A REPORT ON WATER QUALITY AND WATER RIGHTS IN CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

1983 - 1986

Office of Legislative and Public Affairs

About the State and Regional Boards . . .

The State Water Resources Control Board and nine Regional Water Quality Control Boards work together to preserve California water. They are backed by one of the toughest pieces of anti-pollution legislation in the nation, the Porter-Cologne Water Quality Control Act. The law assigns overall responsibility for water rights and water pollution control to the State Water Board and directs the Regional Boards to plan and enforce water quality objectives within their boundaries.

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"WATER IS THE NOBLEST OF THE ELEMENTS" ... Pindar

Introduction

The State Water Resources Control Board is responsible for protecting the state's water quality and allocating water rights. The merger of water rights and water quality functions in 1967 into a single state agency was hailed as a major step toward the more efficient and unified administration of water rights and water quality functions. The final legislative vote which created the Board was an acknowledgement by many that decisions affecting water quality and water rights are, in fact, inseparable.

Carrying out such responsibilities is not as easy task, particularly because California is a large, complex, and diverse state. Within 156,299 square miles, its mountains, valleys and deserts cover both the highest and lowest points in the contiguous 48 states. Thus, California is a land of contrasts--from the steep, heavily forested mountains of the North Coast, with abundant rainfall, to the seasonally hot and dry Central Valley, and the deserts which may go years without seeing significant rainfall. Its economy is the seventh largest in the world and its population is the largest and most ethnically diverse in the country. Despite California's diversity, all Californians share a common concern about the quality of our State's water and the protection of its beneficial uses.

California has over 1,800 miles of coastline, more than 1,000 rivers and streams, 5,000 lakes, and about 460 ground water basins. Increased population, industry, and agricultural activities have combined to make the Board's role of protecting the quality of California's water and allocating rights to its use more challenging than ever before.

The State Board

The Water Board consists of five full-time appointees of the Governor who are confirmed by the Senate. They are appointed to staggered four-year terms with the Chairman designated by the Governor. Of the five members, one must be an

attorney qualified in water supply and water rights; two must be engineers with expertise in water issues; one member must be qualified in water supply and water quality relating to irrigated agriculture, and one appointee, designated the "public member", is not required to have specialized experience.

The Water Board's responsibilities relating to the protection of water quality encompass surface waters, ground water and coastal waters. Moreover, the Board's programs and policies are designed to protect all beneficial uses of California waters including: domestic, municipal, agricultural and industrial supply, power generation, recreation, esthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife and other aquatic resources or preserves. To this end, the Board conducts planning, research, and monitoring, as well as regulatory oversight for the state's water bodies. It also administers a number of major federal water quality programs.

The State Board's water rights responsibilities include issuing water right permits for more than one-third of all available surface water in the state. Permits specify amounts, conditions and construction timetables for water diversion and storage.

Regional Water Quality Control Boards

There are nine Regional Water Quality Control Boards located in each of the nine major watersheds of the state. Each Regional Board consists of nine part-time members appointed by the Governor and confirmed by the Senate. Six of the nine appointees must have expertise in areas ranging from irrigated agriculture to water supply, conservation and industrial water use, to municipal and county government. Of the remaining three, two must have special competence in areas related to water quality problems with the third representing the public at large.

The Regional Boards are governed by local people representing local interests, yet function as agencies of state government. They carry out state and federal law and are guided by policies established by the State Board. Regional Boards develop basin plans, issue waste discharge requirements, take enforcement action against violators, and monitor water quality.

Under the law, the Water Board adopts statewide water quality control plans and regulations which govern decisions by the Regional Boards, reviews regional water quality control plans, and may require other state and local agencies to carry out water quality investigations. The Water Board provides legal, technical, and administrative support to the Regional Boards. In addition, the Water Board serves as an appellate body for Regional Board actions.

Major Programs

The State Board is organized into three major program areas: the Division of Water Quality, the Division of Water Rights, and the Division of Clean Water Grants.

The Division of Water Quality administers a wide array of programs to maintain California's water quality and support its varied beneficial uses. Its programs span monitoring, enforcement, research, and planning activities.

The Division of Water Rights administers the water rights permitting system. The primary work of the Division is the processing of applications for the right to divert directly or store available water. A collateral function is the enforcement of applicable provisions in the Water Code.

The Division of Clean Water Grants administers the Clean Water Grant program through delegation by the EPA. Grants are made available to local governments for the construction of wastewater treatment facilities.

In addition to its major programs, the Board has established a Program Control Unit to improve the management performance of the nine Regional Water Quality Control Boards and several State Board programs. The unit is directed toward improving management efficiency and strengthening Regional enforcement capability.

This report is intended to provide an overview of the Board's major activities and accomplishments between 1983 and 1986, an exciting period of growth and challenge for California's waterscape.

MAINTAINING CALIFORNIA WATER QUALITY

The California waterscape shapes our lives. This vast system of natural streams and lakes, constructed canals and reservoirs, extensive underground basins and 1,840 miles of open coastline provides jobs, recreation and sustenance for 26 million people. It supports 1,400 species of birds, mammals, fish, reptiles and amphibians. It nourishes almost 4,000 different native plants.

Yet, even with such intensive use, the state's waters remain relatively healthy. Despite a 16 percent increase in population over the last decade, measurements of river water quality show improvements. All but a few rivers are fishable and swimmable. Beaches retain their spectacular appeal. Lakes provide recreation and a vision of California's original grandeur.

While overall water quality remains high, serious problems exist that must be addressed in order to prevent future water quality degradation. Over the years, control of conventional sewage-related pollutants -- bacteria and suspended solids -- has been improved due to advances in wastewater treatment, but industrial chemicals, pesticides and other hazardous materials have shown increased evidence of pollution.

As the Water Board works through the 1980s, its water quality programs have focused more and more on hazardous substances and their effect on our waters. Regulatory program staffing needs have grown from 231 positions in 1981-82 to 421 positions in 1985-86. Major efforts are underway to test every possible hazardous waste site for leaks, impose strict construction, operation and monitoring requirements and increase the frequency of site inspections.

Massive new programs for regulating underground tanks and surface impoundments which store hazardous materials have been launched in recent years. Seemingly innocuous garbage dumps are being checked for possible leaks of hazardous waste into ground water. Increased regulatory requirements and inspections will assure that sites which are deemed safe will remain so. Where problems are detected, cleanup will be ordered and appropriate enforcement action taken.

Maintaining California's water quality is an ever-expanding challenge. The state is responding to the concerns of its citizens who view environmental

issues as a priority. Public opinion polls consistently list clean water as a top concern. Since 1970, Californians have passed by overwhelming majorities, four Clean Water Bond Laws for a total of $1.025 billion -- a mandate for clea water the state has not ignored.

Water Quality Assessment

The federal Clean Water Act, as amended in 1977, requires that every state submit a biennial report to the Environmental Protection Agency describing the quality of its navigable waters and recapping the state's water quality management program objectives and achievements. The water quality assessment includes biological and chemical data obtained through monitoring programs together with staff investigations by the nine Regional Water Quality Control Boards.

On a scale ranging from poor to good, water quality in California streams, lakes, coastal waters and ground water was generally good in water years 1984 and 1985. Of resources evaluated by the Regional Boards, 99 percent of the mainland coastal waters, 95 percent of harbors and bays, 80 percent of streams, 90 percent of ground water basins and 61 percent of the lakes were ranked in the medium-to-good water quality range. The data below are based on water bodies assessed by the Regional Boards.

California Water Quality Assessment Summary

Category	Percentage of Total Ranked			
	Good	Medium	Poor	Unknown
Rivers/Streams	64	16	3	17
Lakes	48	13	18	21
Coastal Waters:				
Mainland	99	0	1	0
Bays and Harbors	85	10	4	1
Ground Water Basins	76	14	3	8

Source: 1986 Water Quality Assessment for Water Years 1984 & 1985

Streams

Major pollution sources in California's rivers and streams are:

- Sources not readily identifiable (non-point sources) 29 percent
- Agriculture 27 percent
- Flows of pollutants originating in Mexico 20 percent
- Municipal point-sources such as overflows from sewage treatment plants 16 percent
- Active and abandoned mines 8 percent

Thirty-four streams have pollution problems which periodically exceed water quality objectives. These include the lower San Joaquin (San Joaquin County), the Santa Margarita (San Diego County), the lower Santa Ana (Orange County), Little Grizzly Creek (Plumas County), Spring Creek (Shasta County) and portions of Bryant Creek (Alpine County). Beneficial uses of these waters are precluded and specific causes for their high pollution levels are being studied in order to correct them.

In a separate category are the poor quality international rivers -- Alamo, New and Tijuana -- that flow from Mexico into the United States. They are polluted by untreated sewage discharges, as well as by toxic chemicals.

Lakes

The classification of California's lakes was updated in 1983-84 to provide a basis for making federal grant funds available for restoration activities. Currently, only Lake Tahoe (El Dorado County) and Lake Gibraltar (Santa Barbara County) are receiving federal lake restoration grant funds, although a total of 206 publicly-owned lakes are on the updated clean lakes priority list.

A Lake Tahoe Basin water quality plan, adopted in 1980, outlines a complete program for remedial erosion control on the California side of the lake, including management of surface runoff and development controls.

Routine lake monitoring surveys have been discontinued as results generally indicated that lake water quality in California is quite good, except for the presence of certain toxic pollutants, such as naturally occurring trace metals. While water quality of major lakes has been generally good, fish tissue analyses in several small urban lakes indicate the presence of organic compounds such as chlordane, which may be carried in urban runoff.

Lake Tahoe Update

Since 1979, the major state, federal, and local agencies involved in environmental protection and management at Lake Tahoe have joined to operate a cooperative interagency water quality monitoring program for the Tahoe Basin. The Water Board funds about 35 percent of the monitoring efforts and chairs the program's advisory committee. The interagency program produces annual technical reports and issued a five-year comprehensive summary report in 1986. The program has documented definite declines in water clarity and corresponding increases in algal growth in Lake Tahoe since 1979, continuing a trend started in the 1960s.

Coastal Waters

Ocean, bay, and estuarine water quality is generally good. Overall, 97 percent of the ocean environment was ranked in the good-to-medium water quality range by the six coastal Regional Boards. One percent of the mainland coastal waters -- those bordering Mexico -- was judged poor due to the presence of synthetic organics, trace metals and fecal coliform. Parts of San Francisco, Santa Monica and San Diego Bays are also problem areas.

Lead findings in Monterey Harbor prompted intensified monitoring. The monitoring pinpointed an abandoned slag heap as the source of the lead. High levels of DDT were found in the Moss Landing/Elkhorn Slough areas of Monterey County, although DDT was banned by EPA in 1972. A broad interagency cooperative effort concluded that the most likely reason for high DDT residues in the Salinas Valley soils is the slower than anticipated breakdown of the pesticide formerly used in farming operations.

Ground Water

Regional Boards report generally good water quality in most ground water basins assessed during 1984-85. Localized examples of ground water pollution are being identified at an increasing rate because of additional monitoring and new legislative programs implemented since 1983.

Assessment is based on 139 ground water basins representing 79 percent of the almost 60,000 square mile ground water basin surface area of California. Seventy-six percent of the basins fully support their designated uses. Fourteen percent partially support appropriate uses. Water quality is unknown in about eight percent of the assessed basins surface.

During the past decade, knowledge of ground water quality has increased. Industrial disposal practices and agricultural chemical use have impaired ground water supplies in parts or all of 21 of the 139 basins with 40 percent of the known pollution sources related to agriculture and 37 percent attributable to either industrial or natural causes.

Monitoring: Testing for Water Quality, Checking for Compliance

The Water Board monitors California water quality on a systematic basis. Data are collected in cooperation with other state and federal agencies to pinpoint potential concerns and the need for further monitoring. These data also provide an assessment of long-term trends in California water quality.

The Board's monitoring activities can be divided into four categories: reconnaissance, compliance, enforcement and investigations.

- Reconnaissance monitoring consists of regular and spot checks conducted by the Water Board staff to determine background water quality and detect emerging problems.

- Compliance monitoring consists of periodic analyses of waste streams and adjacent waters for known waste discharges. Most sampling is conducted by dischargers with Regional Board spot checks.

- Enforcement monitoring consists of tests undertaken by Regional Boards to check possible violation of waste discharge requirements. Regional Board efforts focus on developing evidence that can be sustained should a court challenge arise. Dischargers may be ordered to monitor water quality to determine the extent of the problem.

- Investigative monitoring is aimed at ascertaining facts related to water quality problems, usually associated with specific chemicals or industries. Testing is often conducted with the involvement of other state agencies such as DHS, DFG and DFA.

The Board maintains four major monitoring programs: the Surface Water Quality Monitoring program, the Toxic Substances Monitoring program, the State Mussel Watch program, and the Ground Water Quality Monitoring program. Each provides valuable data which are shared with public and private agencies concerned with California's waterscape. These data are then used to establish efforts to address identified water quality problems.

The Board's monitoring programs have become models for the country. Additionally, monitoring efforts have reaped important benefits since the programs were established in the 1970s. An example occurred in 1980 when Water Board documentation of toxaphene's negative water quality impacts was submitted to EPA. The Water Board's findings were instrumental in EPA's decision to severely curtail toxaphene use across the country.

The Surface Water Quality Monitoring Network

The Board's fresh water program has operated continuously since 1977 with field and analytical work done by DFG. Each year, fish samples are collected statewide and analyzed for toxic metals and synthetic organic substances such as lead, mercury, DDT, and PCB.

Each of the Regional Boards participates in selecting sampling sites which are annually reviewed and changed as needed to meet evolving needs for water quality data. The data are presented and evaluated in annual reports.

The Toxic Substances Monitoring Program

The Toxic Substances Monitoring (TSM) program annually tests resident fish species for toxic metals and synthetic organic substances such as lead, mercury, DDT, and PCB. DFG, under contract to the Water Board, collects and analyzes the samples from selected fresh and estuarine waters. Fish are analyzed for two reasons. First, they concentrate toxicants often undetectable in water. Second, concentrations found in fish flesh and organs reflect a constant exposure to the aquatic environment. Moreover, fish react more sensitively to pollutants than humans do, providing an early warning of potential human health problems.

The program incorporates a network of routine sampling stations along with a network of supplemental special study stations which may be sampled for only a few years. The special study stations must meet specific Regional Board monitoring needs. If no problems are found, or if the problem in question has been sufficiently studied, that station is dropped from the network to make way for new stations elsewhere. In this way the program can meet the twin objectives of long-term and broad-based monitoring.

When the program began in 1976, 28 stations were included. That number has increased through the years, with 83 stations tested in 1986. TSM has visited over 150 water bodies involving over 200 stations throughout California. Forty-one fish species and five non-fish species (e.g. turtles, clams, etc.) have been analyzed over the past decade.

The TSM program shows high levels of DDT and toxaphene in California waters from 1983-1986. PCBs, formerly associated with transformers, have also been found in many California water bodies, located in both rural and industrial areas.

High selenium levels were found in Salton Sea fish, prompting DHS to warn those who consume these fish to do so in limited amounts. Other advisories have been issued for:

- Striped bass in the San Francisco Bay-Delta region because of possible mercury toxicity;

- Largemouth bass from Lake Nacimiento (San Luis Obispo County) because of possible mercury toxicity;
- Goldfish or carp from Harbor Park Lake (Los Angeles County) because of chlordane and DDT levels that exceed accepted public health standards;
- White croaker (tom cod) from Santa Monica Bay because of DDT levels that exceed public health standards; and
- Fish of all types from the Kesterson National Wildlife Refuge because of high selenium levels.
- An additional health warning has been issued by the Imperial County Health Department warning against consumption of any variety of fish from the New River and also advising against any physical contact with New River water.

State Mussel Watch Program

Since 1977, the State Mussel Watch program has conducted marine water quality monitoring to provide the State and Regional Boards with annual trends in toxic pollutants along the California coast.

In coastal marine waters, samples of mussels, oysters and clams are used as indicators of selected toxic pollutants, including trace metals and synthetic organic compounds such as pesticides and PCBs.

Mussels are excellent animals for monitoring purposes because they are long-lived, can be transplanted to areas where they do not naturally occur, and they concentrate toxic pollutants from the water, making analysis much easier and more accurate.

The program began with 35 coastal stations near especially fragile and environmentally valuable biological communities known as "Areas of Special Biological Significance" (see p. 16). The program now has some 100 stations in key coastal areas, bays and estuaries along California's coastline. Locations focus on problem areas and are reviewed annually with the Regional Boards and other concerned agencies. Discharger outfall monitoring is also performed, with the costs reimbursed by the dischargers.

Survey areas from 1983-1986 were: Crescent City, Humboldt Bay, City of Eureka sewage treatment plant outfall, San Francisco Bay, Richmond Inner Harbor, Oakland Inner Harbor, Monterey Bay drainage area, Monterey Harbor, Carmel

Sanitary District, Diablo Canyon Nuclear Power Plant, Los Angeles/Long Beach Harbor, Colorado Lagoon, Anaheim Bay, Newport Bay, Oceanside Harbor, San Diego Bay Area, and Tijuana River/Imperial Beach.

Major findings were in Monterey Bay and the Elkhorn Slough area, San Diego, Newport and San Francisco Bays. Monitoring indicated that Blanco Drain is a major conduit through which DDT locked in Salinas Valley soils is washing into the Salinas River and Monterey Bay. Findings of PCBs in San Diego Bay at the East Commercial Basin continued to exceed the Food and Drug Administration's tolerance level. Newport Bay continued to record elevated levels of chlordane, DDT and PCBs, and the Richmond Inner Harbor area of San Francisco Bay showed elevated DDT levels.

Ground Water Monitoring Program

Ground water is subsurface water from which wells and springs are fed. Californians use more ground water than any other state and concern over ground water pollution has increased in recent years.

Since 1979, the Water Board has worked with the USGS and DWR to design and operate ground water quality monitoring networks in several of California's high priority ground water basins. The program tests for minerals, nutrients and toxic pollutants such as pesticides and industrial solvents.

The initial program included the Eureka Plain, Santa Rosa Valley, Tulare Lake and Santa Clara River Valley ground water basins. Since then the San Joaquin Valley, Salinas River Valley, Santa Rosa-Healdsburg Valley, Antelope Valley, and Mojave River Valley ground water basins were added.

Ground water poses natural obstacles to a systematic effort to assess its quality. Fish caught near the mouth of a stream are likely to exhibit pollution levels representative of the entire length of the river, but ground water has no aquatic life to test and moves much more slowly than surface waters. While river flows are timed in feet per second, ground water flows are timed in feet per year. River flows rapidly mix pollutants into a fairly even distribution, but ground water pollutants tend to remain in plumes. All these factors complicate ground water testing and make reconnaissance monitoring difficult.

Monitoring efforts by other agencies also help detect ground water degradation problems. An example is the AB 1803 program which mandates a survey of toxic organic chemicals in public water wells. The first phase of the program (1984-86) covered public water systems having over 200 service connections. Phase two is directed at smaller systems (20-200 connections). Sampling of large system wells showed approximately 18 percent contain toxic organic chemicals, with six percent exceeding state and federal action levels. DHS is lead agency for this program. The Regional Boards are now working to determine pollution sources and to develop cleanup measures.

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San Francisco Bay Delta Aquatic Habitat Program

The Water Board and the San Francisco Regional Water Quality Control Board developed the Bay-Delta Aquatic Habitat Program in order to monitor San Francisco Bay pollutants in a comprehensive, coordinated and cost-effective manner. As part of this program, a water quality monitoring and research plan for the bay was prepared by the University of California, Berkeley, which proposed monitoring impacts on aquatic plants and animals from wastewater effluent to test water quality. Another result of this program was the formation of the Aquatic Habitat Institute.

Aquatic Habitat Institute: Cooperative Study of Bay Biota

The Aquatic Habitat Institute, an independent, non-profit corporation, was formed in 1983 to coordinate monitoring and research programs related to the bay. The Institute provides independent review and analyses of collected data, and make recommendations on monitoring activities and data available.

The Institute is governed by a seven-member board of directors representing the San Francisco Regional Board, the University of California, DFG, EPA and municipal, industrial, and non-point dischargers.

Hydrodynamics: Mapping Bay Currents

Uncertainty about circulation, mixing and Delta outflow have raised questions about effects of pollutants discharged to San Francisco Bay. In 1982, the Water Board contracted with the University of California, Berkeley, to conduct hydrodynamic studies on San Francisco Bay. Based on existing salinity and current data, the studies will ultimately provide a guide for a pollutant transport model within the bay.

The Water Board is also a partner with DFG and DWR, the federal Bureau of Reclamation, USGS and Fish and Wildlife Service, in an comprehensive study of the Bay. This study includes extensive data collection and ties data together for a three-dimensional description of Bay current and salinity patterns, including computer models. Completion of the hydrodynamic project is expected in 1991.

--- --- --- Sidebar Ends --- --- ---

The Board's Prevention Programs

> "IBM Corp. proposed a $30.8 million plan yesterday to clean up the largest ground water pollution problems in the Bay Area at its plant in south San Jose..."
>
> San Francisco Chronicle
> December 2, 1986

The adage about prevention being cheaper than the cure is nowhere more true than in cases of environmental cleanup. If there is one lesson that industry, agriculture, and public officials have learned over the past decade, it is the astronomical cost of rectifying environmental mistakes. Thus, as our knowledge of water pollution increases, more and more emphasis has been placed on preventing mistakes, rather than treating the consequences of mistakes.

In the area of water quality, expanding technology and advanced scientific research have provided experts a high-beam searchlight, replacing the small candle they once used to determine the presence and amounts of contaminants in our waters.

That knowledge has spurred the citizenry, the Legislature and public agencies involved in protecting the environment into action. As a result, a substantial collection of regulatory programs is now in place which seek to prevent further pollution of California's coastal, surface and ground waters.

Ocean Plan Protects California Coast

The Water Board's Water Quality Control Plan for Ocean Waters protects the waters along California's coastline as well as its island shorelines. The plan stems from authority established by the Porter-Cologne Water Quality Control Act and applies to both point and nonpoint sources of waste discharged to the ocean. It does not apply to discharges to enclosed bays and estuaries, inland waters, vessel wastes or dredging spoil.

The Ocean Plan establishes bacteriological, physical, chemical, biological, ar radiological objectives for receiving waters. It prohibits discharge of sludge, radiological, chemical or biological warfare agents and high-level radioactive waste, and limits toxic material discharges. It also provides that the Water Board designate Areas of Special Biological Significance (see below).

The Ocean Plan was adopted in 1972 and has been revised three times as mandated by state and federal law. It is implemented by the Water Board and the six coastal Regional Boards.

Thermal Plan

This is a plan for the control of temperatures in coastal and interstate waters and enclosed bays and estuaries. It specifies water quality objectives, effluent quality limits, and discharge prohibitions related to heat characteristics of interstate waters and waste discharges. Originally adopted in 1971, the plan was amended in 1975 to incorporate provisions of the Federal Water Pollution Control Act and to allow the State or Regional Boards to establish, if needed, independent monitoring studies to the financed by the dischargers.

Areas of Special Biological Significance

California's coastline and offshore islands include 34 designated areas of Special Biological Significance (ASBS) identified by the Water Board in its Ocean Plan. The concept of "special biological significance" embodies the belief that certain unique biological communities, because of their environmental value or fragility, deserve increased water quality protection. Such designation prohibits discharge of treated sewage, cooling water, industrial wastewater or sediments into that particular area.

Hazardous Waste Control

California is the nation's fourth largest producer of hazardous wastes. Conservative estimates put this state's total output at close to ten million tons per year. DHS estimates that California disposes of approximately 800,000 tons of hazardous wastes through some form of land disposal every year. This includes landfills, waste piles, surface impoundments, land farming, injection wells, and other land applications.

