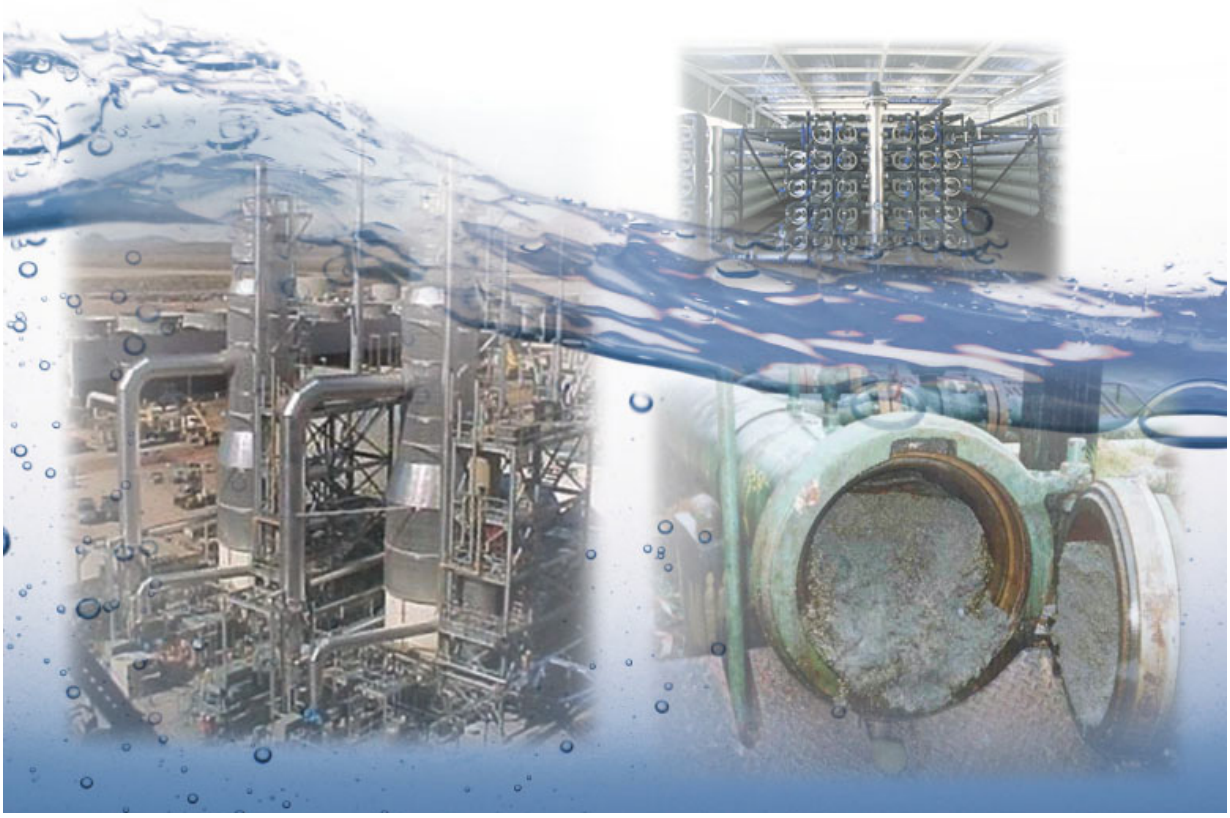
RECLAMATION

Managing Water in the West

Survey Report

Southern California Regional Brine-Concentrate Management Study – Phase I
Lower Colorado Region



U.S. Department of the Interior
Bureau of Reclamation

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Abbreviations and Acronyms

afy	acre-feet per year
ATF	Advanced Treatment Facility
AWPF	Advanced Water Purification Facility
AWTF	Advanced Water Treatment Facility
AWTP	Advanced Water Treatment Plant
BBARWA	Big Bear Area Regional Wastewater Agency
BEMT	Brine Executive Management Team
BMP	best management practice
BOD	biochemical oxygen demand
CBDA	Chino Basin Desalter Authority
CCWMP	Calleguas Creek Watershed Management Plan
CEC	Constituents of Emerging Concern
CEQA	California Environmental Quality Act of 1970
cfs	cubic feet per second
CIWQS	California Integrated Water Quality System
COD	Chemical Oxygen Demand
CSD	Community Services District
DATS	Deep Aquifer Treatment System
DWI	deep well injection
DWP	Department of Water and Power
EDR	electrodialysis reversal
EMWD	Eastern Municipal Water District
gpd	gallons per day
GREAT	Groundwater Recovery Enhancement and Treatment
GRIP	Groundwater Reliability Improvement Program
GWR	Groundwater Replenishment
IEEC	Inland Empire Energy Center
IEUA	Inland Empire Utilities Agency
Initiative	Southern California Water Recycling Projects Initiative

IPR	indirect potable reuse
IRWD	Irvine Ranch Water District
IX	ion exchange
JOS	Joint Outfall System
JPA	Joint Powers Authority
LCSD	Laguna County Sanitation District
MBR	membrane bioreactor
MF	microfiltration
mgd	million gallons per day
MM	management measures
MNWD	Moulton Niguel Water District
MWD	Municipal Water District
MWDSC	Metropolitan Water District of Southern California
NF	nanofiltration
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
PPTP	Principal Potable Treatment Plant
PS	precipitative softening
RCWD	Rancho California Water District
Reclamation	United States Department of the Interior Bureau of Reclamation
RO	reverse osmosis
RWQCB	Regional Water Quality Control Board
SBOO	South Bay Ocean Outfall
SALT_PROC	Salt Solidification and Sequestration
Sanitation Districts	The Sanitation Districts of Los Angeles County
SAR	sodium adsorption ratio
SARI	Santa Ana Regional Interceptor
SAWPA	Santa Ana Watershed Project Authority
SBOO	South Bay ocean outfall
SCCWRRS	Southern California Comprehensive Water Reclamation and Reuse

	Study
SCWD	South Coast Water District
SDCWA	San Diego County Water Authority
SGU	Shallow Groundwater Unit
SMP	Salinity Management Plan
SOCWA	South Orange County Wastewater Authority
SONGS	San Onofre Nuclear Generating Station
SPARRO	Slurry Precipitation and Reverse Osmosis
SS	suspended solids
SWP	State Water Project
TDS	total dissolved solids
TIRE	Terminal Island Renewal Energy
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
TVRI	Temescal Valley Regional Interceptor
U.S.	United States
USDW	underground source of drinking water
USEPA	United States Environmental Protection Agency
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	ultraviolet
VSEP	vibratory shear enhanced processing
WDR	Water Discharge Requirements
WMWD	Western Municipal Water District
WPCF	Water Pollution Control Facility
WPCP	Water Pollution Control Plant
WRD	Water Replenishment District of Southern California
WRF	Water Reclamation Facility
WRP	Water Reclamation Plant
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant
ZLD	zero liquid discharge

1 Introduction and Study Objectives

This section of the report has the following subsections:

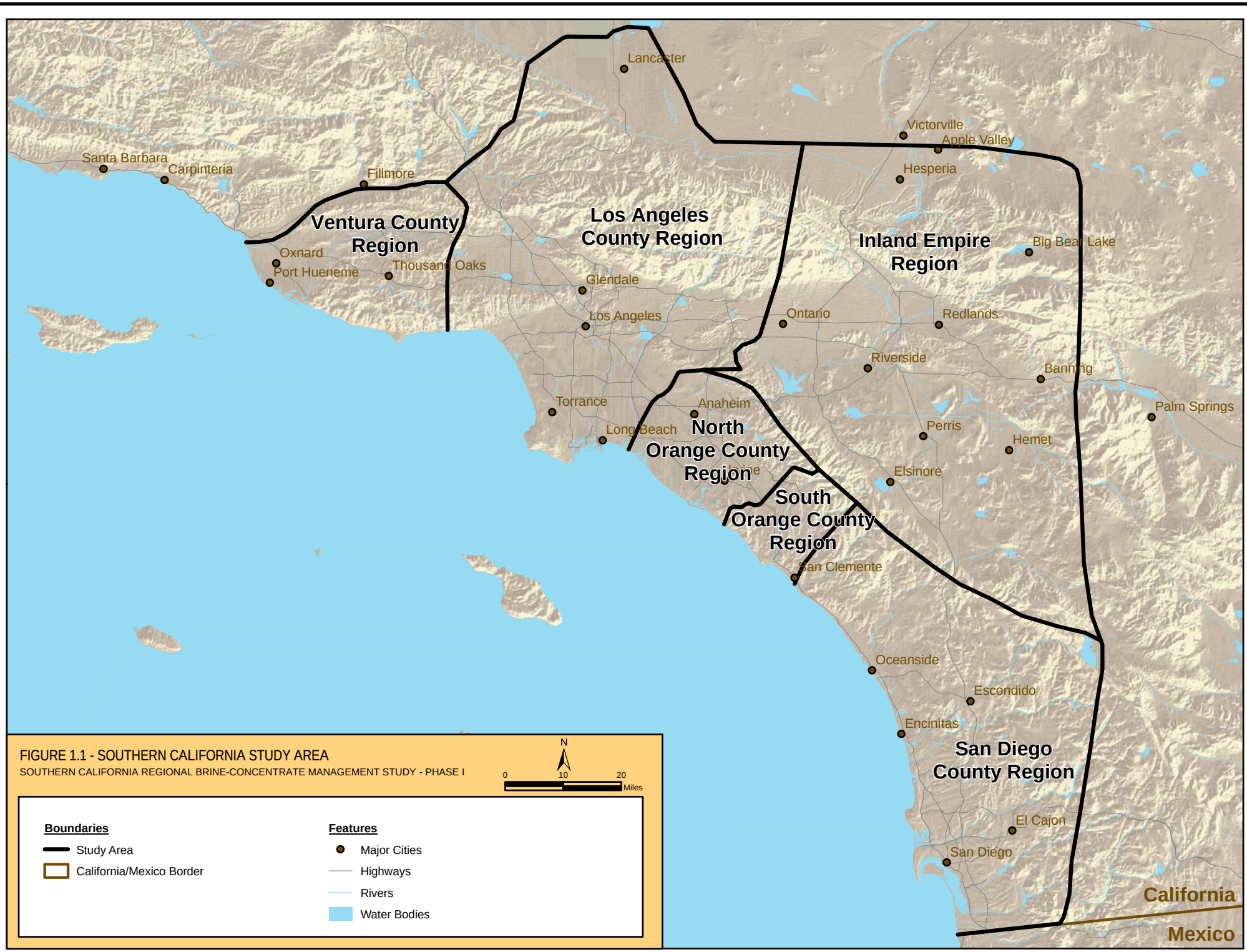
- Introduction
- Study Objectives
- Study Components
- Report Objectives

1.1 Introduction

The Southern California Regional Brine-Concentrate Management Study is a collaboration between the United States (U.S.) Department of the Interior Bureau of Reclamation (Reclamation) and 14 local and state agency partners. Table 1.1 provides a list of the agencies represented on the Brine Executive Management Team (BEMT). The project is funded on a 50/50 cost-sharing basis between Reclamation and the cost-sharing partners, who together form the BEMT. The purpose of the BEMT is to formulate, guide, and manage technical activities of the study. Figure 1.1 shows a map of the study area.

TABLE 1.1
LIST OF BEMT MEMBERS

List of BEMT Members	
City of San Bernardino	Orange County Sanitation District
California Department of Water Resources	Otay Water District
City of San Diego	Rancho California Water District
Inland Empire Utilities Agency	San Diego County Water Authority
Sanitation Districts of Los Angeles County	Santa Ana Watershed Project Authority
Los Angeles Department of Water and Power	U.S. Department of the Interior Bureau of Reclamation
Metropolitan Water District of Southern California	Western Municipal Water District
National Water Resources Institute/ Southern California Salinity Coalition	



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1.2 Study Objectives

The objectives of this study are twofold:

- To assess the brine-concentrate landscape in southern California including brine-concentrate management technologies, regulatory environment, existing infrastructure, and future needs
- To make recommendations for Phase 2 pilot/demonstration projects

To accomplish these objectives, the study will develop six reports that ultimately will be incorporated into a final study report.

1.3 Study Components

The Southern California Regional Brine-Concentrate Management Study has six major components. Each component is focused on providing a piece of the southern California brine-concentrate management landscape. Each component will be summarized in a draft report that will be incorporated into the Final Study Report. The six components of the study are:

- Survey Report – A regional survey to collect data from local agencies about the brine-concentrate landscape in southern California
- Regulatory Issue and Trends Report – A summary of regulatory issues and trends associated with implementing a brine-concentrate project in southern California
- CECs Report – A summary of constituents of emerging concern (CECs) and how regulation of CECs might affect brine-concentrate management in southern California
- Institutional Issues Report – A summary of organizational structures that can be used to foster collaborative relationships between agencies implementing brine-concentrate management projects
- Brine-Concentrate Management Treatment and Disposal Options Report – A summary of brine-concentrate technologies and identification of potential local and regional solutions
- Pilot/Demonstration Project Recommendations Report – A list of recommended pilot/demonstration projects that could be implemented in the inland and coastal areas southern California

These six reports will be incorporated as appendices in the Final Study Report. The Final Report will provide highlights and conclusions of the six component reports in an executive summary format.

1.4 Report Objectives

This report was developed to provide an overview of brine-concentrate management in southern California by identifying existing and future concentrate management projects, issues facing implementation of concentrate management, and the amount of concentrate produced. The data in this report were collected by performing a southern California regional survey of wastewater and concentrate generators.

The report focuses on the survey process and results. It is organized into three sections:

- Survey Process
- Survey Data Review
- Summary of Brine-Concentrate Overview in Southern California

The survey process section describes the development of the survey framework, as well as the process of collecting data from local agencies. The data review section describes the survey data received from local agencies and discusses data gaps. Finally, the summary section of the report provides an overview of brine-concentrate management in southern California, as well as issues and constraints facing the implementation of these projects.

