic pollution on populations of anadromous striped bass Morone saxatilis, in the San Francisco Bay - Delta, California.	Ann. Res. Report to NOAA - OMPA, Nov. 15, 1980. Pages not numbered.	000271
	Whipple, J.A.	1984	Procedures for histopathological examinations, autopsies, and subsampling of striped bass.	NOAA Tech. Mem. NMFS-SWFC-46. August 1984. 81pp. + Appendices.	000272
1HI7901	Brock, R.E.	1980	A bioassay evaluation of proposed discharge of Pearl Harbor dredged material(West Loch) at the Honolulu disposal site.	Unpub. Rep. to Dpt. of Public Works, City and County of Honolulu, from Hawaii Institute of Marine Biology, Kaneohe, Hawaii 96744. 53p + fig.	000034
1HI8201	Magarelli, P.C.	1982	Biological assessments of potential environment impact of dredging materials disposals from Nawiliwili Harbor, Kauai.	Unpub. Rep. to U.S. Army Corps of Engineers by The Oceanic Institute, Waimanalo, Hawaii, Nov., 1982. 54p.	000114
1HI8202	Szyper, J.M.	1982	Biological assessment of potential environmental impacts of dredged material disposal from the projected pier 16 area.	Unpub. Rep. to R.M. Towill Corp by the Oceanic Institute, Waimanalo, Hawaii.	000113
6HI7201	Evans, E.C. (Ed.)	1974	Pearl Harbor Biological Survey - Final Report.	Unpub Rep. NUC TN 1128 August 1974. Approx. 500 p.(5 sections + Appendices A-H), by the Naval Undersea Center, San Diego CA.	000313
6HI7301	Kay, E.A. and R.K. Kawamoto.	1984	Micromollusk monitoring at Barbers Pt. sewage outfall, Oahu, Hawaii.	Wat. Resources Re. Ctr. Tech. Rep. no.162. March 1984.47 p.	000311
6HI7601	Chave, K.E. and J.N. Miller.	1977	Baseline studies and evaluation of the physical, chemical, and biological characteristics of nearshore dredge spoil disposal, Pearl Harbor, Hawaii. Part A. Baseline studies, investigation, and selection of a suitable dredge spoil site.	Unpub. Final Rep. to Pacific Division, Naval Facilities Engineering Command, Honolulu, HI. for Contract N62742-76 C-0050. May 1977. pages not numbered.	000314
	Chave, K.E. and J.N. Miller.	1977	Baseline studies and evaluation of the physical, chemical, and biological characteristics of nearshore dredge spoil disposal, Pearl Harbor, Hawaii. Part B. Immediate effects of dumping: Monitoring studies.	Unpub. Rep. to Pacific Division Naval Facilities Engineering Command, Honolulu, HI., for Contract no. N62742-76 C-0050. pages not numbered.	000315
	Chave, K.E. and J.N. Miller.	1978	Baseline studies and evaluation of the physical, chemical, and biological characteristics of nearshore dredge spoil disposal, Pearl Harbor, Hawaii. Part C. Long-term effects of dumping.	Unpub. Final Rep. to Pacific Division Naval Facilities Engineering Command, Honolulu, HI. May 1978. pages not numbered.	000317

Table 3. Bibliographic references associated with the cataloged studies. Listing is by study identifier, which is sorted by state, type of test or survey conducted, year, and study accession number. (Page26 of 26)

Study ID	Authors	Year	Title	Publication	Refs..
6HI7801	Grovhoug, J.G.	1979	Marine environmental assessment at three sites in Pearl Harbor, Oahu. August–October 1978.	NOSC Tech. Rep. 441. June 1979. 92 p.	000312
1BC8401	Chapman, P.M., and C.T. Barlow.	1984	Sediment Bioassays in various B.C. Coastal areas.	Prepared for the Environmental Protection Service, West Vancouver, B.C. by EVS Consultants, Ltd,. N. Vancouver, B.C. 22p. + Appendices A and B. June 1984.	000051

170 records listed.

Table 4. Numbers of new and ongoing biological effects studies on the Pacific Coast for each year since 1951.

	Year																												
	1951	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
Benthos																													
# New studies	1	1	1	1	2	0	1	0	0	1	2	2	4	3	6	10	7	4	6	4	3	1	4	2	4	3	2		
# Ongoing studies	0	0	1	1	2	2	1	1	1	1	2	3	3	6	5	8	10	13	9	7	8	8	8	11	9	5	4	3	
Total # studies	1	1	2	2	4	2	2	1	1	2	4	5	7	9	11	18	17	17	15	11	11	9	12	13	13	8	6	3	
Total # stations	36	28	28	43	69	23	27	15	15	30	82	120	201	203	194	564	607	436	273	492	351	341	558	581	440	209	156	80	
Fish & Invertebrate Health																													
# New studies	0	0	0	1	0	0	2	0	1	0	3	1	0	2	3	1	4	4	2	3	2	1	4	7	5	6	4		
# Ongoing studies	0	0	0	0	1	1	1	2	1	1	1	3	2	2	3	4	4	2	4	4	5	6	5	4	6	3	3		
Total # studies				1	1	1	3	2	2	1	4	4	2	4	6	5	8	6	6	7	7	7	9	11	11	9	7		
Total # stations				3	3	3	29	16	15	1	16	35	29	34	78	66	195	131	217	149	88	55	108	124	134	92	61		
Bioassays																													
# New studies	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	2	3	4	0	0	0	3	2	5	4	8	4	3	
# Ongoing studies	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	1	1	1	1	0	0	0	1	1	
Total # studies				1	1	1	1	1	1	1	1	2	2	1	2	3	5	6	3	1	1	4	3	5	4	8	5	4	
Total # stations				+	+	+	+	+	+	+	+	8	6	+	8	21	17	32	20	8	8	22	280	66	213	158	77	60	

