WATER QUALITY CONTROL PLAN

SANTA ANA RIVER BASIN (8)

1995

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SANTA ANA REGION

Adopted by Santa Ana Regional Water Quality Control Board, March 11, 1994 (Resolution No. 94-1)
Adopted by State Water Resources Control Board, July 21, 1994 (Resolution No. 94-60)
Approved by Office of Administrative Law, January 24, 1995

California Regional Water Quality Control Board
Santa Ana Region

RESOLUTION NO. 94-1

Resolution Adopting the Updated Water Quality Control Plan for the Santa Ana River Basin (8)

WHEREAS, the California Regional Water Quality Control Board, Santa Ana Region (hereinafter Regional Board), finds that:

1. The Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) was adopted by the Regional Board on April 11, 1975 and approved by the State Water Resources Control Board (State Board) on April 17, 1975.

2. An amended Basin Plan was adopted by the Regional Board on May 13, 1983 and approved by the State Board on October 20, 1983. Since that time, specific amendments to the Basin Plan have been adopted by the Regional Board and approved by the State Board. These amendments include the following: revisions of compliance dates for certain waste discharge prohibitions; revisions of the beneficial use designations, in part to conform the Basin Plan to the State Board's Sources of Drinking Water Policy; revision of the total inorganic nitrogen wasteload allocation for discharges to the Santa Ana River system; and the incorporation of minimum lot size requirements and exemption criteria for the use of septic tank-subsurface disposal systems in the Region.

3. Section 303(c) of the Federal Clean Water Act requires that water quality standards be reviewed and revised, if appropriate, on a triennial basis, and Section 13240 of the California Water Code provides that basin plans must be periodically reviewed and may be revised.

4. In 1989, the State Board initiated a statewide program for comprehensive review and update of the basin plans by all regional boards.

5. With extensive public participation and input, the Regional Board has prepared an updated Basin Plan. This Basin Plan update process satisfies federal triennial review requirements under Section 303(c) of the Clean Water Act and the periodic review requirements of the California Water Code under Section 13240.

6. The Regional Board discussed the basin plan update process at its meeting on April 23, 1993. A first draft of the revised Basin Plan was released in June, 1993 and a public workshop to review that draft was conducted on July 16, 1993. The Regional Board released a second draft of the Basin Plan and the relevant staff report in September, 1993 and conducted a public workshop on October 22, 1993. The public workshops were conducted after notice was given to all interested persons in accordance with Section 13244 of the California Water Code. The testimony introduced at those workshops was considered in the preparation of the final revised Basin Plan.

7. Significant additions to the revised Basin Plan include the addition of a new beneficial use designation of "Limited Warm Freshwater Aquatic Habitat" (LWRM) specifically for concrete-lined channels, the creation of wetlands as a waterbody type, designation of RARE beneficial use for a number of waterbodies, revised un-ionized ammonia objectives and corresponding total ammonia effluent limits, water quality objectives for the Big Bear groundwater basin, revised total dissolved solids wasteload allocation and a discussion of water quality and water resource managment projects in the region.

8. In accordance with applicable guidance and regulations, the Regional Board has developed site-specific water quality objectives (SSOs) for cadmium, copper and lead in the Middle Santa Ana River system. The Regional Board reviewed and discussed the issues related to the development and adoption of these SSOs in public meetings and workshops on August 7, 1992, March 5, 1993 and June 4, 1993. The testimony introduced at these workshops was considered in the preparation of final recommendations for SSOs.

9. In accordance with the provisions of California Water Code, Section 13280 *et seq.*, the Regional Board developed a proposed Basin Plan amendment to incorporate the SSOs.

10. At a duly noticed Public Hearing on October 22, 1993, the Regional Board adopted Resolution No. 93-64, adopting the proposed Basin Plan amendment to incorporate the SSOs for cadmium, copper and lead for the middle Santa Ana River system. A staff report regarding this matter was prepared and distributed to all interested parties 30 days prior to the hearing. However, between the time of the transmittal of the staff report and the October 22, 1993 hearing, new information was presented that led to the modification of the SSOs which had been recommended in the staff report. To avoid procedural questions, it is appropriate to rescind Resolution No. 93-64 and to reconsider adoption of the SSOs as part of the final revised Basin Plan. A report concerning the SSOs considered and adopted by the Regional Board on October 22, 1993 is included in the staff report pertaining to the adoption of the revised Basin Plan.

11. Regional Board Resolution No. 92-10, adopted February 14, 1992, found that some of the national water quality criteria, including those for cadmium, copper and lead, are inappropriate for the Middle Santa Ana River because the flows are dominated by reclaimed water, which provides and supports beneficial uses which would not otherwise exist.

12. A Use-Attainability Analysis (UAA) has been conducted for the Santa Ana River. The UAA provided data and analyses which allow the Regional Board to make the following findings regarding the Santa Ana River:
    a. The Site-Specific Water Quality Objectives (SSOs) for cadmium, copper and lead proposed by Regional Board staff will protect the beneficial uses of the Santa Ana River.
    b. The proposed SSOs have been shown to be conservative.

c. The proposed SSOs, which represent higher water quality than presently exists, will not result in degradation of water quality.

d. Existing levels of cadmium, copper and lead in the SAR do not contribute to toxicity in the Santa Ana River.

e. Dischargers to the Santa Ana River are either in compliance with their NPDES permits or are meeting approved compliance schedules.

13. Adoption and implementation of the cadmium, copper and lead SSOs is consistent with the maximum benefit to the people of California, particularly because it encourages water reclamation and will support important social and economic development in the Santa Ana Region.

14. The findings of this Resolution with respect to metals SSOs are specific to the Santa Ana River and to cadmium, copper and lead These findings are not meant to establish precedent or be applicable to other metals or other water bodies.

15. The Regional Board has prepared and distributed a written report (Staff Report) on adoption of the revised Basin Plan, including site-specific objectives for metals, in compliance with applicable state and federal environmental regulations (California Code of Regulations, Section 3775, Title 23 and 40 CFR Parts 25 and 131).

16. The process of basin planning is exempt from the requirements of the California Environmental Quality Act (Public Resources Code Section 21000 *et seq*) to prepare an Environmental Impact Report or Negative Declaration. The updated Basin Plan includes a completed Environmental Checklist, an assessment of the environmental impacts of the adoption of the updated Basin Plan and a discussion of alternatives. The updated Basin Plan, Environmental Checklist, staff report and supporting documentation are functionally equivalent to an Environmental Impact Report or Negative Declaration.

17. Review of potential environmental impacts of adoption and implementation of the reviewed Basin Plan indicated that a substantial increase in energy consumption might be required and that there may be no feasible alternatives or mitigation measures for this impact. However, the only alternatives identified which would not require increase in energy consumption would not ensure protection of the beneficial uses of the waters of the Santa Ana Region and would therefore not comply with state and federal laws. Pursuant to CEQA regulations Section 15093a, Findings of Overriding Considerations, as attached to the Checklist, are therefore appropriate. The benefits of the Basin Plan amendments outweigh the unavoidable adverse environmental effects.

18. The Regional Board has considered federal and state antidegradation policies, the state Sources of Drinking Water Policy and other relevant water quality control policies and finds the updated Basin Plan consistent with those policies.

19. On January 28, 1994, the Regional Board held a Public Hearing to consider the revised Basin Plan, including site-specific objectives for metals. Notice of the Public Hearing was given to all interested persons and published in accordance with Water Code Section 13244.

20. This Basin Plan must be submitted for review and approval by the State Board, the Office of Administrative Law (OAL) and the US Environmental Protection Agency. Once approved by the State Board, the Basin Plan is to be submitted to the Office of Administrative Law. A Notice of Decision will be filed after the State Board and the Office of Administrative Law have acted on this matter. The Basin Plan must then be submitted for review by the U.S. Environmental Protection Agency.

21. The revised Basin Plan will become effective upon approval by the State Water Resources Control Board and the Office of Administrative Law

NOW THEREFORE BE IT RESOLVED THAT:

1. The California Regional Water Quality Control Board, Santa Ana Region, adopts the updated Water Quality Control Plan for the Santa Ana River Basin (8) as set forth in the attached document.

2. The Regional Board hereby adopts the Findings of Overriding Considerations attached to the Environmental Checklist prepared for the updated Water Quality Control Plan.

3. Resolution No. 93-64 adopting site-specific objectives for metals for the middle Santa Ana River system is hereby rescinded.

4. The Regional Board will implement the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan (Plans), where applicable, as long as they remain in effect. If the Plans are invalidated, the Regional Board will continue to issue National Pollutant Discharge Elimination System permits in compliance with the Porter-Cologne Act and applicable State and federal regulations, including but not limited to, 40 CFR 122.44(d).

5. Within three years after consultation with the Department of Fish and Game on specific waterbodies that support threatened or endangered species, and where scientific evidence indicates that certain existing water quality objectives for these water bodies do not adequately protect such species, the Regional Board will determine whether these objectives are adequately protective. In cases where such existing objectives do not provide adequate protection for threatened and endangered species, the Regional Board will develop and adopt adequately protective site-specific objectives for those constituents.

6. The Executive Officer is directed to forward copies of the updated Water Quality Control Plan for the Santa Ana River Basin (8) to the State Water Resources Control Board in accordance with the requirements of Section 13245 of the California Water Code.

7. The Regional Board requests that the State Water Resources Control Board approve the Water Quality Control Plan in accordance with the requirements of Sections 13245 and 13246 of the California Water Code and forward it to the Office of Administrative Law and the US Environmental Protection Agency-Region IX for approval.

I, Gerard J. Thibeault, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Santa Ana Region, on March 11, 1994.

Gerard J. Thibeault
Executive Officer

WATER QUALITY CONTROL PLAN

SANTA ANA RIVER BASIN (8)

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CHAPTER 1

INTRODUCTION

THE WATER QUALITY CONTROL PLAN (BASIN PLAN) FOR THE SANTA ANA RIVER BASIN

The State Water Resources Control Board (SWRCB or State Board) and the nine Regional Water Quality Control Boards (RWQCBs or Regional Boards) are responsible for the protection and, where possible, the enhancement of the quality of California's waters. The SWRCB sets statewide policy, and together with the RWQCBs, implements state and federal laws and regulations. Each of the nine Regional Boards adopts a Water Quality Control Plan, or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's ground and surface waters, and local water quality conditions and problems.

This document is the Basin Plan for the Santa Ana Region. The Santa Ana Region includes the upper and lower Santa Ana River watersheds, the San Jacinto River watershed, and several other small drainage areas. The Santa Ana Region covers parts of southwestern San Bernardino County, western Riverside County, and northwestern Orange County.

FUNCTION OF THE BASIN PLAN

The Basin Plan for the Santa Ana Region is more than just a collection of water quality goals and policies, descriptions of conditions, and discussions of solutions. It is also the basis for the Regional Board's regulatory programs. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The term "water quality standards," as used in the federal Clean Water Act, includes both the beneficial uses of specific waterbodies and the levels of quality which must be met and maintained to protect those uses. The Basin Plan includes an implementation plan describing the actions by the Regional Board and others that are necessary to achieve and maintain the water quality standards.

The Regional Board regulates waste discharges to minimize and control their effects on the quality of the region's ground and surface water. Permits are issued under a number of programs and authorities. The terms and conditions of these discharge permits are enforced through a variety of technical, administrative, and legal means.

Water quality problems in the region are listed in the Basin Plan, along with the causes, where they are known. For waterbodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included.

In some cases, it has been necessary for the Regional Board to completely prohibit the discharge of certain materials. Some types of discharges are prohibited in specific areas. Details on these prohibitions also appear in the Basin Plan.

LEGAL BASIS AND AUTHORITIES

The Basin Plan reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the California Water Code and the Clean Water Act.

California Water Code

California's Porter-Cologne Water Quality Control Act (Section 13000["Water Quality"] *et seq.*, of the California Water Code), which established both the State Water Resources Control Board and the present system of nine Regional Water Quality Control Boards, directs in Chapter 4, Article 3, "Regional Water Quality Control Plans," that each Regional Board is to formulate and adopt water quality control plans for all areas within the region and is to periodically review and revise them as necessary. Each Regional Board is to set water quality objectives that will insure the reasonable protection of beneficial uses and the prevention of nuisance, with the understanding that water quality can be changed somewhat without unreasonably affecting beneficial uses.

The California Water Code also lists the specific factors which are to be considered in establishing water quality objectives. A detailed listing appears in Chapter 4 (p. 4-1).

Implementation plans are to include, but are not limited to:

(1) a description of the nature of the actions necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private;

(2) a time schedule for the actions to be taken; and

(3) a description of the surveillance to be undertaken to determine compliance with the objectives.

Clean Water Act

The objective of the federal Clean Water Act is to "*restore and maintain the chemical, physical and biological integrity of the Nation's waters*," to make waters of the United States "fishable and swimmable." The Clean Water Act includes several sections which relate to Basin Plans and the basin planning process, including sections on Areawide Waste Treatment Management, Basin Planning, and Water Quality Standards and Implementation Plans.

The Clean Water Act requires that states adopt water quality standards, including standards for toxic substances. The states are also required to have a continuing planning process, which includes public hearings at least once every three years to review the water quality standards and revise them if necessary.

ENVIRONMENTAL SETTING

The Santa Ana Region is the smallest of the nine regions in the state (2800 square miles) and is located in southern California, roughly between Los Angeles and San Diego. Although small, the region's four million residents (1993 estimate) make it one of the most densely populated regions. People have come to southern California over the years for a wide variety of reasons. Once here, many decide to stay. Snow skiing areas in the mountains are as little as two hours from world-famous broad, sandy ocean beaches.

The climate of the Santa Ana Region is classified as Mediterranean: generally dry in the summer with mild, wet winters. The average annual rainfall in the region is about fifteen inches, most of it occurring between November and March. Much of the area would be near-desert were it not for the influence of modern civilization.

Regional Boundaries and Geography

In very broad terms, the Santa Ana Region is a group of connected inland basins and open coastal basins drained by surface streams flowing generally southwestward to the Pacific Ocean (See Figure 1-1).

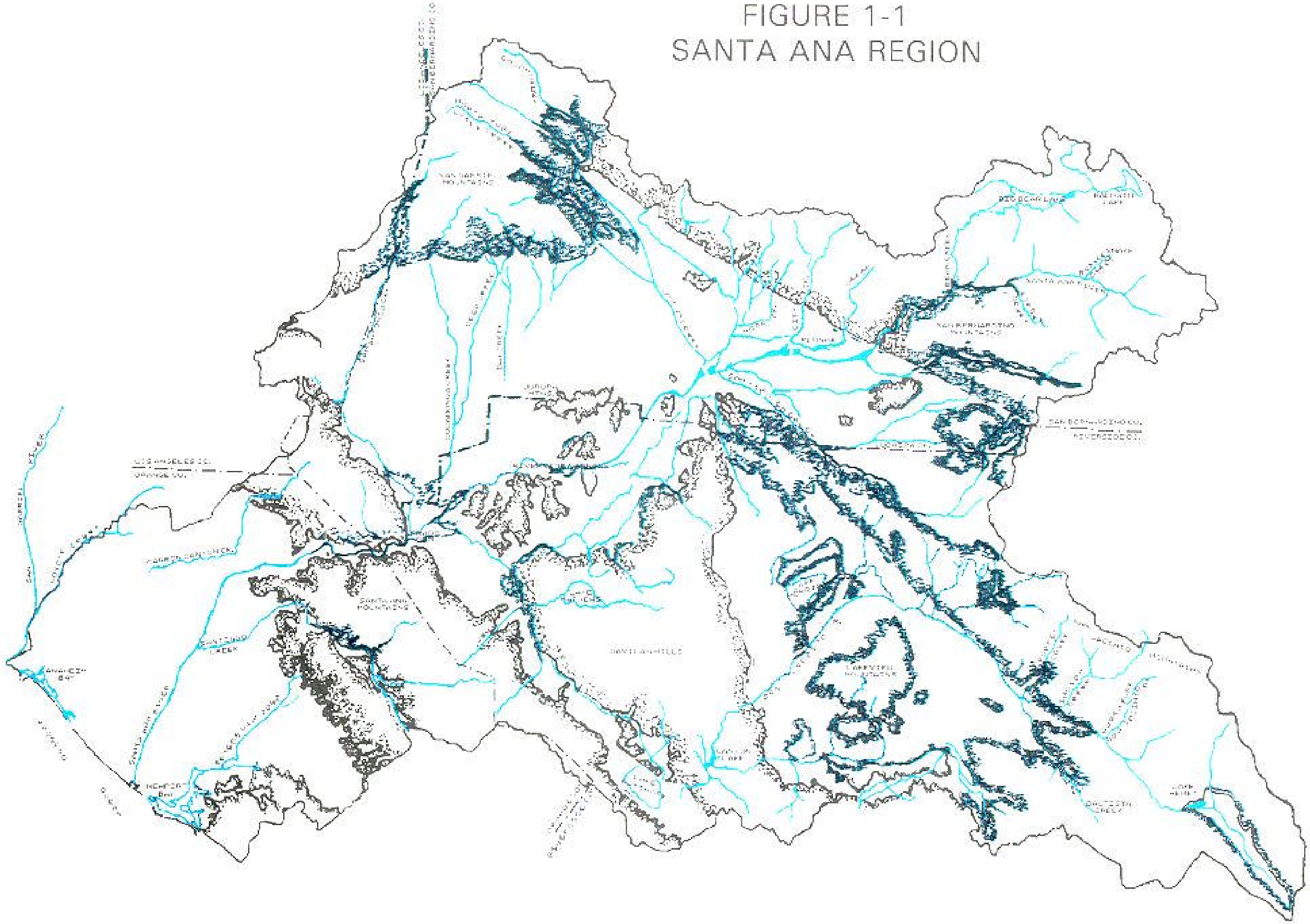
The boundaries between California's nine regions are usually hydrologic divides that separate watersheds, but the boundary between the Los Angeles and Santa Ana Regions is the Los Angeles County line. Since that county line only approximates the hydrologic divide, part of the Pomona area drains into the Santa Ana Region, and, in Orange County, part of La Habra drains into the Los Angeles Region.

The east-west alignment of the crest of the San Gabriel and San Bernardino Mountains separates the Santa Ana River basin from the Mojave Desert, which is part of the Lahontan Basin (Region 6).

In the south, the regional boundary divides the Santa Margarita River drainage area from that of the San Jacinto River, which normally terminates in Lake Elsinore.

Near Corona, the Santa Ana River has cut through the Santa Ana Mountains and flows down onto the Orange County coastal plain. The Pacific Ocean coast of the Santa Ana Region extends from just north of Laguna Beach up to Seal Beach and the Los Angeles County line. Other features of the coast include Newport Bay, Anaheim Bay-Huntington Harbour, and the major coastal wetlands areas associated with those bays.

FIGURE 1-1
SANTA ANA REGION



Geological Faults

Southern California is a geologically active area. Major earthquake faults in the region include the San Andreas Fault and its large branch, the San Jacinto Fault; the Elsinore-Whittier Fault; and the Newport-Inglewood Fault. The San Andreas Fault divides the San Gabriel Mountains from the San Bernardino Mountains. The San Jacinto Fault, which splits off from the San Andreas Fault near San Bernardino, affects groundwater flows associated both with the Santa Ana and San Jacinto Rivers. The Elsinore-Whittier Fault passes under Prado Dam as it trends, like the others, from the northwest toward the southeast. The Newport-Inglewood Fault enters the region from the Los Angeles basin and passes offshore at Newport Beach. In addition to these major faults, there are many branching, connecting, and parallel faults in the region.

HISTORY OF WATER DEVELOPMENT

Early Settlement

Following the Spanish Mission and Rancho Periods, early agriculture centered around horses and cattle. In the early 1800s, the increasing population required more farms and orchards to produce more food. The weather generally supported farming year-round, but the dry summers made irrigation a necessity. Once water supplies became dependable, vast areas of citrus orchards and vineyards also followed. Today, the region still has strong ties to agriculture, including a large dairy industry, but much of what remains is under increasing development pressure. The future probably involves an even larger human population and much less commercial agriculture.

Original Conditions

Before this area was settled, it is thought that the Santa Ana River flowed from its headwaters in the San Bernardino mountains to the Pacific Ocean throughout most of the year. The San Jacinto River, also a substantial surface stream, typically would have ended at Lake Elsinore, which acted as an inland sink. Once out of the sycamore-filled mountain canyons, these rivers meandered along in sandy streambeds, shaded by willows, cottonwoods, and live oaks, flows decreasing where water percolated, filling the groundwater basins, increasing where local geological features forced the groundwater to the surface. High groundwater made springs, swampy areas, marshes, and bogs common.

Deep alluvial valley deposits made up large groundwater basins, both in the inland valleys and on the coastal plain, basins naturally full of fresh water. Along with its nearby tributaries, the Santa Ana River fed the Bunker Hill groundwater basin, the Colton and Riverside basins, and to a lesser extent, part of the Chino Basin. Streams in the San Gabriel Mountains recharged the Chino Basin. The San Jacinto River recharged a deep (over two thousand feet) graben, the San Jacinto groundwater basin, as it left the mountains, then several other basins in succession on its way to Lake Elsinore. When especially heavy rainfall or a series of wet winters filled Lake Elsinore, overflows went down Temescal Creek to the Santa Ana River near Corona. The Santa Ana River entered Santa Ana Canyon and passed through the coastal mountains out onto the Orange County Plain, overlying another large, deep groundwater basin largely recharged by river flows. With the diversion of most of this natural surface flow for agricultural and domestic uses, creeks and rivers dried up, carrying only storm flows and runoff. Eventually, treated wastewater replaced some of the flows in some streams.

Irrigation

The first irrigation diversions were made directly from the streams, often using crude brush and sand dams and hand-dug ditches to lead the water from the river to the fields. As more and more settlers arrived, the number of diversions increased. Eventually, all the surface flows were taken and groundwater recharge diminished sharply.

Groundwater pumping became necessary to provide water for irrigation and for the growing settlements. Windmills were followed by motor-driven pumps, and as groundwater levels fell, deep well turbines became necessary. Artesian areas, such as those near San Bernardino and in Fountain Valley, stopped flowing naturally. The springs, swamps, and other historically wet areas began drying up.

The history of the San Jacinto River and its tributaries parallels that of the Santa Ana. The San Jacinto had historically kept all the groundwater basins in that part of the region full. Now, there is essentially no surface flow beyond the mouth of the canyon, where it exits the mountains; the riverbed is typically dry. Flood flows every five or ten years, however, produce a broad, shallow "Mystic Lake" in the riverbed near the town of Lakeview.

Further downstream, the river is dammed to form Canyon Lake, just upstream from Lake Elsinore. As noted earlier, Lake Elsinore is normally a sink, with no outflow. High annual evaporation rates have historically limited the amount of water in the lake, which has gone dry several times in this century. Only torrential rains or extended wet cycles have produced the rare overflows down Temescal Creek to the Santa Ana River. Several projects to stabilize the level of Lake Elsinore are now being completed.

When local water supplies inevitably ran short, the area's economy, based on agriculture, was strong enough to help support the construction of large imported water projects. The Metropolitan Water District of Southern California (locally MWD-SC or "Met") built and still operates the Colorado River Aqueduct, which has imported millions of acre-feet of water from the Colorado River across the Mojave Desert and into the region. A second, newer system, the California Water Project, pumps comparable volumes of water out of the Sacramento-San Joaquin Delta for delivery to the Santa Ana Region and other parts of Southern California.

Santa Ana River Stipulated Judgement

Despite the availability of imported water, legal arguments focused on locally available (generally cheaper) water supplies. Overuse of the upstream water by extensive recycling had reduced summer flows in the Santa Ana River to a trickle, and even that trickle was somewhat salty. The largest of these legal arguments pitted Orange County (the downstream users) against all of the upstream users in Riverside and San Bernardino Counties. When the case was settled through an engineered solution, the four largest water districts -- San Bernardino Valley Municipal Water District (MWD), Chino Basin MWD, Western MWD, and Orange County WD -- agreed to implement the court's solution through a Santa Ana River Watermaster.

Minimum average annual flows and guaranteed quality (total dissolved solids, or TDS) from the San Bernardino area to and through the Riverside Narrows were required, as well as flows from the upper basin to the lower basin (Orange County), measured at Prado Dam. The water required to meet the Stipulated Judgement can be made up of wastewater, imported water, dry weather runoff or some combination of these, with TDS the measure of minimum acceptable quality.

Together, the four large water agencies affected by the judgement formed SAWPA, the Santa Ana Watershed Planning (later "Project") Authority, a forum for discussion of water issues as well as a joint powers agency that can build projects of common interest to two or more members.

BASIN PLANNING

History

In the 1950s and '60s, the Regional Boards were not actively involved in water quality planning. Water quality problems typically resulted in controls on waste discharges, usually including effluent limits for TDS and perhaps a few other parameters. Beyond that, the only serious restrictions prohibited the creation of a pollution or nuisance. By 1970, however, the Regional Boards were actively involved in the formulation of plans to meet established water quality objectives. The federal Clean Water Act and the Porter-Cologne Act, which required basin-wide planning, plus the National Pollution Discharge Elimination System (NPDES), which empowers the states to set discharge standards, placed new tools in the hands of the Regional Boards and encouraged the development of new approaches to water quality management. With the development of the "1967 Standards," applicable to interstate waters, came Water Quality Control Policies for the San Gabriel Tidal Prism, for the Coastal Bays, Marinas and Sloughs, and for Pacific Ocean Coastal Waters.

In the Santa Ana Region, the 1971 Interim Water Quality Control Plan incorporated the 1967

Standards and set water quality objectives for the Santa Ana River at Prado Dam. After the State Board developed the Ocean Plan and the Thermal Plan, the Revised Interim Water Quality Control Plan incorporated that information.

Also in the early 1970s, the Santa Ana Regional Water Quality Control Board (Regional Board) was investigating the salt balance situation in the upper basin. An early computer model, primitive and slow by modern standards but providing answers of a kind never available before, had been used to assess the situation. SAWPA was contracted to write the first (1975) essentially complete Basin Plan (Water Quality Control Plan) for the Regional Board, using an improved version of that model.

The 1975 Basin Plan outlined a specific water quality management scheme designed to improve groundwater quality in the upper basin. Unfortunately, the kinds of large-scale actions necessary to maintain the quality of the region's ground and surface waters -- basin management facilities, changes in water supply, regional wastewater treatment -- were well beyond the regulatory powers of the Regional Board.

One of the region's major problems at that time was salt balance. Salt (TDS) buildup in the water results from excessive reuse of a given volume of water. Each cycle of use, whether in the home, in industry or use by irrigated agriculture, adds salts directly or indirectly, either through partial evaporation (or evapotranspiration) or direct addition of soluble materials. Typically, each use of water adds 200-300 parts per million (ppm) or milligrams per liter (mg/L) of TDS. TDS begins to interfere with the use of water somewhere between 500 and 1000 mg/L TDS; at 2000 mg/L, water is brackish and generally unusable. In order to allow for subsequent use downstream and to keep ground and surface water bodies usable, careful management of water reuse was necessary. Unlimited recycling created water quality problems. "Pumpback" schemes were strongly discouraged.

Part of the 1975 Basin Plan's solution to the salt balance problem, which seemed most acute in the Chino groundwater basin, was to import and recharge large volumes of low-TDS State Water Project (SWP) water. A second feature of the implementation plan was a large wellfield to extract poor quality water from the lower part of the basin. The third component was a pipeline to the sea to export brines from the upper basin. As years have passed, the list of projects has changed, with desalters replacing groundwater flushing projects. Most of the brine line (the Santa Ana River Interceptor or SARI Line) has been built and one groundwater desalter (Arlington) is now in place. Plans for two more desalters (East and West Chino Basin) in this area are still in design; at least one more is proposed in the San Jacinto watershed.

The Santa Ana Regional Water Quality Control Board and SAWPA (now also including Eastern MWD as a member) have continued to work together toward a common goal a well-operated basin that meets reasonable standards in an economical manner and provides high-quality water supplies when and where they're needed.

THE SANTA ANA RIVER

Reaches

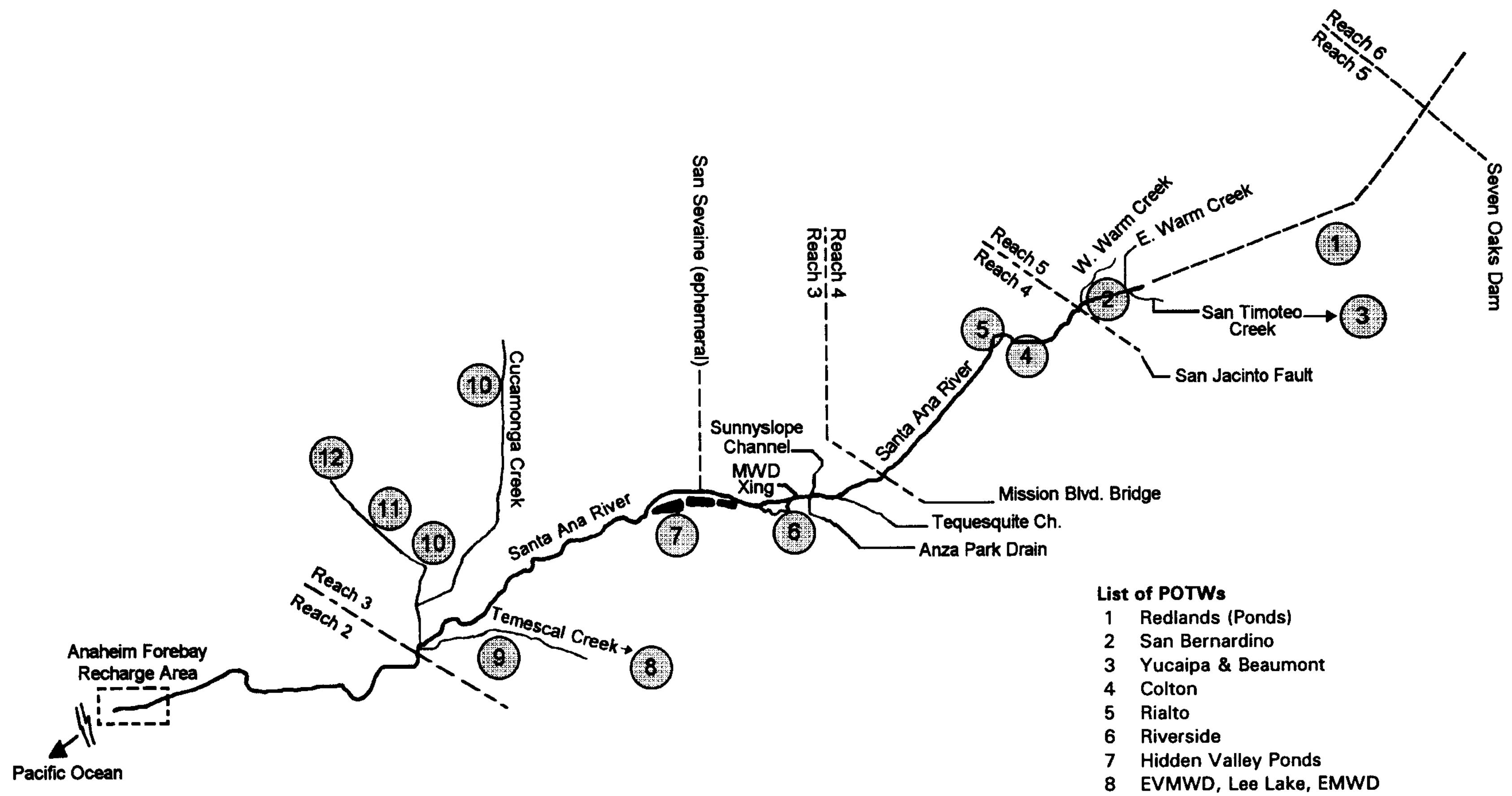
The mainstem of the Santa Ana River is divided into six reaches (Figure 1-2). Each reach is generally a hydrologic and water quality unit.

Reach 6 includes the river upstream of Seven Oaks Dam, now under construction. Flows consist largely of snowmelt and storm runoff. Water quality tends to be very high.

Reach 5 extends from Seven Oaks Dam to San Bernardino, to the San Jacinto Fault (Bunker Hill Dike), which marks the downstream edge of the Bunker Hill groundwater basin. Most of this reach tends to be dry, except as a result of storm flows, and the channel is largely operated as a flood control facility. The extreme lower end of this reach includes rising water and intermittently, San Timoteo Creek flows.

Reach 4 includes the river from the Bunker Hill Dike down to Mission Boulevard Bridge in Riverside. That bridge marks the upstream limit of rising water induced by the flow constriction in the Riverside Narrows. Until about 1985, rising water from upstream and wastewater

FIGURE 1-2
SANTA ANA RIVER AND TRIBUTARIES



List of POTWs

1 Redlands (Ponds)
2 San Bernardino
3 Yucaipa & Beaumont
4 Colton
5 Rialto
6 Riverside
7 Hidden Valley Ponds
8 EVMWD, Lee Lake, EMWD
9 Corona (Ponds)
10 CBMWD RP-1
11 CBMWD RP-2
12 CBMWD Carbon Cyn.

discharges percolated and the lower part of the reach was dry. Flows are now perennial, but may not remain so as new projects are built. Much of this reach is also operated as a flood control facility.

Reach 3 includes the river from Mission Bridge to Prado Dam. In the Narrows, rising water feeds several small tributaries (Sunnyslope Channel, Tequesquite Arroyo, and Anza Park Drain) which are important breeding and nursery areas for the native fish. Temescal, Chino, and Mill/Cucamonga Creeks in Prado Basin are also important river tributaries.

Reach 2 carries all the upstream flows down through Santa Ana Canyon to Orange County, where as much of the water as possible is recharged into the Orange County groundwater basin. The downstream end of the forebay/ recharge area and, therefore, the ordinary limit of surface flows, is at 17th Street in Santa Ana.

Reach 1 is a normally dry flood control facility, presently being expanded and improved even further as part of the U.S. Army Corps of Engineers' Santa Ana River Project. This reach extends from 17th Street to the tidal prism at the ocean.

Flows and Water Quality

When the Santa Ana River Stipulated Judgement was finalized in 1969, surface diversions and groundwater pumping had eliminated most of the dry weather surface flows in the river system between the mountains and Prado Dam. As the inland cities grew, wastewater flows increased. Between 1970 and 1990, the total volume rose from less than 50,000 to over 130,000 acre-feet per year. The river is effluent-dominated, a rare circumstance outside the Southwest. Nevertheless, water quality in the river has improved steadily, due largely to the efforts of the dischargers acting in response to the requirements of the Regional Board.

In the 1970s, secondary treatment with disinfection was required in order to protect the health of the people who used it for contact recreation. These treatment requirements were further upgraded to include virus control: in-line coagulation and filtration and improved disinfection (or their equivalents) were then required. In the late 1980s, control of inorganic nitrogen levels was required to protect the aquatic habitat from un-ionized ammonia toxicity and to manage nitrate levels in groundwater for subsequent municipal uses. Further controls on residual chlorine levels were also added.

By 1991, when SAWPA's Use-Attainability Analysis of the middle Santa Ana River was conducted; full compliance with all these requirements had not yet been achieved. The river was posted to warn against water contact recreation, because certain upstream dischargers had not achieved compliance with virus control requirements. Compliance is expected by the end of 1995. Other identifiable water quality problems in the river were restricted to parts of Reach 4 where ammonia and chlorine controls were not yet in place. No water quality impairment due to toxics was seen in other parts of the system. In those other areas, the kinds and numbers of aquatic organisms at any given location tend to be dictated by habitat conditions.

Aquatic Environment in the Santa Ana River

Because flows are limited or generally absent in several parts of the Santa Ana River, there is no sustained aquatic habitat in those areas. Even where there are perennial flows, the habitat is frequently harsh -- warm, shallow water, shifting sand substrate, little or no instream cover, and no riparian vegetation or tree canopy for shade.

There are no dependable flows from the mouth of the canyon, where the river leaves the mountains, for some distance downstream. In the canyon itself, the Corps of Engineers is presently building the Seven Oaks Dam, a large flood control structure. Groundwater recharge basins immediately downstream percolate flows from the river and its nearby tributaries. The river channel is operated as a typically dry flood control facility.

In the San Bernardino area, the San Jacinto Fault (Bunker Hill Dike) forces groundwater to the surface. At present (1993), perennial flows in the middle Santa Ana River begin at the confluence with East Warm Creek, a short distance upstream. The rising water area associated with the fault, now relatively small, was historically a much larger, swampy area with many large springs. San Timoteo Creek, which the Corps of Engineers plans to line with concrete in the near future, joins the river in this area, its flows predominantly reclaimed wastewater from Yucaipa and other upstream dischargers.

East Warm Creek (near San Bernardino) carries small amounts of water from various non-point sources as well as some rising water. The San Bernardino Publicly-Owned Treatment Works (POTW) currently discharges to this creek just upstream of where it joins the river, but the city plans to move its point of discharge downstream in the near future. The river passes under several major highways and railroads in this area, and parts of the river bottom are lined with concrete. West Warm Creek, fully improved by the Corps for flood control but usually dry, also joins the river in this area.

The Santa Ana River Use-Attainability Analysis (1991) found areas of relatively high habitat value downstream of La Cadena Avenue in Colton, but these areas were largely washed out during the wet 1992-93 winter. Aquatic biota in the stream in this part of Reach 4 were limited, however, because certain POTWs had not yet installed full tertiary treatment and because physical conditions downstream -- high temperatures, lack of cover or shelter -- strongly discouraged upstream or downstream migration. Recent flood control maintenance practices have included removal of all vegetation and straightening of the river channel, severely reducing the value of the habitat. Surface flows presently continue on down through Reach 4, though conditions are likely to change when San Bernardino and Colton effluents are diverted to the RIX (rapid infiltration and extraction) project further downstream. The City of Rialto may also change its point of discharge to the river.

Near the Mission Boulevard Bridge and the upstream limit of Reach 3, rising water marks the Riverside Narrows area. Groundwater rises in the river channel and to either side as well. This water supports several small tributaries: Sunnyslope Channel, mostly improved for flood control; Tequesquite Arroyo Creek, which also drains Sycamore Canyon; and Anza Park Drain. In addition, the overflow from Lake Evans makes up a perennial tributary to the river in this area. These small streams form the present center of population of the Santa Ana Sucker, one of two remaining native species.

The City of Riverside's POTW on the south side of the river discharges in the Narrows, diverting all or part of its flows through the Hidden Valley Wildlife Area. Jurupa's Indian Hills POTW on the north side is permitted to discharge under certain conditions as well, but typically reclaims all its flow for golf course landscape irrigation.

From the Riverside Narrows area downstream to Prado Basin, the river is generally natural and unmodified. Even here, however, the water is warm because the mainstem is generally shallow and has a limited canopy. The substrate is dominated by shifting sand, limiting the bottom habitat and available opportunities for attached algae and insects, with only occasional gravel bars and riffles. The Santa Ana River Use-Attainability Analysis demonstrated that these habitat limitations dictate the kinds and numbers of aquatic organisms found here.

The Prado Flood Control Basin is a largely undisturbed, dense riparian wetland. In this area, flows in tributaries from both north and south of the river are again augmented by rising water. Temescal Creek comes in from the south, also carrying Arlington Channel flows and the occasional overflows from Lake Elsinore mentioned previously. A short distance from the river, near the edge of Prado Flood Control Basin, a section of Temescal Creek is the breeding center of the local Arroyo Chub population, the second native fish species still present in the middle river system. All the other species of fish found in the Middle Santa Ana River, including mosquitofish, bass, carp, catfish, etc., are exotics, escaped or introduced species.

All of the creeks draining Chino Basin come into the river on the north side, but the total dry-weather surface flow is negligible. Reclaimed wastewater from Chino Basin MWD's Regional Plant 1 is discharged to Cucamonga Flood Control Channel and Prado Park Lake. Cucamonga Channel, concrete-lined, offers extremely limited aquatic habitat some attached algae, a few worms and insects, but no resident finfish. The improved channel ends near Prado Basin, and the stream changes names to Mill Creek. Chino Basin MWD's Regional Plant 2 discharges to Chino Creek near Prado Basin, some distance downstream of the discharge from the relatively new Carbon Canyon Plant. The lowest segments of Chino and Mill Creeks, down in Prado Basin, are quite different from most other streams in the watershed, with their muddy bottoms and deeper, slow-flowing water.

Most of the rising Chino Basin groundwater in the Prado area is high in TDS, nitrate, and other constituents, largely reflecting heavy present and historic agricultural water use in the area. Much of the initial water development went to citrus irrigation. That was supplanted first by large-scale vineyards and then by dairies, which are now slowly yielding to urban development.

Temescal Creek also carries reclaimed wastewater from the Lake Elsinore area, but most of that water percolates fairly quickly. Eastern MWD may discharge reclaimed wastewater to Temescal Creek in the future.

Below Prado Dam, the aquatic habitat is again different. The channel is deep in many places, with some rocky substrate and rapid sections. It supports a variety of organisms. In contrast, other stretches are improved for flood control. The river slows as it reaches Anaheim, where Orange County Water District diverts and recharges essentially all the dry weather flows. Downstream from the groundwater recharge areas near Anaheim, the Santa Ana River is normally dry.

WATER SUPPLY AND WASTEWATER RECLAMATION

The most serious water-related problem in the Santa Ana River Basin at this time is water supply. This region now uses approximately twice as much water as is available from local sources. As a result, the quantity of water imported into this region each year now equals or exceeds the amount of ground and surface water utilized.

As noted earlier, the Colorado River Aqueduct delivers water to Lake Mathews, but the relatively high mineral content of this water limits its reuse in this area. The State Water Project likewise imports water from the Sacramento-San Joaquin Delta, water with lower levels of dissolved minerals. State Water Project water can be used and reused again.

FLOOD CONTROL

Most of the annual rainfall in the Santa Ana Region occurs in the winter, as noted earlier. Further, most of it can come in a day or two, resulting in major floods and widespread damage. The last of these was shortly before World War II much of coastal Orange County was inundated, stimulating the construction of Prado Dam by the U.S. Army Corps of Engineers (Corps). The subsequent further urbanization of Orange County has been accompanied by channelizing essentially all the surface streams in the area.

The Corps is presently increasing the capacity of the main river channel through Orange County, and has begun construction of Seven Oaks Dam in the San Bernardino Mountains, upstream of the mouth of Santa Ana River Canyon. Another of the Corps' current projects involves increasing the height of Prado Dam.

Flood control channels are typically designed to move large volumes of water from one place to another rapidly, without property damage. A fully improved channel is usually concrete, severely limiting the aquatic habitat beneficial uses. Partially improved channels may only have levees on either side, but other flood control activities (such as channel straightening, vegetation clearing, and weed control using copper or other toxic materials) can reduce or eliminate the aquatic habitat. Storm flows themselves, not necessarily part of flood events, can and do eliminate streamside habitat in parts of the river through sheer scouring force every few years.

ADOPTION OF THE BASIN PLAN AMENDMENTS TO THE BASIN PLAN

As noted earlier, the California Water Code established the original requirements for the Basin Plan. After the necessary workshops and public hearings, the Regional Board formally adopts the Plan and forwards it to the State Board for their review and approval.

Pursuant to the California Fish and Game Code, Section 2090, Article 4, the Regional Board is required to consult with the Department of Fish and Game with respect to addressing the potential impacts (a) Basin Plan provisions(s) may have on rare, threatened or endangered species within the Region. A Basin Plan or amendment is not considered final until that consultation has occurred.

After State Board approval, the Office of Administrative Law (OAL) must review and approve any new regulatory provisions in the plan to assure that six specific standards are met: necessity (need for the regulation), authority (legislative or legal), clarity (easily understood), consistency (with other regulations), reference (Water Code or other citation), and non-duplication (of existing regulations).

The plan is also transmitted to EPA for review and approval of those parts of the plan that establish or modify water quality standards, as defined in the Clean Water Act (CWA).

CONTENTS OF THE BASIN PLAN

Chapter 2 (Plans and Policies) describes some of the many statewide regulatory and guidance documents which apply to and shape the Regional Board's activities.

Chapter 3 (Beneficial Uses) discusses the many beneficial uses of the various waters of the Santa Ana Region. Ground and surface waterbodies are identified and tabulated, showing the beneficial uses of each.

Chapter 4 (Water Quality Objectives) also tabulates the region's waterbodies, and lists the water quality objectives (levels of various water quality parameters which must be met) necessary to protect those beneficial uses.

Chapter 5 (Implementation) details the Regional Board's water quality regulation and protection programs, lists the region's significant water quality problems and conditions, and describes approaches and solutions to them.

Chapter 6 (Monitoring and Assessment) contains listings and discussions of the monitoring programs, agencies involved, sampling locations and parameters tested, as well as the programs which collect, manage and maintain the data bases. California's statewide Water Quality Assessment is also described and referenced.

Chapter 7 (Water Resources and Water Quality Management) covers topics of regional importance not addressed in the other chapters.

REFERENCES

California Water Code, Section 13000, "Water Quality" *et seq.*

Clean Water Act, PL 92-500, as amended

Annual Reports of the Santa Ana River Watermaster (Orange County Water District vs. City of Chino, *et al.*) Case No. 117628 - County of Orange

Santa Ana Watershed Project Authority, Reports of the Santa Ana River Use-Attainability Analysis, 1991-3

CHAPTER 2

PLANS AND POLICIES

INTRODUCTION

In addition to the Santa Ana Region Basin Plan, a number of water quality control plans and policies adopted by the State Water Resources Control Board direct the Regional Board's actions. The State Board Plans and Policies which apply in this region are briefly described below. Copies of these plans and policies are attached in Appendix I.

These plans and policies may be reviewed periodically and may be revised. The Regional Board should be contacted to determine if a particular plan or policy is still current.

STATE BOARD PLANS

Thermal Plan (Resolution No. 75-89)

This plan, formally known as the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California," was developed and adopted in order to minimize the effects of wastes and wastewaters on the temperature of the receiving waters. This plan specifies water quality objectives, effluent quality limits, and discharge prohibitions related to thermal characteristics of interstate waters, enclosed bays, estuaries, and waste discharges.

Ocean Plan (Resolution No. 90-27)

The "Water Quality Control Plan for Ocean Waters of California," amended in 1990, establishes beneficial uses and water quality objectives for waters of the Pacific Ocean along the California coast outside of enclosed bays, estuaries, and coastal lagoons. The Ocean Plan prescribes effluent quality requirements and management principles for waste discharges and specifies certain waste discharge prohibitions.

The Ocean Plan identifies specific objectives for bacteriological, physical, chemical, and biological characteristics and radioactivity. These objectives are implemented by issuance of waste discharge requirements which include effluent limitations on major wastewater constituents and receiving water limitations for toxic materials. In addition, the Ocean Plan prohibits discharges of specific hazardous substances and waste sludge, bypassing of untreated waste, and impacts to Areas of Special Biological Significance.

Nonpoint Source Management Plan (Resolution No. 88-123)

In 1988, the State Board adopted the Nonpoint Source Management Plan which established the framework for statewide nonpoint source activities. Six statewide objectives and implementation strategies to manage nonpoint source problems are included in the plan. Chapter 5 provides more detailed information regarding the management plan.

Point sources were the principal focus of water quality control in the 1970's and 1980's. Nonpoint sources are now receiving a larger proportion of planning and regulatory attention.

STATE BOARD POLICIES

Policy with Respect to Maintaining High Quality Waters in California (Resolution No. 68-16)

The regulations implementing the Clean Water Act (40 CFR 131.6; 131.12(a)) require that each state develop and adopt a statewide antidegradation policy. In California, this requirement is satisfied by SWRCB Resolution No. 68-16, the "Statement of Policy with Respect to Maintaining High Quality Waters of California." The SWRCB policy requires the continued maintenance of existing high quality waters unless there is a demonstration that: (1) allowing some degradation is consistent with the maximum benefit to the people of the state; and (2) that such degradation would not unreasonably affect existing or potential beneficial use.

Actions which may adversely affect surface water quality must satisfy both Resolution No. 68-16 and the federal antidegradation policy (40 CFR 131.12). The requirements of the two policies are similar: the federal policy requires that existing instream uses and the level of water quality necessary to protect them must be maintained and protected. In addition, a reduction in water quality can be allowed only if there is a demonstration that such a reduction is necessary to accommodate important economic or social development.

Policy for Water Quality Control (by motion July 6, 1972)

This policy declares the State Board's intent to protect water quality through the implementation of water resources management programs and serves as the general basis for the adoption of subsequent water quality control policies.

Policy for Enclosed Bays and Estuaries (Resolution No. 74-43)

The Bays and Estuaries Policy recognizes the high environmental and ecological values of the bays and estuaries in the state. Specific direction is given regarding the San Francisco Bay-Delta system. New discharges to other bay and estuarine waters are prohibited unless enhancement of those waters can be demonstrated. It is also the state's stated policy to phase out or in other ways eliminate existing discharges to bays and estuaries unless such enhancement can be demonstrated.

Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling (Resolution No. 75-58)

This policy provides consistent principles and guidance for supplementary waste discharge requirements or other water control actions for thermal powerplants using inland waters for cooling. The policy specifies that fresh inland waters should be used for cooling only when other alternatives are environmentally undesirable or economically unsound.

Policy and Action Plan for Water Reclamation (Resolution No. 77-1)

The Reclamation Policy recognizes the present and future need for increased amounts of water in California, primarily to support growth. This policy commits both the State Board and Regional Boards to support reclamation in general and reclamation projects which are consistent with sound principles and demonstrated needs.

Policy on the Disposal of Shredder Waste (Resolution No. 87-22)

This policy permits the disposal of shredded wastes produced by the mechanical destruction of car bodies, old appliances, and similar castoffs, into certain landfills under specific conditions designated and enforced by the Regional Boards.

Supplementary to the state policy, the Santa Ana Regional Board Shredder Waste Policy (Resolution 87-108) designates specific solid waste facilities in the region which are authorized to accept shredder waste. Prior to accepting shredder waste at a facility, a Report of Waste Discharge (ROWD) is required to be submitted to the Regional Board.

Sources of Drinking Water Policy (Resolution No. 88-63)

The Sources of Drinking Water Policy (Policy) declares that with specified exceptions, all waters of the state are to be considered suitable, or potentially suitable, for municipal or domestic supply and should be so designated (MUN) by the Regional Boards. Those waters excepted under the Policy include the following: surface and groundwaters with total dissolved solids (TDS) levels in excess of 3,000 mg/L; surface and groundwaters that are contaminated, either by natural processes or by human activity, to the extent that they cannot reasonably be treated for domestic use; and surface waters in systems designated or modified to carry municipal/industrial/agricultural wastewaters or stormwater runoff. Other exceptions are specified in the Policy.

Adoption of the Policy required that Regional Boards review the beneficial uses of their ground and surface waters and determine where MUN designations should be added and which water bodies should be excepted. Periodic reviews and updates of Regional Basin Plans must conform to this Policy.

STATE BOARD PLANNING ACTIVITIES FOR THE BAY/DELTA

The SWRCB is engaged in a comprehensive, multiphase program to protect the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. While the Santa Ana Regional Board will not be directly involved in implementing the management plans which result from this program, the SWRCB's actions are likely to affect both water quality and quantity in the Region and may therefore indirectly affect the Regional Board's water quality control programs.

The Bay/Delta water system is a major source of supply to the State, providing more than half of all water used in California. The Bay/Delta is also of extreme ecological significance: it is one of the largest systems for fish and waterfowl habitat and production in the United States.

Two major water distribution systems divert water from the Delta: the Central Valley Project, operated by the United States Bureau of Reclamation; and the State Water Project (SWP), operated by the California Department of Water Resources. The SWP is an important source of high quality, supplemental water supplies for the Santa Ana Region (see Chapter 5 - Salt Balance and Assimilative Capacity). Numerous other water diversion and management efforts influence the inflows into, flows through, and outflows from the Bay/Delta estuary.

In 1978, the SWRCB adopted the "Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh" (the Delta Plan) and Water Rights Decision 1485 (D-1485). The Delta Plan established water quality objectives for salinity and outflow standards and operational constraints necessary to meet the objectives and assure reasonable protection of beneficial uses. These outflow standards and operational constraints are implemented through D-1485.

The Delta Plan proceedings were limited to the current and near term conditions in the Delta. The SWRCB committed to subsequent review of the Delta Plan and is now in that process.

The current Bay/Delta review program has a number of components, including the development and adoption by the SWRCB of the "Water Quality Control Plan for Salinity - San Francisco Bay/Sacramento-San Joaquin Delta Estuary" (Salinity Plan, 91-15 WR, May 1991). This Plan is primarily concerned with salinity and temperature factors. Numerous water quality objectives were established for: salinity at municipal and industrial intakes; salinity levels to protect Delta agriculture; salinity levels to protect export agriculture; and salinity for fish and wildlife resources in the Estuary. Water quality objectives were also established to provide expansion of the period of protection for striped bass spawning, and to address temperature and dissolved oxygen levels for fisheries in the Delta.

This Salinity Plan set the stage for the ongoing Water Rights phase of the proceedings. Determining the flow requirements necessary to meet the Plan objectives and the allocation of responsibility for meeting those objectives will lead to a revised Water Rights Decision.

A draft decision (D-1630) was released in 1992 and revised in 1993. D-1630 called for substantial limits on exports of waters from the Bay/Delta system, including exports to the SWP, during spring. The quality of Bay/Delta waters is generally best during this time of high flows. Limiting exports to other times of the year is likely to mean that poorer quality water will be supplied to users outside the Bay/Delta system, including the Santa Ana Region. High quality SWP water is essential to address the severe mineralization problem in this Region (see Chapter 5).

The SWRCB has determined that it will not adopt an interim water rights decision (D-1630), in part because the above-average rainfall during 1993 eliminated the urgent need to do so to protect fish and wildlife resources. The SWRCB has resumed its proceedings to establish a long-term water right decision to replace D-1485.

CHAPTER 3
BENEFICIAL USES

INTRODUCTION

Basically, a beneficial use is one of the various ways that water can be used for the benefit of people and/or wildlife. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats.

Section 303 of the federal Clean Water Act (33 U.S.C. §1313) defines water quality standards as consisting of both the uses of the surface (navigable) waters involved and the water quality criteria which are applied to protect those uses. Under the Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Chapter 2, §13050), these concepts are separately considered as beneficial uses and water quality objectives. Beneficial uses and water quality objectives are to be established for all waters of the state, both surface and subsurface (groundwater).

BENEFICIAL USES

Beneficial uses were tabulated and discussed in Chapters 1 and 2 of the 1975 Basin Plan and in Chapter 2 of the 1983 Basin Plan. In 1983, twenty-one beneficial uses were defined statewide. Of those, eighteen were identified and recognized in the 1983 Plan: MUN, AGR, IND, PROC, GWR, NAV, POW, REC1, REC2, COMM, WARM, COLD, BIOL, WILD, RARE, SPWN, MAR, and SHEL.