2 Survey Process

A regional survey was undertaken to assess the concentrate management outlook in southern California. The basis of this survey was data and information developed as part of previous regional efforts including the Southern California Comprehensive Water Reclamation and Reuse Study (SCCWRRS) and the Southern California Water Recycling Projects Initiative (Initiative). These data were developed over a 10-year period (last updated in 2007) and compiled from local agencies based on responses to past surveys that focused on water recycling in southern California.

The survey undertaken as part of this effort expanded the type and detail of information requested to focus primarily on brine-concentrate production and disposal facilities. These facilities include brine lines, ocean outfalls, land discharges, wastewater and advanced treatment facilities (that is, reverse osmosis [RO] or concentrate generators), groundwater desalters, and concentrate management facilities. The data collected on concentrate management facilities included treatment methods, capacities, and water quality. Data were collected for current year (2008) and for future planning years. Data for future planning were collected in 5-year increments for planning years 2010 through 2035.

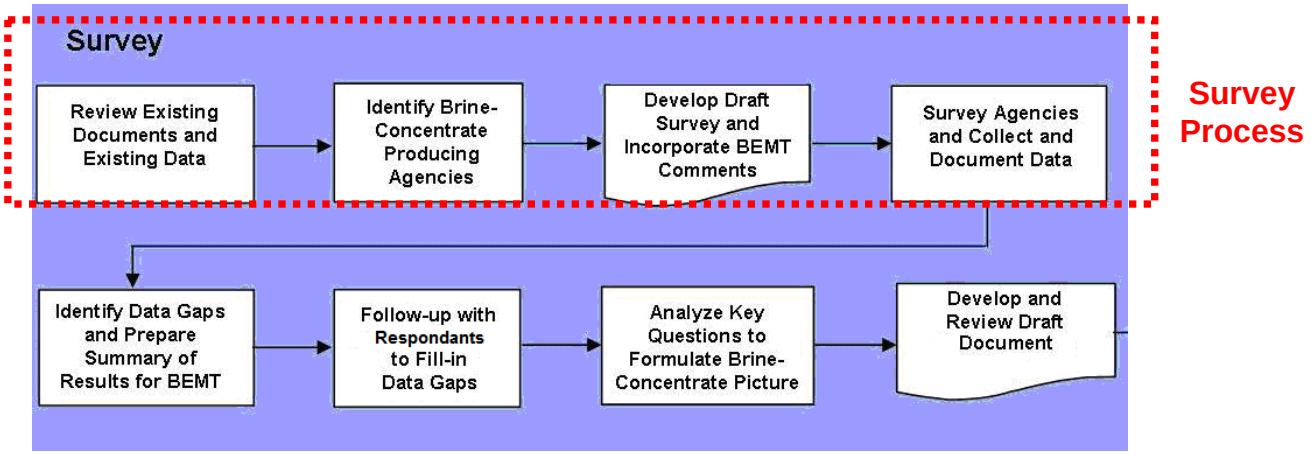
The study area encompassed in this report covers over 6 million acres. Because of the large area covered and the local nature of existing brine-concentrate disposal mechanisms (that is, brine lines and ocean outfalls), the study area was segmented into four geographical areas:

- Inland Empire
- Los Angeles County/Ventura County
- Orange County
- San Diego County

These regional areas allowed data to be collected and analyzed in smaller subregions so that concentrate management facilities could be more easily identified, and a clearer picture of the issues facing concentrate management in a particular region could be viewed.

The following subsections of this report introduce and discuss the survey development process by describing how the survey framework was established and how data were collected. A schematic of the survey process is presented in Figure 2.1.

FIGURE 2.1 SCHEMATIC OF THE SURVEY PROCESS



2.1 Development of the Survey Framework

The survey was developed in coordination with the BEMT for distribution to water and wastewater agencies in southern California, as well as for collection of key information for certain industrial brine-concentrate facilities. The BEMT identified key information to be collected as part of this study during the development of the Plan of Study. These data included information on quantity and quality of water in wastewater, groundwater, and concentrate facilities. In addition, the BEMT identified a number of specific questions/issues to be addressed:

- What upgrades, modifications, or facilities are planned to satisfy additional needs for water supply and brine-concentrate disposal?
- What volumes of local water supplies are available based on existing and future brine-concentrate management projects?
- Do opportunities exist to co-locate brine-concentrate management facilities with existing wastewater treatment plants (WWTP)?
- What factors affect or restrict coastal and inland brine-concentrate management?
- What are the "lessons learned" and challenges for facility design, regulatory compliance and permitting, and operation and maintenance (O&M)?

The study team used the information requested by the BEMT along with existing data from the SCCWRRS and Initiative studies as the bases of the survey framework. The existing data included information about the water quantity and quality at 102 WWTPs or water reclamation plants (WRPs), 28 groundwater desalter and ion exchange (IX) facilities, as well as 11 ocean outfalls.

The survey was developed in a Microsoft Excel-based workbook that contained four separate survey components—each component on a separate worksheet. The survey worksheets focused on data pertaining to wastewater treatment quality and quantity,

groundwater cleanup and desalting, industrial dischargers, and conveyance facilities. Conveyance facilities included brinelines, key WWTP interties, land outfalls, and ocean outfalls. Each of the survey components was organized geographically and alphabetically. A sample survey is provided in Attachment A. The six components that comprised the survey database are described in the following subsections.

2.1.1 Wastewater Treatment Plant Permit and Water Quality Information

This component of the survey contained data pertaining to WWTP effluent water quality and brine-concentrate water quality characteristics. This survey component also identified National Pollution Discharge Elimination System (NPDES) permit requirements, state discharge requirements, and reuse permit requirements for each facility. These data were needed to determine the quality of concentrate being produced currently and in the future. The water quality of the concentrate is important because it can affect an agency's ability to comply with Water Discharge Requirements (WDR) water quality limits. Specifically, this survey focused on collecting data regarding:

- **Sewage Source Information** – This was used to determine type of flow (that is, domestic, industrial, groundwater desalters, and environmental cleanups) and characteristics of average influent total dissolved solids (TDS).
- **WWTP Discharge Information** – This included discharge location, type, and percentage of flow going to each type of discharge (that is, stream, ocean, brineline, percolation, downstream WWTP, and reuse), as well as the location of the nearest brine-concentrate disposal.
- **NPDES or State Discharge Permit Requirements** – This information included permit limits for parameters such as TDS, hardness, biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia-nitrogen (NH_3-N), and pH.
- **Reuse Permit Limits** – This information included permit limits for TDS, as well as other potential reuse limits that could result in the implementation of advanced treatment (that is, RO).
- **Average Effluent Quality** – This included averaged measured concentrations of parameters such as TDS, hardness, BOD, TSS, NH_3-N, pH, residual chlorine, and other parameters pertinent to discharge limits or that could result in the implementation of advanced treatment (that is, RO).
- **Process Type for Tertiary Treatment and Disinfection** – This included the type of tertiary treatment used (that is, cloth media, dual media sand filtration, fuzzy filter, Dynasand, and membrane filtration), as well as the type of disinfection used (that is, free chlorine, chloramine, combination of free chlorine/chloramine, ultraviolet irradiation, and ozonation).
- **Existing Concentrate Treatment Information** – This information included the technology used, as well as water quality for existing brine-concentrate management applications.

2.1.2 Wastewater Treatment Plant Flow Information

This component of the survey focused on collecting information pertaining to existing and projected treatment capacity, average daily flow, maximum daily flow, and recycled water usage for a facility. This information was collected for existing and future planning years. Future planning years were collected in 5-year increments from 2010 to 2035. Calculating the amount of brine-concentrate produced is important because it can assist in identifying capacity constraints in brinelines and outfalls that could limit future discharges. Specifically, this survey focused on collecting data regarding the following information:

- **Facility Information** – This included the facility name, owner, location, and year constructed.
- **Wastewater Treatment Capacities and Flows** – This included the treatment capacity, as well as average daily and maximum daily flows for primary, secondary, tertiary, and advanced treatment processes.
- **Recycled Water Production** – This included identifying a percent allocation of recycled water usage for groundwater recharge (RO and Non-RO), reservoir augmentation (RO), seawater intrusion barrier (RO and Non-RO), industrial (RO and Non-RO), agriculture irrigation, environmental and habitat, construction and dust control, landscape irrigation, and miscellaneous uses.
- **Concentrate Production** – This included treatment capacity, as well as average daily and maximum daily flows for any brine-concentrate production.

2.1.3 Groundwater Desalter and Groundwater Cleanup Treatment Plant Capacity and Discharge Data

Another type of information collected was related to groundwater cleanup and desalting facilities. Information about the location, type, water quality, and quantity of groundwater cleanup and desalting facilities was included in the survey. This information is important because, as the availability of imported water decreases and production costs increase, agencies are implementing additional groundwater projects. These groundwater projects possess degraded water quality that agencies would not have considered an economically feasible water supply in the past. Specific information collected about groundwater projects included the following:

- **Facility Information** – This included the facility name, owner, location, year constructed, treatment method, constituents of concern in groundwater, purpose of project, and brine-concentrate discharge location.
- **Concentrate Water Quality Information** – This included information on the brine-concentrate water quality including parameters such as TDS, total organic carbon (TOC), temperature, NH_3-N, pH, silica, calcium, bromide, strontium, sulfate, arsenic, perchlorate, and phosphate.
- **Treatment Capacities and Flows** – This included quantification of treatment capacity, as well as average daily and maximum daily flows.

- **Concentrate Production** – This included quantifying treatment capacity, as well as average daily and maximum daily flows for any brine-concentrate production.

2.1.4 Industrial Discharger Data

The fourth part of the survey was focused on collecting information about industrial dischargers. Information collected about major dischargers was grouped by downstream discharge facility. The list of industrial dischargers was primarily from Pretreatment Program Reports prepared for the Regional Water Quality Control Board (RWQCB). Understanding the type of flow discharged to each of the outfalls is important because it indicates the potential type of constituent loading and flows that originate at different dischargers. This is particularly important as the drought in California continues, increased water reuse occurs, and decreased infiltration and inflow occur in sewers and brinelines. These factors result in changes to the blending and dilution of concentrate inflows to WWTPs and ocean outfalls, as well as impacts to benthic organisms and noncompliance with WDR permit limitations. The industrial discharge component of the survey collected the following information:

- **Receiving Facility Information** – This included the agency name and location of the receiving facility, downstream WWTP or outfall facility, and the discharger's name.
- **Discharger Information** – Information included the owner's name, location, pretreatment method, and discharge limitation or permit requirements.
- **Type of Discharger** – This identified the type of discharger as biotechnical, pharmaceutical, manufacturing, utilities, medical, or hospitality.
- **Discharge Water Quality Information** – This included water quality information including TDS, BOD, chemical oxygen demand (COD), NH_3-N, nitrate-N, total nitrogen, pH, temperature, and trace organics.
- **Discharger Flow Data** – Information included flow data collected for maximum daily flow, instantaneous flow, and average daily flow conditions.

2.1.5 Ocean Outfalls, Land Outfalls, and Brinelines/Interties

Information was collected about brine-concentrate conveyance facilities to determine if existing facilities are adequate to satisfy future water quality and capacity needs. The same information was collected for ocean outfalls, land outfalls, brinelines, and key WWTP interties. The survey on conveyance facilities included:

- **Facility Information** – This included information about the facility name, owner, location, year constructed, type of flow, and contributing WWTP or other facilities. For brinelines and interties, the locations of ends of pipe also were provided.
- **Pipeline Information** – This included pipeline information such as pipe material, length, size, capacity, planned expansions or additions, and information about problems in the conveyance facilities such as scale formation.

- **Discharge Water Quality Permit Limits/Information** (ocean outfalls only) – This information included the NPDES permit number and water quality requirements such as TDS, hardness, BOD, TSS, NH_3-N, pH, toxicity, and metals.
- **Discharge Water Quality Information** – This included information regarding the water quality in the system such as TDS, hardness, BOD, TSS, NH_3-N, pH, toxicity, and metals.
- **Pipeline Capacity and Flows** – This information included the pipeline capacity, average daily flow, and maximum daily flow for the current year (2008) and future years (2010 to 2035 in 5-year increments).
- **Cost Information** (brinelines/interties only) – This information included costs for discharge, energy, and O&M.

2.2 Regional Meetings

Once the survey framework was developed, the next step was to contact local agencies to request data and information. From past data collection efforts on the SCCWRRS and Initiative studies, it was determined that conducting a series of regional meetings would be the best method to increase participation in the survey. The regional meetings focused on providing a study overview and outlining the data survey request.

Invitees to these regional meetings were developed using existing databases of information, BEMT member contacts, and advertisements in area professional societies and newsletters. The initial step in this process was to use existing data from SCCWRRS and the Initiative to identify potential agencies to include in the survey request. The BEMT also assisted in identifying additional agencies that should be surveyed. Prior to conducting the regional meetings, the meetings were advertised using a number of different methods including:

- Emails to Inland Empire, Los Angeles, and San Diego chapters of WateReuse
- Email to California Rural Water Association
- Email to San Diego County Water Authority (SDCWA) partner agencies
- Email to Santa Ana River Dischargers Association
- Advertisement in the newsletter of the Association of Ground Water Agencies

In addition, Reclamation published a press release about the survey and regional meetings. Members of the public, organizations, and agencies interested in this study were invited to attend. Advertising the meetings increased the number of agencies that were aware of and interested in participating in the study. Four regional meetings were conducted throughout southern California in 2008. The locations and dates of the regional meetings are presented in Table 2.1. These meetings were used to inform the attendees about the approach and schedule for the survey, as well as to encourage participation in the survey. A sample of

Reclamation's press release, a meeting invitation, and a presentation are provided in Attachment B.