Although DHS is lead agency in administering California's hazardous waste program, participation by the Water Board in land disposal and related ground water monitoring is extensive. In its role, the Board maintains and updates a list of all hazardous waste facilities that have or should have ground water monitoring program. In addition, the Water Board inspects, reviews, and evaluates ground water monitoring programs, and conducts technical reviews of applications for land disposal permits.

Underground Storage Tank Program

In 1983, it was discovered that industrial chemicals and gasoline from leaking underground storage tanks were polluting ground water in California. In response to these problems, the Legislature established the Board's Underground Storage Tank Program which has three elements -- inventory, permitting, and monitoring.

In 1984 and 1985, the Water Board completed a one-time only statewide inventory of underground containers storing hazardous substances. Over 170,000 containers, of which 160,000 are underground storage tanks, have been identified. Over 40 percent of the containers are fuel tanks. Farm tanks and non-fuel tanks each comprise a little over 15 percent. The remainder are an assortment of containers.

Under the program, 100 local agencies (58 counties and 42 cities) issue permits for underground storage tanks. Regulations to implement the law were developed by the Board in 1985. These regulations address construction and monitoring standards, closure requirements and permitting requirements for both existing and new underground storage tanks. It is through the permit program that leak detection and prevention are achieved. Since the program began, over 4,000 leak sites have been discovered.

The Regional Boards and some local implementing agencies supervise cleanup of leaking underground storage tank sites. Additional staff has been provided to the Regional Boards to oversee cleanup of the most critical cases. Federal funds have been made available to local agencies to oversee cleanup.

Waste Disposal To Land

Regulations adopted by the Water Board in 1984 tighten operating rules for land disposal sites. The regulations spell out detailed water quality protection standards for discharges of waste to land. The regulations govern both the operation and closure of waste disposal facilities and establish geologic and containment standards which must be complied with to protect water quality. The primary activity of the program is the issuance of waste discharge requirements and other Regional Board orders for those wishing to discharge both hazardous and nonhazardous waste to land.

The Regional Boards also investigates closed, inactive, and abandoned waste disposal facilities and reviews hydrolgeologic and other technical data related to protection and/or closure of the waste sites.

Toxic Pits Cleanup Act

The 1984 Toxic Pits Cleanup Act established a program to prevent water contamination from, and improper storage, treatment, and disposal of, liquid hazardous wastes in surface impoundments. This law requires owners of surface impoundments (pits, ponds, and lagoons) containing hazardous substances to either close the facility according to specified requirements, retrofit the impoundment with double liners, install leachate collection, and ground water monitoring equipment, or receive a limited exemption from the retrofit provisions. In addition, impoundment owners must also prepare hydrogeological assessment reports.

The act divides all surface impoundments into two basic categories for the purposes of regulation: those within one-half mile of a potential drinking water supply and those outside the one-half mile zone. Facilities within one-half mile of a potential drinking water source are prohibited from receiving discharges after June 30, 1988, unless they receive an exemption from a Regional Board. Furthermore, all facilities are prohibited from receiving discharges after January 1, 1989, unless they are retrofitted or receive an exemption.

The Toxic Pits Act requires annual Regional Board inspection and review of monitoring data. Each facility subject to the Act must also submit a hydrogeological assessment report, a comprehensive description of the site and hydrogeology of the area.

In 1985, the Water Board began to develop an estimate of facilities potentially subject to the Toxic Pits Act. As of June 30, 1986, almost 1,000 potential facilities had been identified.

Solid Waste Disposal Program

This program identifies and remedies any hazardous waste leakage from solid waste disposal sites. 1984 legislation required the Water Board to rank all solid waste disposal sites according to the threat they pose to water quality. The Board ranked over 2,000 sites, arranging them into rankings of 150 to be inspected each year under the supervision of the Regional Boards. All surface and ground waters within a mile of the site are to be tested along with soil underneath and down gradient from the site. Testing results for Rank 1 sites will be due July 1, 1987, with each succeeding rank of disposal sites due the following July 1.

Placement on the list does not mean a site is leaking, but merely ranks it according to its potential for problems, based on the site's location in industrial areas and near highway networks where illegal dumping could be relatively easy. Other sites are ranked high because they are close to usable ground water.

Priority Chemical Program

In response to increasing evidence of toxic chemical contamination in both surface and ground water in California, the Water Board in 1980 developed an "early warning" chemical review project for agricultural and industrial chemicals.

The Board's Priority Chemical program identifies and investigates the chemicals of highest risk to public health and to beneficial uses of water, and recommends measures to minimize future impacts on water quality.

While most regulatory efforts focus on specific types of facilities or specific wastes, this program examines existing and potential problems on a chemical-by-chemical basis. The effort does not replace traditional regulatory activities, but gives another perspective to the ongoing assessment of toxic dangers.

The Priority Chemical program develops lists of suspected problem chemicals. For each chemical, there is a thorough evaluation of its toxicology, impact on fish and wildlife, current use patterns, residues in the environment and known trouble spots. Draft reports resulting from the evaluation are circulated

widely in the scientific, regulatory and industrial communities. The final report incorporates appropriate review comments. The evaluation also results in a set of recommended actions to provide proper controls for the chemical under review and brings problem areas to the attention of the State and Regional Boards, and other involved agencies.

Since 1980, the Water Board has completed reviews on the following chemicals: toxaphene, polychlorinated biphenyls (PCBs), 1,2-dichloropropane/1,3-dichloropropene (1,2-D/1/3-D), rice herbicides: molinate and thiobencarb, endosulfan, ethylene dibromide (EDB) 2,4-dichlorophenoxyacetic acid (2,4-D), malathion and glyphosate (Roundup). Chemicals now under review include pentachlorophenol (PCP), and its toxic contaminants, petroleum hydrocarbons, organotins and phthalates.

Pesticide Registration and Evaluation Program

Each year, DFA receives over 1,000 requests for registration of pesticide products. To aid DFA in its registration process, Water Board staff evaluates these products and places them on a priority list for an in-depth "fast track" risk-assessment study based on their potential to contaminate surface or ground waters.

Another effort to prevent ground water contamination was embodied in 1985 legislation which directed DFA to collect data on agricultural pesticides. Based on these data, pesticides are ranked for soil and ground water monitoring in high use areas. When a pesticide is found in ground water or soil below eight feet, a three-member committee of DFA, DHS, and Water Board staff hold hearings and makes recommendations to the Director of DFA on future use of the pesticide.

Laboratory Certification

Until recently, there was no way to ensure the competence of laboratories performing water quality analyses required by the Porter-Cologne Act. Recent legislation requires the Water Board to certify laboratories for competency, proper staffing, and equipment needed to conduct specific analyses. To that end, the Board is developing regulations governing lab certification, including a fee structure to support this work. Minimum standards for certification are being developed in cooperation with DHS.

Contaminated Public Drinking Wells Follow-up

In 1985, the Water Board implemented a program to determine sources of ground water contamination by toxic organic chemicals in public drinking water wells. These investigations are a follow-up to legislation requiring DHS to develop a systematic program for sampling and analysis of toxic chemicals in public water wells.

Under the program, the State and Regional Boards identify suspected dischargers within a half-mile of a contaminated well, initiate ground water investigations of suspected dischargers, and take appropriate enforcement action.

The Water Board is also developing a computerized system to track the progress of these investigations. When contamination sources are confirmed, Regional Boards and other enforcement agencies will require cleanup from those responsible parties or, if they cannot be identified, secure cleanup monies from the state's superfund program.

Ground Water "Hot Spots"

In 1983, the Water Board initiated the ground water "Hot Spots" project to locate previously unidentified areas of ground water contamination. Of particular concern were synthetic organics. When the project began, very few ground water monitoring programs existed which systematically looked for synthetic organics.

The Board has developed and tested a methodology for selecting ground water monitoring sites with a high likelihood of significant toxic contamination. While recent federal and state ground water monitoring programs concentrated on deep aquifer public drinking water supply systems, the "Hot Spots" project has concentrated on shallow domestic, industrial and agricultural wells, which are closer to surface sources of chemical impact.

The project has demonstrated that the percentage of shallow aquifers adversely impacted by toxic organic chemicals in the areas investigated, is equal to or higher than that reported for public water systems. Development of such a methodology helps the Board to efficiently allocate scarce ground water monitoring resources.

Pretreatment Program

There are over 1,000 municipal sewage treatment plants in California. They receive many sources of wastewater, including domestic, commercial and industrial. Incoming wastewater is often contaminated by a variety of toxic or hazardous substances, which can cause serious hazards to treatment plant equipment, plant personnel and to the aquatic life and water quality of the water body which receives the treated wastewater.

Prevention of these undesirable effects can occur through the use of proper technology to remove pollutants from wastewater before it is discharged into the sewage system. This is called "pretreatment."

Pursuant to the Clean Water Act, EPA issued regulations in 1978 and 1981 regarding pretreatment programs at both the state and local levels. In 1984, the California Legislature enacted a law requiring the Water Board to develop a pretreatment program compatible with federal requirements.

The Water Board has been working with commercial and industrial dischargers, sewage treatment facilities, and sanitation districts to develop an approved pretreatment program. Meanwhile, the State and Regional Boards provide oversight and technical assistance for the largest municipal pretreatment programs. Activities include pretreatment compliance inspections and audits and the review of quarterly and annual program activity reports.

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Agricultural Wastewater: A Growing Problem

Ever since ancient civilizations began irrigating arid areas, problems of salt buildup have gone hand in hand with the benefits of increased productivity. Irrigation has transformed arid regions into productive agricultural lands. But irrigation produces drainage water which is high in salts. Unless it is removed, productivity is threatened. Wastewater generated by leaching salts also contains other harmful constituents.

In 1984, selenium contamination at Kesterson Reservoir focused widespread attention on the problem of agricultural drainage in the San Joaquin Valley (See Enforcing Water Quality Protections, p. 132). While Kesterson Reservoir has been the focus of the valley's drainage problem, the trouble does not end there. A sizeable portion of the state's agriculture is threatened by salt accumulation and lack of adequate drainage. The issue poses critical water questions for all concerned with the state's water quality.

Searching for Solutions

For the past few years, the Water Board has been intensively applying its scientific skills to find solutions to the problems of agricultural drainage. Two studies relating to the agricultural drainage are now in progress. The first, performed by the USGS, will locate high selenium areas on the west side of the San Joaquin Valley. The first phase of the study was completed in 1986 with the Bureau of Reclamation funding any continuation of the study. The second, the Pilot Marsh Study at the Kern National Wildlife Refuge, will evaluate reduction of agricultural drainage volume by marsh systems.

In addition, the Water Board began studies during 1983 and 1984 to identify drain water constituents of most concern. Toxicity criteria will be developed for constituents lacking adequate standards to protect the Delta and San Francisco Bay Estuary system. Selenium criteria findings were issued in 1984 showing that a concentration of 5 ppb would be a guideline for fish protection. DHS set a guideline of 1.0 ppm in fish flesh to protect human health.

No Easy Answers

The complex technical issues surrounding the drainage problem do not lend themselves to easy answers or quick remedies. For the short term, potential solutions may include dilution and discharge into the San Joaquin River, recycling into irrigation systems, or storage in impermeable evaporation ponds. But none of these alternatives is desirable for the long term.

Among many long term solutions being explored are treating drainage water to remove pollutants, changing farming practices and collecting and discharging wastewater into evaporation ponds. Each of these alternatives involve significant costs, economic and environmental considerations, and technological difficulties.

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ON THE FRONT LINE: CALIFORNIA'S REGIONAL WATER QUALTY CONTROL BOARDS

The state's nine Regional Water Quality Control Boards are the first line of defense against water pollution. They were created in 1949 with the Dickey Water Pollution Act. That act established a Regional Board for each of the nine geographic regions of the state. Although given limited powers at the time, the Regional Boards were effective in cleaning up gross pollution stemming from untreated industrial and raw sewage discharges that plagued California during the 1950s.

In 1969, the Legislature passed the Porter-Cologne Water Quality Control Act, greatly strengthening the Regional Boards' ability to enforce water quality protections. Enforcement ability was again strengthened with the passage of legislation which authorized Regional Boards to adopt administrative civil liabilities against violators. The new law also increased the maximum civil liability that can be imposed by a court for waste discharge violations. In augmenting the Regional Boards' water quality protection capabilities, the Legislature provided practical and tough enforcement tools which demonstrate how seriously it views violations of California's water quality protection laws. A key to each Region's water quality protection effort is the basin plan.

The Basin Plan

Under the Porter-Cologne Act, each Regional Board is required to develop and update a basin plan which provides the basis for a Region's entire regulatory and enforcement program. The basin plan identifies beneficial uses to be

protected for each water body in the Region, establishes water quality objectives to protect those uses, and contains the Regional Board's program to achieve those objectives.

Basin plans require continual revision and update to reflect changing water quality conditions and current knowledge of pollutants. Federal law requires the plans be reviewed and updated every three years; state law requires periodic updates. Basin plans are subject to approval by the State Water Board and EPA.

Basin planning is guided by State Board policies as well as areawide and specific projects which identify sources of pollution and develop technically, economically, and environmentally sound solutions to water quality problems. Basin plans are tailored to the unique land forms, vegetation, weather, population patterns and economy of the watershed, and provide the scientific basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals.

By working with other governmental agencies, maintaining regional surveillance programs and regulating waste dischargers, California's Regional Water Quality Control Boards continue to develop water quality programs to meet the challenges, not only of their particular regions, but of California as a whole. The unique water quality issues and achievements of each Regional Board reflect the diversity and complexity of our state.

NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD

An area of scenic coastline and remote wilderness, the NORTH COAST REGION contains the North Coastal Basin and the Klamath River Basin. The Region includes coastal mountainous areas with high rainfall and shallow, erodible soils, as well as high, broad valleys with low to moderate rainfall. Its rivers provide domestic, municipal, agricultural and industrial water supplies, and support fisheries, fish and wildlife habitat, ground water recharge, power generation, navigation, and recreation. The region includes approximately 320 miles of unspoiled coastline including eight acres of special biological significance. There are many estuarine systems along the coast, the more important ones being Humboldt Bay, the Eel River Lagoon, and Bodega Harbor.

Water Quality Issues

Erosion from Road Building

The 12-mile Redwood National Park highway, currently under construction, bisects areas of steep slopes and erodible soils subject to heavy winter rainfall. The Redwood Creek area is a sensitive spawning area for salmon and steelhead and is widely used recreationally. In cooperation with the Regional Board, road builders have implemented erosion control steps to protect the creek. Regional Board involvement and cooperation with the California Department of Transportation will continue through the road's completion in 1990.

Logging Controls Reduce Erosion

Over the last decade, significant progress has been made to strengthen regulatory oversight and improve logging practices. Erosion can occur from logging sites and logging roads unless they are properly managed. The Department of Forestry has the lead role for logging on private lands. Regional Board staff actively review Timber Harvest Plans, and, in cooperation with Forestry officials and DFG experts, inspect logging sites. A similar working partnership has been forged with the U.S. Forest Service for logging practices on federal lands.

Ocean Dischargers

In 1983, Crescent City's combined sewage treatment and fish (waste) processing plant completed upgrading to comply with Regional Board cleanup orders. The State Mussel Watch program is testing the impact of the improved effluent to verify the adequacy of the new facility.

In 1983 and 1984, Louisiana-Pacific Corporation and Simpson Paper Company, owners of bleach-kraft pulp mills on the Samoa Peninsula near Eureka, submitted applications justifying exemptions from EPA limits in accordance with the Federal Clean Water Act. The applications have been accepted and public hearings on proposed permits have been held. The Regional Board and EPA issued permits which grant the exemptions. The permits require that the mills complete special monitoring programs to identify water quality impacts.

Santa Rosa Sewage Spills to Russian River

Following major sewage spills into the Russian River drainage system by the City of Santa Rosa, the Regional Board developed action plans for dischargers to the Russian River. Santa Rosa has expanded and improved its regional wastewater treatment facility which handles wastewater from Santa Rosa, Oakmont, Sebastopol, Rohnert Park, Cotati, and Sonoma County South Park. Current efforts include long-term planning to accommodate the wastewater flows resulting from rapid growth occurring in the Santa Rosa metropolitan area.

On-Site Wastewater Treatment and Disposal

To stop chronic septic tank failures, the Manila Community Sanitation District, on the Samoa Peninsula near Eureka, tested the safety and feasibility of pumping septic tank effluent to percolation beds in the area's sand dunes. The project, intended to serve the community for two years, is completed. Meanwhile, plans for expanded treatment facilities are being developed.

Technical criteria have been developed whereby some areas, previously considered unsuitable for an on-site system, due to conditions of high ground water and/or slowly percolating soils, may utilize a mound for wastewater treatment and disposal. The local health departments issue permits for smaller mound system, whereas the Regional Board oversees the installation and maintenance of the larger systems.

Aerial Application of Herbicides

The Regional Board adopted BMPs for aerial application of herbicides on federal timber lands in 1983 and private lands in 1984 in order to protect water quality in sprayed areas. The procedures call for tracking and monitoring of spraying operations for the protection of domestic water supplies and aquatic resources. Since implementation of the BMPs, the Regional Board has found that 98 percent of all water samples taken from streams adjacent to herbicide application sites are within safe levels established by the State and Regional Boards.

Smith River Ground Water

In the Smith River Plains, the Regional Board is nearing completion of a planning program to further coordinate its ongoing monitoring of domestic and agricultural wells. This effort will help prevent ground water pollution caused by pesticide use on lily bulb farms in the area.

Mining Activities in Six Rivers National Forest

A proposed chromium, nickel and cobalt mining project at Gasquet Mountain in the Six Rivers National Forest could, unless properly managed, release mine tailings, solids, and/or processing chemicals to local streams. The Regional Board has worked with the project proponent to establish safeguards to insure that wastes do not contaminate local waters.

Seepage from the mine tailings disposal system at Noranda Eagle Mines near Happy Camp (Siskiyou County) threatened to pollute Indian Creek. Under Regional Board orders, the discharge was abated and long-term maintenance initiated to prevent recurrence of the problem. The ore reserves are near depletion and site closure is anticipated.

An abandoned mine near Hoopa was placed on the EPA Superfund list. The DHS has lead authority for the site and has embarked on remedial measures. Regional Board staff are actively helping resolve these and similar water quality issues.

Russian River Toxic Study

The Regional Board is developing BMPs for the storage, handling, and transportation of toxic wastes and hazardous materials in the Russian River drainage basin. The BMPs will be based on a study identifing hazardous waste discharge sources and high risk areas in the drainage area.

Achievements

- In June 1984, the City of Eureka wastewater treatment facility was completed, capping a 14-year effort. To achieve this, six substandard wastewater treatment systems were phased out and flows now go to an innovative, modern secondary treatment plant.

NORTH COAST REGION (continued)

- In 1986, the City of Arcata completed construction of aerated lagoons and facilities to retain wastewater on a long-term basis. Extensive wetlands absorb pollutants while providing valuable wildlife habitat.

- In 1983, McKinleyville completed waste treatment improvements that allow partial reuse of highly treated wastewater for agriculture and wildlife habitat.

- The City of Blue Lake completed construction of additional wastewater retention/percolation ponds in 1985.

- Sewage treatment facilities at Garberville, Redway, Miranda, Rio Del, Fortuna, Loleta and Ferndale have also been upgraded.

- In 1982, discharge of heavy metals from Noranda Grey Eagle Mines, a gold/silver mining project in Siskiyou County, was stopped and a long term maintenance program implemented.

- The Smith and Mad River systems were tested for heavy metals and chlorinated hydrocarbons. Results show extremely clean water.

- Erosion from logging practices on private and federal lands has been reduced by the combined efforts of the Regional Board, Department of Forestry, DFG and the U.S. Forest Service.

- The threat of another discharge of municipal wastewater into the Russian River drainage system has been abated by the upgraded levels of treatment at the Laguna Wastewater Treatment Facility. Efforts toward the development of a long-term wastewater management plan are underway.

SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

The SAN FRANCISCO BAY REGION supports an urban population of over five million people and includes heavy industry in the Richmond and Pittsburg areas, electronics industry in San Jose and Santa Clara, and agriculture in Napa, Sonoma, parts of Contra Costa County and the lower Santa Clara Valley. The Bay itself provides a natural harbor and waterway of exceptional economic and environmental value.

Over 100 sanitation agencies, nine counties, numerous cities and several regional agencies surround the Bay and Delta systems. Each has some interest in the Bay, either in protecting it, discharging into it, or using it to spur economic growth.

Water Quality Issues

City of San Francisco Sewage Treatment

Progress continues in San Francisco's efforts to clean up raw sewage discharges to the Bay and ocean. Storm waters, domestic sewage and industrial wastes drain into the same sewers. Sewers become overloaded whenever there is a trace of rainfall, resulting in overflows of untreated wastewater to the Bay and ocean. About $800 million is being spent by federal, state and local governments for major improvements that will be completed in 1987.

SAN FRANCISCO BAY REGION (continued)

The $450 million Bayside system went on line in 1982 and provides secondary treatment for all sewage flows during dry weather in the heavily populated eastern half of the city. Secondary treatment removes 90 percent of pollutants in sewage, compared to the 50 percent removed by primary treatment, the level previously attained by San Francisco plants. The system reduces raw sewage overflows to one-tenth previous levels along the northern waterfront and provides primary treatment for half of Bayside storm water/sewage flows. The remaining half discharges after screening in San Francisco Bay.

By October 1986, the $350 million Westside system will end discharge of primary effluent near the shore at Mile Rock, reduce wet weather overflows near Ocean Beach, and provide primary treatment for both. When Westside is operational in 1987, wet weather overflows onto Ocean Beach will be reduced from 114 to eight per year. Dry weather flows will receive primary treatment and, although some dry and wet weather waste discharge requirements will continue to be violated, operation of the system will substantially improve water quality.

The next step in the San Francisco Clean Water program will be completion of southeast area projects to control overflows which now impair important shellfish beds and major recreational facilities. The final step will be the construction of projects to control overflows to the beaches, Lake Merced area and Baker's Beach. The facilities are expected to be in place by mid-1990.

SAN FRANCISCO BAY REGION (continued)

South Bay Dischargers

Because South Bay water and ecology are extremely sensitive to discharge of inadequately treated sewage, reliability of the three South Bay sewage treatment plants is very important. The San Jose/Santa Clara plant experienced major process malfunctions and discharged inadequately treated sewage into the South Bay in 1979 and 1980. Plant upsets caused the Regional Board to issue a cease and desist order requiring the city to improve reliability and increase capacity. San Jose paid $200,000 in civil penalties.

San Jose continues to increase plant capacity. Currently it can reliably treat 143 million gallons per day (mgd). Plant capacity will increase to 167 mgd and provide adequate capacity well into the 21st century. All three South Bay dischargers -- San Jose, Palo Alto and Sunnyvale -- now provide reliable tertiary treatment. Because of the improvements, the South Bay now sustains a commercial bait shrimp fishery.

San Francisco Bay Shellfish

The first public shellfish harvests since the 1930s were made along a one mile stretch of San Mateo shoreline in 1982, 1983 and 1985 under the scrutiny of local and state health and water quality officials.

Once a plentiful resource, San Francisco Bay shellfish are now considered unsafe to eat. The Regional Board is determined to restore productive growing waters and began by focusing on ten specific shellfish beds. No shellfish beds located offshore from San Mateo or adjacent to Richmond meet conditions for safe harvesting during the rainy season. Only two meet criteria for safe harvesting during the summer. This is due to year-round coliform contamination from storm drain runoff mixed with effluent during the rainy season, lagoon discharges to the Bay and sewage bypasses from collection systems.