+ = Number of stations in each year unknown: probably near 100

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 1 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
1003	Sed. Extract: Gonad cell prolif. in vitro	10030019	Rainbow trout gonad (Salmo gairdneri): cell line 2	141	141
1004	Sed. Extract: Juv. cell prolif. in vitro	10040020	Bluegill fry (Lepomis macrochirus): cell line 2	44	44
1005	Microlayer Extract: Gonad cell prolif. in vitro.	10050019	Rainbow trout gonad (Salmo gairdneri): cell line 2	17	37
1020	Sed. Partic. : 15 min sperm cell fertilization capacity	10200024	Strongylocentrotus droebachiensis	2	4
1040	Microlayer Extract: Genotoxicity in vivo.	10400060	Psettichthyes melanostictus	20	20
1041	Microlayer Extract: Genotoxicity in vivo. 4 dil.	10410060	Psettichthyes melanostictus	5	6
1043	Microlayer Extract: Genotoxicity in vitro.	10430019	Rainbow trout gonad (Salmo gairdneri): cell line 2	10	20
1050	Sed. Extract: Genotoxicity in vitro	10500019	Rainbow trout gonad (Salmo gairdneri): cell line 2	145	243
1051	H2O Extract: Genotoxicity in vitro	10510019	Rainbow trout gonad (Salmo gairdneri): cell line 2	7	14
1052	Genotoxicity in vivo - 12 h fish gastrulae	10520026	Genyonemus lineatus	2	66
1053	Sed. Extract: Sister Chromatid Exchange: Kidney Tissue.	10530041	Parophrys vetulus	2	2
1201	Receiving water: 48h bivalve embryo bioassay	12010005	Crassostrea gigas	417	14000
1201	Receiving water: 48h bivalve embryo bioassay	12010006	Protothaca staminea	64	800
1201	Receiving water: 48h bivalve embryo bioassay	12010007	Tresus capax	5	100
1202	Receiving water: 48h bivalve embryo bioassay	12020005	Crassostrea gigas	19	842
1202	Receiving water: 48h bivalve embryo bioassay	12020030	Mya arenaria	1	15
1202	Receiving water: 48h bivalve embryo bioassay	12020031	Crassostrea virginica	1	15
1203	Receiving Water: 15 min sperm cell fertilization capacity	12030076	Dendraster excentricus	12	450
1204	Receiving water: 48h hatching success	12040025	Morone saxatilis	1	28
1205	Receiving water: 96h Acute Toxicity: Juveniles	12050025	Morone saxatilis	1	15
1205	Receiving water: 96h Acute Toxicity: Juveniles	12050034	Oncorhynchus tshawytscha	11	73
1205	Receiving water: 96h Acute Toxicity: Juveniles	12050035	Menidia audens	1	15
1206	Receiving water: 96h Acute Toxicity to eggs and larvae	12060025	Morone saxatilis	1	15
1207	Receiving water: 96h Acute Toxicity: Adults	12070028	Eurytemora hirudinoides	1	24
1207	Receiving water: 96h Acute Toxicity: Adults	12070029	Acartia clausa	1	32
1207	Receiving water: 96h Acute Toxicity: Adults	12070032	Neomysis integer	1	15
1207	Receiving water: 96h Acute Toxicity: Adults	12070033	Palaemon macrodactylus	1	15
1207	Receiving water: 96h Acute Toxicity: Adults	12070036	Hysterocarpus traski	1	15
1208	Rec. Water: 96h-10d toxicity, adults	12080004	Monopylephorus cuticulatus	7	7
1208	Rec. Water: 96h-10d toxicity, adults	12080013	Eogammarus confervicolus	7	7
1208	Rec. Water: 96h-10d toxicity, adults	12080018	Gasterosteus aculeatus	7	7
1210	Sed. Elutriate: 48h bivalve embryo bioassay EC50	12100005	Crassostrea gigas	10	85
1211	Sed.Slurry: 48h bivalve embryo bioassay	12110005	Crassostrea gigas	20	27
1212	Sed. Elutriate: 48h bivalve embryo bioassay	12120005	Crassostrea gigas	13	13
1215	Sed.Slurry: 9h Bivalve veliger bioassay	12150005	Crassostrea gigas	24	54
1220	Sed. Slurry: 48h bivalve embryo bioassay.	12200005	Crassostrea gigas	146	174
1220	Sed. Slurry: 48h bivalve embryo bioassay.	12200008	Mytilus edulis	9	45
1221	Sed. Slurry: 48h bivalve embryo bioassay. (LC50)	12210005	Crassostrea gigas	19	40