Fifty-six representatives from water and wastewater agencies, resource agencies, and the consultant community attended the four regional meetings. A list of these agencies is presented in Table 2.2. Additional survey participants were identified through information from the RWQCB discharge permit holders and county and state waste management boards. A total of 46 agencies were identified as potential survey participants.

TABLE 2.1
REGIONAL MEETINGS

Area	Date	Number of Attendees	Location
Inland Empire	November 14, 2008	14	Santa Ana Watershed Protection Agency (SAWPA) Office Riverside, California
Los Angeles County/ Ventura County	December 4, 2008	5	Metropolitan Water District of Southern California (MWDSC) Office Los Angeles, California
Orange County	December 11, 2008	12	South Orange County Wastewater Authority (SOCWA) Office Dana Point, California
San Diego County	December 2, 1008	25	SDCWA Office San Diego, California

TABLE 2.2
IDENTIFIED SURVEY PARTICIPANTS BY SUBREGION

Inland Empire	Los Angeles County	Orange County	San Diego County	Ventura County
City of Corona Department of Water and Power	Central Basin Municipal Water District	City of San Clemente	City of Chula Vista	Calleguas Municipal Water District
City of Redlands	City of Los Angeles Bureau of Sanitation	City of San Juan Capistrano	City of Escondido	City of Camarillo; Sanitation District
City of Rialto	County Sanitation Districts of Los Angeles County	Irvine Ranch Water District	City of Oceanside	Camrosa Water District
City of Riverside	Groundwater Replenishment District of Southern California	Moulton Niguel Water District	City of San Diego	City of Oxnard; Public Works Administration
City of San Bernardino Municipal Water District	Los Angeles County Department of Public Works; Office of Water Recycling	Orange County Sanitation District	Fallbrook Public Utilities District	City of Simi Valley
Eastern Municipal Water District	Los Angeles Department of Water and Power	Orange County Water District	Otay Water District	City of Thousand Oaks
Inland Empire Utilities Agency	Metropolitan Water District of Southern California	Southern California Water District	Padre Dam Municipal Water District	County of Ventura
Lake Arrowhead Community Services District	Newhall Land Company	SOCWA	Ramona Municipal Water District	
Rancho California Water District	West Basin Municipal Water District		Santa Fe Irrigation District	
SAWPA			Sweetwater Authority	
Western Municipal Water District			Vallecitos Water District	
Yucaipa Valley Water District				

2.3 Data Collection Process

Data were collected using two methods. For public agencies, the survey was used to collect data. For private or other nonpublic facilities, information was collected from the California NPDES permit databases that are maintained by the RWQCBs.

2.3.1 Public Agency Survey

The survey was sent electronically to the 46 identified agencies. Each agency then completed the survey components relevant to their agency. For example, the Sanitation Districts of Los Angeles County sent in surveys for wastewater quality and quantity, brineline/interties, industrial dischargers, and ocean outfalls. Any missing or incomplete data were identified and the study team worked with the agency to fill in these data gaps (as described in the next section of the report).

The data collection process occurred between December 2008 and August 2009. The responsibility of contacting agencies regarding missing or incomplete data was shared among the BEMT members, Reclamation, and the study team. As a result of the data collection process, survey data were received from 42 of the 46 identified agencies (91 percent). Of the 42 surveys received, 41 were complete with no missing or incomplete data. Table 2.3 presents the number of surveys received and completed in each subregion. Based on the responses received from these agencies, a total of 122 wastewater treatment plants were identified, as well as 53 groundwater desalting facilities, 19 ocean outfalls, and 28 major brinelines/interties.

TABLE 2.3
SUMMARY OF SURVEYS RECEIVED AND COMPLETED

Subregion	Number of Survey Meeting Participants	Number of Surveys Received	Number of Surveys Completed
Inland Empire	12	12	12
Los Angeles County	8	8	8
Orange County	8	8	8
San Diego County	11	9	8
Ventura County	7	5	5
Total	**46**	**42**	**41**

2.3.2 Private Facility Data

Information on industrial outfalls was collected through the California Integrated Water Quality System (CIWQS) database, which is accessed through the www.waterboards.ca.gov website. A list of all major (discharges greater than 1 million gallons per day [mgd]) and minor NPDES permits by RWQCB is available. Information was sought for Regions 4, 8, and 9. The database and

website allow access to individual permits, amendments, and other regulatory documents.

The industrial information corresponded to power plants, refineries, and shipbuilding sites. Seventeen sites were identified. The NPDES permit information available through the CIWQS database revealed four other sites having permits for ocean discharge. Three of these were naval bases and the fourth was SeaWorld Park – all four sites are in the San Diego region. Table 2.4 provides a list of the private facilities in southern California.

Information on discharge location and general nature (and for some cases water quality) of discharge is available in the NPDES permits. More specific information on the length, material, and future plans of the outfalls was sought through direct contact to the industrial sites. In all cases these requests were turned down due to security reasons. Discharge for the power plants was typically via one or two outfalls.

TABLE 2.4
PRIVATE DISCHARGE FACILITIES IN SOUTHERN CALIFORNIA

Facility Name	Agency / Discharger	Location		Receiving Water	Notes
		City	County		
Power Plants					
Mandalay Generating Station	RRI Energy Mandalay, Inc.	Oxnard	Ventura	Pacific Ocean	
Ormond Beach Generating Station	RRI Energy Ormond Beach, Inc.	Oxnard	Ventura	Pacific Ocean	
Scattergood Generating Station	Los Angeles Department of Water and Power (DWP)	Playa Del Rey	Los Angeles	Santa Monica Bay (Pacific Ocean)	
Redondo Generating Station	AES Redondo Beach, LLC	Redondo Beach	Los Angeles	Santa Monica Bay (Pacific Ocean)	
El Segundo Generating Station	El Segundo Power, LLC	El Segundo	Los Angeles	Santa Monica Bay (Pacific Ocean)	
Harbor Generating Station	Los Angeles Department of Water and Power (DWP)	Wilmington	Los Angeles	Los Angeles Harbor (Pacific Ocean)	
Haynes Generating Station	Los Angeles DWP	Long Beach	Los Angeles	San Gabriel River (within the estuary)	
Long Beach Generating Station	Long Beach Generation LLC	Long Beach	Los Angeles	Long Beach Harbor (Pacific Ocean)	
Generating Station, Huntington Beach	AES Huntington Beach LLC	Huntington Beach	Orange	Pacific Ocean	

TABLE 2.4
PRIVATE DISCHARGE FACILITIES IN SOUTHERN CALIFORNIA

Facility Name	Agency / Discharger	Location		Receiving Water	Notes
		City	County		
SONGS UNIT 2	Southern California Edison – San Clemente	San Clemente	Orange	Pacific Ocean	Dedicated outfall
SONGS UNIT 3	Southern California Edison – San Clemente	San Clemente	Orange	Pacific Ocean	Dedicated outfall
Encina Power Plant	Cabrillo Power 1 LLC	Carlsbad	San Diego	Pacific Ocean	863.5 mgd
South Bay Power Plant	Duke Energy North America, LLC	Chula Vista	San Diego	South San Diego Bay	Uses discharge channel
Refineries					
Los Angeles Refinery, Carson Plant	ConocoPhillips Company	Carson	Los Angeles	Dominguez Channel within the estuary	One discharge point; 11 mgd of treated wastewater
El Segundo Refinery	Chevron USA, Inc.	El Segundo	Los Angeles	Santa Monica Bay (Pacific Ocean)	Up to 27 mgd: 6.45-mgd refinery wastewater, 2.34-mgd treated petroleum (hydrocarbon) contaminated shallow well groundwater, 4-mgd intermittent sources, 14-mgd rainfall runoff which may be contaminated
Shipbuilding					
BAE Systems San Diego Ship Repair (formerly Southwest Marine Shipyard)	Southwest Marine Inc.	San Diego	San Diego	San Diego Bay	Approximately five sources with less than 0.5 mgd; largest periodic effluent is up to 9 million gallons used as floating drydock ballast
National Steel & Shipbuilding Co	National Steel & Shipbuilding Co	San Diego	San Diego	San Diego Bay	Nine discharge points; minor discharges totaling less than 5 mgd; largest periodic discharge is floating ballast 110 mgd

TABLE 2.4
PRIVATE DISCHARGE FACILITIES IN SOUTHERN CALIFORNIA

Facility Name	Agency / Discharger	Location		Receiving Water	Notes
		City	County		
Naval Base					
Naval Base San Diego	US Navy Southwest Division	San Diego	San Diego	San Diego Bay	Multiple sites with many discharge points
US Naval Base Coronado	US Navy Southwest Division	San Diego	San Diego	Pacific Ocean	A number of low-volume discharge sites
US Naval Base Point Loma	US Navy Southwest Division	San Diego	San Diego	Pacific Ocean	Mostly low-volume discharge sites; includes 6-mgd multistage flash cooling water discharge
Miscellaneous					
SeaWorld, San Diego	Anheuser-Busch, Inc.	San Diego	San Diego	Mission Bay	9.36 mgd via two outfalls

2.4 Data Review and Gap Analysis

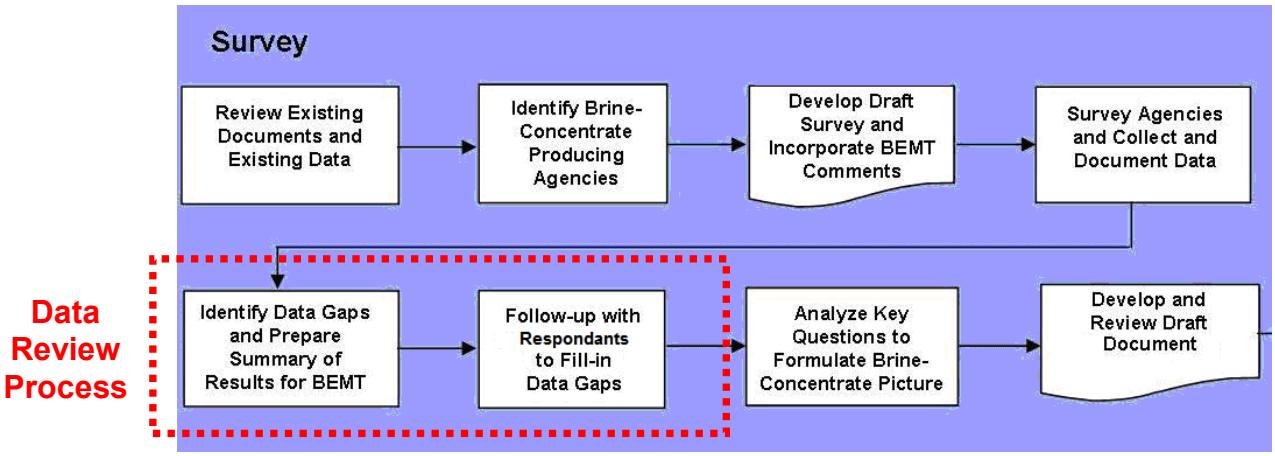
The next step in the data collection process was to identify and, where possible, resolve gaps in data, as shown on the schematic of the data review process presented in Figure 2.2. To accomplish this, a review of each of the survey components was conducted to assess the quality, level of detail, and adequacy of the data. A summary of the usefulness of the data in each survey component, as well as an explanation of how data gaps were filled is provided in this section.

The completed data compiled during the survey are provided in Attachment C, in which each survey component is provided as follows:

- Attachment C.1 - Wastewater Treatment Plant Permit and Water Quality Information
- Attachment C.2 - Wastewater Treatment Plant Flow Information
- Attachment C.3 - Industrial Discharger Data
- Attachment C.4 - Ocean Outfall Information
- Attachment C.5 - Brinelines, WWTP Land Outfalls, and Sewer Interconnection Information

The information contained in these attachments is based on responses from survey participants and collected as part of the survey process.

FIGURE 2.2 SCHEMATIC OF THE DATA REVIEW PROCESS



2.4.1 Wastewater Treatment Plant Permit and Water Quality Information

Survey responses and data collection for this component provided representative data for each region of the study area for analysis. Key data such as the discharge location and nearest brine-concentrate facilities were approximately 90 percent complete. Data compiled as part of the Initiative were substituted for missing data on this survey. Discharge permit information and effluent quality data obtained from the survey requests were less complete; however, these data were adequate for the analysis. In addition, some data were completed using information obtained from the RWQCBs.

2.4.2 Wastewater Treatment Plant Flow Information

Gathering data on WWTP flows in southern California was very important; therefore, much of the data collection, review, and secondary collection efforts focused on resolving gaps in these data. In particular, identification of wastewater plants with existing or planned membrane processes was critical, as these data are used to project future brine-concentrate flows and to identify regions with potentially critical brine-concentrate management issues. These data also were used to help complete and verify the brineline and outfall components. Of the 119 plants identified in this survey, 22 plants projected generating brine-concentrate flows by their ultimate buildout.

Where agencies did not respond or provide complete data on plants identified as having or planning to use membranes, efforts were made to complete this portion of the survey through previous reports, internet data sources, environmental documents, and through previous data survey efforts such as the Initiative. Overall, the data collected for this component were successful. Projections of flows for 2020 through 2035 might have lower accuracy in a few cases because of changing priorities in planning, as well as the level and detail of planning that an agency completes for future years.

2.4.3 Groundwater Desalter and Groundwater Cleanup Treatment Plant Capacity and Discharge Data

Data collection efforts for groundwater desalters and cleanup facilities focused on plants that generated brine-concentrate. A total of 53 groundwater desalters and cleanup site plants were identified as part of the survey. Of these facilities, 51 had projected some level of brine-concentrate generation by ultimate buildout.

Where agencies did not respond or provide complete data, follow-up calls, previous reports, internet sources, environmental documents, and previous data from the Initiative and research surveys were used to complete the data. Overall, these data are complete; however, projections of future flows might be less accurate as a result of varying levels of agency planning.