Prospects for reestablishing commercial shellfisheries are promising. One company is testing oysters, mussels and clams grown in South Bay waters. DHS will probably require depauration (self-purifying of shellfish under controlled conditions at a plant) of any shellfish commercially grown in the Bay. The company has leased five acres of the Bay with the DFG to test the commercial feasibility of shellfish farming.

Leaking Underground Tanks in Silicon Valley

The advanced technology of the Silicon Valley's electronics industry requires highly corrosive chemicals to etch the microchips and other sophisticated components of modern electronic products. Those same chemicals, when they escape from containment, can pose a serious threat to ground water supplies underlying industrial facilities.

During 1984-86, the Regional Board continued to monitor progress toward cleanup of over 100 sites where ground water was polluted or threatened by hazardous materials. Those sites were discovered by an aggressive Regional Board effort that documented a previously unknown vulnerability, the threat of contamination from leaking underground tanks.

The Regional Board discovery led to local control ordinances for underground tanks, to a state-ordered inventory of all underground containers storing hazardous materials in California, and a major new regulatory program. Federal legislation is taking shape to ensure that such tanks do not contaminate ground water.

Sediments, Oils and Metals in Surface Runoff to San Francisco Bay

Forecasters say that by 1990, surface runoff will contribute 60 percent of the sediment load to San Francisco Bay. In addition to sediment, runoff also contains oils and metals. The first hour of a storm can produce as much pollution as raw sewage. Water quality officials recognize the potential problems from this source, but a comprehensive solution would be highly expensive.

In the 1982 Basin Plan update, the Regional Board adopted a strong position on regulation of erosion and sedimentation in an effort to curtail practices that contribute to storm water runoff problems. The Board identified cities and counties where erosion control ordinances need revising and where an improved

regulatory program would reduce damage from erosion and sedimentation. Local governments were asked to develop effective control ordinances, and by mid-1986, about half of the 33 ordinances in need of revision had been appropriately amended.

Aquatic Habitat Program

Complex tides, shifting currents and variable freshwater inflows make understanding San Francisco Bay difficult. It is one of the most studied estuaries in scientific history, yet clear information about the impact of potential pollutants or how to remove known pollutants is still lacking. The knowledge gaps are particularly wide when considering the long term health of aquatic plants and animals in the Bay. Dischargers monitor the receiving water around outfalls, but that information does not adequately assess the overall health o the bay. To solve the problem, the Regional Water Board, along with the State Board, developed the Aquatic Habitat Institute. It is funded largely by major dischargers to the bay and the State Board with additional funding from EPA. The Institute coordinates monitoring and research activities and assists sewage and industrial wastewater dischargers monitor the effects of bay discharges.

SAN FRANCISCO BAY REGION (continued)

Petroleum Refineries

There are six petroleum refineries in the San Francisco Bay area which make up the largest category of industrial waste dischargers to the bay. These refineries process a total of 700,000 barrels of crude oil daily and discharge 26 million gallons of processed wastewater. The refineries are situated on major migratory corridors for anadromous fish, and their wastewater discharges pose an enormous threat to the health of San Francisco Bay.

There have been significant recurring violations of NPDES permit limits during the wet weather periods of the early 1980s from several refineries. As the result, the San Francisco Bay Regional Board adopted cease and desist orders against three of the six petroleum refineries in early 1984.

While there has been a steady decrease in conventional pollutants discharged to the Bay since 1974, the most recent NPDES permit adopted in 1985 include effluent limits for toxic pollutants such as phenols and chromium that are about 60 percent more stringent than the old permits. These tighter permits resulted from new effluent limits for the petroleum refining industry promulgated by EPA in 1985.

In 1985, oil refineries implemented testing methods to demonstrate compliance with toxicity standards contained in the San Francisco Bay basin plan. These monitoring tests -- known as flow-through bioassays -- expose aquatic organisms to a continuous flow of refinery wastewater which may contain a broad range of toxic constituents. Bioassay results have helped refineries pinpoint treatment problem areas. This has lead to wastewater treatment improvements at each of the refineries and significant reductions in the toxicity of their discharges.

Achievements

- San Francisco City discharges have significantly improved with Bayside and Westside systems on line.

- The problem of leaking underground tanks has been confronted by effective measures taken by the Regional Board. The effort served as a warning to other areas of the state and nation. The actions taken by the Regional Board led to state and federal legislation and a systematic effort to reduce threats from underground tanks.

- Public health authorities allowed sport shellfishing along one mile of shoreline, the first harvesting allowed since the 1930s. Prospects for commercial harvesting are bright.

SAN FRANCISCO BAY REGION (continued)

- The Clean Water Grant program has funded $2 billion in new sewage treatment facilities for communities ringing the bay, resulting in a steady decrease in conventional pollutants (bacteria, suspended solids, and biological oxygen demand).

- A 1984 Regional Water Board cleanup and abatement order directed the Santa Fe Land Improvement Company in Richmond to remove highly contaminated soils and battery cases from a 20-acre dumpsite located on the shoreline. Shellfish in nearby beds were heavily contaminated with lead and zinc. The work was completed in 1986. A clay cap was used to isolate any remaining wastes including contaminated bay sediments.

- Implementation of flow-through bioassay testing methods by the six bay area oil refineries has significantly reduced toxic discharges to the bay. San Francisco Bay Basin plan toxicity standards have been met as a result.

CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

With 300 miles of scenic coastline from Santa Cruz to Santa Barbara, the CENTRAL COAST REGION includes the Monterey-Carmel and Santa Barbara tourist and recreation areas, as well as the agricultural Salinas and Santa Maria Valleys. The main inland bodies of water are the Salinas and San Lorenzo Rivers. There are no large natural lakes in the area, but numerous reservoirs provide flood control, water supply, and recreation.

Water Quality Issues

Illegal Waste Discharge, Rare Criminal Prosecution in Gilroy Case

In 1982 and 1983, the joint wastewater treatment plant serving Gilroy and Morgan Hill illegally discharged to Llagas Creek. The violation resulted in the filing of criminal charges by the Attorney General and the issuance of a cease and desist order by the Regional Board. Gilroy's city manager and plant operator pleaded guilty and the city engineer was found guilty in a court trial.

The Regional Board's cease and desist order included a ban on further connections until there is sufficient capacity to handle increased flows. As a result, Gilroy has expanded its plant and developed realistic and practical long-term plans to meet its sewage treatment needs.

CENTRAL COAST REGION (continued)

Carmel Bay Discharges

Carmel Sanitary District continues to discharge into Carmel Bay, an Area of Special Biological Significance. To end the discharge, the district had planned a large scale reclamation project, but the project was scrapped because federal funds were not available. Missed deadlines resulted in a Regional Board cease and desist order. Raw sewage overflows from the district's pump stations have been corrected and a smaller reclamation project is being studied. Monitoring has been intensifed to detect any potential problems.

Ocean Waivers

Goleta Sanitary District in Santa Barbara County and the cities of Watsonville and Santa Cruz in Santa Cruz County all discharge less than secondary treated wastewater to the ocean. Each agency has been under a cease and desist order for failure to comply with secondary treatment standards. The district and the cities sought waivers from these requirements from EPA. Goleta's was granted in 1985. The Regional Board then issued a revised cease and desist order which set a timetable for the district to meet the improved treatment requirements which are a condition of the waiver. EPA has yet to decide on the cities' waiver applications although the Regional Board has worked extensively with EPA on Santa Cruz's draft permit.

Water Short Areas

Water demands in several Central Coast basins outpace available supplies. In the Salinas Valley, ground water mining has led to seawater intrusion. Wastewater reclamation on high value crops would help the situation if public health can be protected. A five-year study conducted near Castroville using highly treated and filtered effluent to irrigate lettuce and artichokes indicates it is safe to eat vegetables irrigated with reclaimed water. Scientists tested vegetables for bacteria, viruses and parasites. Tests appear to allay public health concerns and a full report was issued in 1986. Preliminary tests of ground water and soils indicate no adverse effects attributable to irrigation with reclaimed wastewater.

Agriculture Chemical Applicators

Facilities handling agricultural chemicals are inspected and regulated by the Regional Board. Waste discharge requirements for agricultural chemical applicators in Monterey, Santa Cruz and San Benito have been adopted, with more permits in the development stage.

San Luis Obispo Mine Leaks Mercury to Reservoir

Buena Vista Mine, an inactive mercury mine in San Luis Obispo County, continues to drain acid water into Las Tablas Creek and then to Nacimiento Reservoir. The matter has been turned over to the Attorney General for enforcement. Regional Board staff are investigating other mines in the area.

Hazardous Waste Disposal Site

A hazardous waste disposal site near Casmalia in northern Santa Barbara County has assumed greater significance with the closure of all other similar sites in the Southern California area. Casmalia is now used for disposal of wastes from Superfund sites such as the Stringfellow Acid Pits. Hydrogeology at the site is being investigated by the Regional Board and by the Department of Health Services. There has been significant local opposition to the site, primarily centered on air borne pollutants and public health risks.

In addition to the work at Casmalia, the Regional Board is examining the application of the Toxic Pits Control Act and the Resources Conservation and Recovery Act (RCRA) to some Pacific Gas and Electric impoundments and a portion of the John Smith Solid Waste Disposal site in San Benito County.

Firestone Plant near Salinas

Firestone Tire and Rubber Company operated a manufacturing plant near Salinas from the mid-1960s through mid-1980. During facility closure, the Regional Board learned that organic chemical spills contaminated soil and ground water. In early 1986, Firestone was scheduled to begin operating an on-site extraction and treatment system that uses an airstripping process and activated carbon filtration. Contaminated soils have already been removed. As part of the

cleanup program, Firestone is testing nearby aquifers to determine the extent of any contamination. Off-site contamination at relatively low concentrations has been found in a shallow ground water aquifer and in another aquifer 180 feet below ground level.

Watkins-Johnson Company, Scotts Valley

Watkins-Johnson Company manufactures electronic components at its plant overlying the Santa Margarita aquifer in Santa Cruz County. Past discharges of TCE and other chlorinated hydrocarbons have contaminated the area's ground water. The Regional Board required cleanup and the site has been added to the federal Superfund list.

Other Spill Cleanups

Discoveries of chemical and fuel spills and subsequent soil and ground water contamination are multiplying. Most older underground fuel tanks have leaked over the years. The number of Regional Board enforcement actions is escalating.

Solid Waste Disposal Sites

Most Central Coast solid waste disposal sites are being required to make better assessments of ground water degradation from landfill leachate, or make improvements to prevent leachate production, or both. The Regional Board is requiring intensified water quality protection efforts pursuant to the Board's regulations governing solid waste disposal sites.

Monterey Harbor Lead Study

High lead levels in Monterey Bay reported by the Board's 1981-83 Mussel Watch monitoring program resulted in increased monitoring and preliminary identification of a slag heap used by the railroad as fill as the source. The area was posted as unsafe for mussel consumption and the City of Monterey removed surface slag deposits above the waterline in 1984, as an interim measure.

To investigate the problem further, the Water Board allocated $25,000 for additional studies of mussels, sediment and fish, plus an additional $25,000 for a lead isotope ratio study to fingerprint lead residues in Monterey Bay and harbor. Sediment samples confirmed the slag pile as the source. Cleanup and abatement funds are being used to quantify depth and distribution of lead for cleaup.

Achievements

- Sandyland Nursery, a greenhouse/nursery operation in Santa Barbara County, has been referred to the Attorney General and the courts because of prolonged delays terminating a discharge to Carpenteria Slough. The illegal discharge was terminated in early 1985. The nursery now discharges to the sanitary sewer.

CENTRAL COAST REGION (continued)

- Monte Del Lago, a small Monterey County community, discharged illegally to Moro Cojo Slough in Monterey County. The Regional Board issued a cleanup and abatement order and later referred the case to the courts. In 1985, the community connected to a regional sewerage system, with Clean Water Grant program assistance.

- For the Baywood/Los Osos area, the Regional Board prohibited waste discharge from septic tank disposal systems due to pollution of Los Osos ground water basin from nitrates, which threaten public health. A time schedule has been set for eliminating discharges.

- The Department of Corrections Men's Colony in San Luis Obispo expanded its population before completing expansion of its sewage treatment plant. As a result, the discharges to Chorro Creek exceeded limits in its discharge permit, leading the Regional Board to issue a cease and desist order. The order set a timetable for improvements. Construction is now underway.

- Sewage effluent discharges to the Salinas River and recreational areas of Monterey Bay were eliminated when the Monterey Regional Water Pollution Control Agency completed Phase II of its wastewater treatment facility. It links several individual plants together and pipes treated sewage to central Monterey Bay. Fort Ord also uses the outfall. Phase III will eventually replace existing plants, including Fort Ord's, with one regional facility at an estimated cost of $54 million. This project is also receiving CWG funding.

CENTRAL COAST REGION (continued)

- Ten CWG projects were completed serving: the Cities of Morro Bay, San Luis Obispo, Scotts Valley, Cayucos, King City and Castroville, Moss Landing Community and Davenport County Sanitation Districts, Bear Creek Estates, and Guadalupes Gularte Tract. Projects underway include collection systems for Mission Canyon, Boronda and Fruitland and complete wastewater systems for Los Alamos, Nipomo Community Services Districts and San Luis Obispo's Country Club Estates.

- Concern about mineralization of Lompoc ground water led to tighter water quality objectives. The implementation strategy restricts use of water softeners where they contribute to the problem.

- Pismo Beach completed a land outfall line to the ocean outfall belonging to South San Luis Obispo County Sanitation District. The connection replaced a deficient outfall that periodically ruptured in the surf.

- An Oceanographic Technical Assistance Panel was established to develop and oversee monitoring of discharges from exploratory oil well drilling in the Santa Barbara Channel. Now in its fourth year, this panel has received world-wide recognition for effective off-shore oil platform monitoring techniques.

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

The LOS ANGELES REGION includes a large, highly developed coastal plain, the densely populated San Fernando and San Gabriel Valleys and adjoining foothills. Industrial developments center around Los Angeles-Long Beach Harbor and the Burbank-Glendale area. Population density, the shortage of flowing streams and importance of the coastline, make control of municipal and industrial wastes a high priority.

The rugged and mountainous northern Ventura-Santa Clara Basin contains large undeveloped areas. Important agricultural areas in valleys and the coastal plain around Oxnard are beginning to urbanize due to population overflow from nearby Los Angeles. A major portion of the area lies within Los Padres and Angeles National Forests.

In this arid region, most water is either imported from the Colorado River, Owens Valley or the State Water Project, or extracted from ground water supplies. The demand for ground water exceeds replenishment. Extractions from most major ground water basins have been limited by court-appointed water masters. In addition, over 40,000 acre-feet of water is reclaimed yearly.

Water Quality Issues

Los Angeles City Sewage Spills

Following five sewage spills into Ballona Creek during the summer of 1985, the City of Los Angeles has constructed a $1.6 million system of holding tanks designed to prevent sewage overflows. The Regional Board has fined the city a total of $180,000 for the spills, the largest civil penalty assessed by a Regional Board under a new law enacted in 1984.

The holding tanks were completed in mid-1986 and have a one-million gallon capacity. The chance of further spills will be reduced by the recent opening of a new water treatment plant in the San Fernando Valley along with a voluntary water conservation program for residents on the west side of the county.

Ocean Dumping

In a 1985 report on ocean dumping in Southern California coastal waters, the Regional Board discussed DDT and its sources in the marine environment. The report made several recommendations concerning ocean pollution, including a field study to focus on impacts to marine organisms and sediments.

Field work has been completed for the first two phases of this study. These phases include sampling deep water dump sites and offshore shallow waters, both of which may have been polluted with contaminants from dumping of industrial waste and pesticides or mainland discharges from municipal, industrial, or stormwater sources.

Phase III involves analysis of sportfish commonly taken from local piers. Fish will be analyzed for DDT and PCBs as well as other target contaminants. It is hoped this information will help determine whether local sportfish are safe for human consumption.

Santa Monica Bay: Health Officials Warn Against Fish Consumption

The 21-mile wide Santa Monica Bay provides a major recreational outlet for millions who live in the Los Angeles, San Fernando and San Gabriel basins.

The climate, sand, and relatively gentle surf within the bay combine to attract millions of local residents and tourists each year.

In 1984, DHS recorded high DDT readings in white croakers taken from the bay and posted notices warning anglers to limit consumption of fish taken from the bay. Five waste discharge streams empty into the bay under permits issued by the Regional Board. Daily discharges of up to 410 million gallons from Los Angeles' Hyperion sewage treatment plant, has by far the greatest

impact. Three other dischargers release relatively innocuous waters used to cool power plants. The fifth discharge, also one that concerns water quality officials, flows from the Chevron Refinery in El Segundo at a rate of 6.5 mgd.

In addition to sewage discharges, four dumpsites are located in the offshore waters adjacent to the bay, although only one is still in operation. Two sites accepted refinery, chemical and oil drilling wastes until the early 1970s when federal bans on ocean dumping of toxic materials took effect. A garbage dump also ceased operation in the mid-1970s. The EPA supervises a dumpsite for materials dredged from Southern California harbors. That site still accepts wastes.

While waste discharges and dumpsites are the most readily identifiable pollution sources, storm drains from most of western Los Angeles empty into the bay and aerial fallout is another potentially significant pollutant source.

Another possible source of pollution is the effluent from Los Angeles County Sanitation District's sewage treatment plant which discharges 360 million gallons of treated sewage daily off the Palos Verdes Peninsula, an area technically outside Santa Monica Bay. In past years the outfall carried DDT compounds in large quantities.

Ground Water Contamination: San Gabriel Valley

Ground water contamination was first discovered in 1979 in the San Gabriel Valley by Aerojet Electrosystems Company of Azusa. Although the Regional Board investigated over 200 industrial facilities as possible sources of TCE contamination, no specific point sources were discovered. Investigation indicated most contaminants reaching the wells probably resulted from past industrial practices.

Four distinct areas, El Monte, Baldwin Park, Alhambra and La Puente, were identified and included on EPA's Superfund list for investigation and evaluation of solutions to contamination problems.

Further sampling was carried on by local, state and national agencies. By mid 1986, 373 wells were found to be contaminated. Contamination in 128 wells exceeded EPA's maximum contaminant levels or the DHS' action levels. These contaminants included, among others, TCE, PCE and carbon tetrachloride.

Some wells were contaminated by more than one substance. Affected wells were taken out of service or were diluted to levels acceptable for public consumption.

Ground Water Contamination: San Fernando Valley Basin

In 1980, unsafe levels of TCE and PCE were discovered in 32 wells drawing from the San Fernando Valley Basin. They provided drinking water for the cities of Los Angeles, Burbank, Glendale and San Fernando. TCE and PCE, the major pollutants, were found in a quarter of the ground water wells tested.

A two-year study (1981-1983) initiated by the Los Angeles Department of Water and Power and the Southern California Association of Governments generated two sets of recommendations: one to prevent further pollution of the ground water basin and the second to take remedial actions for current problems with steps to allow full use of the ground water for drinking. An interagency committee, including a Regional Board representative, coordinates the activities of the public and private agencies involved in this management plan.

In 1983, the Regional Board initiated a major program to detect and clean up soil and ground water contaminated by leaking underground tanks. The program predated the statewide effort to inventory tanks and implement adequate leak detection monitoring. The Regional Board focused on finding those tanks with a high potential for leaks of the most dangerous chemicals.

A 1983 survey of 3,000 facilities located primarily in the San Fernando Valley identified 88 facilities with high risk tanks (i.e., cement or metal tanks storing chemical solvents, five or more years old, with no monitoring system). The Regional Board required operators of these facilities to undertake leak

investigations. More than half the 88 tanks showed soil contamination, ground water contamination, or both. By the end of June 1986 the entire Regional caseload had grown to 374.

In January 1985, gasoline vapors were detected in an excavation near a large oil refinery. Subsequent investigation revealed that a plume consisting of gasoline, jet fuel and a naptha-like material had migrated on the ground water surface into the adjacent community. To determine if this was a generic problem, the Regional Board adopted orders requiring 16 oil refineries to perform subsurface investigations of their facilities. Twelve of the facilities found similar ground water pollution problems ranging in severity from minor to that approaching the magnitude of the original problem. In some cases the facility operator was aware of the ground water pollution and had already begun mitigation measures. Staff continues to oversee the completion of all investigations and the initiation or continuation of required mitigation and cleanup.

Seawater Intrusion in the Oxnard Plain

Ground water pumping in the Oxnard Plain in Ventura County exceeds replenishment, causing sea water to flow into the aquifer. By 1950, water levels were 30 feet below sea level and sea water started to move inland. By 1977, monitoring revealed a total inland intrusion covering 20.6 square miles.

About 20 square miles of prime farm land lie over aquifers now contaminated by unusable ocean waters. Since nearly 80 percent of the total water supply for the area comes from ground water, preservation of this resource is essential.

The United Water Conservation District, cooperating with Ventura County, developed a plan to provide an immediate physical solution to the sea water intrusion problem. The State Board authorized a grant of $8 million to complete the project's first phase. Grant funds were made available through the State Assistance program. Local funding was also provided.

Phase I elements included the removal of 47 active Oxnard aquifer irrigation wells, construction of about 15 miles of distribution pipeline, drilling of eight new deep aquifer wells, and construction of two reservoirs, pumping stations, and a moss screening facility. The 47 wells will be removed from service and replacement water will be delivered using the pipeline system. Phase I of the project will be completed in 1987 at a cost of $14.6 million from local sources.

The second phase will include an improved diversion structure, a 3,300-foot conveyance canal, and a 70-acre desilting basin. In addition, reclaimed industrial wastewater from a vegetable processing plant will be used for irrigation, reducing the amount of water normally pulled from underground aquifers.

Shellfish Contamination in Long Beach

High lead content in clams closed the Long Beach-Colorado Lagoon to shell fishing in early 1979. No industries discharge into the water. Data collected by the Regional Board, DFG, City of Long Beach and University of Southern California indicate that lead from auto exhaust is scrubbed out of the air by rain and carried to the lagoon via storm drains.

The Regional Board continues to maintain surveillance of this problem in coordination with the City of Long Beach. The State Mussel Watch program has reported small declines in lead levels since lead was been banned from gasoline. However, those declines have not yet translated into improvements sufficient to restore shellfishing.

Urban Lakes Health Effects Study

Urban lakes provide recreation, fishing, wildlife habitat and flood control benefits for city dwellers. These lakes can be impacted because they are heavily used and are often fed by stormwater that washes chemicals into them.

A study begun in 1983 tested the safety of eating fish caught in recreation lakes. Fish samples taken from Harbor Lake had elevated levels of chlordane and, to a lesser degree, PCBs and DDT. Chlordane exceeded the U.S. FDA's action levels which means the fish in Harbor Lake (mainly goldfish and carp)

are unfit for human consumption. Warnings have been issued by the DFG. Elevated levels of mercury were found in bass from Hansen Dam Lake, although values fell below action levels.

Regional Board, state and local health and water agencies found fish caught in the lakes (except Harbor Lake) safe to eat. The studies continue to monitor pollutant levels and to investigate other potential problems.

Hazardous Waste Disposal Site Closed

Because of the large number of industries in Southern California, this area produces the largest quantity of hazardous waste in the state. BKK Landfill in West Covina, the last operational Class I disposal site in Los Angeles, stopped accepting hazardous wastes in 1984. The site continues to accept non-hazardous solid wastes. In mid-1984, levels of methane and vinyl chloride gases became serious enough to warrant evacuation of families living nearby. Dischargers are now required to treat the wastes to safe levels or transport them 200 miles north of Los Angeles to toxic dumps near Bakersfield and Santa Barbara. Trucks hauling wastes to these dumps logged close to 45,000 miles during 1985, escalating the possibility of spills during transport as well as the risk of illegal dumping.