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 2 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
1222	Sed. Slurry (100g/l): 48h bivalve embryo bioassay.	12220005	Crassostrea gigas	48	48
1223	Sed. Slurry: 48h Toxicity, Juveniles	12230021	Oncorhynchus gorbuscha	5	9
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240052	Cancer magister	1	4
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240099	Paralithodes camtschatica	1	4
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240100	Chionoecetes bairdi	1	4
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240101	Pandalus hypsinotus	1	4
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240102	Pandalus danae	1	4
1224	Sed. Slurry: 96h Toxicity, Larvae (LC50, EC50)	12240103	Eualus suckleyi	1	4
1225	Sed. Slurry: 7-d Larval mortality	12250023	Hypomesus pretiosus	7	14
1245	Sed. Partic.: 96h Toxicity to juveniles (LC50)	12450068	Microstomus pacificus	1	5
1245	Sed. Partic.: 96h Toxicity to juveniles (LC50)	12450089	Artemia salina	3	63
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460052	Cancer magister	1	4
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460088	Chelon engeli	3	63
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460092	Penaeus japonicus	3	63
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460099	Paralithodes camtschatica	1	4
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460100	Chionoecetes bairdi	1	4
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460101	Pandalus hypsinotus	1	4
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460102	Pandalus danae	1	4
1246	Sed. Partic.: 96h Toxicity to adults (LC50)	12460103	Eualus suckleyi	1	4
1250	Sed. Partic.: 96h Acute Tox. to adults	12500014	Acartia tonsa	15	47
1250	Sed. Partic.: 96h Acute Tox. to adults	12500015	Acanthomysis macropsis	14	42
1250	Sed. Partic.: 96h Acute Tox. to adults	12500016	Metamysidopsis elongata	14	42
1250	Sed. Partic.: 96h Acute Tox. to adults	12500017	Tigriopus californicus	2	2
1250	Sed. Partic.: 96h Acute Tox. to adults	12500022	Citharichthyes stigmaeus	14	42
1250	Sed. Partic.: 96h Acute Tox. to adults	12500031	Crassostrea virginica	1	12
1250	Sed. Partic.: 96h Acute Tox. to adults	12500044	Acartia sp.	2	2
1250	Sed. Partic.: 96h Acute Tox. to adults	12500052	Cancer magister	5	15
1250	Sed. Partic.: 96h Acute Tox. to adults	12500067	Crangon nigricauda	1	5
1250	Sed. Partic.: 96h Acute Tox. to adults	12500074	Macoma inclusa	5	15
1250	Sed. Partic.: 96h Acute Tox. to adults	12500075	Acila castrensis	5	15
1250	Sed. Partic.: 96h Acute Tox. to adults	12500076	Dendraster excentricus	5	15
1250	Sed. Partic.: 96h Acute Tox. to adults	12500077	Abarenicola pacifica	5	15
1250	Sed. Partic.: 96h Acute Tox. to adults	12500082	Sabellastarte sanctaejosephi	1	12
1250	Sed. Partic.: 96h Acute Tox. to adults	12500083	Dascyllus albisella	1	12
1250	Sed. Partic.: 96h Acute Tox. to adults	12500084	Periclemenes grandis	1	12
1250	Sed. Partic.: 96h Acute Tox. to adults	12500085	Montipora verrucosa	1	12
1250	Sed. Partic.: 96h Acute Tox. to adults	12500089	Artemia salina	5	48
1250	Sed. Partic.: 96h Acute Tox. to adults	12500092	Penaeus japonicus	4	36
1250	Sed. Partic.: 96h Acute Tox. to adults	12500093	Penaeus stylirostris	4	36
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510014	Acartia tonsa	14	42
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510015	Acanthomysis macropsis	14	42
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510016	Metamysidopsis elongata	14	42
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510022	Citharichthyes stigmaeus	14	42
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510031	Crassostrea virginica	1	12
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510044	Acartia sp.	2	2
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510082	Sabellastarte sanctaejosephi	1	12