2.4.4 Industrial Discharger Data

Only about a dozen agencies responded to the request for industrial discharge data that might be pertinent to brine-concentrate management issues. Because the wastewater and groundwater projections were much more vital, little effort was made to collect additional data for this component. In addition, many agencies do not collect this type of data. The data collected were deemed adequate for purposes of providing the study team with a snapshot of the type of users, TDS levels, water quality, and discharge or permitting concerns. A majority of the data came from annual Pretreatment Program Reports.

2.4.5 Ocean Outfall Information

Overall, 19 public and private industrial outfalls were identified. Initial data collection efforts yielded limited responses, of which most provided only partial information. Additional effort was made to fill in data gaps for public facility outfalls in southern California. Where brine-concentrate flows were high or potentially problematic in terms of capacity limitations or water quality, additional efforts were made to clarify the survey data collected and to resolve gaps. However, for many of the outfalls, data were difficult to collect or difficult to compile in a structured survey due to the complexities of how agencies manage outfalls and how outfalls are permitted. For example, capacity limits provided as survey responses by some agencies are the non-pumped limits. However, most have the ability to pump discharges above this amount through their outfall during peak flow and/or high-tide conditions. These also can be permit-listed values, leading to a wide range of special conditions. For example, some outfall permit limits are based on the capacities at the upstream WWTPs and WRPs that discharge to the outfall system, but the outfall system is capable of conveying flows greater than this permitted limit.

In general the data collected for the public agency outfall were adequate for identifying potential problems related to the brine-concentrate projects for that region. For private industrial outfalls, only a minor amount of data is available from their permits as obtained from the RWQCBs. The study team made efforts to collect these data; however, a majority of the private dischargers would not release information for security reasons. If any of these outfalls are deemed as a potential brine-concentrate management option for a region or agency, then it is recommended that the private owner be contacted to obtain information.

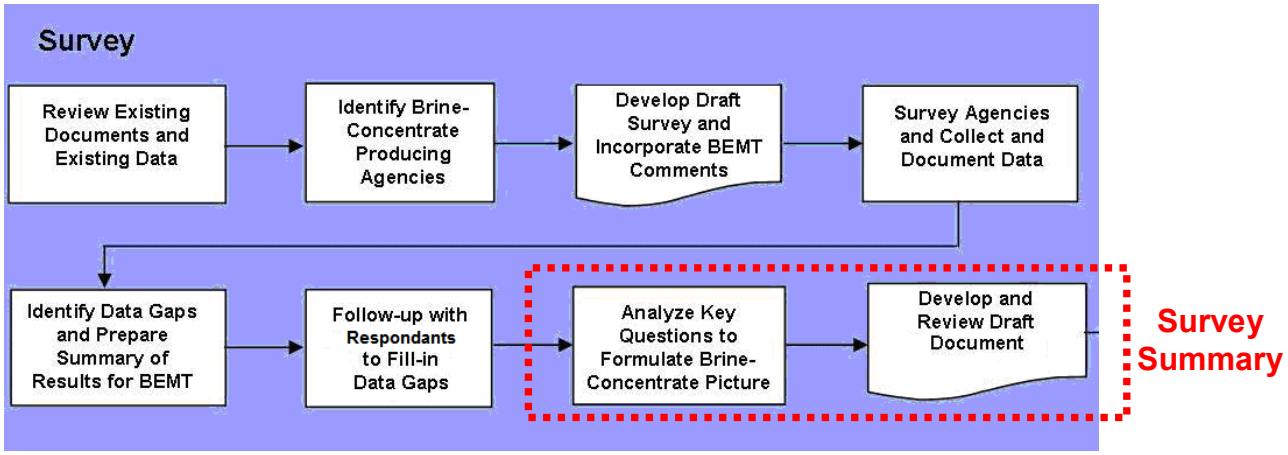
2.4.6 Wastewater Treatment Plant Land Outfalls, and Sewer Interconnection Information

Original data collected under the Initiative effort were limited and incomplete for brinelines, land outfalls, and sewer interconnections; initial requests on this survey component were not comprehensive. For this reason, additional efforts were made to resolve data gaps after the initial survey requests by means of multiple communications with agencies or by utilizing information found in other reports and documents. Similar to the ocean outfall, capacity data for some of these systems might have some discrepancies. In addition, flow data tend to vary greatly because of peak flows and because some systems to convey treated or untreated sewage water along with brine-concentrate flows. Overall, the data collected for these facilities enabled the study team to identify and quantify those regions and system where brine-concentrate management issues are likely to occur in the future.

3 Regional Brine-Concentrate Outlook

The final step in developing the survey process was to analyze data and summarize key data to develop a clear picture of the outlook for brine-concentrate management in southern California, as presented in the schematic shown in Figure 3.1. The following subsections summarize the results from each region, as well as the overall study area.

FIGURE 3.1 SCHEMATIC OF THE SURVEY SUMMARY PROCESS



3.1 Ventura County Region

Nine wastewater facilities, seven groundwater desalters, and three outfall systems exist or are planned in the Ventura County region. Figure 3.2 shows the major WWTPs/WRPs, groundwater desalters, and brine conveyance facilities. Conveyance facilities in this region include brinelines and public and private outfalls. Currently, the existing facilities that generate brine-concentrate are in the Oxnard area. In the future, brine-concentrate facilities will develop along the Salinity Management Plan pipeline (SMP). The SMP is a new brineline being constructed in phases; its alignment runs from a western terminus in the inland area northeast of Oxnard to the Simi Valley in the east.

FIGURE 3.2 - MAJOR WASTEWATER, GROUNDWATER, AND OUTFALL FACILITIES IN THE VENTURA COUNTY REGION

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

N

0 2 4 Miles

Wastewater Treatment Plants
- Land Discharge
- Recycled Water Only
- Stream Discharge
- Ocean Discharge
- Other

Desalination Facilities
- Existing Groundwater Desalter
- Planned Groundwater Desalter
- Proposed Seawater Desalination Plant

Industrial Ocean Outfalls
- Power Plants
- Industrial/Others

Wastewater Outfalls
- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Features
- Highways
- Rivers
- Water Bodies

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3.1.1 Brine-Concentrate Facilities

As part of the survey, nine facilities were identified as existing or planned brine-concentrate generators as shown in Table 3.1. Figures 3.3 and 3.4 show the locations of the brine-concentrate facilities and relative scale of projected brine-concentrate flows for the 2010 and ultimate timeframes. In the Ventura County region, brine-concentrate generation increases approximately sixfold between the existing (2.68-mgd) to the ultimate buildout (15.84-mgd) condition. Under existing conditions, two facilities generate brine-concentrate—the Groundwater Recovery Enhancement and Treatment (GREAT) Program Desalter Facility in Oxnard and the Port Hueneme Water Agency Brackish Water Desalter. In 2010, the amount of brine-concentrate generated will almost double when the Oxnard Advanced Water Purification Facility (AWPF) comes online. For ultimate buildout, three facilities generate 78 percent of the brine-concentrate. These facilities include the Oxnard AWPF, the GREAT Program Desalter Facility, and the Camarillo Groundwater Desalter (Wells A and B). Information about these facilities is provided in Attachment C.

Two publicly owned outfall facilities are in the Ventura County region. The Oxnard Ocean Outfall System is projected to convey 3.63 mgd of brine-concentrate by 2010 and 10.31 mgd by 2035. This system receives flows from the Oxnard WWTP, Oxnard AWPF, and the GREAT Program Desalter Facility through a brineline. The Hueneme Outfall is projected to convey up to 0.8 mgd of brine-concentrate flow by 2010 and up to 5.30 mgd by 2035. The Hueneme Outfall conveys flow from five WWTPs/WRPs, six desalters, and the Calleguas SMP system.

In addition to the publicly owned outfall facilities, the Ventura County region has two major NPDES permits for power plants discharging to the ocean. One of these discharges to the ocean at Mandalay County Park between the cities of Ventura and Oxnard. The other private outfall facility discharges to the ocean through the Ormond Beach Effluent Pipeline ocean outfall owned by Reliant Energy, LLC.

Also, the Las Virgenes Municipal Water District has two discharges to Las Virgenes Creek. These stream discharges originate from the Ahmanson Ranch facility and the Tapia Water Reclamation Facility (WRF). Additionally, the Ventura WWTP, operated by the Ventura Regional Sanitary District, discharges into the Ventura Channel.

FIGURE 3.3 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE VENTURA COUNTY REGION - 2010

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

N

0 2 4 Miles

Wastewater Treatment Plants
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Between 1 and 3 mgd
- Greater than 3 mgd

Desalination Facilities
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Betwen 1 and 3 mgd
- Greater than 3 mgd

Wastewater Outfalls
- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Industrial Ocean Outfalls
- Power Plants
- Industrial/Others

Features
- Highways
- Rivers
- Water Bodies

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TABLE 3.1
WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE VENTURA COUNTY REGION

Ventura County Region		Current (as of end of 2008)		Planning Year 2010		Planning Year 2015		Planning Year 2020		Planning Year 2025		Planning Year 2030		Planning Year 2035		Planning Year Ultimate	
Facility Name	**Facility Owner**	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)
WASTEWATER TREATMENT PLANT INFORMATION																	
Ahmanson Ranch	Las Virgenes MWD	-	-	-	-	-	-	-	-	-	-	-	-	0.23	0.23	0.23	0.23
Oxnard AWPF	City of Oxnard	-	-	1.75	1.75	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	6.56	6.56	6.56	6.56
GROUNDWATER CLEAN-UP AND DESALTER INFORMATION																	
Camarillo Groundwater Desalter (Wells A and B)	City of Camarillo – Public Works Water Division	-	-	-	-	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Camrosa Groundwater Desalter (Conejo No. 3 and Woodcreek Wells)	Camrosa Water District	-	-	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
GREAT Program Desalter Facility	City of Oxnard	1.88	1.88	1.88	1.88	1.88	1.88	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Port Hueneme Water Agency Brackish Water Desalter	Port Hueneme Water Agency	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Somis Desalter	Calleguas MWD	-	-	-	-	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
South Las Posas Desalter (Moorpark Desalter)	Calleguas MWD	-	-	-	-	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
West Simi Valley Desalter	City of Simi Valley	-	-	-	-	-	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	4.00
Total		**2.68**	**2.68**	**4.43**	**4.43**	**9.55**	**9.55**	**13.43**	**13.43**	**13.43**	**13.43**	**13.43**	**13.43**	**15.84**	**15.84**	**15.84**	**19.24**

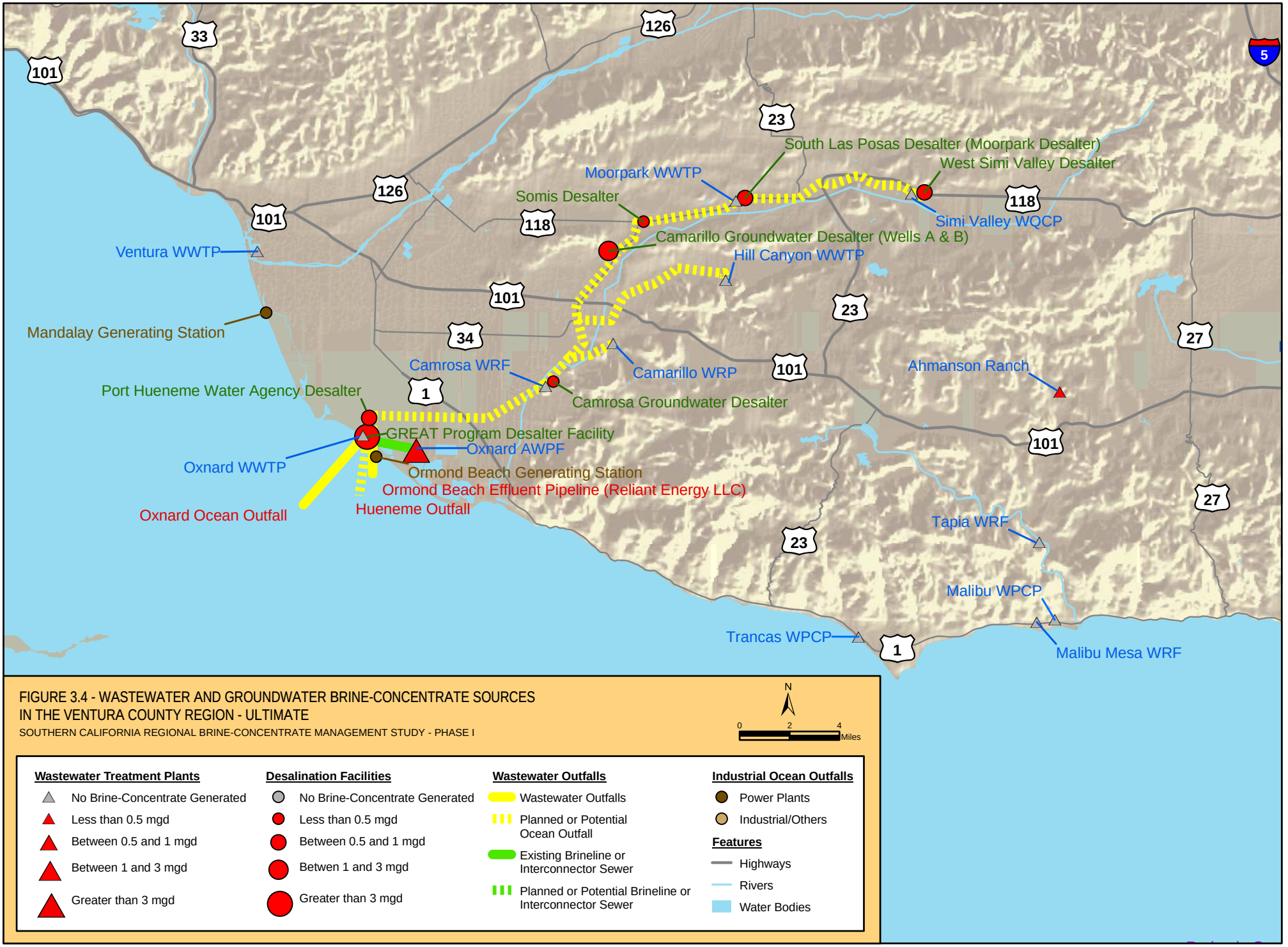

FIGURE 3.4 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE VENTURA COUNTY REGION - ULTIMATE