Hazardous Waste Site Study

The State and Regional Board are evaluating possible disposal sites for Southern California as well as studying alternative disposal practices. A system used in Denmark and Germany, which utilizes extensive treatment and dry burial of toxic wastes is being studied, although finding a burial site has been hampered by strong objections from those living near suggested locations.

Auto Shredder Wastes

In Southern California, the final disposition of "dead" automobiles has been a major problem. The traditional procedure was to strip the car of any useable parts, batteries, gas tanks and tires, then send the remaining hulk (after crushing) to an auto shredder. The shredder reduces the hulk to fist-sized pieces that are separated by magnets and gravity to reclaim ferrous and non-ferrous metals. The residue, auto shredder waste (or fluff), has historically been landfilled. This fluff was determined to be a hazardous waste under California law, and the shredder operators were directed to so treat the waste for disposal purposes. One of the operators in the Los Angeles Region developed a treatment process that rendered the waste nonhazardous, thus allowing it to be deposited in nonhazardous solid waste landfills. The Regional Board adopted requirements for disposal of this waste at a nonhazardous waste site in May 1986.

Beneficial Uses Survey

As part of the Regional Board's periodic basin plan review and update, a survey was initiated to identify beneficial uses of the Region's 185 bodies of surface water. The survey will be completed in late 1986.

Achievements

- An inventory of more than 3,000 underground storage tanks in the San Fernando Valley has been completed. Facilities with high risk underground chemical storage tanks were required to conduct leak detection investigations.

- Twenty hazardous waste facilities in the area with potential ground water problems have been required by the Regional Board to implement ground water monitoring and/or site assessment programs. Improved monitoring systems have been installed at nine major hazardous waste disposal to land facilities. Monitoring systems are also in place at six abandoned hazardous waste facilities.

- Los Angeles-Long Beach Harbor water quality continues to improve due to Regional Board action prohibiting discharges of industrial and oil field wastes to the harbors and requiring upgrading of Los Angeles' Terminal Island wastewater treatment plant.

- Santa Monica Bay water quality is expected to improve with the resolution of the controversy over providing full secondary treatment for flows from Hyperion sewage treatment plant at Playa del Rey.

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

Covering an area of almost 60,000 square miles from the Oregon border to the Tehachapis, the CENTRAL VALLEY REGION contains 40 percent of all state land and the majority of the fresh water used in California. Included in this vast Region is prime agricultural land, as well as widely diversified topography and hydrology ranging from the semi-arid Modoc Plateau to the glaciated Sierra Nevada mountains.

The largest of the nine regions, the Central Valley Region also has numerous population clusters, military bases and industrial centers where pollution problems can occur.

The area's largest river, the Sacramento, runs south for 400 miles from Mount Shasta to the Delta. The Cosumnes, Mokelumne, Stanislaus, Tuolumne, Merced and Fresno Rivers feed into the San Joaquin River, the second major river in the Region. It flows northward into the Delta.

River flows into the Delta flush San Francisco Bay before entering the ocean. Fresh water from the system is pumped into state and federal canals for agricultural, industrial, recreational, and domestic use in Central and Southern California.

Water Quality Issues

Agricultural Discharges

Irrigated agriculture accounts for almost 95 percent of water use in the Central Valley. Both the San Joaquin and the Sacramento Rivers carry substantial amounts of agricultural return flows or drainage. Agricultural wastewater carries salts, nutrients, pesticides, sediments, and other by-products that reduce the water quality of the rivers and Delta.

Irrigation return flows from rice fields in the Sacramento Valley have been found to seasonally carry significant amounts of pesticides into receiving waters. To date, four rice herbicides have been detected in water samples taken from the Sacramento River and/or associated drains. One of these products, Ordram, has been identified as the cause of fish kills that occured annually in the Colusa Basin Drain prior to 1984. A second product, Bolero, was found to be the cause of taste problems in the City of Sacramento water supply. There is general public concern regarding the impacts of these materials on the environment and on human health.

The Regional Board has made a heavy commitment of time and effort working on agricultural wastewater problems in the San Joaquin River Basin. Thirty self-monitoring programs, involving 80 to 90 water and drainage agencies, were established. Staff conducted monthly and bimonthly monitoring studies of agricultural drains and surface waters. The tile drains of the west side (approximately 250 drain sumps) were sampled twice; analysis consisted of 15

constituents, mostly trace metals and pesticides. Regional Board staff serve on the San Joaquin River Technical Committee, which was formed by the State Board Order in 1985 as part of the Kesterson Reservoir enforcement action. The committee will develop and implement a work plan to further study the basin.

Underground Injection Wells

Hundreds of private and public agencies operate wells that inject nonhazardous fluids above or into ground water aquifers used for drinking water. Such wells are closely regulated when hazardous wastes are involved, but the Regional Board is concerned about possible impacts from other wastes such as urban runoff and septic tank effluent.

In 1983, the Regional Board surveyed 1,200 agencies that possibly owned or operated underground injection wells. The responses identified 7,500 such wells in the Central Valley Region. Over 7,200 are used for stormwater runoff (6,500 in the City of Modesto) and 180 are used for septic tank effluent. The remainder are used for disposal of cooling and heat pump return waters and for disposal of condensate. The Regional Board is seeking funds to study potential problems in the Modesto area.

analyses show the presence of volatile organic and inorganic chemicals including TCE (trichloroethylene). Over 20 other similar chemicals have been found. TCE and some of the other constituents are supected carcinogens.

Striped Bass Loss to Intakes at Powerplants

Pacific Gas and Electric Company (PG&E) operates two plants at Pittsburg and Antioch on the San Francisco Bay-Delta Estuary. The estuary is the nursery for striped bass. A portion of the larval and juvenile striped bass population is lost at the plants when young fish either run into cooling water intake screens or are pulled into the cooling water systems.

Acid Mine Drainage

The Regional Board regulates active mines through waste discharge permits. Inactive mines scattered throughout the Region are a definite source of metal contamination in the Delta and other regional waters. Major impacts have been documented due to discharges from Iron Mountain, Walker, and Sulphur Bank Mines, and several others.

Timber Harvesting and Erosion Impacts

Forest management activities, principally timber harvesting and application of herbicides, have the potential to impact beneficial water uses. Timber harvest activities annually take place on several hundred thousand acres of private and

Ground Water Contamination at Industrial Sites

Ground water contamination from industrial sources generally occurs from practices of disposing of fluids or other materials used in production processes. Waste compounds are or were discharged directly to unlined sumps, pits, or depressions, spread on surface soils, or stored in leaking containers onsite. In some cases, these disposal practices went on for many years before they were discovered or discontinued.

New legislation and programs have been initiated to address a wide spectrum of ground water pollution problems. In 1983-84, about 155 sites in the Region were under investigation. By 1985-86, that number had risen to approximately 500 sites. These sites include wood treating facilties, military installations, industrial or research facilities, pesticide applicators, oil and gas facilities, and public drinking water wells. Regional Board activity at these sites ranges from assessing the nature and extent of problems to supervising cleanup actions.

Groundwater Contamination at Aerojet

Aerojet-General Corporation is one of the nation's largest producers of liquid and solid propellant rocket engines. Ground water below Aerojet and adjacent lands in eastern Sacramento County is contaminated with chemicals. The vertical and horizontal extent of contamination is not fully known. Chemical

federal land in the Central Valley Region and may affect water quality throughout the area being harvested. Poor logging practices in the 1960s and 1970s caused severe degradation in many of the state's forested watersheds.

Erosion can result from road construction, tractor logging on steep slopes, excessively large clear-cut harvest areas, post-harvest burning, and the operation of heavy equipment within stream protection zones. Logging debris may be deposited in streams while landslides and other mass soil movements can occur as a result of timber operations.

Achievements

- Rice-Associated Pesticides

  The Regional Board is working with the DFA and several other agencies and organizations to reduce off-target movement of rice-associated pesticides. For most of the products detected, field management practices that reduce discharges have been identified.

  These practices are now required as part of the use restrictions imposed by DFA. Ongoing studies and monitoring refine the BMPs and provide an evaluation of the program's effectivess. The program has been successful in protecting beneficial uses.

In 1986, concentrations detected by the monitoring effort did not exceed action levels and guidelines set by DHS for the prevention of taste problems and protection of human health. Only one exceeded the guidelines established by DFG for aquatic organisms. However, the numeric pesticide objective for Sacramento-San Joaquin Delta waters was exceeded.

- Wastewater Treatment

All sewage discharges between Nimbus Dam and the mouth of the American River ceased when the Sacramento Regional Treatment Plant went on line. The 23 individual wastewater treatment plants previously discharging into the Sacramento and American Rivers were connected to the Sacramento Regional County Sanitation District in 1982 following completion of the $450 million plant. Effluent now discharging into the Sacramento River south of Freeport contains half the pounds of pollutants originally put into both rivers by the older facilities.

The Amador Regional Sanitation Authority (ARSA) was organized in the late 1970s in Amador County, including Sutter Creek, Amador City, and Martell. ARSA is a secondary treatment plant at Sutter Creek utilizing a system of reservoirs serving downstream agricultural use and landscape irrigation. It includes a grey water system at Preston School of Industry at Ione. An advanced treatment facility for Jackson was completed in 1985.

- Striped Bass

To minimize fish losses, the Central Valley and San Francisco Regional Boards set operating and equipment standards for the two power plants operated by the Pacific Gas and Electric Company (PG&E). The Antioch plant is within the Central Valley Region and the Pittsburg plant is within the jurisdiction of the San Francisco Bay Regional Board. PG&E's violation of these standards resulted in an enforcement hearing by the two Boards in June 1985. As an outcome of that hearing, PG&E will reduce the cooling water flows, thus reducing fish losses, and will implement a fish replacement schedule.

In June 1986, the Central Valley Regional Board amended PG&E's permit to require installation of additional hardware to reduce striped bass losses. In addition, revisions were made to the Antioch plant's operating requirements to achieve specific goals for fish loss reduction. The permit set a new fish replacement schedule tied to the percentage reduction actually achieved each year. The San Francisco Bay Regional Board revised the permit for the Pittsburg plant to contain the same requirements.

- Contamination at Aerojet

The Regional Board achieved a tentative settlement between state and federal government agencies and Aerojet during 1985-86. The proposed settlement will result in redirection of resources from litigation to working

cooperatively with Aerojet to clean up contaminated soil and ground water. In addition, the Regional Board continued working on the 1981 Aerojet Vicinity Work Plan. Many areas have been sampled and analyzed including public and private drinking water wells, ground water seeps into the American River and influent and effluent from Aerojet's existing ground water treatment facilities.

- Acid Mine Drainage

In 1982, the Shasta County Court awarded a $16.8 million judgement against the owners of Iron Mine in Shasta County for repeated violations of waste discharge requirements. A negotiated settlement of over $500,000 was paid to the State Cleanup and Abatement fund in 1985. The EPA placed Iron Mountain Mine on the national priority list of serious hazardous waste site in 1983. In 1986, a study was completed to determine the extent of contamination and cleanup alternatives. Actual site cleanup is scheduled to begin in 1988.

Discharges from Walker Mine in Plumas County have severely polluted a ten mile stretch of Little Grizzly Creek. After a decade of enforcement work aimed at getting the mine owner to clean up the discharge, the Regional Board decided to seal the mine and prevent any further discharge. The Plumas County Superior Court has approved the Regional Board's proposal over the objections of the mine owner.

Preliminary studies have documented high levels of mercury in sediment and fish from Clear Lake in Lake County. The Sulphur Bank Mercury Mine now inactive, is on the shore of the Oaks Arm of Clear Lake. Approximately 108 acres of mine tailings, containing concentrations of mercury comparable to those found in adjacent lake sediment, are present. In February 1984, Regional Board staff requested a report from the mine owner to define the water quality problems and to recommend corrective actions. A report was received in May 1986, although no remedial action plan was included. In June 1986, the State Board approved $80,000 from the Cleanup and Abatement Account for an abatement and pollution control contract study of the mine.

Frequent fish kills in Lake Shasta have resulted from discharges of Mammoth and Balakala Mines, which release acid mine drainage into tributaries of the lake. Concrete plugs have been installed in some of the portals, significantly reducing acidic discharges. However, fish kills still occur and further steps are being required by the Regional Board.

Permits have been adopted to regulate discharge from Homestake Mine, located north of Lake Berryessa in Lake County. Homestake is the nation's second largest gold mine and has an extensive monitoring program ensuring environmental protection during mining, processing, and closure operations.

- Educational Resources

The Regional Board has undertaken two important educational efforts to help control diffuse non-point sources of pollution, particularly erosion. A handbook prepared with help from the California Association of Resource Conservation Districts, the UC Cooperative Extension, and U.S. Soil Conservation Service details sound practices to prevent erosion. Requests for the handbook are being received from all parts of the world.

A second erosion control handbook, prepared by the High Sierra Resource Conservation and Development Council, has also gained widespread interest. The practices recommended by the handbook have become an intergral part of erosion control programs in El Dorado, Placer, Nevada, Amador, and Tuolumne Counties. Over 800 copies of this handbook have been distributed.

LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

The LAHONTAN REGION runs along California's eastern border from Oregon south into San Bernardino County. Environmental attractions include the high desert with the unique geology of Death Valley, the eastern face of the Sierra Nevada and, most spectacularly, the pristine beauty of Lake Tahoe. The region is divided into north and south sub-basins at the Walker River drainage divide between Lake Tahoe and Mono Lake.

Lake Tahoe and the Truckee River are primary features of the northern basin with tourism, lumber and cattle grazing dominating the economy. Precipitation in the northern basin ranges from an average of 50-60 inches at Donner Summit to five inches at Susanville. The southern basin contains industries such as mining, power generation, military and aerospace installations. Precipitation in the Southern basin ranges from 2 inches in the desert valley to about 50 inches in the High Sierra Nevada.

Water Quality Issues

Geothermal Projects Monitored for Impacts

Ten geothermal projects discharging effluent to surface waters are currently operating in the northern basin. These facilities provide energy for greenhouses, electricity generation and heating, including the 1,800-inmate Susanville Correctional Center. Although geothermal water quality is generally better than the highly mineralized waters of the eastern Great Basin, the

Regional Board monitors the projects to avoid problems with elevated temperatures, boron, arsenic, molybdenum, metals and other materials. Utilizing EPA funding, the State and Regional Boards are currently doing wasteload allocations on the Susan River where there are several geothermal discharges.

Acid Drainage at Leviathan Mine Abated

Acid mine drainage from the 200-acre sulfur and copper producing Leviathan Mine virtually destroyed Leviathan and Bryant Creeks and damaged the East Fork of the Carson River in Nevada. The Regional Board directly managed the $6.1 million cleanup construction because the mine was abandoned. Project components included isolating Leviathan Creek from on-site acid spoils, construction of surface drainage facilities minimizing infiltration into spoil areas and construction of 14 acres of on-site evaporation ponds. A large portion of the site was revegetated.

Military Bases Assessed for Ground Water Contamination

The Regional Board requested hazardous waste assessment programs for all six major military installations in South Lahontan Basin as well as for the Sierra Army Depot in the North Lahonton Basin. The bases in the South Lahonton Basin are Edwards Air Force Base, George Air Force Base, Air Force Plant #42 in Palmdale, China Lake Naval Weapons Center, Fort Irwin National Training Center, and the U.S. Marine Corp Logistics Base in Barstow.

Each installation has submitted an initial report identifying past and present hazardous waste disposal areas and recommending cleanup efforts or additional monitoring, where needed. Cleanup and abatement orders have been issued to sites where ground water contamination has been confirmed. The Regional Board is working closely with DHS and EPA in site assessment and cleanup at the Sierra Army Depot.

Basin Plan Amendments

The Regional Board is continually in the process of updating the two basin plans that cover the Lahonton Region. Basin plans set water quality standards for specific bodies of water. Once adopted and approved by the State Water Board, the standards become enforceable.

Amendments to the Basin Plan were made for the West Fork Carson River and Indian Creek Watersheds in 1983. These amendments set forth chemical water quality objectives for Indian Creek Reservoir and the West Fork Carson River at Woodfords and Stateline. Implementation measures to achieve thse objectives include facilities improvements at the South Tahoe Public Utility District, extensive monitoring of the ground and surface waters of the watersheds and continued control by local agencies on densities of septic tanks/leachfield systems.

In addition to reducing public health threats, basin plan amendments for the Eagle Lake Watershed which were adopted in 1983 have increased protection of the lake's value as a wildlife habitat and recreational resource by prohibiting sewage discharges and establishing controls on cattle grazing. The geology of the area makes it difficult to use septic tanks without degrading water quality. The Regional Board has actively facilitated Clean Water Grant funding for communities seeking to replace septic tanks with more effective treatment systems.

Further amendments for the Eagle Lake Watershed were adopted in 1985 as concerns regarding the impacts of cattle and cattle grazing on the watershed increased. This amendment included requirements to assess nutrient loading to Eagle Lake from erosion, loss of vegetation and direct nutrient inputs to surface and ground waters due to cattle grazing and developments of non-lakeshore and non-stream zone cattle watering sites. In addition, the Regional Board is conducting water quality monitoring studies for areas impacted by cattle grazing.

In 1985 the Regional Board extended the effective date of a septic tank prohibition affecting the Glenshire and Devonshire subdivisions in the Truckee River Watershed to allow interim use of septic systems pending completion of a sewer system for which funding has been assured.

In addition, exemption criteria for Regional Board prohibitions against discharge within the 100-year flood plains in the Truckee River Watershed were adopted in 1985. These criteria will permit the construction of certain projects which benefit the public such as bridges, utility lines, some types of recreation projects and erosion control projects.

In 1983 water quality objectives for total dissolved solids and nitrate-nitrogen were set for the Middle and Lower Mojave Basins. Waste discharge regulations will maintain the existing high quality of an 80-mile reach of the Mojave River.

Waste discharge prohibitions were revised in 1986 for Alta Vista, Mesa Vista, and Mustang Mesa areas of Inyo County. The prohibitions were revised as it became evident that the continued discharge of waste from subsurface disposal systems will unreasonably degrade water quality.

South Lake Tahoe Public Utility District (STPUD)

The Regional Board has revised the NPDES permit for the tertiary level treated effluent and adopted waste discharge requirements for the proposed, more economical and reliable, secondary treatment facility. Effluent from both the tertiary and proposed secondary facilities has been and will continue to be reclaimed for irrigation in Alpine County. In-plant modifications for filtered secondary effluent in South Lake Tahoe began in the summer of 1986 and are expected to be completed by early 1988. The Alpine County portions of the project, including construction of the Harvey Place Reservoir and associated diversion works, are expected to be completed in 1989.

The Regional Board continues to closely monitor the advanced wastewater treatment plant which has reached its design life expectancy. Additionally, the Board has begun the process to adopt reclamation requirements for Alpine County users of STPUD wastewater.

In 1986, a Cease and Desist Order against STPUD was issued for violations of its NPDES permit. The Order requires STPUD to line its 60 million gallon emergency retention basin which has long been suspected of leaking. In addition, the order required attention to infiltration and inflow problems within the collection system.

Lake Tahoe: Erosion and Stormwater Runoff Control Permits

Because of Lake Tahoe's sensitivity to nutrients carried in silt and sediments, extra measures are taken to prevent erosion. The Lake Tahoe Basin Water Quality Plan requires the Regional Board to issue permits for all storm sewer discharges to surface waters of Lake Tahoe. Permits include timetables to correct existing erosion problems. This is being implemented through a program which implements BMPs for erosion and stormwater runoff control on commercial establishments.

The Regional Board held public hearings on this issue in 1983 and 1984, subsequently issuing waste discharge requirements to the City of South Lake Tahoe, El Dorado County and Placer County, the three entities with jurisdiction

over stormwater runoff into the California side of Lake Tahoe. The Regional Board is now working with EPA to issue NPDES permits for these discharges.

Gold Mining

Numerous gold mining projects utilizing a cyanide leachate have been proposed. The Regional Board has issued waste discharge requirements requiring double-lined facilities to protect groundwater from potential cyanide contamination.

Achievements

- Since the inception of the Lake Tahoe Remedial Erosion Control Program, the Regional Board has approved funding for 39 erosion control projects. To date, 23 projects that reduce sediment and nutrient discharges to Lake Taho have been completed. In addition, significant erosion control work has been completed at the Mammoth Mountain and June Mountain ski areas and within the town of Mammoth Lakes. Runoff was impacting water quality in adjacent creeks.

- The Regional Board has diligently pursued funding for projects to protect the area's valuable water resources. Resulting projects include construction of sewers for the Glenshire/Devonshire subdivisions, upgrading the Mojave Public Utility District wastewater treatment facility, and construction of a new domestic wastewater treatment plant in California City.

- Regional Board Cleanup and Abatement Orders have resulted in the construction of facilities in Barstow to clean up ground water contaminated by gasoline leakage from underground storage tanks and the cleanup and removal of cyanide and other hazardous wastes illegally stored at the Keynot Mine located in the Inyo Mountains near Lone Pine.

- In 1985, the Regional Board initiated a program in Victor Valley, San Bernardino County, to require secondary-level treatment of wastewater from high density residential and commercial developments utilizing septic tank systems. The Regional Board action was instrumental in motivating some of the local sewer districts to extend sewers to high density areas.

- Sewage spills to Lake Arrowhead's drinking water supply have been greatly reduced due to a 1983 Cease and Desist Order and sewer connection ban for the Lake Arrowhead Community Services District. The district is implementing a $42 million program to upgrade its collection system and construct a larger wastewater treatment plant. The district has replaced many sewer lines that were severely over capacity. The sewer connection ban was rescinded in 1984 due to the district's diligence in correcting sewer system deficiencies. The new treatment plant is scheduled to be on line by early 1988.

COLORADO RIVER REGIONAL WATER QUALITY CONTROL BOARD

Irrigated agricultural lands of the Coachella, Imperial, Palo Verde and Bard Valleys lie in the COLORADO RIVER BASIN REGION. The larger western sub-basin drains into a number of desert basins and to the Salton Sea. The eastern sub-basin is a relatively narrow strip draining into the Colorado River.

Excellent ground waters supply Coachella and several other valleys in the Region with water for domestic and other uses. Imported Colorado River water also supports municipal use, irrigation and ground water recharge. The Imperial Valley relies on Colorado River water imported via the All-American Canal for domestic and irrigation uses. The Region is renowned for its winter crops.

Water Quality Issues

New River Pollution Continues

For over 40 years, Mexicali, Mexico, a city twice the size of San Francisco, has discharged raw sewage, industrial waste, pesticides and other pollutants into the New River before it crosses the border into California. Despite continuing negotiations between the United States and Mexico governments, Mexico continues to be in violation of established water quality standards. Improvements to Mexicali's sewerage facilities have not been sufficient to keep pace with the City's rapid growth.

The sea's TDS concentration, a measure of salinity, is currently about 41,000 ppm and increasing. Ocean water TDS is 35,000 ppm. The salinity is expected to adversely affect the sport fishery as well as diminish other water-oriented recreation and wildlife uses.

During routine monitoring in the spring of 1985, high levels of selenium were found in Salton Sea fish. Health advisories were posted in the area by DHS, suggesting limited consumption of the four major fish found in the sea: corvina, tilapia, croaker and sargo.

The Salton Sea poses a dilemma for water managers. Increased freshwater flows to dilute salts raise the level of the sea, innundating shoreline facilities. On the other hand, reduced freshwater flows would hasten the increase of salt concentration in the sea water.