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 3 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510083	Dascyllus albisella	1	12
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510084	Periclemenes grandis	1	12
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510085	Montipora verrucosa	1	12
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510089	Artemia salina	8	111
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510091	Tapes japonica	7	35
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510092	Penaeus japonicus	4	20
1251	Sed.Elut. (H2O): 96h Acute Tox. to adults	12510093	Penaeus stylirostris	8	56
1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	12520088	Chelon engeli	11	135
1252	Sed.Elut. (H2O): 96h Acute Tox. to juveniles	12520090	Penaeus japonicus - vannamei (juv)	6	78
1300	Sed.: 96h-10d Acute Tox. to adults	13000004	Monopylephorus cuticulatus	97	97
1300	Sed.: 96h-10d Acute Tox. to adults	13000013	Eogammarus confervicolus	97	97
1300	Sed.: 96h-10d Acute Tox. to adults	13000018	Gasterosteus aculeatus	97	97
1301	Sed.: 10d Tox. to adults	13010012	Rhepoxynius abronius	2	5
1302	Sed.: 10d Tox. to adults	13020012	Rhepoxynius abronius	196	616
1303	Sed.: 10d Acute Tox. to adults	13030012	Rhepoxynius abronius	421	565
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040003	Neanthes arenaceodentata	14	70
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040006	Protothaca staminea	24	87
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040010	Macoma nasuta	1	5
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040012	Rhepoxynius abronius	37	334
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040016	Metamysidopsis elongata	14	14
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040050	Glycinde picta	11	22
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040051	Macoma inquinata	11	22
1304	Sed.(Flow Th.): 10d Acute Tox. to adults	13040053	Cumacea	11	22
1305	Sed.: 10d Acute Tox. to adults	13050012	Rhepoxynius abronius	5	10
1305	Sed.: 10d Acute Tox. to adults	13050059	Citharichthyes sordidus	5	10
1305	Sed.: 10d Acute Tox. to adults	13050067	Crangon nigricauda	5	10
1305	Sed.: 10d Acute Tox. to adults	13050074	Macoma inclusa	5	10
1305	Sed.: 10d Acute Tox. to adults	13050077	Abarenicola pacifica	5	10
1305	Sed.: 10d Acute Tox. to adults	13050078	Crangon stylirostris	5	10
1305	Sed.: 10d Acute Tox. to adults	13050079	Crangon franciscorum	5	10
1305	Sed.: 10d Acute Tox. to adults	13050082	Sabellastarte sanctaejosephi	1	5
1305	Sed.: 10d Acute Tox. to adults	13050083	Dascyllus albisella	1	5
1305	Sed.: 10d Acute Tox. to adults	13050086	Quadrans palatum	1	5
1305	Sed.: 10d Acute Tox. to adults	13050087	Saron marmoratus	1	5
1306	Sed.: 10d Acute Tox. to larvae	13060023	Hypomesus pretiosus	22	44
1307	Sed.: 10d Tox. to adults	13070012	Rhepoxynius abronius	14	49
1308	Sed.: 10d Tox. to adults (LC50)	13080012	Rhepoxynius abronius	6	6
1309	Sed.(Flow Th.): 9+d Acute Tox. to adults	13090057	Grandifoxus grandis	10	40
1310	Sed.: 14d Tox. to adults	13100045	Rangia cuneata	2	2
1310	Sed.: 14d Tox. to adults	13100048	Palaemonetes pugio	2	2
1311	Sed. Slurry: 10d Toxicity to juveniles	13110052	Cancer magister	1	1
1312	Sed.(Recirc.): 10d Acute Tox. to adults	13120012	Rhepoxynius abronius	12	48
1350	Sed. 20d Tox. to adults	13500010	Macoma nasuta	2	20
1350	Sed. 20d Tox. to adults	13500022	Citharichthyes stigmaeus	2	20
1351	Sed. 21d Toxicity, Juveniles	13510052	Cancer magister	1	8
1401	Receiving water: 28d Tox. to adults	14010031	Crassostrea virginica	1	12
1420	Receiving water: 28d survival & growth: juveniles	14200025	Morone saxatilis	1	15
1451	Receiving water: hatching success	14510039	Leuresthes tenuis	1	1
1500	Sed.+Sed.Elut.(H2O): 35d Tox. to adults	15000002	Capitella capitata	22	22
1501	Sed. Elutriate (H2O): 50d Tox.: Larva-Adult.	15010002	Capitella capitata	22	22
1510	Sed.: Development to Hatching	15100023	Hypomesus pretiosus	22	44
1540	Receiving water: 90d survival, growth, & fecundity: adults	15400052	Cancer magister	4	12
1550	Sed.(>69u): 4wk Reproduction & Survival	15500017	Tigriopus californicus	11	11
1551	Microlayer - egg viability	15510008	Mytilus edulis	10	10
1551	Microlayer - egg viability	15510024	Strongylocentrotus droebachiensis	10	10
1551	Microlayer - egg viability	15510043	Engraulis mordax	10	10
1551	Microlayer - egg viability	15510060	Psettichthyes melanostictus	35	120