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

N

0 2 4 Miles

Wastewater Treatment Plants

- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Between 1 and 3 mgd
- Greater than 3 mgd

Desalination Facilities

- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Betwen 1 and 3 mgd
- Greater than 3 mgd

Wastewater Outfalls

- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Industrial Ocean Outfalls

- Power Plants
- Industrial/Others

Features

- Highways
- Rivers
- Water Bodies

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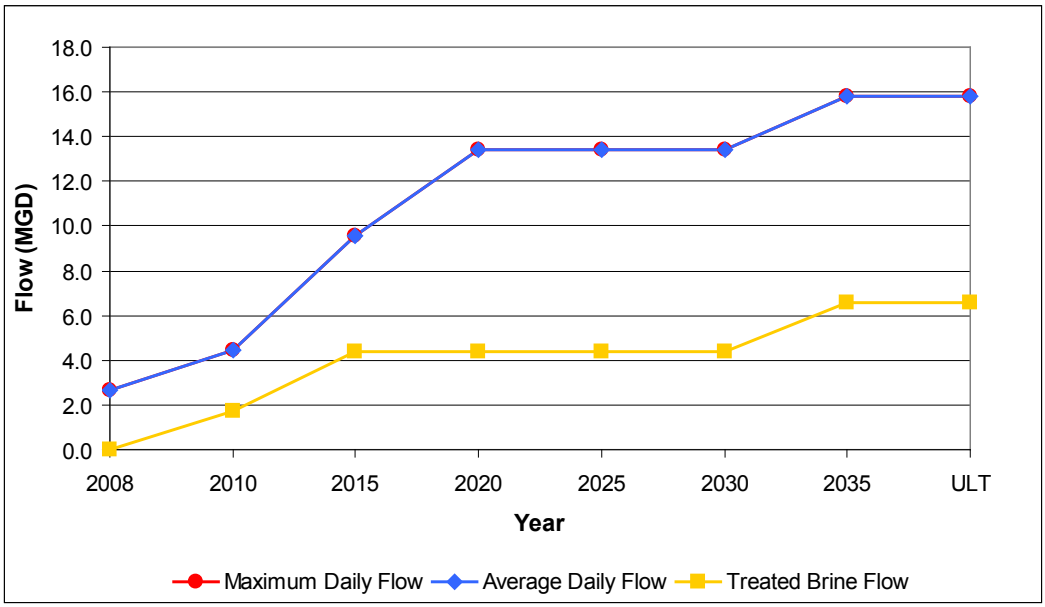
3.1.2 Regional Summary

Brine-Concentrate Flow Summary

In the Ventura County region, projected brine-concentrate flows increase from 2.68 mgd in 2008 to 15.84 mgd by 2035. Figure 3.5 shows a summary of these projected flows. A majority of this flow (100 percent in 2008 and over 57 percent in 2035) is generated from existing and planned groundwater desalters. The remaining brine-concentrate flow is generated from advanced treated MF/RO processes at WWTPs/WRPs. The GREAT Program Desalter Facility is currently the primary generator of brine-concentrate, but the planned Oxnard AWPF will generate most of the flow in the future. As shown in Figure 3.5, brine-concentrate will be treated starting in 2010 at the Oxnard AWPF using wetlands. This treatment will begin by treating 1.8 mgd of brine-concentrate via wetlands prior to disposal via ocean outfall in 2010, and the flow will increase to 6.8 mgd by ultimate buildout.

FIGURE 3.5 BRINE-CONCENTRATE FLOW SUMMARY FOR VENTURA COUNTY REGION



Note: Brine generation is from wastewater treatment and groundwater desalting.

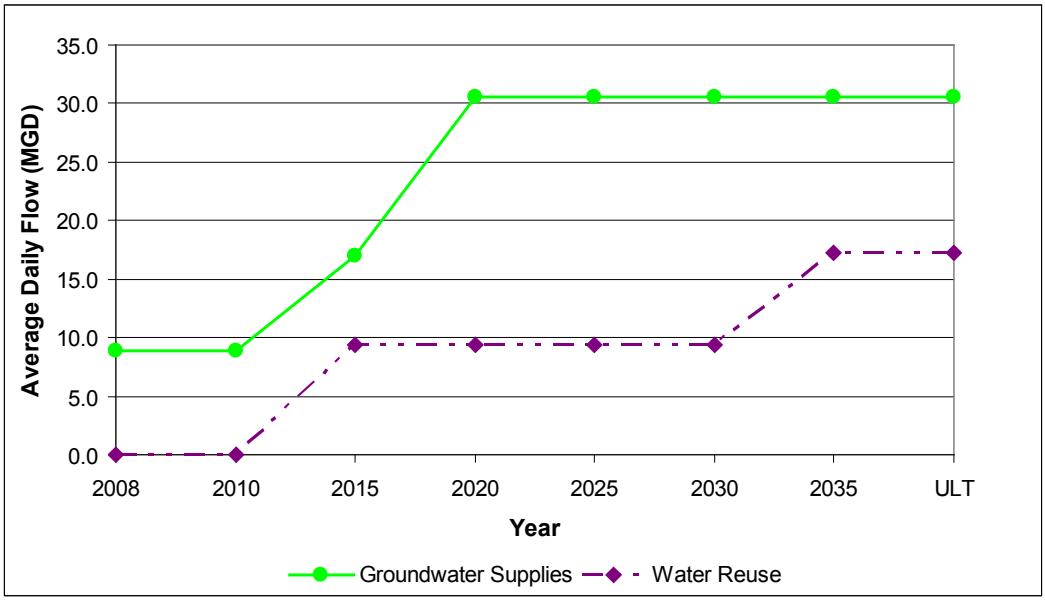
Water Supply Summary

The scarcity of water supply continues because of the limited availability of imported water and the drought, which make even more important the development of reliable and locally controlled water supplies. Groundwater desalting and water reclamation are two methods of developing new reliable and locally controlled water supplies. Consequently, developing a long-term plan for brine-concentrate management for the Ventura County region is of importance. The SMP system is a key component of being able to develop these locally controlled water supplies.

As shown in Figure 3.6, nearly 9 mgd of water supply is currently produced from the use of RO treatment processes. In the future, the projected amount of water supply is approximately 48 mgd, which is more than a fivefold increase in water supplies produced via facilities that will generate approximately 16 mgd of brine-concentrate.

Groundwater supplies generated from these treatment processes increase from approximately 9 mgd to over 30 mgd by 2020. A majority of this flow originates from the GREAT Program Desalter Facility. The use of RO to recover water from WWTPs/WRPs results in an increase of water supply from 0 mgd in 2008 to approximately 17 mgd by 2035. This water is produced for groundwater recharge at the Oxnard AWPF.

FIGURE 3.6 WATER SUPPLIES THAT RESULT IN GENERATION OF BRINE-CONCENTRATE IN THE VENTURA COUNTY REGION



Note: Figure includes WWTP/WRPs, groundwater recharge, seawater intrusion barrier, and brackish groundwater.

Specific Brine-Concentrate Management Projects and Issues

In the Ventura County region, a majority of the brine-concentrate generated is disposed of via brinelines and ocean outfalls. Calleguas' SMP system is key to the region being able to develop brackish groundwater resources. If the SMP is not constructed, then desalting in inland areas will depend on the ability to implement another brine-concentrate treatment or disposal mechanism. Even with the implementation of the SMP and Oxnard brine-concentrate wetlands projects, issues exist that need to be resolved to ensure the success of these projects.

Calleguas SMP System – The Calleguas SMP will be constructed in nine phases and will ultimately connect the West Simi Valley Desalter with the Hueneme Outfall. The SMP will eventually connect six desalters, five WWTPs/WRPs, and a number of industrial dischargers. The initial phase of construction of the project began in 2004 and is scheduled to be completed in 2019. The capacity of the SMP is 20 mgd, which should be sufficient to convey brine-concentrate flow to the ocean. However, if all upstream WWTPs/WRPs discharge all of their flows, then the SMP will not have adequate capacity.

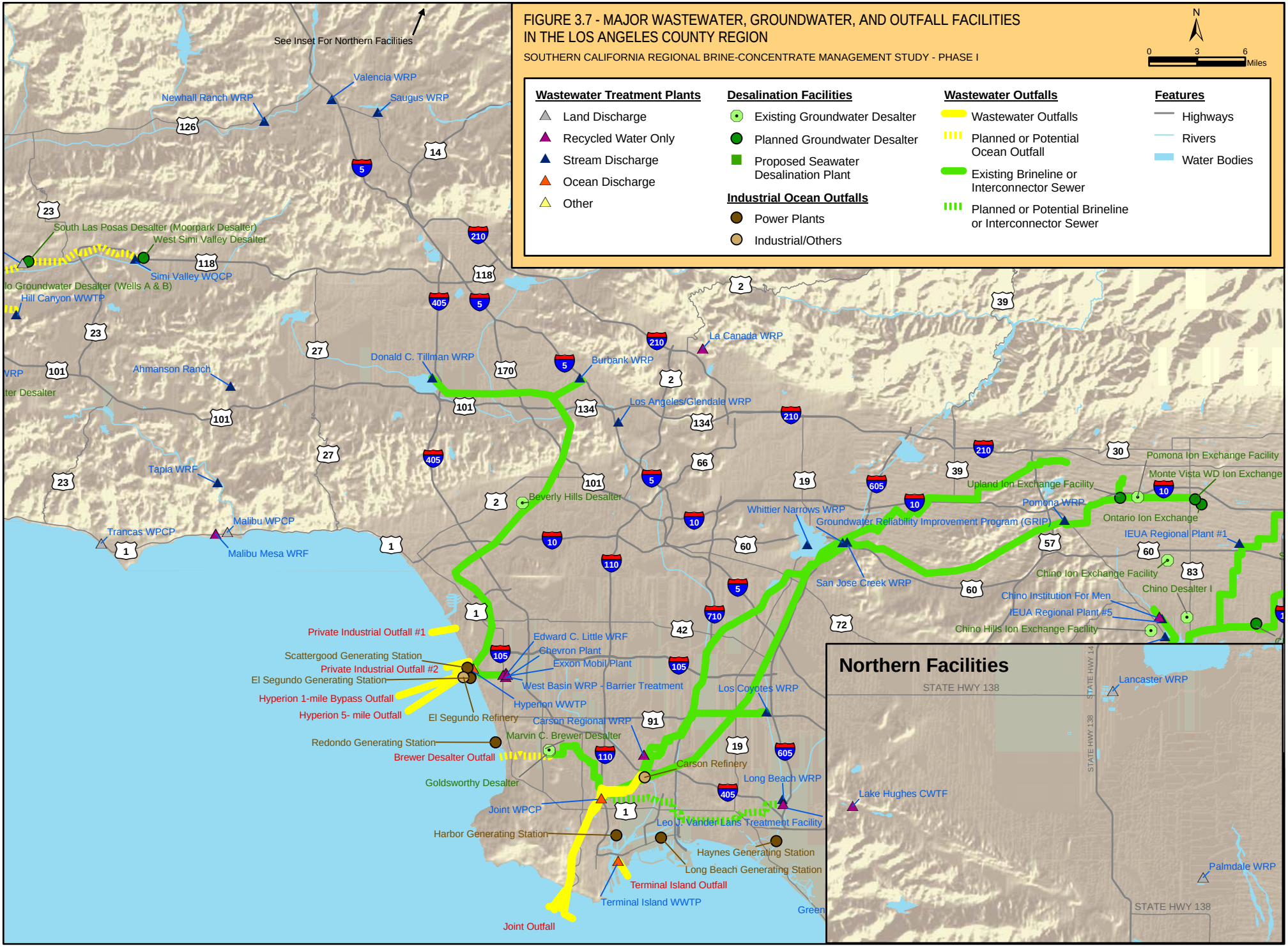
Oxnard AWPF Brine-Concentrate Treatment Wetlands – The AWPF is a part of the City of Oxnard's Groundwater Recovery Enhancement and Treatment program.

The focus of the GREAT program is to use existing water resources more efficiently. To this end, the AWPF will provide the City with reclaimed water that can be used for landscape and agricultural irrigation, industrial process water, and groundwater recharge. The AWPF will be constructed in two phases—the initial phase will treat approximately 8 to 9 mgd of secondary effluent and produce 6.25 mgd of product water; the build-out phase will treat approximately 33 to 37 mgd of secondary effluent and produce 25 mgd of product water. The AWPF will use microfiltration, RO, and advanced oxidation to treat the secondary effluent. The use of RO will result in generation of brine-concentrate.

A portion of the brackish concentrate that an RO system generates will be treated by an innovative wetlands system intended to reduce nutrients, heavy metals, and other toxic compounds while demonstrating the ability to use the concentrate as a beneficial resource. This treatment will begin in 2012 by treating flows ranging from 0.01 to 0.1 cubic feet per second (cfs) of brine-concentrate in a demonstration wetlands. Depending on the wetland performance, the demonstration wetland has hydraulic capability for up to 1.0 cfs. Discharge from the demonstration wetland will be returned to the Oxnard WWTP. This unique application of wetlands treatment is the first of its kind being used to reduce the volume of concentrate flows that use the ocean for an ultimate disposal locale. The City of Oxnard would like to use brine-concentrate to assist in rehabilitating an existing degraded wetland that feeds into the ocean. A long-term study of the efficacy of the brackish wetlands needs to be undertaken to determine if this water could be used to feed these existing degraded wetlands.