In 1988, the State Board adopted the Sources of Drinking Water Policy (SWRCB Resolution No. 88-63) which directed the Regional Boards to add the Municipal and Domestic Supply (MUN) Beneficial Use for all waterbodies not already so designated, unless they met certain exception criteria. To implement this Policy, the Regional Board revised the table of Beneficial Uses in the 1983 Basin Plan, adding the MUN designation for certain waterbodies and specifically excepting others (RWQCB Resolution No. 89-42). Shortly thereafter, this revised Beneficial Use table was reviewed again and changes were made, including the addition of the Water Contact Recreation (REC1) use for some waterbodies, the revision of some Beneficial Use designations from intermittent (I) to existing (X), and the addition of more waterbodies (RWQCB Resolution No. 89-99).

In this Plan, further changes to the Beneficial Use table have been made. Significant waterbodies not previously identified are included and the beneficial uses are designated. Certain of these waters are excepted from the MUN designation. The designation RARE has been added where substantial evidence indicates that the waterbody supports rare, threatened or endangered species (Appendix II). Certain known wetlands in the Region are listed in a new waterbody category (see wetlands discussion below). A revised list of Beneficial Use definitions, including four new Beneficial Uses, was developed as part of a comprehensive statewide update of all Basin Plans. Using this revised statewide list as a guide, this Basin Plan updates the list of Beneficial Use definitions contained in the 1983 Plan.

In all, twenty-three beneficial uses are now defined statewide; of these, nineteen are recognized within the Santa Ana Region. (The four not utilized are Migration of Aquatic Organisms, Freshwater Replenishment, Inland Saline Water Habitat, and Aquaculture.) One beneficial use specific to the Region, Limited Warm Freshwater Habitat, has been added, bringing the total number of beneficial uses recognized in the Santa Ana Region to twenty. The region's beneficial uses are listed and described below.

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BENEFICIAL USE DEFINITIONS

Municipal and Domestic Supply (MUN) waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.

Agricultural Supply (AGR) waters are used for farming, horticulture or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.

Industrial Service Supply (IND) waters are used for industrial activities that do not depend primarily on water quality. These uses may include, but are not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Industrial Process Supply (PROC) waters are used for industrial activities that depend primarily on water quality. These uses may include, but are not limited to, process water supply and all uses of water related to product manufacture or food preparation.

Groundwater Recharge (GWR) waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality or halting saltwater intrusion into freshwater aquifers.

Navigation (NAV) waters are used for shipping, travel or other transportation by private, commercial or military vessels.

Hydropower Generation (POW) waters are used for hydroelectric power generation.

Water Contact Recreation (REC1*) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

Non-contact Water Recreation (REC2*) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment inconjunction with the above activities.

Commercial and Sportfishing (COMM) waters are used for commercial or recreational collection of fish or other organisms, including those collected for bait. These uses may include, but are not limited to, uses involving organisms intended for human consumption.

Warm Freshwater Habitat (WARM) waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

Limited Warm Freshwater Habitat (LWRM) waters support warmwater ecosystems which are severely limited in diversity and abundance as the result of concrete-lined watercourses and low, shallow dry weather flows which result in extreme temperature, pH, and/or dissolved oxygen conditions. Naturally reproducing finfish populations are not expected to occur in LWRM waters.

Cold Freshwater Habitat (COLD) waters support coldwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

Preservation of Biological Habitats of Special Significance (BIOL) waters support designated areas or habitats, including, but not limited to, established refuges, parks, sanctuaries, ecological reserves or preserves, and Areas of Special Biological Significance (ASBS), where the preservation and enhancement of natural resources requires special protection.

Wildlife Habitat (WILD) waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife.

* The REC1 and REC2 beneficial use designations assigned to surface waterbodies in this Region should not be construed as encouraging recreational activities. In some cases, such as Lake Mathews and certain reaches of the Santa Ana River, access to the waterbodies is prohibited because of potentially hazardous conditions and/or because of the need to protect other uses, such as municipal supply or sensitive wildlife habitat. Where REC1 or REC2 is indicated as a beneficial use in Table 3-1, the designations are intended to indicate that the uses exist or that the water quality of the waterbody could support recreational uses.

Rare, Threatened or Endangered Species (RARE) waters support habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened or endangered.

Spawning, Reproduction, and Development (SPWN) waters support high quality aquatic habitats necessary for reproduction and early development of fish and wildlife.

Marine Habitat (MAR) waters support marine ecosystems that include, but are not limited to, preservation and enhancement of marine habitats, vegetation (*e.g.*, kelp), fish and shellfish, and wildlife (*e.g.*, marine mammals and shorebirds).

Shellfish Harvesting (SHEL) waters support habitats necessary for shellfish (*e.g.*, clams, oysters, limpets, abalone, shrimp, crab, lobster, sea urchins, and mussels) collected for human consumption, commercial or sports purposes.

Estuarine Habitat (EST) waters support estuarine ecosystems, which may include, but are not limited to, preservation and enhancement of estuarine habitats, vegetation, fish and shellfish, and wildlife, such as waterfowl, shorebirds, and marine mammals.

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More than one beneficial use may be identified for a given waterbody. Water quality objectives are established (Chapter 4) which are sufficiently stringent to protect the most demanding use. The Regional Board reserves the right to resolve any conflicts among beneficial uses based on the facts in a given case.

WETLANDS

The Clean Water Act was enacted by Congress to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The nation's waters include *wetlands*, as well as rivers, streams, lakes, estuaries, and the territorial seas. Generally, wetlands include swamps, marshes, bogs, sloughs, mangroves, wet meadows, savannas, wet tundra, playa lakes, and vernal pools. Wetlands serve a number of important functions, including absorption of floodwaters, shoreline erosion control, and water quality improvement by the removal of pollutants. They also provide habitat for wetland species, and have important aesthetic, recreational, scientific, and educational values. More than half of the wetlands in the United States have been destroyed. Due to this high loss, a goal of "no net loss" of wetlands has been established at both the federal and state level.

The definition of wetlands varies widely among the federal agencies, however both the United States Army Corps of Engineers and United States Environmental Protection Agency (US EPA) agree on the definition in Section 404 of the Clean Water Act, which specifies that wetlands are "those areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands are generally agreed to have three characteristics: hydrophytic vegetation; hydric soils; and wetland hydrology. Hydrophytic vegetation describes those plants adapted for growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Hydric soils are those soils that are oxygen-depleted due to saturation for long periods during the growing season. Wetland hydrology can be described as the presence of water at or above the soil surface for a sufficient period of the year to significantly influence the plant types and soil that occur in the area. Strict definitions of these characteristics have not been formally adopted. The Regional Board includes these characteristics and criteria as general reference and not as guidance.

As part of an overall effort to protect the Nation's wetland resources, US EPA has called for states to adopt water quality standards (beneficial uses and water quality objectives) for wetlands. Applying water quality standards to wetlands provides a regulatory basis for a variety of wetlands management programs. For example, these standards will play an important role in the State and Regional Boards' water quality certification process by providing the basis for approving, conditioning or denying federal permits and licenses as appropriate. (This certification process, conducted in accordance with Section 401 of the CWA is described in more detail in Chapter 5.)

The 1975 and 1983 Basin Plans listed a number of waterbodies which are known to be or to include wetlands (*e.g.*, San Joaquin Freshwater Marsh, Upper Newport Bay, Anaheim Bay-National Wildlife Refuge). These Plans specified both beneficial uses and water quality objectives for these waterbodies. In the earlier Plans, these waters were not specifically identified as wetlands. In this Plan, a "Wetlands" waterbody category has been added to the Table of Beneficial Uses. Certain waters known to be wetlands are listed under this category and their beneficial uses are designated. (Note: estuarine wetlands continue to be shown in the "Bays, Estuaries, and Tidal Prisms" category.) The numeric objectives specified for these wetlands in the earlier Basin Plans are included in this Plan (Chapter 4). Additional numeric objectives will be developed and implemented as part of the ongoing Basin Planning process. Further detailed review of the water resources within the Region is also expected to result in the listing of additional wetlands.

The intent of including the wetlands category is to provide a more accurate description of the Region's waters. The listing of specific wetlands does not trigger any new or different regulatory actions by the Regional Board. Standards applied to permitting, 401 certification, and/or enforcement actions will not be affected by this listing. Again, the listing of wetlands in this Plan is a partial one only and should not be construed as placing any limitations on the exercise of the Regional Board's responsibilities or authorities with respect to the protection of wetlands in the region. Nor is the present listing intended to define wetlands which are subject to the United States Army Corps of Engineers jurisdiction.

Figure 3-1 shows the general locations of the wetlands listed in this Plan. The specific boundaries of each of these wetland areas will be determined on an as-needed basis (for 401 certifications and the like), using the methods described in the 1987 Corps of Engineers Wetland Delineation Manual or other accepted techniques.

A brief description of each of the wetlands listed in this Plan is provided in Appendix III. Some of these wetlands occur naturally. Others were created, either incidentally, as the result of the construction of dams or levees, or purposefully, as mitigation for development projects elsewhere. Examples of created wetlands include those in the Prado Basin, which resulted from the construction of Prado Dam, and the San Joaquin Freshwater Marsh, created for development mitigation purposes.

A third type of wetlands, constructed wetlands, is proposed for the Santa Ana Region. Constructed wetlands would be designed, built, and managed to provide wastewater treatment to meet specific waste discharge requirements. Constructed wetlands do not include percolation ponds, equalization basins or other conventional treatment works. At this time, the proposed use of constructed wetlands in the region would be principally for nitrogen removal. The use of constructed wetlands for management of stormwater flows may also be proposed. Currently, the Orange County Water District is using approximately 600 acres of ponds in the Prado area to investigate the use of constructed wetlands for nitrogen removal. The City of Riverside proposes to construct and operate wetlands treatment ponds in the Hidden Valley area. Constructed wetlands are also being contemplated by Eastern Municipal Water District and Elsinore Valley Municipal Water District.

While the purpose of these constructed wetlands would be to provide wastewater treatment, they will inevitably have other uses and benefits, including the support of waterfowl and other wildlife and opportunities for education and recreation. The Regional Board's approach toward regulation of the use of these constructed wetlands will be to ensure that these affiliated uses are reasonably protected, while appropriate wastewater treatment uses are supported. As an example, the Board could allow the use of constructed wetlands for the treatment of various parameters such as nitrogen and phosphorus. However, the Board may disallow the use of wetlands for treatment of certain parameters such as toxics if there is evidence that these parameters would adversely and unreasonably affect the affiliated uses of the constructed wetlands. In this case, the Board would require compliance with toxics limits prior to discharge to the constructed wetlands.

In August 1993, the "California Wetlands Conservation Policy" was announced by the Governor. The Policy, included in Appendix III, has three principal objectives:

- to ensure no overall net loss of wetlands and achieve a long-term gain in the quantity, quality, and permanence of wetlands acreage and values;
- to reduce procedural complexity and confusion in the administration of wetlands conservation programs; and
- to make cooperative planning efforts and landowner incentive programs the primary focus of wetland conservation and restoration.

The methods identified to achieve these objectives are numerous and include:

- a statewide wetlands inventory and identification of conservation, restoration, and enhancement goals;
- development of a consistent wetlands definition, standards, and guidelines for regulatory purposes; and
- integration of wetlands policy and planning with other environmental and land use processes.

An interagency task force on wetlands is to be created to direct and coordinate administration and implementation of this policy.

BENEFICIAL USE TABLES

Table 3-1 lists the designated beneficial uses for waterbodies within the Santa Ana Region. In this table, an "X" indicates that the waterbody has an existing or potential use. Many of the existing uses are well-known; some are not. Lakes and streams may have potential beneficial uses established because plans already exist to put the water to those uses, or because conditions (*e.g.*, location, demand) make such future use likely. The establishment of a potential beneficial use serves to protect the quality of that water for such eventual use.

An "I" in Table 3-1 indicates that the waterbody has an intermittent beneficial use. This may occur because water conditions do not allow the beneficial use to exist year-round. The most common example of this is an ephemeral stream. Ephemeral streams in this region include, at one extreme, those which flow only while it is raining or for a short time afterward, and at the other extreme, established streams which flow through part of the year but also dry up for part of the year. While such ephemeral streams are flowing, beneficial uses are made of the water. Because such uses depend on the presence of water, they are intermittent. Waste discharges which could impair intermittent beneficial uses, whether they are made while those uses exist or not, are not permitted.

A "+" in the MUN column in Table 3-1 indicates that the waterbody has been specifically excepted from the MUN designation in accordance with the criteria specified in the "Sources of Drinking Water Policy."

The listing of waters within the basin attempts to include all significant surface streams and bodies of water, as well as the significant groundwater basins and subbasins which are recognized as water supply sources or which are receiving waters. Specific waters which are not listed have the same beneficial uses as the streams, lakes or reservoirs to which they are tributary or the groundwater basins or subbasin to which they are tributary or overlie.

REFERENCES

The Federal Clean Water Act, 33 USC 466 *et seq*.

California State Water Resources Control Board, Resolution No. 88-63, "Sources of Drinking Water Policy," adopted May 19, 1988.

California Regional Water Quality Control Board, Santa Ana Region, Resolution No. 89-42, "Incorporation of 'Sources of Drinking Water' Policy into the Water Quality Control Plan (Basin Plan)," adopted March 10, 1989.

California Regional Water Quality Control Board, Santa Ana Region, Resolution No. 89-99, "Adoption of Revised Table of Beneficial Uses," adopted July 14, 1989.

California Water Code, Section 13000, "Water Quality" *et seq.*

City of Big Bear Department of Water and Power, "Final Report - Task 4, Revised Water Quality Objectives, Big Bear Ground Water Basins," April 1993.

United States Environmental Protection Agency "National Guidance-Water Quality Standards for Wetlands," EPA 440/s-90-011, July 1990.

Governor Pete Wilson, "California Wetlands Conservation Policy," August, 1993.

List of Wetlands

1. Shay Meadows
2. Stanfield Marsh
3. Glen Helen
4. San Jacinto Wildlife Area
5. Prado Flood Control Basin
6. San Joaquin Freshwater Marsh
7. Upper Newport Bay
8. Santa Ana River Salt Marsh
9. Bolsa Chica Ecological Reserve
10. Seal Beach National Wildlife Refuge

FIGURE 3-1
SANTA ANA REGION WETLANDS

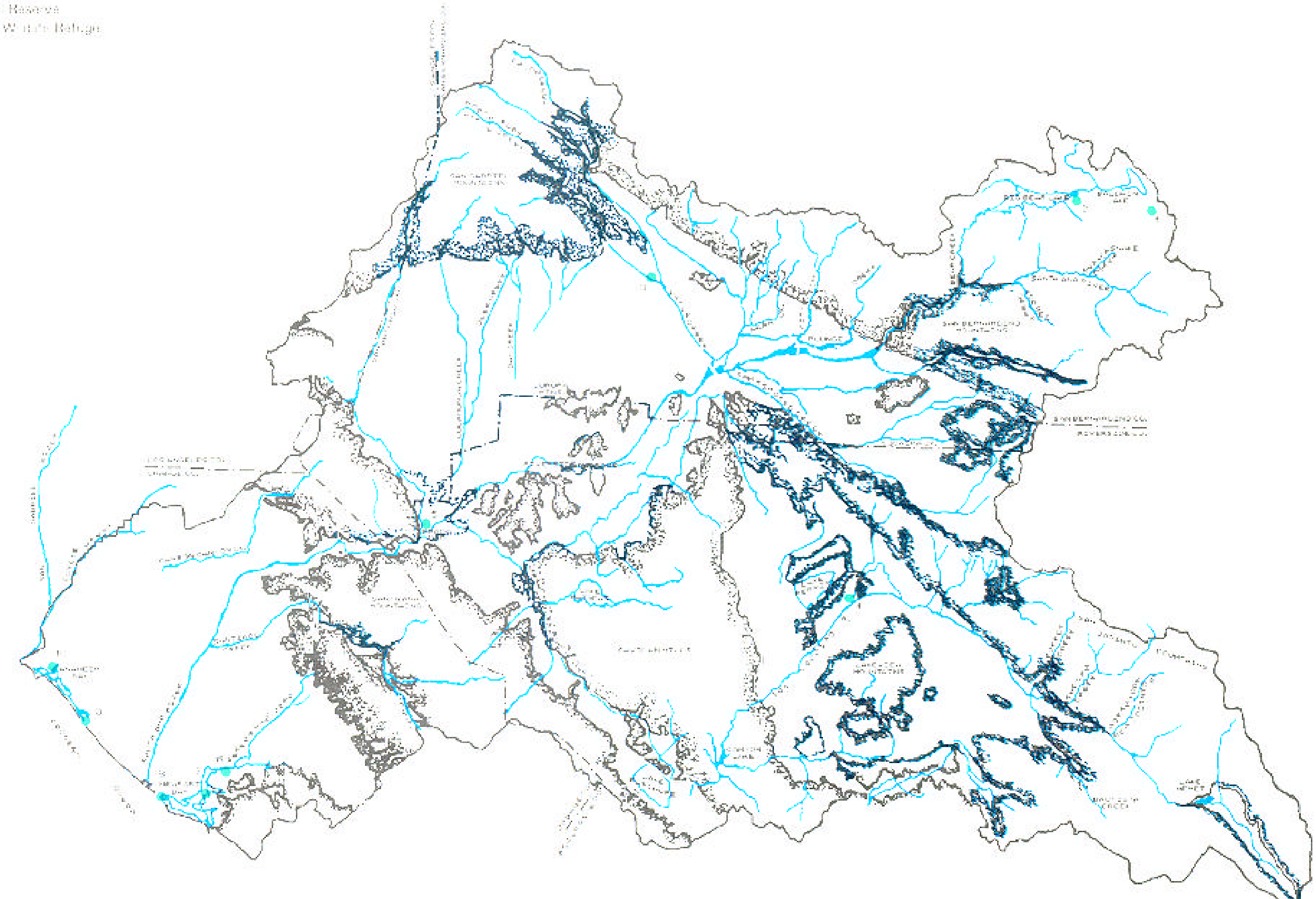

Table 3-1 BENEFICIAL USES

OCEAN WATERS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
NEARSHORE ZONE*																						
San Gabriel River to Poppy Street in Corona del Mar	+		X			X		X	X	X					X	X	X	X	X		801.11	
Poppy Street to Southeast Regional Boundary	+					X		X	X	X				X	X	X	X	X	X		801.11	
OFFSHORE ZONE																						
Waters Between Nearshore Zone and Limit of State Waters	+		X			X		X	X	X					X	X	X	X				

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from MUN (see text)

* Defined by Ocean Plan Chapter II A.1.: "Within a zone bounded by shoreline and a distance of 1000 feet from shoreline or the 30-foot depth contour, whichever is further from shoreline..."

Table 3-1 BENEFICIAL USES - Continued

BAYS, ESTUARIES, AND TIDAL PRISMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Anaheim Bay - Outer Bay	+					X		X	X					X	X	X	X	X			801.11	
Anaheim Bay - Seal Beach National Wildlife Refuge	+							X[1]	X					X	X	X	X	X		X	801.11	
Sunset Bay - Huntington Harbour	+					X		X	X	X					X	X	X	X			801.11	
Bolsa Bay	+							X	X	X				X	X	X	X	X	X		801.11	
Bolsa Chica Ecological Reserve	+							X	X					X	X	X	X	X		X	801.11	
Lower Newport Bay	+					X		X	X	X					X	X	X	X	X		801.11	
Upper Newport Bay	+							X	X	X				X	X	X	X	X	X	X	801.11	
Santa Ana River Salt Marsh	+							X	X					X	X	X		X		X	801.11	
Tidal Prism of Santa Ana River (to within 1000' of Victoria Street) and Newport Slough	+							X	X	X					X	X		X			801.11	
Tidal Prism of San Gabriel River - River Mouth to Marina Drive	+		X					X	X	X					X	X		X	X	X	845.61	
Tidal Prisms of Flood Control Channels Discharging to Coastal or Bay Waters	+							X	X	X					X			X			801.11	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from MUN (see text)

[1] No access per agency with jurisdiction (U.S. Navy)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
LOWER SANTA ANA RIVER BASIN																						
Santa Ana River																						
Reach 1 - Tidal Prism to 17th Street in Santa Ana	+							X[2]	X		I				I						801.11	
Reach 2 - 17th Street in Santa Ana to Prado Dam	+	X			X			X	X		X				X	X					801.11	801.12
Aliso Creek	X				X			X	X		X				X	X					845.63	
Carbon Canyon Creek	X				X			X	X		X				X	X					845.63	
Santiago Creek Drainage																						
Santiago Creek																						
Reach 1 - below Irvine Lake	X				X			X[2]	X		X				X						801.12	801.11
Reach 2 - Irvine Lake (see Lakes, pg. 3-23)																						
Reach 3 - Irvine Lake to Modjeska Canyon	I				I			I	I		I				I						801.12	
Reach 4 - in Modjeska Canyon	X				X			X	X		X				X						801.12	
Silverado Creek	X				X			X	X		X				X						801.12	
Black Star Creek	I				I			I	I		I				I						801.12	
Ladd Creek	I				I			I	I		I				I	I					801.12	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

[2] Access prohibited in all or part by Orange County Environmental Managmeent Agency (OCEMA)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
San Diego Creek Drainage																						
San Diego Creek																						
Reach 1 - below Jeffrey Road	+							X[2]	X		X				X						801.11	
Reach 2 - above Jeffrey Road to Headwaters	+				I			I	I		I				I						801.11	
Other Tributaries: Bonita Creek, Serrano Creek, Peters Canyon Wash, Hicks Canyon Wash, Bee Canyon Wash, Borrego Canyon Wash, Agua Chinon Wash, Laguna Canyon Wash, Rattlesnake Canyon Wash, Sand Canyon Wash,* and other Tributaries to these Creeks	+				I			I	I		I				I						801.11	
San Gabriel River Drainage																						
Coyote Ck. (within Santa Ana Regional boundary)	X							X	X		X				X							

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

* Sand Canyon Wash also has **RARE** Beneficial Use
[2] Access prohibited in all or part by Orange County Environmental Managmeent Agency (OCEMA)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
UPPER SANTA ANA RIVER BASIN																						
Santa Ana River																						
Reach 3 - Prado Dam to Mission Blvd. in Riverside	+	X			X			X	X		X				X	X					801.21	801.27, 801.25
Reach 4 - Mission Blvd. in Riverside to San Jacinto Fault in San Bernardino	+				X			X[3]	X		X				X						801.27	801.44
Reach 5 - San Jacinto Fault in San Bernardino to Seven Oaks Dam[†]	X[*]	X			X			X[3]	X		X				X	X					801.52	801.57
Reach 6 - Seven Oaks Dam to Headwaters (see also Individual Tributary Streams)	X	X			X		X	X	X				X		X		X				801.72	
San Bernardino Mountain Streams																						
Mill Creek Drainage:																						
Mill Creek																						
Reach 1 - Confluence with Santa Ana River to Bridge Crossing Route 38 at Upper Powerhouse	I	I			I			I	I				I		I	I					801.58	
Reach 2 - Bridge Crossing Route 38 at Upper Powerhouse to Headwaters	X	X			X		X	X	X				X		X						801.58	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

[*] **MUN** applies upstream of Orange Avenue (Redlands); downstream, water is excepted from **MUN**
[†] Reach 5 uses are intermittent upstream of Waterman Avenue
[3] Access prohibited in some portions by San Bernardino County Flood Control

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Mountain Home Creek	X				X		X	X	X				X		X						801.58	
Mountain Home Creek, East Fork	X				X		X	X	X				X		X		X				801.70	
Monkey Face Creek	X				X			X	X				X		X						801.70	
Alger Creek	X				X			X	X				X		X						801.70	
Falls Creek	X				X		X	X	X				X		X		X				801.70	
Vivian Creek	X				X			X	X				X		X						801.70	
High Creek	X				X			X	X				X		X						801.70	
Other Tributaries: Lost, Oak Cove, Green, Skinner, Momyer, Glen Martin, Camp, Hatchery, Rattlesnake, Slide, Snow, Bridal Veil, and Oak Creeks and other Tributaries to these Creeks	I				I			I	I				I		I						801.70	
Bear Creek Drainage:																						
Bear Creek	X	X			X		X	X	X				X		X		X				801.71	
Siberia Creek	X				X			X	X				X		X		X				801.71	
Slide Creek	I				I			I	I				I		I						801.71	
All other Tributaries to these Creeks	I				I			I	I				I		I						801.71	
Big Bear Lake (see Lakes, pg. 3-23)																						

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Big Bear Lake Tributaries:																						
North Creek	X				X			X	X				X		X		X				801.71	
Metcalf Creek	X				X			X	X				X		X		X				801.71	
Grout Creek	X				X			X	X				X		X		X				801.71	
Rathbone (Rathbun) Creek	X				X			X	X				X		X						801.71	
Meadow Creek	X				X			X	X				X		X						801.71	
Summit Creek	I				I			I	I				I		I						801.71	
Other Tributaries to Big Bear Lake: Knickerbocker, Johnson, Minnelusa, Polique, and Red Ant Creeks and other Tributaries to these Creeks	I				I			I	I				I		I						801.71	
Baldwin Lake (see Lakes, pg. 3-23)																						
Baldwin Lake Drainage:																						
Shay Creek	X				X			X	X				X		X	X					801.73	
Other Tributaries to Baldwin Lake: Sawmill, Green, and Caribou Canyons and other Tributaries to these Creeks	I				I			I	I				I		I						801.73	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Other Streams Draining to Santa Ana River (Mountain Reaches‡)																						
Cajon Creek	X				X			X	X				X		X	X					801.52	801.51
City Creek	X	X			X			X	X				X		X	X	X				801.57	
Devil Canyon Creek	X				X			X	X				X		X						801.57	
East Twin and Strawberry Creeks	X	X			X			X	X				X		X		X				801.57	
Waterman Canyon Creek	X				X			X	X				X		X						801.57	
Fish Creek	X				X			X	X				X		X		X				801.57	
Forsee Creek	X				X			X	X				X		X		X				801.72	
Plunge Creek	X	X			X			X	X				X		X	X					801.72	
Barton Creek	X	X			X			X	X				X		X						801.72	
Bailey Canyon Creek	I				I			I	I				I		I						801.72	
Kimbark Canyon, East Fork Kimbark Canyon, Ames Canyon, and West Fork Cable Canyon Creeks	X				X			X	X		X		X		X						801.52	
Valley Reaches‡ of Above Streams	I				I			I	I		I				I						801.52	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

‡ The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Other Tributaries (Mountain Reaches‡): Alder, Badger Canyon, Bledsoe Gulch, Borea Canyon, Breakneck, Cable Canyon, Cienega Seca, Cold, Converse, Coon, Crystal, Deer, Elder, Fredalba, Frog, Government, Hamilton, Heart Bar, Hemlock, Keller, Kilpecker, Little Mill, Little Sand Canyon, Lost, Meyer Canyon, Mile, Monroe Canyon, Oak, Rattlesnake, Round Cienega, Sand, Schneider, Staircase, Warm Springs Canyon, and Wild Horse Creeks and other Tributaries to these Creeks	I				I			I	I				I		I						801.72	801.71, 801.57
San Gabriel Mountain Streams (Mountain Reaches‡)																						
San Antonio Creek	X	X	X	X	X		X	X	X				X		X						801.23	
Lytle Creek (South, Middle, and North Forks) and Coldwater Canyon Creek	X	X	X	X	X		X	X	X				X		X	X					801.41	801.42, 801.52, 801.59
Day Creek	X			X	X			X	X				X		X						801.21	
East Etiwanda Creek	X			X	X			X	X				X		X	X					801.21	
Valley Reaches‡ of Above Streams	I				I			I	I		I				I						801.21	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

‡ The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Cucamonga Creek																						
Reach 1 - Confluence with Mill Creek to 23rd St. in Upland	+				X			X[3]	X			X			X						801.21	
Reach 2 (Mountain Reach‡) -23rd St. in Upland to headwaters	X		X	X	X		X	X	X				X		X		X				801.24	
Mill Creek (Prado Area)	+							X	X		X				X	X					801.25	
Other Tributaries (Mountain Reaches‡): Cajon Canyon, San Sevaine, Deer, Duncan Canyon, Henderson Canyon, Bull, Fan, Demens, Thorpe, Angalls, Telegraph Canyon, Stoddard Canyon, Icehouse Canyon, Cascade Canyon, Cedar, Falling Rock, Kerkhoff, and Cherry Creeks and other Tributaries to these Creeks	I				I			I	I				I		I						801.21	801.23
San Timoteo Area Streams																						
San Timoteo Creek																						
Reach 1 - Santa Ana River Confluence to Gage at San Timoteo Canyon Road	+	I			I			I[3]	I		I				I						801.52	801.53

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

‡ The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains
[3] Access prohibited in some portions by San Bernardino County Flood Control

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Reach 2 - Gage at San Timoteo Canyon Road to Confluence with Yucaipa Creek	+				X			X	X		X				X						801.61	801.62
Reach 3 - Confluence with Yucaipa Creek to Bunker Hill II Groundwater Subbasin Boundary (T2S/R3W-24)	+				X			X	X		X				X						801.62	
Reach 4 - Bunker Hill II Groundwater Subbasin Boundary (T2S/R3W-24) to Confluence with Little San Gorgonio and Noble Creeks (Headwaters of San Timoteo Creek)	+				X			X	X		X				X						801.62	
Oak Glen, Potato Canyon, and Birch Creeks	X				X			X	X		X				X						801.67	
Little San Gorgonio Creek	X				X			X	X				X		X						801.69	801.62, 801.63
Yucaipa Creek	I				I			I	I		I				I						801.67	801.61, 801.62, 801.64
Other Tributaries to these Creeks - Valley Reaches‡	I				I			I	I		I				I						801.62	801.52, 801.53
Other Tributaries to these Creeks - Mountain Reaches‡	I				I			I	I				I		I						801.69	801.67
Anza Park Drain	X							X	X		X				X		X				801.27	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

‡ The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Sunnyslope Channel	X							X	X		X				X		X				801.27	
Tequesquite Arroyo (Sycamore Creek)	+				X			X	X		X				X		X				801.27	
Prado Area Streams																						
Chino Creek																						
Reach 1 - Santa Ana River confluence to beginning of concrete-lined channel south of Los Serranos Rd.	+							X	X		X				X	X					801.21	
Reach 2 - Beginning of concrete-lined channel south of Los Serranos Rd. to confluence with San Antonio Creek	+							X[3]	X			X			X						801.21	
Temescal Creek																						
Reach 1A - Santa Ana River Confluence to Lincoln Ave.	+	X	X		X			X[4]	X		X				X	X	X				801.25	
Reach 1B - Lincoln Ave. to Riverside Canal	+							X[4]	X			X			X						801.25	
Reach 2 - Riverside Canal to Lee Lake	+	I	I		I			I	I		I				I						801.32	801.25
Reach 3 - Lee Lake (see Lakes, pg. 3-23)																						

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

3 Access prohibited in some portions by San Bernardino County Flood Control
4 Access prohibited in some portions by Riverside County Flood Control

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Reach 4 - Lee Lake to Mid-section line of Section 17 (downstream end of freeway cut)	+	I			I			I	I		I				I	X					801.34	
Reach 5 - Mid-section line of Section 17 (downstream end of freeway cut) to Elsinore Groundwater Subbasin Boundary	+	X			X			X	X		X				X	X					801.35	
Reach 6 - Elsinore Groundwater Subbasin Boundary to Lake Elsinore Outlet	+				I			I	I		I				I						801.35	
Coldwater Canyon Creek	X	X			X			X	X		X				X						801.32	
Bedford Canyon Creek	+				I			I	I		I				I						801.32	
Dawson Canyon Creek	I				I			I	I		I				I						801.32	
Other Tributaries to these Creeks	I				I			I	I		I				I						801.32	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
SAN JACINTO RIVER BASIN																						
San Jacinto River																						
Reach 1 - Lake Elsinore to Canyon Lake	I	I			I			I	I		I				I						802.32	802.31
Reach 2 - Canyon Lake (see Lakes, pg. 3-24)																						
Reach 3 - Canyon Lake to Nuevo Road	+	I			I			I	I		I				I						802.11	
Reach 4 - Nuevo Road to North-South Mid-Section Line, T4S/R1W-S8	+	I			I			I	I		I				I						802.14	802.21
Reach 5 - North-South Mid-Section Line, T4S/R1W-S8, to Confluence with Poppet Creek	+	I			I			I	I		I				I						802.21	
Reach 6 - Poppet Creek to Cranston Bridge	I	I			I			I	I		I				I						802.21	
Reach 7 - Cranston Bridge to Lake Hemet	X	X			X			X	X				X		X						802.21	
Bautista Creek - Headwaters to Debris Dam	X	X			X			X	X				X		X						802.21	802.23
Strawberry Creek and San Jacinto River, North Fork	X	X			X			X	X				X		X						802.21	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

INLAND SURFACE STREAMS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Fuller Mill Creek	X	X			X			X	X				X		X						802.22	
Stone Creek	X	X			X			X	X				X		X						802.21	
Salt Creek	+							I	I		I				I						802.12	
Other Tributaries: Logan, Black Mountain, Juaro Canyon, Indian, Hurkey, Poppet, and Protrero Creeks and other Tributaries to these Creeks	I	I			I			I	I		I				I						802.21	802.22

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

LAKES AND RESERVOIRS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
UPPER SANTA ANA RIVER BASIN																						
Baldwin Lake	+							I	I		I		I	I	I	I					801.73	
Big Bear Lake	X	X			X			X	X		X		X		X	X					801.71	
Erwin Lake	X							X	X				X	X	X	X					801.73	
Evans, Lake	+							X	X		X		X		X						801.27	
Jenks Lake	X	X			X			X	X				X		X						801.72	
Lee Lake	+	X	X		X			X	X		X				X						801.34	
Mathews, Lake	X	X	X	X	X			X[5]	X		X				X	X					801.33	
Mockingbird Reservoir	+	X						X[6]	X		X				X						801.26	
Norconian, Lake	+							X	X		X				X						801.25	
LOWER SANTA ANA RIVER BASIN																						
Anaheim Lake	+				X			X	X		X				X						801.11	
Irvine Lake (Santiago Reservoir)	X	X						X	X		X		X		X						801.12	
Laguna, Lambert, Peters Canyon, Rattlesnake, Sand Canyon, and Siphon Reservoirs	+	X						X[7]	X		X				X						801.11	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

[5] Access prohibited by the Metropolitan Water District
[6] Access prohibited by the Gage Canal Company (owner-operator)
[7] Access prohibited by Irvine Ranch Company

Table 3-1 BENEFICIAL USES - Continued

LAKES AND RESERVOIRS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
SAN JACINTO RIVER BASIN																						
Canyon Lake (Railroad Canyon Reservoir)	X	X			X			X	X		X				X						802.11	802.12
Elsinore, Lake	+							X	X		X				X						802.31	
Fulmor, Lake	X	X						X	X		X		X		X						802.21	
Hemet, Lake	X	X			X		X	X	X		X		X		X		X				802.22	
Perris, Lake	X	X	X	X	X			X	X		X		X		X						802.11	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

WETLANDS (INLAND)	BENEFICIAL USE																				Hydrologic Unit	
	MUN	**AGR**	**IND**	**PROC**	**GWR**	**NAV**	**POW**	**REC1**	**REC2**	**COMM**	**WARM**	**LWRM**	**COLD**	**BIOL**	**WILD**	**RARE**	**SPWN**	**MAR**	**SHEL**	**EST**	Primary	Secondary
San Joaquin Freshwater Marsh**	+							X	X		X			X	X	X					801.11	
Shay Meadows	I							I	I				I		I						801.73	
Stanfield Marsh**	X							X	X				X		X	X					801.71	
Prado Flood Control Basin**	+							X	X		X				X	X					801.25	
San Jacinto Wildlife Preserve**	+							X	X		X			X	X	X					802.15	
Glen Helen	X							X	X		X				X						801.59	

X Present or Potential Beneficial Use

I Intermittent Beneficial Use

\+ Excepted from **MUN** (see text)

** This is a created wetland as defined in the wetlands discussion.

Table 3-1 BENEFICIAL USES - Continued

GROUNDWATER SUBBASINS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
UPPER SANTA ANA RIVER BASIN																						
Big Bear Valley	X			X																	801.71	801.73
Cucamonga	X	X	X	X																	801.24	801.21
Chino I	X	X	X	X																	801.21	481.23, 481.22, 801.27
Chino II	X	X	X	X																	801.21	481.21, 801.23
Chino III	X	X	X	X																	801.21	481.21, 801.27, 801.26
San Timoteo	X	X	X	X																	801.60	801.63, 801.64, 801.66, 801.68
Bunker Hill I	X	X	X	X																	801.51	
Bunker Hill II	X	X	X	X																	801.52	
Bunker Hill Pressure	X	X	X	X																	801.52	
Lytle Creek	X	X	X	X																	801.41	801.42
Rialto	X	X	X	X																	801.43	801.44
Colton	X	X	X	X																	801.44	801.45, 801.27
Riverside I	X	X	X	X																	801.27	
Riverside II	X	X	X	X																	801.27	
Riverside III	X	X	X	X																	801.27	
Arlington	X	X	X	X																	801.26	801.25

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

GROUNDWATER SUBBASINS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Bedford (Upper Temescal I)	X	X	X	X																	801.32	
Lee Lake (Upper Temescal II)	X	X	X	X																	801.34	
Coldwater (Upper Temescal III)	X	X	X	X																	801.31	
Temescal	X	X	X	X																	801.25	
SAN JACINTO RIVER BASIN																						
Garner Valley	X	X																			802.22	
Idyllwild Area	X		X																		802.22	802.21
San Jacinto - Canyon	X	X	X	X																	802.21	
San Jacinto - Lower Pressure	X	X	X																		802.21	
San Jacinto - Intake	X	X	X	X																	802.21	
San Jacinto - Upper Pressure	X	X	X	X																	802.21	
Hemet	X	X	X	X																	802.15	802.21
Lakeview	X	X	X	X																	802.14	
Perris North	X	X	X	X																	802.11	
Perris South I	X	X																			802.11	
Perris South II	X	X																			802.11	
Perris South III	X	X																			802.11	
Winchester	X	X																			802.13	
Menifee I	X	X		X																	802.12	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from **MUN** (see text)

Table 3-1 BENEFICIAL USES - Continued

GROUNDWATER SUBBASINS	BENEFICIAL USE																				Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST	Primary	Secondary
Menifee II	X	X		X																	802.12	
Elsinore	X	X		X																	802.31	802.32
LOWER SANTA ANA RIVER BASIN																						
La Habra	X	X																			845.62	
Santiago	X	X	X																		801.12	
Santa Ana Forebay	X	X	X	X																	801.11	801.13, 845.61
Santa Ana Pressure	X	X	X	X																	801.11	845.61
Irvine Forebay I	X	X	X	X																	801.11	
Irvine Forebay II	X	X	X	X																	801.11	
Irvine Pressure	X	X	X	X																	801.11	

X Present or Potential Beneficial Use
I Intermittent Beneficial Use
\+ Excepted from **MUN** (see text)

CHAPTER 4

WATER QUALITY OBJECTIVES

INTRODUCTION

The Porter-Cologne Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" (§13050(h)). Further, the Act directs (§13241) that:

"Each regional board shall establish such water quality objectives in water quality control plans as in its judgement will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

(a) Past, present, and probable future beneficial uses of water.

(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

(d) Economic considerations.

(e) The need for developing housing within the region.

(f) The need to develop and use recycled water."

Two important additional factors which were also considered in setting the water quality objectives in this Plan are (1) historic and present water quality, and (2) the antidegradation policies cited in Chapter 2.

The water quality objectives in this plan supersede and replace those adopted in the 1983 Basin Plan. Perhaps the most significant difference between this and the prior Plan is the inclusion of new objectives for un-ionized ammonia and site-specific objectives for the middle Santa Ana River system for copper, cadmium, and lead.

Some of these water quality objectives refer to "controllable sources" or "controllable water quality factors." Controllable sources include both point and nonpoint source discharges, such as conventional discharges from pipes, as well as discharges from land areas or other diffuse sources. Controllable water quality factors are those characteristics of the discharge and/or the receiving water which can be controlled by treatment or management methods. Examples of other activities which may not involve waste discharges, but which also constitute controllable water quality factors, include the percolation of storm water, transport/delivery of water via natural stream channels, and stream diversions.

The water quality objectives in this Plan are specified according to waterbody type: ocean waters; enclosed bays and estuaries; inland surface waters; and groundwaters.

The narrative water quality objectives below are arranged alphabetically. They vary in applicability and scope, reflecting the variety of beneficial uses of water which have been identified (Chapter 3). Where numerical limits are specified, they represent the maximum levels that will allow the beneficial use to continue unimpaired. In other cases, an objective may prohibit the discharge of specific substances, may tolerate natural or "background" levels of certain substances or characteristics but no increases over those values, or may express a limit in terms of not impacting other beneficial uses. An adverse effect or impact on a beneficial use occurs where there is an actual or threatened loss or impairment of that beneficial use.

OCEAN WATERS

Water quality objectives specified in the "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and the "Water Quality

Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) are incorporated into this Basin Plan by reference. The provisions of the Ocean Plan and Thermal Plan apply to the ocean waters within this Region.

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ENCLOSED BAYS AND ESTUARIES

"Enclosed bays" means indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. "Estuaries" means waters, including coastal lagoons, located at the mouths of streams which serve as areas of mixing for fresh and ocean waters. Enclosed bays and estuaries do not include ocean waters or inland surface waters (see definition in the Inland Surface Waters section).

The objectives which are included below apply to all enclosed bays and estuaries within the region. In addition to these parameter-specific objectives, the following narrative objective shall apply:

Enclosed bay and estuarine communities and populations, including vertebrate, invertebrate, and plant species, shall not be degraded as a result of the discharge of waste. Degradation is damage to an aquatic community or population with the result that a balanced community no longer exists. A balanced community is one that is (1) diverse, (2) has the ability to sustain itself through cyclic seasonal changes, (3) includes necessary food chain species, and (4) is not dominated by pollution-tolerant species, unless that domination is caused by physical habitat limitations. A balanced community also (5) may include historically introduced non-native species, but (6) does not include species present because best available technology has not been implemented, or (7) because site-specific objectives have been adopted, or (8) because of thermal discharges.

Algae

Excessive growth of algae and/or other aquatic plants can degrade water quality. Algal blooms sometimes occur naturally, but they are often the result of excess nutrients (*i.e.*, nitrogen, phosphorus) from waste discharges or nonpoint sources. These blooms can lead to problems with tastes, odors, color, and increased turbidity and can depress the dissolved oxygen content of the water, leading to fish kills. Floating algal scum and algal mats are also an aesthetically unpleasant nuisance.

Waste discharges shall not contribute to excessive algal growth in receiving waters.

Bacteria, Coliform

Fecal bacteria are part of the intestinal flora of warm- blooded animals. Their presence in bay and estuarine waters is an indicator of pollution. Total coliform is measured in terms of the number of coliform organisms per unit volume. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal coliform bacteria.

Water quality objectives for numbers of total and fecal coliform vary with the uses of the water, as shown below.

Bays and Estuaries

REC-1 *Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples/30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period*

SHEL *Fecal coliform: median concentration not more than 14 MPN (most probable number)/100 mL and not more than 10% of samples exceed 43 MPN/100 mL*

Chlorine, Residual

Wastewater disinfection with chlorine usually produces a chlorine residual. Chlorine and its reaction products are toxic to aquatic life.

To protect aquatic life, the chlorine residual in wastewater discharged to enclosed bays and estuaries shall not exceed 0.1 mg/L.

Color

Color in water may arise naturally, such as from minerals, plant matter or algae, or may be caused by industrial pollutants. Color is primarily an aesthetic consideration.

Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affects beneficial uses. The natural color of fish, shellfish or other bay and estuarine water resources used for human consumption shall not be impaired.

Floatables

Floatables are an aesthetic nuisance as well as a substrate for algae and insect vectors.

Waste discharges shall not contain floating materials, including solids, liquids, foam or scum, which cause a nuisance or adversely affect beneficial uses.

Oil and Grease

Oil and grease can be present in water as a result of the discharge of treated wastes and the accidental or intentional dumping of wastes into sinks and storm drains. Oils and related materials have a high surface tension and are not soluble in water, therefore forming a film on the water's surface. This film can result in nuisance conditions because of odors and visual impacts. Oil and grease can coat birds and aquatic organisms, adversely affecting respiration and/or thermoregulation.

Waste discharges shall not result in deposition of oil, grease, wax or other materials in concentrations which result in a visible film or in coating objects in the water, or which cause a nuisance or adversely affect beneficial uses.

Oxygen, Dissolved

Adequate dissolved oxygen (D.O.) is vital for aquatic life. Depression of D.O. levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

The dissolved oxygen content of enclosed bays and estuaries shall not be depressed to levels that adversely affect beneficial uses as a result of controllable water quality factors.

pH

pH is a measure of the hydrogen ion concentration of water. pH values generally range from 0 (most acidic) to 14 (most alkaline). Many pollutants can alter the pH, raising or lowering it excessively. These extremes in pH can have adverse effects on aquatic biota and can corrode pipes and concrete. Even small changes in pH can harm aquatic biota.

The pH of bay or estuary waters shall not be raised above 8.6 or depressed below 7.0 as a result of controllable water quality factors; ambient pH levels shall not be changed more than 0.2 units.

Radioactivity

Radioactive materials shall not be present in the bay or estuarine waters of the region in concentrations which are deleterious to human, plant or animal life.

Solids, Suspended and Settleable

Settleable solids are deleterious to benthic organisms and may cause anaerobic conditions to form. Suspended solids can clog fish gills and interfere with respiration in aquatic fauna. They also screen out light, hindering photosynthesis and normal aquatic plant growth and development.

Enclosed bays and estuaries shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors.

Sulfides

Sulfides are generated by many industries and from the anaerobic decomposition of organic matter. In water, sulfides can react to form hydrogen sulfide (H_2S), commonly known for its "rotten egg" odor. Sulfides in ionic form are also toxic to fish.

The dissolved sulfide content of enclosed bays and estuaries shall not be increased as a result of controllable water quality factors.

Surfactants (surface-active agents)

This group of materials includes detergents, wetting agents, and emulsifiers.

Waste discharges shall not contain concentrations of surfactants which result in foam in the course of flow or use of the receiving water, or which adversely affect aquatic life.

Taste and Odor

Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s).

The enclosed bays and estuaries of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations which cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish or other enclosed bay and estuarine water resources used for human consumption shall not be impaired.

Temperature

Waste discharges can cause temperature changes in the receiving waters which adversely affect the aquatic biota. Discharges most likely to cause these temperature effects are cooling tower and heat exchanger blowdown.

All bay and estuary waters shall meet the objective specified in the Thermal Plan.

Toxic Substances

Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health.

The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.

Turbidity

Turbidity is a measure of light scattered due to particulates in water.

Increases in turbidity which result from controllable water quality factors shall comply with the following:

Natural Turbidity	*Maximum Increase*
0-50 NTU	*20%*
50-100 NTU	*10 NTU*
Greater than 100 NTU	*10%*

All enclosed bay and estuaries of the region shall be free of changes in turbidity which adversely affect beneficial uses.

INLAND SURFACE WATERS

Inland surface waters include streams, rivers, lakes, and wetlands in the Region. Ocean waters and enclosed bays and estuaries are not considered inland surface waters.

The narrative objectives which are included below apply to all inland surface waters within the region, including lakes, streams, and wetlands. In addition, specific numerical objectives are listed in Table 4-1. Where more than one objective is applicable, the stricter shall apply. In addition to these objectives, the following shall apply:

Inland surface water communities and populations, including vertebrate, invertebrate, and plant species, shall not be degraded as a result of the discharge of waste. Degradation is damage to an aquatic community or population with the result that a balanced community no longer exists. A balanced community is one that is (1) diverse, (2) has the ability to sustain itself through cyclic seasonal changes, (3) includes necessary food chain species, and (4) is not dominated by pollution-tolerant species, unless that domination is caused by physical habitat limitations. A balanced community also (5) may include historically introduced non-native species, but (6) does not include species present because best available technology has not been implemented, or (7) because site-specific objectives have been adopted, or (8) because of thermal discharges.

Algae

Excessive growth of algae and/or other aquatic plants can degrade water quality. Algal blooms sometimes occur naturally, but they are often the result of excess nutrients (*i.e.*, nitrogen, phosphorus) from waste discharges or nonpoint sources. These blooms can lead to problems with tastes, odors, color, and increased turbidity and can depress the dissolved oxygen content of the water, leading to fish kills. Floating algal scum and algal mats are also an aesthetically unpleasant nuisance.

Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters.

Ammonia, Un-ionized

Un-ionized ammonia (NH_3 or UIA) is toxic to fish and other aquatic organisms. In water, UIA exists in equilibrium with ammonium (NH_4^+) and hydroxide (OH^-) ions. The proportions of each change as the temperature, pH, and salinity of the water change.

The 1983 Basin Plan specified an UIA objective of 0.8 mg/L for water bodies designated WARM. The SWRCB directed the Regional Board to review the 0.8 mg/L objective because of concerns that it is not stringent enough to protect aquatic wildlife. The US EPA concurred that this review was necessary.

The Regional Board contracted with California State University, Fullerton to conduct a study of un-ionized ammonia in the Santa Ana River and to develop recommendations regarding the UIA objective. This study, which was conducted in 1985-87, was complemented by additional Regional Board staff analysis. The additional staff analysis focused on adjusting EPA's national criteria for WARM waters (published in 1984 and amended in 1992), using the recalculation procedure. With this procedure, cold- and warmwater species not found in the Santa Ana Region's WARM designated waters were deleted from the database used to derive the national criteria, and new criteria were calculated.

Based on these analyses, this Plan specifies UIA objectives for WARM and COLD designated waterbodies in the Region. **Note:** site-specific objectives have been developed for the Santa Ana River and certain tributaries (see next page).

Acute (1-hour) UIA-N Objectives

For waterbodies designated COLD:

Objective=0.822[0.52/FT/FPH/2], where

$FT=10^{0.03(20-T)}$ $\quad 0 \le T \le 20\,°C$

$FT=1$ $\quad 20 \le T \le 30\,°C$

$FPH=\frac{1+10^{(7.4-pH)}}{1.25}$ $\quad 6.5 \le pH \le 8$

$FPH=1$ $\quad 8 \le pH \le 9$

For waterbodies designated WARM:

Objective=0.822[0.87/FT/FPH/2], where

$FT=10^{0.03(20-T)}$ $\quad 0 \le T \le 25\,°C$

$FT=0.7079$ $\quad 25 \le T \le 30\,°C$

$FPH=\frac{1+10^{(7.4-pH)}}{1.25}$ $\quad 6.5 \le pH \le 8$

$FPH=1$ $\quad 8 \le pH \le 9$

Chronic (4-day) UIA-N Objectives

For waterbodies designated COLD:

Objective=0.822[0.52/FT/FPH/RATIO], where

$FT=10^{0.03(20-T)}$ $\quad 0 \le T \le 15\,°C$

$FT=1.4125$ $\quad 15 \le T \le 30\,°C$

$FPH=\frac{1+10^{(7.4-pH)}}{1.25}$ $\quad 6.5 \le pH \le 8$

$FPH=1$ $\quad 8 \le pH \le 9$

$$RATIO = \frac{24[10^{(7.7-pH)}]}{1+10^{(7.4-pH)}} \quad 6.5 \le pH \le 7.7$$

$$RATIO = 13.5 \quad 7.7 \le pH \le 9$$

For waterbodies designated WARM:

Objective=0.822[0.87/FT/FPH/RATIO], where

$$FT = 10^{0.03(20-T)} \quad 0 \le T \le 20°C$$

$$FT = 1 \quad 20 \le T \le 30°C$$

$$FPH = \frac{1+10^{(7.4-pH)}}{1.25} \quad 6.5 \le pH \le 8$$

$$FPH = 1 \quad 8 \le pH \le 9$$

$$RATIO = \frac{24[10^{(7.7-pH)}]}{1+10^{(7.4-pH)}} \quad 6.5 \le pH \le 7.7$$

$$RATIO = 13.5 \quad 7.7 \le pH \le 9$$

Calculated numerical UIA-N objectives as well as corresponding total ammonia nitrogen concentration for various pH and temperature conditions are shown in Tables 4-2 and 4-3. Table 4-4 lists the above equations in a form that can be entered into a computer or calculator program.

Site-specific Un-ionized Ammonia Objective for the Santa Ana River System

In addition to the un-ionized ammonia (UIA) objectives specified above, this Plan includes a chronic (4-day) site-specific UIA objective for the middle Santa Ana River, Chino Creek, Mill Creek (Prado Area), Temescal Creek, and San Timoteo Creek. This site-specific objective is based on carefully controlled chronic toxicity tests on Santa Ana River water conducted as part of the Santa Ana River Use-Attainability Analysis Study. The Santa Ana River water was spiked with UIA concentrations ranging from 0.0 (control) to 1.0 mg/L. The No Observed Effect Level (NOEL) was found to be at a UIA concentration of 0.24 mg/L (or 0.19 mg/L as UIA-nitrogen). Using a 50% safety factor, the UIA objective developed is 0.12 mg/L (or 0.098 mg/L UIA-nitrogen).

To prevent chronic toxicity to aquatic life in the Santa Ana River, Reaches 2,3, and 4, Chino Creek, Mill Creek (Prado Area), Temescal Creek and San Timoteo Creek, discharges to these waterbodies shall not cause the concentration of un-ionized ammonia (as nitrogen) to exceed 0.098 mg/L (NH_3-N) as a 4-day average.

Bacteria, Coliform

Fecal bacteria are part of the intestinal flora of warm- blooded animals. Their presence in surface waters is an indicator of pollution. Total coliform is measured in terms of the number of coliform organisms per unit volume. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal coliform bacteria. Water quality objectives for numbers of total and fecal coliform vary with the uses of the water, as shown below.

Lakes and Streams

MUN *Total coliform: less than 100 organisms/100 mL*

REC-1 *Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples/30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period*

REC-2 *Fecal coliform: average less than 2000 organisms/100 mL and not more than 10% of samples exceed 4000 organisms/100 mL for any 30-day period*

Boron

Boron is not considered a problem in drinking water supplies until concentrations of 20-30 mg/L are reached. In irrigation, boron is an essential element. However, boron concentrations in excess of 0.75 mg/L may be deleterious to certain crops, particularly citrus. The maximum safe concentration of even the most tolerant plants is about 4.0 mg/L of boron.