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 4 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
1552	Microlayer: egg viability (LC50)	15520060	Psettichthyes melanostictus	4	10
1601	H2O(centr.): Adult Respiration Rate	16010004	Monopylephorus cuticulatus	7	7
1602	Rec. Water: 96h Productivity	16020027	Thallassiosira decipiens	1	15
1603	Sed. Slurry: 48h Photosynthesis	16030001	Skeletonema sp.	4	11
1610	Sed. Elutriate (H2O): Adult Respiration Rate	16100004	Monopylephorus cuticulatus	146	150
1611	Sed. Elutriate: 96h Plankton growth (mgC/ml)	16119010	Aufwuchs- fouling community	7	14
1615	Sed. Extract: Microtox	16150049	Photobacterium phosphoreum	20	77
1616	Sed. Elutriate: Microtox	16160049	Photobacterium phosphoreum	51	255
1620	Rec. Water: 1mo Growth in situ: caged mussels	16200008	Mytilus edulis	8	48
1621	Rec. Water: 2mo Growth in situ: caged mussels	16210008	Mytilus edulis	8	48
1622	Rec. Water: 4mo Growth in situ: caged mussels	16220008	Mytilus edulis	8	48
1624	Rec. Water: 2wk Growth in situ: caged mussels	16240008	Mytilus edulis	5	5
1625	Rec. Water: 6wk Growth in situ: caged mussels	16250008	Mytilus edulis	17	28
1626		16260008	Mytilus edulis	5	5
1640	Rec. Water: 2wk Growth in situ: Laminaria.	16400106	Laminaria spp.	2	2
1641	Rec. Water: 4mo Growth in situ: Fucus.	16410107	Fucus distichus	2	8
1642	Rec. Water: 3mo Growth in situ: Nereocystis stipe elongation.	16420105	Nereocystis luetkeana	2	6
1643	Rec. Water: 3mo. growth in situ: algal blade elongation, (cm per 2wks).	16430098	Egregia sp.	8	8
1680	Scope for growth.	16800008	Mytilus edulis	6	11
1750	Rec. Water: caged fish exposure in situ	17500094	Hypsopsetta guttulata	1	1
1750	Rec. Water: caged fish exposure in situ	17500095	Paralichthyes californiensis	1	1
1750	Rec. Water: caged fish exposure in situ	17500096	Phanerodon furcatus	1	1
1750	Rec. Water: caged fish exposure in situ	17509092	Juvenile salmon (5 spp.)	6	136
1751	Sed. Extract: Disease Induction, fish livers.	17510060	Psettichthyes melanostictus	12	12
1752	Microlayer: Egg viability in situ	17520060	Psettichthyes melanostictus	3	6
1753	Sed. Extract: 1 Injection: Fish liver metabolism, fertilization, egg viability.	17530041	Parophrys vetulus	3	3
1754	Sed. Extract: 12d Inj.Schedule: Fish liver metabolism, fertilization, egg viability.	17540041	Parophrys vetulus	1	1
1755	Rec. Water: caged fish exposure in situ: Histopath, metallothionens, Cyt. P450	17550081	Scorpaena guttata	1	4
1756	Sed.: 1yr Disease induction (lab), fish	17560068	Microstomus pacificus	1	2
1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	17600010	Macoma nasuta	14	14
1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	17600042	Ostrea lurida	9	9
1760	Rec. Water (?): 1yr Disease induction in situ, bivalves	17600061	Cancer gracilis	7	7
1810	Sed.: 48h adult survival & reburial	18100011	Macoma balthica	9	45
1910	Rec. Water: 3-30mo algae succession in situ.	19109151	Macroflora in situ	2	8
1923	Fouling community: glass slide growth racks.	19239101	Macroinfauna >0.5mm	8	128
1924	Diatom growth on Mylar plates in situ.	19249010	Aufwuchs- fouling community	5	40
1926	Sed.: Recruitment (duration?)	19269100	Macroinfauna >1mm	7	7
1927	Sed.: 8 wk Recolonization in situ.	19270002	Capitella capitata	9	9
1927	Sed.: 8 wk Recolonization in situ.	19270108	Polydora ligni	9	9
1927	Sed.: 8 wk Recolonization in situ.	19270109	Pseudopolydora kempi japonica	9	9
1927	Sed.: 8 wk Recolonization in situ.	19270111	Streblospio benedicti	9	9
1940	Fouling community growth in situ: 2-3 wks	19409010	Aufwuchs- fouling community	2	6
2010	Fish health - egg and larval viability	20100026	Genyonemus lineatus	2	66
2050	Fecundity, fertilization success	20500025	Morone saxatilis	6	150
2050	Fecundity, fertilization success	20500041	Parophrys vetulus	2	2
2055	Fish health - starving larvae	20550043	Engraulis mordax	64	64
2056	Fish health - Reproductive condition, Atresia	20560041	Parophrys vetulus	2	2

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 5 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
2100	Fish health - fin erosion	21009091	Demersal fishes	8	160
2101	Fish health - external pathology	21010038	Hippoglossoides elassodon	3	
2101	Fish health - external pathology	21010041	Parophrys vetulus	13	150
2101	Fish health - external pathology	21019091	Demersal fishes	202	1594
2102	Fish health - histopathology	21020041	Parophrys vetulus	40	40
2102	Fish health - histopathology	21020054	Lepidopsetta bilineata	28	28
2102	Fish health - histopathology	21020058	Platichthyes stellatus	17	17
2102	Fish health - histopathology	21020069	Leptocottus armatus	28	28
2102	Fish health - histopathology	21020081	Scorpaena guttata	1	1
2102	Fish health - histopathology	21029090	Fishes	6	6
2102	Fish health - histopathology	21029091	Demersal fishes	7	39
2102	Fish health - histopathology	21029093	Pelagic fishes	3	21
2103	Fish health - liver pathology	21030041	Parophrys vetulus	47	44
2103	Fish health - liver pathology	21030046	Zaniolepis latipinnis	4	4
2103	Fish health - liver pathology	21030047	Icelinus quadriseriatus	3	3
2103	Fish health - liver pathology	21030054	Lepidopsetta bilineata	1	1
2103	Fish health - liver pathology	21030056	Myoxocephalus polyacanthocephalus	1	1
2103	Fish health - liver pathology	21030059	Citharichthyes sordidus	3	3
2103	Fish health - liver pathology	21030064	Paralabrax clathratus	2	2
2103	Fish health - liver pathology	21030080	Symphurus atricauda	5	5
2103	Fish health - liver pathology	21030081	Scorpaena guttata	3	3
2104	Fish health - Reproductive condition, morphometrics, MFO activity.	21040022	Citharichthyes stigmaeus	2	2
2104	Fish health - Reproductive condition, morphometrics, MFO activity.	21040058	Platichthyes stellatus	7	7
2104	Fish health - Reproductive condition, morphometrics, MFO activity.	21040059	Citharichthyes sordidus	4	6
2104	Fish health - Reproductive condition, morphometrics, MFO activity.	21049090	Fishes	26	54
2105	Fish health - reproductive condition, morphometrics, histopathology.	21050026	Genyonemus lineatus	2	2
2105	Fish health - reproductive condition, morphometrics, histopathology.	21050046	Zaniolepis latipinnis	3	33
2105	Fish health - reproductive condition, morphometrics, histopathology.	21050047	Icelinus quadriseriatus	3	33
2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	21060026	Genyonemus lineatus	1	1
2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	21060064	Paralabrax clathratus	6	6
2106	Fish health - liver, kidney, gonad histopathology, morphometrics.	21060065	Sebastolobus altivelis	2	2
2107	Fish health - liver, kidney, gill histopathology	21070041	Parophrys vetulus	44	146
2107	Fish health - liver, kidney, gill histopathology	21070054	Lepidopsetta bilineata	34	136
2107	Fish health - liver, kidney, gill histopathology	21070058	Platichthyes stellatus	10	10
2107	Fish health - liver, kidney, gill histopathology	21070069	Leptocottus armatus	34	136
2107	Fish health - liver, kidney, gill histopathology	21070070	Microgadus proximus	34	136
2107	Fish health - liver, kidney, gill histopathology	21070071	Sebastes maliger	34	136
2108	Fish health - liver, muscle pathology	21080026	Genyonemus lineatus	2	2
2110	Fish health - skin papillomas, size	21100041	Parophrys vetulus	2	24
2110	Fish health - skin papillomas, size	21100058	Platichthyes stellatus		48
2110	Fish health - skin papillomas, size	21109091	Demersal fishes	143	227
2111	Fish health - liver, kidney, fin histopathology	21110041	Parophrys vetulus	8	16
2111	Fish health - liver, kidney, fin histopathology	21110054	Lepidopsetta bilineata	8	16
2111	Fish health - liver, kidney, fin histopathology	21110058	Platichthyes stellatus	8	16
2112	Fish health - external deformity	21120097	Paralabrax nebulifer	2	2
2113	Fish health - spinal deformity	21130097	Paralabrax nebulifer	1	1
2120	Fish health - external pathology, liver histopathology, size.	21200041	Parophrys vetulus	22	47
2120	Fish health - external pathology, liver histopathology, size.	21200058	Platichthyes stellatus	5	30