3.2 Los Angeles County Region

Twenty-eight wastewater facilities, 8 groundwater desalters, and 6 outfall systems exist or are planned in the Los Angeles County region. Figure 3.7 shows the major WWTPs/WRPs, groundwater desalters, and brine conveyance facilities. Conveyance facilities in this region include brinelines, WWTP interties, as well as public and private outfalls. The Joint Outfall System and Hyperion Outfall are the largest existing brine-concentrate facilities in the system. These systems handle over 90 percent of the flow in the Los Angeles County region.



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3.2.1 Brine-Concentrate Facilities

As part of the survey, 18 facilities were identified to be existing or planned brine-concentrate generators as shown in Table 3.2. Figures 3.8 and 3.9 show the locations and the relative scale of projected brine-concentrate flows for the 2010 and ultimate timeframes for the brine-concentrate facilities. In the Los Angeles County region, brine-concentrate generation increases approximately fourfold between the existing (6.71-mgd) to the ultimate buildout (27.1-mgd) condition. In addition, the West Basin Municipal Water District (MWD) WRPs currently generate over 50 percent of the brine-concentrate in the Los Angeles County region. In 2010, over 70 percent of the brine-concentrate is projected to be generated at the West Basin MWD WRPs (4.50-mgd) and Pomona Ion Exchange (IX) (4.5-mgd) facilities. At ultimate buildout, four facilities are projected to generate almost 80 percent of the brine-concentrate. These facilities include the West Basin MWD WRPs, Pomona IX Facility, Donald C. Tillman WRP, and the Groundwater Reliability Improvement Program (GRIP). Information about these facilities is provided in Attachment C.

There are four publicly owned outfall facilities in the Los Angeles County region. The Joint Water Pollution Control Facility (WPCF) outfall system is projected to convey 12.02 mgd of brine-concentrate by 2010 from WWTP and groundwater desalter sources and approximately 14.24 mgd by 2035. This system receives flows from eight WRPs and seven groundwater desalters through five brinelines or system interties. The Terminal Island Outfall is projected to convey up to 1 mgd of brine-concentrate flow from the Terminal Island Advanced Water Treatment Facility (AWTF) by 2010. The Hyperion outfall conveys flow from 6 WWTPs/WRPs, one desalter, and one brineline to the ocean. This outfall is projected to discharge approximately 4.05 mgd of brine-concentrate by 2010 and up to 7.35 mgd by 2035.

In addition to the publicly owned outfall facilities, the Los Angeles County region has six major NPDES permits for power plants and two for refineries discharging to the ocean or a contiguous estuary. Two of these outfalls are located near the Hyperion WWTP outfall and discharge to the Santa Monica Bay, two discharge to the Los Angeles/Long Beach Harbor area, one discharges to the Wilmington Drain within the estuary, and one discharges to the San Gabriel River within the estuary.

The Sanitation Districts of Los Angeles County (Sanitation Districts) also have two stream discharges in the Santa Clarita Valley. These stream discharges originate from the Valencia WRP.

TABLE 3.2
WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE LOS ANGELES REGION

Los Angeles County Region		Current (as of end of 2008)		Planning Year 2010		Planning Year 2015		Planning Year 2020		Planning Year 2025		Planning Year 2030		Planning Year 2035		Planning Year Ultimate	
Facility Name	Facility Owner	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)
WASTEWATER TREATMENT PLANT INFORMATION																	
Donald C. Tillman WRP	City of Los Angeles Bureau of Sanitation	-	-	-	-	-	-	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
Groundwater Reliability Improvement Program (GRIP)	WRD/Upper San Gabriel Valley MWD-Owners Los Angeles Community Services District (CSD) – Operators	-	-	-	-	2.84	2.84	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25
Leo J. Vander Lans Treatment Facility	WRD (Owner) City of Long Beach (Operator)	0.53	0.53	0.53	0.53	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.20	1.05	1.20
Newhall Ranch WRP	Newhall Ranch Sanitation District	-	-	-	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Terminal Island WRP	City of Los Angeles Bureau of Sanitation	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Valencia WRP	Los Angeles CSD	-	-	-	-	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
West Basin-Carson Regional WRP-RO	West Basin MWD	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63
West Basin WRP-Barrier Treat	West Basin MWD	1.88	1.88	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63
West Basin WRP-Chevron Plant-RO	West Basin MWD	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
West Basin WRP-Exxon Mobil-RO	West Basin MWD	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48

TABLE 3.2
BRINE-CONCENTRATE GENERATORS IN THE LOS ANGELES REGION (CONTINUED)

Los Angeles County Region		Current (as of end of 2008)		Planning Year 2010		Planning Year 2015		Planning Year 2020		Planning Year 2025		Planning Year 2030		Planning Year 2035		Planning Year Ultimate	
Facility Name	Facility Owner	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)
GROUNDWATER CLEAN-UP AND DESALTER INFORMATION																	
Beverly Hills Desalter	City of Beverly Hills	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
City of Chino Ion Exchange Facility	City of Chino/ LA County	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Goldsworthy Desalter	WRD/ City of Torrance	0.63	0.83	0.63	0.63	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Marvin C. Brewer Desalter	West Basin MWD	0.39	0.39	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Monte Vista WD Ion Exchange	Monte Vista WD/ City of Chino	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Ontario Ion Exchange	City of Ontario	-	-	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Pomona Ion Exchange Facility	LA County	-	-	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Upland Ion Exchange Facility	City of Upland/ IEUA/ LACSD	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
TOTAL		**6.71**	**6.92**	**12.82**	**12.82**	**17.48**	**17.48**	**25.20**	**25.20**	**27.07**	**27.07**	**27.07**	**27.07**	**27.07**	**27.22**	**27.07**	**27.22**

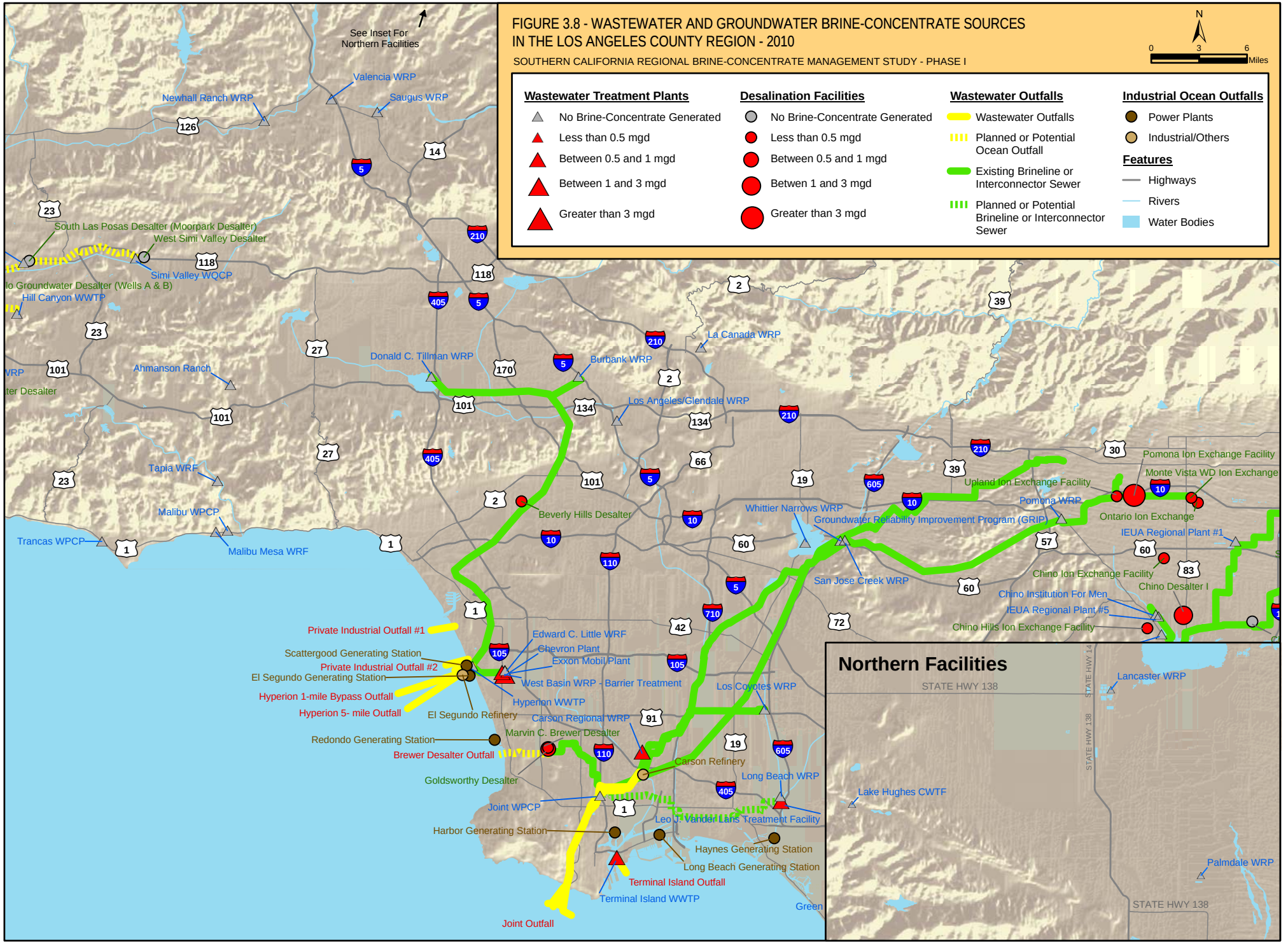


FIGURE 3.8 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE LOS ANGELES COUNTY REGION - 2010
SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I
N
0 3 6 Miles
Wastewater Treatment Plants
No Brine-Concentrate Generated
Less than 0.5 mgd
Between 0.5 and 1 mgd
Between 1 and 3 mgd
Greater than 3 mgd
Desalination Facilities
No Brine-Concentrate Generated
Less than 0.5 mgd
Between 0.5 and 1 mgd
Betwen 1 and 3 mgd
Greater than 3 mgd
Wastewater Outfalls
Wastewater Outfalls
Planned or Potential Ocean Outfall
Existing Brineline or Interconnector Sewer
Planned or Potential Brineline or Interconnector Sewer
Industrial Ocean Outfalls
Power Plants
Industrial/Others
Features
Highways
Rivers
Water Bodies
See Inset For Northern Facilities
Valencia WRP
Newhall Ranch WRP
Saugus WRP
South Las Posas Desalter (Moorpark Desalter)
West Simi Valley Desalter
Simi Valley WQCP
Hill Canyon WWTP
Donald C. Tillman WRP
Burbank WRP
La Canada WRP
Los Angeles/Glendale WRP
Ahmanson Ranch
Tapia WRF
Malibu WPCP
Malibu Mesa WRF
Trancas WPCP
Beverly Hills Desalter
Whittier Narrows WRP
Groundwater Reliability Improvement Program (GRIP)
San Jose Creek WRP
Pomona Ion Exchange Facility
Monte Vista WD Ion Exchange
Upland Ion Exchange Facility
Pomona WRP
Ontario Ion Exchange
IEUA Regional Plant #1
Chino Ion Exchange Facility
Chino Desalter I
Chino Institution For Men
IEUA Regional Plant #5
Chino Hills Ion Exchange Facility
Private Industrial Outfall #1
Edward C. Little WRF
Chevron Plant
Exxon Mobil Plant
Scattergood Generating Station
Private Industrial Outfall #2
El Segundo Generating Station
West Basin WRP - Barrier Treatment
Hyperion 1-mile Bypass Outfall
Hyperion 5- mile Outfall
Hyperion WTP
El Segundo Refinery
Carson Regional WRP
Los Coyotes WRP
Marvin C. Brewer Desalter
Redondo Generating Station
Brewer Desalter Outfall
Carson Refinery
Goldsworthy Desalter
Long Beach WRP
Joint WPCP
Lake Hughes CWTF
Leo J. Vander Lans Treatment Facility
Harbor Generating Station
Haynes Generating Station
Long Beach Generating Station
Terminal Island Outfall
Terminal Island WWTP
Joint Outfall
Northern Facilities
STATE HWY 138
Lancaster WRP
Palmdale WRP
STATE HWY 14