Boron concentrations shall not exceed 0.75 mg/L in inland surface waters of the region as a result of controllable water quality factors.

Chemical Oxygen Demand (COD)

COD is a measure of the total amount of oxidizable material present in a sample, including stable organic materials which are not measured by the BOD test.

Waste discharges shall not result in increases in COD levels in inland surface waters which exceed the values shown in Table 4-1 or which adversely affect beneficial uses.

Chloride

Excess chloride concentrations lead primarily to economic damage rather than public health hazards. Chlorides are considered to be among the most troublesome anions in water used for industrial or irrigation purposes since they significantly affect the corrosion rate of steel and aluminum and can be toxic to plants. A safe value for irrigation is considered to be less than 175 mg/L of chloride. Excess chlorides affect the taste of potable water, so drinking water standards are generally based on potability rather than on health. The secondary drinking water standard for chloride is 500 mg/L.

The chloride objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Chlorine, Residual

Wastewater disinfection with chlorine usually produces a chlorine residual. Chlorine and its reaction products are toxic to aquatic life.

To protect aquatic life, the chlorine residual in wastewater discharged to inland surface waters shall not exceed 0.1 mg/L.

Color

Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. Color is primarily an aesthetic consideration, although it can discolor clothes and food. The secondary drinking water standard for color is 15 color units.

Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affect beneficial uses. The natural color of fish, shellfish or other inland surface water resources used for human consumption shall not be impaired.

Dissolved Solids, Total (Total Filtrable Residue)

The Department of Health Services recommends that the concentration of total dissolved solids (TDS) in drinking water be limited to 1000 mg/L (secondary drinking water standard) due to taste considerations. For most irrigation uses, water should have a TDS concentration under 700 mg/L. Quality-related consumer cost analyses have indicated that a benefit to consumers exists if water is supplied at or below 500 mg/L TDS.

The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test ("Standard Methods for the Examination of Water and Wastewater, 16th Ed.," 1985: 209B (180°C), p.95), shall not exceed the specific objectives listed in Table 4-1 as a result of controllable water quality factors.

Filtrable Residue, Total

See Dissolved Solids, Total

Floatables

Floatables are an aesthetic nuisance as well as a substrate for algae and insect vectors.

Waste discharges shall not contain floating materials, including solids, liquids, foam or scum, which cause a nuisance or adversely affect beneficial uses.

Fluoride

Fluoride in water supply used for industrial or irrigation purposes has certain detrimental effects. Fluoride in optimum concentrations in water supply (concentration dependent upon the mean annual air temperature) is considered beneficial for preventing dental caries, but concentrations above approximately 1 mg/L, or its equivalent at a given temperature, are considered likely to increase the risk of occurrence of dental fluorosis.

Fluoride concentrations shall not exceed values specified in the table below in inland surface waters designated MUN as a result of controllable water quality factors.

Annual Average of Maximum Daily Air Temperature (°C)	Optimum Fluoride Concentration (mg/L)
12.0 and below	1.2
12.1 to 14.6	1.1
14.7 to 17.6	1.0
17.7 to 21.4	0.9
21.5 to 26.2	0.8
26.3 to 32.5	0.7

Hardness (as $CaCO_3$)
The major detrimental effect of hardness is economic. Any concentration (reported as mg/L $CaCO_3$) greater than 100 mg/L results in the increased use of soap, scale buildup in utensils in domestic uses, and in plumbing. Hardness in industrial cooling waters is generally objectionable above 50 mg/L.

The objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors. If no hardness objective is listed in Table 4-1, the hardness of receiving waters used for municipal supply (MUN) shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.

Inorganic Nitrogen, Total
see Nitrogen, Total Inorganic

Metals
Metals can be toxic to human and animal life.

In 1990, the Environmental Protection Agency (EPA) placed the Santa Ana River, reaches 2, 3, and 4, and Chino Creek on the §304(l) list of "Waters Not Meeting Applicable Water Quality Standards" based on its review of data on certain metals in POTW discharges to the River.

The Santa Ana River dischargers and the Regional Board disagreed with and objected to EPA's §304(l) designation. To demonstrate whether or not the §304(l) designation is correct and what effects, if any, heavy metal levels may have on aquatic life in the Region, the Santa Ana River Dischargers Association and the Santa Ana Watershed Project Authority agreed to conduct a Use-Attainability Analysis (UAA).

The purpose of a Use-Attainability Analysis is to evaluate the "physical, biological, chemical, and hydrological conditions of a river to determine what specific beneficial uses the waterbody can support." If local conditions preclude full attainment of an aquatic life beneficial use for reasons unrelated to water quality, federal and state authorities may allow variances from the generic water quality criteria.

The UAA began in February 1991 and concluded in March 1992. It provided detailed information on chemical, biological, and hydrologic conditions in the middle Santa Ana River aquatic system. Conclusions and recommendations were presented to the Board in June 1992. The information presented is reflected in the Santa Ana River discussion in Chapter 1 and in the new LWRM Beneficial Use designation (Chapter 3). Data provided by the UAA was also used to support the adoption of site-specific objectives for three metals, cadmium (Cd), copper (Cu), and lead (Pb) for the Santa Ana River (Reaches 2, 3, and 4) and the perennial portions of some tributaries (including Chino Creek, Cucamonga/Mill Creek, Temescal Creek, and creeks in the Riverside Narrows area).

In adopting these SSOs, the Regional Board found (RWQCB Resolution No. 94-1) that:

a. The Site-Specific Water Quality Objectives (SSOs) will protect the beneficial uses of the Santa Ana River.

b. The SSOs are conservative.

c. The SSOs, which represent higher water quality than presently exists, will not result in degradation of water quality.

d. Existing levels of cadmium, copper, and lead in the Santa Ana River do not contribute to toxicity in the Santa Ana River.

The toxicity of these metals varies with water hardness. No fixed hardness value is assumed; objectives are calculated using the hardness of the collected sample.

The following equations represent the SSOs which apply to these waterbodies. These SSOs are expressed as the dissolved form of the metals.

SSO for Cadmium:

$$Cd\ SSO = 0.85[e^{[0.7852*\ln(TH)-3.490]}]$$

SSO for Copper:

$$Cu\ SSO = 0.85[e^{[0.8545*\ln(TH)-1.465]}]$$

SSO for Lead:

$$Pb\ SSO = 0.25[e^{[1.273*\ln(TH)-3.958]}]$$

where TH is the total hardness (as $CaCO_3$) in mg/L.

The SSOs for cadmium and copper are simply the hardness-dependent formulas for calculating the objective (national criteria), corrected by the dissolved-to-total (metal) ratio. The SSO for lead is the recalculated* hardness-dependent formula, corrected by the dissolved-to-total ratio.

The table below shows the site-specific objectives for cadmium, copper, and lead that would apply to a water sample with 200 mg/L total hardness (as $CaCO_3$).

Metal	Calculated WQO	Recalculated Value	EPA Correction Factor	SSO
Cd	2.0	NA	0.85	1.7
Cu	21.4	NA	0.85	18.2
Pb	7.7	16.2	0.25	4.1

Toxicity testing performed as part of the Santa Ana River Use-Attainability Analysis (UAA) has demonstrated that the levels of dissolved metal shown below are safe and non-toxic in Santa Ana River water.

Cadmium	4 μg/L
Copper	37 μg/L
Lead	28 μg/L

There is also evidence that levels as much as 100% higher than those shown above do not result in chronic toxicity.

Methylene Blue-Activated Substances (MBAS)
The MBAS test is sensitive to the presence of detergents (see surfactants). Positive results may indicate the presence of wastewater. The secondary drinking water standard for MBAS is 0.05 mg/L.

MBAS concentrations shall not exceed 0.05 mg/L in inland surface waters designated MUN as a result of controllable water quality factors.

Nitrate
High nitrate concentrations in domestic water supplies can be toxic to human life. Infants are particularly susceptible and may develop methemoglobinemia (blue baby syndrome). The primary drinking water standard for nitrate (as NO_3) is 45 mg/L or 10 mg/L (as N).

Nitrate-nitrogen concentrations shall not exceed 45 mg/L (as NO_3) or 10 mg/L (as N) in inland surface waters designated MUN as a result of controllable water quality factors.

Nitrogen, Total Inorganic
The objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Oil and Grease
Oil and grease can be present in water as a result of the discharge of treated wastes and the accidental or intentional dumping of wastes into sinks and storm drains. Oils and related materials have a high surface tension and are not soluble in water, therefore forming a film on the water's surface. This film can result in nuisance conditions because of odors and visual impacts. Oil and grease can coat birds and aquatic organisms, adversely affecting respiration and/or thermoregulation.

Waste discharges shall not result in deposition of oil, grease, wax or other materials in concentrations which result in a visible film or in coating objects in the water, or which cause a nuisance or adversely affect beneficial uses.

Oxygen, Dissolved
Adequate dissolved oxygen (D.O.) is vital for aquatic life. Depression of D.O. levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

* Recalculation for lead was carried out by EPA-Region IX, using the lowest genus mean acute value (GMAV) as the final acute value (FAV) and an acute-to chronic ratio (ACR) of 51.29, resulting in a final chronic value (FCV) of 2.78 and the SSO formula already shown.

The dissolved oxygen content of surface waters shall not be depressed below 5 mg/L for waters designated WARM, or 6 mg/L for waters designated COLD, as a result of controllable water quality factors. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95th percentile concentration to fall below 75% of saturation within a 30-day period.

pH

pH is a measure of the hydrogen ion concentration of water. pH values generally range from 0 (most acidic) to 14 (most alkaline). Many pollutants can alter the pH, raising or lowering it excessively. These extremes in pH can have adverse effects on aquatic biota and can corrode pipes and concrete. Even small changes in pH can harm aquatic biota.

The pH of inland surface waters shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors.

Radioactivity

Radioactive materials shall not be present in the waters of the region in concentrations which are deleterious to human, plant or animal life. Waters designated MUN shall meet the limits specified in the California Code of Regulations, Title 22, and listed here:

Combined Radium-226 and Radium-228	*5*	*pCi/L*
Gross Alpha particle activity	*15*	*pCi/L*
Tritium	*20,000*	*pCi/L*
Strontium-90	*8*	*pCi/L*
Gross Beta particle activity	*50*	*pCi/L*
Uranium	*20*	*pCi/L*

Sodium

The presence of sodium in drinking water may be harmful to persons suffering from cardiac, renal, and circulatory diseases. It can contribute to taste effects, with the taste threshold depending on the specific sodium salt. Excess concentrations of sodium in irrigation water reduce soil permeability to water and air. The deterioration of soil quality because of the presence of sodium in irrigation water is cumulative and is accelerated by poor drainage.

The sodium objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Solids, Suspended and Settleable

Settleable solids are deleterious to benthic organisms and may cause anaerobic conditions to form. Suspended solids can clog fish gills and interfere with respiration in aquatic fauna. They also screen out light, hindering photosynthesis and normal aquatic plant growth and development.

Inland surface waters shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors.

Sulfate

Excessive sulfate, particularly magnesium sulfate ($MgSO_4$) in potable waters can lead to laxative effects, but this effect is temporary. There is some taste effect from magnesium sulfate in the range of 400-600 mg/L as $MgSO_4$. The secondary drinking water standard for sulfate is 500 mg/L. Sulfate concentrations in waters native to this region are normally low, less than 40 mg/L, but imported Colorado River water contains approximately 300 mg/L of sulfate.

The objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Sulfides

Sulfides are generated by many industries and from the anaerobic decomposition of organic matter. In water, sulfides can react to form hydrogen sulfide (H_2S), commonly known for its "rotten egg" odor. Sulfides in ionic form are also toxic to fish in.

The dissolved sulfide content of inland surface waters shall not be increased as a result of controllable water quality factors.

Surfactants (surface-active agents)

This group of materials includes detergents, wetting agents, and emulsifiers. See also Methylene Blue-Activated Substances (MBAS).

Waste discharges shall not contain concentrations of surfactants which result in foam in the course of flow or use of the receiving water, or which adversely affect aquatic life.

Taste and Odor

Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s). The secondary drinking water standard for odor (threshold) is 3 odor units.

The inland surface waters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations which cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish or other regional inland surface water resources used for human consumption shall not be impaired.

Temperature

Waste discharges can cause temperature changes in the receiving waters which adversely affect the aquatic biota. Discharges most likely to cause these temperature effects are cooling tower and heat exchanger blowdown.

The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of waters designated COLD shall not be increased by more than 5°F as a result of controllable water quality factors. The temperature of waters designated WARM shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors. Lake temperatures shall not be raised more than 4°F above established normal values as a result of controllable water quality factors.

Total Dissolved Solids

See Dissolved Solids, Total

Total Filtrable Residue

See Dissolved Solids, Total

Total Inorganic Nitrogen

See Nitrogen, Total Inorganic

Toxic Substances

Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health.

The concentrations of contaminants in waters which are existing or potential sources of drinking water shall not occur at levels which are harmful to human health.

The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.

Turbidity

Turbidity is a measure of light scattered due to particulates in water. The secondary drinking water standard for turbidity is 5 NTU (nephelometric turbidity units).

Increases in turbidity which result from controllable water quality factors shall comply with the following:

Natural Turbidity	*Maximum Increase*
0-50 NTU	*20%*
50-100 NTU	*10 NTU*
Greater than 100 NTU	*10%*

All inland surface waters of the region shall be free of changes in turbidity which adversely affect beneficial uses.

GROUNDWATERS

The narrative objectives which are included below apply to all groundwaters as noted. In addition, specific numerical objectives are listed in Table 4-1. Where more than one objective is applicable, the stricter shall apply.

Arsenic

Arsenic concentrations shall not exceed 0.05 mg/L in groundwaters designated MUN as a result of controllable water quality factors.

Bacteria, Coliform

Fecal bacteria are part of the intestinal flora of warm- blooded animals. Their presence in groundwater is an indicator of pollution. Total coliform is measured in terms of the number of coliform organisms per unit volume. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal coliform bacteria. Water quality objectives for numbers of total and fecal coliform vary with the uses of the water, as shown below.

Total coliform numbers shall not exceed 2.2 organisms/100 mL median over any seven-day period in groundwaters designated MUN as a result of controllable water quality factors.

Barium

Barium concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.

Boron

Boron is not considered a problem in drinking water supplies until concentrations of 20-30 mg/L are reached. In irrigation, boron is an essential element. However, boron concentrations in excess of 0.75 mg/L may be deleterious to certain crops, particularly citrus. The maximum safe concentration of even the most tolerant plants is about 4.0 mg/L of boron.

Boron concentrations shall not exceed 0.75 mg/L in groundwaters of the region as a result of controllable water quality factors.

Chloride

Excess chloride concentrations lead primarily to economic damage rather than public health hazards. Chlorides are considered to be among the most troublesome anions in water used for industrial or irrigation purposes since they significantly affect the corrosion rate of steel and aluminum and can be toxic to plants. A safe value for irrigation is considered to be less than 175 mg/L of chloride. Excess chlorides affect the taste of potable water, so drinking water standards are generally based on potability rather than on health. The secondary drinking water standard for chloride is 500 mg/L.

The chloride objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Color

Color in water may arise naturally, such as from minerals, plant matter or algae, or may be caused by industrial pollutants. Color is primarily an aesthetic consideration, although it can discolor clothes and food. The secondary drinking water standard for color is 15 color units.

Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affects beneficial uses.

Cyanide

Cyanide concentrations shall not exceed 0.2 mg/L in groundwaters designated MUN as a result of controllable water quality factors.

Dissolved Solids, Total (Total Filtrable Residue)

The Department of Health Services recommends that the concentration of total dissolved solids (TDS) in drinking water be limited to 1000 mg/L (secondary drinking water standard) due to taste considerations. For most irrigation uses, water should have a TDS concentration under 700 mg/L. Quality-related consumer cost analyses have indicated that a benefit to consumers exists if water is supplied at or below 500 mg/L TDS.

The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test ("Standard Methods for the Examination of Water and Wastewater, 16th Ed.," 1985: 209B (180°C), p.95), shall not exceed the specific objectives listed in Table 4-1 as a result of controllable water quality factors.

Filtrable Residue, Total

See Dissolved Solids, Total

Fluoride

Fluoride in water supply used for industrial or irrigation purposes has certain detrimental effects. Fluoride in optimum concentrations in water supply (concentration dependent upon the mean annual air temperature) is considered beneficial for preventing dental caries, but concentrations above approximately 1 mg/L, or its equivalent at a given temperature, are considered likely to increase the risk of occurrence of dental fluorosis.

Fluoride concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.

Hardness (as $CaCO_3$)

The major detrimental effect of hardness is economic. Any concentration (reported as mg/L $CaCO_3$) greater than 100 mg/L results in the increased use of soap, scale buildup in utensils in domestic uses, and in plumbing. Hardness in industrial cooling waters is generally objectionable above 50 mg/L.

The objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors. If no hardness objective is listed in Table 4-1, the hardness of receiving waters used for municipal supply (MUN) shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.

Metals

Metals can be toxic to human and animal life.

Metals concentrations shall not exceed the values listed below in groundwaters designated MUN as a result of controllable water quality factors.

Metal	*Concentration (mg/L)*
Cadmium	*0.01*
Chromium	*0.05*
Cobalt	*0.2*
Copper	*1.0*
Iron	*0.3*
Lead	*0.05*
Manganese	*0.05*
Mercury	*0.002*
Selenium	*0.01*
Silver	*0.05*

Methylene Blue-Activated Substances (MBAS)

The MBAS test is sensitive to the presence of detergents (see surfactants in inland surface waters discussion). Positive results may indicate the presence of wastewater. The secondary drinking water standard for MBAS is 0.05 mg/L.

MBAS concentrations shall not exceed 0.05 mg/L in groundwaters designated MUN as a result of controllable water quality factors.

Nitrate

High nitrate concentrations in domestic water supplies can be toxic to human life. Infants are particularly susceptible and may develop methemoglobinemia (blue baby syndrome). The primary drinking water standard for nitrate (as NO_3) is 45 mg/L or 10 mg/L (as N).

Nitrate-nitrogen concentrations listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Oil and Grease

Oil and grease can be present in water as a result of the discharge of treated wastes and the accidental or intentional dumping of wastes into sinks and storm drains. Oils and related materials have a high surface tension and are not soluble in water, therefore forming a film on the water's surface. This film can result in nuisance conditions because of odors and visual impacts.

Waste discharges shall not result in deposition of oil, grease, wax or other materials in concentrations which cause a nuisance or adversely affect beneficial uses.

pH

pH is a measure of the hydrogen ion concentration of water. pH values generally range from 0 (most acidic) to 14 (most alkaline). Many pollutants can alter the pH, raising or lowering it excessively. These extremes in pH can corrode pipes and concrete.

The pH of groundwater shall not be raised above 9 or depressed below 6 as a result of controllable water quality factors.

Radioactivity

Radioactive materials shall not be present in the waters of the region in concentrations which are deleterious to human, plant or animal life. Groundwaters designated MUN shall meet the limits specified in the California Code of Regulations, Title 22, and listed here:

Combined Radium-226 and Radium-228	*5*	*pCi/L*
Gross Alpha particle activity	*15*	*pCi/L*
Tritium	*20,000*	*pCi/L*
Strontium-90	*8*	*pCi/L*
Gross Beta particle activity	*50*	*pCi/L*
Uranium	*20*	*pCi/L*

Sodium
The presence of sodium in drinking water may be harmful to persons suffering from cardiac, renal, and circulatory diseases. It can contribute to taste effects, with the taste threshold depending on the specific sodium salt. Excess concentrations of sodium in irrigation water reduce soil permeability to water and air. The deterioration of soil quality because of the presence of sodium in irrigation water is cumulative and is accelerated by poor drainage.

The sodium objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Sulfate
Excessive sulfate, particularly magnesium sulfate ($MgSO_4$) in potable waters can lead to laxative effects, but this effect is temporary. There is some taste effect from magnesium sulfate in the range of 400-600 mg/L as $MgSO_4$. The secondary drinking water standard for sulfate is 500 mg/L. Sulfate concentrations in waters native to this region are normally low, less than 40 mg/L, but imported Colorado River water contains approximately 300 mg/L of sulfate.

The objectives listed in Table 4-1 shall not be exceeded as a result of controllable water quality factors.

Taste and Odor
Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s). The secondary drinking water standard for odor (threshold) is 3 odor units.

The groundwaters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations which cause a nuisance or adversely affect beneficial uses.

Total Dissolved Solids
See Dissolved Solids, Total

Total Filtrable Residue
See Dissolved Solids, Total

Total Inorganic Nitrogen
See Nitrogen, Total Inorganic

Toxic Substances
All waters of the region shall be maintained free of substances in concentrations which are toxic, or that produce detrimental physiological responses in human, plant, animal or aquatic life.

THE SANTA ANA RIVER

Setting objectives for the flowing portions of the Santa Ana River is a significant feature of this Basin Plan. The River provides water for recreation and for aquatic and wildlife habitat. River flows are a significant source of groundwater recharge in the lower basin, which provides domestic supplies for more than two million people. These flows account for about 70% of the total recharge.

The dividing line between reaches 2 and 3 of the River, and between the upper and lower Santa Ana Basins, is Prado Dam, a flood control facility built and operated by the U.S. Army Corps of Engineers. The dam includes a subsurface groundwater barrier, and as a result all ground and surface waters from the upper basin are forced to pass through the dam (or over the spillway). For this reason, it is an ideal place to measure flows and monitor water quality.

The Prado Settlement, a stipulated court judgement (Orange County Water District vs. City of Chino, *et al.*), which requires that a certain minimum amount of water be released each year from the upper basin, is overseen by the Santa Ana River Watermaster. The U.S. Geologic Survey (USGS) operates a permanent continuous monitoring station immediately below Prado Dam, and the data collected there are utilized by the Watermaster. Orange County Water District (OCWD) samples the river monthly at the USGS gage and determines the water quality. Compliance with the objectives for reaches 2 and 3 is monitored by the Regional Board, using the data and information available from the USGS gage and these sources, plus the data from its own specific sampling programs (see Chapter 6).

The quality of the Santa Ana River is a function of the quantity and quality of the various components of the flows. The two major components of total flow are storm flow and base flow. Storm flow is the water which results directly from rainfall (surface runoff) in the upper basin; it also includes the stormwater runoff from the San Jacinto Basin which may reach the River via Temescal Creek. Most storms occur during the winter rainy season (December through April). Base flow is composed of wastewater discharges, rising groundwater, and nonpoint source discharges. Wastewater discharges are the treated sewage effluents discharged by municipalities to the river and its tributaries. Rising groundwater occurs at a number of locations along the River, including the San Jacinto Fault, Riverside Narrows, and in or near the Prado Flood Control Basin. Nonpoint source discharges include uncontrolled runoff from agricultural and urban areas which is not related to storm flows.

Nontributary flow is a third element of total flow. It is generally imported water released in the upper basin, for recharge in the lower basin (Santa Ana Forebay).

The Santa Ana River Watermaster calculates the amount and quality of total flow for each water year (October 1 to September 30). The Watermaster's Annual Report is used to determine compliance with the stipulated judgement referred to earlier, which set quality and quantity limits on the river. The Watermaster's report presents summary data compiled from the continuous monitoring of flow in cfs (cubic feet per second) and salinity as E.C. (electrical conductivity) at the USGS Prado Gaging Station. The Watermaster's annual determination of total flow quality will be used to determine compliance with the total flow objectives in this Plan. In years of normal rainfall, most of the total flow of the river is percolated in the Santa Ana Forebay, and directly affects the quality of that groundwater. For that reason, compliance with the total dissolved solids (TDS) water quality objective for Reach 2 will be based on the five- year moving average of the annual TDS content of total flow. Use of this moving average allows the effects of wet and dry years to be smoothed out over the five-year period.

As was noted earlier, the three components of base flow in the river are wastewater, rising water, and nonpoint source discharges. These three components are present in varying amounts throughout the year, and the contributions and quality of each can be affected by the regulatory activities of the Regional Board. The quantity of storm flow is obviously highly variable; programs to control its quality are in their nascent stages. For these reasons, water quality objectives for controllable constituents are set based on the base flow of the river, rather than on total flow.

The regulatory activities of the Regional Board include setting waste discharge requirements on point source discharges. Waste discharge requirements are developed on the basis of the limited assimilative capacity of the river (see TDS and Nitrogen Wasteload Allocation, Chapter Five). Nonpoint source discharges, generally urban runoff (nuisance water) and agricultural tailwater, will be regulated by requiring compliance with Best Management Practices (BMPs), where appropriate. The rising water component of base flow will be affected by the extraction of brackish groundwater in several subbasins (a Basin Plan implementation action), by regulation of wastewater discharges, and other activities.

The quantity and quality of base flow is most consistent during the month of August. At that time of year the influence of storm flows and nontributary flows is at a minimum. There is usually no water impounded behind Prado Dam. The volumes of rising water and nonpoint source discharges tend to be low during that time. The major component of base flow in August, therefore, is municipal wastewater. For these reasons, this period has been selected as the time when base flow will be measured and its quality determined. This information will subsequently allow the evaluation of available assimilative capacity, which serves to verify the accuracy of the wasteload allocation. In order to determine whether the water quality and quantity objectives for base flow in Reach 3 are being met, the Regional Board will collect a series of grab and composite samples during August of each year. The results will also be compared with the continuous monitoring data collected by USGS and data from other sources. Additional sampling in Reach 3 will help evaluate the effects of the various constituents of base flow.

Future river flows and quality (TDS and TIN) were projected by computer models. The results indicate that the objectives for TDS and total nitrogen will be met. The objectives for individual mineral constituents are expected to be met if the TDS objective is met.

REFERENCES

The "Federal Clean Water Act," 33 USC 466 *et seq.*

California Water Code, Section 13000 "Water Quality," *et seq*.

California State Water Resources Control Board, "Water Quality Criteria, Second Edition," 1963.

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California Regional Water Quality Control Board, "Public Workshop - Review of the Un-ionized Ammonia Objective - Summary of Findings & Recommendation," Staff Report, December 1988.

Santa Ana Watershed Project Authority, "Final Report, Santa Ana River Use-Attainability Analysis," June 1992.

California Regional Water Quality Control Board, Resolution No. 93-64, "Resolution Amending the Water Quality Control Plan to Set Site-Specific Water Quality Objectives for Cadmium, Copper, and Lead in the Middle Santa Ana River," October 1993.

ENSR Consulting and Engineering, "Short-Term Chronic Toxicity of Un-ionized Ammonia to Fathead Minnows (*Pimephales promelas*) in a Site Water," September 1993.

Upper Santa Ana Watershed

1 Big Bear Valley
2 Cucamonga
3 Chino I
4 Chino II
5 Chino III
6 San Timoteo
7 Bunker Hill I
8 Bunker Hill II
9 Bunker Hill Pressure
10 Lytle Creek
11 Rialto
12 Colton
13 Riverside I
14 Riverside II
15 Riverside III
16 Arlington
17 Bedford (Upper Temescal I)
18 Lee Lake (Upper Temescal II)
19 Coldwater (Upper Temescal III)
20 Temescal

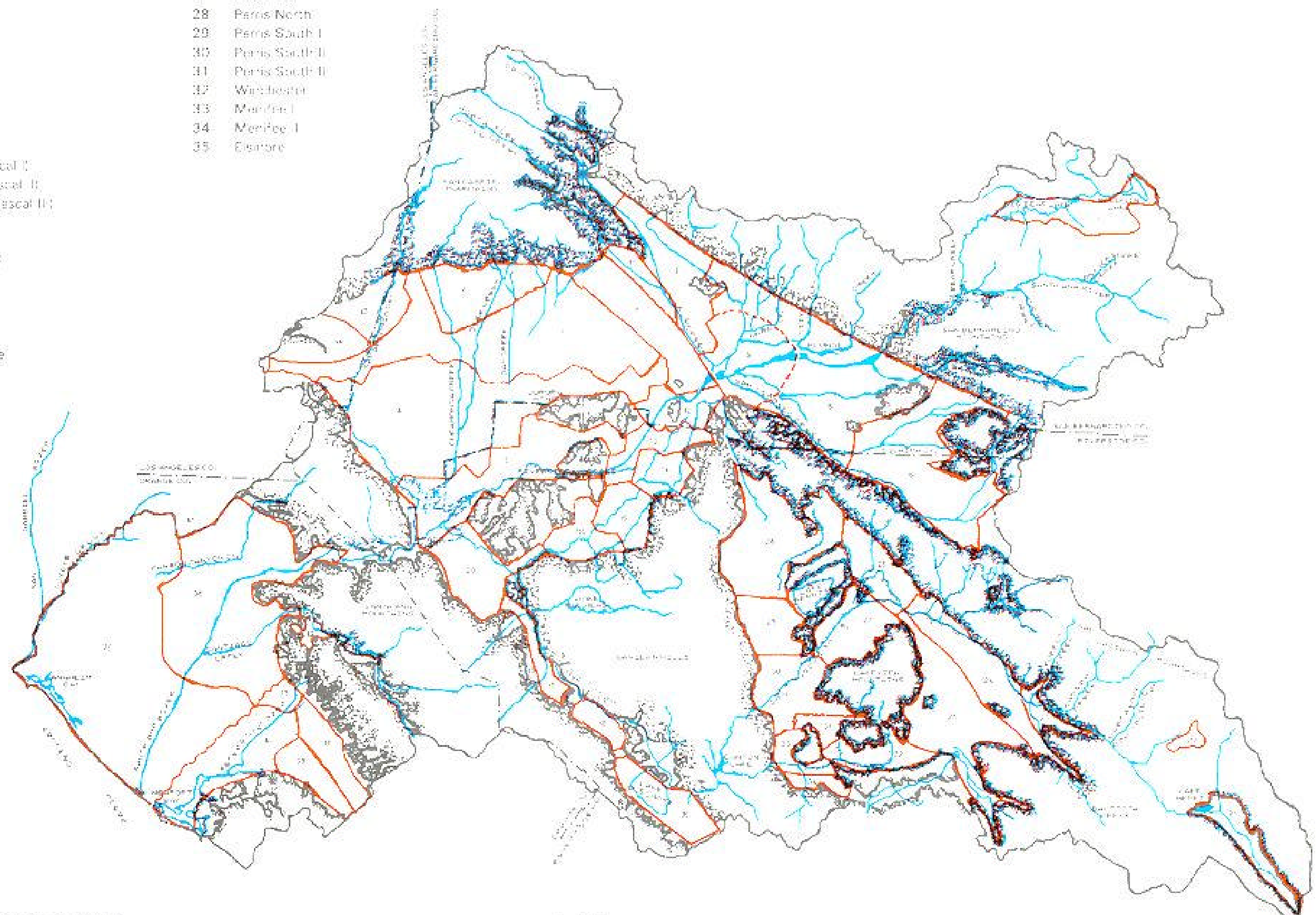
Lower Santa Ana Watershed

36 Santa Ana Forebay
37 Santa Ana Pressure
38 Irvine Forebay I
39 Irvine Forebay II
40 Irvine Forebay Pressure
41 La Habra
42 Santiago

San Jacinto Watershed

21 Garner Valley
22 Idyllwild Area
23 San Jacinto Canyon
24 San Jacinto - Intake and Upper Pressure
25 San Jacinto - Lower Pressure
26 Hemet
27 Lakeview
28 Perris North
29 Perris South I
30 Perris South II
31 Perris South III
32 Winchester
33 Menifee I
34 Menifee II
35 Elsinore

FIGURE 4-1
SANTA ANA REGION GROUNDWATER BASINS



In the Los Angeles Region, but within the Santa Ana River drainage area

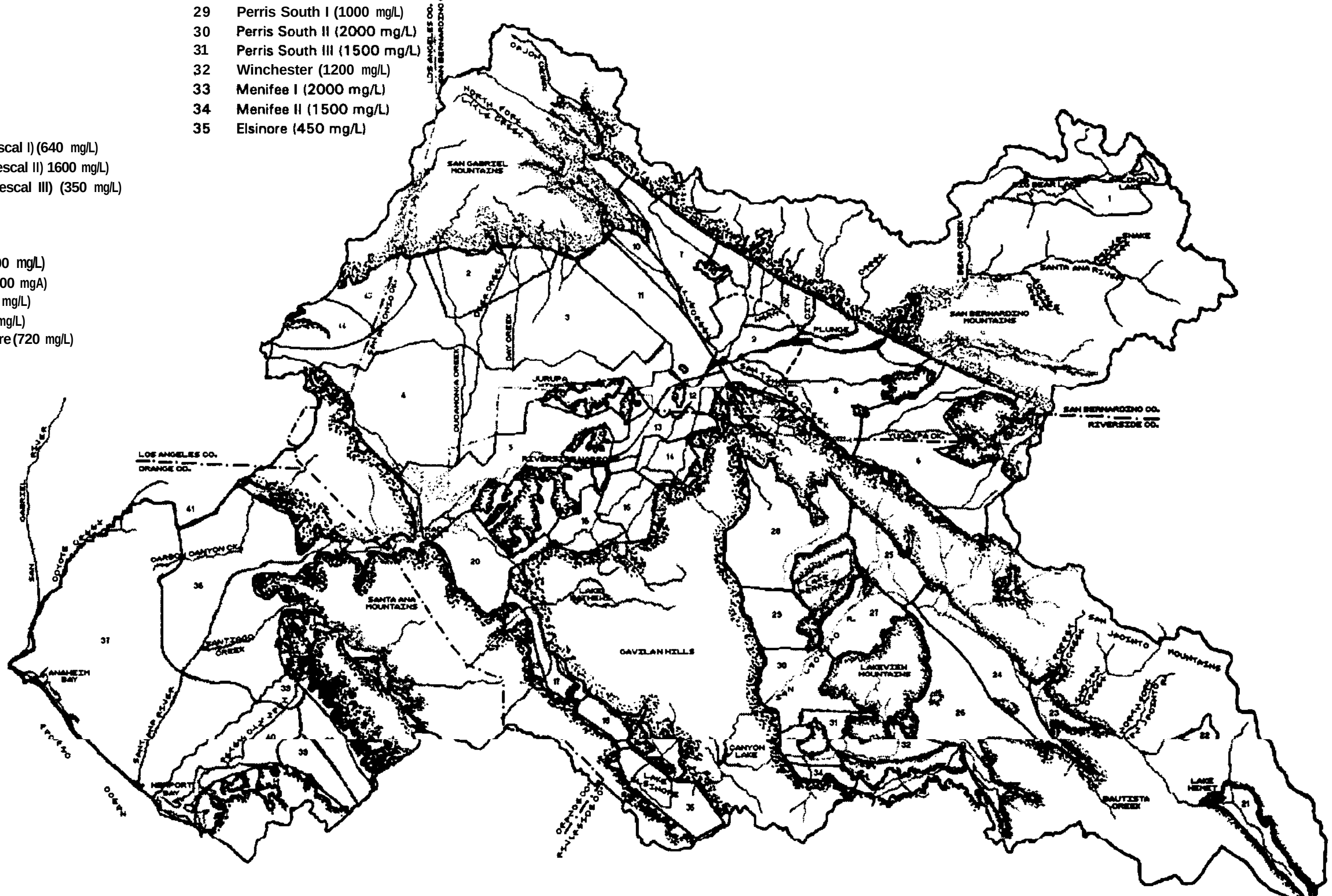
43 Claremont Heights
44 Pomona

FIGURE 4-2
SANTA ANA REGION GROUNDWATER BASINS
(TDS, mg/L)

Upper Santa Ana Watershed
1 Big Bear Valley (300mg/L)
2 Cucamonga(220 mg/L)
3 Chino I (220 mg/L)
4 Chino II I330 mg/L)
5 Chino III (740 mg/L)
6 San Timoteo (240 mg/L)
7 Bunker Hill I (260 mg/L)
9 Bunker Hill II (290 mg/L)
9 Bunker Hill Pressure(300 mg/L)
10 LytleCreek (225 mg/L)
11 Rialto(200 mg/L)
12 Colton(400 mg/L)
13 Riverside I (490 mg/L)
14 Riverside II (650 mg/L)
15 Riverside III (990 mg/L)
16 Arlington (1050 mg/L)
17 Bedford (Upper Temescal I) (640 mg/L)
16 Lee Lake (Upper Temescal II) 1600 mg/L)
19 Coldwater (Upper Tamescal III) (350 mg/L)
20 Temescal(640 mg/L)

Lower Santa Ana Watershed
36 Santa Ana Forebay(600 mg/L)
37 Santa Ana Pressure (500 mgA)
39 Irvine Forebay I(1000 mg/L)
39 Irvine Forebay II(720 mg/L)
40 Irvine Forebay Pressure(720 mg/L)
41 La Habra (1000 mg/L)
42 Santiago (None)

San Jacinto Watershed
21 Garner Valley (300)
22 Idyllwild Area (None)
23 San Jacinto Canyon (250 mg/L)
24 San Jacinto - Intake and Upper Pressure (350 mg/L)
25 San Jacinto · Lower Pressure (900 mg/L)
26 Hemet (600 mg/L)
27 Lakeview (500 mg/L)
28 Perris North (300 mg/L)
29 Perris South I (1000 mg/L)
30 Perris South II (2000 mg/L)
31 Perris South III (1500 mg/L)
32 Winchester (1200 mg/L)
33 Menifee I (2000 mg/L)
34 Menifee II (1500 mg/L)
35 Elsinore (450 mg/L)



In the Los Angeles Region, but within the Santa Ana River drainage area
43 Claremont Heights
44 Pomona

FIGURE 4-3
SANTA ANA REGION GROUNDWATER BASINS
(NO_3-N, mg/L)

Upper Santa Ana Watershed

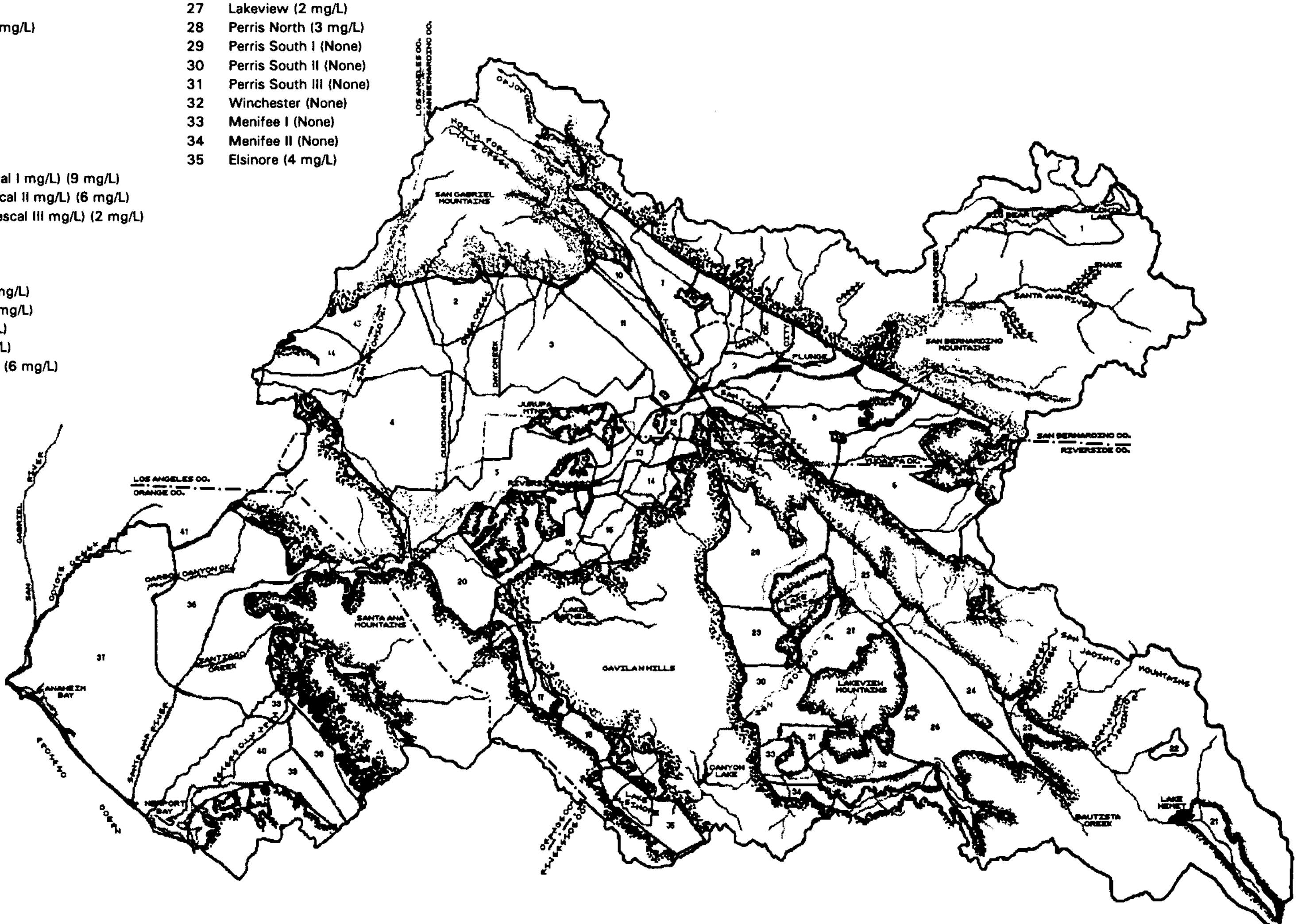
1 Big Bear Valley (5 mg/L)
2 Cucamonga (5 mg/L)
3 Chino I (5 mg/L)
4 Chino II (6 mg/L)
5 Chino III (11 mg/L)
6 San Timoteo (6 mg/L)
7 Bunker Hill I (1 mg/L)
8 Bunker Hill II (5 mg/L)
9 Bunker Hill Pressure (1 mg/L)
10 Lytle Creek (1 mg/L)
11 Rialto (2 mg/L)
12 Colton (3 mg/L)
13 Riverside I (4 mg/L)
14 Riverside II (10 mg/L)
15 Riverside III (20 mg/L)
16 Arlington (20 mg/L)
17 Bedford (Upper Temescal I mg/L) (9 mg/L)
18 Lee Lake (Upper Temescal II mg/L) (6 mg/L)
19 Coldwater (Upper Temescal III mg/L) (2 mg/L)
20 Temescal (9 mg/L)

Lower Santa Ana Watershed

36 Santa Ana Forebay (3 mg/L)
37 Santa Ana Pressure (3 mg/L)
38 Irvine Forebay I (8 mg/L)
39 Irvine Forebay II (6 mg/L)
40 Irvine Forebay Pressure (6 mg/L)
41 La Habra (None)
42 Santiago (None)

San Jacinto Watershed

21 Garner Valley (2 mg/L)
22 Idyllwild Area (None)
23 San Jacinto Canyon (1 mg/L)
24 San Jacinto - Intake and Upper Pressure (5 mg/L)
25 San Jacinto - Lower Pressure (3 mg/L)
26 Hemet (4 mg/L)
27 Lakeview (2 mg/L)
28 Perris North (3 mg/L)
29 Perris South I (None)
30 Perris South II (None)
31 Perris South III (None)
32 Winchester (None)
33 Menifee I (None)
34 Menifee II (None)
35 Elsinore (4 mg/L)



In the Los Angeles Region, but within the Santa Ana River drainage area

43 Claremont Heights
44 Pomona

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Table 4-1 WATER QUALITY OBJECTIVES

OCEAN WATERS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
NEARSHORE ZONE*									
San Gabriel River to Poppy Street in Corona del Mar+	---	---	---	---	---	---	---	801.11	
Poppy Street to Southeast Regional Boundary+	---	---	---	---	---	---	---	801.11	
OFFSHORE ZONE									
Waters Between Nearshore Zone and Limit of State Waters+	---	---	---	---	---	---	---		

* Defined by Ocean Plan Chapter II A.1.: "Within a zone bounded by shoreline and a distance of 1000 feet from shoreline or the 30-foot depth contour, whichever is further from shoreline..."

+ Numeric ojectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

BAYS, ESTUARIES, AND TIDAL PRISMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Anaheim Bay - Outer Bay+	---	---	---	---	---	---	---	801.11	
Anaheim Bay - Seal Beach National Wildlife Refuge+	---	---	---	---	---	---	---	801.11	
Sunset Bay - Huntington Harbour+	---	---	---	---	---	---	---	801.11	
Bolsa Bay+	---	---	---	---	---	---	---	801.11	
Bolsa Chica Ecological Reserve+	---	---	---	---	---	---	---	801.11	
Lower Newport Bay+	---	---	---	---	---	---	---	801.11	
Upper Newport Bay+	---	---	---	---	---	---	---	801.11	
Santa Ana River Salt Marsh+	---	---	---	---	---	---	---	801.11	
Tidal Prism of Santa Ana River (to within 1000' of Victoria Street) and Newport Slough+	---	---	---	---	---	---	---	801.11	
Tidal Prism of San Gabriel River - River Mouth to Marina Drive+	---	---	---	---	---	---	---	845.61	
Tidal Prisms of Flood Control Channels Discharging to Coastal or Bay Waters+	---	---	---	---	---	---	---	801.11	

+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
LOWER SANTA ANA RIVER BASIN									
Santa Ana River									
Reach 1 - Tidal Prism to 17th Street in Santa Ana+	(Flood Flows Only)							801.11	
Reach 2 - 17th Street in Santa Ana to Prado Dam	650[1]	---	---	---	---	---	---	801.11	801.12
Aliso Creek+	---	---	---	---	---	---	---	845.63	
Carbon Canyon Creek+	---	---	---	---	---	---	---	845.63	
Santiago Creek Drainage									
Santiago Creek									
Reach 1 - below Irvine Lake	600	---	---	---	---	---	---	801.12	801.11
Reach 2 - Irvine Lake (see Lakes, pg. 4-36)									
Reach 3 - Irvine Lake to Modjeska Canyon	350	260	20	12	2	80	---	801.12	
Reach 4 - in Modjeska Canyon	350	260	20	12	2	80	---	801.12	
Silverado Creek	650	450	30	20	1	275	---	801.12	
Black Star Creek+	---	---	---	---	---	---	---	801.12	
Ladd Creek+	---	---	---	---	---	---	---	801.12	

1 Five-year moving average
+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
San Diego Creek Drainage									
San Diego Creek									
Reach 1 - below Jeffrey Road	1500	---	---	---	13	---	90	801.11	
Reach 2 - above Jeffrey Road to Headwaters	720	---	---	---	5	---	---	801.11	
Other Tributaries: Bonita Creek, Serrano Creek, Peters Canyon Wash, Hicks Canyon Wash, Bee Canyon Wash, Borrego Canyon Wash, Agua Chinon Wash, Laguna Canyon Wash, Rattlesnake Canyon Wash, Sand Canyon Wash and other Tributaries to these Creeks[+]	---	---	---	---	---	---	---	801.11	
San Gabriel River Drainage									
Coyote Ck. (within Santa Ana Regional Boundary)[+]	---	---	---	---	---	---	---		

[1] Five-year moving average
[+] Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
UPPER SANTA ANA RIVER BASIN									
Santa Ana River									
Reach 3 - Prado Dam to Mission Blvd. in Riverside - Base Flow[2]	700	350	110	140	10[3]	150	30	801.21	801.27, 801.25
Reach 4 - Mission Blvd. in Riverside to San Jacinto Fault in San Bernardino	550	---	---	---	10	---	30	801.27	801.44
Reach 5 - San Jacinto Fault in San Bernardino to Seven Oaks Dam	300	190	30	20	5	60	25	801.52	801.57
Reach 6 - Seven Oaks Dam to Headwaters (see also Individual Tributary Streams)	200	100	30	10	1	20	5	801.72	
San Bernardino Mountain Streams									
Mill Creek Drainage:									
Mill Creek									
Reach 1 - Confluence with Santa Ana River to Bridge Crossing Route 38 at Upper Powerhouse	200	100	30	10	1	20	5	801.58	
Reach 2 - Bridge Crossing Route 38 at Upper Powerhouse to Headwaters	110	100	25	5	1	15	5	801.58	

[2] Additional Objectives: Boron: 0.75 mg/L
[3] Total nitrogen, filtered sample

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Mountain Home Creek	200	100	30	10	1	20	5	801.58	
Mountain Home Creek, East Fork	200	---	---	---	---	---	---	801.70	
Monkey Face Creek	200	100	30	10	1	20	5	801.70	
Alger Creek	200	---	---	---	---	---	---	801.70	
Falls Creek	200	100	30	10	1	20	5	801.70	
Vivian Creek	200	---	---	---	---	---	---	801.70	
High Creek	200	---	---	---	---	---	---	801.70	
Other Tributaries: Lost, Oak Cove, Green, Skinner, Momyer, Glen Martin, Camp, Hatchery, Rattlesnake, Slide, Snow, Bridal Veil, and Oak Creeks, and other Tributaries to these Creeks	200	---	---	---	---	---	---	801.70	
Bear Creek Drainage:									
Bear Creek	175	115	10	10	1	4	5	801.71	
Siberia Creek	200	---	---	---	---	---	---	801.71	
Slide Creek	175	---	---	---	---	---	---	801.71	
All other Tributaries to these Creeks[+]	---	---	---	---	---	---	---	801.71	
Big Bear Lake (see Lakes, pg. 4-36)									

[+] Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Big Bear Lake Tributaries:									
North Creek	175	---	---	---	---	---	---	801.71	
Metcalf Creek	175	---	---	---	---	---	---	801.71	
Grout Creek	150	---	---	---	---	---	---	801.71	
Rathbone (Rathbun) Creek	300	---	---	---	---	---	---	801.71	
Meadow Creek+	---	---	---	---	---	---	---	801.71	
Summit Creek+	---	---	---	---	---	---	---	801.71	
Other Tributaries to Big Bear Lake: Knickerbocker, Johnson, Minnelusa, Polique, and Red Ant Creeks, and other Tributaries to these Creeks	175	---	---	---	---	---	---	801.71	
Baldwin Lake (see Lakes, pg. 4-36)									
Baldwin Lake Drainage:									
Shay Creek+	---	---	---	---	---	---	---	801.73	
Other Tributaries to Baldwin Lake: Sawmill, Green, and Caribou Canyons and other Tributaries to these Creeks+	---	---	---	---	---	---	---	801.73	

+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Other Streams Draining to Santa Ana River (Mountain Reaches[‡])									
Cajon Creek	200	100	30	10	1	20	5	801.51	
City Creek	200	115	30	10	1	20	5	801.57	
Devil Canyon Creek	275	125	35	20	1	25	5	801.57	
East Twin and Strawberry Creeks	475	---	---	---	---	---	---	801.57	
Waterman Canyon Creek	250	---	---	---	---	---	---	801.57	
Fish Creek	200	100	30	10	1	20	5	801.57	
Forsee Creek	200	100	30	10	1	20	5	801.72	
Plunge Creek	200	100	30	10	1	20	5	801.72	
Barton Creek	200	100	30	10	1	20	5	801.72	
Bailey Canyon Creek	200	---	---	---	---	---	---	801.72	
Kimbark Canyon, East Fork Kimbark Canyon, Ames Canyon and West Fork Cable Canyon Creeks	325	---	---	---	---	---	---	801.52	
Valley Reaches[‡] of Above Streams	(Water Quality Objectives Correspond to Underlying GW Basin Objectives)							801.52	

[‡] The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Other Tributaries (Mountain Reaches[‡]): Alder, Badger Canyon, Bledsoe Gulch, Borea Canyon, Breakneck, Cable Canyon, Cienega Seca, Cold, Converse, Coon, Crystal, Deer, Elder, Fredalba, Frog, Government, Hamilton, Heart Bar, Hemlock, Keller, Kilpecker, Little Mill, Little Sand Canyon, Lost, Meyer Canyon, Mile, Monroe Canyon, Oak, Rattlesnake, Round Cienega, Sand, Schneider, Staircase, Warm Springs Canyon and Wild Horse Creeks, and other Tributaries to these Creeks	200	100	30	10	1	20	5	801.72	801.71, 801.57
San Gabriel Mountain Streams (Mountain Reaches[‡])									
San Antonio Creek	225	150	20	6	4	25	5	801.23	
Lytle Creek (South, Middle and North Forks) and Coldwater Canyon Creek	200	100	15	4	4	25	5	801.41	801.42, 801.52, 801.59
Day Creek	200	100	15	4	4	25	5	801.21	
East Etiwanda Creek	200	100	15	4	4	25	5	801.21	
Valley Reaches[‡] of Above Streams	(Water Quality Objectives Correspond to Underlying GW Basin Objectives)							801.21	

[‡] The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Cucamonga Creek									
Reach 1 - Confluence with Mill Creek to 23rd St. in Upland[+]	---	---	---	---	---	---	---	801.21	
Reach 2 (Mountain Reach[‡]) - 23rd St. in Upland to headwaters	200	100	15	4	4	25	5	801.24	
Mill Creek[+]	---	---	---	---	---	---	---	801.25	
Other Tributaries (Mountain Reaches[‡]): Cajon Canyon, San Sevaine, Deer, Duncan Canyon, Henderson Canyon, Bull, Fan, Demens, Thorpe, Angalls, Telegraph Canyon, Stoddard Canyon, Icehouse Canyon, Cascade Canyon, Cedar, Falling Rock, Kerkhoff and Cherry Creeks, and other Tributaries to these Creeks	200	---	---	---	---	---	---	801.21	801.23
San Timoteo Area Streams									
San Timoteo Creek									
Reach 1 - Santa Ana River Confluence to Gage at San Timoteo Canyon Road	290	175	60	60	6	45	15	801.52	801.53

[+] Numeric objectives have not been established; narrative objectives apply.
[‡] The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Reach 2 - Gage at San Timoteo Canyon Road to Confluence with Yucaipa Creek	290	175	60	60	6	45	15	801.61	801.62
Reach 3 - Confluence with Yucaipa Creek to Bunker Hill II Groundwater Subbasin Boundary (T2S/R3W-24)	290	175	60	60	6	45	15	801.62	
Reach 4 - Bunker Hill II Groundwater Subbasin Boundary (T2S/R3W-24) to Confluence with Little San Gorgonio and Noble Creeks (Headwaters of San Timoteo Creek)	290	175	60	60	6	45	15	801.62	
Oak Glen, Potato Canyon and Birch Creeks	230	125	50	40	3	45	5	801.67	
Little San Gorgonio Creek	230	125	50	40	3	45	5	801.69	801.62, 801.63
Yucaipa Creek	290	175	60	60	6	45	15	801.67	801.61, 801.62, 801.64
Other Tributaries to these Creeks - Valley Reaches+‡	---	---	---	---	---	---	---	801.62	801.52, 801.53
Other Tributaries to these Creeks - Mountain Reaches‡	290	---	---	---	---	---	---	801.69	801.67
Anza Park Drain+	---	---	---	---	---	---	---	801.27	

+ Numeric objectives have not been established; narrative objectives apply.
‡ The division between Mountain and Valley reaches occurs at the base of the foothills of the San Bernardino or San Gabriel Mountains.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Sunnyslope Channel[+]	---	---	---	---	---	---	---	801.27	
Tequesquite Arroyo (Sycamore Creek)[+]	---	---	---	---	---	---	---	801.27	
Prado Area Streams									
Chino Creek									
Reach 1 - Santa Ana River confluence to beginning of concrete-lined channel south of Los Serranos Rd.	550	240	75	75	8	60	15	801.21	
Reach 2 - Beginning of concrete-lined channel south of Los Serranos Rd. to confluence with San Antonio Creek[+]	---	---	---	---	---	---	---	801.21	
Temescal Creek									
Reach 1A - Santa Ana River Confluence to Lincoln Ave.	800	400	100	200	6	70	---	801.25	
Reach 1B - LIncoln Ave. to Riverside Canal[+]	---	---	---	---	---	---	---	801.25	
Reach 2 - Riverside Canal to Lee Lake[+]	---	---	---	---	---	---	---	801.32	801.25
Reach 3 - Lee Lake (see Lakes, pg. 4-36)									

[+] Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Reach 4 - Lee Lake to Mid-section line of Section 17 (downstream end of freeway cut)+	---	---	---	---	---	---	---	801.34	
Reach 5 - Mid-section line of Section 17 (downstream end of freeway cut) to Elsinore Groundwater Subbasin Boundary+	---	---	---	---	---	---	---	801.35	
Reach 6 - Elsinore Groundwater Subbasin Boundary to Lake Elsinore Outlet+	---	---	---	---	---	---	---	801.35	
Coldwater Canyon Creek	250	---	---	---	---	---	---	801.32	
Bedford Canyon Creek+	---	---	---	---	---	---	---	801.32	
Dawson Canyon Creek+	---	---	---	---	---	---	---	801.32	
Other Tributaries to these Creeks	250	---	---	---	---	---	---	801.32	

+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	Hard.	Na	Cl	TIN	SO_4	COD	Primary	Secondary
SAN JACINTO RIVER BASIN									
San Jacinto River									
Reach 1 - Lake Elsinore to Canyon Lake	450	260	50	65	3	60	15	802.32	802.31
Reach 2 - Canyon Lake (see Lakes, pg. 4-37)									
Reach 3 - Canyon Lake to Nuevo Road	820	400	---	250	6	---	15	802.11	
Reach 4 - Nuevo Road to North-South Mid-Section Line, T4S/R1W-S8*	500	220	75	125	5	65	---	802.14	802.21
Reach 5 - North-South Mid-Section Line, T4S/R1W-S8, to Confluence with Poppet Creek	300	140	30	25	3	40	12	802.21	
Reach 6 - Poppet Creek to Cranston Bridge	250	130	25	20	1	30	12	802.21	
Reach 7 - Cranston Bridge to Lake Hemet	150	100	10	15	1	20	5	802.21	
Bautista Creek - Headwaters to Debris Dam	250	130	25	20	1	30	5	802.21	802.23
Strawberry Creek and San Jacinto River, North Fork	150	100	10	15	1	20	5	802.21	

+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

INLAND SURFACE STREAMS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
Fuller Mill Creek	150	100	10	15	1	20	5	802.22	
Stone Creek	150	100	10	15	1	20	5	802.21	
Salt Creek[+]	---	---	---	---	---	---	---	802.12	
Other Tributaries: Logan, Black Mountain, Juaro Canyon, Indian, Hurkey, Poppet and Protrero Creeks, and other Tributaries to these Creeks	150	70	10	12	1	15	5	802.21	802.22

[*] Note the quality objective for Reach 4 is not intended to preclude transport of water supplies or delivery to Canyon Lake

Table 4-1 WATER QUALITY OBJECTIVES - Continued

LAKES AND RESERVOIRS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
UPPER SANTA ANA RIVER BASIN									
Baldwin Lake*+	---	---	---	---	---	---	---	801.73	
Big Bear Lake**	175	125	20	10	0.15	10	---	801.71	
Erwin Lake+	---	---	---	---	---	---	---	801.73	
Evans, Lake	490	---	---	---	---	---	---	801.27	
Jenks Lake	200	100	30	10	1	20	---	801.72	
Lee Lake+	**---**	**---**	**---**	**---**	**---**	**---**	**---**	801.34	
Mathews, Lake	700	325	100	90	---	290	---	801.33	
Mockingbird Reservoir	650	---	---	---	---	---	---	801.26	
Norconian, Lake	1050	---	---	---	---	---	---	801.25	
LOWER SANTA ANA RIVER BASIN									
Anaheim Lake	600	---	---	---	---	---	---	801.11	
Irvine Lake (Santiago Reservoir)	730	360	110	130	6	310	---	801.12	
Laguna, Lambert, Peters Canyon, Rattlesnake, Sand Canyon, and Siphon Reservoirs	720	---	---	---	---	---	---	801.11	

* Fills occasionally with storm flows; may evaporate completely
** Additional Objective: 0.15 mg/L Phosphorus
\+ Numeric objectives have not been established; narrative objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

LAKES AND RESERVOIRS	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
SAN JACINTO RIVER BASIN									
Canyon Lake (Railroad Canyon Reservoir)***	700	325	100	90	8	290	---	802.11	802.12
Elsinore, Lake****	2000	---	---	---	1.5	---	---	802.31	
Fulmor, Lake	150	70	10	12	1	15	---	802.21	
Hemet, Lake	135	---	25	20	1	10	---	802.22	
Perris, Lake	220	110	50	55	1	45	---	802.11	

*** Note : The quality objectives for Canyon Lake is not intended to proclude transport of water supplies or delvery to the Lake.
**** Lake volume and quality highly variable.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

WETLANDS (INLAND)	WATER QUALITY OBJECTIVES (mg/L)							Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**TIN**	**SO_4**	**COD**	Primary	Secondary
San Joaquin Freshwater Marsh**	2000	---	---	---	13	---	90	801.11	
Shay Meadows+	---	---	---	---	---	---	---	801.73	
Stanfield Marsh+**	---	---	---	---	---	---	---	801.71	
Prado Flood Control Basin+**	---	---	---	---	---	---	---	801.25	
San Jacinto Wildlife Preserve+**	---	---	---	---	---	---	---	802.15	
Glen Helen+	---	---	---	---	---	---	---	801.59	

+ Numeric objectives have not been established; narrative objectives apply.
** This is a created wetland as defined in the wetlands discussion (see Chapter 3).