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PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
2120	Fish health - external pathology, liver histopathology, size.	21209091	Demersal fishes	42	544
2121	Fish health - Liver-somatic index.	21210068	Microstomus pacificus	5	5
2121	Fish health - Liver-somatic index.	21219091	Demersal fishes	5	5
2122	Fish health - MFO activity	21220054	Lepidopsetta bilineata	5	5
2160	Invert. health - gonad histopathology	21600037	Strongylocentrotus purpuratus	3	30
2161	Invert health - histopathology	21610009	Mytilus californicus	3	30
2162	Invert. health - histopathology	21620008	Mytilus edulis	5	102
2163	Invert. health - histopathology	21630009	Mytilus californicus	1	1
2163	Invert. health - histopathology	21630052	Cancer magister	2	2
2163	Invert. health - histopathology	21630061	Cancer gracilis	28	28
2163	Invert. health - histopathology	21630104	Macoma carlottensis	1	1
2163	Invert. health - histopathology	21639065	Crustacea: Caridea	34	34
2164	Invert health - histopathology	21640009	Mytilus californicus	30	75
2164	Invert health - histopathology	21640052	Cancer magister	14	7
2164	Invert health - histopathology	21640061	Cancer gracilis	9	9
2164	Invert health - histopathology	21640062	Pandalus platyceros	3	3
2164	Invert health - histopathology	21640063	Pandalopsis dispar	3	3
2201	Community Status: Macrobenthos>1mm: 0.1m2 grab.	22019100	Macroinfauna >1mm	313	7714
2202	Community Status: Macrobenthos>1mm: 0.1m2 grab.	22029100	Macroinfauna >1mm	33	93
2203	Community Status: Macrobenthos>1mm: 0.1m2 grab.	22039100	Macroinfauna >1mm	15	75
2204	Community Status: Macrobenthos>1mm: 0.1m2 grab.	22049100	Macroinfauna >1mm	132	176
2205	Community Status: Macrobenthos>1mm: 0.04m2 grab.	22059100	Macroinfauna >1mm	9	90
2206	Community Status: Macrobenthos>1mm: 0.1m2 Smith-McIntyre grab.	22069100	Macroinfauna >1mm	260	1359
2207	Community Status: Macrobenthos>1mm: Petersen grab.	22079100	Macroinfauna >1mm	95	963
2208	Community status: Macrobenthos > 420u: 0.3ft grab (SCUBA)	22089100	Macroinfauna >1mm	10	87
2209	Community Status: Macrobenthos>1mm: 0.06m2 grab.	22099100	Macroinfauna >1mm	91	676
2210	Community Status: Macrobenthos>1mm: 0.04m2 grab.	22109100	Macroinfauna >1mm	53	2327
2211	Community Status: Macrobenthos>1mm: subsampled 0.1m2 grab.	22119100	Macroinfauna >1mm	48	134
2212	Community Status: Macrobenthos>1mm:11 scoops.	22129100	Macroinfauna >1mm	3	9
2213	Community Status: Macrobenthos>1mm: 0.1m2 grab.ITI, T# only	22139100	Macroinfauna >1mm	46	456
2214	Community Status: Macrobenthos>1mm: 0.1m2 grab.: Taxon groups only	22149100	Macroinfauna >1mm	39	306
2215	Community Status: Macrobenthos>1mm: 0.1m2 grab.: Taxon Group biomass, ITI species abundance	22159100	Macroinfauna >1mm	300	300
2216	Community Status: Macrobenthos>1mm: 0.1m2 grab.: All species; ITI species abundance	22169100	Macroinfauna >1mm	151	877
2217	Community Status: Macrobenthos>1mm: 0.1m2 grab.: ITI species abundance, richness	22179100	Macroinfauna >1mm	41	41
2218	Community status: Macrobenthos >1mm: 0.1m2 grab: Species abundance, biomass	22189100	Macroinfauna >1mm	79	251
2219	Community status: Macrobenthos >1mm: 0.05m2 Ponar grab.	22199100	Macroinfauna >1mm	23	181
2220	Community status: Macroinfauna >1mm; 0.05m2 x 15cm subsample	22209100	Macroinfauna >1mm	5	720
2221	Community status: Macrobenthos >1mm: 0.05 - 0.08m2 orange peel grab.	22219100	Macroinfauna >1mm	28	202
2232	Community Status (Intertidal): Macrobenthos>0.5mm:0.17m2 core	22329101	Macroinfauna >0.5mm	1	36
2233	Community Status: Macrobenthos>0.5mm:0.09m2 box core	22339101	Macroinfauna >0.5mm	164	219
2234	Community Status: Macrobenthos>0.5mm: Shipek	22349101	Macroinfauna >0.5mm	30	916
2236	Community Status: Macrobenthos>0.5mm:	22369101	Macroinfauna >0.5mm	123	1657