Colorado River

The Colorado River flows into California from a drainage basin that includes portions of six upper-basin states. As previously explained, Colorado River water is used for farming on desert lands which require complex agricultural soil-salinity control. Unless salt input from upper-basin states is controlled, the salinity concentration of Colorado River water will increase. The Colorado River Basin Salinity Control Forum, composed of the seven basin states, sets salinity standards for the main stem of the river. All of the

In 1983, a United States/Mexico agreement for environmental protection in the border area was signed by the Presidents of the two countries. It transferred responsibility for border environmental problems, including New River pollution, from the International Boundary and Water Commission (IBWC) to EPA and to the Secretaria de Desarollo Urbano y Ecologia for Mexico. This shift in responsibilities however, has not appeared to have a noticeable impact on the New River pollution situation.

The California Legislature is considering funding for projects that will reduce the human health hazard and improve water quality in the New River. An engineering firm under contract to the Regional Board has developed a preliminary workplan to abate New River pollution and recommend remedial steps.

In 1984, the U.S. Senate appropriated $300,000 to the IBWC to construct facilities (probably in Mexico) for partial cleanup of the New River.

Salton Sea Salinity/Selenium

The Salton Sea is located in a geologic sink where water evaporates, but salts remain and accumulate. The sea was originally designated as a terminus for agricultural drainage. Agricultural drainage constitute the principal service of fresh water replenishment for Salton Sea. The Regional Board does not allow industrial or other highly-saline discharges into the Salton Sea.

Pesticides

The Regional Board sets requirements for wastewater discharge (principally rinsewater) by pesticide applicators. Poor practices can result in build up of pesticides in the soil. Windblown dust can transfer these pesticides into canals that provide drinking water. Also, surface runoff can carry contaminated soils to drainage ditches. Regional Board requirements bar such contamination and require monitoring to check compliance. Cooperative field investigations by county agricultural commissioners and other governmental agencies aid the Regional Board in solving these problems.

Achievements

- Since the initiation of the CWG program, over 20 sewage treatment facilities in the region were constructed, improved or expanded. Grantees include the cities of Indian Wells, Holtville, Calexico, Imperial, Palm Springs, Blythe, Brawley, Calipatria, Westmorland, Needles and El Centro; county water districts for Coachella Valley, Winterhaven, Brawley, Seeley, and Desert Hot Springs; and sanitation districts of Niland, Coachella and Mecca.

  Other grantees are Riverside County, Quechan Tribal Council, Imperial Community College District, Salton Community Service District and Heber Public Utility District.

- The Regional Board completed its Triennial Basin Plan review and update. The State Board approved the amendments in 1984.

states are pledged to honor these standards. Within California, the Regional Board closely monitors proposed developments to avoid increases in salinity. In addition, the Regional Board, Palo Verde Irrigation District, and the U.S. Geologic Survey jointly develop plans to reduce major non-point sources of salt loadings.

Ground Water Degradation

Concentrations of nitrates and other minerals in water in a few of the more shallow wells in the Coachella Valley are increasing. Ground water studies by the Regional Board and the two major and local water agencies are underway. These studies are designed to develop and implement BMPs to curb further degradation.

Agricultural Drains

Canals, drains, and other desert irrigation waterways in the Imperial, Palo Verde, Coachella and Bard Valleys have created a life-supporting environment. Aquatic life presently inhabits agricultural drains, attracting other forms of wildlife.

Concern over potential harm to wildlife from discharges of fertilizers, silt and pesticides to the drains prompted the Regional Board to study farm practices affecting water quality. The Board's concern focuses primarily on spills, overruns, and aerial drift that may cause entrance of the above pollutants into these waterways, rather than "routine farm practices."

- The Regional Board cooperated with the Desert Water Agency and Coachella Valley Water District to prepare a comprehensive Ground Water Management Plan for the Coachella Valley. As a result, a Regional Ground Water Management Network now exists. Quarterly ground water sampling by the Regional Board will provide valuable data for developing objectives for the Region's basin plan updates.

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

Two river basins, the Santa Ana and the San Jacinto, serve the 2,800 square miles of valley floor and mountains of the SANTA ANA REGION and the more than two million people who live there.

The Santa Ana River originates in the San Bernardino mountains and flows to an area near Redlands where it goes underground, running intermittently during the winter. Near Riverside, underlying geologic features force water to the surface. The Santa Ana River flows year-round to the Anaheim area where the water is percolated into underground basins to serve the population of Orange County.

The San Jacinto Basin drains into Lake Elsinore with limited outflow to the Santa Ana Basin and the ocean. The San Jacinto River usually flows only during the winter. Most small ground water basins in the area are highly saline because of overdraft and past irrigation with the salt-laden Colorado River water.

Water Quality Issues

Bunker Hill Basin Ground Water Contamination

The Bunker Hill ground water basin, at the headwaters of the Santa Ana River, supplies 400,000 people in Riverside and San Bernardino Counties with high quality water. Twenty wells have been removed from service due to contamination by industrial solvents and soil fumigants. The Regional Board and local

officials are working to correct problems, locate those responsible for contamination, and undertake cleanup activities to prevent contamination from spreading to other wells.

Newport Bay Siltation, DDT and Bacterial Quality

With the largest number of recreational boats on the West Coast, Newport Bay serves as a major recreational resource for Orange County residents. An integral part of that resource is the area's marine and animal life. The upper bay provides important wildlife habitat and is operated by the DFG as an ecological reserve.

In 1982, DFG, the City of Newport Beach, and other local participants funded the removal of 250,000 cubic yards of silt from the upper bay, creating a desilting basin. This basin not only traps silt but also provides more surface water area for aquatic habitat. The San Diego Creek desilting basins, included in the project, prevented silt from returning to the bay during the heavy winter rains of 1982-83. The upper bay basin was expanded during 1985. Planning for additional desilting basins in the bay and in San Diego Creek is underway.

As part of the State Mussel Watch program which monitors coastal water quality by analyzing mussels, Regional Board investigation has determined that DDT and other pollutants are entering the Bay. The Regional Board investigation indicates that DDT readings reflect the heavy usage of the pesticide prior to its being banned in 1972 and do not represent fresh applications.

DDT survives for a long time in the soil, breaking down into harmful residues. Reducing Newport Bay siltation should help reduce DDT levels in fish and other marine life.

Lower Newport Bay was the site of special Regional Board investigations in 1984 and 1985 to evaluate bacterial quality. Tests to identify enterococcus, an indicator bacteria, showed periodic peaks of these bacteria on weekends, implicating waste discharges from boats as the cause of the contamination. Plans are underway to prevent vessel waste discharges in the bay by deploying pumpout facilities within the bay and educating boat owners about their importance. The bay is designated a no-discharge harbor and the Regional Board is seeking more authority to enforce compliance with this prohibition.

Santa Ana River: Removing Bacterial Contamination, Reducing Salinity

To make the Santa Ana River swimmable, all municipal discharges to the river must be tertiary-treated, removing bacteria and viruses to within state health standards for body contact. Approximately 60 million of 95 million gallons per day from three major treatment plants are now at tertiary levels. However, the river cannot be declared safe for swimming until facilities at the Corona Rehabilitation Center (CRC) and the upstream communities of Colton, Rialto, and San Bernardino are improved. By Regional Board order, the discharge from the

CRC to the Santa Ana River is to be terminated by November 1986. Compliance with this order is to be achieved by the connection of the facility to the Santa Ana Regional Interceptor, a waste line owned and operated by the Santa Ana Watershed Project Authority.

NPDES permits for Colton, Rialto and San Bernardino give them until March 1988 to provide tertiary treatment. It appears that this compliance deadline will have to be revised to allow time for the construction of necessary facilities. When compliance is achieved, it is expected that Santa Ana River quality will improve to a level that allows water-contact recreation.

The Santa Ana River is used extensively by industry, agriculture and municipalities as a major water resource. Each use of water results in an increase of inorganic salts which degrade the water. If this degradation is severe, downstream users may be denied reuse of the water or forced to pay for expensive desalting. To minimize increased salinity, the Regional Board has implemented controls on municipal and industrial waste discharges. Each discharger is allocated reasonable salinity increases, but is required to remove, pretreat or provide source controls to limit dissolved salts in the waste stream.

To help export the salt, a 36-mile pipeline operated by the Santa Ana Watershed Project Authority exports treated industrial waste, brackish ground water and, in the future, waste brines from reverse osmosis facilities. The wastes thus

bypass surface and ground waters and end up in the ocean, where salts are not a problem. The Orange County Sanitation District, Fountain Valley plant, treats the wastes prior to discharge.

Stringfellow Hazardous Waste Site

The Regional Board is providing technical assistance to the DHS and EPA as those agencies conduct studies and remedial programs at the Stringfellow hazardous waste site. The studies are funded by state and federal Superfund dollars and will result in the selection of an abatement alternative. Study completion is targeted for November 1987.

In 1982, the Regional Board completed a $4 million interim abatement program for Stringfellow, funded under the State Assistance Program. This halted water quality threat to the Santa Ana River stemming from overflows during the rainy season, bypassed drainage around the site and allowed time for study of a permanent solution. Responsibility for the site was assumed in late 1982.

Dairy Waste Management

Dairy operations in the Chino-Corona-Ontario area are the most densely concentrated in the world. Salts contained in manure and dairy wash water can percolate into ground waters and degrade water quality. Inadequate flood control facilities in upstream urban areas have flooded the dairy area, threatening direct discharges of dairy wastes to the Santa Ana River. The

Regional Board has placed discharge requirements on dairy facilities and conducts routine compliance inspections. The Regional Board is also working with the U.S. Soil Conservation Service and San Bernardino County to identify and implement long term solutions to dairy waste problems.

Achievements

- A sewage collection and treatment system was completed in the Lytle Creek area, replacing septic tanks for dwellings bordering the creek. Holding tanks were required because insufficient soil to adequately treat percolated wastewater resulted in contamination of the creek and local water wells.

- Oil drilling operations by Aminoil USA in the Bolsa Chica wetlands discharge to treatment ponds. To ensure that the disposal area is restored at the completion of the operations, the Regional Board ordered creation of a restoration fund as a condition of Aminoil's waste discharge requirements. The fund will be used to restore the site to its natural condition.

- A regional wastewater treatment plant for the City of Lake Elsinore and the surrounding unincorporated areas is operating, eliminating degradation of the lake due to failing septic systems.

- The $58 million Yucaipa-Calimesa regional wastewater treatment plant is completed. The system will replace septic tanks now used by area residents. Frequent failures of septic systems led to water quality and public health problems.

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

Covering 85 miles of coastline in the southwest corner of California, the SAN DIEGO REGION has a population of over two million, and continues to grow at an exceedingly rapid rate. Economic projections indicate that the accelerated growth of a varied economy within the Region will continue for many years.

The Region extends inland 50 miles and is a water resources deficient area. Rainfall ranges from 10 inches on the coast to 30 inches in the coastal range mountains. More than 90 percent of water consumed in the Region is imported from the Colorado River and at times from Northern California. The improvement and protection of the Region's water resources will take on greater importance as increased population places greater demands on imported and existing native water resources.

Water Quality Issues

Sewage Flows From Tijuana

Continued raw sewage discharges from Tijuana, Mexico contaminate beaches and waterways adjacent to the California border, creating a public health hazard. Beaches in this area are frequently posted as unsafe. Growing recreation and tourism-oriented activities combine to expose more people to this health hazard than any other water quality problem in the Region.

Efforts to secure funding for needed pipelines, treatment facilities and an ocean outfall within the United States are proceeding at the federal level. The State Board has authorized funding for oceanographic studies requested for an ocean outfall. The Regional Board has taken an active role in seeking long term solutions to the border sewage problem. Regional Board staff sample surface waters along the border, respond to spills, and inspect the International Boundary and Water Commission's facilities.

The 1984 State Budget Act appropriated $5.365 million to be used for constructing an interim solution to the pollution problem created by the discharge of Tijuana sewage. In May 1985, the State Board made this appropriation available to the City of San Diego for the design and construction of facilities necessary to intercept and collect raw sewage flows entering the United States from Tijuana, Mexico.

Interim water pollution control facilities have been designed for each of four gullies and/or gulches that carry raw sewage flows north into the United States and the Tijuana River.

The International Boundary and Water Commission and EPA also have plans to fund water pollution control facilities for this border area. Currently, an effort is being made to coordinate planned construction activities to minimize environmental impacts.

Secondary Treatment Waivers for Ocean Dischargers

Amendments to the Federal Clean Water Act adopted in 1978 authorized EPA, with the concurrence of the Regional Board, to grant waivers from the requirement for secondary treatment to publicly owned wastewater treatment facilities which discharge to the ocean. In order for such a waiver to be granted, the applicant must demonstrate that no adverse impacts on the marine environment would result from the less-than-secondary level of treatment. Because of potential cost savings, applications for such waivers were submitted for all six ocean outfalls in the San Diego Region. As of June 30, 1986, a waiver had been granted for the discharge through on the outfall and waiver applications for three other outfalls had been withdrawn. Final action on waiver applications for two remaining outfalls is anticipated before the end of 1987.

Mission Bay Water Quality

A sampling program for toxics in sediments in Mission Bay has been used to investigate an abandoned hazardous waste landfill. This program complements the State Board's Mussel Watch program.

San Diego Bay Water Quality

In December 1985, the Regional Board issued a report which spelled out the need to study water quality within the bay. Regional Board meetings on the proposed study brought together pertinent parties to examine water quality concerns within the bay and explore cooperative means to address them. As a result, the

San Diego Bay Cooperative Study proposed a sampling program to characterize water quality problems, relying heavily on State Mussel Watch findings to detect discharges which may be impacting bay water quality. Funding for the first year of this study is expected to be made available by the State Board by the end of 1986. This will allow Regional sampling for PCBs and organotin as well as pinpointing sources of urban runoff and mainland oil spills.

Protecting Ground Waters

Initially funded in 1981 and scheduled to extend into 1989, the San Diego Region Ground Water Study has already updated the Region's information on its valuable ground water resources. For ground waters of usable quality, basin plan amendments will specify protective measures to ensure continued high water quality. The completed update is likely to increase reclaimed water use in the Region by identifying naturally degraded basins that do not need salinity protection. Salts in reclaimed water can adversely affect ground waters.

Encouraging Wastewater Reclamation

In 1982, the Regional Board formed the Coastal Corridor Reclamation Committee to foster wastewater reclamation and reuse along the coastal reach of the Region where ample supplies of treated wastewater are available and where reclaimed water use on underlying ground waters would not impair beneficial uses. In addition, the California Department of Transportation, in cooperation with Fallbrook Sanitary District and the City of San Diego has begun using reclaimed water to irrigate freeway landscape areas.

In 1985, the Regional Board held two public workshops to discuss reclamation issues and to encourage development of reclamation projects. As a result of these workshops, the Regional Board adopted a comprehensive policy on reclaimed water use in 1986.

Hazardous Waste Sites

In addition, closure requirements for several hazardous waste sites within the Region are being developed. Sites include the Otay landfill in Chula Vista, Mission Bay landfill, Apache Service site and the closed U.S. Navy North Island disposal site.

There are an estimated 8,500 underground tanks storing hazardous wastes within Regional boundaries. The Regional Board is currently providing technical assistance to Orange, San Diego and Riverside Counties to clean up contaminated ground water and soil resulting from leaking underground storage tanks at over 200 sites.

Achievements

- In 1986, staff began updating the Region's Basin Plan standards for surface and ground waters. Staff also initiated efforts to develop regulatory policies on dairy waste management, erosion control, and subsurface disposal of domestic wastes.

- In 1986, Regional Board distributed for public comment its draft report on the review of nutrient standards for coastal lagoons.

- The Regional Board issued a Cease and Desist Order against the City of San Diego for noncompliance with federal secondary treatment requirements and the 1983 California Ocean Plan. The Regional Board's order included time schedules to achieve compliance with federal and state standards.

- All major public sewering agencies in the Region now have active pretreatment programs that require removal of toxics and other damaging contaminants from wastewater dumped into the sewage system by industrial dischargers. The Regional Board is currently auditing the agencies to determine the effectiveness of the program.

- The Regional Board is working with the Department of Transportation and the City of San Diego to utilize reclaimed water from the new city aquaculture plant for irrigation of Interstate 15. This project may be expanded to provide irrigation water for a portion of Interstate 8 in Mission Valley. The aquaculture plant will eventually reclaim up to a million gallons of raw sewage daily. The Regional Board amended its basin plan to facilitate wastewater reuse for irrigation.

- The Regional Board helped secure CWG funding for sewering the central Valley Center area with a septic tank effluent pump system and expanding/modifying the existing Moosa Canyon treatment plant, replacing the San Marcos Water District's failing 8.4 mile wastewater conveyance system, and building a much needed regional solids handling facility for the Southeast Reclamation Authority.

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Regional Water Quality Control Plans

The Porter-Cologne Water Quality Control Act provides for a comprehensive water quality protection program for California. Integral to that program are the State and Regional Boards' roles in formulating and adopting water quality control plans and state policy for water quality control. In accordance with Porter-Cologne, such plans and policies become a part of the California Water Plan once reported to the Legislature.

Pursuant to Porter-Cologne, each Regional Board formulates and adopts regional water quality control plans (Basin Plans) for all areas within its boundaries. Basin plans conform with policies developed by the State Board, are periodically revised by the Regional Boards, and are subject to State Board approval. All of the Basin Plans, as well as the State Board's water quality control plans and policies adopted as part of state policy for water quality control were reported to the Legislature through previous biennial reports.

During the 1983-86 period, seven of the nine Regional Boards amended their Basin Plans. The amendments are listed below. The other two are currently preparing revisions which were considered after June 30, 1986 or will be considered in the near future. The amendments reflect the diversity of California's nine Regions.

NORTH COAST REGION

- Approved amendments to the Klamath River and North Coastal Basin Plan regarding policy on individual on-site waste treatment and disposal practices (83-061).

- Approved amendments to the Klamath River and North Coastal Basin Plan revising policy and action plan for control of discharges of herbicide wastes from silvicultural applications (83-092; 85-079).

CENTRAL COAST REGION

- Approved amendment revising existing and anticipated uses of inland surface waters (84-011).

- Approved amendment regarding implementation plan for individual, alternative, and community disposal systems (83-094).

- Approved amendment regarding municipal wastewater management related to the Salinas River, Carmel River and Monterey Coastal sub-basins (83-048).

- Approved amendment prohibiting individual sewage disposal systems in the Pasatiempo area (83-079).

- Approved amendment prohibiting individual and community sewage disposal systems in the Los Alamos area of Santa Barbara County (84-012).

- Approved amendment prohibiting individual sewage disposal systems in Los Osos/Baywood Park area of San Luis Obispo County (84-013).

- Approved amendment prohibiting additional individual and community sewage disposal systems and discharge from existing individual and community sewage disposal systems after July 1, 1987 in the Fruitland subdivision of Monterey County (84-036).

- Approved amendment separating Moss Landing Harbor and Elkhorn Slough for the purposes of establishing beneficial uses of each (84-01).

- Approved amendment correcting beneficial use designations for Nacimiento and San Antonio reservoirs and adding shellfish harvesting as an existing beneficial use for Moss Landing harbor (84-052).

CENTRAL VALLEY REGION

- Approved amendment regarding disposal of oil field wastewater in the Tulare Lake Basin (83-047).

- Approved amendment regarding disposal of agricultural wastewater subsurface drainage (83-085).

- Approved amendment certifying best management practices for land disposal of stillage waste from wineries (83-091).

- Approved amendment to Regional Board guidelines for water quality protection during small hydroelectric project construction and operation (84-022).

- Approved amendment revising water quality objectives for copper and zinc and adding new objectives for cadmium in the Sacramento River upstream of Hamilton City (84-055).

LAHONTAN REGION

- Approved amendment requiring nutrient removal to protect beneficial uses of the West Fork Carson River hydrological unit and the Indian Creek watershed in Alpine County (83-072).

- Approved amendment incorporating objectives for lower Mojave River Basin in San Bernardino County (83-090).

- Approved amendment revising water quality objectives and prohibiting individual subsurface disposal systems in the Eagle Lake hydrologic unit (85-050).

- Approved exemptions to 100-year flood plain discharge prohibition for Truckee River and Little Truckee River hydrologic units (86-009).

- Approved amendment extending the effective date of discharge prohibitions to Glenshire and Devonshire subdivisions to October 1, 1988 (86-022).

- Approved amendment adding control measures concerning cattle grazing in the Eagle Lake hydrologic unit (86-053).

COLORADO RIVER BASIN REGION

- Approved the Colorado River Basin Plan (85-012).

SANTA ANA REGION

- Approved amendment revising beneficial uses, objectives, regulatory policies, implementation plans, surveillance and monitoring programs for the Region, and identifing a waste load allocation for the Santa Ana River (83-082).

- Approved amendment revising effective date of prohibition and exemption criteria for subsurface leaching or percolating waste disposal systems in the Yucaipa-Calimesa area (84-019; 86-056).

SAN DIEGO REGION

- Approved amendment to allow exceptions to existing numerical nutrient water quality objectives for discharges to inland surface waters and coastal waters (84-015).

- Approved amendment allowing modifications to ground water quality objectives for San Elijo hydrogeologic subarea (84-031).

- Approved amendment revising ground water quality standards for Mission San Diego hydrologic subarea (84-082).

- Approved amendment revising surface water quality objectives and beneficial use designations for Mission San Diego and part of Santee hydrologic subareas (86-014).

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ALLOCATING CALIFORNIA WATER RIGHTS

The history of California is the history of its development and use of water. While pioneers saw plentiful supplies, those supplies did not always service the areas most attractive for settling and farming. Early in the history of California, water development projects played an important and pivotal role. The most controversial disputes occurred when water was taken from one watershed and transported across the countryside to supply another basin. These struggles became subject to the statutory water rights process in 1914. Since that time a body of laws has been passed establishing the rules for allocating rights to the use of the state's waters.

There are two major kinds of surface water rights: riparian rights which come with ownership of land adjacent to streams, lakes or ponds and appropriative rights whereby a user may take water from a particular source without regard to the contiguity of the land to the source. This is based on the concept of "first in time, first in right". Since 1914, an appropriative right to use surface water has been acquired by obtaining a permit from the Water Board. In granting the permit, the Water Board determines how much water may be taken, its approved use, the season of taking, and other conditions necessary to protect the environment, the public interest, and downstream water right holders.

Rights to ground water include rights held by those owning the land over the ground water basin. These rights may be exercised by taking the water and applying it to beneficial use if supplies exist over prior rights.

During 1983-86 the Water Board issued 958 water right permits for 13,490 cubic feet per second of direct diversion water and over 753,360 acre-feet of water to be stored in reservoirs. There are presently nearly 10,000 licensed water appropriators in California.

Protecting the Delta

Water issues entwined in the Sacramento-San Joaquin Delta Estuary and San Francisco Bay affect every aspect of California life. The Delta is the vital water link between the water-productive, lightly populated north and the arid,

heavily populated south. It is roughly triangular in shape and consists of 700 miles of rivers and sloughs. In the Delta, the fresh water of the Sacramento and San Joaquin Rivers meets the salt water of the Pacific Ocean moving east through San Francisco Bay. It is one of the largest, most important estuarine systems for fish and waterfowl production on the Pacific Coast, as well as a major stop on the Pacific Flyway. Both the State Water Project (SWP), which carries water to portions of the Central Valley and Southern California, and the federal Central Valley Project (CVP) which brings water primarily to Central Valley farmers, use the Delta as a transfer point.

In competition for the high fresh water demands of the state's two major water projects are Delta farmers who need water to maintain over 500 thousand acres of fertile farmland. Fresh water is also imperative to the health of the Bay-Delta Estuary.

Coupled with the demands for fresh water from the Delta is the need for standards to maintain the integrity of Delta waters. Maintaining the delicate balance between fresh and salt water in the Delta system calls for continued vigilance from the Water Board, the agency responsible for the protection of Delta waters.