Table 4-1 WATER QUALITY OBJECTIVES - Continued

GROUNDWATER SUBBASINS	WATER QUALITY OBJECTIVES (mg/L)						Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**NO_3-N**	**SO_4**	Primary	Secondary
UPPER SANTA ANA RIVER BASIN								
Big Bear Valley	300	225	20	10	5	20	801.71	801.73
Cucamonga	220	170	15	15	5	20	801.24	801.21
Chino I	220	170	15	15	5	20	801.21	481.23, 418.22, 801.27
Chino II	330	185	18	18	6	20	801.21	418.21, 801.23
Chino III	740	425	100	50	11	110	801.21	481.21, 801.27, 801.26
San Timoteo	240	170	45	25	6	35	801.60	801.63, 801.64, 801.66, 801.68
Bunker Hill I	260	190	15	10	1	45	801.51	
Bunker Hill II	290	190	30	20	5	62	801.52	
Bunker Hill Pressure	300	160	30	20	1	62	801.52	
Lytle Creek	225	175	15	10	1	30	801.41	801.42
Rialto	200	95	35	35	2	40	801.43	801.44
Colton	400	240	35	35	3	64	801.44	801.45, 801.27
Riverside I	490	270	50	50	4	85	801.27	
Riverside II	650	360	70	85	10	100	801.27	
Riverside III	990	500	125	170	20	135	801.27	
Arlington	1050	500	125	180	20	160	801.26	801.25

Table 4-1 WATER QUALITY OBJECTIVES - Continued

GROUNDWATER SUBBASINS	WATER QUALITY OBJECTIVES (mg/L)						Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**NO_3-N**	**SO_4**	Primary	Secondary
Bedford (Upper Temescal I)	840	440	80	100	9	200	801.32	
Lee Lake (Upper Temescal II)	600	300	100	100	6	140	801.34	
Coldwater (Upper Temescal III)	350	175	45	25	2	125	801.31	
Temescal	840	440	120	180	9	160	801.25	
SAN JACINTO RIVER BASIN								
Garner Valley	300	100	65	30	2	40	802.22	
Idyllwild Area+	---	---	---	---	---	---	802.22	802.21
San Jacinto - Canyon	250	130	25	20	1	30	802.21	
San Jacinto - Lower Pressure	800	380	120	100	3	330	802.21	
San Jacinto - Intake	350	145	50	35	5	40	802.21	
San Jacinto - Upper Pressure	350	145	50	35	5	40	802.21	
Hemet	600	300	80	80	4	215	802.15	802.21
Lakeview	500	190	80	160	2	25	802.14	
Perris North	300	100	70	90	3	15	802.11	
Perris South I	1000	---	---	---	---	---	802.11	
Perris South II	2000	---	---	---	---	---	802.11	
Perris South III	1500	---	---	---	---	---	802.11	
Winchester	1200	---	---	---	---	---	802.13	
Menifee I	2000	---	---	---	---	---	802.12	

+ Numeric objectives have not been established; narratve objectives apply.

Table 4-1 WATER QUALITY OBJECTIVES - Continued

GROUNDWATER SUBBASINS	WATER QUALITY OBJECTIVES (mg/L)						Hydrologic Unit	
	TDS	**Hard.**	**Na**	**Cl**	**NO_3-N**	**SO_4**	Primary	Secondary
Menifee II	1500	---	---	---	---	---	802.12	
Elsinore	450	260	50	60	4	60	802.31	802.32
LOWER SANTA ANA RIVER BASIN								
La Habra+**	1000	---	---	250	---	250	845.62	
Santiago+	---	---	---	---	---	---	801.12	
Santa Ana Forebay	600	290	60	65	3	120	801.11	801.13, 845.61
Santa Ana Pressure	500	240	45	55	3	100	801.11	845.61
Irvine Forebay I	1000	450	180	180	8	340	801.11	
Irvine Forebay II	720	380	100	150	6	240	801.11	
Irvine Pressure	720	380	100	150	6	240	801.11	

+ Numeric objectives have not been established; narratve objectives apply.

** Water quality objectives apply to upper unconfined La Habra subbasin. Additional objective, Boron; 1.0 mg/L. Lower confined La Habra subbasin objectives are consistent with the Santa Ana Pressure water quality objectives.

Table 4-2

4-Day Average Concentration for Ammonia
Salmonids or Other Sensitive Coldwater Species Present
(COLD)

Un-ionized Ammonia (mg/liter N)		Temperature, °C						
		0	5	10	15	20	25	30
pH	6.50	0.0004	0.0005	0.0007	0.0010	0.0010	0.0010	0.0010
	6.75	0.0006	0.0009	0.0013	0.0018	0.0018	0.0018	0.0018
	7.00	0.0011	0.0016	0.0022	0.0031	0.0031	0.0031	0.0031
	7.25	0.0020	0.0028	0.0040	0.0056	0.0056	0.0056	0.0056
	7.50	0.0035	0.0050	0.0070	0.0099	0.0099	0.0099	0.0099
	7.75	0.0069	0.0097	0.0137	0.0194	0.0194	0.0194	0.0194
	8.00	0.0080	0.0112	0.0159	0.0224	0.0224	0.0224	0.0224
	8.25	0.0080	0.0112	0.0159	0.0224	0.0224	0.0224	0.0224
	8.50	0.0080	0.0112	0.0159	0.0224	0.0224	0.0224	0.0224
	8.75	0.0080	0.0112	0.0159	0.0224	0.0224	0.0224	0.0224
	9.00	0.0080	0.0112	0.0159	0.0224	0.0224	0.0224	0.0224

Total Ammonia (mg/liter N)		Temperature, °C						
		0	5	10	15	20	25	30
pH	6.50	1.36	1.27	1.20	1.15	0.796	0.556	0.393
	6.75	1.36	1.27	1.20	1.15	0.796	0.556	0.393
	7.00	1.36	1.27	1.20	1.16	0.798	0.558	0.395
	7.25	1.36	1.27	1.20	1.16	0.800	0.560	0.397
	7.50	1.36	1.27	1.21	1.16	0.804	0.565	0.402
	7.75	1.49	1.40	1.33	1.28	0.890	0.627	0.448
	8.00	0.974	0.913	0.871	0.844	0.589	0.418	0.302
	8.25	0.551	0.519	0.497	0.484	0.341	0.245	0.179
	8.50	0.313	0.297	0.286	0.282	0.202	0.147	0.111
	8.75	0.180	0.172	0.168	0.169	0.123	0.093	0.072

Table 4-3

4-Day Average Concentration for Ammonia Salmonids or Other Sensitive Coldwater Species Absent[1] (WARM)

Un-ionized Ammonia (mg/liter N)		Temperature, °C						
		0	5	10	15	20	25	30
pH	6.50	0.0006	0.0008	0.0012	0.0017	0.0024	0.0024	0.0024
	6.75	0.0010	0.0015	0.0021	0.0030	0.0042	0.0042	0.0042
	7.00	0.0019	0.0026	0.0037	0.0053	0.0074	0.0074	0.0074
	7.25	0.0033	0.0047	0.0066	0.0094	0.0132	0.0132	0.0132
	7.50	0.0059	0.0083	0.0118	0.0166	0.0235	0.0235	0.0235
	7.75	0.0115	0.0162	0.0229	0.0324	0.0458	0.0458	0.0458
	8.00	0.0133	0.0188	0.0265	0.0375	0.0530	0.0530	0.0530
	8.25	0.0133	0.0188	0.0265	0.0375	0.0530	0.0530	0.0530
	8.50	0.0133	0.0188	0.0265	0.0375	0.0530	0.0530	0.0530
	8.75	0.0133	0.0188	0.0265	0.0375	0.0530	0.0530	0.0530
	9.00	0.0133	0.0188	0.0265	0.0375	0.0530	0.0530	0.0530

Total Ammonia (mg/liter N)		Temperature, °C						
		0	5	10	15	20	25	30
pH	6.50	2.27	2.12	2.01	1.93	1.88	1.31	0.928
	6.75	2.27	2.12	2.01	1.93	1.88	1.31	0.930
	7.00	2.27	2.12	2.01	1.93	1.89	1.32	0.933
	7.25	2.27	2.12	2.01	1.94	1.89	1.32	0.939
	7.50	2.27	2.13	2.02	1.95	1.90	1.33	0.949
	7.75	2.49	2.34	2.22	2.14	2.10	1.48	1.06
	8.00	1.63	1.53	1.46	1.41	1.39	0.987	0.713
	8.25	0.922	0.868	0.831	0.811	0.806	0.578	0.424
	8.50	0.524	0.496	0.479	0.472	0.476	0.348	0.262
	8.75	0.301	0.287	0.281	0.282	0.291	0.219	0.170
	9.00	0.175	0.170	0.170	0.175	0.187	0.146	0.119

1 These values may be conservative, however. If a more refined criterion is desired, EPA recommends a site-specific criteria modification.

Table 4-4

Equations Used to Calculate UIA-N and Total Ammonia-N Water Quality Objectives for COLD and WARM Waterbodies

COLD-Chronic UIA-N	$0 \le T \le 15$	$15 \le T \le 30$
$6.5 \le pH \le 7.7$	$\frac{0.0223}{10^{(8.3-.03T-pH)}}$	$\frac{0.0158}{10^{(7.7-pH)}}$
$7.7 \le pH \le 8$	$\frac{0.0396}{10^{(0.6-0.03T)}+10^{(8.0-0.03T-pH)}}$	$\frac{0.0280}{1+10^{(7.4-pH)}}$
$8 \le pH \le 9$	$\frac{0.0317}{10^{(0.6-0.03T)}}$	0.0224

WARM-Chronic UIA-N	$0 \le T \le 15$	$15 \le T \le 30$
$6.5 \le pH \le 7.7$	$\frac{0.0372}{10^{(8.3-.03T-pH)}}$	$\frac{0.0372}{10^{(7.7-pH)}}$
$7.7 \le pH \le 8$	$\frac{0.0662}{10^{(0.6-0.03T)}+10^{(8.0-0.03T-pH)}}$	$\frac{0.0662}{1+10^{(7.4-pH)}}$
$8 \le pH \le 9$	$\frac{0.0530}{10^{(0.6-0.03T)}}$	0.0530

Total Ammonia-N Objectives

$$NH_3\text{-}N = UIA\text{-}N * [1 + 10^{(0.09018 + \frac{2729.92}{T+273.15} - pH)}]$$

Note: For all equations, T is the temperature in °C

CHAPTER 5
IMPLEMENTATION

SELECTED CHAPTER CONTENTS PAGE

INTRODUCTION

This chapter describes the implementation plan, the actions that are necessary to achieve the water quality objectives specified in Chapter 4 and thereby protect the beneficial uses of the region's surface and groundwaters (Chapter 3). These actions will require the coordinated efforts of the Regional Board and numerous water supply and wastewater management agencies, as well as city and county governments and other planning entities within the Region.

The Implementation chapter of the 1983 Basin Plan focused largely on the mineral imbalance problem in the region and the management of total dissolved solids (TDS) through waste discharge requirements, wastewater reclamation requirements, improvements in water supply quality, recharge projects, and other measures. Since the adoption of the 1983 Basin Plan, the Regional Board's knowledge of the water quality problems in the Santa Ana Region has increased considerably, and the number and variety of water quality programs undertaken to address those problems have increased accordingly. Several new programs are being implemented statewide by each regional board, including broad new responsibilities related to landfill operations and closure, oversight of leaking underground storage tank cleanup activities, and control of nonpoint sources such as urban runoff and stormwater from industrial facilities and construction sites. These new programs are part of the Board's implementation plan and are described in this chapter.

IMPLEMENTATION THROUGH WASTE DISCHARGE REQUIREMENTS

The Regional Board's principal means of achieving the water quality objectives and protecting the beneficial uses specified in this plan is the development, adoption, issuance, and enforcement of waste discharge requirements. By regulating the quality of wastewaters discharged, and in other ways controlling the discharge of wastes which may impact surface and groundwater quality, the Regional Board works to protect the Region's water resources.

The Regional Board's regulatory tools include National Pollutant Discharge Elimination System permits, Waste Discharge Requirements, Water Reclamation Requirements, Water Quality Certification, and Waste Discharge Prohibitions.

National Pollutant Discharge Elimination System (NPDES)

National Pollutant Discharge Elimination System (NPDES) permits are required for discharges of pollutants to "navigable waters" of the United States, which includes any discharge to surface waters – lakes, rivers, streams, bays, the ocean, dry stream beds, wetlands, and storm sewers that are tributary to any surface water body. NPDES permits are issued under the federal Clean Water Act, Title IV "Permits and Licenses," Section 402 (33 USC 466 *et seq.*). The Regional Board issues these permits in lieu of direct issuance by the US EPA, subject to review and approval by the US EPA Regional Administrator (EPA Region IX). The terms of these NPDES permits implement pertinent provisions of the federal Clean Water Act and the Act's implementing regulations including pretreatment, sludge management, effluent limitations for specific industries, and antidegradation. In general, the discharge of pollutants is to be eliminated or reduced as much as practicable so as to achieve the Clean Water Act's goal of "fishable and swimmable" navigable (surface) waters. Technically, all NPDES permits issued by the Regional Board are also Waste Discharge Requirements issued under the authority of the California Water Code.

In addition to regulating discharges of wastewater to surface waters, NPDES permits also require municipal sewage treatment facilities to implement and monitor industrial pretreatment programs if their design capacity is greater than five million gallons per day (MGD). Smaller municipal treatment systems may also be required to conduct pretreatment programs if there are significant industrial contributions to their systems. The pretreatment programs must comply with the federal regulations specified in 40 CFR 403.

At this time, there are approximately 2,000 NPDES permits in effect in the Santa Ana Region. As shown in Table 5-1, these NPDES permits regulate discharges from publicly owned treatment works (POTWs, or sewage treatment plants), industrial discharges, stormwater runoff, dewatering operations, and groundwater cleanup discharges. NPDES permits are issued for five years or less and are therefore to be updated regularly. The rapid and dramatic population and urban growth in the Santa Ana Region has caused a significant increase in NPDES permit applications for new waste discharges. Because of staff resource limitations, the Board generally focuses its permitting efforts on the issuance of permits for these new discharges. NPDES permit updates are done to the extent feasible, particularly for the more significant discharges. In some cases, if the discharge does not change substantially over the permitting period, administrative extensions of the existing permits are issued by the Regional Board's Executive Officer.

To expedite the permit issuance process, the Regional Board has adopted several general NPDES permits, each of which regulates numerous discharges of similar types of wastes. These general permits address discharges from groundwater cleanup projects (Order No. 91-63) and dewatering activities (Order No. 93-49). Proponents of groundwater cleanup or dewatering projects are required to file individual permit applications, which are reviewed by Regional Board staff to determine whether the requirements of the general permits apply and are sufficient to assure water quality protection. If so, the applicants are authorized by the Regional Board's Executive Officer to discharge in conformance with the general permit. A general permit for boatyard operations is being drafted. Additional general permits will be developed and adopted as appropriate to streamline the permitting process.

Similarly, the State Board has issued general permits for stormwater runoff from industrial facilities and construction sites statewide (see discussion on stormwater runoff). Stormwater discharges from industrial and construction activities in the Santa Ana Region can be covered under these general permits, which are administered jointly by the State Board and Regional Boards.

Table 5-1

Representative NPDES Permitted Facilities in the Santa Ana Region
(as of November 3, 1993)[1]

Facility Type	Number Regulated
Boatyards	10
Dewatering Operations	31
Groundwater Cleanup Projects	150
Stormwater Discharges 39 individually regulated by RWQCB; ≈ 1800 regulated by SWRCB's general permits	1839
Publicly Owned Treatment Works	24
TOTAL	**2054**

[1] The list of facilities regulated under NPDES permits is updated periodically and is available at the Regional Board office.

Table 5-2

Representative WDR Permitted Facilities in the Santa Ana Region
(as of November 3, 1993)[2]

Facility Type	Number Regulated
Brine Evaporation	24
Composting	19
Groundwater Cleanup	32
Dairies	468
Landfills	43
Mobile Home Parks (community septic systems)	22
Publicly Owned Treatment Works	37
TOTAL	**645**

[2] The list of facilities regulated under WDR permits is updated periodically and is available at the Regional Board office.

Where the terms of these general permits are not sufficient to protect water quality, the Board issues individual permits for these discharges.

Waste Discharge Requirements

Waste Discharge Requirements (WDRs) are issued by the Regional Board under the provisions of the California Water Code, Division 7 "Water Quality," Article 4 "Waste Discharge Requirements." These requirements regulate the discharge of wastes which are not made to surface waters but which may impact the region's water quality by affecting underlying groundwater basins. Such WDRs are issued for POTWs' wastewater reclamation operations, discharges of wastes from industries, subsurface waste discharges such as septic systems, sanitary landfills, dairies, and a variety of other activities which can affect water quality. There are approximately 550 WDRs in place, as indicated in Table 5-2.

Table 5-2 shows that most WDRs have been issued to dairies. To streamline the permit process, the Regional Board has developed a general permit for dairies and other animal confinement facilities (Order No. 94-7). To implement the federal stormwater requirements, this permit will be issued as an NPDES permit.

Waivers

The California Water Code allows Regional Boards to waive waste discharge requirements (WDRs) for a specific discharge or types of discharges where it is not against the public interest (Section 13269). These waivers are conditional and may be terminated at any time.

On May 11, 1984, the Regional Board adopted Resolution No. 84-48, which waives WDRs for certain types of discharges. Resolution No. 84-48 was amended by Resolution No. 91-75 in 1991. Resolution No. 84-48 and Resolution No. 91-75 are incorporated into the Basin Plan by reference and are included in Appendix IV. Only discharges which comply with the conditions contained in Resolution No. 84-48 as amended by Resolution No. 91-75, qualify for this waiver. Even though a discharge may qualify for a waiver, dischargers are still required to file Reports of Waste Discharge (ROWD), together with the appropriate filing fees. Regional Board staff determines if the effort expended in reviewing the ROWD justifies retaining any portion of the fee. If not, the fee is fully refunded.

Water Reclamation Requirements

Reclaimed water is water that, as a result of treatment, is suitable for a direct beneficial use or a controlled use that would otherwise not occur and is therefore considered a valuable resource. The State Board adopted the Reclamation Policy to encourage development of water reclamation facilities to increase the availability of reclaimed water to help meet the growing water requirements of the state (Chapter 2). The State Board is authorized to provide loans for the development of water reclamation facilities, or for studies and investigations in connection with water reclamation.

Section 13521 of the California Water Code requires the State Department of Health Services to establish statewide reclamation criteria for each type of use of reclaimed water, where such use involves the protection of public health. These regulations, contained in Title 22 of the California Code of Regulations, are the basic regulations governing the use of reclaimed water in California. The existing Title 22 regulations were adopted in 1978; proposed new regulations are currently under review.

The Regional Board implements the provisions of Title 22 by issuing Water Reclamation Requirements (WRRs) to the producer, the user of reclaimed water, or both. WRRs are issued for a variety of uses, including, but not limited to, landscape irrigation, fodder crop irrigation, duck ponds, freeway landscape irrigation, groundwater recharge, injection for seawater intrusion barrier, use in toilet flushing, and other non-domestic uses in high rises or nonresidential buildings.

The Santa Ana Regional Board currently has 76 WRRs issued to producers and/or users of reclaimed water. Some of the producers have received or applied for Master Reclamation Requirements (MRR) which would allow the producer to distribute their reclaimed water to various users without additional user reclamation requirements from the Regional Board. With the water shortage in southern California, there is an increase in the demand for reclaimed water. With sophisticated treatment technologies, reclaimed water could be used for almost anything, except domestic supply.

The detailed requirements, conditions, prohibitions, and other specifications included within NPDES, WDR, and WRR permits are developed on the basis of existing state and federal law, State Board Water Quality Control Plans and Policies (*e.g.*, the Ocean Plan), and the contents of this Basin Plan. The foremost consideration is the protection of water quality. The quality of the discharge specified through the limitations in the permit is calculated to allow the water quality objectives of the receiving water to be met or maintained, and in some cases, the water quality is improved.

When the limits included in the NPDES, WDR or WRR permits cannot be met because treatment facilities are inadequate or the water supply is inferior, these permits may include a time schedule for compliance and interim discharge requirements, allowing the discharger a period of time to make the necessary changes and/or improvements.

Waste Discharge Prohibitions

The Regional Board also implements this Basin Plan through the adoption of waste discharge prohibitions as necessary. Section 13243 of the California Water Code states that a Regional Board may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted. The Regional Board implements this section of the Water Code by adopting waste discharge prohibitions, both in waste discharge requirements issued to individual discharges and in the Basin Plan itself.

A. General Prohibitions

1. Unless regulated by appropriate waste discharge requirements, the discharge to surface or groundwaters of waste which contains the following substances is prohibited:

   - Toxic substances or materials;
   - Pesticides;
   - PCB's (polychlorinated biphenyls);
   - Mercury or mercury compounds;
   - Radioactive substances or materials in excess of levels allowed by the California Code of Regulations.

   This list is not necessarily all-inclusive. The Regional Board may modify or update this list as appropriate.

B. Prohibitions Applying to Inland Surface Waters

1. The discharge of untreated sewage to any surface water stream, natural or man-made, or to any drainage system intended to convey stormwater runoff to surface water streams, is prohibited.

2. The discharge of treated sewage to streams, lakes or reservoirs, or to tributaries thereto, which are designated **MUN** and which are used as a domestic water supply is prohibited unless approved by the California Department of Health Services. The discharge of treated sewage to waterbodies which are excepted from **MUN** (see Table 3-1) but which are tributary to waters designated **MUN** and are used as a domestic water supply is prohibited unless the discharge of treated sewage to the drinking water supply is precluded or approved by the California Department of Health Services.

C. Prohibitions Applying to Oceans, Bays, and Estuary Waters

   The prohibitions included in the California Ocean Plan, Thermal Plan, and the Policy for Enclosed Bays and Estuaries are hereby incorporated into this plan by reference.

D. Prohibitions Applying to Groundwaters

1. The discharge of the following materials to the ground, other than into impervious facilities, is prohibited:

   a. Acids or caustics, whether neutralized or not, and

   b. Excessively saline wastes (electrical conductivity greater than 2000 μmhos/cm)

2. Prohibitions Applying to Subsurface Leaching Percolation Systems

   In 1973, the Regional Board adopted prohibitions on the use of subsurface disposal systems in the following areas:

   a. Grand Terrace (CSA 70, Improvement Zone H);

   b. Yucaipa-Calimesa (Yucaipa Valley County Water District);

   c. Lytle Creek above 2600 foot elevation;

   d. Mill Creek above 2600 foot elevation; and

   e. Bear Valley (includes Baldwin Lake Drainage Area);

   In 1982, the Regional Board adopted prohibitions on the use of subsurface disposal systems for the Homeland-Green Acres area and Romoland areas (exact boundaries for these prohibition areas are shown on maps on file at the Regional Board office).

   The Board adopted specified dates for final compliance with these prohibitions. In some cases, these dates have been revised via Basin Plan amendments. The compliance dates are as follows:

   a. Grand Terrace: February 1, 1988

   b. Yucaipa-Calimesa - February 1, 1988

   c. Lytle Creek - July 1, 1978

   d. Mill Creek - July 1, 1978

   e. Bear Valley - July 1, 1980

   f. Homeland-Green Acres - July 1, 1990

   g. Romoland - July 1, 1990

   Exemptions from these prohibitions may be granted if certain criteria are satisfied (exemption criteria are described in Appendix V).

Water Quality Certification (Section 401)

In addition to the issuance of NPDES permits or waste discharge requirements, the Regional Board acts to protect the quality of surface waters through water quality certification as specified in Section 401 of the Clean Water Act (33 USC 466 *et seq.*). Section 401 requires that any person applying for a federal permit or license for an activity which may result in a discharge of pollutants into waters of the nation must obtain a state water quality certification verifying that the activity complies with the state's water quality standards.

No license or permit can be granted until certification required by Section 401 has been obtained or waived. Further, no license or permit can be granted if certification has been denied by the state. Similarly, coastal states must concur that the activity meets the requirements of the Coastal Zone Management Program of the state or waive their right to concur by not taking action by a specified time.

The following permits or licenses require 401 Certification:

- NPDES permits issued by US EPA under Section 402 of the CWA (33 USC 466 *et seq.*);
- CWA Section 404 (33 USC 466 *et seq.*) permits issued by the U.S. Army Corps of Engineers;

- Permits issued under Sections 9 and 10 of the Rivers and Harbors Act (33 USC 400 *et seq.*) (for activities which may affect navigation);
- Licenses for hydroelectric power plants issued by the Federal Energy Regulatory Commission under the Federal Power Act; and
- Licenses issued by the Nuclear Regulatory Commission.

To date, the Regional Board's water quality certification activities have focused on applications for permits for the discharge of dredged or fill material to surface waters. These permits are issued by the U.S. Army Corps of Engineers (Section 404 permits) subject to any conditions imposed by the Regional Board.

The Section 404 program is administered at the federal level by the U.S. Army Corps of Engineers and the US EPA. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service have important advisory roles. The U.S. Army Corps of Engineers has the primary responsibility for the permit program and is authorized, after notice and opportunity for a public hearing, to issue permits for the discharge of dredged or fill material. US EPA develops the regulations under which permits may be granted. States may assume the responsibility for implementation of the 404 permit program, however, California has not done so.

The Regional Board evaluates the projects for which 404 permits are requested and determines whether to deny water quality certification, issue a certification with conditions, or waive the certification. A certification is usually denied if the activity violates any water quality standards; if the activity may violate standards, a conditional certification is given; when the activity does not violate any standards, a 401 waiver may be given.

Presently, the Executive Director of the State Board issues all water quality certifications in accordance with recommendations from the Regional Board.

MONITORING AND ENFORCEMENT

Waste discharge requirements issued by the Regional Board include requirements for monitoring of discharges. In some cases, the receiving waters must be monitored by the dischargers. The results of the "self monitoring" programs are reported to the Board and are used to determine compliance with the waste discharge requirements (see Chapter 6).

The California Water Code provides the Regional Board with a number of enforcement remedies for violations of requirements. Enforcement actions include Time Schedules, Cease and Desist Orders, Cleanup and Abatement Orders, and the issuance of Administrative Civil Liability Complaints.

Time Schedules

When a discharge is taking place or threatening to occur that will cause a violation of a Regional Board requirement, a discharger may be required to submit a detailed compliance plan and schedule (California Water Code Section 13300). These schedules may also be required when the waste collection treatment or disposal facility of a discharger are approaching capacity. Time Schedules are adopted by the Regional Board after a public hearing or by the Executive Officer pursuant to his or her authority.

Cease and Desist Order

If discharge prohibitions or requirements of the State Board or Regional Board are violated or threatened to be violated, the Regional Board may adopt a Cease and Desist order (California Water Code Section 13301) requiring the discharger to comply forthwith, to comply in accordance with a time schedule, or if the violation is threatened, to take appropriate remedial or preventive action. Cease and Desist orders may restrict or prohibit the volume, type or concentration of waste added to community sewer systems, if existing or threatened violations of waste discharge requirements occur. Cease and Desist orders may specify interim time schedules as well as limitations that must be complied with until full compliance is achieved. Cease and Desist orders are adopted by the Regional Board after a public hearing.

Cleanup and Abatement Order

The Board may order *any* person who has discharged, is discharging or is threatening to discharge wastes that will result in a violation of waste discharge requirements or other order or prohibition of the State Board or Regional Board, to cleanup and abate the effects of the discharge or to take appropriate remedial action (California Water Code 13304). The Regional Board has delegated issuance of these orders to its Executive Officer; Cleanup and Abatement orders do not require Board action, but are often brought before the Regional Board for consideration.

Administrative Civil Liability

The Regional Board may also issue Administrative Civil Liability complaints (ACLs) to those who intentionally or negligently violate enforcement orders of the Board, or who intentionally or negligently discharge wastes in violation of any order, prohibition or requirement of the Board where the discharge causes conditions of pollution or nuisance (California Water Code Section 13350). ACLs may also be issued in cases where a person fails to submit reports requested by the Board (California Water Code Sections 13261 and 13268) or when a person discharges waste without first having filed the appropriate Report of Waste Discharge (ROWD) (California Water Code Section 13265). ACLs may be issued pursuant to California Water Code Section 13385 for violations of any Regional Board prohibition or requirement implementing specified sections of the Clean Water Act, or any requirement in an approved pretreatment program, without showing intent or negligence. Issuance of ACLs is delegated to the Board's Executive Officer, but, all administrative civil liability settlements must be affirmed by the Board. Amounts of administrative civil liability that the Board can impose range up to $10,000 per day of violation. The Water Code also provides that a superior court may impose civil liability assessments in substantially higher amounts. The Regional Board may conduct a hearing if a discharger contests the imposition of the Administrative Civil Liability.

The Water Code provides that a Regional Board may request the State Attorney General to petition a superior court to enforce orders and complaints issued by the Board. The Regional Board may also request that the Attorney General seek injunctive relief in specific situations, such as violations of Cease and Desist orders or discharges which cause or threaten to cause a nuisance or pollution that could result in a public health emergency (California Water Code Sections 13331 and 13340).

SALT BALANCE AND ASSIMILATIVE CAPACITY - UPPER Santa Ana Basin

I. Background

The 1975 and 1983 Basin Plans for the Santa Ana River Basin reported that the most serious problem in the basin was the buildup of dissolved minerals, or salts, in the ground and surface waters. Sampling and computer modeling of groundwaters showed that the levels of dissolved minerals, generally expressed as total dissolved solids (TDS) or total filterable residue (TFR), were exceeding water quality objectives or would do so in the future unless appropriate controls were implemented. Nitrogen levels in the Santa Ana River, largely in the form of nitrate, were likewise projected to exceed objectives. As was discussed in Chapter 4, high levels of TDS and nitrate adversely affect the beneficial uses of ground and surface waters. The mineralization of the Region's waters, and its impact on beneficial uses, remains a significant problem.

Each use of water adds an increment of dissolved minerals. These salts may be added to the water as it is used, or the concentration of dissolved minerals can be increased by reducing the volume, such as by evaporation or evapotranspiration. One of the principal causes of the mineralization problem in the Region is historic irrigated agriculture, particularly citrus, which in the past required large applications of water to land, causing large losses by evaporation. TDS and nitrate concentrations are increased both by this reduction in the total volume of return water and by the direct application of these salts in fertilizers.

Dairy operations, which began in the Region about forty years ago and continue today, also contribute large amounts of salts to the basin. Significant increments of salts have been added by municipal and industrial wastewaters and the reuse and recycling of these waters as they move from the higher areas of the basin towards the ocean. Salts are added as waters are used for municipal or industrial purposes; in some cases, the wastewaters generated were discharged to the same groundwater subbasins from which the source waters were derived. These subbasins were then pumped and the water used again, adding additional salts.

The implementation chapters of both the 1975 and 1983 Basin Plans focused on recommended plans to address the mineralization problem. The 1975 Plan initiated a total watershed approach to salt source control. Both the 1975 and 1983 Plans called for controls on salt loadings from all water uses – residential, commercial, industrial, and agricultural (including dairies). The plans included: measures to improve water supply quality, including the import of high quality water from the State Water Project; waste discharge regulatory strategies (*e.g.*, wasteload allocations, allowable mineral increments for uses of water); and recharge projects and other remedial programs to correct problems in specific areas. These Plans also carefully limited reclamation activities and the recycling of wastewaters into the local groundwater basins.

These salt management plans were developed using a complex set of groundwater computer models and programs, known collectively as the Basin Planning Procedure. For the 1983 Basin Plan, a surface water model, QUAL-II, was used to evaluate quality conditions in the Santa Ana River. Updated and improved versions of these models were used to develop the revised salt management plans specified in this Basin Plan.

II. Computer Simulation of the Basin

The Basin Planning Procedure, or BPP, is used to project the quality and quantity of groundwaters in the basin given various assumptions about the ways water is supplied and used, and how wastewater is managed. A complex set of data goes into the BPP, including: current and projected landuse information and associated salt loads; population estimates; the location, quantity, and quality of waste discharges; the quantity and quality of water supply sources which are or will be used in the area; data on hydrology, including rainfall and deep percolation of precipitation into underlying groundwater; etc. This and other information is integrated into the BPP to make projections of future quality in each groundwater subbasin. For the upper Santa Ana Basin, the BPP also provides data on the location, quality, and quantity of groundwater which rises into the Santa Ana River and becomes part of the River's surface flows.

The BPP projects where water quality problems will arise unless changes in water quality management are made. Such changes can include revisions in the requirements governing waste discharges, changes in water supply sources and quality, and the implementation of special projects or programs. Alternative management practices and projects are entered into the BPP, the BPP is run, and the effectiveness of the proposed alternatives in addressing identified problems is evaluated. Subsequent runs of the BPP incorporate and assess additional alternatives. Ultimately, a recommended plan for the management of salts in groundwater is developed.

The modeling work leading to the development of the 1975 and 1983 Basin Plans focused on the upper Santa Ana Basin and, to a smaller extent, on the San Jacinto Basin, where the BPP is less developed and refined. The constituent modeled for in those Plans was TDS. For this Basin Plan, modeling was conducted with the BPP for both the upper Santa Ana and San Jacinto Basins. However, most of the attention was again directed to the upper Santa Ana Basin, for which significant improvements to the BPP were made under a joint effort by the Santa Ana Watershed Project Authority, the Santa Ana River Dischargers Association, the Metropolitan Water District of Southern California, and the Regional Board. The most significant change to the BPP was the addition of a nitrogen modeling component so that projections of the nitrogen (nitrate) quality of groundwaters could be made, in addition to TDS. The salt management plan for the upper Santa Ana Basin specified in this Basin Plan now addresses the correction and prevention of both nitrogen and TDS groundwater quality problems.

The BPP has not been used to model groundwater quality conditions in the lower Santa Ana Basin. For that Basin, the Regional Board's TDS and nitrogen management plan relies, in large part, on the control of the quality of the Santa Ana River flows, which are a major source of recharge in the Basin. The QUAL-II model and its derivatives are used to assess water quality conditions in the Santa Ana River (see below). Other TDS and nitrogen management activities in the lower Santa Ana Basin, conducted principally by the Orange County Water District are described later in this chapter and in Chapter 7.

The QUAL-II model, developed initially by the US EPA, was calibrated for the Santa Ana River and used to make detailed projections of River quality (TDS and nitrogen) and flow for the 1983 Basin Plan. The model reflects the quantity and quality of inputs to the River from various sources, including the headwaters, municipal wastewater treatment plant discharges, and rising groundwater, based on the water supply and wastewater management plans used in the BPP. Data on rising groundwater quality and quantity is provided to the QUAL-II model by the BPP. As with the BPP, the QUAL-II model projections are used to identify water quality problems and to assess the effectiveness of changes in management strategies, such as revised waste discharge requirements. The 1983 Basin Plan specified TDS and nitrogen management strategies for the Santa Ana River, known as wasteload allocations, which were developed with this model.

An improved version of the model, called QUAL2E, was subsequently developed and calibrated for the Santa Ana River as part of the joint BPP improvement effort noted above. This new QUAL2E model is the principal tool used to develop the revised TDS and nitrogen wasteload allocations which are contained in this Basin Plan and which are described in more detail later in this section.

III. Update of the Total Dissolved Solids/Nitrogen Management Plan - Upper Santa Ana Basin

After the 1983 Basin Plan was adopted, a number of agencies in the Santa Ana River watershed expressed concerns about certain aspects of the Plan, including the limitations placed on wastewater reclamation and the equity of the wasteload allocations for the Santa Ana River. In response, a consortium of agencies, including the Santa Ana Watershed Project Authority (SAWPA), the Santa Ana River Dischargers Association (SARDA), the Metropolitan Water District of Southern California (MWD-SC), and the Regional Board, undertook studies to update the Plan for the upper basin [Ref. 1-4].

As already noted, this update effort included substantial improvements to the ground and surface water models. These improved models were then used to evaluate future water quality conditions in the upper basin.

The modeling work began with the evaluation of a baseline plan, the set of present water supply and wastewater management practices which are extended into the future (to the year 2015) to project water quality and quantity conditions. The baseline plan results indicated where water quality (and quantity) problems would arise if no water quality management changes were made. The findings showed that substantial degradation of the nitrogen and TDS quality of most of the groundwater subbasins in the upper basin would occur over time. Meanwhile, annual sampling of the Santa Ana River at Prado Dam (see Chapter 4) had shown that the nitrogen quality of the River exceeded the objective. These monitoring and modeling results demonstrated that changes were necessary in the TDS and nitrogen management strategy employed in the upper basin.

A series of alternative TDS and nitrogen management alternatives were then developed and evaluated using the models. A recommended alternative, Alternative 5C, was selected, based on its predicted ability to protect and maintain water quality, and based also on the feasibility and likelihood of its implementation. The projects and plans incorporated in this alternative are described below.

Additional work with the QUAL2E model was conducted to refine the recommended nitrogen wasteload allocation for the Santa Ana River. Alternative 5C was used as the basis for these additional sensitivity runs. Again, a recommended alternative (Alternative 5C-10) was selected; the nitrogen wasteload allocation specified in this alternative was adopted by the Regional Board on November 15, 1991 (Resolution No. 91-125). This wasteload allocation is also described below.

IV. Recommended TDS/Nitrogen Management Plan - Upper Santa Ana Basin

The Recommended TDS/Nitrogen Management Plan (Recommended Plan, or 5C/5C-10) is a composite of plans, projects, assumptions, ongoing programs, and projections, and is therefore very difficult to define succinctly. The closest one can come is to say that the Recommended Plan is the entire package of data which is fed into the models (BPP and QUAL2E) and the products of those models, for the selected alternative. The BPP considers the municipal, industrial, agricultural and other water supplies in the basin, and the available imported water. A Water Supply Plan is developed and is part of the Recommended Plan. Similarly, the BPP and QUAL2E consider data on present and projected waste discharges and a Wastewater Management Plan is developed. This too is an essential component of the Recommended Plan. Assumptions on hydrology, natural and artificial recharge, replenishment, extraction, and remediation go into the models and become part of the Groundwater Management Plan. These plans — all the assumptions which were included, all the facilities which need to be built — are part of the Recommended Plan. The BPP and QUAL2E, then, are integral parts of this Basin Plan.

The upper Santa Ana Basin study reports cited previously and the associated task reports and computer printouts specify all the details of 5C and 5C-10. Included here are summary descriptions of the following elements:

A. Water Supply Plan

B. Wastewater Management Plan

C. Groundwater Management Plan

These descriptions include discussions of the regulatory provisions included in 5C and 5C-10. Other important aspects of the Recommended Plan and its implementation are also discussed. These include the concepts of salt assimilative capacity and of the reasonable use of water, with allowable mineral increments (additions). These factors play a significant role in the Regional Board's issuance of waste discharge requirements. Finally, specific water quality problems and the steps being taken to address them are also summarized.

A. Water Supply Plan

The water supply plan is an essential part of the Recommended Plan. Water supply plans directly affect the quality of discharges from municipal wastewater treatment plants, discrete industrial discharges, returns to groundwater from homes using septic tank systems, returns from irrigation of landscaping in sewered and unsewered areas, and returns to groundwater from commercial irrigated agriculture. In fact, sensitivity runs using the BPP for projects in the upper Santa Ana watershed show that water supply is the single most important variable in Basin-wide TDS quality management planning.

This Recommended Plan integrates the water supply systems with the area of use, the type of use, salt additions from use, the specific point of discharge after use, reclamation, and downstream uses. Water supply plans cannot be directly regulated by the Regional Board; however, limitations in waste discharge requirements and NPDES permits may necessitate efforts to improve source water quality. Limits on TDS and specific mineral constituents are based on consideration of the quality of waters supplied in the discharger's service area and on the quality of the receiving waters and whether or not those waters have assimilative capacity (see below).
Detailed water supply plans for the water purveyors and irrigation water distributors in the upper Santa Ana Basin are included in Appendix VI. These include each agency's water supply sources, the quality and quantity of those supplies, and allocations of the supplies to municipal, industrial, and agricultural uses within the agency's service area. In a number of cases, water purveyors are also responsible for wastewater treatment and disposal. Water purveyors/wastewater managers are not compelled to follow the water supply plans in this Recommended Plan. However, if a violation of the mineral limits in a discharger's waste discharge requirements occurs or is threatened, the water supply plans for the discharger's service area will be reviewed by Regional Board staff and discussed with the discharger. In these cases, the discharger will be

expected to make best efforts to improve the quality of the waters used in the source area and influent to the treatment facility.

Imported water supplies are an important part of this Recommended Plan, from both a quantity and quality standpoint. Imported water is needed by many agencies to supplement local sources and satisfy the ever-increasing demands. The importation of high quality State Water Project water (water that is low in salt content) is particularly essential. The use of State Water Project water allows maximum reuse of water supplies without aggravating the mineralization problem. It is also used for recharge and replenishment to improve the quality of local water supply sources, which might otherwise be unusable. Thus, the use of high quality State Water Project water in the Region has water supply benefits that extend far beyond the actual quantity imported.

The water supply plan specifies the quality and quantity of both State Water Project and Colorado River water which is expected to be used in the upper Santa Ana Basin. The plan assumes that the quality of imported water from the State Water Project will be 250 mg/L TDS. This value is close to the long-term average for water delivered to this area and the 10-year average in the State Water Project contract. However, in recent drought years, the TDS values were in the 400 mg/L range. The plan provides for importing approximately 192,600 acre-feet per year by the year 2000 for use in the upper Santa Ana Basin. Minimum use is about 138,000 acre-feet per year, of which 34,000 is to be used for groundwater replenishment (Table 5-3).

B. Wastewater Management Plan

The recommended wastewater management plan for the upper Santa Ana Basin has a number of components, including wastewater disposal to the ground and surface waters of the upper Santa Ana Basin, export of wastewaters outside the basin, and reclamation. The fundamental philosophy of the recommended plan is to allow a reasonable use of the water supplied, to treat it adequately, and to allow it to flow downstream (or to lower groundwater basins) for reuse.

Projections of the present and future methods of wastewater disposal and the quantity and quality of the wastewaters are included in the BPP. Details of the individual wastewater management plans of the many municipalities and wastewater entities are included in Appendix VI. In part, these plans are the basis for the Regional Board's development and adoption of waste discharge requirements.

The contributions of return flows and discharges from agriculture and industry are also included in the BPP, as are those from developed areas which are likely to remain unsewered. Waste discharges in these unsewered areas are governed, in part, by the Regional Board's "Guidelines for Sewage Disposal from Land Developments" [Ref. 5], which are hereby incorporated by reference, and by the Regional Board's minimum lot size requirements for septic system use (see Nonpoint Source section of this chapter). As previously described, waste discharge prohibitions have been established for septic system use in certain areas. These prohibitions are a part of the wastewater management plan (pg. 5-5).

Those industries which discharge to municipal wastewater facilities (POTWs) are required by the Clean Water Act to develop and implement pretreatment programs which protect the POTWs' treatment processes from shock or upset and which also allow the discharger to comply with their waste discharge requirements (including mineral limits). Another important component of industrial waste management is the use of pipelines to transport brine wastes out of the basin for treatment and disposal to the ocean. There are two such lines in the Region, the Santa Ana Regional Interceptor (SARI) and the Chino Basin Non-Reclaimable Line (NRL). Discharges of brines and other mineralized wastewaters to the SARI and NRL are encouraged.

Several important aspects of the wastewater management plan warrant additional discussion:

1. Salt assimilative capacity
2. Mineral increments
3. TDS and nitrogen wasteload allocations
4. Wastewater reclamation

Table 5-3

Upper Santa Ana Basin Recommended Plan 5C Imported Water

Groundwater Replenishment Volume

Subbasin	Groundwater Replenishment AF/Y
San Timoteo	0
Lytle Creek	0
Bunker Hill Pressure	0
Bunker Hill II	0
Rialto	5,000
Colton	5,000
Riverside I	0
Riverside II	0
Riverside III	0
Arlington	0
Chino I	19,000
Chino II	0
Chino III	0
Cucamonga	5,000
Upper Temescal	0
Temescal	0
TOTAL	**34,000**

1. Salt Assimilative Capacity

Because the waters of this Region are reused as they flow from the higher areas of the basin toward the ocean, the concept of a "reasonable use" of the water was developed and included in the 1983 Basin Plan. This concept is also an important part of the TDS (and nitrogen) management strategy in this Basin Plan.

Most of the so-called biological characteristics (BOD, ammonia, etc.) of wastewater are readily treatable, while many of the inorganic or mineral characteristics are not. For this reason, reasonable use is generally described in terms of mineral additions. Some waters in the Region have assimilative capacity for additions of TDS and/or nitrogen (N); that is, wastewaters with higher TDS/N concentrations than the receiving waters are diluted sufficiently by natural processes, including rainfall or recharge, such that the TDS and nitrogen objectives of the receiving waters are met. The amount of assimilative capacity varies widely, depending on the individual characteristics of the waterbody in question.

A number of factors were considered in determining which waterbodies in the upper Santa Ana Basin do not have assimilative capacity for TDS and/or nitrogen inputs. For groundwaters, the results of the BPP for the Recommended Plan (5C) were used initially. The year 2010[1] quality (TDS and nitrate) projections for each subbasin were compared to their respective subbasin objectives to determine whether the objectives would be met and whether there was any evidence of degradation. Also considered was the existing quality of the subbasins, as shown by the BPP input data and recent field studies. This evidence was reviewed in light of the Regional Board's knowledge of a number of additional factors, including: the past, present, and future waste loads to each subbasin; subbasin hydrology; and the uncertainties associated with modeling procedures.

Based on consideration of these factors, the following subbasins in the upper Santa Ana Basin lack assimilative capacity for TDS:

Bunker Hill II and Pressure
Riverside I
Colton
Rialto
Chino II and III

The following subbasins lack assimilative capacity for nitrogen:

Bunker Hill I, II, and Pressure
Colton
Rialto
Riverside I, II, and III
Temescal
Chino II and III

The remaining subbasins in the upper Santa Ana Basin have assimilative capacity for TDS and nitrogen. However, these findings of assimilative capacity are contingent on the actual implementation of the Recommended Plan, according to the schedule provided therein. That is, assimilative capacity exists in the remaining subbasins if and only if the quantity and quality of waste loads and methods of disposal, the quantity and quality of water supplies, groundwater management projects (see below), and the other components of the Recommended Plan are implemented. If these measures are not implemented, the Regional Board will reconsider its findings of assimilative capacity.

These assimilative capacity findings are significant from a regulatory perspective. Water Code Section 13263 requires that waste discharge requirements implement relevant water quality control plans (basin plans). Therefore, waste discharge requirements must be related directly to water quality objectives in the Basin Plan. If there is assimilative capacity in the receiving waters for TDS, nitrogen or other constituents, the allowed

[1] The planning period evaluated by the BPP extended to the year 2015. The water supply and wastewater management practices assumed for the year 2010 were simply extended to the year 2015. Given the uncertainties about such long-range projections, Regional Board staff determined that the use of the year 2010 projections would be more appropriate for the determination of assimilative capacity. Findings with respect to assimilative capacity will be reviewed again in the future.

waste discharge may be of lower quality than the objectives for those constituents for the receiving waters as long as the discharge does not cause violation of the objectives. However, if there is no assimilative capacity in the receiving waters, such as the subbasins identified above, the numerical limits in the discharge requirements cannot exceed the receiving water objectives or the degradation process would be accelerated. This rule was expressed clearly by the State Water Resources Control Board in a decision regarding the appropriate TDS discharge limitations for the Rancho Caballero Mobilehome park located in the Santa Ana Region (Order No. 73-4, the so called "Rancho Caballero decision") [Ref. 6]. However, this rule is not meant to restrict overlying agricultural irrigation, or similar activities such as landscape irrigation. Even in subbasins without assimilative capacity, groundwater may be pumped and used for agricultural purposes in the area.

In some cases, compliance with subbasin TDS objectives for discharges to waters without assimilative capacity may be difficult to achieve. Poor quality water supplies or the need to add certain salts in the treatment process to achieve compliance with other discharge limitations could render compliance with strict TDS limits impossible. The Regional Board addresses such situations by providing dischargers with the opportunity to participate in TDS offset programs, such as desalters, in lieu of compliance with numerical TDS limits. These offset provisions are incorporated in waste discharge requirements. Provided that the discharger takes all reasonable steps to improve the quality of the waters influent to the treatment facility (such as through source control or improved water supplies), and provided that chemical additions are minimized, the discharger can proceed with an acceptable program to offset the effects of TDS discharges in excess of the permit limits.