Table 5. Tests used in cataloged studies, species or communities used, and total number of stations and number of samples for each. (Page 7 of 7)

PCodes	Probes	Probe:Sp#	Taxon	PNSta	PNSamp
	0.05m2 Ponar grab				
2237	Community status: Macrobenthos >0.5mm: 0.07m2 orange peel grab.	22379101	Macroinfauna >0.5mm	28	236
2238	Community status: Macrobenthos >0.6mm: 0.085m2 orange peel grab.	22389101	Macroinfauna >0.5mm	18	108
2238	Community status: Macrobenthos >0.6mm: 0.085m2 orange peel grab.	22389103	Macroinfauna >0.6mm	28	236
2239	Community status: Macrobenthos >0.6mm: 0.05m2 Ponar grab.	22399103	Macroinfauna >0.6mm	60	417
2240	Community status: Macrobenthos >0.6mm: 0.06m2 Ponar grab.	22409103	Macroinfauna >0.6mm	10	276
2241	Community Status: Macrobenthos>0.5mm: 0.15m2 core	22419101	Macroinfauna >0.5mm	6	36
2242	Community Status: Macrobenthos>0.5mm: 0.18m2 core	22429101	Macroinfauna >0.5mm	3	36
2250	Community status: Amphipods >1mm: 0.1m2 grab.	22509060	Amphipods	48	48
2251	Community status: Micromollusks >0.062 mm.	22519050	Micromolluscs >62u	55	156
2252	Community status: Foraminifera >0.062 mm.	22529011	Foraminifera	18	36
2253	Community status: Flatfish egg density	22539090	Fishes	4	40
2254	Population status: Abundance, size structure; scraped samples.	22540008	Mytilus edulis	6	18
2262	Community status: Polychaetes >1mm: 0.1m2 grab.	22629055	Polychaetes >1mm.	12	36
2263	Community status: Polychaetes and bivalves >6mm; 0.25m2 x 25cm subsample	22639102	Macroinfauna >6mm; live sieved	5	360
2264	Community status: Macroalgae in 0.25m2 quadrats, scraped.	22640105	Nereocystis luetkeana	2	12
2264	Community status: Macroalgae in 0.25m2 quadrats, scraped.	22649015	Macroflora; scraped	5	240
2350	Community Status: Plankton	23509010	Aufwuchs- fouling community	5	5
2401	Community status: Macrobenthos: Transect observations.	24019091	Demersal fishes	8	8
2402	Community status: Macrobenthos: Quadrat observations.	24029150	Biota in situ: (photos)	25	1476
2403	Community status: Macrocystis, sea urchins; 1.0m2 quadrat, in situ photos.	24030110	Macrocystis pyrifera/sp.	60	2160
2404	Community status: Belt transects: Kelp, epibenthos abundance.	24040105	Nereocystis luetkeana	2	6
2404	Community status: Belt transects: Kelp, epibenthos abundance.	24040110	Macrocystis pyrifera/sp.	5	200
2405	Community status: Macrobenthos >1cm; 1.0m2 quadrat in situ	24059151	Macroflora in situ	8	40
2406	Community status: Macroalgae in situ: line transects	24069151	Macroflora in situ	92	161
2410	Community status: Macroalgae in 0.25m2 quadrats, in situ photos.	24109151	Macroflora in situ	5	3840
2412	Community status: Areal extent of kelp bed canopies.	24120110	Macrocystis pyrifera/sp.	38	355
2420	Community status: Macrobenthos; subsampled 0.25m2 quadrat; in situ	24209151	Macroflora in situ	5	1440
				7019	59275

305 records listed.

Table 6. Species or communities representing 1% or more of the total number of stations or samples along the Pacific Coast.