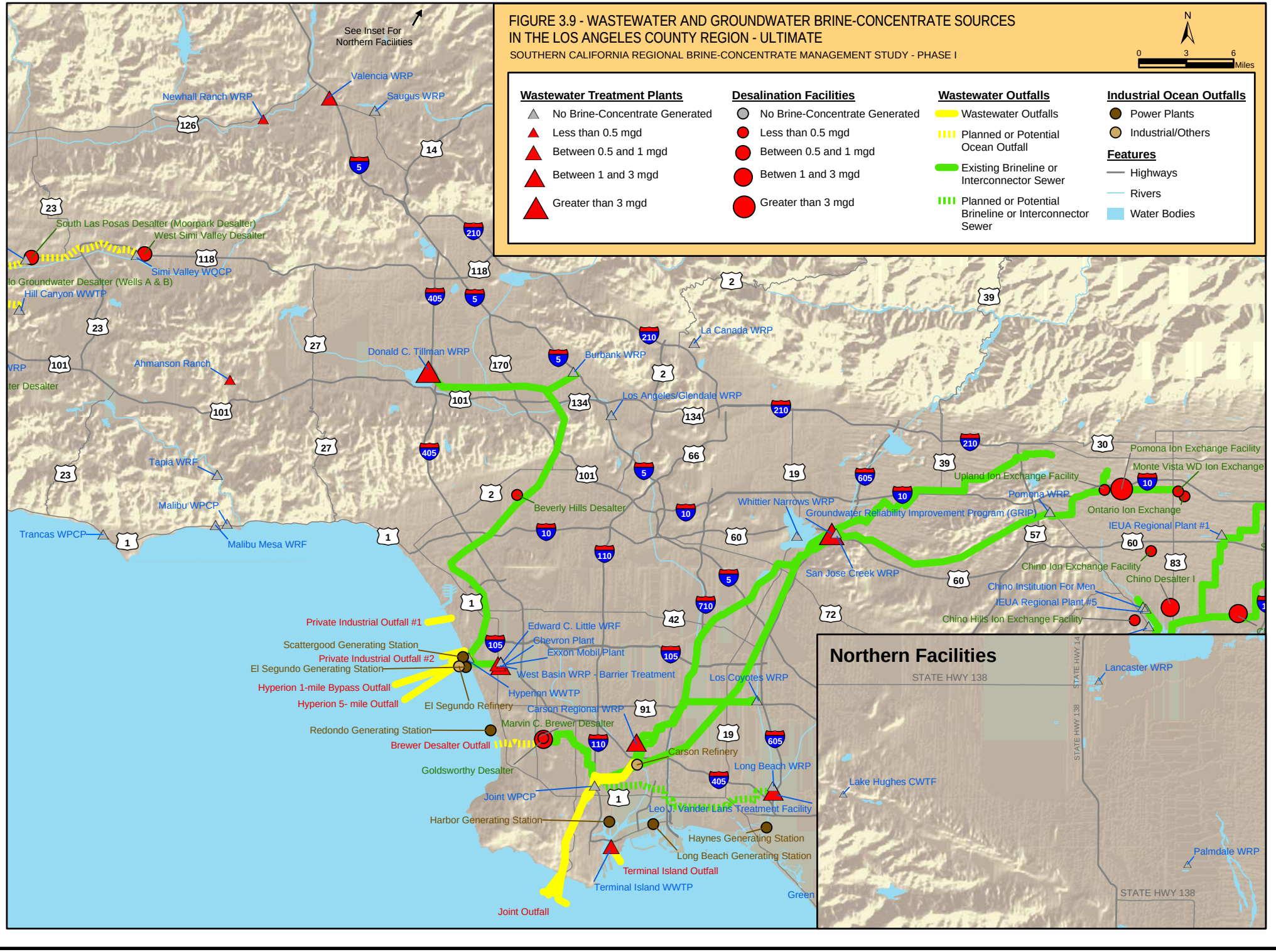


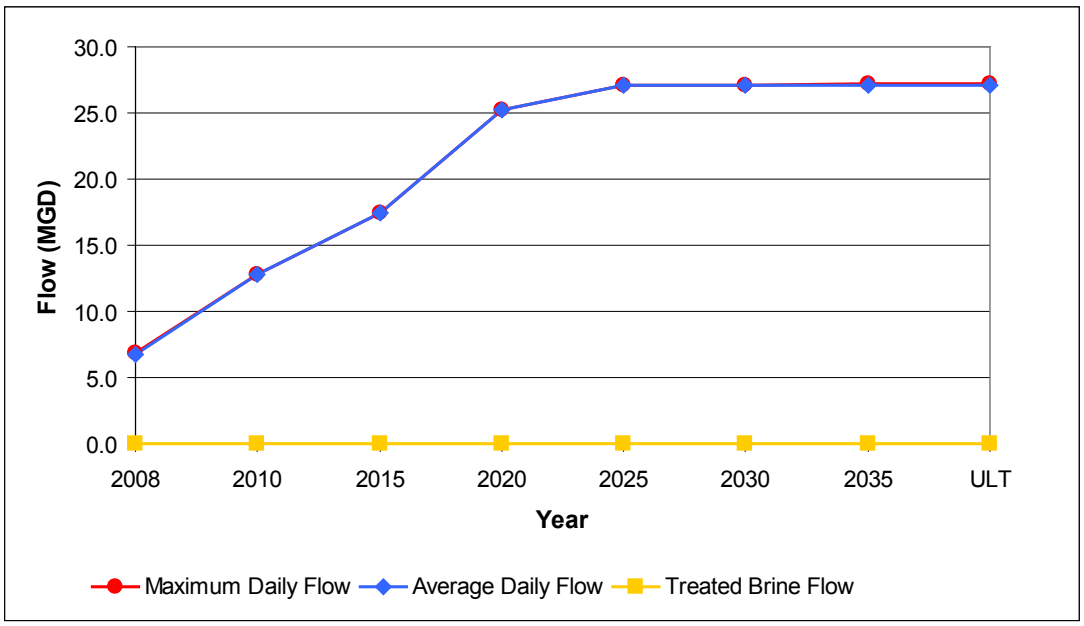
FIGURE 3.9 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE LOS ANGELES COUNTY REGION - ULTIMATE
SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I
N
0 3 6 Miles
Wastewater Treatment Plants
No Brine-Concentrate Generated
Less than 0.5 mgd
Between 0.5 and 1 mgd
Between 1 and 3 mgd
Greater than 3 mgd
Desalination Facilities
No Brine-Concentrate Generated
Less than 0.5 mgd
Between 0.5 and 1 mgd
Betwen 1 and 3 mgd
Greater than 3 mgd
Wastewater Outfalls
Wastewater Outfalls
Planned or Potential Ocean Outfall
Existing Brineline or Interconnector Sewer
Planned or Potential Brineline or Interconnector Sewer
Industrial Ocean Outfalls
Power Plants
Industrial/Others
Features
Highways
Rivers
Water Bodies
See Inset For Northern Facilities
Valencia WRP
Newhall Ranch WRP
Saugus WRP
South Las Posas Desalter (Moorpark Desalter)
West Simi Valley Desalter
Simi Valley WQCP
Hill Canyon WWTP
Donald C. Tillman WRP
Ahmanson Ranch
Tapia WRF
Malibu WPCP
Malibu Mesa WRF
Trancas WPCP
Burbank WRP
La Canada WRP
Los Angeles/Glendale WRP
Beverly Hills Desalter
Whittier Narrows WRP
Groundwater Reliability Improvement Program (GRIP)
San Jose Creek WRP
Pomona WRP
Upland Ion Exchange Facility
Pomona Ion Exchange Facility
Monte Vista WD Ion Exchange
Ontario Ion Exchange
IEUA Regional Plant #1
Chino Ion Exchange Facility
Chino Desalter I
Chino Institution For Men
IEUA Regional Plant #5
Chino Hills Ion Exchange Facility
Private Industrial Outfall #1
Scattergood Generating Station
Private Industrial Outfall #2
El Segundo Generating Station
Hyperion 1-mile Bypass Outfall
Hyperion 5- mile Outfall
El Segundo Refinery
Edward C. Little WRF
Chevron Plant
Exxon Mobil Plant
West Basin WRP - Barrier Treatment
Hyperion WWTP
Carson Regional WRP
Marvin C. Brewer Desalter
Redondo Generating Station
Brewer Desalter Outfall
Goldsworthy Desalter
Los Coyotes WRP
Carson Refinery
Long Beach WRP
Joint WPCP
Leo J. Vander Lans Treatment Facility
Harbor Generating Station
Haynes Generating Station
Long Beach Generating Station
Terminal Island Outfall
Terminal Island WWTP
Joint Outfall
Northern Facilities
STATE HWY 138
Lancaster WRP
Lake Hughes CWTF
Palmdale WRP
STATE HWY 138

3.2.2 Regional Summary

Brine-Concentrate Flow Summary

In the Los Angeles County region, projected brine-concentrate flows increase from 6.71 mgd in 2008 to 27.07 mgd by 2025. Figure 3.10 shows a summary of these projected flows. A majority of this flow (over 75 percent) is generated from advanced treated microfiltration (MF)/RO processes at WWTPs and WRPs. The remaining brine-concentrate flow is from existing and planned groundwater desalters. West Basin WRPs are currently the primary generators of brine-concentrate; however, in the future, the planned GRIP will generate the most flow. As shown in Figure 3.10, no agencies currently plan to implement brine-concentrate reduction or zero liquid discharge (ZLD) treatment technologies.

FIGURE 3.10 BRINE-CONCENTRATE FLOW SUMMARY FOR THE LOS ANGELES COUNTY REGION



Note: Brine-concentrate generation is from wastewater treatment and groundwater desalting.

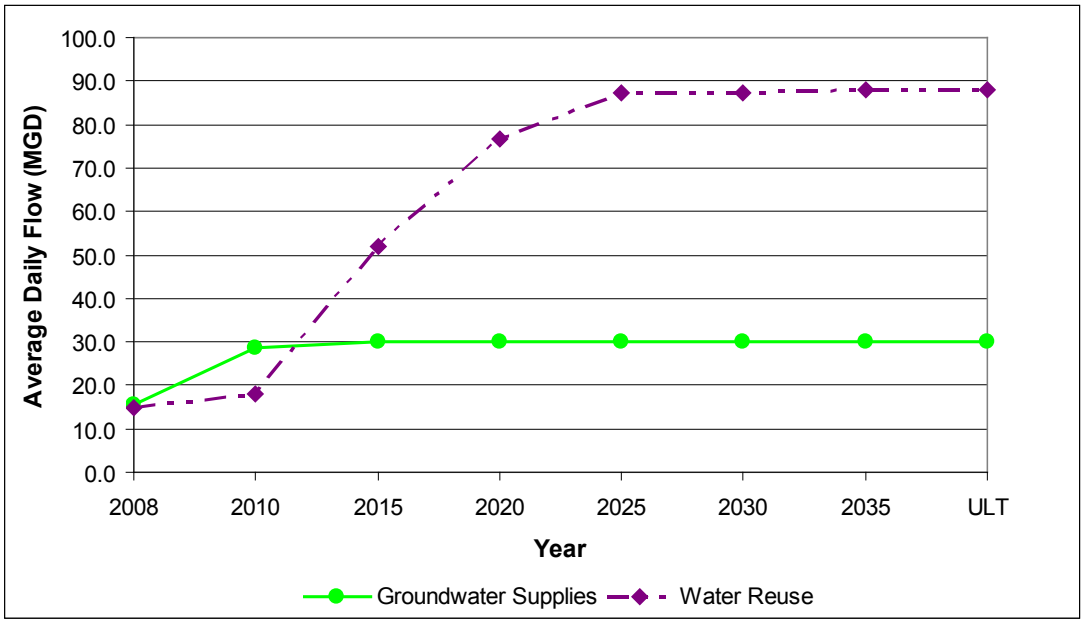
Water Supply Summary

The scarcity of water supply continues because of the limited availability of imported water and the drought, which make even more important the development of reliable and locally controlled water supplies. Groundwater desalting and water reclamation are two methods of developing new reliable and locally controlled water supplies. Consequently, developing a long-term plan for brine-concentrate management for the Los Angeles County region is of great importance.

As shown in Figure 3.11, over 30 mgd of water supply is currently produced from the use of RO treatment processes. In the future, the amount of water supply is projected to be approximately 118 mgd, which is an almost fourfold increase in water supplies from facilities that will generate brine-concentrate. To supply this additional water, approximately 27.07 mgd of brine-concentrate will be generated. Groundwater supplies generated from these treatment processes increase from

approximately 16 mgd to 30 mgd by 2020. The use of RO to recover water from WWTPs/WRPs results in an increase of water supply from approximately 15 mgd in 2008 to 88 mgd by 2035. A majority of this increase is from operation of the Pomona IX Facility and GRIP, both of which use membrane processes to improve water quality so that an existing source can be used for water supply.

FIGURE 3.11 WATER SUPPLIES THAT RESULT IN GENERATION OF BRINE-CONCENTRATE IN THE LOS ANGELES COUNTY REGION



Note: Figure includes WWTP/WRPs, groundwater recharge, seawater intrusion barrier, and brackish groundwater.

Specific Brine-Concentrate Management Projects and Issues

In the Los Angeles County region, a majority of the brine-concentrate produced is disposed via brinelines, interties, and ocean outfalls. Even with the available discharge mechanisms in the region, there are a number of locations where changes in discharge permits or increased water reuse might benefit from implementation of different brine-management strategies. These potential projects and issues were identified from deficiencies noted in the data, information from survey respondents, or information obtained via the regional meetings. In the Los Angeles County region, nine potential projects and issues were identified, each of which is described below. Also, described below is one project not in the Los Angeles County region but is being planned by the Metropolitan Water District of Southern California (MWDSC).

Hyperion WWTP Water Quality – Water quality at the Hyperion WWTP might be affected by advanced treatment at the Donald C Tillman WRP. This advanced treatment would be driven by the need to provide high-quality recharge water for the East Valley Recharge Project. The planned recharge project would result in the implementation of RO at the Donald C Tillman WRP, which would generate up to 3.3 mgd of brine-concentrate. This concentrate is unlikely to result in a significant change in water quality at the Hyperion WWTP because Hyperion currently handles

an average daily flow of 320 mgd. However, if inflows to the Hyperion WWTP drop because of upstream water reuse and the brine-concentrate impacts the influent water quality to the Hyperion WWTP, then this could impact the influent water quality to the West Basin MWD. This would impact West Basin MWD's Title 22 recycled water users and impact their RO operations at their WRPs. West Basin MWD WRPs serve polished water to a number of industrial users for cooling water and boiler make-up water. These uses require consistently high-quality water as specified in the user contracts. If the water quality changes significantly, then West Basin MWD's ability to satisfy these user requirements will be jeopardized.

West Basin MWD Water Quality Requirements – As discussed above, the West Basin MWD WRPs serve polished water to a number of industrial users for cooling water and boiler make-up water. If the water quality changes significantly, then the ability of West Basin MWD to meet its user requirements are jeopardized. Recently due to changes in water quality from the Weymouth WTP, West Basin MWD has had difficulty supplying consistent water quality to users. Water quality fluctuations at Weymouth WTP are the result of different mixes of State Water Project (SWP) water and Colorado River water, both of which serve as water supply sources for Weymouth WTP. Due to recent court decisions that limit the amount of SWP water that can be pumped out of the California Bay-Delta system, more Colorado River water has been used as a supply for the Weymouth WTP. This has resulted in increased TDS at the WTP, which has affected the ability of West Basin MWD to meet user water quality requirements.