Similarly, compliance with the nitrate-nitrogen objectives for groundwaters specified in this Plan would be difficult in many cases. These objectives, which were established in 1975 based on the relatively limited data available at that time, are generally very low concentrations, most below the drinking water standard. In adopting the wasteload allocation for total inorganic nitrogen, which is described in detail in the next section, the Regional Board specified that nitrogen discharges to the groundwaters of the upper Santa Ana Basin be held to 10 mg/L (total inorganic nitrogen).

The Santa Ana River lacks assimilative capacity for nitrogen inputs, as shown by violations of its nitrogen objective at Prado Dam. This problem is addressed through the implementation of the total inorganic nitrogen wasteload allocation (see section 3).

The TDS objective for the River at Prado Dam is being met as a result of the implementation of a TDS wasteload allocation (also described in section 3). This Plan incorporates a revised TDS wasteload allocation to ensure continued compliance with the objective.

2. Mineral Increments

The Department of Water Resources has recommended values for the maximum incremental additions of specific ions and characteristics which should be allowed based on a detailed study of water supplies and wastewater quality in the Region [Ref. 7]. Their recommendations are as follows:

Sodium	70 mg/L
Sulfate	40 mg/L
Chloride	65 mg/L
TDS	250 mg/L
Total Hardness	30 mg/L

These mineral increments have been in effect since the late 1960s and were also incorporated into the 1983 Basin Plan. They will be incorporated into waste discharge requirements as appropriate and necessary.

3. Wasteload Allocations for the Santa Ana River

Wasteload allocations for discharges of TDS and nitrogen to the Santa Ana River are another important component of the wastewater management plan for the upper Santa Ana Basin. As described earlier, the Santa Ana River is a significant source of recharge to the Orange County groundwater basin. Therefore, the quality of the River has a significant effect on the quality of that groundwater and must be properly controlled.

As described earlier, sampling and modeling analyses indicated that two water quality objectives for the Santa Ana River, those for TDS and total nitrogen, were being violated or were in danger of being violated. Under the Clean Water Act (Section 303(d)(1)(c); 33 USC 466 *et seq.*), violations of water quality objectives for surface waters must be addressed by the calculation of the maximum wasteloads which can be discharged to achieve and maintain compliance. Accordingly, TDS and nitrogen wasteload allocations were developed and included in the 1983 Basin Plan. Revised wasteload allocations for these constituents are included in this Plan.

The wasteload allocations distribute a share of the total TDS and nitrogen wasteloads to the River to each of the discharges to the River. The allocations are implemented principally through TDS and nitrogen limits in waste discharge requirements issued to wastewater treatment facilities which discharge to the River, either directly or indirectly[2]. Nonpoint source inputs of TDS and nitrogen to the River are also considered in the development of these wasteload allocations. Controls on these inputs are more difficult to identify and achieve. In part, these controls are addressed via the Groundwater Management Plan (below), and through the areawide stormwater permits issued to the counties by the Regional Board.

Periodic review and update of the wasteload allocations is necessary to reflect changing conditions in the watershed, including increasing municipal wastewater flows, changes in water supply sources (which may affect the total dissolved solids quality of the wastewaters), and changes in the quality of the River. In part, review of the total dissolved solids wasteload allocation was initiated in response to equity concerns expressed by the dischargers. In the case of nitrogen, evidence that the nitrogen objective for the River was being exceeded prompted Regional Board staff to begin the review process [Ref. 8].

Both the TDS and nitrogen wasteload allocations were developed with the QUAL2E model, using the water supply and wastewater management plans specified in Alternative 5C. Input on rising groundwater was provided by the BPP. The ability of the individual wastewater treatment plants to meet the limits specified in the revised allocations and the facility/operational costs associated with compliance were carefully considered by both the Regional Board and the dischargers.

a. Total Dissolved Solids Wasteload Allocation

The revised wasteload allocation for TDS discharges to the Santa Ana River is shown in Table 5-4.

The 1992 baseflow TDS quality of the Santa Ana River at Prado Dam was 648 mg/L, which is below the objective specified in this Basin Plan (700 mg/L). The revised wasteload allocation will ensure continued compliance with the objective.

As noted in Table 5-4, footnote 1, certain discharges affect groundwater subbasins without TDS assimilative capacity (see list on page 5-14). These dischargers will be held to the affected subbasin objectives, rather than the wasteload allocations specified for them, unless the dischargers participate in acceptable salt offset programs (see section B.1. for discussion of assimilative capacity and waste discharge requirements). If approved by the Regional Board, salt offset programs can include studies to determine appropriate offset quantities (which may entail a review of subbasin water quality objectives) and project alternatives.

Where difficulties with compliance with this allocation arise, the Regional Board has determined that additional consideration should be given. As discussed earlier, the Regional Board incorporates

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[2] The ground and surface waters in the upper Santa Ana Basin eventually enter the Santa Ana River and flow through Prado Dam. Discharges to these waters will therefore eventually affect the quality of the River and must be regulated so as to protect both the immediate receiving waters and other affected waters, including the River.

Table 5-4

Wasteload Allocation for Discharges of Total Dissolved Solids to the Santa Ana River and its Tributaries

DISCHARGER (NOTE#)	DISCHARGE TO	HISTORIC DATA		WASTELOAD ALLOCATION		FUTURE PROJECTIONS	
		1990 FLOW (MGD)	1990 TDS (mg/L)	1995 FLOW (11) (MGD)	1995 TDS (mg/L)	2000 FLOW (11) (MGD)	2000 TDS (mg/L)
BEAUMONT (1)	STC	0.0(9)	0	1.9	540	2.2	540
YUCAIPA VALLEY CWD (1)	STC	0.0(9)	0	3.0	540	4.0	540
REDLANDS TO PONDS (1)	R 5	6.8	465	6.0	465	5.0	515
REDLANDS TERTIARY (1)	R 5	0	0	1.6	465	3.6	515
SAN BERNARDINO	R 4	27.6	535	2.5(2)	535	4.0(2)	540
COLTON	R 4	5.1	590	0	0	0	0
SAWPA (S.B. & Colton) (1)	R 4 (3)	0	0	32.9	510	0	0
SAWPA (S.B. & Colton) (1)	R 3	0	0	0	0	37.2	550
RIALTO	R 4	6.3	530	8.0	490	13.0	400
RIVERSIDE REGIONAL	R 3	34.2	650	36.0	650	38.0	650
JURUPA CSD INDIAN HILLS	R 3	0.1	650	0.6	650	1.0	650
CHINO BASIN MWD RP3	R 3	0	0	0	0	8.0	650
WESTERN RIVERSIDE	R 3	0	0	7.0	625	10.0	625
CORONA TERTIARY	TMS	0	0	1.0	700	5.0	650
CORONA TO PONDS	R 3	7.4	700	10.0	700	10.0	650
LEE LAKE WD	TMS	0.3	650	1.3	650	2.0	675
ELSINORE VALLEY MWD	TMS	2.0	700	7.0	700	9.0	675
EASTERN MWD (4)	TMS	0.0(10)	0	16.0	650	28.0	650
CHINO BASIN MWD RP2A (5)	CHN	0	0	7.7	555	10.4	560
CHINO BASIN MWD RP2	CHN	6.6	610	6.3	610	7.0	600
CHINO BASIN MWD RP1	CHN (6)	17.8	515	24.2	515	16.7	540
CHINO BASIN MWD RP1	CUC (7)	19.8	515	21.4	515	18.1	540
CHINO BASIN MWD RP4	CUC (8)	0	0	0	0	13.4	505
TOTAL		**134.2**		**194.4**		**245.6**	

NOTES

STC - SAN TIMOTEO CREEK R 5 - REACH 5 SANTA ANA RIVER R 4 - REACH 4 SANTA ANA RIVER R 3 - REACH 3 SANTA ANA RIVER

TMS - TEMESCAL CREEK CHN - CHINO CREEK CUC - CUCAMONGA (Mill) CREEK

(1) These discharges affect subbasins that do not have assimilative capacity for TDS. TDS wasteload allocations apply to these discharges in lieu of direct application of groundwater objectives, only if these dischargers participate in approved mitigation (offset) programs (see discussion re: Rancho Caballero decision on p. 5-15)

(2) Local reclamation. (3) At RIX site, (lower part of Colton Subbasin). (4) San Jacinto River Basin. (5) Carbon Canyon Plant. (6) Prado Park Lake.

(7) Near HWY 60 Xing. (8) Via Deer Creek. (9) Flows from Beaumont and Yucaipa are shown as zero since they are not always continuous with the river.

(10) EMWD's present discharges are reclaimed or percolated. (11) Flow estimates used for model projections, TDS limits apply to all flows up to and including estimated values.

provisions in waste discharge requirements which allow dischargers to participate in acceptable programs to offset the water quality impacts of TDS discharges in excess of specified limits. Provided that the discharger has taken all appropriate steps to minimize TDS concentrations in the wastewater, and provided that the discharger participates in a salt offset program, the Regional Board has indicated its intent not to enforce violations of the numeric TDS limits in waste discharge requirements, thereby preventing undue hardship to dischargers.

b. Nitrogen Wasteload Allocation

Because so much of the water in the Santa Ana River is made up of treated municipal effluent (particularly during low flow periods), there is the threat of significant nitrogen discharge impacts on the groundwaters of both the upper Santa Ana Basin and Orange County, and on the aquatic fauna of the River itself. The latter impact is related to discharges of ammonia, one of the components of nitrogen which dissociates under certain conditions to the toxic un-ionized form.

To address these concerns, a total inorganic nitrogen wasteload allocation, including specific limits on nitrate and ammonia, was included in the 1983 Basin Plan. However, as previously noted, evidence that the nitrogen objective for the River was being violated indicated that review and revision of that wasteload allocation was necessary. That review was conducted as part of the comprehensive TDS and Nitrogen Management Studies for the upper Santa Watershed [Ref. 1-4]. In addition, a revised objective for un-ionized ammonia is specified in this Plan, necessitating revision of ammonia effluent limits.

1) Total Inorganic Nitrogen

In 1991, the Regional Board adopted a revised total inorganic nitrogen (TIN) wasteload allocation (Resolution No. 91-125). After extensive analysis of alternatives and discussions with dischargers, the TIN allocation selected was the one specified in Alternative 5C-10, a part of the Recommended Plan in this Basin Plan. Under Alternative 5C-10, wastewater discharges to Reaches 4 and 5 of the River and tributaries thereto are limited to 10 mg/L TIN; for discharges to Reach 3, existing[3] POTW flows are limited to 13 mg/L TIN, while new[4] flows are limited to 10 mg/L. The Recommended Plan also specifies that all wastewater discharges to percolation ponds (existing and new) be limited to 10 mg/L TIN.

In contrast to its predecessor in the 1983 Basin Plan, this revised allocation addresses compliance with nitrogen objectives throughout the River system and not only at Prado Dam. In addition, the revised total inorganic nitrogen allocation addresses the severe groundwater nitrate problems identified in the comprehensive TDS and nitrogen management studies for the upper Santa Ana watershed. The total nitrogen objectives for the various reaches of the River were established to protect the use of the River for groundwater recharge (GWR) and, by extension, the quality of underlying groundwater. As shown on page 5-14, many of the groundwater subbasins in the upper Santa Ana Basin, including those affected by Santa Ana River flows, exceed their respective nitrate objectives. This requires that the Regional Board impose limits on wastewater discharges which are sufficient to ensure compliance with water quality objectives throughout the River system. The historic focus on objective compliance at Prado is no longer adequate. This is reflected in the TIN limits specified in the wasteload allocation. In addition, the revised total inorganic nitrogen wasteload allocation addresses the groundwater nitrate problems directly

3 For the purposes of this allocation, “existing” POTW flows are defined as the wastewater projected in the model up to the year 2000. Projected wastewater flows are shown in Table 5-5.

4 For the purpose of this allocation , “new” flows are defined as flows from new treatment facilities projected to come on-line during the planning period (1990-2000) (*e.g.*, Chino Basin MWD RP2A and RP4), flows from existing wastewater treatment plants not previously discharged to the Santa Ana River system (*e.g.*, Eastern Municipal Water District), and any flows from operating POTWs which are in excess of existing flows, as defined (see footnote 3).

by specifying that wastewater discharges to percolation ponds not exceed 10 mg/L TIN. The groundwater subbasins of the upper Santa Ana Basin are designated for use for municipal and domestic supply (**MUN**). The 10 mg/L TIN concentration is essentially comparable to the nitrate drinking water standard which protects the **MUN** use. By holding wastewater discharges to percolation ponds to 10 mg/L TIN, the Regional Board ensures that the **MUN** use will not be adversely affected by those discharges, and that cleanup of currently unusable groundwater will not be encumbered by percolation of wastewater with nitrogen in excess of potable standards.

The wasteload allocation is shown in Table 5-5. The salient features of this table are:

- Present and projected wastewater discharges to the middle Santa Ana River and its tributaries are listed in the left column. The total inorganic nitrogen wasteload allocation to be used to establish effluent limitations for these discharges is the set of total inorganic nitrogen concentrations shown for the year 1995 discharges.

- The Cities of Redlands and Corona currently discharge to percolation ponds. Corona's discharge is considered as a direct discharge to the Santa Ana River. In the future, portions of the flow from both communities will receive tertiary treatment with discharge to the Santa Ana River.

- Year 1990 and projected years (1995 and 2000) wastewater flows for each of the discharges are listed. Year 1990 wastewater flows (and total inorganic nitrogen concentrations) are shown for information only. The years 1995 and 2000 flow values are not intended as limits on POTW flows. Rather, these flows were derived from population assumptions and are used in the models for quality projections. Wastewater flows significantly in excess of those projected will necessitate additional model analysis to confirm the propriety of the allocation.

- Year 2000 wastewater flows and total inorganic nitrogen concentrations are listed in Table 5-5. These values may be revised.

2) Ammonia Nitrogen

The un-ionized ammonia objective specified in Chapter 4 of this Basin Plan for warmwater aquatic habitats, such as the Santa Ana River system, is more stringent than that found in the 1983 Basin Plan. The ammonia limits in the 1983 wasteload allocation will not ensure compliance with the new objective.

Revised ammonia effluent limits for discharges to the Santa Ana River system are incorporated in this Plan (Table 5-6). The revised limits were derived using QUAL2E, the Colorado Ammonia Model, water quality data on the River and effluent quality.

4. Wastewater Reclamation

Reclamation of wastewater for reuse is an important feature of the Wastewater Management Plan for the upper Santa Ana Basin and, indeed, for the Region as a whole. State policy (State Board Resolution No. 77-1) strongly supports reclamation. However, because reclamation projects tend to add to the salt balance problem in the Region, they must be carefully planned and implemented. The significant benefits which result from such projects include:

- The total water supply can be effectively increased, reducing the need for imports;

- Wastewater treatment costs can be reduced in some cases. Meeting the level of treatment required for discharge to surface waters may be more expensive than treating the effluent for use in irrigation;

- Stream flows can be established or enhanced, providing aquatic riparian habitat and allowing recreation and other beneficial uses of the stream;

- Downstream delivery commitments can often be met by discharges of appropriately treated wastewater.

Table 5-5

Wasteload Allocation for Discharges of Total Inorganic Nitrogen (TIN) to the Santa Ana River and its Tributaries

DISCHARGER (NOTE #)	DISCHARGE TO	HISTORIC DATA		WASTELOAD ALLOCATION		FUTURE PROJECTION	
		1990 FLOW (MGD)	1990 TIN (mg/L)	1995 FLOW (10) (MGD)	1995 TIN (mg/L)	2000 FLOW (10) (MGD)	2000 TIN (mg/L)
BEAUMONT	STC	0 (8)	0	2.0	10	2.2	10
YUCAIPA VALLEY CWD	STC	0	0	5.5	10	6.0	10
REDLANDS TO PONDS (1)	R 5	6.8	23	5.1	10	5.1	10
REDLANDS TERTIARY	R 5	0	0	2.7	10	3.6	10
SAN BERNARDINO	EWC	27.6	22	17.7	10	17.7	10
COLTON	R 4	5.1	16	0	0	0	0
SAN BERNARDINO TERTIARY (2)	R 3	0	0	15.7	13	17.7	13
COLTON TERTIARY (2)	R 3	0	0	6.0	13	6.8	13
RIALTO TERTIARY	R 4	6.3	20	8.8	10	11.6	10
RIVERSIDE REGIONAL	R 3	34.2	16	35.9	13	38.0	13
JURUPA CSD INDIAN HILLS	R 3	0.1	10	0.7	10	0.7	10
CHINO BASIN MWD RP3	R 3	0	0	8.0	10	11.8	10
WESTERN RIVERSIDE REGIONAL	R 3	0	0	6.8	10	8.4	10
CORONA TERTIARY	TMS	0	0	1.0	10	4.6	10
CORONA TO PONDS (1)	R 3	7.4	18	10.2	13	9.0	13
LEE LAKE WD	TMS	0.3	10	1.3	13	1.7	13
ELSINORE VALLEY MWD	TMS	2.0	10	7.2	13	8.8	13
EASTERN MWD (3)	TMS	0 (9)	0	16.6	10	27.9	10
CHINO BASIN MWD RP2A (4)	CHN	0	0	6.4	10	9.6	10
CHINO BASIN MWD RP2	CHN	6.6	17	6.8	13	6.7	13
CHINO BASIN MWD RP1 (5)	CHN	17.8	19	17.5	13	17.0	13
CHINO BASIN MWD RP1 (6)	CUC	19.8	19	17.5	13	17.4	13
CHINO BASIN MWD RP4 (7)	CUC	0	0	3.1	10	6.3	10
TOTAL		**134.2**		**202.2**		**238.3**	

NOTES

Total inorganic nitrogen (TIN) is the sum of the nitrate-N, nitrite-N, and ammonia-N in a filtered sample of water.

STC - SAN TIMOTEO CREEK
R 5 - REACH 5 SANTA ANA RIVER
EWC - EAST WARM CREEK
R 3 - REACH 3 SANTA ANA RIVER
R 4 - REACH 4 SANTA ANA RIVER
TMS - TEMESCAL CREEK
CHN - CHINO CREEK
CUC - CUCAMONGA (MILL) CREEK

(1) Indirect load
(2) Diverted to R 3
(3) San Jacinto River Basin
(4) Carbon Canyon Plant
(5) Near Hwy 60 Xing
(6) Prado Park Lake
(7) Via Deer Creek
(8) Flows from Beaumont and Yucaipa are shown as zero since they are not always continuous with the River. Actual 1990 discharges: Beaumont 1.0 MGD; Yucaipa 2.5 MGD.
(9) EMWD's present discharges are reclaimed or percolated. A surface discharge may be made in the future.
(10) Flow estimates used for model projections. TIN limits apply to all flows up to and including estimated values.

Table 5-6

Effluent Limits for Total Ammonia Nitrogen[1]

Discharge Location	Effluent Limit - Total Ammonia Nitrogen[2] (mg/L)	
	Year 1995	Year 2000
San Timoteo Wash	5.0	4.5
Santa Ana River - Reach 4	5.0	4.5
Santa Ana River - Reach 3	5.0	5.0
Chino Creek	5.0	4.5
Mill Creek (Prado Area)	5.0	4.5
Temescal Creek	5.0	4.5
Other **WARM** designated waterbodies	Determined on a case-by-case basis	

[1] Total Ammonia Nitrogen Wasteload Allocation is specified in order to meet the site-specific Santa Ana River un-ionized ammonia objective (See Chapter 4).

[2] Total Ammonia Nitrogen = Un-ionized Ammonia Nitrogen (NH_3-N) + Ammonium Nitrogen (NH_4^+-N).

Concerns related to wastewater reclamation projects include:

1) Mineral Quality Effects

The mineral quality of the receiving water (surface or groundwater) can be adversely affected. Each cycle of water use increases the salinity of the water. The amount of the increase depends on the type of use; normal domestic use generally adds 200-300 mg/L of TDS to the initial concentration. Agricultural use generally doubles the salinity, while industrial uses most often degrade water quality to a level where it may be unsuitable for discharge. Therefore, it is important that the type of reclaimed wastewater use and the likely effects on water quality be evaluated carefully prior to initiating such reuse. Certain waters in the upper Santa Ana Basin do not have assimilative capacity to accept the additional salinity which would probably result from reclamation.

2) Public Health Effects

Municipal wastewaters contain significant concentrations of bacteria, viruses, and organics. These wastewaters must be treated extensively to remove pathogens before they can be reclaimed. Stable organics in reclaimed water are also cause for considerable concern. Chlorination of treated wastewater effluents can produce chlorinated hydrocarbons, some of which are carcinogenic. For this reason, the California State Department of Health Services is concerned with proposals which would return a high proportion of treated wastewater effluent into domestic water supply aquifers. Adequate treatment and dilution of the wastewater is essential. The Department is developing guidelines for the proposed use of reclaimed wastewater for groundwater recharge.

3) Land Use Considerations

One of the major problems facing the future of wastewater reclamation is a decrease in the total amount of agricultural land in the basin. As the population of the basin increases, commercial and residential developments eliminate agricultural land and the need for irrigation waters. Some reclaimed wastewater may be used for irrigating landscaping in the new developments, but the volume utilized will almost certainly be reduced.

4) The Prado Settlement

On October 18, 1963, the Orange County Water District filed a class action lawsuit against the water users in the upper Santa Ana Basin, seeking an adjudication of water rights against substantially all the water users in the area tributary to Prado Dam in the Santa Ana River watershed. As a result of the 1969 settlement of this case, the wastewater dischargers in the upper basin are required to provide 42,000 acre-feet at Prado Dam. This can consist of treated wastewater effluent or imported water as well as certain natural flows (*e.g.*, rising water); stormflows are not included. The amount of flow delivered is subject to adjustment based upon the TDS content of the water. Reclamation uses within the upper basin are thus limited to a degree by the need to ensure compliance with this settlement.

Wastewater is presently being reclaimed in the upper Santa Ana Basin (and elsewhere in the Region) in a number of different ways:

1) Irrigation of Agricultural Land and Landscaping

Most of the direct reclamation of wastewater in the Region occurs as part of commercial agricultural and landscape irrigation. This use is conducted under Water Reclamation Requirements issued by the Regional Board.

2) Discharge to the Santa Ana River

Although it is not widely considered as such, discharges of treated wastewater to Reaches 3, 4 and 5 of the Santa Ana River constitute the largest single reclamation activity in the Region. These discharges make up as much as 95 percent of the river's dry weather flow and enhance the in-stream beneficial uses of the river throughout its 26-mile length. Essentially all this water is recharged into the groundwater basin in Orange County.

3) Groundwater Recharge by Percolation

This type of reclamation is common throughout the Region. Most wastewater treatment plants which do not discharge directly to the River discharge their effluent to percolation ponds. All of the treated wastewater in the upper Santa Ana Basin which is not directly reclaimed for commercial agricultural and landscape irrigation purposes, or discharged directly to the Santa Ana River, is returned to local or downstream groundwater subbasins by percolation.

4) Dual Water Supply Systems

Given increasing demands for water supply but diminishing resources, there is great interest in using reclaimed water in office buildings and the like for flushing toilets and urinals. Clearly, the addition of this water supply source must be carefully planned and overseen to prevent any public health problems. No dual systems have been implemented as yet in the upper basin; in Orange County, the Irvine Ranch Water District has implemented dual systems (a reclaimed water system in addition to a potable supply) in a number of office buildings in its service area, with the approval of the Department of Health Services and the Regional Board.

As discussed in a later section regarding TDS and nitrogen management activities in the lower Santa Ana Basin, wastewater is also reclaimed and used to control saltwater intrusion into the coastal aquifers of the Region.

The Recommended Plan draws a balance between the benefits and problems of reclamation by including carefully planned and limited reclamation activities in the upper basin. The Recommended Plan provides for reclamation within the upper basin as shown in Table 5-7. Discharges associated with large-scale reclamation projects which are not identified in the recommended plan and which have the potential to significantly affect the surface or groundwater quality must be subjected to further analysis prior to their implementation to evaluate the water quality impacts.

C. Groundwater Management Plan

The Groundwater Management Plan attempts to balance natural recharge, artificial recharge, groundwater pumping, surface water use, imported water use, and wastewater reclamation in order to optimize water quality and quantity. In essence, it is an integration of the Water Supply Plan and the Wastewater Management Plan. In addition, where necessary, the Groundwater Management Plan includes specific remediation programs and projects, such as groundwater extraction and treatment. The Basin Planning Procedure (BPP) is used to balance these various Plan components.

One of the most important aspects of groundwater management planning in the basin has been the ongoing effort (since the 1971 Interim Plan) to move once used water downstream rather than recycling it back to the local groundwater basins. Careful management of reuse and reclamation within any one subbasin reduces the problem of excessive mineralization. This approach does not require more imported water if the needs of both the upper and lower basin are considered. In this Recommended Plan, most municipal wastewater is exported directly from the upper basin, reducing groundwater quality degradation and localized high groundwater problems. This Plan also includes adequate recharge of groundwater basins with good quality water.

The Recommended Plan includes five specific groundwater extraction and treatment projects (desalters), as shown in Table 5-8. The Arlington desalter is already in operation; the Recommended Plan assumes that the remaining facilities will be in place by 1995. Two Chino desalters are in advanced planning stages.

These desalters are necessary to provide assimilative capacity for the planned wasteloads identified in the Recommended Plan, and to protect the beneficial use of the groundwaters for municipal supply. The desalter product waters will be used to supplement local water supplies.

Operation of these desalters by themselves will not result in compliance with groundwater quality objectives for TDS or nitrate; as described earlier, a

Table 5-7

Wastewater Reclamation as Specified in Alternative 5C

Upper Santa Ana Basin

Subbasin Receiving Reclaimed Water	Source	Amount AF/Y Period 1995 - 2000
San Timoteo	Beaumont, City of	250
Bunker Hill II	San Bernardino, City of	117
Colton	Colton, City of	200
Chino II and III	Chino Basin MWD RP-1	1,200
Chino II and III	Chino Basin MWD RP-2A	2,470
Chino II and III	Chino Basin MWD RP-4	3,300
Chino III	California Institute for Men	650
Chino I	Upland Golf Course	31
Temescal	Corona, City of	1,000
	TOTAL	**9,218**

Table 5-8

Recommended Plan - Groundwater Extraction and Desalting Facilities[1]

Upper Santa Ana Basin

Groundwater Desalter	Approximate Poor Quality Extraction Amount (AF/Y)	Product Water Flow (MGD)	**Community Served**
Arlington[2]	7,800	6.3	Orange County Groundwater
Southwest Chino[3]	16,000	10.7	City of Chino; San Bernardino County Water Works No. 8
Southeast Chino[3]	30,000	24.2	Jurupa CSD; City of Norco
Riverside/Colton	28,000	18.9	City of Riverside
Temescal	25,000	19.5	City of Corona
TOTAL	**106,800**	**80.0**	--

1 Recommended Plan (Alternative 5C), Year 2000.

2 The Arlington Desalter is currently in operation.

3 Phase II figures for the Chino Basin Desalters. At the completion of Phase I, the desalters will extract approximately 7,000 AF/Y each and produce a total of approximately 10.7 MGD of product water.

number of subbasins still lack assimilative capacity for these constituents. Indeed, the BPP studies found that there was no realistic way that full compliance can be achieved. Long-term historic land use practices, particularly agriculture, have left an enormous legacy of salts which are now in the unsaturated soils overlying the groundwater subbasins. A significant amount of these salts will, over time, degrade groundwater quality. The programs of groundwater extraction, treatment, and replenishment needed to completely address these historic salt loads far exceed the resources available to implement them [Ref. 1-4]. However, it is expected that desalters and other types of recharge and remediation programs beyond those now included in this Recommended Plan will be developed and implemented. Such projects are expected to be increasingly important to protect local water supplies and to provide supplemental, reliable sources of potable supplies.

1. Arlington Desalter

The water quality of the Arlington Subbasin has been degraded by historic agricultural activities. Agricultural drainage has increased salt levels in the groundwater to the point that the water is no longer a viable drinking water source.

To reclaim the use of this subbasin, the Santa Ana Watershed Project Authority (SAWPA), in cooperation with the Metropolitan Water District of Southern California and the State Water Resources Control Board, constructed the Arlington desalter. This facility is now in operation. At full production, this desalter produces 6 million gallons per day of potable water [Ref. 9].

The operation of the desalter will reduce the amount of salts entering the Santa Ana River, provide a potable water supply, and help to restore the quality of the groundwater subbasin. The BPP results show that this subbasin has assimilative capacity for both TDS and nitrate, apparently made available by the operation of this facility.

2. Chino Basin Desalter Projects

Two Chino Basin desalters are now being planned by SAWPA and other local and regional agencies. In the first phase, these facilities will extract and treat approximately 14,000 acre-feet per year of brackish groundwater from the Chino III Subbasin. The objectives of the desalters are to protect and create potable water supplies and to intercept poor quality rising groundwater and improve the quality of the Santa Ana River baseflow. When operational, these facilities will remove about 15,000 tons of salts from the Basin annually. It is expected that these facilities will be expanded in the future.

3. Riverside/Colton Desalter

The Recommended Plan includes a desalter to address the severe TDS and nitrate problems in the Colton and Riverside Subbasins, caused largely by historic agriculture and long-term recharge of these subbasins by wastewater effluents. As proposed in the Recommended Plan, this desalter would improve the quality of the waters in the subbasin and the quality of both the drinking water supplies and wastewaters of the City of Riverside and the Rubidoux Community Services District.

An intensive study of water resources management for the Colton and Riverside Subbasins is now underway (see Chapter 7). This study may result in additional or alternative recommendations for water quality management in this area. Revisions to this Recommended Plan can be considered on the basis of the results and recommendations of this study.

4. Temescal Desalter

The Recommended Plan also includes a desalter for the Temescal Subbasin. This desalter would: improve the drinking water and wastewater quality for the City of Corona; reduce that City's reliance on Colorado River water as a source of supply (Colorado River water is high in TDS content); and finally, improve the quality of the subbasin.

5. Special Studies

A number of studies are in progress to investigate in greater detail the TDS and nitrogen problems in the Upper Santa Ana Basin and to identify solutions. The results of these studies may lead to changes in this Basin Plan, including new regulatory strategies or other implementation measures.

These efforts include the development and evaluation of water resources management plans for the Chino Basin (Chino Basin Water Resources Management Study) and for the Colton-Riverside Subbasins (Colton-Riverside Basin Conjunctive Use Study). Studies are also in progress to evaluate total inorganic nitrogen and total organic carbon removal in the Prado Basin (Santa Ana River TIN/TOC Study). A brief description of each of these programs is included in Chapter 7.

SALT BALANCE AND ASSIMILATIVE CAPACITY - San Jacinto Basin

The groundwater subbasins in the San Jacinto Watershed were evaluated for water quality and assimilative capacity in a study conducted by SAWPA from 1987-1989. The study covered both TDS and nitrate quality of groundwaters. For the San Jacinto Basin, the study was only superficial in depth and extent. There have been many changes in water supply, wastewater disposal, and reclamation since that time.

The Graben area, which consists of the Canyon, Intake, Upper Pressure, and Lower Pressure Subbasins, was modeled with moderate detail; the other seven subbasins in the San Jacinto watershed were modeled in less detail. The data available for nitrate modeling was meager and therefore the nitrate quality projections should be considered only approximate.

Results of projected subbasin groundwater quality for TDS indicated that all of the San Jacinto groundwater basins with the exception of the Canyon Subbasin have assimilative capacity for planned TDS wasteloads. The Canyon Subbasin exceeds the TDS water quality objective at the present time and at the end of the planing period (2005). Lakeview and Hemet Subbasins exceed their respective TDS water quality objectives at the present time (1990 and 1995), but do show improvement in the future. There are mitigation programs being developed for the Hemet Subbasin, as described below.

Based on model projections, the following subbasins in the San Jacinto watershed have no assimilative capacity for nitrate:

Canyon
Perris, North
Hemet
Menifee I
Menifee II
Lakeview

Presently, Eastern Municipal Water District is conducting studies of the Hemet Subbasin which should provide a better understanding of the quality problems and alternative mitigation measures (see Special Studies discussion). A desalter is planned for the Menifee I Subbasin. When these studies and efforts are completed or are further in the planning stages, any changes in the San Jacinto Management Plan will be incorporated into the Basin Plan.

Surface Water Management

Surface waters of the San Jacinto watershed are tributary to the Santa Ana River via Temescal Creek and therefore all probable flows from the watershed are incorporated into the San Ana River wasteload allocation for TDS and nitrate (see Tables 5-4 and 5-5).

Special Studies and Projects

Eastern Municipal Water District is involved in a number of studies and projects related to TDS and nitrogen management in the San Jacinto watershed. The results of these studies may lead to changes in the Basin Plan. Descriptions of these studies are included in Chapter 7.

<u>Menifee Basin Desalter</u>

A desalter in the Menifee I Subbasin is being planned by Eastern Municipal Water District as part of an effort to decrease dependency on costly and unreliable imported water and to recover high TDS groundwater in the Menifee Subbasin. Agricultural activities and the hydrologic nature of the basin have caused TDS concentrations to rise to an average of 2000 mg/L.

The Menifee Desalter would extract approximately 3 MGD of degraded water. The water would be treated by either reverse osmosis (RO) or electrodialysis. The product water would be blended with groundwater to provide a useable domestic water source with TDS averaging 500 mg/L. The waste brine would be disposed of via the Santa Ana Regional Interceptor line (SARI line).

SALT BALANCE AND ASSIMILATIVE CAPACITY - LOWER Santa Ana Basin

The Santa Ana River recharges Orange County groundwater subbasins. Rapid percolation basins located in the Santa Ana River streambed are operated and maintained by Orange County Water District (OCWD). OCWD also owns and operates a number of other recharge pits, ponds, and basins in the Santa Ana Forebay area which are supplied with the Santa Ana River water via pipelines.

Groundwater makes up approximately 63% of the total product water supply for the OCWD area. The river and several very small tributaries provide about half of the groundwater recharge. The River flow is made up of base flow and storm flow components. Baseflow generally provides 70% or more of the water recharged. In rare wet years, baseflow accounts for a smaller, but still significant percentage (40%) of the recharge. Therefore, to protect Orange County groundwater it is essential to control the quality of baseflow. Most of the baseflow (80-90%) is composed of treated sewage effluent; it also includes nonpoint source inputs and rising groundwater in the river.

In part, water quality objectives are established for the Santa Ana River in order to protect the Orange County aquifers (see discussion in Chapter 4). In addition, water quality objectives are specified for the Santa Ana Forebay. The relationship between the water quality of the Santa Ana River and the Orange County subbasin quality needs to be investigated in order to assure that water quality objectives and control measures are appropriate.

Special Projects

Water Factory 21

Water Factory 21, which has been in operation since 1976, provides advanced treatment of wastewater for groundwater injection. Water Factory 21 produces 75,000 acre-feet of highly treated reclaimed wastewater for injection into the OCWD's seawater intrusion barrier. This highly treated water serves not only to keep salt water from contaminating inland wells, but also adds to the supply of available groundwater.

Tustin Nitrate Removal Project

The Tustin Nitrate Removal project, which was completed in 1990, will add approximately 3,000 acre-feet of water annually to Tustin's domestic water supply. Treatment systems employing reverse osmosis and ion exchange are operating at two wells that had been shut down because of excessive nitrate concentrations.

Irvine Desalter

Orange County Water District and Irvine Ranch Water District (IRWD) are moving forward with the Irvine Desalter, a dual-purpose regional groundwater remediation and water supply project located in the City of Irvine and its sphere of influence. The project consists of an extensive seven-well groundwater extraction and collection system, a treatment system, a five-mile brine disposal pipeline, a finished water delivery system, and ancillary facilities. While providing approximately 6,700 acre-feet per year to IRWD for potable supply, the project will extract and treat brackish groundwater as well as capture an overlapping regional plume of TCE-contaminated groundwater demonstrated to have originated from the U.S. Marine Corps Air Station-El Toro. Approximately 5,400 tons of salt per year will be removed from the basin with this project. The Irvine Desalter is expected to be on line by February 1996.

Frances Groundwater Desalter

IRWD is planning the Frances Groundwater Desalter, a dual-purpose regional groundwater remediation and water supply project located in the City of Tustin and the City of Irvine. The project consists of an extensive six-well groundwater extraction and collection system, a treatment system, a brine disposal pipeline, a finished water delivery system, and ancillary facilities. While providing approximately 11,300 acre-feet per year to IRWD for potable supply, the project will extract and treat water with nitrate concentrations above the drinking water standard (45 mg/L). Approximately 4,100 tons of salt per year will be removed from the basin with this project. The Frances Groundwater Desalter is planned to be on line in 1995.

NONPOINT SOURCE PROGRAM

Considerable improvements in water quality have been achieved in the nation through the control of point source discharges such as those from sewage treatment plants or industrial facilities. It is now recognized that in many areas, nonpoint source inputs, such as urban nuisance flows and stormwater runoff, are the principal sources of contaminant inputs to surface and groundwaters.

In contrast to point sources, which discharge wastewater of predictable quantity and quality at a discrete point (usually at the end of a pipe), nonpoint source inputs are diffuse in origin and variable in quality. Management of nonpoint source inputs is in many ways more difficult to achieve, since it requires an array of control techniques customized to local watershed conditions.

Nonpoint Source Management Plan

Section 319 of the 1987 amendments to the Clean Water Act (33 USC 466 *et seq.*), established the framework for nonpoint source activities. Section 319 requires each state to prepare a Nonpoint Source Management Plan and to conduct an assessment of the impact nonpoint sources have on the state's waterbodies. In response to these requirements, the State Board adopted the Nonpoint Source Management Plan (NPSMP) in 1988 and the Water Quality Assessment in 1990 (see Chapter 6 for a discussion of the Water Quality Assessment). The NPSMP establishes a statewide policy for managing nonpoint source inputs to California's waters and is a part of this Basin Plan.

The State Board defined six objectives of the Nonpoint Source Management Plan, four of which apply to activities in the Santa Ana Region:

1. Initiate and institutionalize activities for control of nonpoint source pollution (drainage from urban activities, agriculture, silviculture, abandoned mines, construction, grazing, hydrologic modification, and individual disposal systems). These activities include outreach, education, public participation, technical assistance, financial assistance, interagency coordination, and demonstration projects.

   A major part of the Regional Board staff's nonpoint source activities is participation in outreach activities. Board staff attend committee meetings to exchange information and to coordinate planning efforts among the various agencies in the region. Staff also coordinates with other public agencies and citizens' groups engaged in protecting water quality from nonpoint source impacts, generally by participating in technical advisory committees. Regional outreach activities are also beginning to include identification of best management practices such as education, information dissemination, and structural and nonstructural water quality controls.

2. Fund contracts for nonpoint source projects selected for nonpoint source grant funding in State Fiscal Year 1992-93. Regional Water Board staff will also participate in these projects and provide technical assistance.

   Regional Board staff has managed or acted in an advisory capacity for a number of nonpoint source grant funded contracts. These projects have included Newport Bay studies to develop a hydrodynamic model of the Bay as well as a study to monitor sources of toxics into the Bay.

3. Initiate nonpoint source watershed pilot programs on nine watersheds in the state.

   San Diego Creek was designated as the region's pilot watershed project. The Creek's water quality has been impaired by excessive sedimentation, nitrates, pesticides, and metals originating from point and nonpoint sources (see the following discussion on the Newport Bay Watershed). In addition, the Upper Newport Bay Dredging Project was identified as the Region's focused nonpoint source watershed project. The U.S. Army Corps of Engineers, under Congressional authorization, is investigating dredging Upper Newport Bay to deepen the channel. The Army Corps of Engineers' activities could modify the Upper Bay's water quality and currents. Regional Board staff are aiding the Army Corps of Engineers in their development of preliminary ideas so as to prevent potential water quality degradation.

4. Implement the requirements of the 1990 Reauthorization of the Coastal Zone Management Act (CZMA) which requires the State Water Board and the California Coastal Commission to develop and implement an enforceable nonpoint source program in the coastal zone.

   The reauthorization of the CZMA, together with specific guidance from the US EPA and the National Oceanic & Atmospheric Administration (NOAA), requires coastal states to develop coastal nonpoint pollution control programs. These programs are to implement management measures for the control of land uses which contribute nonpoint source pollution to coastal waters. Management measures, which include specific measures for mitigating water quality impacts, are specified for the following land uses: agriculture; grazing; confined animal facilities; forestry; urban development; roads; marinas and recreational boating; hydromodification; and mines. The state's coastal program is to be considered for approval by the US EPA and NOAA in July 1995.

Revision of the NPSMP has been initiated. The revised NPSMP will go beyond the requirements of the Coastal Zone Management Act by specifying management measures that are applicable throughout the state. There will also be more of an emphasis placed on watershed based nonpoint source controls in the revised NPSMP. To develop these management measures, the State Board is forming Task Force Committees composed of experts in the various nonpoint source categories. The management measures developed by the Task Force Committees will be reviewed by an Oversight Committee made up of State and Regional Board staff prior to inclusion in the revised NPSMP. The anticipated date of completion of the revised NPSMP is in 1995.

Some major nonpoint source problems which have been addressed in the Santa Ana Region include:

- Urban runoff: addressed through the stormwater permitting program;
- Animal confinement facilities: addressed through the Dairy Regulatory Strategy;
- On-site disposal systems: addressed through prohibitions and the Minimum Lot-Size Criteria; and
- Erosion/sedimentation in the Newport Bay watershed: addressed through the implementation of the Areawide 208 Plan.

Stormwater Program

The 1987 Clean Water Act amendments required the U.S. Environmental Protection Agency (US EPA) to establish regulations to control stormwater discharges associated with industrial activity, and discharges from large and medium municipal separate storm sewer systems. Large municipal separate storm sewer systems serve a population of 250,000 or more and medium municipal separate storm sewer systems serve a population of more than 100,000 but less than 250,000. On November 16, 1990, EPA published the final regulations that established the National Pollutant Discharge Elimination System (NPDES) permit requirements for discharges of stormwater from large and medium municipal separate storm sewer systems and stormwater discharges associated with industrial activities, including construction activities.

The stormwater NPDES permitting program is administered by the State Board and the Regional Boards.

A. Municipal Stormwater Discharge Permits

   Prior to the promulgation of EPA's final regulations, the Santa Ana Regional Water Quality Control Board adopted areawide urban NPDES stormwater permits for each of the three counties in the Region. As shown in Table 5-9, as part of the areawide urban permits, the

Table 5-9

Municipal Stormwater Permits
Santa Ana Region

Municipality	Order Number	Date Issued
Orange County Environmental Management Agency, the County of Orange, and 23 incorporated cities	90-071 NPDES - CA8000180	7/13/90
Riverside County Flood Control and Water Conservation District, the County of Riverside, and 13 incorporated cities	90-104 NPDES - CA8000192	7/13/90
San Bernardino County Transportation and Flood Control Department, the County of San Bernardino, and 16 incorporated cities	90-136 NPDES - CA8000200	10/19/90

counties are named as the principal permittee and the incorporated cities are named as co-permittees. These permits require the development and implementation of programs to identify and eliminate illegal/illicit discharges to municipal stormwater conveyance systems, the development and implementation of best management practices (BMPs) to reduce pollutants in stormwater and urban runoff, and the development and implementation of monitoring programs.

B. Industrial and Construction Stormwater Discharge Permits

The federal regulations identify eleven industrial categories which are subject to stormwater discharge permitting:

1. Facilities subject to stormwater effluent guidelines (40 CFR Subchapter N);
2. Manufacturing facilities;
3. Mining and Oil and Gas facilities;
4. Hazardous waste treatment, storage or disposal facilities;
5. Landfills, land application sites, and open dumps that receive industrial waste;
6. Recycling facilities such as metal scrap yards, battery reclaimers, salvage yards, and automobile yards;
7. Steam electric generating facilities;
8. Transportation facilities;
9. Sewage treatment plants;
10. Construction activities; and
11. Certain facilities if materials are exposed to stormwater.

As shown, these categories include construction activities (#10), which are covered by a separate permit in the State of California (see below).

To satisfy the federal requirements, the State Board issued two general permits: the General Industrial Activities Stormwater Permit (State Board Order No. 91-13-DWQ as amended by State Board Order No. 92-12-DWQ); and the General Construction Activity Stormwater Permit (State Board Order No. 92-08-DWQ). Industrial facilities and proponents of construction projects must file a Notice of Intent (NOI) with the State Board to be covered under the applicable general permit.

The General Industrial Activities Stormwater Permit requires dischargers to comply with federal regulations to reduce or eliminate industrial stormwater pollution, to develop and implement a stormwater pollution prevention plan, and to perform monitoring of stormwater discharges. This permit covers stormwater discharges from all the listed categories of industrial activity, except construction activities.

The General Construction Activity Stormwater Permit addresses stormwater discharges associated with a construction activity where grading, clearing, and excavation results in a land disturbance of five acres or more. A stormwater discharge from a construction activity resulting in a land disturbance of less than five acres also requires a permit if the construction is a part of a larger common plan of development or sale.

The use of general permits to regulate these various types of stormwater discharges streamlines the permitting process, which greatly benefits the Regional Board. It is also the least costly way for a discharger to obtain a permit and comply with federal and state regulations.

For industrial and construction activities in the Region, it is the Regional Board's responsibility to enforce the General Industrial Activities and General Construction Activity stormwater permits. In addition to these general permits, the Regional Board has issued and will continue to issue individual permits for stormwater dischargers if warranted by the character of the discharges and/or the sensitivity of the receiving waters.

Animal Confinement Facilities (Dairies)

As described earlier in this chapter, one of the most significant water quality problems confronting the region is increasing concentrations of TDS and nitrates in the groundwater. This problem is particularly acute in those groundwater subbasins without assimilative capacity, including the Chino II and III Groundwater Subbasins.

In 1989-90, the Regional Board conducted a special investigation of the salt balance problem in the Chino Basin, described in "Dairies and Their Relationship to Water Quality Problems in the Chino Basin" or Dairy Report [Ref. 10]. The findings of this study showed that while irrigated agriculture and municipal wastewater disposal are contributors to the degradation, wastes from dairies and other animal confinement facilities play an overwhelmingly significant role.

Dairy operations began in the Chino Basin about 40 years ago and continue intensively today. In fact, the Chino Basin contains the highest concentration of dairy animals found anywhere in the world. Within an area of about 15,000 acres, there are approximately 300 dairies, housing about 300,000 animals. These animals produce approximately 0.5 million tons (dry weight) per year of manure. Significant quantities of water are used to wash the cows prior to milking. Both this wastewater and the manure contain significant quantities of salts (TDS and nitrogen). The Regional Board's studies showed that close to 30,000 tons of salts reach Chino Basin groundwater every year as a result of the disposal of these dairy wastes.

Dairy operations and waste disposal practices can also affect the quality of surface waters. Discharges of washwater and/or runoff of stormwater which has come into contact with manure contribute salts and other pollutants to receiving streams, which ultimately flow into the Santa Ana River. While the Regional Board prohibits these discharges (with the exception of stormwater under certain conditions), these discharges do occur as a result of inadequate construction and maintenance of containment facilities. Drainage from upstream urban areas exacerbates this problem.

The quality of the Santa Ana River is affected indirectly as well: significant quantities of the poor quality groundwater in the Chino Basin rises to the surface and enters the River just upstream of Prado Dam. The TDS and nitrogen problems in the Santa Ana River, which are addressed by the implementation of wasteload allocations, have been described previously. The failure to address and correct the water quality problems in the Chino Basin could compromise the effectiveness of the water quality improvements implemented by the sewage treatment plants in response to those allocations.

The Regional Board initiated a regulatory program to address the water quality impacts of the salt loads from dairy operations in 1972. Waste discharge requirements are issued to all dairies and other significant animal confinement facilities. (See the Dairy Report for a detailed description of the Regional Board's waste discharge requirements). However, the Regional Board's studies demonstrated that changes in this regulatory program were necessary.

The Regional Board developed a revised regulatory strategy, working closely with dairy industry representatives. As described in the Dairy Report, it consists of a comprehensive, three part program. Part I is designed to address the present and future impacts from ongoing dairy activities, Part II addresses the impacts from past dairy activities, and Part III addresses the need for improved drainage facilities upstream of and within the dairy area. Although termed a "dairy" regulatory strategy, the strategy is intended to apply to all animal confinement facilities within the Chino Basin. The term "dairy" is used here for simplicity.

Part I. Dairy Waste Discharge Requirements: Impacts of Ongoing Operations

The first part of the strategy addresses dairy waste discharge requirements and the impacts of ongoing operations. Four specific changes to the dairy regulatory program are included: an improved manure tracking system; inclusion of groundwater monitoring requirements for dairy operators; submittal of engineered waste management plans; and revision of waste discharge requirements to prohibit dairy waste disposal unless suitable offset programs are implemented.

1. Implementation of Manure Tracking and Reporting System

The Regional Board determined that the manure tracking system in use was not adequate to determine the full effects of dairy waste management practices on groundwater quality, nor was it adequate to determine compliance with waste discharge requirements related to manure disposal.

In response, a new manure tracking manifest form was developed and is now being used. Dairy operators are required to complete the form and submit it annually in a report to the Regional Board.

2. Implementation of Groundwater Monitoring Requirements

Comprehensive groundwater quality data is necessary for planning mitigation activities in the Chino Basin. Groundwater monitoring requirements will be included in the waste discharge requirements for all dairy operators in the Chino Basin. The WDRs will provide the operators with the option of participating in an established, comprehensive groundwater monitoring program in lieu of their individual monitoring efforts. Such a monitoring program is now being conducted by the Chino Basin Watermaster.

3. Preparation of an Engineered Waste Management Plan as part of the Report of Waste Discharge

Historically, the Regional Board has required that dairy operators provide a general description of their proposed containment controls as part of the Report of Waste Discharge (ROWD). Experience has shown, however, that this is not adequate and that illegal discharges of manured water occur due to improper design, construction, and maintenance of containment controls.

To address this problem, the Regional Board now requires that a waste management plan be prepared by a registered engineer, member of the Soil Conservation Service or others who are suitably qualified. This plan must address containment of all washwater and stormwater runoff, as well as protection of the facility from inundation, as required by the waste discharge requirements. For any given property, the engineering plan must address necessary containment controls for the property as a whole, even in situations where some portion of that property is leased, subleased or operated by another party (for example, cultivation of agricultural crops by a farmer on a portion of a dairy property).

Engineered waste management plans are required to be submitted as part of the ROWD for new or substantially modified dairy operations. These plans are also required when the containment controls at facilities are known or suspected to be inadequate.

4. Revision of the Manure and Washwater Disposal Requirements

As noted earlier, the Chino II and III Groundwater Subbasins lack assimilative capacity for additional salt inputs. In basins without assimilative capacity, mineral increments are not permitted when regulating waste discharges (see preceding section on salt balance and assimilative capacity, State Board Order No. 73-4, the Rancho Caballero decision [Ref. 6]). To meet the Chino Basin groundwater objectives, the discharge of manure and dairy washwater and their application as fertilizer and irrigation water cannot be legally permitted.

The implications of prohibiting manure and washwater disposal are significant. Recognizing this, the strategy allows for the implementation of programs to offset the salt loads contributed by ongoing manure/washwater disposal. An offset program would work as follows: for every ton of salt that will reach groundwater as a result of continued disposal/application of manure or washwater within the Chino Basin, the dairy operator must remove an equivalent amount of salt from the Basin through participation in a desalter or other appropriate means. The offsets required of the dairy industry would depend on the industry's success in identifying acceptable methods of manure and wastewater disposal; the more manure and washwater that is removed from the basin, the less need there is for offset.

The strategy calls for the waste discharge requirements for dairy operators in the Chino

Basin to be revised to "prohibit the disposal of manure and washwater, and their application as fertilizer or irrigation water in the Chino Basin unless the dairy operator participates in an offset program. The offset program must ensure that water quality impacts of continued manure and/or washwater disposal/application practices are mitigated."

Implementation of this element of the dairy regulatory strategy has been withheld since acceptable mitigation projects are now being developed. As described in the preceding section, the selected TDS and nitrogen management plan (Alternative 5C) includes two desalters in the Chino Basin, which are being built by the Santa Ana Watershed Project Authority and other participating agencies. These desalters, though not designed or implemented specifically to address ongoing dairy salt loading, will provide sufficient groundwater treatment and salt removal to offset the present and projected salt loads identified in Alternative 5C. This includes the salt loads from present and future dairy operations and other agriculture, unsewered areas, and other sources.

Part II. Impacts of Past Dairy Operations

This part of the dairy regulatory strategy addresses the mitigation of water quality impacts caused by past discharges of dairy waste in the Chino Basin.

While the two desalters mentioned above should be adequate to offset present and future salt wasteloads, they will not provide sufficient groundwater treatment to address the historic contributions of salts from long-term dairy or other agricultural activities, municipal wastewater disposal, etc. These historic salt inputs must be addressed to protect the beneficial uses of the Basin's groundwaters and to prevent long-term adverse impacts to the Santa Ana River.

Additional desalters or other treatment facilities and strategies will be necessary. The implementation of these measures may have significant costs. To be equitable, each of the sources of TDS and nitrogen input to the Basin, including dairies, other types of agriculture, and municipalities, should assume its fair share of the Chino Basin cleanup costs. The dairy regulatory strategy incorporates the concept of shared responsibility and directs the use of this concept to develop an equitable approach to water quality correction in the Chino Basin.

A comprehensive study of water resources management in the Chino Basin is now being conducted. The study, the Chino Basin Water Resources Management Study, is funded by a task force which includes representatives of the Chino Basin Watermaster (composed of water users in the Chino Basin including the agricultural industry), Chino Basin Municipal Water District, Western Municipal Water District, the Santa Ana Watershed Project Authority, Metropolitan Water District, and the Regional Board. The goal of this study is to identify a water resources management plan which will provide for water quality protection and remediation such that local water supplies are protected, water demands are met, and the quality of the Santa Ana River is not adversely affected by outflow from the Basin.

Part III. Surface Water Quality Impacts: Control of Drainage in the Chino Agricultural Preserve

The third part of the dairy strategy addresses surface water drainage problems in the Chino Agricultural Preserve, where most of the dairies are located. These problems are caused both by inadequate and poorly maintained drainage facilities within the Preserve, and by inadequate controls on drainage from upstream urban areas.