TAXON OR COMMUNITY TESTED	NUMBERS OF STATIONS (%)	NUMBERS OF SAMPLES (%)
Individual Species		
Bacteria		
Photobacterium phosphoreum	71 (1.8)	332 (1.2)
Annelids		
Monopylephorus cuticulatus *	257 (6.4)	261 + (1.0%)
Capitella capitata	53 (1.3)	53 +
Molluscs		
Crassostrea gigas *	716 (17.8)	15,283 (56)
Mytilus edulis	87 (2.2)	368 (1.3)
Protothaca staminea	88 (2.2)	887 (3.2)
Crustacea		
Eogammarus confervicolus	104 (2.6)	104 +
Rhepoxynius abronius *	693 (17.3)	1,633 (6.0)
Metamysidopsis elongata	42 (1.1)	98 +
Cancer gracilis	44 (1.1)	44 +
Fishes		
Rainbow trout gonad cell line-2 *	320 (8.0)	455 (1.6)
Bluegill fry cell line-2	44 (1.1)	44 +
Gasterosteus aculeatus	104 (2.6)	104 +
Hypomesus pretiosus	51 (1.3)	102 +
Lepidopsetta bilineata	76 (1.9)	186 +
Leptocottus armatus	62 (1.6)	164 +
Parophrys vetulus	186 (4.6)	477 (1.8)
Platichthyes stellatus	47 (1.2)	128 +
Psettichthyes melanostictus	79 (2.0)	174 +
Engraulis mordax	74 (1.9)	74 +
Dominant 20 Taxa - Totals	3,198 (80)	20,971 (77)
All 107 Taxa - Totals	4,000 (100)	27,309 (100)
COMMUNITIES		
Micromolluscs .06 mm	73 (2.4)	156 +
Amphipods	48 (1.6)	48 +
Benthic invertebrates 1 mm *	1,781 (59.0)	17,044 (53.3)
Benthic invertebrates 0.6 mm	98 (3.2)	929 (2.9)
Benthic invertebrates 0.6 mm live sieved	5 +	360 (1.1)
Benthic invertebrates 0.5 mm *	381 (12.6)	3,372 (10.6)
Benthos observed in situ	25 +	1,476 (4.6)
Demersal fishes *	415 (13.8)	2,577 (8.1)
Other fishes	36 (1.2)	100 +
Macroflora observed in situ *	110 (3.6)	5,484 (17.2)
Dominant 10 Groups - Totals	2,961 (97.4)	31,546 (98.1)
All Groups - Totals	3,019 (100)	31,966 (100)

* Those comprising 5% or more of the totals.

Table 7. Numbers of stations sampled for each major category of test and each geographic area.

	Alaska	B.C.	WA Col.R.	WA P.S.	Oregon	N.Cal.	S.F.Bay	S.Cal.	Hawaii
BIOASSAYS									
Sediment									
Acute	16	12	41	1,199	65	0	77	171	60
Cytotox/Genotox	0	0	0	359	0	0	0	4	0
Sublethal	4	0	0	286	0	0	17	0	0
Subtotal	20	12	41	1,844	65	0	94	175	60
Receiving Water									
Acute	0	0	0	621	0	0	8	0	0
Cytotox.	0	0	0	32	0	0	0	0	0
Sublethal	0	0	0	29	0	0	53	0	0
Subtotal	0	0	0	682	0	0	61	0	0
TOTALS	20	12	41	2,526	65	0	155	175	60
HEALTH SURVEYS									
Fish	115	0	0	487	1	0	62	374	0
Invert.Health	0	0	3	164	36	7	10	28	0
TOTALS	115	0	3	651	37	7	72	402	0
BENTHOS	66	0	0	686	483	0	452	919	131

APPENDIX I - List of Abbreviations for Performing Agencies

Battelle-MRL - Battelle Pacific Northwest Marine Research Laboratory
BML - Bodega Marine Laboratory, University of California
B & C Eng. - Brown and Caldwell Engineers
Cal. F & G - California Department of Fish and Game
Cl Coll - Clairmont College
CSUF - California State University at Fullerton
CSULB - California State University at Long Beach
ENSECO - ENSECO, Inc.
Eng. Sci. Inc. - Engineering Science, Inc.
E.Q.A. - Environmental Quality Analysts
EVS - EVS Consultants, Inc.
FW Health - Fish and Wildlife Health Consultants
HEP - Harbors Environmental Projects, University of Southern California
HIMB - Hawaii Institute of Marine Biology
Kin Lab - Kinnetics Laboratories, Inc.
LACSD - Los Angeles County Sanitation District
Mar. Ecol. Inst. - Marine Ecological Institute
MBC, Inc. - Marine Biological Consultants, Inc.
MBL - Marine Bioassay Laboratories, Inc.
METRO - Municipality of Metropolitan Seattle
MLML - Moss Landing Marine Laboratory
NOAA-SWFS - National Oceanic and Atmospheric Administration, Southwest Fisheries Center
NOSC - Naval Ocean Systems Center
NWAFC - Northwest and Alaska Fisheries Center
NUC - Naval Undersea Center
Occ. Col. - Occidental College
OrCoSan - Orange County Sanitation Districts
OSU - Oregon State University
PEL - Pacific Environmental Laboratory

SAI - Science Applications, Inc.

SCC - Shoreline Community College

SCCWRP - Southern California Coastal Water Research Project

SEEHRL or SERL - Sanitary Engineering Research Laboratory, University of California at Berkeley

UA-IMS - University of Alaska, Institute of Marine Science

UBC - University of British Columbia

UB Research - Underwater Biological Research

UCB - University of California at Berkeley

UC Davis - University of California, Davis, California

UCLA - University of California at Los Angeles

UC-Liv - University of California, Lawrence Livermore National Laboratory

UCSD - University of California at San Diego

UH Env.Ctr. - University of Hawaii Environmental Center

UH-WRRC - University of Hawaii, Water Resources Research Center

URS Co. - URS Engineers Co.

US EPA - United States Environmental Protection Agency

US FWS-Oxford - U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries

USGS - United States Geological Survey

UW-FRI - University of Washington, Fisheries Research Institute

UW-Ocean. - University of Washington, Department of Oceanography

WDF - Washington Department of Fisheries

WDOE - Washington Department of Ecology

WES-COE - Waterways Experiment Station, Corps of Engineers

WWU-Huxley - Western Washington University, Huxley College of Environmental Studies