Compliance with Delta Water Quality Standards

In the fall of 1980, the Water Board established the Bay-Delta Program to oversee the mandates of the Board's Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh and Water Right Decision 1485, both adopted in 1978. These two documents specify Delta flow and salinity conditions that must be maintained by the CVP and SWP. These standards require that whenever the CVP and SWP divert water from the Delta, water quality protections in the Delta must be as good as they would be in the absence of the two projects.

Flow and salinity standards protect the beneficial uses of the estuary, the Delta, and Suisun Marsh. Since natural runoff to the Delta from the Central Valley varies from year to year, so do the standards. In general, the wetter the year, the higher the water quality protections are required to be.

1983 was the wettest year in the Central Valley since runoff measurements were first recorded in 1900. Water quality conditions were excellent and Decision 1485 standards were met as they were again during 1984-85. Good conditions continued through 1985-86.

Although water quality standards were high during the 1983-86 period due to sufficient precipitation, dry years bring an obligation for CVP and SWP operators to release stored water to maintain proper water quality standards in the Delta. When nature fails to flush the Delta with adequate fresh water, tightly regulated controls come into play in order to maintain water quality levels in this most vital water distribution hub.

Striped Bass

In order to more accurately maintain Delta water quality standards, the health of the striped bass population, the most important sportfish in the Bay-Delta system, was chosen as an indicator of the overall health of Delta waters. Until 1977, the survival of young bass correlated closely with outflow and diversion operations in the Delta. Because of this, DFG established a striped bass "index" based on long-term relationships between the amount of Delta outflow and the size of the bass population. The index predicted the fish population would bounce back in 1978, following a two-year drought, as it had after other water short periods. But it didn't happen. What scientists had hoped would be a reliable scientific basis for deciding water quality failed to materialize.

The striped bass population has continued to decline. Since 1980 young bass production has been less than half the expected levels. To isolate causes for the decline and recommend corrective action, the Water Board commissioned the Striped Bass Work Group which included the Bureau of Reclamation, Fish and Wildlife Service, DFG, DWR, the National Marine Fisheries Service and consultants from the University of California, Davis, and several private consulting firms.

The Work Group focused on four likely causes of the decline:

- decreased food production for young striped bass
- increased loss of young bass in diversions from the Delta
- increased stress on young and adult bass due to toxic substances
- insufficient egg production due to insufficient adult population

Studies and data analyses were initiated as a result of the Work Group's recommendations. One study, the Export Curtailment Project, conducted field experiments in the Central Delta during the spring months of 1984, 1985 and 1986 to determine how operations of the CVP and SWP export pumps influenced growth of algae, an important element in the food chain of young striped bass.

Public Trust Doctrine

The public trust doctrine is a long-established set of legal principles which define the rights of the public regarding natural resources. It dates back to Roman law and can be found in old English law. The public trust doctrine came to this country in the early 1800s. In an important expression of the doctrine, individual states have underscored their rights over important natural resources within their state.

The California Water Code requires the Water Board to consider the amount of water needed to remain in its source for protection of fish, wildlife, and recreational beneficial uses. This mandate was strengthened with the 1983 California Supreme Court decision National Audubon Society v. Superior Court of Alpine County. This case defined the relationships between the modern appropriative water rights system and the "public trust doctrine". Before the National Audubon Society case was decided, the doctrine had been invoked in California primarily to include tidelands, navigation and access to navigable streams for fishing.

However, no case had directly decided the scope of the public trust or the powers and duties of the state as trustee of the public trust when the state granted water rights to divert and use surface water.

In National Audubon, the court held that the Water Board has a responsibility to consider public trust values before it makes a water right decision affecting navigable waterways and, if feasible, to avoid or minimize damage to values protected by the public trust. The court further held that the Water Board has a public trust duty of continuing supervision over the diversion and use of appropriated water. Public trust uses include, in addition to navigation, commerce and fishing, recreational and ecological values.

The court made it clear that public trust uses -- like all other beneficial uses -- are subject to the California Constitution's prohibition against waste and unreasonable use of water.

The Small Hydro Boom

During the late 1970s and early 1980s, unstable oil supplies, environmental regulations, and increasing problems with conventional energy sources caused California to look for alternative sources of energy. Hydroelectric power in the form of small hydroelectric projects became a viable solution for special districts, small utility companies and cities that had sites available for small hydro projects.

Development of these projects was spurred on by federal legislation offering tax credits, accelerated depreciation, and other financial incentives for new energy sources.

Under water rights responsibilities, the Water Board requires applications for new water rights or petitions for changing existing rights to cover these small hydro projects. As 1983 began, 314 applications for these projects were submitted to the Board.

The number and location of the projects drew protests from fish and wildlife agencies, county boards of supervisors, environmental and public interest organizations, vested water right holders and a concerned public. Over 97 percent of small hydro applications are protested. Those not protested are primarily retrofit projects for existing facilities.

The Water Board has been able to resolve the issues and grant permits for 77 small hydro projects over the 1983-86 period. Of these, 42 projects are for retrofit facilities on existing dams and water conveyances.

The number of applications filed decreased by-mid 1986 due to legislation requiring applicants to pay the costs of the Water Board's permitting process and DFG's evaluation and processing procedures. Costs for processing a single project application may range from $150 to $23,000.

Water Transfers

During the past decade, California's interest in voluntary transfer of water as a means of supplying increasing water demand has grown. Voluntary transfers are viewed by many as an alternative to environmentally and financially costly new water development projects.

New state laws encourage water users to sell, lease, or trade water without extinguishing their appropriative rights, provided that others' rights, the local economy, and the environment are not adversely affected.

However, neither the increased interest nor recent statutes have triggered anything like a free market in water transfers of water rights. Since 1982 the Water Board has received and processed only a handful of petitions for water transfers -- two petitions for temporary change, six temporary urgency changes, and one trial transfer.

Important Water Right Proceedings

American River Litigation: Report of Referee

California law provides that the Board may be appointed as "referee" in water right disputes. In this capacity, the Board is not a party to suit, but rather serves as an expert consultant to the court. This role came into play as a result of a 1970 contract between East Bay Municipal Utility District (EBMUD) and the U.S. Bureau of Reclamation. Under this agreement, the Bureau would provide an annual delivery of 150,000 acre-feet of water via the Folsom-South Canal near Folsom Reservoir. In 1972, the Environmental Defense Fund and others filed suit seeking to prevent EBMUD from diverting water from the American River. The Environmental Defense Fund, Save the American River

Association, and the County of Sacramento contend that EBMUD should divert water below the confluence of the American and Sacramento Rivers in order to protect beneficial uses of water in the lower American River. EBMUD, on the other hand, maintains it has a right and responsibility to meet its future domestic water supply needs from the highest quality drinking water source available and that delivery of water via the Folsom-South Canal will not harm reasonable uses made of the lower American River. The case has been considered by the California Supreme Court and the U.S. Supreme Court.

In 1984, the Alameda County Superior Court referred the case to the Water Board for investigation. The court asked the Board to investigate 21 issues relating to water right questions, environmental aspects and public trust considerations. The Board spent two years studying hydrology records, water quality information, EBMUD's future water needs, public trust uses of the river (e.g., boating, wildlife, swimming, nature study) and available alternatives. By mid-1986, the Board was in the process of completing its research.

Water Availability in the Delta Watershed: Decision 1594

When acting on applications to appropriate water, the Water Board must determine if and when water is available. Because a stream has high flows, potential exporters may assume water is available, but many times it is already allocated to downstream users.

Since 1960, the Water Board has not allowed additional diversion from Central Valley rivers during the generally low-flow months of July and August. Since 1965, the Board has also included a term in water right permits that reserves jurisdiction for the Water Board to change the season of diversion. This permit term is included in over 500 water right permits in the Sacramento-San Joaquin drainage basins.

In 1983, the Water Board completed a comprehensive study of water availability in the Delta watershed. This study was particularly complex because of the size of the area, the variability in yearly flow, the extent of storage and management of streamflows, the number of permits involved, and the complexity of Bay/Delta water quality standards. The purpose was to determine the allowable season of diversion in the Central Valley. It also determined the

obligation of over 500 water right holders to help meet the Delta water quality standards adopted by the Water Board in the 1978 Delta Water Quality Control Plan.

The Water Board, after several workshops and extensive public comment, adopted Water Right Decision 1594 in November 1983. Decision 1594 obligates large diverters since 1960 to help the CVP and SWP meet Delta water quality standards for agricultural, municipal, industrial, and fish and wildlife beneficial uses.

Water availability depends on the amount of annual precipitation. Restrictions are put on large diversions when natural and abandoned flows fail to maintain water quality standards in the Delta. Under these conditions the SWP and CVP must augment river flow through the release of stored water. Because the complexity of requiring small users to adjust releases outweighs the benefits of the water they would contribute, Water Right Decision 1594 provides a fixed season of diversion for small water users which excludes the period of June 15 through August 31. This restriction applies to most permits for diversion of small quantities of water issued in the Delta watershed since the mid-1960s.

Litigation Regarding Decision 1485 and the 1978 Delta Plan

Following the Board's adoption of Decision 1485 and the 1978 Delta Plan, 14 parties filed eight separate law suits challenging the Board's action. These suits fell into two categories: those challenging interpretations of state and federal water right and water supply laws and those challenging procedural actions under the California Environmental Quality Act.

A long legal battle ensued with the matter eventually going to trial in 1984. The resulting decision was appealed to the California Court of Appeal. In a ruling written by Justice P.J. Racanelli, the court basically upheld Decision 1485, and clearly defined the Water Board's authority to protect water quality.

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The Racanelli Decision

On May 28, 1986, the California Court of Appeal in San Francisco issued a 103-page ruling essentially upholding Decision 1485, and clarifying the powers of the State Water Resources Control Board. A month later important modifications were made to the original decision.

The three-judge panel, headed by P.J. Racanelli, not only upheld Decision 1485 against most challenges, but provided a long and incisive analysis of both the Porter-Cologne Water Quality Control Act and California water rights laws.

In issuing its decision, the court stressed the word "balance." In its ruling, the court stated that the Water Board has an obligation to plan to attain the highest reasonable water quality considering all the demands being made as well as the total values involved -- beneficial, detrimental, economic, social, tangible, and intangible. Water quality and quantity elements are to be balanced in proper proportions.

In summary, the landmark decision mandated the Water Board to:

- Set water quality standards to protect beneficial uses -- not just water rights
- Include upstream users in setting standards
- Look at other excess diversions and instances of pollution as part of the overall water quality process
- Consider riparian water right holders in the South Delta in the required protection of beneficial uses in the South Delta
- Determine water quality available at the Contra Costa Canal intake
- Include public trust considerations

The legal framework set forth in the Racanelli Decision will go a long way toward guiding the future of California water resources. In the colorful, complex history of California water law, the Racanelli Decision has already become an important chapter.

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Imperial Irrigation District: Decision 1600

In addition to water right responsibilities, the Water Board administers, with DWR, state laws prohibiting waste and unreasonable use of water. The 1984 decision, in response to a complaint filed by an Imperial County farmer, represents the most significant exercise to date of the Board's jurisdiction under these laws.

The Imperial Irrigation District (IID) in Imperial County, encompasses roughly 1,060,000 acres of which about 450,000 are irrigated with water from the Colorado River. The Salton Sea is the repository for all runoff and return flows and receives approximately a million acre-feet of irrigation runoff annually from IID.

Due to the rising level of the Salton Sea, property adjacent to the sea has been flooded. In 1980, a farmer affected by this flooding alleged misuse of water by IID due to wasteful water management and marketing practices.

A report by DWR revealed that up to 438,000 acre-feet of water could be saved through increased canal lining and other conservation measures. IID was notified of the findings and was requested to submit a water conservation plan. When IID did not comply, DWR referred the matter to the Water Board.

Following six days of hearings in El Centro, the Board entered Water Right Decision 1600, directing IID to implement water conservation measures and prepare a comprehensive conservation plan.

The district filed suit in Imperial County Superior Court to overturn the Board decision and the matter is currently before the Fourth District Court of Appeal. In the meantime, the district has taken initial steps to comply with the Decision. IID has also begun negotiations with Metropolitan Water District of Southern California aimed at making conserved water available for use on the coastal plain in exchange for financial assistance for implementing water conservation measures in IID.

ENFORCING WATER QUALITY AND WATER RIGHTS: LINCHPINS FOR PROTECTION

Strong enforcement authority provides the linchpin to California's water quality/water rights program. The Porter-Cologne Water Quality Control Act gives the State and Regional Boards the tools necessary to safeguard state waters from pollution and misuse. Those who pollute may be ordered to clean up the pollution, be assessed civil liabilities, or face criminal prosection. those who use water unlawfully may lose their water rights or be referred to the courts.

Enforcing Water Quality Laws

A strong regional enforcement program is the key to safeguarding the state's water quality. New legislation authorizes Regional Boards to impose substantial civil liability on polluters. Previously, cases had to go to the courts for time-consuming and costly litigation. The law also raised the amount which can be imposed through the courts from $10,000 to $15,000 per day. Money paid in administrative civil liabilities is placed in a special account to assist cleanup efforts.

In addition, Regional Boards maintain computerized databases covering an array of regulatory activities. This statewide data bank helps keep the State Board apprised of the state's overall enforcement picture.

Pollution Detection

The Water Boards are alerted to water quality problems in a variety of ways:

- Violation of National Pollutant Discharge Elimination System (NPDES) Permits/Waste Discharge Requirements. Communities or businesses discharging treated wastewater into California waters must obtain a NPDES permit. This is a federal permit required under the Clean Water Act and issued by the Regional Boards. Those discharging treated wastewater to ground water or land must follow Regional Board waste discharge requirements. If the discharge being controlled is from a point source to surface waters, waste

discharge requirements also serve as an NPDES permit. Requirements call for dischargers to monitor the discharge and report regularly. Regional Boards review self-monitoring reports and conduct unannounced compliance inspections and monitoring to double-check the accuracy.

- Water Quality Monitoring. Ongoing testing programs provide early warning of pollution problems. The Water Board's Mussel Watch and Toxic Substances Monitoring programs test marine and freshwater life for indications of toxic degradation (see Monitoring, page 13). Ground water from high-risk areas around the state is also sampled for evidence of pollution.

- Special Studies. Regional Boards undertake investigations to determine the extent and nature of potential problems. Recent examples include the Central Valley Regional Board study of rice herbicides and the San Francisco Bay Regional Board survey of underground tanks. Regional Boards investigate complaints filed by citizens who spot what may be potential water quality problems. Fish kills, illegal dumping and odors are the most frequent complaints.

- Spills. Accidents that threaten water quality may lead to enforcement action. Examples include oil tanker leaks or overturned fuel trucks.

- Other Agencies. State and county health officials, DFA and others alert Regional Boards to problems and routinely forward water quality information they collect.

Enforcement Actions

The vast majority of dischargers routinely comply with the state's water pollution control laws. When problems arise, Regional Boards determine which enforcement measures to adopt. Decisions are based on the nature of the violation, the discharger's record and input received at public hearings. Decisions of the Regional Boards may be appealed to the State Water Board. Enforcement actions include:

- Administrative Letter. In most cases, Regional Board staff take the first step in bringing about an enforcement action. Administrative letters put dischargers on notice that they are out of compliance and give them an opportunity to correct the problem. This type of action is generally taken when the violation does not appear to constitute an immediate water quality threat.

- Cleanup and Abatement Order. This action directs polluters to clean up pollution within a closely monitored period of time. The orders may be adopted by Regional Boards, but are normally issued by Executive Officers. This allows enforcement actions to be taken quickly during emergencies.

- Cease and Desist Order. The cease and desist order is adopted by Regional Boards in response to ongoing, severe water quality threats stemming from violation of waste discharge requirements or discharge prohibitions. Hearings are held to receive public input before orders are adopted. Polluters are directed to cease violations according to a schedule set in the order.

  Cease and desist orders for sewage treatment plants can prohibit or restrict increased flows to already overloaded facilities. This authority, sometimes called the connection ban power, often provides strong motivation for rapid improvements.

- Civil Liability. As of January 1, 1985, Regional Boards can administratively impose civil liabilities against those who pollute California waters. The maximum liability can range from $1,000 to $5,000 per day, depending on the type and nature of the violation.

- Court Referral. In addition to adopting cease and desist orders or other administrative orders, Regional Boards may refer violators to the courts for criminal prosecution and civil liability of up to $15,000 a day. Regional Boards may also seek court orders for those who violate cleanup and abatement or cease and desist orders.

California's water quality enforcement program sends a clear message to those who discharge wastes into state waters: those who violate the law face a broad range of enforcement measures. The Regional Boards have aggressively protected California's valuable water quality through their active enforcement activities.

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A Case in Point: The Troubled Waters of Kesterson

During 1984 and 1985, the State Water Board confronted the complex and sensitive issues surrounding contamination at Kesterson Reservoir. The Kesterson experience successfully tested the breadth of California's water quality protection laws and amply demonstrates the scope of the Board's enforcement program.

Background:

Kesterson Reservoir was constructed in the early 1970s as part of the San Joaquin Valley's agricultural drainage system. It is owned and operated by the U. S. Bureau of Reclamation, which provides irrigation supplies to much of the valley.

The 12 interconnected evaporation ponds which comprise Kesterson Reservoir are located near Los Banos in Merced County and cover 1,280 acres. The reservoir is located 2.3 miles from the San Joaquin River and is bordered by Mud Slough, one of the river's tributaries. Beneath it lies a ground water body which provides drinking water for most of the San Joaquin Valley.

The reservoir was originally intended to regulate flows into the San Luis Drain, which would transport agricultural wastewater to the Delta. Instead, it became a wastewater disposal facility as funding and environmental concerns ended construction of the drain in 1975. It was also intended to provide a valuable wildlife habitat within the U. S. Fish and Wildlife Service's 5,900-acre Kesterson Wildlife Refuge.

Grassland Water District is adjacent to Kesterson Reservoir and comprises the largest tract -- roughly 52,000 acres -- of native grasslands remaining in the San Joaquin Valley. Unlike Kesterson, it receives water from several different sources. Managed annual flooding provides winter nesting sites for migrating waterfowl. Its protection is a top priority of Fish and Wildlife's overall waterfowl habitat preservation program.

Initially, only subsurface agricultural wastewater mixed with fresh water was discharged into the reservoir, but in 1981 annual discharges of undiluted wastewater began flowing into the reservoir. Unregulated discharge into Kesterson continued for several years. The result was severe contamination at the site and widespread loss of wildlife. Problems became evident in 1983 as biologists noted disturbing abnormality rates among Kesterson wildlife. Normal fish populations disappeared and the waterfowl population had a low rate of hatching success.

The Board's Challenge:

The process testing California's water quality protection laws was set in motion when the Board was petitioned to review the inaction of the Central Valley Regional Control Board in regulating agricultural discharges into Kesterson Reservoir. The State Water Board exercised its statutory authority to accept the petition and thus began one of the most challenging decision-making processes in its history.

The complex issues to be addressed in developing appropriate enforcement action presented a significant challenge. The process involved painstaking review of legal and technical considerations. Over 24 hours of public testimony was heard at three fact-finding hearings. The Board found that the wastewater being discharged into Kesterson Reservoir contained many constituents in concentrations harmful to human, animal and aquatic life. Wildlife abnormalities were attributed to the presence of toxic levels of selenium, a naturally-occurring trace element which moves easily through water and becomes concentrated as it moves up the food chain. Food chain organisms at the reservoir contained up to 100 times the normal concentration of selenium. Other trace elements, notably mercury, nickel, chromium (VI), cadmium, zinc,

and copper were also identified in drainage water in concentrations which exceeded EPA water quality criteria for protection of human health or freshwater aquatic life.

The Board's Enforcement Orders:

In February 1985, the State Water Board unanimously adopted Cleanup and Abatement Order No. 85-1. The order required the Bureau to take appropriate actions to minimize seepage at Kesterson Reservoir, to alleviate the threat of future surface discharges from Kesterson, and to mitigate the nuisance conditions caused by the reservoir's operation. In essence, the Bureau was told to clean up Kesterson Reservoir or close it. The Bureau was allowed five months to develop a plan specifying how it would comply with the order and three years to carry it out. In addition, the order required the Central Valley Regional Board to monitor for leaks from the site and to develop a program to evaluate the quantity, quality, and destination of agricultural drainage flows within the San Joaquin River Basin.

In July 1985, the Bureau submitted its Kesterson Reservoir Closure and Cleanup Plan to the Water Board. The Bureau elected to comply with the cleanup order by closing Kesterson. The Bureau proposed a phased close-out of flows to Kesterson by June 30, 1986 and enumerated possible steps to clean up the site. While the Bureau's overall strategy was acceptable to the Water Board, the plan failed to provide a firm cleanup plan. Additionally, the Board found that although Grassland Water District had worked diligently to comply with the Board's order, it had not adequately addressed specific selenium control measures within the required time.

As a result, in August 1985, the Water Board adopted Order No. 85-5. It spelled out compliance deficiencies and directed both the Bureau and Grassland Water District to take necessary clean-up steps, but did not alter the cleanup schedule. The Bureau's cleanup plan is due to the Board in December 1986. Following technical and legal review of the plan for feasibility, and compliance with the Board's order and water quality laws, the Board will determine whether to accept, reject, or modify the Bureau's response to the Kesterson enforcement action.

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REGIONAL BOARD ENFORCEMENT ACTIONS
1983 - 1986

REGION	Waste Discharge Permits Issued	Compliance Monitoring Inspections	Complaint Inspections	Monitoring Reports Reviewed	Administrative Enforcement	Cleanup & Abatement Orders	Cease & Desist Orders	Court Referrals	Administrative Civil Liabilities Assessed*
North Coast	262	3,554	728	5,482	806	31	9	1	$ 81,050
San Francisco Bay	652	1,894	1,144	5,072	1,102	59	37	28	273,500
Central Coast	414	1,790	570	7,721	1,536	115	22	15	25,500
Los Angeles	290	2,506	968	9,490	716	12	9	12	367,420
Central Valley	691	3,629	929	13,000	1,850	39	23	18	205,320
Lahontan	300	2,284	478	1,905	664	49	4	2	5,000
Colorado River Basin	176	1,470	27	2,415	150	7	7	2	---
Santa Ana	412	3,169	1,100	14,230	2,243	30	7	19	98,762
San Diego	219	1,439	480	2,586	1,058	25	2	0	662,900

* This enforcement power took effect January 1, 1985. Totals reflect assessments adopted through July 30, 1986. Assessments may be reduced if specific compliance measures are achieved.

Enforcing Water Right Protections

The underlying concept of protecting water rights has its roots in California's early history. As forty-niners rushed into the state seeking gold, they soon learned the value of water which they transported over great distances to their mining sites. Water rights were established on a "first in time, first in right" basis and were as fiercely guarded as mining claims. This principle demonstrated a practical wisdom toward water development, and is today an important feature of the water right permit process. Loss of water rights by abandonment or non-use helped guarantee optimum use of a limited and valuable resource.

Since those early days, water right protections have been refined by the Legislature and the courts to provide safeguards against waste and unreasonable use of water and infringement of vested water rights. In addition to curtailing illegal diversions of water and enforcing conditions of water right permits and licenses, the Water Board is responsible for taking appropriate action to prevent the waste or unreasonable use of water.

Historically, there was minimal need for Water Board oversight to assure compliance with water right permits and licenses. This approach worked reasonably well provided that permit and license conditions protected downstream water users and provided that competition for water did not exceed available supply. During the 1976-77 drought, however, compliance problems arose and the Water Board received over 300 complaints alleging interference with prior vested rights. The Board responded to this problem by establishing an active enforcement program within its Division of Water Rights.

Alerting the Board to Non-Compliance

The Board becomes aware of water right violations in two ways: through review of self-monitoring reports and by complaints received from water users and concerned citizens.