Runoff from the rapidly developing areas upstream of the dairy area creates additional difficulties for many dairy operators in complying with the manured water containment requirements specified in their waste discharge requirements. A number of studies have been conducted to determine the best method of preventing urban stormwater runoff impacts in the dairy area. The most recent study, "Chino Agricultural Preserve Drainage and Land Use Study" [Ref. 11], was conducted with federal 205(j) planning funds and was completed in

1987. The recommended solution to these urban drainage problems was the construction of a trapezoidal earth swale at the northern boundary of the dairy area (roughly, at Riverside Avenue, between Campus Avenue and the Cucamonga Creek flood control channel, just west of Archibald Avenue). This swale would intercept flows from upstream urban areas (cities of Ontario and Chino) and convey these flows to the Lower Cucamonga Spreading Grounds, adjacent to the Cucamonga Creek channel.

To alleviate drainage problems in the dairy area and reduce surface water quality problems which result from dairy waste inputs, the following measures need to be implemented:

1. Riverside Avenue interceptor swale - San Bernardino County and/or the cities of Ontario and Chino should pursue the funding and implementation of the interceptor swale project at Riverside Avenue.

2. Other drainage controls - Both San Bernardino and Riverside counties and the cities tributary to the dairy area should identify and implement a coordinated program of drainage controls necessary to supplement the interceptor swale and prevent drainage problems within the dairy area.

These recommendations are directed to the counties and cities, rather than to the dairy industry. The counties are required to implement such best management practices (BMPs) as part of their NPDES stormwater permits.

Dairy Operations Outside the Chino Basin

Since the greatest concentration of dairies occurs in the Chino Basin, the dairy strategy has appropriately focused on mitigating the problems in this area. However, in recent years, many new dairies have been established elsewhere in the Region, specifically in the San Jacinto Basin, and this trend appears to be continuing. To prevent the recurrence of the groundwater quality problem now confronting the Region in the Chino Basin, an appropriate dairy waste management strategy for the San Jacinto Basin must be developed and implemented. The pattern of dairy land use, the quality of underlying groundwater, and the availability of assimilative capacity in the San Jacinto Groundwater Subbasins should be considered in more detail before recommending a complete dairy strategy. However, it is anticipated that the wastewater management plan, the manure tracking system, and the groundwater monitoring elements of the strategy recommended for the Chino Basin will also apply in the San Jacinto Basin.

Minimum Lot Size Requirements and Exemption Criteria for New Developments Using On-Site Septic Tank-Subsurface Leaching/Percolation Systems

The Santa Ana Region is characterized by dramatic population growth. Most of this population is concentrated in urban areas, where high density development on small lots is typical. Sanitary sewers are not available in many areas where rapid growth is occurring, so many of these high density developments use on-site septic tank-subsurface disposal systems for sewage disposal.

In 1989, the Regional Board investigated the relationship between these high density developments and the nitrate problems found in the groundwater of the Region [Ref. 12]. The findings showed that the use of high density subsurface disposal systems would cause or add to nitrate quality problems. To control these impacts, the Board found that it was necessary to limit the density of new subsurface systems.

On October 13, 1989, the Regional Board adopted Resolution No. 89-157, amending the Water Quality Control Plan to add a one-half acre minimum lot size requirement for new developments using on-site septic tank-subsurface leaching/percolation systems region-wide. Certain exemptions from the minimum lot size requirement were specified in Resolution No. 89-157. On December 7, 1990, the Regional Board adopted Resolution No. 90-158, which revised the exemption criteria. However, on June 7, 1991, the Regional Board adopted Resolution No. 91-51, rescinding Resolution No. 90-158 and revising the exemption criteria in Resolution No. 89-157. On July 16, 1993, the Regional Board adopted Resolution No. 93-40, revising the requirements and exemption criteria in Resolution No. 89-157, as amended by Resolution No. 91-51. Resolution No. 89-157, as amended by Resolution No. 93-40, stipulates the following:

I. A minimum lot size of one-half acre (average gross) per dwelling unit is required for new developments in the Region using on-site septic tank-subsurface leaching/percolation systems.

   A. The term "one-half acre" specified as the minimum lot size requirement means an average gross area of land of one-half acre per dwelling unit. Easements (including streets, curbs, commons, and greenbelts), or those portions thereof which are part of the property proposed for development shall be included in the calculation of the average gross area of land.

   B. A "new" development is defined as a proposed tract, parcel, industrial or commercial development for which:

      1. One or more of the following has not been granted on or prior to September 7, 1989:

         a. Conditional approval or approval of a tentative parcel or tract map by the local agency such as the county/city Planning Commission, City Council or the Board of Supervisors.

         b. A conditional use permit.

         c. Conditional approval or approval by the San Bernardino County Department of Environmental Health Services, Riverside County Department of Health, Orange County Health Care Agency or other local agency; or

      2. One or more of the conditional approvals or approvals listed under B.1., above, were granted on or prior to September 7, 1989 but had expired prior to September 7, 1989.

   C. The minimum lot size requirement does not apply to existing developments where septic tank-subsurface disposal systems have been installed on or prior to September 7, 1989. Replacement of the existing septic tank-subsurface disposal systems shall be exempt from the minimum lot size requirements under the following conditions:

      1. For Residential, Commercial and Industrial Developments
         Replacement of the existing septic tank-subsurface disposal systems is necessary to bring the system up to code as required by the local health care agencies and/or the building and safety departments.

      2. For Single-Family Residential Only
         Replacement of the existing septic tank-subsurface disposal systems is proposed to allow additional flows resulting from additions to the existing dwelling unit. (This does not include any free-standing additional structures.)

         (Note: Board staff does not consider the number of bedrooms and/or bathrooms for existing or proposed single-family dwelling units in determining compliance with the exemption criteria.)

         a. An existing development on land zoned single-family residential will be considered as a new development if the addition of any free-standing structures which will result in additional wastewater flows to the septic system is proposed. Commercial and/or industrial developments will be considered as new development if any additions to the existing structures are proposed which will result in additional wastewater flows to the septic system.

         b. For single-family residential developments, if the existing septic system could accommodate additional wastewater flows, then additional installations (rooms/ bathroom) to these developments shall be exempt from the minimum lot size requirements.

D. Those tracts, parcels, industrial or commercial developments which have received one or more of the approvals listed in B.1., above, on or prior to September 7, 1989 are exempt from minimum lot size requirements for use of septic tank-subsurface disposal systems. However, those tracts, parcels, industrial or commercial developments which had received one or more of the approvals listed in B.1., above, but for which the approval had expired prior to September 7, 1989 are considered as new development and are subject to the minimum lot size requirements.

E. Industrial/commercial developments are developments other than single-family residential developments. For new industrial/commercial developments utilizing septic tank-subsurface disposal systems, the wastewater flow for each one-half acre gross area of land may not exceed that from a three-bedroom, two-bathroom single-family dwelling unit. For determining compliance with this criterion, a flow rate of 300 gallons per day shall be considered as the flow equivalent to that from a 3-bedroom, 2-bathroom single family dwelling. For industrial/commercial developments with lots smaller than one-half acre, this flow rate requirement shall be prorated. (For example, an industrial/commercial development on a one-quarter (1/4) acre parcel will be in compliance with this requirement if the wastewater flow does not exceed 150 gallons per day.)

F. This minimum lot size requirement does not affect the lot size criterion for continuing exemptions in prohibition areas (1 acre minimum).

G. This minimum lot size requirement doesnot preclude the prescription of more stringent lot size requirements in specific areas if it is determined necessary to protect water quality.

H. No exemptions shall be granted for <u>new</u> developments on lots less than one-half acre which are 200 feet or less from a sewer which could serve that tract/parcel, barring legal impediments to such use. All other developments shall be considered on a sliding scale, *e.g.*, for each additional unit (any development which is more than a single family dwelling), this requirement should be increased by 100 feet per dwelling unit. For example, a 10-lot subdivision shall be required to connect to a sewer if the sewer is within 1,100 feet (200 + 9 x 100 feet = 1,100 feet) of the proposed development barring legal impediments to connection to the sewer. For this subsection, a commercial/industrial development which produces a wastewater flow of up to 300 gallons per day would be considered equivalent to a single family dwelling unit.

I. New lots of less than one-half acre may be formed by combining two or more lots which have received one of the approvals specified in Section B.1., above, on or prior to September 7, 1989. Individually, these existing lots would be eligible for an exemption from the minimum lot size requirement. Developments on the combined lots may also be granted an exemption provided that the total number of units proposed for the new parcel is equal to or less than the total number of units proposed for the existing parcel. For the purposes of this subsection, a combined lot of less than one-half acre formed from two or more existing lots shall not be considered a new development.

J. Exemptions from the minimum lot size requirements for the use of septic tank-subsurface disposal systems on lots smaller than one-half acre may be granted if the following conditions are met:

1. The project proponent implements an acceptable offset program. Under an offset program, the project proponent can proceed with development using septic systems on lots smaller than one-half acre if the proponent connects an equivalent number of septic systems to the sewer. The unsewered developments must be those which would not otherwise be required to connect to the sewer.

2. If the septic systems (developments) proposed are not identical to the ones connected to the sewer (the offset), an engineering report shall be submitted certifying that the nitrogen loading rate from the proposed development(s) is(are) equivalent to or less than the nitrogen loading rate from the septic systems in the offset program.

3. The proposed use of septic tank-subsurface disposal systems complies with the Regional Board's "Guidelines for Sewage Disposal from Land Developments."

K. The project proponent may propose an alternative treatment system for sewage disposal as the basis for an exemption from the minimum lot size requirement. Each request for use of an alternative treatment system shall be reviewed on a case-by-case basis and submitted to the Regional Board for consideration.

Newport Bay Watershed

Water quality problems in Newport Bay were described in detail in reports prepared in response to Senate Concurrent Resolutions 38 and 88 [Ref. 13,14]. These problems are essentially nonpoint source problems and fall into four major categories: 1) siltation; 2) bacterial contamination; 3) eutrophication and 4) toxic substances contamination. Each of these problems have been or is being addressed by either local or state agencies. A brief description follows:

<u>Siltation</u>

Erosion in the watershed and the resultant siltation in the Bay is a continual threat to the Bay's designated uses. Sediment loads result from erosion of open space lands in foothill areas and from man's activities in the watershed: extensive grading for development; increased runoff and channel erosion due to urbanization; and erosion of agricultural lands. San Diego Creek, which is the largest drainage system in the watershed, accounts for approximately 94 percent of the sediment delivered to the Bay. Most deposition occurs during major storm events, although low-level transport occurs year-round.

In 1982, the Southern California Association of Governments (SCAG) completed the "San Diego Creek Comprehensive Stormwater Sedimentation Control Plan" as part of an areawide planning process conducted pursuant to Section 208 of the Clean Water Act. This Plan recommended a two-part approach to management of the erosion-siltation problem. The first part is the reduction of erosion at the source through the implementation of agricultural and construction best management practices (BMPs) and resource conservation plans (RCPs). The second part of the Plan is to intercept as much of the remaining sediment as possible in sediment traps in San Diego Creek and in excavated basins in the upper Bay.

Intensive and well-coordinated efforts to implement the recommendations of the 208 Plan have been and are being made by the state, local agencies and The Irvine Company, the largest private landowner in the watershed. Construction and maintenance of in-channel and in-bay basins is achieved through cooperative agreements among the California Department of Fish and Game, the County of Orange, the Cities of Newport Beach, Irvine and Tustin, and the Irvine Company. Between 1982 and 1988, about 2.4 million cubic yards of sediments were removed from the Bay, at a cost of about $13 million. The location and design of the in-bay basins are carefully coordinated with the Department of Fish and Game's management plan for the Upper Newport Bay Ecological Reserve, so that the basins serve not only to trap sediment but also to restore wildlife habitat.

The U.S. Army Corps of Engineers (Corps) is also involved in sediment removal from the Bay. The Corps has principal responsibility for dredging activities needed to maintain navigable channels in the lower Bay. The Corps has also received congressional authorization to dredge a new channel in the upper Bay, which may have substantial effects on circulation patterns in the Bay and therefore, on the transport of sediments and other constituents in the water column. This project is in the planning stages.

To minimize sediment transport to the Bay, programs have been implemented to control erosion resulting from grading operations at construction sites and to prevent erosion of agricultural lands. The cities of Irvine, Costa Mesa, Santa Ana, and Newport Beach have grading ordinances which require erosion/siltation control plans for construction projects within their boundaries. The focus of these plans is on the implementation of BMPs. Permit actions by the Regional Board (the areawide stormwater permit for Orange County) and the State Water Resources Control Board (the general construction activity stormwater permit) (see preceding discussion on the Stormwater Program) will necessitate additional coordinated efforts to control sediment inputs from construction activities. With technical assistance from the Regional Board, Orange County oversees a program to ensure development and implementation of resource conservation plans (RCPs) by agricultural landowners, principally The Irvine Company.

Bacterial Contamination

Bacterial contamination of the waters of Newport Bay can directly affect two beneficial uses: water-contact recreation (REC-1) and shellfish harvesting (SHEL). The Orange County Health Care Agency conducts routine bacteriological monitoring and more detailed sanitary surveys as necessary, and is responsible for closure of areas to recreational and shellfish harvesting uses if warranted by the results.

The upper portion of Upper Newport Bay has been closed to these uses since 1974. In 1978, the shellfish harvesting prohibition area was expanded to include all of the Upper Bay. A number of storm channels empty into the Upper Bay and appear to be the principal sources of the high bacterial (coliform) concentrations. Statistical evaluation of the long-term data shows a significant reduction in bacterial concentrations in the Upper Bay in recent years. This reduction may be associated, at least in part, with the excavation of the in-bay basins, which have significantly increased tidal flushing.

Certain areas in the Lower Bay also show frequent high bacterial concentrations, particularly those locations which are subject to urban runoff and have limited tidal flushing. As in the Upper Bay, more violations of bacterial standards generally occur during storm runoff periods than during dry weather. However, an additional and more significant source of bacterial input contributes to these violations on occasion. This source is the discharge of vessel sanitary wastes.

Newport Bay has been designated a no-discharge harbor for vessel sanitary wastes since 1976. Despite this prohibition, discharges of these wastes have continued to occur. Since these wastes are of human origin, they pose a significant public health threat.

The Regional Board, the City of Newport Beach (City), the County of Orange, the Newport Harbor Quality Committee, and other parties have taken or stimulated actions to enforce the discharge prohibition. The principal focus of these efforts has been to make compliance with the prohibition convenient and therefore more likely. Vessel waste pumpouts have been installed at key locations around the Bay and are inspected routinely by the Orange County Health Care Agency. A City of Newport Beach ordinance addresses people-intensive boating activities to ensure that sanitary wastes are appropriately disposed. The ordinance requires that sailing clubs, harbor tour, and boat charter operations install pumpouts for their vessels. Another City ordinance addresses vessel waste disposal by persons living on their boats. Efforts have also been made to ensure that there are adequate public restrooms onshore. The City also sponsors an extensive public education campaign designed to advise both residents and visitors of the discharge prohibition, the significance of violations, and of the location of pumpouts and restroom facilities.

Eutrophication

Nutrient loading to the Bay, particularly from the San Diego Creek watershed, contributes to seasonal algal blooms which can create a recreational and aesthetic nuisance. These algal blooms may also adversely affect wildlife.

While there are a number of sources of nutrient input, tailwaters from the irrigation of agricultural crops and from several commercial nurseries in the watershed have been the predominant source. The Regional Board issued Waste Discharge Requirements to the three nurseries, requiring substantial reductions in their nutrient loads. Significant improvements have been achieved by these nurseries, largely due to the implementation of drip irrigation systems (which greatly reduce the amount of tailwater) and/or recycle systems. Installation of drip irrigation systems for other agricultural crops has also significantly reduced the volume of nutrient-laden tailwaters. These improvements, coupled with the increased tidal flushing caused by the in-bay basins, appears to have resulted in a substantial downward trend in nitrate concentrations in the Bay.

Further progress to address the nutrient problem is expected as the requirements of Orange County's stormwater permit are implemented. It is recognized, however, that the eutrophication problem in the Bay has been developing over many years and that correcting this problem is also likely to be a long-term process.

Toxic Substance Contamination

As described in Chapter 6 (Monitoring and Assessment), a number of monitoring programs are conducted by the Regional Board and local agencies to determine the presence and sources of toxic substances in Newport Bay and its watershed. These studies have shown high levels of certain trace metals and organics in San Diego Creek and at certain locations in the Bay itself. As a result of these findings, the Board has designated San Diego Creek as a water quality limited segment. Further evaluation of toxic constituents in the Upper and Lower Newport Bay is being addressed by the Bay Protection and Toxic Cleanup Program, which is discussed later in this chapter.

Sources of these trace metals and organics include past and present agricultural activities, erosion and transport of soils to which toxicants are bound, boatyard operations, and urban and stormwater runoff.

The efforts described earlier to reduce erosion and siltation and to control nutrient inputs in agricultural irrigation tailwaters should also result in reduced loadings of toxics to the Bay and its tributaries.

Boatyard operations in the Region are regulated by the Regional Board under NPDES permits. Each operator is required to develop and implement a Pollution Control Plan (PCP) to prevent discharges of pollutants to the Bay. In 1989-90, the Regional Board conducted a study to evaluate the effectiveness of the PCPs utilized by boatyards in Newport Bay (and Anaheim Bay-Huntington Harbour) [Ref. 15]. The study found that some boatyard waste collection and treatment practices are not effective in reducing the discharge of heavy metals to the Bay. Specific recommendations for necessary improvements were provided and are generally being implemented. Where necessary, enforcement actions will be taken by the Board to address continuing problems.

During 1992-93, the Regional Board contracted with local universities to further evaluate the occurrence and impacts of toxics in the Newport Bay watershed. The results are contained in final reports prepared by UC Irvine and UC Davis [Ref. 16,17]. The results of the study indicated that metal concentrations in Newport Bay and its watershed have generally improved, with the exception of locations near the boatyard facilities. This confirms the data used to designate Lower Newport Bay as a Toxic Hot Spot (see following discussion). Endosulfan was found to be ubiquitous in the watershed. DDT also persists in the Bay and watershed. In most cases, endosulfan and DDT levels exceeded established water quality criteria.

The chronic toxicity bioassays on the freshwater samples indicated no toxicity due to metals. Some toxicity was observed, apparently caused by one or more nonpolar organic compounds. Additional efforts should focus on a more specific identification of the toxic compound(s).

Additional discussion of the Newport Bay Coordinating Council and their activities in Newport Bay, is provided in Chapter 7.

Anaheim Bay/Huntington Harbour

As in Newport Bay, bacteria and toxics threaten the water quality and beneficial uses of Anaheim Bay/Huntington Harbour. As shown in Table 5-10, the presence of toxic metals and pesticides/herbicides has resulted in the designation of Anaheim Bay and Huntington Harbour as a Toxic Hot Spot for some constituents and a Potential Toxic Hot Spot for other constituents. Two major storm drains, the Bolsa Chica Channel and the East Garden Grove Wintersburg Channel, as well as their tributaries, drain into the Anaheim Bay/Huntington Harbour complex. Inputs of stormwater and urban nuisance flows via these channels appear to be significant sources of pollutants. The County of Orange's general stormwater permit requires the implementation of best management practices (BMPs) and other measures in the watershed to control these inputs to the maximum extent practicable.

During 1992-1993, the Regional Board contracted with UC Irvine and UC Davis to evaluate the occurrence and impacts of these toxics in Huntington Harbour [Ref. 18,19]. Results of the study indicated that concentrations of trace metals have decreased over a 13 year period and 1992/93 measurements met established water quality criteria. However, an unidentified nonpolar organic compound was found to be acutely toxic to test species.

Anaheim Bay (inland of Pacific Coast Highway bridge) and Huntington Harbour are designated as no discharge areas for vessel sanitary wastes. Pumpout facilities are in place throughout the Harbour to facilitate compliance. Additional discussion of the activities of the Huntington Harbour Waterways Committee is provided in Chapter 7.

Big Bear Lake

Big Bear Lake, located in the San Bernardino Mountains, has a surface area of 3,000 acres, a storage capacity of 73,328 acre-ft and an average depth of 24 feet. The lake reaches its deepest point of 72 feet at the dam. The spillway altitude is 6,744 feet. The major inflows to the Lake are creeks, including Rathbone (Rathbun) Creek, Summit Creek, and Grout Creek. Outflow from the Lake is to Bear Creek, which joins the Santa Ana River at about the 4000-foot elevation level.

Big Bear Lake is moderately eutrophic. Deeper water during the summer months may exhibit severe oxygen deficits. Nutrient enrichment has resulted in the growth of rooted aquatic plants, which has impaired the fishing, boating, and swimming uses of the lake. To control this vegetation, mechanical harvesters are used to remove aquatic plants, including the roots.

Toxics may be entering the Big Bear Lake watershed and accumulating in aquatic organisms and bottom sediments at concentrations that are of concern, not only for the protection of aquatic organisms, but for the protection of human health as well. Past Toxic Substances Monitoring Program data have indicated the presence of copper, lindane, mercury, and zinc in fish tissue.

During 1992-1993, the Regional Board conducted a Phase I Clean Lakes study (Section 314 of the Clean Water Act) to evaluate the current water quality condition of the lake and its major tributaries [Ref. 20]. The focus of the study was to identify the tributaries responsible for inputs of toxics and nutrients.

As in previous Big Bear Lake studies, phosphorus was found to be the limiting nutrient. Approximately 80% of the phosphorus load emanates from Rathbone Creek. The large amount of precipitation in Southern California during 1993 resulted in more runoff from the Big Bear Lake tributaries and an increased input of nutrients. For instance, the total phosphorus load increased between 1992 to 1993 by a factor of 2, and the total nitrogen load increased by a factor of 100. Given the increasing eutrophic condition of the Lake, harvesting of aquatic vegetation may not be effective much longer. It is appropriate to implement control measures for reducing the input of nutrients from the major tributaries, Rathbone Creek and Grout Creek.

Metals are present in the Lake and some tributaries. Mercury and copper concentrations in the Lake and in several of the tributaries exceeded water quality criteria. In addition, copper was also detected at levels exceeding 95 percent of statewide measurements in *Corbicula* (freshwater clams) at most Lake and tributary stations. At the same time, however, chronic toxicity bioassays were inconclusive as to whether the presence of metals was causing a toxic response in test organisms. Additional investigations should be done to both pinpoint the source(s) of metals into the Lake and determine if metal concentrations are causing toxicity. Once that is accomplished, source control measures can be implemented.

BAY PROTECTION AND TOXIC CLEANUP PROGRAM

Legislation enacted in 1989 added Chapter 5.6, Bay Protection and Toxic Cleanup, to Division 7 of the California Water Code (Sections 13390-13396). These new sections require the State Board and Regional Boards to establish programs for the maximum protection of beneficial uses of bays and estuaries, focusing on water quality problems due to toxic substances. In part, the State Board was directed to formulate and adopt a water quality control plan for Enclosed Bays and Estuaries and a workplan for the development of sediment quality objectives. When setting waste discharge requirements, the Regional Boards must implement the water quality control plan and any sediment quality objectives which may be adopted by the State Board.

The Bay Protection and Toxic Cleanup Program (BPTCP) must also include plans to identify and remediate "toxic hot spots." These are areas in the enclosed bays, estuaries or adjacent waters where the contamination affects the interests of the state and "... where hazardous substances have accumulated in the water or sediment to levels which (1) may pose a substantial present or potential hazard to aquatic life, wildlife, fisheries or human health, or (2) may adversely affect the beneficial uses of bay, estuary or ocean waters as defined in water quality control plans, or (3) exceeds adopted water quality or sediment quality objectives." Criteria for the assessment and priority ranking of toxic hot spots are to be developed by the State Board in coordination with the California Department of Fish and Game and the California Office of Environmental Health Hazard Assessment (OEHHA). The ranking criteria will be used by the Regional Board to prioritize toxic hot spots based on the severity of the problem.

The BPTCP consists of both short- and long-term activities. The short-term activities include:

- Develop and maintain a program to identify toxic hot spots, plan for their cleanup or mitigation,and amend Water Quality Control Plans and policies to abate toxic hot spots;
- Develop and implement regional monitoring and assessment programs;
- Develop numeric sediment quality objectives;
- Develop and implement Toxic Hot Spot Cleanup Plans;
- Revise waste discharge requirements, if necessary, to conform to the Basin Plan; and
- Develop a comprehensive database containing information pertinent to describing and managing toxic hot spots.

Long-term activities of the BPTCP include:

- (Continue to) develop numeric sediment quality objectives;
- Develop and implement strategies to prevent the formation of new Toxic Hot Spots and to reduce the severity of effects from existing Toxic Hot Spots;
- Periodic review and update of a Water Quality Control Plan for enclosed bays and estuaries; and
- Maintain the comprehensive database.

The BPTCP is a comprehensive effort to regulate toxic pollutants in enclosed bays and estuaries and is not intended to be a monitoring program resembling the State Mussel Watch Program or the Toxic Substances Monitoring Program (see Chapter 6 for descriptions of these programs). The BPTCP program does, however, use the data from the State

Mussel Watch Program and the Toxic Substances Monitoring Program to identify Toxic Hot Spots.

In the Santa Ana Region, State Mussel Watch data and data provided by the Orange County Environmental Management Agency have been used to identify toxic hot spots and potential toxic hot spots in Newport Bay and Anaheim Bay/Huntington Harbour. Tables 5-10 and 5-11 lists the known toxic hot spots and potential toxic hot spots, respectively. The Regional Board, in coordination with the State Board and the California Department of Fish and Game are currently in the process of confirming these toxic hot spots and potential toxic hot spots using a battery of toxicity tests on both the water column and sediment. Once confirmed, the list of toxic hot spots and potential toxic hot spots will be ranked according to the ranking criteria. The priority ranking will be included in the regional Toxic Hot Spot Cleanup Plan(s) which will include identification of likely contaminant sources and appropriate remedial actions.

GROUNDWATER CONTAMINATION FROM VOLATILE ORGANIC COMPOUNDS

In 1984, the legislators passed Assembly Bill 1803 which instructed the California Department of Health Services, Office of Drinking Water, to develop and implement a program to require the sampling of public drinking water supply wells for volatile organic compounds. The Department was instructed to provide the results to the appropriate Regional Board. The initial data indicated extensive organic contamination of groundwater supplies throughout the state. As a result, in 1985, the State Board and the Regional Water Quality Control Boards initiated the Well Investigation Program. The intent of the Well Investigation Program was to identify the parties responsible for the organic contamination of municipal drinking water supply wells so that those parties could be made accountable for cleanup.

In order to identify the responsible parties, the Regional Board followed an intensive investigation program for each contaminated public drinking water supply well on a priority basis. This program included:

- Field reconnaissance for potential sources
- Record searches
- Hydrogeological assessments
- Questionnaires, meetings, and inspections
- Requests for preliminary soil investigations and follow-up soil and groundwater investigations of potential sources
- Requests for cleanup
- Enforcement actions, where appropriate

In the late 1980's the Well Investigation Program was expanded to include private drinking water supply wells and agricultural and industrial supply wells that were located in areas where organic contamination posed a threat to public drinking water supply wells. In the late 1980's, the Well Investigation Program represented the largest single funded program in the Region. However, due to severe budget cuts statewide, the Well Investigation Program was scaled down and eventually discontinued in 1992. Investigation and cleanup of sites identified by the Well Investigation Program are currently being overseen by the Regional Board's Spills, Leaks, Investigations, and Cleanup (SLIC) program.

Currently (1993), there are more than 300 water supply wells identified in the Region which contain organic compound contaminants. The loss of many drinking water supply wells and the threat of loss of additional existing drinking water supply wells due to organic compound contamination is a serious problem in several areas of the Region, most notably the Bunker Hill, Chino, and Santa Ana Forebay Groundwater Basins.

Perchloroethylene (PCE) and trichloroethylene (TCE) are the major contaminants in the Bunker Hill I Subbasin, which underlies northern San Bernardino. The City of San Bernardino lost 25% of its water supply in the early 1980s when 14 wells operated by the City were found to contain concentrations of perchloroethylene above the state and federal drinking water Maximum Contaminant Level (MCL). The Newmark Wellfield was placed on the federal Superfund list in 1988, and EPA assumed lead responsibility for investigating the extent of the contamination and identifying long-term cleanup measures. The Regional Board has identified no specific source of the contamination; potential sources

Table 5-10

Known Toxic Hot Spots
Santa Ana Region

Waterbody Name	Pollutants Involved
Lower Newport Bay	Cd, Pb, As, Se, Zn, Cu
Upper Newport Bay Ecological Reserve	Pb, Cu, Cd
Anaheim Bay	Cd, Cu, Pb, Cr
Huntington Harbour	Cd, Pb, Se, Cr, Cu
Bolsa Bay	Cr, Cu, Pb

Table 5-11

Potential Toxic Hot Spots
Santa Ana Region

Waterbody Name	Pollutants Involved
Lower Newport Bay	Chlorpyrifos, Dacthal, PCB, Chlorbenside, DDT, Lindane, Ronnel, Hexachlorbenzene, Chlordane, Endosulfan, Toxaphene, Aldrin, Heptachlorepoxide, Heptachlor
Upper Newport Bay Ecological Reserve	Dacthal, DDT, PCB, Endosulfan, Chlordane, Chlorpyrifos, Diazinon, Lindane, Heptachlorepoxide
Anaheim Bay	Aldrin, Chlordane, Lindane Chlorbenside, PCB, DDT Chlorpyrifos, Endosulfan, Heptachlorepoxide, Hexachlorbenzene
Huntington Harbour	Aldrin, Chlorbenside, DDT, Lindane, Endosulfan, Chlordane, Chlorpyrifos, Dieldrin, Endrin, Toxaphene, Heptachlorepoxide

include dry cleaners, airports, and a World War II munitions facility. Interim groundwater cleanup is being accomplished by groundwater extraction and treatment at existing municipal supply wells using air stripping and granulated activated carbon (GAC) facilities funded by the California Department of Toxic Substances Control. These facilities have the capacity to treat 37.6 million gallons per day (MGD). The treated water is used as a potable water supply to replace the water lost as a result of the solvent contamination.

The Bunker Hill II Subbasin underlying Redlands has been contaminated with TCE and dibromochloropropane (DBCP). It is estimated that the TCE plume covers an area of approximately twenty square miles. Twenty-six water supply wells are impacted by TCE or DBCP, including five municipal water supply wells where the concentration of TCE or DBCP exceeds the MCL. No responsible parties have been identified yet, however, potential sources for the TCE plume include an airport, commercial and industrial facilities, and a former rocket motor testing facility. DBCP, a soil fumigant, was used extensively by the citrus industry prior to the 1960's and the DBCP contamination in the Bunker Hill II Subbasin is believed to be the result of this past legal agricultural use. A 3.0 MGD GAC facility at the Rees Well, which began operation in 1989, treats the contaminated water and provides potable water for the City of Redlands. In addition, an 8.6 MGD wellhead treatment facility at the Texas Street Well Field began operation in 1993. The facility, which was funded by the State Board and the State Department of Toxics, removes TCE and DBCP and also provides potable water back to the City of Redlands.

Forty-four water supply wells in the Chino Basin, primarily the Chino II Subbasin, contain TCE and PCE. To date, only one facility, the former GE Flatiron Plant in Ontario, has been confirmed as a source of organic compound contamination that has impacted a water supply well. In 1993, prior to exploring final cleanup options, GE will be implementing plume containment and interim cleanup activities on the almost two mile long, one-half mile wide TCE plume. Other potential sources in the Chino Basin include the California Institute for Men, the Chino Airport, and the Ontario Airport. Potential responsible parties are in the process of conducting investigative studies.

Organic contamination from TCE, PCE, dichloroethylene (DCE), and dichloroethane (DCA) has been found in water supply wells in Orange County in the Santa Ana Forebay and Irvine Forebay Groundwater Basins. A wellhead treatment unit (air stripping) was installed at the City of Orange Well No. 13 and began operation in 1993. The Regional Board staff oversees investigations at numerous sites in the Forebay area where past discharges of industrial solvents have occurred. Twenty-one of these sites have been identified to date as sources of volatile organic compounds in groundwater. Site investigations are being conducted to identify the extent of contamination and to clean up the effects of the discharges.

The Regional Board has been successful in identifying many sites throughout the region where volatile organic compounds have impacted groundwater. However, with the exception of the former GE Flatiron facility in the Chino Basin, there has been no other direct cause-and-effect relationship drawn between a contaminated drinking water supply well and a specific source. In most cases, records of compounds used at facilities have not been maintained and information regarding past disposal practices is not available, making it difficult to pinpoint specific sources. In addition, considering that most sources of the volatile organic compounds found in water supply wells are probably industrial discharges that may have occurred as long as 30 years ago, and considering the complex factors affecting the fate of volatile organic compounds in soil and groundwater and the changes in groundwater flow patterns from pumping, etc., it is difficult to backtrack contamination from water supply wells to specific sites which may be sources of local groundwater contamination.

DEPARTMENT OF DEFENSE FACILITIES

There are six major Department of Defense (DoD) facilities in the Santa Ana Region, two of which are currently scheduled for closure. Table 5-12 identifies these facilities and the water quality problems of each.

Table 5-12

Summary of Water Quality Problems from
Department of Defense (DoD) Facilities

Santa Ana Region

DoD Facility	Receiving Water Affected	Water Quality Problem Identified to Date
Norton Air Force Base[1]	Bunker Hill I Subbasin	trichloroethylene (TCE) plume; landfills; Superfund listing
March Air Force Base	Perris North Subbasin	trichloroethylene (TCE) plume; fuel plume; landfills; Superfund listing
Marine Corps Air Station - El Toro	Irvine Forebay Subbasin	trichloroethylene (TCE) plume; fuel plume; benzene plume; landfills; proposed Superfund listing
Marine Corps Air Station - Tustin[1]	Irvine Pressure Subbasin	volatile organic compound (VOC) plume; fuel plume
Naval Weapons Station - Seal Beach	Santa Ana Pressure Subbasin	fuel plume; landfills
Armed Forces Reserve Center - Los Alamitos	Santa Ana Pressure Subbasin	fuel plume; landfill

1 Facilities which are scheduled to be closed. These bases are given high cleanup priority.

Significant groundwater contamination has been detected at a number of these facilities. Contamination is severe enough at three of these facilities to have them placed on EPA's National Priorities List (NPL) for remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly referred to as Superfund).

For these three National Priorities List facilities (Norton and March Air Force Bases and Marine Corps Air Station - El Toro), the EPA is the lead environmental regulatory agency for oversight of investigation and cleanup. CERCLA requires EPA to consider applicable or relevant and appropriate state laws and regulations when establishing cleanup standards for remedial activities. To ensure that the state's concerns are properly addressed, two Cal/EPA agencies, the Regional Board and the Department of Toxic Substances Control (DTSC) also perform a significant oversight role in the investigations and cleanup of these facilities.

The US EPA, DoD, and the state agencies have signed Federal Facility Agreements (FFA) for each of the National Priorities List facilities. The intent of the FFA is to ensure that: (1) environmental impacts are investigated; (2) remedial actions are defined; (3) procedural framework or schedules are established; (4) cooperation among agencies is facilitated; (5) adequate assessment is performed; and (6) compromise is reached.

The US EPA is not involved in the investigation and cleanup of DoD facilities that are not on the National Priorities List (Marine Corps Air Station-Tustin, Naval Weapons Station-Seal Beach, and Armed Forces Reserve Center-Los Alamitos). However, many of these facilities have significant contamination. In these cases, the two state agencies enter into Federal Facility Site Remediation Agreements (FFSRAs) with DoD. FFSRAs are very similar to the above-mentioned Federal Facility Agreements, with the exception that US EPA is not a party. The Regional Board and Department of Toxic Substances Control have already entered into an agreement with DoD for the Naval Weapons Station - Seal Beach and are near the end of negotiations on Federal Facility Site Remediation Agreements for Marine Corps Air Station - Tustin.

The Department of Toxic Substances Control has been identified as the “lead” state agency and the Regional Board as “support” agency for all of the above facilities. A Memorandum of Understanding has been signed by the State Board and Department of Toxic Substances Control which describes the roles of each agency. The Regional Board's oversight role is with regard to the investigation and cleanup of water resources that have been impacted or are threatened by waste discharges from the facilities. The Regional Board's responsibility also extends to source areas (landfills, contaminated soil, etc.) that currently, or may in the future, pose a threat to water quality. DTSC's role is to address all other environmental aspects including health risk assessment, air emissions, community relations, etc.

The State Board and DTSC have entered into a two-year cooperative agreement with the Department of Defense for cleanup and oversight reimbursement. All work performed by the State agencies with regard to the investigation and cleanup of environmental problems at these facilities is fully reimbursed by DoD.

LEAKING UNDERGROUND STORAGE TANKS

The Underground Storage Tank Program was enacted in 1983 and took effect January 1, 1984. The authority for the program is found in the Health and Safety Code, Division 20, Chapter 6.7, and the regulations for the program are found in the California Code of Regulations, Title 23, Division 3, Chapter 16. In 1988, the State Board and the Department of Health Services (now Department of Toxic Substances Control) issued the Leaking Underground Fuel Tank (LUFT) field manual which prescribes specific methods for evaluating the effects of underground storage tank leaks.

There are approximately 2,000 known cases of leaking underground storage tanks (USTs) in the Region. Approximately 35% of the cases involve instances where only soil contamination is present, 35% involve instances where groundwater contamination has been confirmed, and the remaining 30% are cases which have been closed. The majority of the releases from these underground storage tanks are gasoline and the constituent of most concern is benzene, a known carcinogen. A smaller percentage of the underground storage tank releases involve chlorinated industrial solvents, which are suspected carcinogens. As anticipated, the majority of the sites where these releases have occurred are automotive service stations, with tanks from industrial facilities contributing a smaller, but significant, minority. To date, these groundwater impacts have not grown to the point where drinking water supply wells have been affected. The Regional Board maintains and regularly updates the Leaking Underground Storage Tank Information System (LUSTIS) database, which identifies all known underground storage tank release sites in the Region.

Implementation of the underground storage tank program includes direct Regional Board oversight of leaking underground storage tank cleanups. It also involves coordination of oversight activities with local agencies under contract with the State Board through the Local Oversight Program. Local agencies have the authority, pursuant to Section 25297.1 of the Health and Safety Code, to act on behalf of the Regional Board in requiring investigations and cleanup of underground storage tanks cases. The local agencies also implement the permitting, construction, inspections, and monitoring portion of the Underground Tank Regulations. The Orange County Health Care Agency, the County of Riverside Department of Environmental Health, and the County of San Bernardino Department of Environmental Health Services handle approximately 80% of the active cases in the Region, with several cities managing their own programs. The local agencies' caseload consists of soil cases and simple groundwater cases, while the Regional Board maintains responsibility for the highly complex cases where groundwater has been affected.

As specified in State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges," the investigation and cleanup of releases from underground storage tanks involves several steps including: (1) preliminary site assessment and workplan submittal; (2) pollution characterization; (3) remediation; and (4) post-remedial action monitoring. Soil contamination cleanup levels are determined on a case-by-case basis and are established to prevent continued leaching from the affected soils at levels which may cause the underlying groundwater to exceed applicable water quality objectives. Cleanup goals for groundwater contamination cases are generally established at drinking water standards (Maximum Contaminant Levels or Action Levels).

In most areas of the Santa Ana Region, the uppermost portions of the aquifers are considered to be in hydrologic contact with deeper portions which are currently utilized for drinking water supplies. In the pressure zone of Orange County, the uppermost sediments are fine-grained materials which are unable to sustain sufficient pumping rates. However, due to the large volume of water held within these sediments, the close vertical proximity of these areas to underlying pumping locations, and the existence of pathways for movement into the deeper aquifers, the shallow waters in this area are considered as contributing to the sources of drinking water in Orange County. Leaking underground storage tank cleanups must be conducted accordingly.

Underground Storage Tank Cleanup Fund

The State Board, Division of Clean Water Programs, administers the Underground Storage Tank Cleanup Fund. The Cleanup Fund can be used as a mechanism to satisfy federal financial responsibility requirements and pay for corrective action and third party liability costs resulting from a leaking petroleum UST. The Fund can also pay for direct cleanup (by local agency or Regional Board) of UST sites requiring emergency and prompt action on abandoned or recalcitrant sites. This fund, collected by the Board of Equalization, is supported by a 0.6 cents per gallon fee for gasoline. The Fund has been established to provide reimbursement to tank owners or operators for the costs of cleanup of the effects of unauthorized releases of petroleum. Up to one million dollars ($1,000,000) can be provided per site, with the first ten thousand dollars ($10,000) being provided by the claimant. With certain qualifications, expenditures made to remediate an unauthorized petroleum release since January 1, 1988 can be reimbursed and letters of credit can be issued for the funding of ongoing remediation activities.

The Regional Boards provide technical support to both the applicants who file claims against the UST Cleanup Fund and the State Board staff who verify the corrective action work covered by the claim. For claims that involve future work, the Regional Boards will oversee site investigation and cleanup on cases for which they are the lead agency.

ABOVEGROUND STORAGE TANKS

The state's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990 (Health and Safety Code, Chapter 6.67).

The purpose of the regulation is to protect the public and the environment from the serious threat of millions of gallons of petroleum-derived chemicals stored in thousands of aboveground storage tanks. The Regional Board inspects aboveground petroleum storage tanks, which were used to store crude oil and its fractions after January 1991, to assure compliance with a federally required site-specific Spill Prevention, Control, and Countermeasure Plan. In the event that a release occurs which threatens surface or groundwater, the Act allows the state to recover reasonable costs incurred in the oversight and regulation of cleanup.

Storage statements are required from facilities with aboveground storage tanks, describing the nature and size of their tanks. Filing fees are required which are intended to fund inspections, training, and research. Approximately 280 aboveground storage tanks are under regulation in the Santa Ana Region as of May 1, 1993. Their number is continually expanding as aboveground storage tanks are increasingly used to replace underground storage tanks. A list of aboveground storage tanks is available from the Regional Board.

DISPOSAL OF HAZARDOUS AND NONHAZARDOUS WASTE TO LAND

Hazardous and nonhazardous waste disposal can, if not properly managed and regulated, diminish the beneficial uses of the waters of the Region. These are typically losses to groundwater beneficial uses, but in some cases, surface waters can also be affected by disposal operations or contaminated soil in the vadose zone.

The Regional Board regulates landfills receiving municipal solid wastes and surface impoundments receiving hazardous or designated liquid wastes. Although these sites are closely regulated and monitored, some water quality problems have been detected and are being addressed. There are no hazardous solid waste disposal facilities currently operating in the Region.

The laws and regulations governing the disposal of both hazardous and nonhazardous solid wastes have been revised and strengthened in the last few years. The US EPA, DTSC, the State Board, and Regional Water Quality Control Boards are implementing the federal RCRA regulations. Described below is Regional Board implementation of RCRA and the following state programs: Title 23, Division 3, Chapter 15; Toxic Pits Cleanup Act; and Solid Waste Assessment Tests.

Resource Conservation and Recovery Act

The state implements the Resource Conservation and Recovery Act (RCRA) in California through the Department of Toxic Substances Control (DTSC) and the Regional Boards. Chapter 15 monitoring requirements were amended in 1991 so as to be equivalent to RCRA requirements. These monitoring requirements have been implemented through the adoption of waste discharge requirements for both hazardous and nonhazardous waste disposal sites covered by RCRA. The discharge requirements for hazardous waste sites are part of a state RCRA permit issued by the DTSC. The Regional Board and the Integrated Waste Management Board issues state permits for nonhazardous waste disposal sites.

The Resource Conservation and Recovery Act of 1976 provided for the development of federal and state programs for the regulation of land disposal of waste materials and the recovery of materials and energy resources from the waste stream. The Act regulates not only the generation, transportation, treatment, storage, and disposal of hazardous wastes, but also nonhazardous solid waste disposal facilities. In addition, the 1976 Act called for phasing out the use of open dumps for disposal of solid wastes in favor of sanitary landfills.

The most recent and significant amendments to RCRA (1984) impose a variety of new, more stringent requirements both on hazardous and nonhazardous waste generators, transporters, and the owners/operators of treatment, storage, and disposal facilities within the existing regulated community. Significant provisions include bans on land disposal of certain wastes, restrictions on placement of liquids in landfills, and establishment of minimum technological requirements for landfills and surface impoundments.

Subtitle C of RCRA contains requirements related to the identification and listing of hazardous wastes and standards applicable to generators, transporters, owners, and owner/operators of treatment, storage, and disposal facilities. Primary responsibility for the implementation of Subtitle C rests with the DTSC, with Regional Board participation as necessary.

Subtitle D of RCRA establishes a framework for federal, state, and local government cooperation in controlling the management of nonhazardous solid waste. The federal role in this arrangement is to establish the overall regulatory direction by providing minimum nationwide standards for protecting human health and the environment and to provide technical assistance to states for planning and developing their own environmentally sound waste management practices. The actual planning and direct implementation of solid waste programs under Subtitle D, however, remain largely state and local functions, and the act authorizes states to devise programs to deal with state-specific conditions and needs. US EPA approved the state's proposed solid waste management program, and delegated authority to the state to implement the program in October 1993. In September 1993, the Santa Ana Region adopted a blanket Waste Discharge Requirement (WDR) amendment for all affected landfills in the Region which implements both Subtitle D and Chapter 15.

Subtitle D includes the Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257). The criteria establish minimum national performance standards necessary to ensure that "no reasonable probability of adverse effects on health or the environment" will result from solid waste disposal facilities or practices.

Part 258 of subtitle D establishes minimum national criteria for municipal solid waste landfills including those used for sludge disposal and disposal of nonhazardous waste combustion and ash. Part 258 also sets forth minimum federal criteria for municipal solid waste landfills, including location restrictions, facility design and operating criteria, groundwater monitoring requirements, corrective action requirements, financial assurance requirements, and closure and post-closure care requirements. The rule establishes differing requirement for existing and new units, (*e.g.*, existing units are not required to remove wastes in order to install liners).

Subtitle D provides that states with approved water management programs and that wish to run the program will have flexibility in implementing these criteria. A municipal solid waste landfill unit that does not meet the Part 258 Criteria will be considered to be engaged in the practice of "open dumping" in violation of Section 4005 of RCRA. Municipal solid waste landfill units that receive sewage sludge and fail to satisfy those criteria will be deemed to be in violation of Sections 309 and 405(e) of the Clean Water Act.

Title 23, Division 3, Chapter 15

The most important regulation used by the Regional Board in regulating hazardous and nonhazardous waste disposal is California Code of Regulations (CCR) Title 23, Division 3, Chapter 15 (formerly Subchapter 15). These regulations include very specific siting, construction, monitoring, and closure requirements for all existing and new waste disposal facilities. Chapter 15 also contains a provision requiring landfill operators to provide assurances of financial responsibility for initiating and completing closure, and for corrective action to address all known or reasonably foreseeable releases from their waste management units. Detailed technical criteria are provided for establishing water quality protection standards, monitoring programs, and corrective action programs for releases from waste management units.

Chapter 15 defines waste types to include hazardous wastes (Class I), designated wastes (Class II), and nonhazardous solid wastes (Class III). Hazardous wastes are defined by DTSC in Title 22 of the California Code of Regulations.

Designated wastes are defined as:

1. Those nonhazardous wastes consisting of or containing contaminants which under ambient landfill conditions could be released at concentrations that could cause water quality degradation, or

2. Those wastes which are hazardous according to Title 22, but are not considered hazardous by the federal RCRA definition and have been granted a variance from hazardous waste management requirements by DTSC.

Nonhazardous solid wastes are those normally associated with domestic and commercial activities. The California Integrated Waste Management Board (CIWMB) is the lead agency responsible for non-water quality-related issues relating to nonhazardous waste management in California (Division 7 of Title 14 of the CCR). CIWMB has the overall responsibility for landfill operations and ensuring that nonhazardous wastes are collected and disposed of in a manner which protects public health and safety as well as the environment. Inert wastes can be regulated by the Regional Board if necessary to protect water quality.

The Regional Board has regulated nonhazardous municipal solid waste facilities (Class III) since the mid-1970s. Many of the smaller, older facilities have closed, and waste is now typically disposed of at larger regional nonhazardous solid waste facilities. The Regional Board is responsible for the review and revision of waste discharge requirements for both active and inactive permitted sites to assure consistency with the current regulations. These responsibilities include the upgrading of groundwater monitoring systems to identify violations of water quality protection standards, and the establishment of corrective action programs where standards are violated.

A significant task faced by the Regional Board in implementing Chapter 15 at nonhazardous solid waste facilities is defining what constitutes designated wastes. Many wastes which are not hazardous still contain constituents of water quality concern that can become mobile in a nonhazardous solid waste facility, and can produce leachates that could pose a threat to beneficial uses of the waters of the state. The criteria for determining whether a nonhazardous waste is a designated waste are based on water quality objectives for waters located in the vicinity of the sites, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. To assist in the identification of designated waste criteria, the Regional Board will rely on a methodology acceptable to the Executive Officer and other relevant technical data.

Landfill Expansion

A steady increase in the rate of solid waste generation in the region is causing landfills to reach capacity sooner than expected. This situation has made it necessary not only to plan for the closure of some existing landfills, but also to anticipate the need for expansions of existing facilities and the construction of new ones. To minimize the problems associated with the rapid filling and subsequent closure of solid waste disposal facilities, the Regional Board supports efforts to reduce the volume of wastes disposed of at landfills. To reduce the potential for household hazardous wastes entering municipal landfills, the Regional Board also supports public education and household hazardous waste disposal and recycling programs.

The Regional Board conducts many other activities related to the disposal of wastes. Examples of these activities are review and approval of site design plans and construction oversight for new or expanding facilities, implementation of strict drainage and erosion control measures at landfills, soil and groundwater cleanup activities at contaminated disposal sites, and closure/post-closure plan review, approval, and closure construction oversight.

Toxics Pits Cleanup Act

The Toxics Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste must be either reconstructed with a liner/leachate collection system or be dried out by July 1, 1988. These facilities must also be closed by removing all contaminants or by capping to contain any residual soil contamination. In 1985, there were 11 sites in the Santa Ana Region with ponds subject to TPCA. As of 1993, 2 facilities are continuing to operate following upgrades to meet TPCA requirements, eight facilities have closed, and discharges at the remaining facility have ceased. Lead responsibility for closure of the remaining site has been assumed by the DTSC, with participation continued by the Regional Board.

Solid Waste Assessment Tests

Section 13273 was added to the Water Code in 1985, requiring all operators of both active and inactive nonhazardous landfills to complete a Solid Waste Assessment Test (SWAT). The purpose of the SWAT is to determine whether hazardous or toxic substances above regulatory thresholds, or any other constituents which may threaten water quality, are migrating from the facility. Funding for the SWAT program is provided by the California Integrated Waste Management Board.

There were 159 sites identified in the region subject to this program. Pursuant to a list adopted by the State Board, 150 sites statewide were to be evaluated each year through the year 2001 (approximately 10 sites per year in the Santa Ana Region). These sites were ranked according to their perceived threat to water quality. Active sites, those overlying high quality aquifers, and those already known to have adversely impacted groundwater were replaced in the highest ranks (Ranks 1 through 4).

Program funding was eliminated in 1991, but was restored in 1992 for a period of three years to allow for review of reports for sites in Ranks 1 through 5 only. These reviews must be completed by 1995. Although landfill site evaluations, which seek to identify adverse impacts to both surface and groundwater quality, can be required pursuant to Chapter 15 whenever necessary, it appears that the SWAT program will be fully funded after 1995. A revised SWAT ranking list will be created prior to implementation of the program for Rank 6 and beyond.

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CHAPTER 6

MONITORING AND ASSESSMENT

INTRODUCTION

The effectiveness of a water quality control program cannot be judged without information supplied by a comprehensive monitoring and assessment program. The State Board, the Regional Boards, and other federal, state, and local agencies monitor water quality throughout the state. Coordination among the agencies is essential to identify data gaps and supplement monitoring efforts as necessary. The results of these programs show where water quality problems exist now and where problems can be expected based on quality trends over time. Monitoring activities in the Santa Ana Region were described as part of Chapter 5 (Plan Assessment) in the 1983 Basin Plan. In this Plan, that discussion has been expanded and updated. New programs have been added and obsolete programs have been deleted. Additionally, this chapter provides a brief description of the databases being used to store and analyze the data collected. This chapter also describes the periodic water quality assessments which are conducted on a statewide basis, using the monitoring data collected.

STATE MONITORING PROGRAMS

The State Board is the lead agency for statewide monitoring activities. The State Board coordinates extensively with the California Departments of Fish and Game, Water Resources, Health Services, and various federal agencies in its monitoring activities. The objectives of the State's surveillance and monitoring program are as follows:

- To measure the achievement of water quality goals and objectives specified in the Basin Plan;
- To measure the specific effects of water quality changes on established beneficial uses;
- To measure background conditions of water quality;
- To determine long-term trends in water quality;
- To locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment;
- To provide information needed to compare receiving water quality to mass emissions of pollutants from waste discharge;
- To provide data for determining compliance with permit conditions and to support enforcement actions, if necessary;
- To measure wasteloads discharged to receiving waters and to identify their effects, and in water quality limited segments, to prepare wasteload allocations necessary to achieve water quality control;
- To provide data needed to carry on the continuing planning process;
- To measure the effects of water rights decisions on water quality and to guide the State Board in its responsibility to regulate unappropriated water for the control of quality;
- To provide a clearinghouse for the collection and dissemination of water quality data gathered by other agencies and private parties cooperating in the program; and
- To prepare reports on water quality conditions as required by federal and state regulations and other users requesting water quality data.

The monitoring program provides for collection and analysis of samples and the reporting of water quality data. It includes laboratory support and quality assurance, storage of data for rapid and systematic retrieval, and preparation of reports and data summaries. Most important is the interpretation and evaluation of data leading to recommendations for action.

The State monitoring program focuses on fresh and marine surface waters. The goal of the State monitoring program is to provide an overall, continuing assessment of water quality in the state. Historically, conventional parameters such as minerals, nutrients, and dissolved oxygen were considered to be the most important parameters. More recently, toxic substances have received increasing attention in federal and state water pollution control activities. The State and Regional Boards are intensifying their efforts to investigate the presence of toxic substances in surface waters and the effects of these substances on aquatic biota.

The State program consists of a toxicity monitoring program, the Inland Surface Waters Toxicity Testing Program, and two toxic substances monitoring programs - the Toxic Substances Monitoring Program and State Mussel Watch.

Inland Surface Waters Toxicity Testing Program

The goal of this program, which was initiated in 1990, is to evaluate the extent, magnitude, nature and sources of toxicity in the waters of the State. Emphasis is on those waters where toxicity is associated with unregulated discharges such as runoff from agriculture, mining or urban areas. As part of this program, a toxicity testing facility at the University of California, Davis was established to conduct State and Regional Board studies. The Regional Board performs the sampling of the waterbodies in the region and supplies the testing facility with the samples.