Water right permits and licenses spell out how much water may be taken from a particular source as well as when, where, and how it will be used. Permit and license holders are required to submit periodic self-monitoring reports which detail these water use conditions. Enforcement action is triggered when permit or license conditions are not met. Non-compliance may include such activities as overuse of water, failure to maintain required streamflow levels, or diversion outside a prescribed season of use.

A far more common avenue for enforcement action is complaints received from water users and concerned citizens. Complaints range from waste and unreasonable use of water and abridgement of existing rights to diversion without a water right. Complaints are often made by downstream water right holders whose water availability is impaired by illegal diverters. The Board works with the parties involved to seek resolution, but most complaints proceed to investigation and appropriate enforcement action.

Enforcement Actions

The Board may take several actions against violators of water right law. In determining appropriate enforcement action, the Board reviews the alleged violation and mitigation measures offered to correct it, and may conduct investigations and public hearings. Complaints or non-compliance discovered in self-monitoring reports may lead to one of three actions.

- Revocation of Permits and Licenses: Those who violate the terms and conditions of water right permits or licenses may have them revoked. Water rights are lost when revocation occurs.

- Cease and Desist Orders: Cease and desists orders direct violators to take necessary steps to come into compliance within a closely monitored time frame. Required actions may include ceasing diversion during certain periods, repairing leaking pipelines, or curtailing diversion amounts. Cease and desist orders may also direct violators to cease operation.

- Court Referral: The Board may refer violators to the courts for injunctions against further water rights violations. In addition, the Board may seek court-imposed penalities of up to $500 per day for continued violation.

The Board has seldom found it necessary to pursue the adoption of cease and desist orders or court referrals. In carrying out its role to protect water rights, the Water Board has found that the prospect of such enforcement actions is often sufficient incentive for violators to meet compliance requirements and preserve their water rights. However, the Water Board actively pursues its enforcement role to protect the state's valuable and limited water resources from waste and unreasonable use as summarized below.

WATER RIGHT ENFORCEMENT ACTIONS
1983 - 1986

Complaints Received	Complaints Resolved	Complaints Pending Resolution
221	156	226

Permits/Licenses Revoked	Cease and Desist Orders	Court Referrals
312	0	4

FUNDING PROGRAMS

California has long been a leader in pollution control. Passage of the Dickey Water Pollution Act of 1949 signaled the beginning of a continuing process to improve water quality. Since 1949, Californians have devoted substantial resources to restoring and maintaining water quality. One of the lessons learned is that clean water to meet California's myriad needs does not come cheaply. Thus the search for funding sources has remained at the center of the government's efforts to protect and upgrade water quality in California.

The Clean Water Grant Program

The Clean Water Grant program as it exists today began in 1972 with passage of amendments to the Federal Water Pollution Control Act (Clean Water Act). The concern was that unregulated pollution would significantly degrade the quality of life in the United States unless steps were taken to improve municipal wastewater treatment facilities. Prior to the program, each municipality and community was on its own and handled its sewage needs in whatever fashion it could -- including septic tanks and raw sewage dumps. State oversight was minimal.

The Clean Water Act gave states "the primary responsibility and right to prevent, reduce, and eliminate pollution". And along with the responsibility came some funding. Since 1972 through mid-1986 the program has provided California with $4.2 billion for building water pollution control facilities. Over this period, a total of 1,650 projects have been funded, ranging in size from San Francisco's $800 million wastewater treatment program to small, rural projects in the $100,000 range. Almost every community in California has received a grant. During this time, California gave matching grants for another 12-1/2 percent of the costs. The remaining 12-1/2 percent of eligible costs and 100 percent of ineligible costs were borne by the grantee.

Economic realities of the early 1980s forced a reevaluation of the grant program, prompting debate at the national level concerning the future funding picture of the program. The Clean Water Act was last amended in 1981. The

amendments made major changes in the program, including decreasing the federal share for most projects from 75 to 55 percent, eliminating grant funding for reserve capacity and eliminating separate grants for planning and design.

In 1983, EPA formed a task force to examine the future federal role in municipal wastewater treatment. The ultimate goal was to create incentives for local waste treatment efforts to become financially self-sufficient. The task force report recommended that the federal grant program be transitioned into a revolving fund loan program.

Realizing that federal program reductions would have a significant impact on the local cost of treatment work projects, California began to discuss how funds lost through federal reductions could be replaced. One result of these discussions was the passage of the 1984 California Clean Water Bond Law which provided state matching funds and low-interest loans for wastewater treatment plant construction.

Examples of pollution control efforts funded through the Clean Water Grant program are as follows:

- Sludge Dehydration/Energy Recovery System: Los Angeles County/Metropolitan Area

This project began in 1975 with a regional sludge management study jointly conducted by the County of Los Angeles, the City of Los Angeles, and the Orange County Sanitation District. The goal was to develop a long-term sludge management plan and implementation strategy concerning the disposal of solids (sludge) resulting from industrial and municipal wastewater treatment.

The study analyzed several sludge management alternatives and chose the Carver-Greenfield (C-G) Multiple-Effect Evaporation Process. The C-G process, in combination with special furnaces to burn dry sludge, is considered the most advanced method for converting sludge to energy. The components in this facility represents the latest technology. Design was funded with $3.4 million from the Innovative and Alternatives Program. This system is now under construction at the Los Angeles District main sewage plant (LACSD) in Carson. Construction cost are estimated at $40 million. Construction completion is expected by mid-1990.

The principal advantage of the process being used at LACSD is the significant energy savings achieved over other methods of burning sludge because it saves up to 75 percent of the energy required by other available processes. Dried sludge recoved from the C-G process will be thermally processed for volume reduction and energy recovery. A special furnace will be used to burn sludge and produce steam for power generation. This process will produce up to 11 megawatts of power at full load by the year 2007.

- Wastewater Collection, Treatment, and Disposal: The Central Coast

The Monterey Regional Water Pollution Control Agency (MRWPCA) was awarded two construction grants pursuant to the Clean Water Grant program. The first grant covered construction of a regional interceptor/outfall pipeline and the second covered construction of the regional wastewater treatment facility. The total planning, design and construction costs for the project total about $120 million.

The project provides wastewater collection, treatment and disposal services for the Cities of Monterey, Pacific Grove, Seaside, Del Rey Oaks, Salinas, Sand City, Castroville, Moss Landing and the military reservation of Fort Ord. Each entity had previously been treating its own wastewater and discharging into the Pacific Ocean or surface waters. Because this is an environmentally sensitive area, the County of Monterey and the State of California adopted a prohibition against disposal in 1977 with a goal to eliminate wastewater discharges into the Bay from these areas.

Because of this prohibition and the EPA's belief that one wastewater discharger into offshore deep water is less detrimental to the environment than several dischargers in shallow water close to the shore, the MRWPCA was awarded funding for the construction of a single wastewater treatment facility. When completed, the facility will be capable of treating an average of 30 million gallons of wastewater per day to a secondary level by using modern technologies. This level of treatment provides a greater removal of harmful bacteria and other elements that could be detrimental to the ecosystem. The interceptor and outfall are completed and the treatment plant is targeted for completion in mid-1988.

The chart below depicts the funding picture and results of the CWG program for the 1983-86 period.

Clean Water Grant Program
1983 - 1986

Source of Funds	Amount (in millions)	Percent of Total
EPA	415	74.3
State	70	12.5
Local	74	13.2

Total number of projects funded = 74

Number of projects completed = 176

Number of projects under construction = 221

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Minority and Women-Owned Business Participation

The Water Board continues sponsorship of an aggressive recruitment program to give minority-owned (MBE) and women-owned businesses (WBE) the opportunity to compete for Clean Water Grant related contracts. Contracts are of two kinds: architectural and engineering (A/E) and construction (C). Inclusion of women-owned businesses was added to the program in 1983. New EPA regulations and guidance in 1983 eliminated the use of MBE/WBE goals in the construction program and replaced them with a system of "positive efforts" which must be taken by a grant recipient. The figures below show MBE and WBE participation during 1983-1986.

MBE AND WBE PARTICIPATION
CWG CONTRACTS
1983 - 1986

YEARS	TYPE OF CONTRACT	TOTAL FUNDS	MBE PERCENT	WBE PERCENT
1983 - 1984	A/E	36 M	12.3	0.6
	C	100 M	15.8	3.2
1984 - 1985	A/E	54 M	16.6	1.4
	C	275 M	8.0	3.9
1985 - 1986	A/E	30 M	16.6	1.6
	C	213 M	10.8	4.8

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Planning for Pollution Control: Water Quality Management Program

Section 205(j) of the Clean Water Act authorizes EPA to provide water quality management planning grants to the states in an amount equal to one percent of their annual Clean Water Construction Grant. For California, this amount has been about $1.75 million per year and should continue at that approximate level through 1990. Authorization for these grants became effective in federal fiscal year 1982.

The program provides the Board with considerable latitude in selecting and funding projects. As a result, the Water Board has focused program funding on water quality planning needs specific to California. These funds have been used for a variety of planning efforts, which include determining the nature, extent, and causes of water quality problems and identification of the most cost effective and locally acceptable facility and non-point source measures to meet and maintain water quality standards. To date, funding has been provided to state, local, and regional agencies to address a wide variety of surface and ground water quality problems.

The Board conducts its program in coordination with local, regional, and interstate entities. A Program Advisory Committee (PAC) reviews proposals and makes recommendations to the Board. PAC members include the Water Board,

Regional Boards, California Council of Governments, County Supervisors Association of California, California Resource Conservation District Association, and the League of California Cities.

Funding criteria includes uses of water being protected, public health threats, and local commitment to solving the problem. Program participants pay at least 25 percent of the costs. Between 1983 and 1986, 59 projects received funding. Examples of the projects funded are shown below.

- Management of Small Quantities of Hazardous Waste

  San Bernardino County conducted a two year study to develop and implement a pilot program to collect and dispose of small quantities of hazardous waste. Management of hazardous wastes is complicated by the large size of the county, its sparsely distributed population, and its distance from a Class I disposal site. The county identified management alternatives, selected and implemented the best alternative, and evaluated the project in a report which can be used by other local government agencies.

- Prevention of Seawater Intrusion in Salinas Ground Water Basin

  Monterey County Flood Control and Water Conservation District assessed the extent of seawater intrusion into local aquifers and examined alternative measures to control further seawater intrusion. Alternatives, including pumping restrictions, well closures, use of alternative water sources and possible statutory adjudications were evaluated.

- Buena Vista Lagoon

  The State Coastal Conservancy administered a ten-month study to minimize sediment impacts on Buena Vista Lagoon, a 200-acre coastal wetland in San Diego County. DFG owns most of the lagoon. The study determined the major sources of sediment, proposed alternative on-site controls, established priorities for construction of control structures, and recommended an overall sediment management strategy.

Innovative and Alternative Technologies

To promote better and new water pollution control technologies that eliminate pollutant discharges, reclaim water, conserve energy, and save money, the federal Clean Water Act Amendment of 1977 established a three-year pilot program called the Innovative and Alternative (I/A) Technology Program. This program offered special financial incentives to applicants willing to choose unconventional treatment systems. Two classes of qualifying treatment works were defined: alternative and innovative technologies. Alternative technologies refer to particular, fully proven systems that conserve resources. Innovative technologies include systems which are developed but not yet fully proven but which offer technological advancement in cost or energy savings.

The Water Board vigorously undertook the I/A program and thus aided more than 70 communities to develop alternative and innovative works. These projects are worth over $200 million and are estimated to have saved much more money. More importantly, these systems provide simple, reliable, and economical solutions to pollution problems. The summaries below illustrate the variety of projects funded by the program.

Innovative Technologies

- Los Angeles' Sludge Dehydration and Energy Recovery Works

  With a total design cost of $3.4 million, this project represents one of the largest I/A-funded programs. The City of Los Angeles and the County Sanitation Districts of Los Angeles County both selected the innovative "Carver-Greenfield" process to dry their sludge. This process enabled each agency to reduce the residuals it landfills, produce enough power to run their entire treatment plants, and sell any excess. Moreover, these projects helped reduce air and water pollution and helped the city to reduce the amount of sludge discharged into the Pacific Ocean. Construction will be funded with Clean Water Grant program dollars.

- Sacramento's Sludge Works

The Sacramento County Regional Sanitation District built an innovative sludge management system that involves vacuum deodorization of blended, anaerobically-digested sludge, storage in lagoons, then disposal via injection to land used solely for sludge disposal purposes. The unique odor control works include sludge mixers, wind machines, perimeter barrier walls, and a station which measures air quality readings. Sacramento's system efficiently manages its sludge, controls nuisance and odors, and saves both cost and energy. As in other I/A projects, Sacramento's sludge works achieves a minimum 20 percent savings over conventional systems.

- Miranda's and Port Costa's Recirculating Sand Filters

To improve their wastewater facilities and reduce operations and maintenance costs, the small towns of Miranda and Port Costa both built innovative recirculating sand filters. These filters are comprised of beds of sand about four feet deep and involve several complex physical, chemical, and biological processes. The works are also simple to operate and have proven very reliable. The recirculating sand filters were about 15 percent less costly to build and annually save about 20 percent of the operating expense compared with conventional treatment systems.

Alternative Technologies

- Land Treatment Systems

Natural systems, which use soil and plants to treat wastewater, need little operator attention or skill and can be cost-effective where land is available. These systems also conserve limited water resources and eliminate pollutant discharges. Some of the alternative land treatment technologies built in California include overland flow systems at Davis and Newman, aquaculture systems at Arcata and Gustine, and wastewater irrigation systems at Calistoga, Julian, and Las Virgenes.

- Energy Conservation and Reuse Systems

  Wastewater and sludge treatment processes produce many residuals; these residuals commonly include methane gas and heat. To conserve energy, save money, and beneficially reuse these residuals, many municipalities built alternative technologies. For instance, Contra Costa County Sanitation District and the County Sanitation Districts of Los Angeles County both built systems which capture and reuse the methane gas produced in their digesters; the gas is then burned to generate power.

During the course of the I/A program, the Water Board found many more qualified applicants than available funds. And, as pollution control costs have grown, small, rural communities have experienced more difficulty solving their wastewater woes. For these reasons, the Water Board adopted a priority system to allocate the limited federal money and also reserved funds exclusively for technologies which serve small communities. It appears that Congress will continue the I/A program through the remainder of the grants program.

State Assistance Program

The Clean Water and Water Conservation Bond Law of 1978 authorized the State Board to provide up to $50 million in grants to municipalities for eligible state assisted projects. Eligible projects were defined as those necessary for the control of water pollution or feasible and cost effective for conservation and reclamation of water. Funded projects must also be ineligible for Federal Clean Water Act funding. The program to administer the grants is known as the State Assistance Program (SAP).

SAP funds were utilized in three major project categories: water pollution control, water conservation, and water reclamation. A total of 28 projects were funded. SAP grants were later supplemented with $2.3 million in Federal Clean Lakes grant funds and a $1.3 million grant from the State Energy and Resources Fund.

In general, the Regional Boards were given responsibility for managing the water pollution control projects and the State Board retained the responsibility for the water conservation and reclamation projects as well as the overall administration of the program.

The table below summarizes the number and type of projects authorized and completed and the SAP grant funds authorized and disbursed through June 30, 1986

SAP PROJECT SUMMARY THROUGH 1986

	PROJECTS		SAP GRANT FUNDS		
Category	Number Authorized	Number Completed	Amount Authorized	Amount Disbursed	Amount of Savings
Pollution Control	18	10	32,249,842*	20,299,231	172,801
Conservation	6	5	6,555,960	4,462,630	580,718
Reclamation	4	3	$11,194,122	$ 9,926,333	$ 23,473
TOTAL	28	18	$49,999,924	$34,688,194	$776,992**

* includes $10 million that the State Board has set aside for approval of several sub-projects in the Lake Tahoe Basin.

** the Board authorized redirection of savings to fund two additional projects, Agro-Forestry Project for Drainage Flow Reduction ($50,000), and Selinium Removal Project from Drain Water ($50,000). In addition, the Board unencumbered $645,000 of SAP savings to fund non-SAP Bay-Delta studies. The remaining savings at this time amount to $31,992.

Of the 28 authorized projects, 17 were completed by June 30, 1986 and are operational; the remaining 11 projects are at different stages of design and construction. As of June 30, 1986, total grant reimbursements totalled $34,688,194. Examples of projects that were funded by the SAP program are summarized below.

- Water Conservation: Department of Water Resources

  Utilizing a SAP grant of $4 million, DWR conducted 12 water conservation assistance and demonstration programs. Major efforts were directed to such programs as urban water leak detection and repair, mobile labs to evaluate and improve farm water management and use, potential of reuse of saline

irrigation drainage and return flows in Imperial Valley, reduction of flows to wastewater treatment plants, and development of computerized on-farm water use and management training.

The Leak Detection program provided 59 agencies with funds for water audits and leak detection. Forty-seven agencies are carrying out leak detection surveys. Utilities pay leak repair costs. DWR has estimated that by mid-1986, the program had resulted in recovering leakage of 16,192 acre-feet of water worth $3.4 million.

The Mobile Lab program helped growers in Fresno, Kings, Kern, San Diego and Imperial Counties conserve water. The program provided trained staff and appropriate equipment to make on-farm evaluations of the major types of irrigation methods being used and provided suggestions ways to improve efficiency. The program is being continued by DWR through its own funding.

Nine of the 12 funded programs have been completed. The remaining three programs are scheduled for completion in 1990. The completed programs demonstrate that implementation of a well planned water conservation program is cost-effective and may result in considerable revenue savings. Several local and private agencies have recognized that the wise use of water pays and, consequently, have requested funding for water conservation programs either wholly or on a cost-share basis.

- Water Reclamation: City of Long Beach

The Long Beach Water Department is one of four recipients of SAP monies to construct facilities to reuse treated wastewater. Historically relying heavily on imported water to meet its water demands, the city found that the cost of reclaimed water compared favorably to the cost of new Northern California water development.

Supplementing $2.23 million in SAP funds with $0.23 million in local funds, the City constructed 5.6 miles of pipeline and a pump station. Wastewater is reclaimed at the Long Beach Water Reclamation Plant operated by the County Sanitation Districts of Los Angeles County. Because a high level of treatment is required to discharge the wastewater into an adjacent creek, no additional treatment is required to put this water to other beneficial

uses. If not reused, this already highly treated wastewater would eventually be lost to the ocean.

Long Beach delivers the reclaimed water through the pipeline from the treatment plant to a variety of uses: two golf courses, a nursery, an elementary school, a community college, two parks, and a sports stadium. It is also used for freeway landscaping. The system is designed to deliver 1,700 acre-feet per year, or the equivalent water demand of over 7,000 people. Since the project began in 1984, Long Beach has extended the project using its own funds and is seeking a state loan for further expansion.

- Water Pollution Control: Lake Tahoe Erosion Projects

Tucked between California and Nevada, Lake Tahoe is one of the world's most spectacular natural environments. Only Crater Lake in Oregon and Lake Baikal in the Soviet Union rival Lake Tahoe for clarity, extremely low algae growth and cobalt-blue color. Close to 75,000 people make their year-round home near Tahoe's shores. Vistors throng to the area, averaging 100,000 per day in the summer.

The price of popularity is decreasing clarity and quality of Lake Tahoe water. Basin development has greatly increased erosion and runoff. Over 61,000 tons of sediment wash into the lake every year -- a twenty-fold increase over natural levels. Nutrient-laden silt spurs algae growth, disrupting the lake's natural balance.

In 1974, the Water Board asked the bi-state Tahoe Regional Planning Agency (TRPA) to develop an effective water quality program to protect Lake Tahoe. TRPA submitted a plan in 1978 which was rejected because it lacked an effective implementation program to control erosion.

In 1980, the Water Board approved the Lake Tahoe Basin Water Quality plan, describing a complete program for remedial erosion control on the California side, including management of surface runoff and development controls. In 1981, the State Water Board approved TRPA's revised plan which barred construction on highly erodable lands and mandated $100 million in erosion control projects.

Since the inception of the Lake Tahoe Remedial Erosion Control Program, the Board has approved funding for 39 erosion control projects using $10.0 million in SAP funds and $2.45 million in EPA Clean Lake funds. Local contributions added an additional $8.5 million. Erosion control measures include slope stabilization and revegetation, infiltration facilities, siltation basins, rock-lined drainage channels and shoreline protection. The pace of construction has doubled each of the last two years. To date, 23 projects have been completed.

Clean Water Bond Act of 1984: California Voters Pick Up Some of the Burden

In November 1984, 72 percent of California voters approved the $325 million Clean Water Bond Act of 1984. This bond law provides $250 million for state matching grants and low-interest state loans for wastewater treatment plant construction. In addition, the bond law provides $40 million for a supplemental state grant program for qualifying small, needy communities and $25 million for a wastewater reclamation loan program both administered by the Board. A $10 million allocation for a water conservation program was also included which is administered by DWR.

While past bond laws paid the 12-1/2 percent state share of clean water grants, more flexibility was built into this measure. For example, low-interest loans are authorized for grantees receiving only 55 percent federal grants. In addition, loan repayments create a revolving loan fund. The first $30 million in loan repayments will be transferred to the water reclamation account for reissuance as reclamation project loans.

- Grants for Small Communities

  Even with the availability of federal and state grants, many small communities cannot afford adequate sewage systems. In order to qualify, a community must have a population of 5,000 or less. A reasonably isolated portion of a larger city with fewer than 5,000 persons may also be eligible. The proposed project must also have a final price tag of $2.5 million or less and the community must be needy. Only communities which received clean water grants after October 1, 1984 can receive this assistance. The total

amount of federal and state assistance cannot be more than 97.5 percent of the project costs. Thus, local communities must provide the remaining portion, or 2.5 percent.

- Water Reclamation Account

  This account was established to provide low-interest loans to municipalities for water reclamation projects. Forty-nine water reclamation loan applications were submitted and reviewed. A priority list of 19 eligible projects, totaling about $26 million was established. As the applicants submitted completed facility plans, loan contracts were issued for project design and construction. An additional $30 million will be transferred to the water reclamation account from the first loan repayments under the construction grant account.

  While substantial preparatory work had been completed under the 1984 bond law by mid-1986, no projects had actually been put into operation.

Water Conservation and Water Quality Bond Law of 1986: Agricultural Drainage Water Management Monies

The Water Conservation and Water Quality Bond Law of 1986 provided $75 million in low-interest loans to local agencies for agricultural drainage water management. Drainage water management facilities are defined as facilities for the treatment, storage, and disposal of agricultural drainage water which, if untreated, would pollute or threaten to pollute water of the state. The Water Board will be developing program guidelines into 1987.

Loans may be made for up to 100 percent of the cost of design and construction of an eligible project up to $20 million per project. Loans up to $100,000 may also be issued to conduct feasibility studies of projects potentially eligible for funding. The interest rate set at 50 percent of the rate for bonds issued most recently for this program. The loan repayment period may be up to 20 years.

LEGISLATIVE SUMMARY

The three-year period between 1983 and 1986 marked one of the most rapid expansions of the State and Regional Water Boards' responsibilities since the Board was created in 1967. In reviewing the notable benchmarks in Water Board history, one can clearly see how this recent phase has been an exciting yet uncertain time.

The Water Commission Act of 1913 marked the beginnings of legislative involvement in California's waterscape. While earlier water rights were extensions of mining law, the act established the modern system of appropriative rights. Under the act, water rights were granted by three water commissioners required to be "men of practical knowledge or experience in the application and use of water for irrigation, mining, and municipal purposes". From 1921 to 1956, the State Engineer, housed in the Department of Public Works, was charged with overseeing water rights. In 1956, the Office of State Engineer was abolished and two new entities were created -- the Department of Water Resources and the State Water Rights Board.

Meanwhile, during the 1940's, concern developed over a new aspect of water management -- water pollution. In 1949, the Legislature enacted the Dickey Water Pollution Act which established the State Water Pollution Control Board. The Legislature placed this new board within the state Department of Public Health and gave it responsibility for sewage and industrial waste control.

In 1967, the Legislature recognized that water quality and water supply were inextricably linked and melded the Water Pollution Control Board and Water Rights Board into the Water Resources Control Board. Passage of the Porter-Cologne Water Quality Control Act in 1969 represented a landmark in California's water legislation. Today this act serves as the major blueprint for water quality activities of both the State and Regional Boards.

At the federal level, enactment of the Clean Water Act in 1972 turned the Boards' attention to development of a joint federal-state grant program to fund wastewater treatment facilities throughout California. Prior to creation of the grant program, many communities were unable to finance treatment plants for proper disposal of sewage. Frequently, spills of raw sewage caused closure

of California beaches and issuance of health warnings. Under the program, major efforts were made to bring municipal systems, both large and small, into the new technology, thereby curtailing a major cause of surface water pollution.

In the area of hazardous waste, a key federal bill was enacted in 1976, the Resource Conservation and Recovery Act (RCRA). RCRA was designed to provide cradle to grave management for hazardous wastes and establish management requirements for generators and transporters of hazardous materials as well as owners and operators of treatment, storage, and disposal facilities. RCRA's construction and siting requirements are particularly important in protecting water quality.

The 1970s also marked the passage of major state environmental legislation. Most notably, the California Environmental Quality Act recognized the need to consider environmental impacts of all governmental construction and planning projects. Thus, as time went on, the Legislature, the Executive Branch and the electorate have grown more aware of the need to protect California's natural resources.

Focus on environmental protections during the 1970s provided an apt prologue to the preventative and remedial programs of the 1980s. The new decade brought additional, perhaps graver, concerns to the State and Regional Boards through hazardous waste contamination discoveries. New sophisticated sampling technology has made us cognizant that past practices have threatened, and in many cases, degraded California's water quality. As our technical knowledge has increased, so has our knowledge that water is a precious and finite resource which must be protected from degradation and misuse.

In the short period between 1983 and 1986, the Legislature, and the State and Regional Boards responded to this increased knowledge by implementing and expanding programs in a broad range of areas to preserve surface and ground water quality and to enhance beneficial uses. These include increasing protection of drinking water supplies, tightening the Boards' regulatory and enforcement capability, providing funding for sewage-related problems, and promoting the optimal use of the state's water while safeguarding the environment. The summary below demonstrates how government has responded to California's changing water quality and water rights picture.

- Protecting Drinking Water Supplies

AB 1803 (Connelly) Chapter 881, Statutes of 1983: Requires each public water system, having more than 200 connections, to sample and analyze its water supply for organic chemical contaminants in accordance with the DHS' plans. DHS must coordinate with State and Regional Water Boards to review past and present waste disposal practices which may affect public water systems.

AB 1803 (Connelly) Chapter 818, Statutes of 1985: Requires DHS to evaluate small public water systems of 200 connections or less for organic chemical contamination, requires Regional Boards to initiate an investigation for the potential contamination sources and local health offices to implement the evaluation.

AB 2058 (Connelly) Chapter 1591, Statutes of 1985: Requires the DHS to inventory all wells local ordinance used at any time since January 1, 1960 to discharge hazardous wastes, transmit that information to appropriate agencies and local governments, and report to the Legislature on contamination from injection well sites. Prohibits the discharge of hazardous wastes into new injection wells after January 1, 1986, and existing injection wells after January 1, 1988, if drinking water exists within one half-mile of any point along the length of the well. DHS may grant the operator an exemption from this prohibition.

- Strengthening Enforcement Capability and Tightening Water Quality Protections

SB 2131 (McCorquodale) Chapter 1541, Statutes of 1984: Establishes civil penalties for specified Porter-Cologne violations and authorizes the Regional Water Boards to impose administrative penalties against violators. These administrative penalties are appealable to the State Board and to the courts.

AB 3566 (Katz) Chapter 1543, Statutes of 1984: Divides all surface impoundments into two basic categories in order to regulate them: those within one half-mile of potential a drinking water supply and those outside the half-mile zone. Those within the half-mile mile zone are required to close as of

June 30, 1988 unless the Regional Water Board grants an exemption. Impoundments outside the half-mile zone are required by January 1, 1989 to have a double liner, a leachate collection system, and a ground water monitoring system in accordance with RCRA requirements and state and federal regulations, unless granted an exemption.

AB 2013 (Cortese) Chapter 1045, Statutes of 1983: Requires operators of underground storage tanks containing hazardous substances, to register their tanks with the State Board by July 1, 1984. Farmers were given an additional six months to register.

AB 1362 (Sher) Chapter 1046, Statutes of 1983: Establishes regulatory provisions for storage of hazardous substances in underground tanks. Sets state policy requiring secondary containment for underground tanks storing hazardous materials and requires the State Board to adopt regulations.

AB 3447 (Sher) Chapter 1537, Statutes of 1984: Closes a loophole in AB 1362 to allow imposition of a fee on all underground tank owners. Also allows local governments to impose civil penalties for local ordinance violations.

AB 3525 (Calderon) Chapter 1532, Statutes of 1984: Makes changes in the Water, Government, and Health and Safety Codes to improve regulation of municipal landfills by creating mandatory notification and inspection responsibilities among environmental agencies with authority over these sites, including Regional Water Boards.

AB 3667 (Campbell) Chapter 1542, Statutes of 1984: Requires the Water Board to develop pretreatment standards for industrial firms to control toxic pollutants that cannot be adequately treated in municipal sewage treatment facilities.

AB 2021 (Connelly) Chapter 1298, Statutes of 1985: Requires pesticide registrants to submit specified information on pesticides registered with DFA. Prohibits DFA from registering a pesticide for which a ground water protection data gap exists after December 1, 1988. Establishes procedures for cancelling registration of pesticides found in ground water or eight feet below the surface of the soil unless certain findings are made.

Requires DFA to establish a program to collect well water monitoring data from all agencies that test ground water for the presence of pesticides, analyze the results of such testing and provide the monitoring results to the Water Board.

- Funding for Water Quality Efforts

AB 1732 (Costa) Chapter 337, Statutes of 1984: Placed on the November 1984 ballot the authorized sale of $430 million in general obligation bonds to be used for construction of sewage treatment plants, water reclamation, and water conservation projects.

AB 1982 (Costa) Chapter 6, Statutes of 1986: Enacts the Water Conservation and Water Quality Bond Law of 1986 to provide a $75 million appropriation to the Water Board for low interest loans to public agencies for agricultural drainage projects and an additional $75 million to DWR for low interest loans to public agencies for water conservation and ground water recharge projects. Approved by the voters in June 1986.

SB 1745 (Bergeson) Chapter 1468, Statutes of 1986: Appropriates $150,000 from the General Fund to finance a work plan for abating pollution in the New and Alamo Rivers coming from Mexico. Directs the State Board to allocate these funds to the Colorado River Basin Regional Water Board for use in completing or entering into a contract with an outside firm to complete the plan.

- Maximizing Beneficial Uses of Water

AB 951 (Jones) Chapter 1985: Requires the Water Board to make specified findings in the water rights application proceeding when considering the economic feasibility of a proposed small hydroelectric power generating facility. The facility must be a "qualified small power production facility" as defined, and may not be on an existing dam, diversion, or canal. Expresses legislative findings and creates state policy that small hydro projects should be developed, to the extent feasible, on existing dams and diversions with a sufficient water drop so that power may be efficiently generated without significant environmental effects.

AB 3722 (Costa) Chapter 970, Statutes of 1986: Requires DWR to establish a program to facilitate voluntary exchange or transfer of water. Requires DWR to maintain a list of entities involved in water management who could assist transfers and prepare a water transfer guide listing pertinent laws and resources for further information including resources useful in identifying potential third-party impacts and mitigation alternatives.

A LOOK TO THE FUTURE

Over the next few years, the Board will address a number of complex issues ranging from decreasing federal grant money for wastewater treatment plants to increasing demands for high quality water in ample quantity, to the on-going need to increase State and Regional Boards' productivity and accountability. Major issues the Board will be facing in the years just ahead are described below.

- The Federal Clean Water Act

The Clean Water Grant program is on the wane. Since 1972, California has participated in a partnership of federal and local agencies to meet the objectives of the Clean Water Act. By mid-1986, it was clear that the grant program would be transitioned into a revolving loan program and that overall, fewer dollars would be available over the next several years.

According to a 1986 EPA survey, California will need $6.1 billion to meet year 2005 wastewater treatment needs. Thus, the Board will be following developments closely as information on the revolving loan program becomes available. The challenge will be to use this loan fund in the most fiscally responsible and effective manner possible.

- The San Francisco Bay/Sacramento San-Joaquin Delta Hearing

When the Water Board adopted Water Right Decision 1485 and the Water Quality Control Plan in 1978 setting water quality standards in the Delta and Suisun Marsh, it realized the uncertainties associated with the State Water Project and the Central Valley Project. The Board also recognized the need to consider new hydrological and ecological information before constructing long-range protections for this vital water link. And so the Board resolved to reexamine Bay/Delta protections by 1988 by way of the Board's hearing process.

As currently projected, the Board will convene meetings during late 1986 and early 1987 to establish the scope and breadth of the hearing and the process to be used in the conduct of the hearing. The actual hearing will begin in 1987.

The hearing will result in a new Bay/Delta Water Quality Control Plan for flows and salinity and a pollutant policy document to spell out state policy on the regulation of pollutants in the Bay/Delta Estuary. It will conclude with the Board's adoption of a plan to attain water quality goals and a water right decision to implement the objectives.

The Board's ultimate responsibilty will be to consider all available data and balance all beneficial uses to arrive at the highest reasonable water quality protections for the Bay and Delta considering all demands being made of those waters.

- The Ground Water Strategy

Ground water supplies over 40 percent of California's total water demand. Numerous ground water quality problems have been documented throughout the state and no ground water basin may be presumed immune from pollution.

In 1984, the Water Board was named lead agency in developing a ground water protection strategy for California. This strategy, to be available in 1987 will identify goals, policies and approaches needed to prevent ground water degradation and reverse the trend of increasing pollution. It will be prepared with the cooperation and assistance of federal, state, and local agencies with ground water responsibilities.

Development of the strategy will be a unique opportunity to evaluate past ground water protection practices and identify future needs. The document will serve as a guide to help responsible agencies address ground water problems in a more direct and effective manner.

- Toxics

The Porter-Cologne Act provides the Board with wide ranging water quality responsibilities. An area clearly within the Board's jurisdiction is that of toxics. In addition to Porter-Cologne, the Board's major regulatory programs -- Underground Tanks, Toxic Pits, Solid Waste Assessment Testing, Waste Disposal

to Land -- prohibit toxic discharges under their own terms. Because of our rapidly expanding data in this area, the Board's activities will likely continue to grow over the next several years.

By mid-1986, an initiative measure to regulate chemicals that cause cancer had qualified for the November 1986 ballot. Under the initiative, known as Proposition 65, the Board's functions would include notification of county officials of alleged hazardous waste discharges, identification of designated drinking water sources through review of the nine Regional Basin Plans, and review of requests from dischargers of listed chemicals for safe use determinations. Given the Board's previous experience in the regulation of toxic waste discharges, it will likely play a major role in the implementation of the initiative, should it be successful.

- Agricultural Drainage Water

As part of the Board's 1985 order addressing Kesterson selenium contamination, a technical committee was appointed to investigate water quality concerns in the San Joaquin River Basin, an area subject to considerable water degradation due to agricultural runoff.

The technical committee's report, to be completed in 1987, will examine water quality in the San Joaquin River, propose water quality objectives for the Basin, and recommend a plan to regulate the discharges.

The Central Valley Regional Board will consider the report in their review of the Basin Plan and establish specific water quality objectives for the Basin. Once adopted, these objectives will be the design criteria for engineers and agricultural scientists seeking solutions to the complex problem of maintaining productivity of important agricultural lands despite increasing salt and selenium levels found in some soils.

- Program Control Unit

The Water Board's Program Control Unit (PCU) was established in 1984 in response to an Auditor General's Report which recommended that the State Board monitor the regulatory activities of the Regional Boards and improve their management capabilities.

In addition to the PCU, the Water Board established a data base to track Regional Board activities and developed an administrative procedures manual to guide the Regional Boards in their regulatory activities.

Future plans of the PCU are to audit each of the nine Regional Boards, evaluate regulatory activities of the Water Board's Division of Water Quality, and evaluate the Division of Water Rights in order to improve efficiency and strengthen enforcement capability.

STATE WATER QUALITY POLICIES

Over the years, the State Board has adopted a number of policies to guide California water resources. These policies were adopted after extensive public hearing to allow maximum public participation. The Board's water quality policies are described below:

- The "Statement of Policy with Respect to Maintaining High Quality of Waters in California" requires the continued maintenance of existing high-quality waters, although it does provide conditions under which a change in water quality is allowed. Under the policy, a change must be consistent with maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of water, and not result in water quality less than that prescribed in water quality control plans or policies. (68-16)

- The "State Policy for Water Quality Control" outlines water resources management principles which guide the Board's programs. All water quality control plans and waste discharge requirements must conform to this policy. (7/6/72)

- The "Water Quality Control Policy for Enclosed Bays and Estuaries of California" provides water quality principles and guidelines for the prevention of water quality degradation and protection of beneficial uses of waters of enclosed bays and estuaries. This policy does not apply to wastes from vessels or land runoff except as specifically indicated for siltation and combined sewer flows. (74-43)

- The "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling" constitutes a guide to planning for new power-generating facilities. It is based on the premise that fresh inland waters should be used for power plant cooling only as a last alternative, after other sources have been shown to be environmentally undesirable or economically unsound. (75-58)

- The "Policy and Action Plan for Water Reclamation in California" encourages water reclamation projects meeting specific conditions, reclamation and reuse of water in water-short areas of the state, and water conservation measures. The policy encourages other agencies, particularly DWR, to assist in implementing its goals. (77-1)

GLOSSARY

acre foot	The amount of water required to cover one acre one foot deep. A family of five uses about one acre foot of water per year, including lawn and garden irrigation.
adjudication	A determination of water rights for a stream or ground water basin. Adjudication sets priorities during shortages.
anadromous	Species of fish which migrate up rivers from the ocean in order to breed in fresh water.
aquifer	Any underground formation that stores, transmits and yields water to wells and springs.
Areas of Special Biological Significance	34 locations along California coast and offshore islands which the Water Board has officially designated as of unique biological value and/or fragility.
basin plan (i.e., water quality control plans)	Defines beneficial water uses, establishes water quality objectives to protect those uses, identifies water quality threats and outlines corrective measures. The basin plan is used to develop discharge limits and guide Regional Board decisions on specific cases. There is a basin plan for each of California's 16 major watersheds.
beneficial use	Water use protected under Porter-Cologne Act. Includes domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife and other aquatic resources.
bioassay	Test in which the quantity or strength of material is determined by its effects upon living organisms.
BMPs (Best Management Practices)	Steps needed to protect water quality, usually from non-point sources such as agriculture, logging, construction, mining or urban runoff. BMPs can also be applied to point source waste discharges.
BOD (Biochemical Oxygen Demand)	The quantity of oxygen used by organic matter in water. High levels rob water of oxygen needed to support fish and other aquatic life. A standard wastewater test.

Clean Water Act	The primary federal water quality control law governing surface waters. Establishes national water quality objectives and waste discharge standards; outlines the National Pollutant Discharge Elimination System permit process; outlines the Clean Water Grant and Clean Lakes Grant programs. (Also called the Federal Water Pollution Control Act, as amended.)
Clean Water Bond Law of 1984	Provides $325 million in state bonds for water pollution control. This includes $250 million for wastewater treatment, $40 million for small needy communities, $25 million for water reclamation and $10 million for water conservation.
CWG (Clean Water Grant)	Allocations under the Clean Water Act for upgrading or constructing publicly owned and operated sewage treatment facilities.
contamination	Water quality impairment to a degree which creates a public health hazard through poisoning or through spread of disease.
DDT (dichlorodiphenyl trichloroethane and derivative)	A toxic pesticide banned in 1972 but still widely found in water and fish samples.
DFA (Department of Food and Agriculture)	California state agency responsible for registration and regulation of chemical pesticides; programs include monitoring for chemicals which may enter water supply.
DFG (Department of Fish and Game)	California state agency responsible for protecting fish and wildlife; programs include investigation of toxic pollution problems, enforcement of fish and game pollution control laws, and assisting State and Regional Water Quality Control Boards in monitoring programs.
DHS (Department of Health Services)	California state agency responsible for protecting public health; programs include the regulating on of hazardous waste and safeguarding of domestic water supplies.
diversion	Taking of water from a stream or other body of surface water into a canal, pipeline or other conduit.
DWR (Department of Water Resources)	California state agency responsible for the water management; programs include maintenance of the State Water Project, and operation of flood control, dam safety, and water conservation projects.

effluent	Wastewater that has undergone treatment to remove pollutants.
EPA (Environmental Protection Agency)	Federal agency responsible for protecting the environment. The State and Regional Water Quality Control Boards are delegated by EPA to implement specified federal water quality laws and programs.
eligible cost	That portion of a sewage treatment project that can be funded under state and federal regulations. Generally includes treatment facilities to specified capacities, some large sewer pipes and, in some cases, collection sewers.
erosion	Wearing away of earth rock by running water, glaciers, winds and waves.
estuary	Where a freshwater river meets the sea.
Federal Water Pollution Control Act, as amended	Original title of the Clean Water Act, the primary federal water quality control law.
ground water	Water contained in the spaces between soil and rock particles, subsurface water from which wells and springs are fed.
hazardous material (or substance)	Any substance which is toxic, corrosive, flammable, reactive, an irritant, or a strong sensitizer and which thereby poses a threat to human health and the environment. Hazardous material which spills onto roadways or other surfaces automatically becomes hazardous waste.
hazardous waste	A waste, or combination of wastes, which, because of quantity, concentration, or physical, chemical or infectious charaterisitics, may either cause or significantly contribute to death or serious illness or, pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.
herbicide	A chemical used for plants.
hydrologic subarea	A unit within a hydrologic basin.
instream use	A beneficial water use within a stream channel such as recreation, fish and wildlife navigation, maintenance of riparian vegetation or scientific study.

leachate	Any liquid that percolates through the soil; frequently refers to the liquid leaking from landfills which often contains contaminates.
mgd (million gallons per day)	A measurement of water or wastewater flow equal to about 0.5 cubic feet per second.
NPDES permit (National Pollutant Discharge Elimination System Permit	Permits issued by the Regional Water Quality Control Board, or in some cases by the State Water Resources Control Board, under provisions of the federal Clean Water Act. Sets conditions for waste discharges from point sources to surface waters such as rivers, lakes, bays, oceans, etc.
nonpoint source	A diffuse pollution source such as erosion or agricultural runoff that comes from more than one point.
nutrients	Those elements necessary for plant growth, the most common being nitrogen and phosphorous. The presence of excess nutrients in surface waters can cause excessive algae and other plant growth.
Ocean Plan	Adopted by Water Board in 1972, amended in 1978 and 1983, this plan limits waste discharges into the ocean.
ppb (parts per billion)	The number of weight units of a substance in each billion units of a solution or mixture.
ppm (parts per million)	The number of weight units of a substance in each million units of a solution or mixture.
PCB (polychlorinated biphenyls)	An extremely toxic industrial chemical used in transformers and capacitors and in the manufacture of carbonless paper. Manufacture was banned in 1976 and use is discouraged.
PCE (perchloroethlyene)	Organic chemical used chiefly as industrial solvent.
percolation	The movement of water through soil or rock.
pesticide	A chemical used to kill insects.
plume	A body of ground or surface water differing from surrounding waters and originated from a specific source.
point source	A single pollution source such as a waste discharge pipe, drainage ditch or tank.
pollution	An alteration of water quality by waste that impairs beneficial uses.

Porter-Cologne Water Quality Control Act	The 1969 California law defining water rights and water pollution control programs. Significantly strengthened enforcement, planning and water rights efforts.
pretreatment	Removal of toxic or hazardous substances from wastewater before it is discharged into a sewage system.
primary treatment	First stage of sewage treatment; refers to the settling out of large suspended solids by screening and sedimentation before either discharging the treated wastewater or subjecting it to further treatment.
Regional Water Quality Control Boards	Established for each of the nine hydrologic regions of the state, the Regional Boards plan for and enforce water quality standards within their boundaries. Each Regional Board includes nine part-time members appointed by the governor to four-year terms.
RCRA (Resource Conservation and Recovery Act)	A 1976 federal act which gives the Environmental Protection Agency the authority to develop a nationwide program to regulate hazardous wastes from "cradle-to-grave".
return flow	In irrigation, the waters applied to land that return to a river, stream or drainage system.
riparian	Next to a river. A riparian water user owns land on the bank of a stream.
runoff	Precipitation that is not absorbed and reaches a stream or other body of water or a drain or sewer.
seawater intrusion	A coastal ground water condition that occurs when freshwater over-pumping draws seawater into an aquifer.
secondary treatment	Additional treatment of sewage by biological processes to break down organic matter remaining in the sewage following primary treatment.
sedimentation	The depositing and settling of suspended matter carried by water, wastewater, or other liquids.
small hydro	Power plants using water to generate up to five megawatts of electric energy.
SMW (State Mussel Watch Program)	Monitoring network of coastal stations where surveys of mussel tissue are used to evaluate toxic pollutant levels.

SWRCB (State Water Resources Control Board)	The state agency responsible for water rights and water pollution control. Its five members are appointed by the governor to four-year terms.
Steps 1-3	The stages of funding under the Clean Water Grants program. Includes planning (Step 1), design (Step 2) and construction (Step 3) of sewage treatment facilities.
Superfund	State and federal funding mechanisms and programs to clean up hazardous waste sites that pose a threat to public health.
surface impoundment	A hazardous waste facility devised from a natural topographic depression, man-made excavation, or diked area, designed to hold an accumulation of liquid wastes or wastes containing free liquids, usually in order to treat the wastes.
TCE (trichloroethylene)	Organic chemical used chiefly as industrial solvent.
tertiary treatment	Additional treatment of sewage beyond the secondary stage to accomplish a very high degree of pollution reduction; typical pollutants removed are organic chemicals, nutrients and excessive salts.
TDS (Total Dissolved Solids)	A measure of salinity related to the quantity of minerals in solution in water. Usually stated in parts per million (PPM).
Toxaphene	Long-lived pesticide used in California under restriction on cotton, tomatoes and other field crops.
toxic	Lethal, injurious or damaging to humans or other living organisms including plants, domestic animals, fish and wildlife.
TSM (Toxics Substances Monitoring Program)	Analysis of freshwater fish species throughout California to evaluate presence of toxics in surface waters.
208 planning	A program to control non-point source pollution authorized under Section 208 of 1972 amendments to the federal Water Pollution Control Act. Requires states to develop areawide implementation plans.

waste discharge requirements	Conditions for waste discharges that could adversely affect the waters of the state. Set by the Regional Water Quality Control Board, or in some cases, the State Water Resources Control Board. If the discharge being controlled is from a point source to surface waters, waste discharge requirements also serve as an NPDES permit.
wastewater	Sewage; a combination of liquid and water-carried wastes from residences, commercial buildings and industrial plants.
wastewater reclamation	Removal of pollutants in wastewater so that it can be reused.
watershed	The total land area that contributes water to a river, stream, lake or other body of water. Synonymous with drainage area, drainage basin and catchment.
wetlands	Marshes or swamps that are saturated with moisture; they often serve as wildlife refuges.