The toxicity test measures the combined effects of toxics in the water and is not used to separate and identify a specific toxic substance. Toxicity is determined by using water column samples from a waterbody under lab conditions. Appropriate test organisms are observed for their response by using growth, reproduction or mortality as indicators. Two types of toxicity tests are used, acute and chronic, which involve measuring responses in different life stages of the test organisms.

In the Santa Ana Region, Big Bear Lake and its tributaries, the Anaheim and Newport Bay Watersheds, Lake Elsinore, and some creeks have been sampled for toxicity as part of this program.

Toxic Substances Monitoring Program

The Toxic Substances Monitoring Program (TSMP) was initiated in 1976 by the State Board. The TSMP was organized to provide a uniform statewide approach to the detection and evaluation of the occurrence of toxic substances in fresh and estuarine waters of the state. The TSMP primarily targets waterbodies with known or suspected impaired water quality and is not intended to give an overall water quality assessment. Data obtained from the TSMP is used to focus the Regional Board's attention on those waterbodies impacted by toxic pollutants. Special TSMP or other studies are then conducted to investigate the source(s) of the pollutants. The State Board has contracted with the Department of Fish and Game to perform the monitoring and chemical analyses associated with this program.

The presence of toxic substances often cannot be determined by water column sampling due to the low concentrations of toxicants in the water. Also, a number of toxic substances are not water soluble, but can be found associated with sediment or organic matter. The process of bioaccumulation acts to concentrate toxicants through the aquatic food web, sometimes many hundreds of times the levels actually in water. Therefore, in the TSMP the flesh of fish and other aquatic organisms (mainly crayfish) is analyzed to indicate whether any toxic substance is present. Fish livers are analyzed for metals, including arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc; fish muscle tissue (filet) is analyzed for mercury and selenium. In addition, fish filet and crayfish tail are analyzed for 45 synthetic organic compounds, which include pesticides and PCBs (Table 6-1). When very small-sized fish are available, only whole-body analyses are conducted.

The objectives of the Toxic Substances Monitoring Program are as follows:

- To develop statewide baseline data and to demonstrate trends in the occurrence of toxic elements and organic substances in the aquatic biota;
- To assess impacts of accumulated toxicants upon the usability of State waters by man;

- To assess impacts of accumulated toxicants upon the aquatic biota; and

- Where problem concentrations of toxicants are detected, to attempt to identify sources of toxicants and to relate concentrations found in the biota to concentrations found in the water.

Based upon the priorities identified by the Regional Board and the TSMP, the number and location of the sampling stations and the constituents investigated vary each year. When the program began, streams and lakes were ranked according to various criteria established to indicate their importance to the state in terms of water quality. The Priority I, or highest priority, waterbodies were included in the first phase of monitoring. The Santa Ana River was included in this list and the station at Prado Dam has been sampled annually since the program began. The monitoring was expanded to include four other stations on the Santa Ana River and two of its tributaries, Chino and Cucamonga Creeks. A number of sites in the Newport Bay Watershed have also been sampled, largely in response to findings by the State Mussel Watch Program (see below) of high levels of organics and metals in the Bay itself. The results of this TSMP sampling led to an intensive study of toxics in San Diego Creek in 1985. Several stations were added to the program to monitor Anaheim Bay and its tributaries because of similar concerns. A number of the lakes in the region, including several park lakes, have also been sampled in this program. Table 6-2 lists the TSMP sampling sites in the Santa Ana Region (1978-1991).

Reports which describe the statewide TSMP sampling program sites, the constituents investigated, and the results have been published annually since 1977. A ten-year data summary was published in 1987.

State Mussel Watch Program

The State Mussel Watch (SMW) program is the state's long term marine water quality monitoring program, initiated in 1977. The SMW program provides the state with data showing trends in coastal and estuarine water quality. The Regional Board uses the data from SMW to establish the presence or absence of toxic substances and to monitor the variation in the concentrations detected at the various locations. Using this information, the Regional Board then attempts to locate the sources of the contamination. As with the Toxic Substances Monitoring Program, the State Board contracts with the Department of Fish and Game to perform the sampling and analysis.

The primary goals of the SMW program are as follows:

- To provide long-term monitoring of certain toxic substances levels in coastal marine waters;

- To provide an important element in comprehensive water quality monitoring strategy; and

- To identify on a year-to-year basis specific areas where concentrations of toxic materials are higher than normal.

Mussels were chosen for the State Mussel Watch program because: (1) they are common along the California coast; (2) they are immobile in nature, permitting a localized measurement of water quality; (3) they have the ability to concentrate pollutants above ambient seawater levels; and (4) they provide a time-averaged sample. Where freshwater tributaries are suspected sources of toxics, freshwater clams are used. The trace metals analyzed in mussel and clam tissues are similar to those investigated by the Toxic Substances Monitoring Program and include aluminum, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc. Synthetic organic compounds analyzed are listed in Table 6-1.

As with the Toxic Substances Monitoring Program, the number and location of SMW sites investigated varies each year, according to program needs and resource constraints. Several key areas in the Santa Ana Region are frequently sampled in this program (See Table 6-3). Anaheim Bay/Huntington Harbour area sampling locations include the Anaheim Navy Harbor, Anaheim Navy Marsh, Anaheim Bay at Edinger Street, and Anaheim Bay at Warner Avenue. In the Newport area, the most frequently sampled stations include Newport Bay Island, Newport Bay at Hwy 1 Bridge, Newport Bay at

Crows Nest, Rhine Channel, and Newport Bay/Upper Rhine Channel. As with the TSMP, statewide SMW reports are published annually and a ten-year data summary for 1977-1987 is available.

REGIONAL MONITORING PROGRAMS

The regional monitoring programs are grouped with local agencies' programs because they are, for the most part, cooperative efforts. The sampling frequency, sampling stations, constituents, and other details vary from year to year, depending on needs and the budgets of the Regional Board and local agencies.

The regional monitoring effort consists of the following:

1. Surface Water Monitoring
2. Groundwater Monitoring
3. Compliance Monitoring
4. Complaint Investigations
5. Intensive Surveys
6. Aerial Surveillance
7. Stormwater Monitoring

Surface Water Monitoring

With the exception of the annual sampling of the Santa Ana River at Prado Dam, the Regional Board's surface water monitoring program is not strictly formalized. The sampling frequency, locations, constituents, and other details vary from year to year depending on identified problems and needs, and on staff and funding availability. A number of other agencies conduct surface water monitoring programs in the Region, including water purveyors, wastewater dischargers, and flood control agencies. The Regional Board makes every effort to coordinate its monitoring activities with these other agencies to maximize the collection and exchange of data, as well as the use of resources.

This Basin Plan specifies water quality objectives applicable to Reach 3 of the Santa Ana River for TDS, nitrogen, and other constituents which are set on the baseflow of the River (see Chapter 4). To determine compliance with these objectives, the Basin Plan requires that sampling of the River be conducted annually at Prado Dam. As directed by the Basin Plan, Board staff conducts the sampling during August, when the quantity and quality of baseflow is most consistent. Staff then reports the results to the Board. The results of this program are used to assess the effectiveness of the Board's regulatory programs and to determine whether changes, such as revisions to the TDS and nitrogen wasteload allocations, are necessary.

Groundwater Monitoring

The regional groundwater monitoring program depends upon the cooperation of local agencies to ensure that data are collected. The Region's municipal water supply districts sample their potable water wells to assure that the public health regulations are met. The sample results are also submitted to the Regional Board.

This Region relies greatly on groundwater computer models for basin planning studies. The groundwater quality data is collected by numerous agencies. The Regional Board contributes to the collection effort. All data will be collected in a computer database compiled by the Santa Ana Watershed Project Authority.

Compliance Monitoring

Under this program, data is collected and used to determine compliance with discharge requirements and receiving water standards, and to support enforcement actions and waste discharge prohibitions. The data are collected from self-monitoring reports generated by waste dischargers and from compliance monitoring reports prepared by Regional Board staff.

Self-monitoring reports submitted to the Regional Board are reviewed, and if violations are noted, appropriate action is taken, ranging from administrative enforcement to judicial abatement, depending on the circumstances. Self-monitoring report data have also been used to develop pollutant loads and to measure general water quality conditions in the receiving water.

Table 6-1

Synthetic Organic Compounds Analyzed
in the State Mussel Watch
and Toxic Substances Monitoring Programs

Aldrin	p,p'-DDMU	Delta-Lindane
Chlorbenside	o,p'-DDT	Total Lindane[2]
alpha-Chlordane	p,p'-DDT	Methoxychlor
gamma-Chlordane	Total DDT	Methyl Parathion
cis-Chlordane	Diazinon	Oxadiazon[2]
trans-Chlordane	Dieldrin	PCB 1248
Oxychlordane	Endrin	PCB 1254
Total Chlordane	Endosulfan 1	PCB 1260
cis-Nonachlor	Endosulfan 2	Total PCB
trans-Nonachlor	Endosulfan Sulfate	Pentachlorophenol[1]
Chlorpyrifos	Total Endosulfan	Phenol[1]
Dacthal	Ethyl Parathion	Ronnel[1]
Dicofol[2]	Heptachlor	Tetrachlorophenol[1]
p,p'-DDE	Heptachlor Epoxide	Tetradifon[1]
o,p'-DDE	Hexachlorobenzene	Toxaphene
o,p'-DDD	alpha-Lindane	Tributylin[1]
p,p'-DDD	beta-Lindane	
p,p'-DDMS	gamma-Lindane	

[1] These constituents are analyzed only in the State Mussel Watch Program

[2] These constituents are analyzed only in the Toxic Substances Monitoring Program

Table 6-2

Toxic Substances Monitoring Program Stations
(Santa Ana Region)

			Year Sampled													
Stations	Station Nos.	Map No.[1]	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Anaheim Bay Watershed																
Bolsa Chica Channel/Westminster Ave.	801.11.08	1									X	X	X			
E.G.G. Wintersburg Chnl/Beach Blvd.	801.11.90	2										X				
E.G.G. Wintersburg Chnl/Gothard St.	801.11.02	3									X		X			
Huntington Harbour/Anaheim Bay	801.11.00	4													X	
Ocean View Chnl/Beach Blvd.	801.11.03	5									X	X				
Ocean View Chnl/Brookhurst St	801.11.91	6										X				
Ocean View Chnl/Newhope St.	801.11.92	7										X				
Westminster Chnl/Graham St.	801.11.01	8									X	X				
Newport Bay Watershed																
Newport Bay	801.11.97	9													X	
Peters Canyon Channel	801.11.96	10												X	X	X
San Diego Ck/Barranca Pkwy	801.11.09	11										X			X	X
San Diego Ck/Laguna Rd.	801.11.13	12										X				
San Diego Ck/Michelson Dr.	801.11.07	13						X	X	X	X	X	X	X	X	X
San Diego Ck/Upper Newport Bay	801.11.04	14							X	X	X					
Other																
Anza Channel	801.26.03	15												X	X	

[1] See Figure 6-1 for station locations.

Table 6-2

Toxic Substances Monitoring Program Stations
(Santa Ana Region)(Continued)

			Year Sampled													
Stations	Station Nos.	Map No.[1]	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Big Bear Lake	801.71.10	16											X	X		
Big Bear Lake/Boulder Bay	801.71.08	17							X							
Canyon Lake	802.12.01	18												X		
Carbon Canyon Park Lake	801.13.90	19										X				
Chino Creek/d/s Euclid Ave.	801.21.02	20							X	X	X		X			
Chino Creek/u/s Pine Ave.	801.21.03	21									X					
Craig Park Lake	845.61.91	22										X				
Cucamonga-Mill Ck/McCarty Rd.	801.21.04	23												X		
Delhi Channel	801.11.05	24								X						
Irvine Park Lake	801.12.01	25										X				
Lake Elsinore	802.31.00	26						X	X							
Lake Evans	801.26.01	27									X					
Lake Mathews	801.33.00	28									X					
Los Coyotes Park Lake	845.61.90	29										X				
Mason Park Lake	801.11.93	30										X				
Mile Square Park Lake #1	801.11.94	31										X				
Mile Square Park Lake #2	801.11.95	32										X				
Prado Lake	801.21.90	33												X		

[1] See Figure 6-1 for station locations.

Table 6-2

Toxic Substances Monitoring Program Stations
(Santa Ana Region)(Continued)

			Year Sampled													
Stations	Station Nos.	Map No.[1]	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Santa Ana River/Featherly Park	801.13.03	34								X						
Santa Ana River/Hamner Ave.	801.21.05	35											X			
Santa Ana River/Imperial Hwy	801.13.00	36								X						
Santa Ana River/Prado Dam	801.25.00	37	X	X	X	X	X	X	X	X	X		X	X	X	X
Santa Ana River/USGS Gage	801.21.09	38								X			X			
Yorba Park Lake	801.13.91	39										X				

[1] See Figure 6-1 for station locations.

Table 6-3

State Mussel Watch Stations
(Santa Ana Region)

		Years sampled															
Stations	Station Nos.[1]	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
Anaheim Bay Watershed																	
Anaheim Navy Harbor	707							X		X	X	X		X	X	X	
Anaheim Navy Marsh	708							X			X	X		X	X	X	
Anaheim Navy Marsh 2	708.5														X	X	
Anaheim Bay Entrance	709						X										
Anaheim Fuel Docks N	710				X	X											
Anaheim Fuel Docks S	710.2									X	X			X			
Launch Ramp Docks	711						X										
Peters Landing	712						X										
Anaheim Edinger St.	713							X		X	X				X	X	
Anaheim Bay - Warner Ave.	715							X		X	X			X	X	X	
Anaheim Harbor Ln.	717										X				X	X	
G.G. Wintersburg Channel	727															X	
Newport Bay Watershed																	
Newport Pier	720										X						
Newport Entrance Channel	721						X	X		X	X			X			
Newport Bay Police Docks	722				X		X				X						
Newport Bay El Pasco Dr.	722.4										X						

[1] See Figure 6-1 for station locations.

Table 6-3

State Mussel Watch Stations
(Santa Ana Region)(Continued)

		Years sampled															
Stations	Station Nos.[1]	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
Newport Bay Island	723						X		X	X	X			X	X	X	
Newport Bay Turning Basin	723.4										X			X	X	X	
Newport Hwy 1 Bridge	724						X	X		X	X			X		X	
Newport Bay Dunes Dock	724.4										X						
Newport Crows Nest	725						X	X		X	X	X	X	X	X	X	
Newport Upper Rhine	726						X	X		X	X	X	X	X			
Newport Bay Rhine Channel	726.2										X				X		
Newport Bay Rhine Channel End	726.4										X					X	
Newport Pier	731				X												
Newport W. Jetty	732			X	X												
Newport W. Jetty End	733				X												
Newport E. Jetty	734				X												
San Diego Ck./MacArthur	728.4									X	X				X	X	
San Diego Ck./Michelson	728.7															X	
Peters Cyn/Barranca	728.9															X	
Other																	
Corona Del Mar	735	X	X	X		X										X	
Santa Ana River/Prado Dam	719.1																X
Temescal Ck/Nickels Road	719.8																X

[1] See Figures 6-2 , 6-3, and 6-4 for station locations.

Figure 6-1
Toxic Substances Monitoring Program
Santa Ana Region Stations

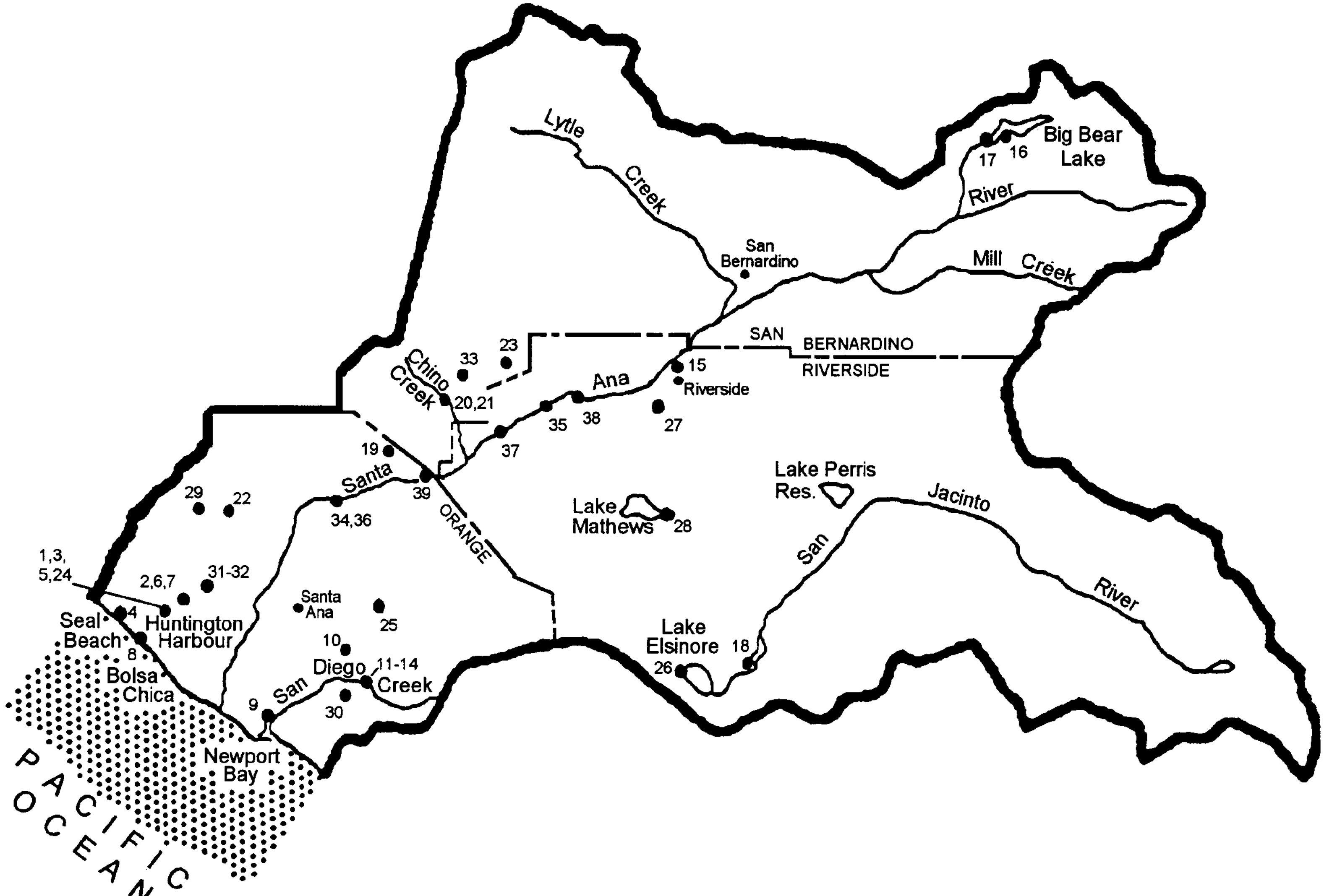


Figure 6-2
State Mussel Watch Stations
Anaheim Bay/Huntington Harbour Watershed

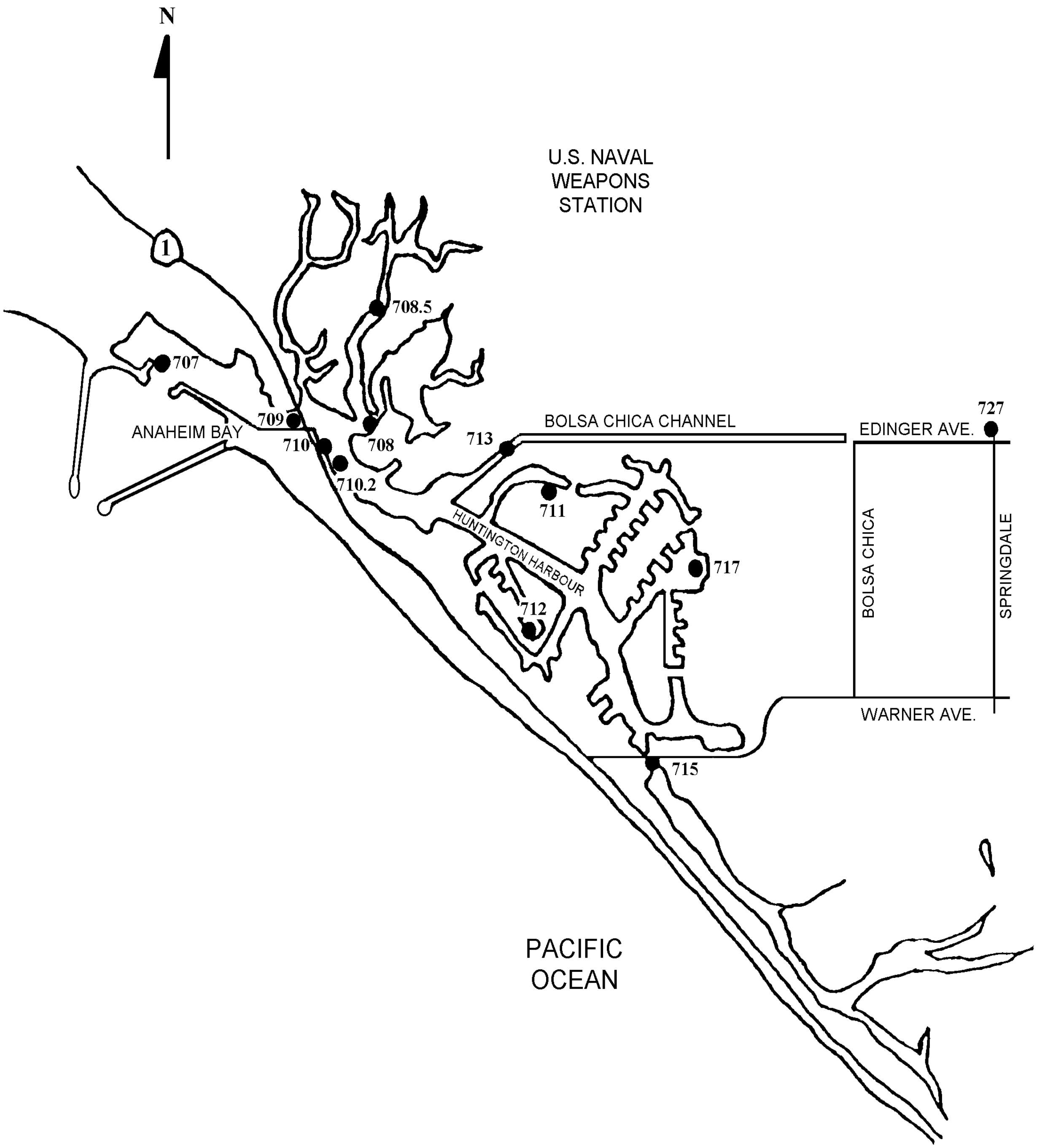
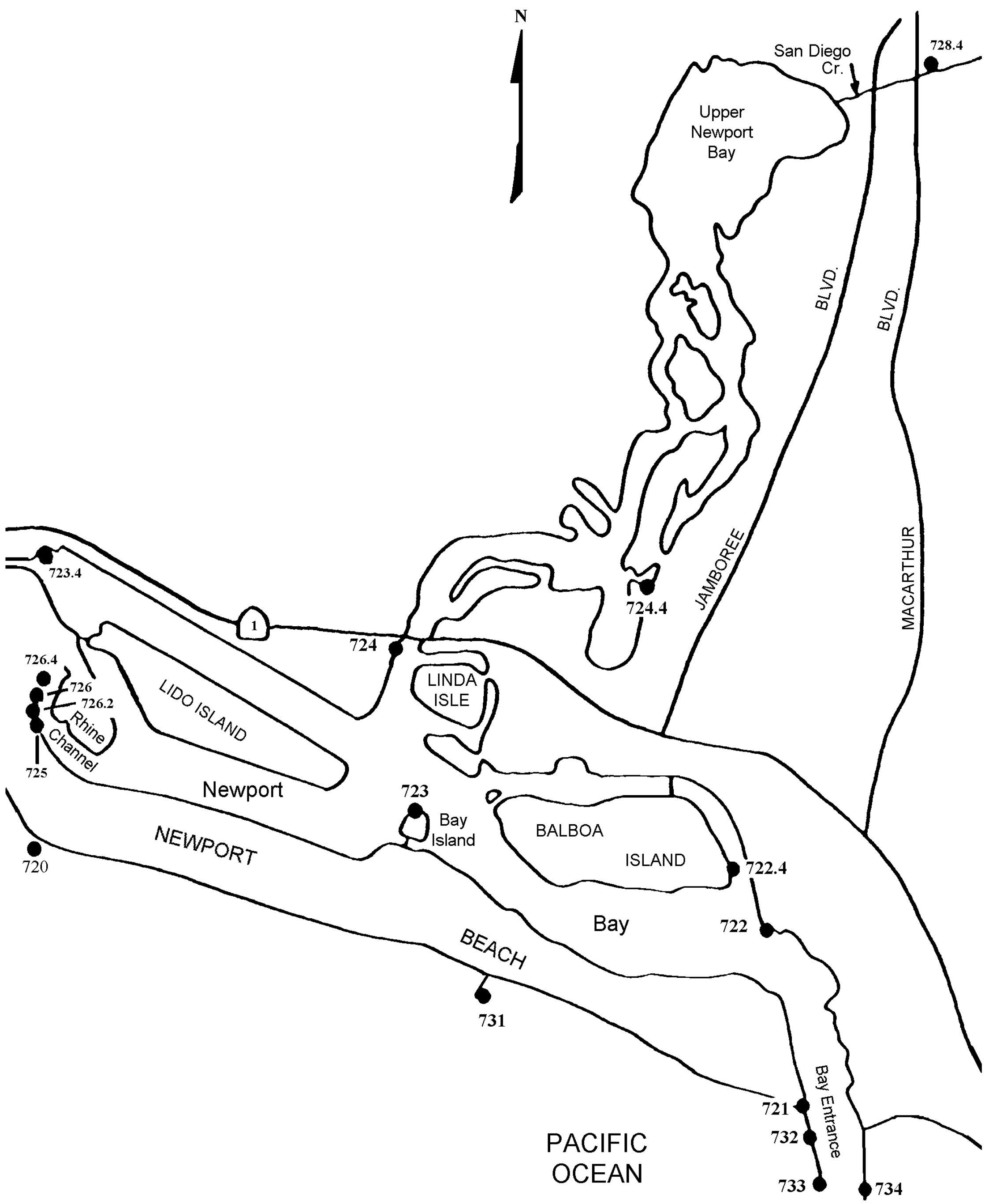


Figure 6-3
State Mussel Watch Stations
Newport Bay Watershed



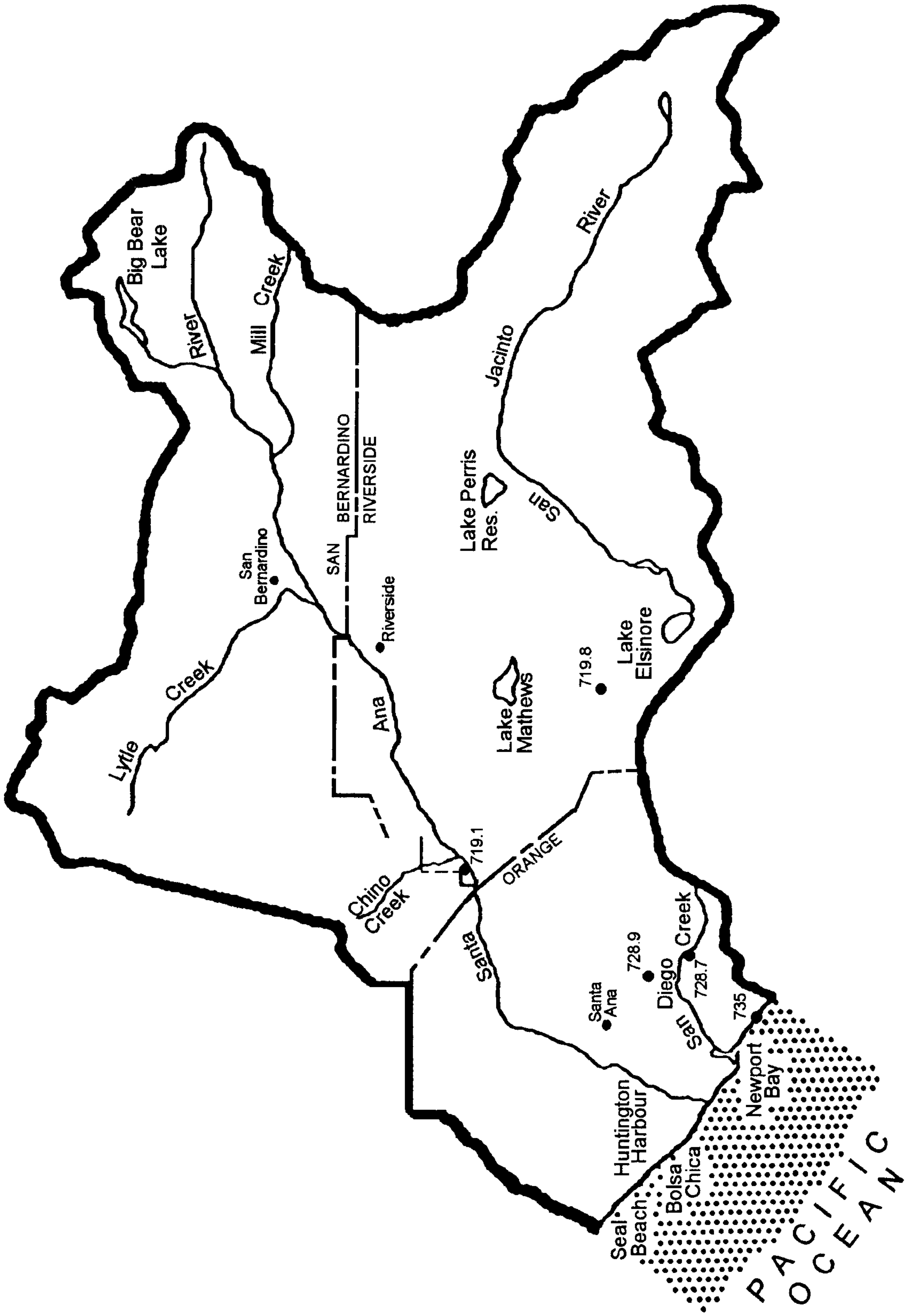


Figure 6-4
State Mussel Watch
Additional Stations

Compliance Monitoring (Continued from page 6-4)

The lowest concentration by which permit compliance is reliably measured is called the Practical Quantification Level (PQL). The PQL is used and taken into account when establishing waste discharge limits. PQLs will be developed using all available information, and will be established based upon information obtained from regional laboratories.

The Regional Board requires the initiation of a Toxicity Reduction Evaluation (TRE) if a discharge consistently exceeds its chronic toxicity effluent limit. The Regional Board, to date, has interpreted the "consistently exceeds" trigger as the failures of three successive monthly toxicity tests, each conducted on separate samples. Initiation of a TRE has also been conditioned on a determination that a sufficient level of toxicity exists to permit effective application of the analytical techniques required by a TRE. The Regional Board also encourages the development of scientifically sound toxicity test quality control and standardized interpretation criteria to improve the accuracy and reliability of chronic toxicity determinations.

Compliance monitoring also involves staff inspections of regulated and unregulated sites and includes observations made by staff members and/or results of analyses performed on samples collected by staff members.

Complaint Investigation

This program involves the investigation of complaints from citizens and public or governmental agencies regarding the discharge of wastes or creation of nuisance conditions. It is a Regional Board responsibility which includes field studies, preparation of reports and letters, and other necessary follow-up actions to document observed conditions and to initiate appropriate corrective actions.

Intensive Surveys

Intensive monitoring surveys provide detailed water quality data to locate and evaluate violations of receiving water standards and to make wasteload allocations. They usually involve localized, intermittent sampling at a higher than normal frequency. These surveys are performed in water quality-limited segments or hydrologic units which require additional sampling data to supplement the routine monitoring program results. The surveys are specially designed to evaluate water quality problems.

Beneficial use surveys are executed to aid in the review of the Basin Plan's water quality standards. This periodic review, entitled a "triennial review," is required in the Clean Water Act. Intensive surveys have been performed on the middle Santa Ana River, Lake Elsinore, Lytle Creek, Mill Creek, San Diego Creek, Newport Bay, Huntington Harbour, and Strawberry Creek.

The Clean Lakes Program is specified in Section 314 of the Clean Water Act, and requires that all publicly owned freshwater lakes be identified and classified according to their trophic conditions. If a lake's condition is not known, a Clean Lakes Program survey may be performed to assess its water quality condition. If the trophic quality of the lake is determined not to protect its beneficial uses, the pollution sources and potential restorative measures are to be identified. The above actions may be conducted under a Clean Lake grant received from the federal government. Clean Lake grant-funded studies of Lake Elsinore and Big Bear Lake are currently in progress.

Aerial Surveillance

Aerial surveillance is used primarily to gather photographic records of discharges and water quality conditions in the Region. Aerial surveillance is particularly effective because of the overall view of a facility that is obtained and because many facilities can be observed in a short period of time.

Municipal Stormwater Monitoring

The stormwater permitting program has been established to protect the water quality of the waterbodies which receive stormwater runoff. See Chapter 5 for a complete description of this program. Sampling of first-flush phenomena has indicated that stormwater discharges contain significant amounts of pollutants. Therefore, the Region's municipal stormwater permits require the permittees to develop comprehensive management and monitoring programs. Because each permit generally covers a large number of waterbodies, the required monitoring program is in two phases.

Phase I requires the discharger to sample those receiving waters where the beneficial uses are threatened or impaired due to runoff of stormwater and urban nuisance water. Under Phase II the dischargers will be required to develop stormwater management and monitoring programs for the remaining waterbodies included under the permit.

Stormwater discharges from urbanized areas consist mainly of surface runoff emanating from residential, commercial, and industrial areas. In addition, there are stormwater discharges from agricultural and other land uses. The constituents of concern in these discharges include: total and fecal coliform, enterococcus, total suspended solids, biochemical oxygen demand, chemical oxygen demand, total organic carbon, oil and grease, heavy metals, nutrients, base/neutral and acid extractibles, pesticides, herbicides, petroleum hydrocarbon products, and/or those causing extremely high or low pH.

The objectives of the stormwater monitoring programs are to: 1) define the type, magnitude, and sources of pollutants in the stormwater discharges within the permittee’s jurisdiction so that appropriate pollution prevention and correction measures can be identified; 2) evaluate the effectiveness of pollution prevention and correction measures; and 3) evaluate compliance with water quality objectives established for the stormwater system or its components.

QUALITY ASSURANCE/QUALITY CONTROL

The purpose of the Quality Assurance Program is to ensure that data generated from environmental measurement studies are technically sound and legally defensible. A State Quality Assurance (QA) Program Plan was prepared under authority of the State Board in April 1990 describing how the State and Regional Boards will implement and manage the QA program. This Plan was approved by the State Board and the US EPA, Region IX, to meet requirements for federal funding.

The federal regulation requiring the State to develop and implement a QA Program is written in EPA Order 5360.1, April 3, 1993. The mandate is identified in 40 CFR 30.503 (July 1, 1987) requiring State agencies involved in environmentally-related measurement projects to develop and implement a Quality Assurance Program for programs partially or fully supported by Federal funds.

This mandate further requires that a QA Program Plan be developed that describes how a State agency will implement and manage a QA Program. It also requires that a QA Project Plan be prepared and approved prior to the start of any field or laboratory activities. A State’s QA Program Plan must be approved by the federal award official before federal funds can be released. QA Project Plans are approved by a state’s designated QA Officer and are available for federal review.

The State Board has appointed a QA Program Manager to direct and coordinate the overall program. Each State Board division and Regional Board has appointed a QA Officer to administer their respective QA responsibilities. The State and Regional Boards jointly administer the program but the State Board has lead responsibility for managing the overall program and reporting to EPA.

The Regional Board's QA Officer interacts with project managers on the required preparation of QA Project Plans for studies involving field and laboratory activities. The Project Plans should outline project objectives, data quality objectives in which management decisions will be based, and field and laboratory procedures that will be used to achieve the objectives. Once completed, the Plan must be reviewed and approved by an agency QA Officer or, when problems arise, by the State Board QA Program Manager before any field work can begin. Guidelines on Plan preparation have been distributed to the State and Regional Board QA Officers.

ASSESSMENT PROGRAMS

There are several statewide water quality assessments which are performed periodically. The assessments are used to evaluate the effectiveness of the Regional Boards' water quality programs to determine if making any changes are needed.

Water Quality Assessment

The Water Quality Assessment (WQA) is a catalog of the State's waterbodies and their water quality condition. The WQA identifies the water quality condition as good, intermediate, impaired or unknown. The data used to categorize waterbodies in the WQA are obtained from the various monitoring programs identified previously. All Regional Boards adopted their regional WQA at public meetings and submitted them to the State Board for inclusion in the State WQA. In addition, for impaired and high priority waters, factsheets were prepared to provide additional detail. The State Board intends the WQA to be updated on a regular basis, generally every two years.

The WQA serves many different purposes. The WQA, a public document, reports the condition of the State's waterbodies in a summary format. The lists of impaired waterbodies, included in the WQA, satisfy several Clean Water Act listing requirements. These federal lists are identified by the applicable Clean Water Act (CWA) section or Code of Federal Regulation (CFR) number. These include:

- CWA 303(d) - Water Quality Limited Segments where water quality objectives will not be met even with the Best Available Treatment/Best Control Technology (BAT/BCT)
- CFR 131.11 - Segments which may be affected by or warrant concern due to toxics
- CWA 314 - Lake Priorities
- CWA 319 - Nonpoint Source Impacted Waters
- CWA 304(l) ("Long List") - Waters designated as impaired because narrative or numeric objectives are violated or beneficial uses are impaired similar to CWA Section 303(d).
- CWA 304(s) ("Short List") - Waters not meeting water quality objectives because of toxics from point source discharges
- CWA 304(m) ("Mini List") - Waters not meeting water quality objectives because of toxics from either point or nonpoint sources.

<u>WQA Water Quality Condition Classification</u>
For each region, the individual waterbodies are listed. They are identified by water resource type, *i.e.*, bays and harbors, wetlands, coastal waters, estuaries, lakes and reservoirs, groundwater, rivers and streams, and saline lakes. An entire waterbody may be classified with one water quality condition or divided by segments into more than one.

Good: waters that support and enhance the designated beneficial uses. Waterbodies classified as good may be designated a high priority if a threat to water quality is present.

Intermediate: waters that support designated beneficial uses while there is occasional degradation of water quality. Waterbodies suspected of impairment but for which there is inadequate data to conclude impairment are also given this classification.

Impaired: waters not reasonably expected to attain or maintain applicable water quality standards. Standards include both numeric and narrative water quality objectives and the beneficial uses the objectives are intended to protect.

Unknown: waters with unknown water quality where limited or no direct observations are available.

The WQA also provides the foundation for the State Board's Clean Water Strategy process. The current regional WQA and the associated factsheets are included as Appendix VII.

Clean Water Strategy

The Clean Water Strategy (CWS) is a process that the State Board implemented to assure that staff and fiscal resources are directed at the highest priority water quality issues throughout California. The primary objective of the CWS is to more effectively define and respond to priorities as revealed by the best available water quality information. A CWS goal is to link State and Regional Board programs together in directing actions on individual waterbodies.

The CWS relies on the Water Quality Assessment condition ratings to provide the technical information necessary to identify waterbodies needing protection or prevention actions, additional assessment or cleanup activities. In addition to the Water Quality Assessment, the regions determined the relative resource value of their waterbodies to recognize the relative importance of individual waters when compared to each other. The regions developed priority waterbody lists which are based upon the severity of their water quality problems or needs and relative resource values, from which the State Board assembled a statewide priority list based upon the same criteria.

There are six phases involved in implementing the Clean Water Strategy. As of this date, phases 1 and 2 have been completed. The State Board has begun a pilot study to determine the feasibility of phases 3 through 6.

Phase 1: Obtain the best information
2: Compare and prioritize waterbody concerns
3: Prioritize actions to address concerns
4: Allocate new resources
5: Implement strategy goals
6: Review results

305(b) Report

The 305(b) Report, also known as the National Water Quality Inventory Report, is a summary of all states' water quality reports compiled by the Environmental Protection Agency. The report is prepared biennially from information the states are required to submit pursuant to Section 305(b)(1) of the Clean Water Act.

The State Board prepares the State report using information taken from the WQA. The State 305(b) Report includes: (a) a description of the water quality of major navigable waters in the State during the preceding years; (b) an analysis of the extent to which significant navigable waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water; (c) an analysis of the extent to which elimination of the discharge of pollutants is being employed or will be needed; and (d) estimates of the environmental impact, the economic and social costs necessary to achieve the "no discharge" objective of the Clean Water Act, the economic and social benefits of such achievement, and the dates of such achievement. The report also recommends programs which must be implemented to achieve the CWA goals.

DATA MANAGEMENT

Regional Modeling Efforts

SAGIS/ADSS: The Santa Ana Watershed Project Authority Planning Department has devised a modeling program and system called the Advanced Decision Support System (ADSS) to aid in the development of long-range plans to meet water quality and quantity objectives. The ADSS creates a central data storage facility standardizing data collection, storage, and retrieval. The core of the ADSS is the Santa Ana Geographic Information System (SAGIS). SAGIS is an ARC/INFO[1]-based water resource analysis and graphic tool written in ARC Macro Language. SAGIS includes a library of various geographic overlays to create custom base maps for water resource data. The system also allows the user to view data stored in tabular form and plot the results versus time. SAGIS will produce a variety of water quality and quantity analysis maps and plots. SAGIS includes a comprehensive landuse

1 ARC/INFO is trademark of the Environmental Systems Research Institute's copyrighted program. Although this product is mentioned in the Basin Plan, the Santa Ana Regional Board is not endorsing any commercial products.

database of the Santa Ana River Basin to project future water needs.

Regional Databases

STORET: STORET, which stands for STOrage and RETrieval, is a national database system that contains environmental monitoring data relating to the water quality within this Regional Board's boundaries and throughout the United States. These data are the results of field and laboratory analyses performed on samples gathered from streams, lakes, estuaries, groundwater, and other waterbodies. The STORET system resides on an IBM 3090 mainframe computer maintained by the US EPA at the National Computer Center in North Carolina.

The original database has evolved into a more comprehensive system capable of performing a broad range of analyses, as well as serving as the depository for data. In California, stations are sampled, in part, by the following agencies: California Department of Water Resources, U.S. Geological Survey, California Department of Health Services, and the Regional Boards. The Regional Board, as well as the State Board, EPA, and other regulatory agencies utilize the STORET database to examine the causes and effects of water pollution, to measure compliance with water quality objectives and maintenance of beneficial uses, and to determine water quality trends.

SABRINA: Another part of the ADSS is the Santa Ana Relational Database Management System, or SABRINA. Developed by SAWPA, SABRINA is a menu-driven application written in a database language and stores the data used by SAGIS.

REFERENCES

California Regional Water Quality Control Board - Santa Ana Region, "Newport Bay Clean Water Strategy" A Report and Recommendations for Future Actions," September, 1989.

California State Water Resources Control Board, "California State Mussel Watch, Ten Year Data Summary 1977-1987, WQMR No. 87-3," May, 1988.

California Regional Water Quality Control Board, Santa Ana Region, Staff Report, "State Mussel Watch Results, 1987-1988 and 1988-1989, Item 21," February 9, 1990.

California State Water Resources Control Board, "Toxic Substances Monitoring Program, 1988-89, 91-1WQ," June, 1991.

California State Water Resources Control Board, "Toxic Substances Monitoring Program, Ten Year Summary Report 1978-1987, 90-1WQ," August, 1990.

California Regional Water Quality Control Board, Santa Ana Region, "Newport Bay Clean Water Strategy, A Report and Recommendations for Future Action," September, 1989.

United States Environmental Protection Agency, "STORET Documentation for Menu-Driven User Interface," February, 1992.

CHAPTER 7

WATER RESOURCES AND WATER QUALITY MANAGEMENT

INTRODUCTION

Numerous water resource management studies and projects, focused on water quality and/or water supply, are in progress in the Region under the auspices of a variety of parties. Some of these activities bear directly on the implementation of this Plan and were briefly described earlier (Chapter 5). Others may lead to future Basin Plan amendments to incorporate appropriate changes, such as revised regulatory strategies for POTWs or other dischargers. Excellent examples of these programs are the extensive, multi-agency effort in the Chino Basin to evaluate water resource management alternatives and the implementation of groundwater desalters by the Santa Ana Watershed Project Authority (SAWPA) to address the severe TDS and nitrate quality problems in that Basin. Such investigations, and the implementation of appropriate physical solutions, are an essential and integral part of the effort to restore and maintain water quality in the Region.

Funding for these investigations and projects comes from a variety of sources. Local and regional agencies contribute substantial funds and staff resources. State and federal funds, in the form of loans or grants administered principally by the State Water Resources Control Board or the US EPA, are an important source of support. Volunteer efforts by citizens' groups and private landowners also contribute significantly.

The purpose of this chapter, which is new to the Basin Plan, is strictly informational - the intent is to provide an overview of some of these studies, the agencies conducting them, and funding mechanisms. This discussion is necessarily brief and incomplete but should convey a sense of the scope and significance of the participation of others in water resources management in the Region.

SANTA ANA WATERSHED PROJECT AUTHORITY

The activities of the Santa Ana Watershed Project Authority (SAWPA) have been and remain exceptionally important to the management and protection of water resources in the Region. For this reason, SAWPA warrants special discussion.

As noted in Chapter 1, SAWPA is a joint powers agency which conducts water-related investigations and planning studies, and builds physical facilities where needed for water supply, wastewater treatment or water quality remediation. SAWPA is comprised of the five major water supply and/or wastewater management agencies in the Region: Chino Basin Municipal Water District (CBMWD); Eastern Municipal Water District (EMWD); Orange County Water District (OCWD); San Bernardino Valley Municipal Water District (SBVMWD); and Western Municipal Water District (WMWD).

Since the early 1970's, SAWPA has played a key role in the development and update of the Basin Plan for the Santa Ana Region. SAWPA continues to sponsor, participate in, and/or oversee numerous water quality planning studies. Ongoing studies include the Chino Basin Water Resources Management Study, the Colton-Riverside Conjunctive Use Project, an investigation of water quality in Lake Elsinore, and studies of nitrogen and organic carbon in the Prado Basin. These studies are briefly described later in this chapter.

SAWPA also plays a crucial role in the implementation of the Basin Plan through the construction of physical facilities. SAWPA built and now operates the Arlington Desalter and is in the process of implementing two such facilities in the Chino Basin. As described in Chapter 5, these desalters are key parts of this Plan's strategy to address salt problems in the upper Santa Ana Basin. Additional desalters for the Riverside/Colton and Temescal areas are being considered.

SAWPA is responsible for the construction of the West Riverside County Regional Wastewater Treatment Facility and, with the cities of San Bernardino and Colton, for the Rapid Infiltration and Extraction treatment facility, which will provide wastewater treatment equivalent to tertiary for those cities. SAWPA built and is now planning expansion of the Santa Ana Regional Interceptor, or SARI line, which transports highly saline wastes out of the Basin (see also Chapter 5). SAWPA constructed and operates treatment facilities for contaminated groundwater at the Stringfellow site. SAWPA has also played a key role in the implementation of the Lake Elsinore Stabilization Project.

As noted in Chapter 6, SAWPA has undertaken to act as a clearinghouse for regionwide data on water quality, landuse, population, etc., by implementing database and geographical information systems including SABRINA, SAGIS (Santa Ana Geographic Information System) and the Advanced Decision Support System.

NATIONAL WATER RESEARCH INSTITUTE

The National Water Research Institute (NWRI) was founded through funding provided by the Joan Irvine Smith and Athalie R. Clarke Foundation, the County Sanitation Districts of Orange County, the Irvine Ranch Water District, the Municipal Water District of Orange County, Orange County Water District, and the San Juan Basin Authority. The Institute was created to identify and support independent research projects throughout the United States which will lead to improved water quality and water supplies.

The Institute's research priorities include water quality improvement and recycling, watershed management, health risk assessment, membrane research, and the development of public policy. The Institute uses a number of strategies to fulfill these objectives, including:

- working with local, state, and national water resource organizations to identify research needs;
- encouraging broad-based participation in joint venture partnerships which support water research;
- providing opportunities for members of the national water research community to meet and exchange ideas;
- developing technical and institutional strategies which ensure that research results are implemented in a timely, cost-effective manner;
- educating the general public about the need for water conservation and research; and
- serving as a catalyst to encourage development of centers of excellence in water research.

The Institute is independently governed by a Board of Directors consisting of one member from each of the contributing agencies. The NWRI and its partners establish joint ventures to sponsor research projects. NWRI has funded numerous projects which benefit the region including research on water quality and wildlife enhancement in the Prado Wetlands, television documentaries focusing on water resources issues on the lower Santa Ana River, investigation of several wastewater treatment technologies, and the treatment of contaminants in groundwater.

INLAND SURFACE WATERS

Big Bear Watershed

Big Bear Lake is located in the San Bernardino Mountains in central San Bernardino County. The close proximity of the Lake and mountains to the urban communities within Los Angeles, San Diego, Riverside, and San Bernardino Counties has made it a heavily utilized recreational attraction. During winter, the mountains surrounding Big Bear Lake are visited by hundreds of thousands of skiers and sightseers, while the summer months bring thousands of tourists to enjoy the pleasures of the Lake and the beautiful forested landscape. The Lake is also an important wildlife resource, providing habitat for a wide variety of plants and animals, including rare and endangered species.

A cooperative effort to ensure proper management and protection of this resource is in progress. A number of agencies, private organizations, and individuals have joined in the development of the Big Bear Valley Coordinated Resource Management Plan (CRMP). A geographic information system will be developed to integrate information on plant and animal habitats, tributaries, and other relevant data. The intent is to use this system as a guide in making land use decisions.

The participants include:

- East Valley Resource Conservation District
- City of Big Bear Lake
- Big Bear Municipal Water District
- County of San Bernardino Planning Department
- Santa Ana Regional Water Quality Control Board
- California Department of Forestry
- California Department of Fish and Game
- California Department of Health Services
- Natural Heritage Foundation
- Big Bear Area Regional Wastewater Agency
- Big Bear City Community Services District
- Bear Mountain Ski Area
- Snow Summit Ski Area
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Soil Conservation Service
- USDA Forest Service

Lake Elsinore

Lake Elsinore is a heavily used recreational waterbody located in the San Jacinto Watershed in southwest Riverside County. As noted in Chapter 1, the lake periodically goes dry, resulting in fish kills and adverse impacts on recreational opportunities. Projects to stabilize the level of the Lake are now being completed or considered. Among these is consideration of the use of reclaimed water to maintain water levels.

SAWPA is overseeing a study of the Lake, funded by a Clean Water Act Section 314 Clean Lakes Program grant. The objectives of the study, which is to be completed by December 1993, are to:

- determine Lake Elsinore's current water quality and its effect on its beneficial uses;

- analyze the potential effects of reclaimed water upon the Lake; and

- prepare a water quality management plan.

The study is a one-year program consisting of water quality sampling and analysis. The Lake's water quality will be compared to the water quality of reclaimed water distributed by Eastern Municipal Water District. A water quality management plan will be prepared and should specify: (1) ways to maximize the Lake's water quality; (2) the feasibility of the proposed improvements; (3) a technical plan; and (4) a schedule with implementation milestones.

Santa Ana River Mainstem Project

Because of rapid growth and development in Orange, Riverside, and San Bernardino Counties, the current flood control system is inadequate to manage the runoff in these areas. The three counties are working collaboratively with the U.S. Army Corps of Engineers (Corps) to design and construct the Santa Ana River Mainstem Project (Mainstem Project). The Mainstem Project will provide increased flood protection to communities within those counties, and will include specific environmental restoration projects.

The Mainstem Project will cover 75 miles from the Santa Ana River headwaters to its mouth. The project will provide the upper and lower Santa Ana River Basin various levels of flood protection ranging from a 100-year to 190-year flood flows.

The Corps will construct structural improvements including Seven Oaks Dam, Mill Creek Levee, San Timoteo Creek, Prado Dam, Oak Street Drain in Corona, 23 miles of the lower Santa Ana River, and Santiago Creek. Prado Dam and the spillway will be raised an additional thirty feet in height. Ninety-two acres of currently degraded marshland located within the Santa Ana River Salt Marsh will be restored, increasing the marsh's value as a wetland habitat. In addition, a large portion of Santa Ana Canyon will be purchased and a resource, habitat, and floodplain management plan will be developed to ensure that that part of the Canyon will not undergo any landuse changes.

Santa Ana River Total Inorganic Nitrogen/Total Organic Carbon

Modeling work done for the update of the total dissolved solids and nitrogen management plans for the upper Santa Ana Basin (see Chapter 5) demonstrated the presence of a "nitrogen sink" in the Prado Basin. This sink effectively removes a major portion of the nitrate present in the Santa Ana River. In order to optimize this phenomenon, Orange County Water District and SAWPA have undertaken a study to evaluate the natural biochemical processes impacting total inorganic nitrogen (TIN) and total organic carbon (TOC) concentrations in the water as it flows through constructed wetlands. Based on the study's findings and conclusions, ways to enhance the natural processes to maximize total inorganic nitrogen removal will be recommended.

Multipurpose Corridor

Eastern Municipal Water District is leading the conceptual development of a natural multipurpose corridor to be located within the San Jacinto River and Salt Creek riparian corridors. The multipurpose corridor would connect adjacent communities, as well as agricultural regions, wildlife habitats, and rural areas. A planning task force has endorsed the idea of establishing such a passageway. The task force is hoping the corridor will lead to other benefits such as the development of:

- A water resource management plan, including groundwater basin recharge and emergency storage, general water quality improvement, storm flow storage, and erosion and flood control;
- coordinated landuse planning, including parks, water conservation measures, recreational areas, buffer zones, shared utility easements, and cost-effective resource management; and
- enhancement of the local environment for both wildlife and people.

Water Harvesting Demonstration Project

The development of demonstration water harvesting facilities within the San Jacinto watershed has been proposed by Eastern Municipal Water District (EMWD). The objective would be to capture surface water flows, consisting of rainfall runoff and stormwater discharges, which would normally flow unimpeded in the river. EMWD is considering this project because rapid urban development has decreased the amount of surface area available for percolation of rainfall and other runoff into the aquifers.

The District is interested in implementing the water capture plan to supplement their reclaimed water supplies. EMWD could use the harvested runoff directly for irrigation or site percolation ponds in locations where the groundwater basin would be recharged for domestic beneficial uses. Initiation of the program will entail a review of the physical and chemical properties of the runoff, hydrology, operational and maintenance controls of the reuse facilities, economics, compliance with the Basin Plan's water quality objectives, and permitting issues.

Several project locations were identified during a feasibility study and include existing stormdrains, conveyance pipelines, and recharge facilities. Facilities currently under consideration are the Buena Vista and San Jacinto Retention Basins and the San Jacinto Reservoir. Conceptual projects include the Salt Creek and San Jacinto River Multipurpose Corridors, the San Jacinto Northwest Improvement Plan, and the Lake Hemet Municipal Water District Cooperative Program.

Multipurpose Wetlands

EMWD and the U.S. Bureau of Reclamation are cooperating in a Multipurpose Wetlands Research and Demonstration Study. The objective is to evaluate the effectiveness and feasibility of integrating constructed wetlands with conventional wastewater treatment facilities.

The agencies have constructed a wetlands research facility located on four acres of the Hemet/San Jacinto Regional Water Reclamation Facility. It is being used to determine future design and operating criteria for a demonstration wetlands at the Reclamation Facility and to refine the design and operating criteria for future EMWD wetlands projects.

EMWD is interested in the use of desalters to reclaim brackish groundwater for water supply or groundwater recharge purposes. A pilot study at the Wetlands Research Facility is being conducted to evaluate the feasibility of using the reject stream from the desalters in vegetated saline marshes. If they prove feasible, these marshes would provide wildlife habitat as well as additional use of brackish water.

A 20-to-30-acre demonstration project at the Reclamation Facility is expected to begin in the fall of 1993. It will include an integrated system of 5 separate wetlands treatment units, a combined open water and marsh habitat area, and a combined final polishing wetland. One of the objectives of this project is to evaluate the ability of a constructed wetland system to provide treatment of secondary wastewater which is equivalent to that of conventional tertiary treatment facilities, and to remove nitrogen and low levels of metals and organic compounds.

A 20-acre demonstration project at the San Jacinto Wildlife Area is also planned. The intent is to provide additional treatment of wastewater, while maximizing brooding habitat for a variety of birds.

GROUNDWATERS

Chino Basin Water Resources Management Study

The purpose of this study is to develop a comprehensive plan for water resources management in the Chino Basin. The objectives are to coordinate the management of imported and local water supplies, including wastewater, and to develop plans and projects which will maximize the use of these resources, assure reliable, good quality supplies, and protect or improve local water quality.

This study is being conducted by a consortium of agencies, including the Chino Basin Municipal Water District, SAWPA, the Metropolitan Water District of Southern California (MWD), the Chino Basin Watermaster (which represents municipal and agricultural water users in the Basin), and the Regional Board.

A significant feature of this study is the development of a new integrated ground and surface water model for the Chino Basin. The model is calibrated for both TDS and nitrogen. This model is much more detailed and refined than the Basin Planning Procedure (BPP)(see Chapter 5) and will supplant the use of the BPP in this area. The new model will be used to evaluate the water quality (and quantity) effects of alternative water resource management plans. These analyses will then be used to select a recommended plan.

The Chino Basin water resources management plan is expected to include the following: management of rising groundwater contributions to the Santa Ana River; use and protection of groundwater supplies; the expansion of wastewater reclamation; optimization of capture of local runoff for recharge purposes; and reduction of water demand through water conservation.

MWD has proposed a groundwater storage program in the Chino Basin, whereby State Water Project water would be recharged in the Basin for use during emergency, drought, and other conditions when the Project water is not available. As proposed, the recharge would occur directly, via spreading or injection of State Project Water, and indirectly, through exchange of Chino Basin groundwater for surface water delivered to local water supply agencies. The Chino Basin study will evaluate opportunities to increase seasonal storage and optimize local and imported water use.

In part because of the involvement and varied interests of so many parties, the development and implementation of the water resources management plan is likely to be very complex. The Regional Board’s requirements must also be satisfied. Further, Chino Basin is adjudicated and the requirements of the adjudication must be met or modified, if all the parties agree to the management plan.

The results and recommendations of this study may lead to changes in this Basin Plan. Such changes would be accomplished through appropriate Basin Plan amendments.

Colton-Riverside Basins Water Resources Management Plan

Under the auspices of SAWPA, a project task force has been formed to develop a water resources conjunctive use plan for the Colton and Riverside groundwater subbasins. The task force members are:

- Western Municipal Water District
- San Bernardino Valley Municipal Water District
- Orange County Water District
- Eastern Municipal Water District
- Elsinore Valley Municipal Water District
- San Bernardino Valley Water Conservation District
- Yucaipa Valley Water District
- Jurupa Community Services District
- City of Riverside
- City of San Bernardino
- City of Colton
- City of Rialto
- SAWPA

Many other parties have interests in the development and implementation of the management plan, including the Regional Board, which is participating in the study in an advisory role.

The purpose of the plan is to integrate the management of imported water, wastewater, and stormwater in the two subbasins. The overall objective is to maximize the use of local water resources with equitable sharing of the costs among all parties, including water purveyors, regional water management agencies, and wastewater dischargers. The term "conjunctive use" refers to this coordinated management of water supply sources such that the yield from these sources is greater than the sum of the yields resulting from independent management of the sources.

Some of the goals identified are to: restore the quality of the Colton and Riverside subbasins; ensure a reliable potable water supply; reduce dependence on imported water; maximize both the use of local groundwater and reuse of wastewater; minimize the cost of wastewater treatment; and redistribute base flow in the Santa Ana River to allow more capture of the flows by Orange County Water District.

Four projects, designated A, B, C, and D, have been identified to accomplish these goals. Project A involves the improvement of wastewater quality discharged to the Santa Ana River through improvements at the Colton, Rialto, and San Bernardino wastewater treatment plants, and the construction of a pipeline to relocate the wastewater discharge points downstream of the Colton subbasin. Project B involves the production of high-TDS groundwater from the Riverside subbasin with the goal of creating capacity for recharge with higher quality water (such as stormwater, State Project water, and Bunker Hill subbasin groundwater) and seasonal storage of wastewater. Project C would improve groundwater quality in the Colton subbasin by pumping and export of groundwater and recharge with higher quality local runoff, State Project water, Bunker Hill groundwater, and San Bernardino wastewater. Recharge would be accomplished via run-of-river "T" levees. Project D is a Riverside subbasin restoration and water supply project. Groundwater would be extracted and high quality stormwaters, imported water, Bunker Hill groundwater, and reclaimed wastewater would be percolated in a system of "T" levees in the Santa Ana River. The mix of waters recharged would be controlled to produce a water supply quality that is consistent with both drinking water standards and wastewater discharge limitations.

These projects will be considered and implemented in phases. Wastewater treatment plant improvements (Project A) are already in progress. As in the Chino Basin (see preceding discussion), the involvement and interests of the many parties is likely to make implementation complex. Water resources in this area are also adjudicated and, again, the requirements of the adjudication must be satisfied. The Regional Board's concerns and requirements must also be addressed.

The results of the Conjunctive Use study may lead to changes in this Basin Plan. For example, a revised regulatory strategy for wastewater discharges by San

Bernardino, Colton, and Rialto may be found appropriate. Implementation of the identified projects may supplant the need for the Riverside-Colton desalter, which is included in the Recommended Plan (Alternative 5C). If appropriate, amendments to the Basin Plan can be made to incorporate such changes.

Bunker Hill Basin Replenishment

The Bunker Hill Basin is artificially recharged by several agencies. Surface stream diversions are made for groundwater replenishment by the Lytle Creek Water Association on Lytle Creek and by the San Bernardino Valley Water Conservation District on Santa Ana River and Mill Creek. The San Bernardino County Flood Control District has facilities on Devil Creek, Twin Creek, Waterman Creek, and Sand Creek which may be used for groundwater recharge. The surface diversion of the waters of Lytle Creek have occurred as early as 1872. Lytle Creek water rights, which include diversions for groundwater recharge, are now administered by the Lytle Creek Water Association for six parties, according to a 1924 judgement. The San Bernardino Valley Water Conservation District began recharging the Bunker Hill Basin with Santa Ana River water (through its predecessor) in 1911 while groundwater recharge on Mill Creek began in the 1890s and was taken over by the Conservation District in 1934. In excess of 1,000,000 acre feet of Santa Ana River and Mill Creek waters have been recharged to replenish the Bunker Hill Basin. In addition, the San Bernardino Valley Municipal Water District has imported State Project Water for replenishment into the Bunker Hill Basin. Since 1972, in excess of 150,000 acre feet of imported State Project Water has been recharged in the Bunker Hill Basin. The replenishment activities of the above four agencies play an extremely important role in managing the Bunker Hill Basin to supply the current and future needs of the Basin.

Hemet and San Jacinto Groundwater Basin Management Program

The Hemet/San Jacinto Groundwater Association and Eastern Municipal Water District are in the process of developing a Groundwater Management Plan for the Hemet and San Jacinto basins. The objective of the Management Plan is to optimize use and management of the groundwater resources in the Hemet and San Jacinto groundwater subbasins through the cooperative efforts of an association of the major basin pumpers. Eastern Municipal Water District is cooperating with the Metropolitan Water District of Southern California (MWD), the U.S. Geological Survey, UC Riverside and UC Los Angeles to collect water quality and quantity data, landuse information, and data on basin hydrogeology, and to develop appropriate planning tools. A Management Plan will be developed and will include plans or programs designed to maximize the groundwater resources and ensure future water supplies.

To protect the other subbasins in the San Jacinto watershed, including Perris, Menifee, Lakeview, Winchester, and San Jacinto Lower Pressure, Eastern Municipal Water District has initiated an Assembly Bill (AB) 3030 Groundwater Management Plan. AB 3030 was adopted by the California Legislature in 1992. AB 3030 amends Section 10750 *et seq.* of the Water Code to allow a local agency whose service area includes a groundwater basin that is not already subject to groundwater management pursuant to law or court order to adopt and implement a groundwater management plan. The program could include plans to mitigate overdraft conditions, control brackish water, and monitor and replenish groundwater.

Hemet Groundwater Investigations

Eastern Municipal Water District and the U.S. Geological Survey (USGS) are currently involved in a four-year investigation of the dynamics of nitrate and TDS movement in the unsaturated zone of the Hemet groundwater subbasin. The study objectives are to define the thickness and extent of water-bearing materials and to determine the direction of groundwater flow, the chemical quality of groundwater, the flux of nitrate in the unsaturated zone, and the degree of mixing and vertical distribution of nitrate in the saturated zone. The USGS has completed a draft study and is scheduled to provide a final report by the end of 1993.

Eastern Municipal Water District and MWD are also contracting with UC Los Angeles to develop an Optimal Data Collection Design Strategy as a basin management planning tool for the Hemet Basin.

Eastern Municipal Water District and MWD contracted with UC Riverside to perform geophysical investigations in order to delineate the bedrock of the Hemet Basin and to obtain information on the available water supply of the Basin.

San Jacinto River Groundwater Recharge Program

A groundwater recharge/storage program within the San Jacinto Basin has been developed by EMWD. A demonstration project was begun in October 1990 with cooperation from MWD and the Universities of California, Riverside, and Los Angeles. The objectives of the demonstration project were to evaluate the infiltration rate, establish the impacts on basin hydrology and groundwater quality, and approximate the distribution of the recharged water.

The demonstration project used ponds located within the San Jacinto riverbed to recharge the aquifer with State Project Water for a three-year period. Interaction between the local groundwater and State Project Water was assessed by monitoring water quality conditions and levels from October 1990 through January 1991. It was concluded that the average percolation rate in these basins is 6.30 feet/day. The study has determined that imported water can be successfully stored seasonally.

Green Acres Project

Orange County Water District has obtained funding for the Green Acres project from the State Board. The Green Acres project uses reclaimed wastewater to extend local water supplies. Secondary effluent supplied by the County Sanitation Districts of Orange County is treated at the Green Acres facility site in Fountain Valley. The product water is provided to parks, greenbelts, nurseries, schoolyards, golf courses, and industrial sites within a five-mile radius of the plant. Phase I of the project provides 7.5 million gallons of water each day for those uses. The facility design allows for a second-phase expansion to 15 million gallons per day.

The Green Acres distribution system calls for over 25 miles of pipe ranging in diameter from 6 to 36 inches. The first reach of the pipeline will extend into the City of Fountain Valley. The distribution system will supply areas in Santa Ana, Costa Mesa, and eventually Huntington Beach and Newport Beach.

Southern California Comprehensive Reclamation and Reuse Study

In October 1991, SAWPA and several other local agencies became participants in the Southern California Comprehensive Reclamation and Reuse ("SOCAL") Study. The project is a 6-year, $6 million effort which will be cost-shared 50 percent by the U.S. Bureau of Reclamation and 50 percent by local agencies. The region's participants include SAWPA, Chino Basin Municipal Water District, Eastern Municipal Water District, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District. The San Diego County Water Authority is a participant as well. The purpose of the study is to develop a long-range strategy for more effective integration of fresh and reclaimed water management programs, and to determine the feasibility of various water reclamation projects within Southern California.

The overall study, initiated on March 10, 1992, consists of two main phases with the first phase consisting of two parts. The first part, Phase 1a, will be the compilation and generation of baseline information. The intended objective of Phase 1a is to more clearly identify the potential for increasing the use of reclaimed water throughout Southern California. When all data on reclaimed water supply and potential use is collected, possible reclamation project alternatives will be identified, including the possibility of transferring reclaimed water across jurisdictional lines.

Phase 1a will also include the development of screening criteria and tools of analysis necessary to identify and evaluate potential reclaimed water projects. Significant public involvement efforts will begin in Phase 1a and continue through the remainder of the study.

Phase 1a will conclude with the production of a report. The report will include: 1) a description and evaluation of those project alternatives that are considered likely to be feasible given the current and expected economic, environmental, and institutional conditions during the 20-year and 50-year planning horizons; 2) an economic distribution model to be used to further analyze the feasibility of those projects; and 3) a detailed scope of work for Phase 1b.

COASTAL WATERS

Southern California Coastal Water Research Project

As discussed in Chapter Six (Monitoring and Assessment), the Regional Board requires that waste dischargers conduct monitoring programs to evaluate the effects of their discharges on the receiving waters. In the Santa Ana Region, the most extensive self-monitoring program (approximately 2 million dollars per year) is carried out by the County Sanitation Districts of Orange County (CSDOC), which discharges about 240 MGD of wastewater to the Pacific Ocean via a 5-mile outfall.

Other ocean dischargers, such as the Southern California Edison's Huntington Beach Generating Station, conduct receiving water monitoring programs, though these are considerably less extensive than that prescribed for CSDOC.

It has been recognized for some time, however, that these individual discharger efforts, despite their intensity and sophistication, are not in themselves sufficient to obtain an accurate and complete picture of the impacts of ocean discharges. A broader, regional perspective is necessary to evaluate the cumulative effects and interactions of all inputs to the coastal waters from both point and nonpoint sources.

Towards that end, the Southern California Coastal Water Research Project (SCCWRP) was established in 1969 by a consortium of waste dischargers. SCCWRP conducts a wide variety of chemical, physical, and biological investigations of the open coastal waters from San Diego to Ventura, an area commonly called the Southern California Bight. SCCWRP's mission is to understand the effects of urban wastes on the marine environment. Annual reports describe the specific research projects conducted to characterize the sources, fates, and effects of anthropogenic pollution on marine water quality, biota, and sediments.

The organization of the SCCWRP administration was recently revised. The SCCWRP Commission, which provides direction on regional monitoring needs and priorities, now includes staff representatives from the Los Angeles, Santa Ana, and San Diego Regional Boards, the State Board and US EPA, as well as the Sanitation Districts of Orange and Los Angeles Counties and the cities of Los Angeles and San Diego.

Huntington Beach

The City of Huntington Beach coordinates the Huntington Beach Waterways and Beaches Committee, a public outreach task force engaged in tracking agency activities in the Huntington Beach area. The public at large is invited to the meetings in which staff from the City Council, Orange County (Environmental Management Agency, Health Care Agency, and Flood Control District), the U.S. Naval Weapons Station at Seal Beach, and Regional Board staff participate. Reports are given to update the activities and studies in which the above agencies are involved. One of the Committee's major concerns is water quality. The Committee is actively involved in public education and efforts to ensure compliance with holding tank requirements.

Newport Bay Watershed

Water quality problems in Newport Bay and its watershed and the activities in progress to address them are described briefly in Chapter 5 and, in more detail, in reports prepared in response to Senate Concurrent Resolutions (SCR) 38 and 88. Both SCR reports identify a plan for future action by the agencies and parties with responsibilities and interests related to water quality in the watershed. A major theme of these reports is the need for continued interagency coordination to implement these action plans.

Towards this end, the Newport Bay Coordinating Council was formed. It includes representatives from the Regional Board, the Environmental Management and Health Care Agencies of Orange County, Senator Marian Bergeson's office, City of Newport Beach, Newport Harbor Quality Committee, California Department of Fish and Game, U.S. Army

Corps of Engineers (Corps), Irvine Company, and various Newport Bay community action groups. The Council provides a forum for the exchange of information on and coordination of activities related to the Bay, from grass roots debris cleanups to the possible Corps dredging in the Upper Bay. The Council also sponsors public education and outreach programs.

Many of the representatives on the Coordinating Council are also members of the City of Newport Beach Harbor Quality Committee. The City of Newport Beach Parks and Recreation and Marine Departments are participants as well. This committee has been involved in many projects to educate the public on ways Newport Harbor water quality can be better protected. It has sponsored excellent outreach projects, such as the Baywatchers Program, and has distributed informational brochures identifying simple pollution prevention practices. The Committee assisted in the development of a pamphlet showing the locations of vessel pumpout stations in the Bay and was instrumental in the adoption of a City ordinance regarding vessel waste management for charter and tour boats. The Committee's action also led to a ban on the use of endosulfan in the Newport Bay watershed.

FUNDING PROGRAMS

Grant Programs

<u>Clean Water Act §205(j) Water Quality Planning Grant Program</u>

Section 205(j) of the federal Clean Water Act (CWA) allows each state to reserve up to one percent of its annual Clean Water Construction Grant allotment for water quality management and planning. In addition, Congress has provided funding under Section 604(b), State Revolving Fund Set Aside. Any interstate, regional or local public agency may apply directly to the State Water Resources Control Board for funding. As funds are available, State agencies and publicly-funded educational institutions may also apply.

Generally, the State Board requests a workplan on the project be submitted one year prior to the project's actual start date, due to the period of delay between submittal of the proposal and receipt of federal funding. The State Board notifies interested parties through a Request for Workplans notice. Currently, the workplans are evaluated and ranked according to specific criteria. The criteria include:

- Resource value of the waterbody
- Condition rating of the waterbody
- Whether/how water quality is addressed
- Feasibility of the workplan proposal
- Benefits expected from the work
- Cost of the work
- Applicant's institutional/financial commitment to implement work products
- Applicant's capability to carry out workplan

The resource value and condition ratings have been calculated and usually are identified in the Water Quality Assessment factsheets. In all cases, there is a minimum 25 percent local funds match requirement for all 205(j)(2) funded projects. The match is calculated on the basis of the total project cost.

<u>Clean Water Act §319 Nonpoint Source (NPS) Grant Program</u>

The Clean Water Act (CWA) Section 319(h) provides grant funds for projects directed at the management of nonpoint source pollution. In California, the State Board determines which projects receive Section 319 funds, with input from the Regional Boards. The amount of funds available is dependent upon Congressional appropriations and therefore varies each year.

The State Board has placed highest priority on projects which implement specified nonpoint source management practices under Section 319 requirements. The State Board must also commit to address nonpoint source waters listed pursuant to CWA section 303(d) (water quality limited segments), and to the protection of high quality waters.

For fiscal Year (FY) 1994, the nonpoint source funds are to be used for the implementation of watershed management plans or strategies that will lead to coordinated water management, or for the demonstration of specific practices considered part of a watershed management effort.

Activities which reduce, eliminate, and/or prevent NPS pollution are eligible projects. The agencies eligible to receive Section 319 funds are those with the demonstrated authority to require implementation of the project (*e.g.*, local governments with regulatory authority) or demonstrated capability to ensure the implementation of projects (*e.g.*, Resource Conservation Districts). Examples of specific activities eligible for Section 319 funds include the demonstration of best management practices (BMPs) for agricultural drainage, acid mine drainage, channel erosion, hydrologic modification, groundwater protection, pollution prevention, and septic systems.

Generally, the State Board requests that a workplan on the project be submitted one year prior to the project's actual start date, due to the period of delay between submittal of the proposal and receipt of federal funding. The State Board notifies interested parties of the availability of funds through a Request for Workplans notice. The workplans are then evaluated and ranked according to specific criteria. The applicant is required to match the grant funds with a 40 percent nonfederal match. The State Board's NPS Program staff should be contacted to get other specific guidance on this grant.

Clean Water Act §314 Clean Lakes Grant Program

The Clean Lakes Program grant is similar to the CWA 205(j) program, but is specified under CWA section 314. Under the Clean Lakes Program, the US EPA, through the State Board, provides assistance in two phases. Phase I awards up to $100,000 per project for diagnostic/feasibility studies and requires a 30 percent non-federal match. These studies must be completed in three years. The Phase II awards have no funding cap, but they require a 50 percent non-federal match. These funds are available to support implementation of pollution control and/or in-lake restoration methods and procedures, including final engineering design. These projects must be completed in four years.

Funding is also available for Lake Water Quality Assessment projects, which are projects intended to achieve any needed lake monitoring and assessment which would not otherwise be done. These grants require a fifty percent non-federal match.

All State and local agencies can participate in the 314 Program. Only projects dealing with publicly-owned lakes are eligible for funding. The lake must also be prioritized for remediation by the State, which is demonstrated by placement on the 314 list of impacted water bodies in the Water Quality Assessment.

Currently, procedures require State Board staff to evaluate the proposed projects and draft a project priority list to be brought before the State Board. The State Board adopts and submits the list to the US EPA, which determines the final priority projects for funding.

Small Communities Grant Program

The 1987 amendments to the CWA terminated the federal Clean Water Grant Program but provided for the use of federal funds to capitalize State Revolving Fund (SRF) loan programs (see SRF discussion below). California voters recognized that many small communities would not be able to afford the higher costs of the SRF Program and passed the Clean Water and Water Reclamation Bond Law of 1988. The Clean Water Bond Law contains 25 million dollars in State grant assistance for small communities. The program defines a small community as less than 3,500 people. No grant under this program can exceed 2 million dollars. The Law also states that the State Board may make grants on a sliding scale based on a community's ability to pay.

The Small Communities Grant (SCG) Program provides only the funds to make a wastewater treatment project affordable. It is assumed that a community can afford to spend a certain percentage of its Median Household Income (MHI) on sewage treatment. The higher the MHI calculated, the higher the percentage the community can afford to spend for wastewater facilities. If a community's treatment costs exceed what the program assumes is affordable, the SCG Program will provide up to 2 million dollars to reduce the costs to make the project more affordable.

A community can receive a SCG for up to 97.5 percent of the allowable project costs and is also eligible to apply to any other State or federal agency to fund the local share of the project costs. A low interest loan from the SRF Program may be obtained, for example, if the project is on the SRF Loan Priority List. If funding is not available for the local share from any source at a reasonable cost, the community may apply for a low interest loan from the Water Quality Control Fund. The combined assistance can not exceed 100 percent of the total project costs.

There are many requirements to receive a SCG. Briefly, the project must be submitted to the Regional Board for placement on a Regional Board SCG Priority List. The project is classified according to the need for a sewage treatment facility. The Regional Board SCG lists are compiled for State Board adoption and further prioritized according to several criteria. There are other restrictions and specific provisions a grantee must satisfy, as specified in guidelines provided by the State Board.

The State Board may use a portion of the SCG to fund pollution study grants. The SCG Program will fund up to 97.5 percent of the eligible costs for an approved pollution study. The objective of the study must be to document the existence of an actual or potential public health or water quality problem.

Loan Programs

State Revolving Fund (SRF) Loan Program

The SRF Loan Program provides funding for construction of publicly-owned treatment works (POTWs), for nonpoint source correction programs and projects, and for the development and implementation of estuary conservation and management programs. Water reclamation projects are also eligible for SRF funding. The loan interest rate is set at one-half the rate of the most recent sale of a State general obligation bond.

Proposed projects must be submitted to the Regional Board for placement on a Regional Board SRF Priority List. Projects are classified and ranked according to several criteria, including documented health problems, conformance with applicable Water Quality Control Plans, and/or compliance with waste discharge requirements. The Executive Officer can directly submit the list to the State Board. The State Board adopts the Statewide Priority List, after which the funds are available on a first-come, first-served basis.

There are other restrictions and specific provisions which the SRF prioritized projects must satisfy; the State Board's Clean Water Program staff should be contacted for a copy of the guidelines.

Agricultural Drainage Water Management Loan Program (ADLP)

The State Agricultural Drainage Water Management Loan Program is funded with a $75 million bond fund. The program funds are available for feasibility studies and the design and construction of agricultural drainage water management projects. The interest rate is set at one-half the rate of the most recent sale of a general obligation bond. The loan term is not to exceed 20 years. The loan limitations are $20 million for any one project and $100,000 dollars for each feasibility study.

Only local agencies can apply for this loan. The project must remove, reduce, or mitigate pollution from agricultural drainage. The specific types of projects funded include agricultural drainage projects such as evaporation ponds and deep injection wells, selenium removal projects, cleanup of groundwater contaminated from agricultural practices, and agro-forestry projects. In this region, projects which have acquired ADLP funds include SAWPA's Arlington Desalter and the Chino Basin West Desalter.

The loan application is obtained from the State Board's Division of Water Quality. The completed loan application is submitted with the project planning documents. Upon completion of the loan contract, the applicant submits the final plans and specifications for the project.

Water Reclamation Loan Program

This program makes available low-interest loans for the design and construction of water reclamation projects. The objective of this program is to meet a portion of the future water needs for California through the use of reclaimed water. Projects funded must be cost-effective compared to the development of new sources of water or alternative new freshwater supplies.

As of July 1, 1989, $33 million were available for use only by local public agencies. The funds are augmented annually by loan repayments. The loan interest rate is set at one-half the rate of the most recent sale of the State general obligation bond. The loan term may not exceed 20 years, with up to $5 million available for any one project. Eligible projects include the wastewater treatment facilities necessary to produce water for beneficial reuse, as well as reclaimed water storage and distribution systems. Only that capacity of wastewater which can be used within five years of the completion of construction is eligible.

A loan application package may be obtained from the State Board's Office of Water Recycling. The completed application is submitted with the project planning documents. Projects with complete application packages are funded on a first-come, first-served basis.

<u>Water Quality Control Fund (WQCF) Loan Program</u>
The WQCF Loan Program is a special set-aside intended only for the construction of wastewater treatment facilities or for wastewater reclamation loan feasibility studies. Approximately 6 million dollars are available with the interest rate set at one-half the average rate paid by the State on general obligation bonds sold in the preceding year.

This program's eligibility requirements state that the applicant must hold a local election with a simple majority approving the application for the loan. In addition, the applicant must demonstrate that: 1) revenue or general obligation bonds cannot be sold; 2) financial hardship exists; and 3) local funding is not available.

The State Board's Division of Clean Water Programs is the contact for a loan application. The application is submitted with the documents which demonstrate financial hardship, lack of the local share, and the election results.

REFERENCES

James M. Montgomery Consulting Engineers, Inc., "Chino Groundwater Basin Management Task Force, Draft Work Plan to Develop a Water Resources Management Plan," June, 1990.

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Boyle Engineering Corporation, "Newport Bay Watershed, San Diego Creek Comprehensive Stormwater Sedimentation Control Plan," August, 1983.

Wildermuth, Mark J., Water Resources Engineer, "Plan of Study, Implementation of a Conjunctive Use Plan for the Colton and Riverside Basins, Draft Number 1," June, 1993.

"Southern California Coastal Water Research Project, Annual Report 1990-91 and 1991-92," November, 1992.

California Regional Water Quality Control Board, Santa Ana Region, "Newport Bay: Water Quality Issues and Recommendations," November, 1985 (SCR 38 Report).

California Regional Water Quality Control Board, Santa Ana Region, "Newport Bay Clean Water Strategy, A Report and Recommendations for Future Action," September, 1989 (SCR 88 Report).

ENVIRONMENTAL IMPACT REVIEW

ENVIRONMENTAL IMPACTS

Introduction

The Clean Water Act and the California Water Code require that Water Quality Control Plans be developed, and periodically reviewed. These plans must include water quality standards (beneficial uses and water quality objectives) and an implementation plan. The last major review and update of the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin (Region 8) was completed with the adoption of the 1983 Basin Plan. Since that time, amendments to specific parts of the 1983 Basin Plan have been adopted. The Water Quality Control Plan amendments now proposed represent a thorough review and revision of the 1983 Basin Plan.

Because the California Environmental Quality Act (CEQA) provides for the exemption of certain certified regulatory programs from the requirements of the Act (Public Resource Code, Section 21080.5) and because the basin planning program has been so certified by the Secretary for Resources (California Code of Regulations-Title 14, Section 15251), preparation of an Environmental Impact Report, Negative Declaration and Initial Study is not required prior to adoption of these Basin Plan Amendments. In compliance with CEQA, these draft amendments, including this assessment and an environmental checklist, are being circulated in lieu of an EIR or other document.

Project Description

The project under consideration is the adoption and subsequent implementation of these 1994 Basin Plan Amendments. These amendments amount to an almost entirely rewritten Basin Plan. Water quality standards have been reviewed. New un-ionized ammonia objectives and site-specific objectives for copper, lead, and cadmium in the middle of the Santa Ana River system are incorporated in this Plan. Where appropriate, beneficial use designations for RARE, SPWN, and WILD have been added. Water bodies in the Region not previously listed in the Basin Plan are included and their beneficial uses designated. Descriptions of water quality control programs undertaken since the adoption of the 1983 Plan are included. This 1994 plan also includes the amendments made to the 1983 plan. Those amendments include the revised Total Inorganic Nitrogen Waste Load Allocation, Beneficial Use designations, and Minimum Lot Size Criteria for subsurface disposal system use. Environmental impacts were taken into account and CEQA requirements were satisfied when these revisions were adopted.

The Board's water quality standards provide the basis for regulation of waste discharges throughout the region. These waste discharge requirements, together with the other elements of the implementation plan of this Basin Plan, result in the protection and preservation (and, in some cases, enhancement) of the Region's water resources.

Environmental Checklist

Significant population growth is anticipated within the region, continuing a trend toward urbanization which began many years ago. If and as this growth and urbanization occurs, there is the potential for significant adverse environmental impacts, unless suitable alternatives and/or mitigation measures are implemented. The impacts of population growth and urbanization would likely include: disruptions, displacements and compaction of soils; increases in air emissions and deterioration of air quality; increases in wastewater discharges to surface and ground waters; increases in water supply demands, necessitating additional groundwater pumping and or importation of water; deterioration of plant and animal habitats and changes in species composition; increases in energy consumption and new demands on other utilities and public services; increases in vehicular traffic and new demands for transportation systems.

Population growth and urbanization are projected to occur in the region whether or not this plan is implemented. It is neither the Regional Board's responsibility nor the intent of this Plan to control this population growth and land use; that responsibility rests with local planning agencies. Rather, the Regional Board, through this plan, must anticipate population growth and land use changes and identify the facilities, management practices, regulatory strategies, etc. necessary to address potential water quality impacts and ensure water quality protection as these changes occur. This plan anticipates population growth and urbanization (from a water quality perspective) but does not induce them. Accordingly, the environmental checklist prepared for these Basin Plan amendments focuses on the potential environmental effects of the implementation of these amendments. The possible environmental effects of the growth and urbanization which are anticipated in this plan are acknowledged but are not addressed in this checklist (with exception of water-related effects). CEQA analysis and compliance with respect to these impacts necessarily rests with local lead agencies.

As indicated in the Environmental Checklist, implementation of the Basin Plan amendment (1994 Basin Plan) is not expected to result in any significant, long-term adverse environmental impacts. Failure to implement this Plan could result in substantial adverse impacts to the environment, the public, and wildlife.

Project Alternatives

Alternatives to adopting the proposed Basin Plan Amendments are:

1. Do not adopt the proposed amendments (no project). In that case, the 1983 Plan as amended would remain in effect. New information and needed revisions would not be incorporated into the plan. Water quality in the Region would not be adequately protected.

2. Adopt Amendments which differ from these proposed in one or more specific ways, for example, alternative water quality objectives or beneficial use designations. The extensive analysis which led to the development of the proposed amendments indicates that these amendments are the appropriate and scientifically defensible means to ensure reasonable protection of water quality and beneficial uses.

Mitigation

With one possible exception, no significant, long-term adverse environmental impacts are expected to result from adoption and implementation of the proposed Amendments.

As described in the checklist, implementation of this Plan may result in increases in energy consumption for which no feasible alternatives or mitigation measures are available. However, failure to implement this Plan would likely result in even greater adverse impacts on energy resources as energy-intensive processes would be required to remediate water quality problems and/or to transport alternative water supplies.

As described in the checklist, some dischargers may respond to the requirements of this Plan by modifying the location of their discharge. Such effluent diversions could adversely affect beneficial uses, including wildlife and the availability of waters for domestic supplies. Incentives for such effluent diversions might be reduced through the inclusion of offset provisions in waste discharge requirements. Such offset provisions could be used only where beneficial uses would not be adversely affected. The Water Quality Control Plan is intended to protect and preserve the water resources of the Region.

CEQA Compliance

The preceding assessment of adverse environmental impacts, alternatives and mitigation measures indicates that adoption and implementation of the proposed Amendments complies with the requirements of CEQA (PRC 21000 *et seq.*).

ENVIRONMENTAL CHECKLIST

I. **BACKGROUND**:

1. Name of Proponent: California Regional Water Quality Control Board, Santa Ana Region.
2. Address and Phone Number of Proponent: 2010 Iowa Ave. Suite 100, Riverside CA 92507 (909)782-4130
3. Date Checklist Submitted: September 20, 1993
4. Agency Requiring Checklist: N/A
5. Name of Proposal, if applicable: Adoption of 1994 Water Quality Control Plan (Basin Plan Amendments)

II. **ENVIRONMENTAL IMPACTS**

(Explanation of all "yes" and "maybe" answers are required on attached sheets.)

	Yes	Maybe	No
1. **Earth.** Will the proposal result in:			
a. Unstable earth conditions or changes in geologic substructures?			X
b. Disruptions, displacements, compaction or overcoming of the soil?		X	
c. Change in topography or ground surface relief features?		X	
d. The destruction, covering or modification of any unique geologic or physical features?			X
e. Any increase in wind or water erosion of soils, either on or off the site?		X	
f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of river or stream or the of the ocean or any bay, inlet or lake?			X

	Yes	Maybe	No
g. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?			X
2. **Air**. Will the proposal result in:			
a. Substantial air emissions or deterioration of ambient air quality?			X
b. The creation of objectionable odors?		X	
c. Alteration of air movement, moisture, or temperature, or any change in climate either locally or regionally?			X
3. **Water.** Will the proposal result in:			
a. Changes in current, or the course of direction of water movements, in either marine or fresh waters?		X	
b. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?		X	
c. Alterations to the course or flow of flood waters?		X	
d. Change in the amount of surface water in any water body?		X	
e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	X		
f. Alteration of the direction or rate of flow of groundwater?	X		
g. Change in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	X		

	Yes	Maybe	No
h. Substantial reduction in the amount of water otherwise available for public water supplies?		X	
i. Exposure of people or property to water related hazards such as flooding or tidal waves?			X

4. **Plant Life.** Will the proposal result in:

	Yes	Maybe	No
a. Change in the diversity of species, or number of any species of plants (including trees, shrubs, grass, crops, and aquatic plants)?		X	
b. Reduction of the numbers of any unique, rare or endangered species of plants?			X
c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?		X	
d. Reduction in acreage of any agricultural crop?		X	

5. **Animal Life**. Will the proposal result in:

	Yes	Maybe	No
a. Change in the diversity of species, or numbers of any species of animals (birds, land animals, including reptiles, fish and shellfish, benthic organisms or insects?)		X	
b. Reduction of the numbers of any unique, rare or endangered species of animals?			X
c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?			X
d. Deterioration to existing fish or wildlife habitat?		X	

	Yes	Maybe	No
6. **Noise.** Will the proposal result in:			
a. Increases in existing noise levels?		X	
b. Exposure of people to severe noise levels?			X
7. **Light and Glare.** Will the proposal produce new light or glare?			X
8. **Land Use.** Will the proposal result in a substantial alteration of the present or planned land use of the area?		X	
9. **Natural Resources.** Will the proposal result in:			
a. Increase in the rate of use of any natural resources?			X
b. Substantial depletion of any non-renewable natural resources.			X
10. **Risk of Upset.** Will the proposal involve:			
a. A risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?			X
b. Possible interference with an emergency response plan or an emergency evaluation plan?			X
11. **Population.** Will the proposal alter the location, distribution, density, or growth rate of the human population of an area?			X
12. **Housing.** Will the proposal affect housing, or create a demand for additional housing?			X

	Yes	Maybe	No
13. **Transportation/Circulation.** Will the proposal result in:			
a. Generation of substantial additional vehicular movement?		X	
b. Effects on existing parking facilities, or demand on new parking?			X
c. Substantial impact upon existing transportation systems?			X
d. Alterations to prevent patterns of circulation or movement of people and/or goods?			X
e. Alterations to waterborne, rail or air traffic?			X
f. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?			X
14. **Public Services.** Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
a. Fire Protection?		X	
b. Police Protection?		X	
c. Schools?		X	
d. Parks or other recreational facilities?		X	
e. Maintenance of public facilities, including roads?		X	
f. Other governmental services?		X	
15. **Energy.** Will the proposal result in:			
a. Use of substantial amounts of fuel or energy?		X	

	Yes	Maybe	No
b. Substantial increase in demand upon existing sources or energy, or require the development of new sources of energy?			X
16. **Utilities.** Will the proposal result in a need for new systems, or substantial alterations to the following utilities?			
a. Power or Natural Gas?		X	
b. Communications systems?			X
c. Water?	X		
d. Sewer or septic tanks?	X		
e. Storm water drainage?		X	
f. Solid waste and disposal?	X		
17. **Human Health.** Will the proposal result in:			
a. Creation of any health hazard or potential health hazard (excluding mental health)?			X
b. Exposure of people to potential health hazards?			X
18. **Aesthetics.** Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?		X	
19. **Recreation.** Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?		X	
20. **Cultural Resources**. Will the proposal result in:			
a. The alteration of or the destruction of a prehistoric or historic archaeological site?			X

	Yes	Maybe	No
b. Adverse physical or aesthetic effects to a prehistoric or historic building, structure, or object?	___	____	_X_
c. The potential to cause a physical change which would effect unique ethnic cultural values?	___	____	_X_
d. Restricting existing religious or sacred uses within the potential impact area?	___	____	_X_

21. **Mandatory Findings of Significance**.

	Yes	Maybe	No
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habit of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	___	____	_X_
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	___	____	_X_
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	___	____	_X_

	Yes	Maybe	No
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	___	___	X

III. **Discussion of Environmental Evaluation**
(Narrative description of environmental impacts.)

IV. **Determination**

On the basis of this initial evaluation:

___ I find that the proposed project COULD NOT have a significant effect on the environment.

X I find that the proposed project MAY have a significant adverse impact on the environment; however, there are feasible alternatives and/or mitigation measures available which will substantially lessen any significant adverse impact. These alternatives and mitigation measures are discussed in the attached written report.

___ I find the proposed project MAY have a significant effect on the environment. There are no feasible alternatives and/or feasible mitigation measures available which would substantially lessen any significant adverse impact. See the attached written report for a discussion of this determination.

March 11, 1994
Date

Joanne B. Schneider
Signature

ATTACHMENT - ENVIRONMENTAL CHECKLIST

Discussion of Environmental Impacts

Explanation of "yes" and "maybe" answers and proposed mitigation measures.

1. Earth (b)(c)(e)

Implementation of this Plan will result in the construction of new wastewater treatment facilities, desalters, water supply facilities and other water-related facilities. Short-term construction-related impacts, such as increases in wind or water erosion of soils, will result from these projects. Implementation of best management practices will mitigate these impacts to insignificant levels. In addition, each of these projects will be subject to separate CEQA review, providing site-specific analysis and development of mitigation measures, where necessary.

2. Air (b)

Sewage treatment plants and other waste disposal facilities are sometimes subject to upset, resulting in objectionable odors. At well-operated facilities, such upsets are infrequent and limited in duration. Failure to implement this Plan would likely result in the creation of substantial objectionable odors as wastes might not be properly controlled and treated.

3. Water (a)(b)(c)

This Plan includes measures to address stormwater inputs of pollutants to the Region's waters. Implementation of these programs may necessitate changes in the flood control systems.

3. Water (d)

It is possible that some dischargers may take steps to comply with requirements of this Plan that would result in changes in the volume of surface water. For example, some dischargers might choose to reclaim, recharge, divert or otherwise modify the location of their discharge to reduce or avoid the expense and effort involved in meeting certain waste discharge requirements (such as those for total inorganic nitrogen or ammonia). Stream flow would be reduced if existing discharges are removed from the stream system. Such flow reductions could adversely affect beneficial uses. Case-specific analysis may be required to determine suitable mitigation measures. In some cases, the incentive for effluent diversion might be reduced through the use of offset provisions, whereby necessary water quality protection would be achieved via the discharger's implementation of suitable programs, rather than through strict compliance with numerical effluent limitations. Such offset provisions could be used only where beneficial uses would not be adversely affected.

3. Water (e)

Increased wastewater discharges are included and addressed in this Plan. The Plan includes treatment for these discharges which will protect and/or improve water quality. Implementation of the wastewater management and other provisions of the Plan will protect or improve ground and surface water quality in the Region.

3. Water (f)(g)

Reclamation, recharge, desalter projects and wastewater discharges included in this Plan will affect the quantity and quality of groundwaters in the Region. These elements of the Plan were developed using the Region's groundwater models to correct and prevent adverse water quality conditions, and to improve conditions where feasible.

3. Water (h)

See response to 3(d). Changes in wastewater discharge locations may affect the quantity of groundwaters recharged in certain areas and used subsequently for domestic supply. Offset provisions in waste discharge requirements might reduce the incentive for effluent diversions.

4. Plant Life (a)(c)

This plan will result in additional wastewater treatment facilities, desalters, and water supply facilities. The area surrounding these facilities will be landscaped displacing resident plant life with introduced species of plants. Any project in the region will be subject to separate CEQA review, providing site-specific analysis and development of mitigation measures in order to protect any rare, threatened, or endangered plant species. Water quality improvements should enhance plant diversity and/or abundance.

5. Animals (a)

Construction associated with this plan may affect the diversity of animals surrounding the new facilities. Those projects effecting rare, threatened, or endangered animal species will be subject to separate CEQA review on a site-specific basis and mitigation measures to minimize impacts will be developed. Water quality improvements should enhance animal diversity and/or abundance.

5. Animals (d)

see response to 3(d)

6. Noise (a)

Due to construction of new wastewater facilities a short-term increase in noise level may occur on a site-specific basis.

8. Land Use (a)

Land use plans may be altered to accommodate new wastewater facilities, desalters, or water supply facilities. The intent of this Plan is to address and prevent water quality problems associated with the various types of land use.

13. Transportation/Circulation (a)

Wastewater facilities and upgrades of present facilities may occur as a result of this plan and more short-term vehicular movement may occur as a result of construction activities.

14. Public Services (a)(b)(c)(d)(e)(f)

Upgrades and expansions of present wastewater facilities and construction of new facilities, including desalters, are a part of this plan. Funds available for other public services such as fire and police protection, parks and schools may be adversely affected. However, failure to ensure water quality protection and adequate waste water treatment would likely have far more significant effects on the availability of funds as funds would be required to remediate water quality problems, ensure adequate potable supplies via treatment or importation and to address public health problems that might otherwise ensue.

15. Energy (a)

Operation of new, expanded or otherwise modified wastewater treatment facilities, desalters and other facilities called for in this plan will result in increased energy consumption. More advanced waste treatment and other activities (desalters) necessary to meet the Plan's objectives may also result in increased energy consumption. This increase is necessary to protect the environment by preventing adverse water quality impacts. Co-generation or other means of mitigating this impact may be implemented. However, in some cases, there may be no feasible way to substantially mitigate this impact. Failure to implement this Plan would result in water quality degradation, which in turn would necessitate wellhead treatment systems or other energy-consuming remedial activities, importation of alternative water supplies, and other measures to provide potable water supplies, protect public health, and protect other beneficial uses.

16. Utilities (a)(c)(d)(e)(f)

    This plan includes water supply and wastewater management plans and programs for stormwater and solid waste disposal control. These plans and programs will necessitate changes in the utilities which are necessary to protect water quality. This plan addresses both stormwater inputs and solid waste disposal which have been implemented by state or federal law and have already undergone appropriate CEQA (or NEPA) review. Adverse water quality impacts will be mitigated by the implementation of this plan thereby necessitating the impact to the utilities.

18. Aesthetics

    Wastewater treatment facilities constructed in accordance with this plan will have to be carefully located and engineered to minimize the impact to specific vistas or views.

19. Recreation

    Improvements in water quality will expand existing recreational opportunities.

DETERMINATION

As has been noted, the implementation of this Plan will result in certain impacts associated with the construction and operation of new wastewater treatment plants, desalters and other such facilities. Some of these impacts (e.g. soil disruptions, increased wind/water erosion) will be localized and short term in nature and can be mitigated by the implementation of best management practices. Individual projects will be subject to CEQA review, providing for site-specific environmental analysis and development of appropriate mitigation measures. Operation of facilities called for in this plan may result in certain impacts (e.g. increased energy consumption) for which there are no feasible alternatives or mitigation measures. However, these facilities and their related impacts are necessary to protect the environment by controlling water quality.

Failure to implement this Plan would result in significant adverse environmental impacts. Water quality would not be protected, resulting in adverse impacts to the public and wildlife.

FINDINGS OF OVERRIDING CONSIDERATIONS

The California Regional Water Quality Control Board, Santa Ana Region, finds:

1. The project, as proposed, may require a substantial increase in energy consumption by local jurisdictions;

2. There may be no feasible way to substantially mitigate the increase in energy use while carrying out the project;

3. The only identified alternatives to the project which will not require the increased use of energy do not provide protection to the beneficial uses of the waters of the Santa Ana Region and will not comply with California and federal law.

THEREFORE, overriding social and environmental considerations require that the project be carried out despite the possible unmitigated adverse environmental consequence of increased energy use identified in the checklist. The increased wastewater treatment required by this project may require a substantial increase in electrical energy. This increased consumption of electricity may be necessary to prevent adverse impacts of water quality and to protect the beneficial uses of the waters of the Santa Ana Region, thereby improving and protecting the environment.

APPENDICES NOT INCLUDED

CAN BE OBTAINED FROM THE
SANTA ANA REGIONAL BOARD

3737 Main Street, 5th Floor
Riverside, CA 92501

909-782-4130

REGION 8 INDEX

801.00 SANTA ANA RIVER HYDROLOGIC UNIT
801.10 Lower Santa Ana River HA
1.11 East Coastal Plain HSA
1.12 Santiago HSA
1.13 Santa Ana Narrows HSA
801.20 Middle Santa Ana River HA Split
801.21 Chino HSA Split
481.21 Chino HSA Split
481.22 Harrison HSA
801.23 Claremont Heights HSA Split
481.23 Claremont Heights HSA Split
801.24 Cucamonga HSA
1.25 Temescal HSA
1.26 Arlington HSA
1.27 Riverside HSA
801.30 Lake Matthews HA
1.31 Coldwater HSA
1.32 Bedford HSA
1.33 Cajalco HSA
1.34 Lee Lake HSA
1.35 Terra Cotta HSA
801.40 Colton-Rialto HA
1.41 Upper Lytle HSA
1.42 Lower Lytle HSA
1.43 Rialto HSA
1.44 Colton HSA
1.45 Reche HSA
801.50 Upper Santa Ana River HA
1.51 Cajon HSA
1.52 Bunker Hill HSA
1.53 Redlands HSA
1.54 Mentone HSA
1.55 Reservoir HSA
1.56 Crafton HSA
1.57 Santa Ana Canyon HSA
1.58 Mill Creek HSA
1.59 Sycamore HSA
801.60 San Timoteo HA
1.61 Yucaipa HSA
1.62 Beaumont HSA
1.63 Cherry Valley HSA
1.64 Chicken Hill HSA
1.65 Gateway HSA
1.66 Oak Glen HSA
1.67 South Mesa HSA
1.68 Triple Falls Creek HSA
1.69 Noble Creek HSA
801.70 San Bernardino Mountain HA
1.71 Bear Valley HA
1.72 Seven Oaks HSA
1.73 Baldwin HSA

802.00 SAN JACINTO VALLEY HYDROLOGIC UNIT
802.10 Perris HA
2.11 Perris Valley HSA
2.12 Menifee HSA
2.13 Winchester HSA
2.14 Lakeview HSA
2.15 Hemet HSA
802.20 San Jacinto HA
2.21 Gilman Hot Springs HSA
2.22 Hemet Lake HSA
2.23 Bautista HSA
802.30 Elsinore Valley HA
2.31 Elsinore HSA
2.32 Railroad HSA

805.00 LOS ANGELES-SAN GABRIEL RIVER HYDROLOGIC UNIT
805.10 Coastal Plain of Los Angeles County HA Split
845.15 Central HSA Split
845.60 Anaheim HA Split
845.61 Anaheim HSA Split
845.62 La Habra HSA Split
845.63 Yorba Linda HSA Split

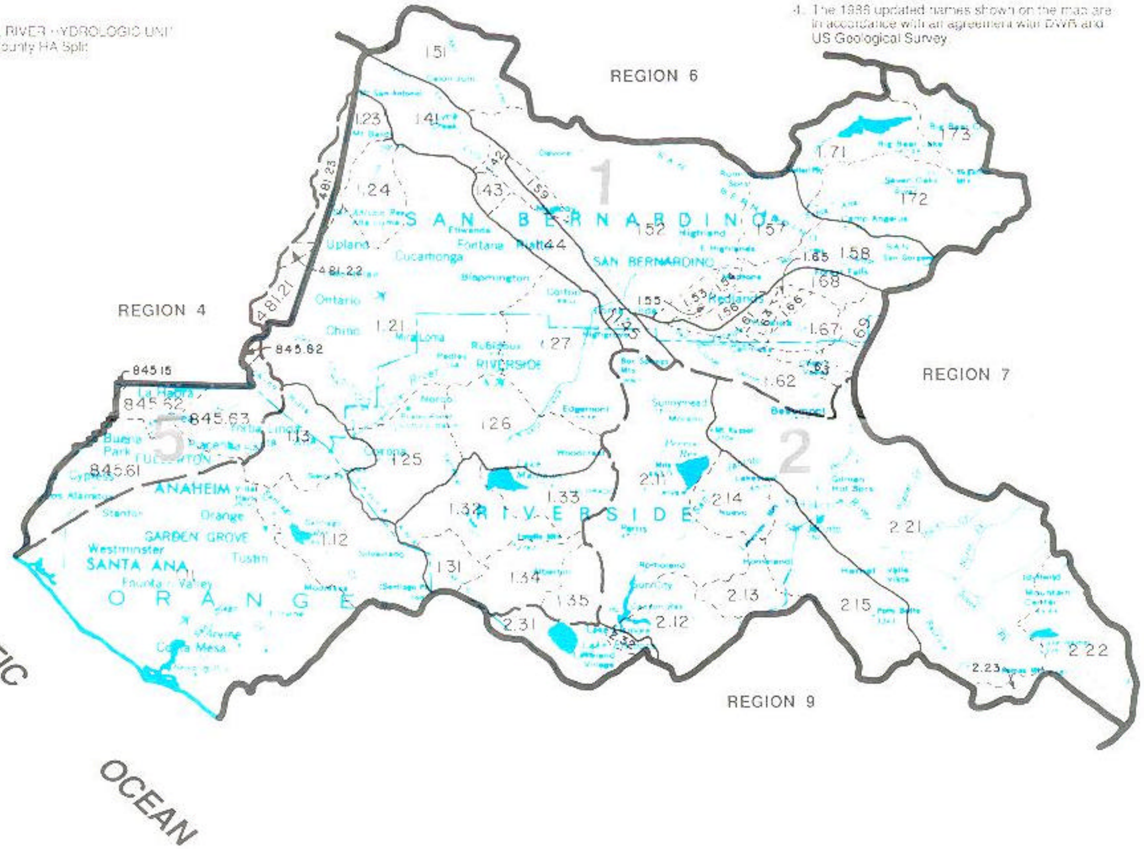
NOTE

1. The names and areas shown on this map are the same as used by the Department of Water Resources (DWR) in their Bulletin 130 Series except as explained below.

2. The numbering system used on this map is an adaptation of the numbering system used in the 130 Series.

3. The boundary between Region 8 and Region 4 follows the boundary between Los Angeles County and Orange or San Bernardino Counties, not the Hydrologic Boundary. The San Bernardino County line splits Hydrologic Unit 1 (Santa Ana River HU) so that Sub-Areas 481.21, 481.22, and 481.23 are legally in Region 4 but drain into Region 8. The Orange County line splits Hydrologic Unit 5 (Los Angeles San Gabriel River HU) so that Sub-Areas 845.15, 845.61, 845.62 and 845.63 are legally in Region 8 but drain into Region 4. Therefore, a 5 digit number on the map indicates that a regional boundary divides a hydrologic unit, area or subarea. In these cases the second digit is the number of the region from which the hydrologic area has been separated by the regional boundary. All other digits are as described in the legend.

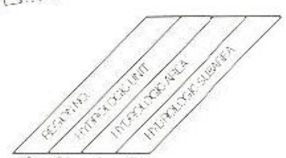
4. The 1986 updated names shown on the map are in accordance with an agreement with DWR and US Geological Survey.



KEY TO REGION

LEGEND

STREAM
REGIONAL BOUNDARY
HYDROLOGIC UNIT BOUNDARY (HU)
HYDROLOGIC AREA BOUNDARY (HA)
HYDROLOGIC SUBAREA BOUNDARY (SA)
5 HYDROLOGIC UNIT NUMBER



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April 1973
Revised: July 1976
Revised: August 1986

State Water Resources Control Board
Surveillance and Monitoring Section
T.E. Laverda, P.E.

State of California

REGIONAL WATER QUALITY CONTROL BOARD

Santa Ana Region (8)

SANTA ANA HYDROLOGIC BASIN PLANNING AREA (SA)

Scale in miles

0 8 16 24 32

Scale 1:500 000