The Groundwater Reliability Improvement Program – The Water Replenishment District of Southern California (WRD), the Upper San Gabriel Valley MWD (USGVMWD), and the Sanitation Districts are investigating the feasibility of implementing an indirect potable reuse project that would treat up to 48 mgd of effluent from the San Jose Creek WRP. This product water (46,000 acre-feet per year [afy]) would be used to recharge the central and main San Gabriel groundwater basins. The initial stage of this project is planned to be online by 2015 and the final stage is planned to be in place by 2020. The projected brine-concentrate flows resulting from this project are 2.84 mgd by 2015 and 7.25 mgd by 2020. This project would most likely use existing industrial brinelines or interties between the San Jose Creek WRP and the Joint Water Pollution Control Plant (WPCP).

C. Marvin Brewer Desalter Outfall – The C. Marvin Brewer Desalter uses RO to treat water from a saline groundwater plume prior to supplying the water to users in the West Basin MWD service area. TDS in the groundwater plume is approximately 3,600 milligram per liter (mg/L). Currently, brine from the desalter is conveyed to the Joint Outfall System (JOS) for ocean discharge. West Basin MWD is investigating the potential use of another outfall at the AES Redondo Generating Station.

Leo J. Wander Lans Plant Expansion – WRD is planning an expansion at the Leo J. Vander Lans Plant to produce another 3,000 to 5,000 afy of water. This expansion would allow imported water used to recharge the Alamitos Barrier Project to be replaced. The plant uses MF, RO followed by UV disinfection of treat recycled water for groundwater recharge. These processes would generate approximately

0.53 mgd of brine for discharge to the Long Beach WRP via a sewer. This project will double the brine discharged to the sewer, which will exceed the sewer capacity. A volume reducing technology is necessary to reduce flows so that the brine can be discharged to the sewer.

JOS Rehabilitation or Repair – The Sanitation Districts of Los Angeles County have been investigating methods to rehabilitate or repair the JOS. The condition of the JOS has not been surveyed in a number of years and might not be safe to dewater so its condition can be assessed. For this reason, the Sanitation Districts of Los Angeles County is investigating alternatives to take the existing JOS offline either for a short period to assess the condition of the system or for a longer period to repair or rehabilitation the system. Advanced treatment might be necessary to satisfy water quality requirements if the flow from the JOS is discharged to the Los Angeles Harbor or reused for groundwater recharge. Use of advanced treatment would result in the need to implement concentrate management.

Terminal Island Renewal Energy Project (TIRE) – The TIRE is a project developed by the City of Los Angeles Bureau of Sanitation that is the nation's first and only full-scale application of deep well injection (DWI) technology to convert biosolids into green power and simultaneously sequester greenhouse gases. This project has been injecting brine-concentrate along with Terminal Island WWTP biosolids for the past 13 months via a 6,000-foot-deep well. However, the amount of brine-concentrate that can be injected is limited due to the capacity of the well used for the TIRE project. The addition of brine-concentrate to biosolids creates a bioslurry that is easier to inject than the biosolids alone. The bioslurry is approximately 6 to 8 percent solids. Biosolids without brine-concentrate might not have enough liquid to use for DWI. For gas recovery or energy production in the future, the existing monitoring wells would have to be converted to extraction wells; however, this cannot be done until the biosolids injected create enough pressure.

Currently, all of the biosolids from the Terminal Island WWTP are being injected. To expand injection of brine-concentrate, another well(s) would need to be developed. This well could be shallower (depth of 2,000 feet) than the existing well as long as any underground sources of drinking water (USDW) are not affected. In addition, the U.S. Environmental Protection Agency (USEPA) Class V well will have to be permitted, which includes water quality requirements for TDS.

Santa Clarita River Chloride Total Maximum Daily Load – In the Santa Clarita area, the Saugus and Valencia WRPs, which are owned and operated by Sanitation Districts of Los Angeles County, are facing discharge limitations for chloride. These discharge limits are based on total maximum daily loads (TMDLs) that have been established to improve water quality on the 303(d)-listed Santa Clara River. Currently, the Sanitation Districts of Los Angeles County is working with the RWQCB to determine the amount of chloride that can be discharged from these two plants.

The Sanitation Districts of Los Angeles County has submitted a plan to treat 3.2 mgd of flow from the Valencia WRP using advanced treatment processes (RO, that is) prior to discharge. This advanced treatment will result in concentrate generation of

approximately 0.57 mgd in an inland area where access to brinelines does not exist. For this reason, the Sanitation Districts of Los Angeles County is investigating the use of DWI for concentrate disposal. If the RWQCB does not accept the existing discharge plan and if discharge limitations become more rigid creating the need for additional advanced treatment, the Sanitation Districts of Los Angeles County would likely use a combination of volume-reduction technologies as an initial process before DWI or an ocean outfall were constructed.

Newhall Ranch WRP – The Newhall Ranch WRP is planned for construction in 2015. The Newhall Ranch WRP will discharge to the Santa Clara River; therefore, the discharge will have to satisfy TMDL requirements for chloride and nitrogen. To comply with these requirements 1 mgd of RO treatment will be provided and DWI will be used to dispose of the brine-concentrate. Currently, feasibility studies are being performed on DWI.

Antelope Valley Power Generation – In the Antelope Valley, solar power generators create brine-concentrate as a waste product. This brine-concentrate is generated from the advanced treatment of recycled water for process water at the solar facilities. Currently, the brine-concentrate generated from these pilot solar projects is conveyed to the Sanitation Districts of Los Angeles County WRPs in Lancaster and Palmdale for disposal. The Sanitation Districts of Los Angeles County does not want to be responsible for disposal of the brine-concentrate over a long term. The solar power generators most likely would implement evaporation ponds to dispose of brine-concentrate from the full-scale power generating facilities. However, ZLD might have to be used if the RWQCB will not permit evaporation ponds.

San Joaquin Valley Agricultural Water Recovery Demonstration Project – The MWDSC has approved a project to develop environmental documentation in accordance with the California Environmental Quality Act of 1970 (CEQA). This project would recover excess agricultural flows in the San Joaquin Valley using a series of shallow collection wells. The water from these wells will be treated using pressure filters and chemical treatment for pretreatment, followed by RO to remove salts. The RO system is proposed to produce 9.4 mgd of permeate, which will be blended with a split stream to produce a total of 10 mgd of product water. The brine-concentrate from the RO system will be handled using an enhanced evaporation system that consists of spray evaporators used in conjunction with evaporation ponds. For this project, over 25 acres of earthen-lined ponds will be used.

3.3 Inland Empire Region

There are 33 wastewater facilities and 14 groundwater desalters that exist or are planned in the Inland Empire region; no ocean outfall systems are in the Inland Empire region. However, the Santa Ana Regional Interceptor (SARI) brineline discharges to the ocean through the Orange County Sanitation District (OCSD) ocean outfall No. 1. Figure 3.12 shows the major WWTPs/WRPs, groundwater desalters, and brine conveyance facilities in the Inland Empire. Conveyance facilities in this region include brinelines and WWTP interties.

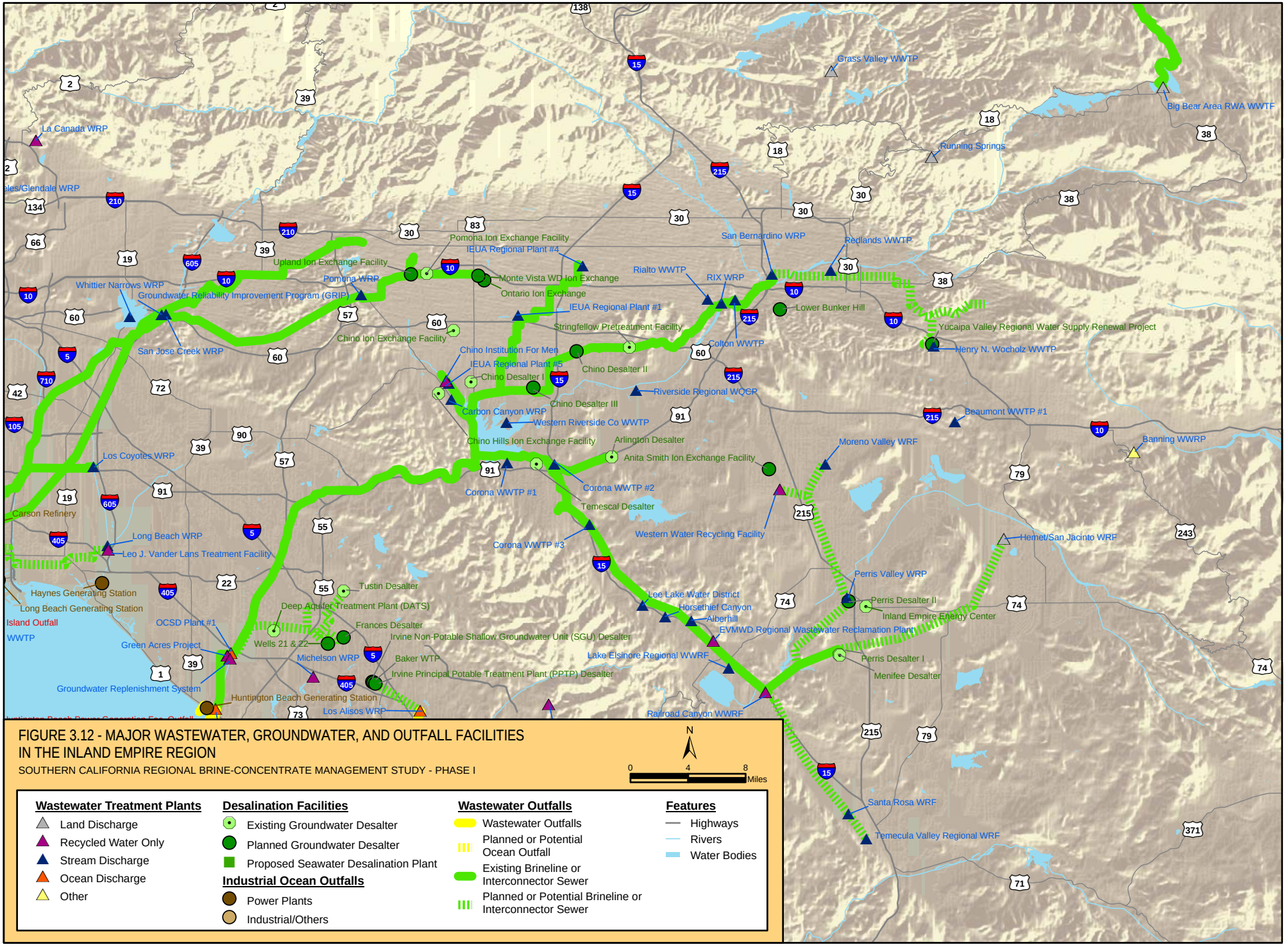


FIGURE 3.12 - MAJOR WASTEWATER, GROUNDWATER, AND OUTFALL FACILITIES IN THE INLAND EMPIRE REGION

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

Wastewater Treatment Plants
- Land Discharge
- Recycled Water Only
- Stream Discharge
- Ocean Discharge
- Other

Desalination Facilities
- Existing Groundwater Desalter
- Planned Groundwater Desalter
- Proposed Seawater Desalination Plant

Industrial Ocean Outfalls
- Power Plants
- Industrial/Others

Wastewater Outfalls
- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Features
- Highways
- Rivers
- Water Bodies

3.3.1 Brine-Concentrate Facilities

As part of the survey, 17 facilities were identified as existing or planned brine-concentrate generators and are listed in Table 3.3. Figures 3.13 and 3.14 show the locations and relative scale of projected brine-concentrate flows for the 2010 and ultimate timeframes for the brine-concentrate facilities. In the Inland Empire region, three desalting facilities account for over 60 percent of the brine-concentrate currently generated. These facilities are the Chino Desalter I (1.90 mgd generated), Chino Desalter II (1.20 mgd generated), and the Temescal Desalter (1.76 mgd generated). The generation of brine-concentrate in the region is planned to triple the existing average daily flow of 7.83 mgd to 23.70 mgd by the ultimate buildout condition. Nine facilities will be generating brine-concentrate in 2010, and this expands to 17 facilities by 2035. Brine-concentrate flows increase to 13.62 mgd in 2015 when the Perris II Desalter comes online and the Chino Desalters I and II are expanded. By buildout six desalters comprise over 55 percent of the total brine-concentrate flow produced. These facilities are the Chino Desalters I and II, Perris Desalter I, Lower Bunker Hill Desalter, and the Yucaipa Valley Regional Water Supply Renewal Project. Information about these facilities is provided in Attachment C.

Because of its geographic location, no publicly or privately owned ocean outfall facilities are in the Inland Empire region. The only flow that can be discharged to the ocean is conveyed to OCSD outfall No. 1 via the SARI pipeline. The SARI brineline is projected to convey nearly 11 mgd of brine-concentrate by 2010 from groundwater desalters, and approximately 23.5 mgd by 2035 from groundwater desalters and the Santa Rosa WRF. The capacity of the SARI is 30 mgd.

Two facilities in the Inland Empire region do not discharge brine-concentrate to the SARI brineline system—the Grass Valley WWTF and the Big Bear Area Regional Wastewater Agency (BBARWA) WWTF. The Grass Valley WWTF is owned and operated by the Lake Arrowhead Community Services Department and discharges wastewater via a land outfall to the Hesperia percolation ponds, which are adjacent to the Mohave River. In addition, the BBARWA WWTF will dispose of brine-concentrate using evaporation ponds in Lucerne Valley for crop irrigation. Currently, these fields are used to grow fodder crops and are irrigated with recycled water.

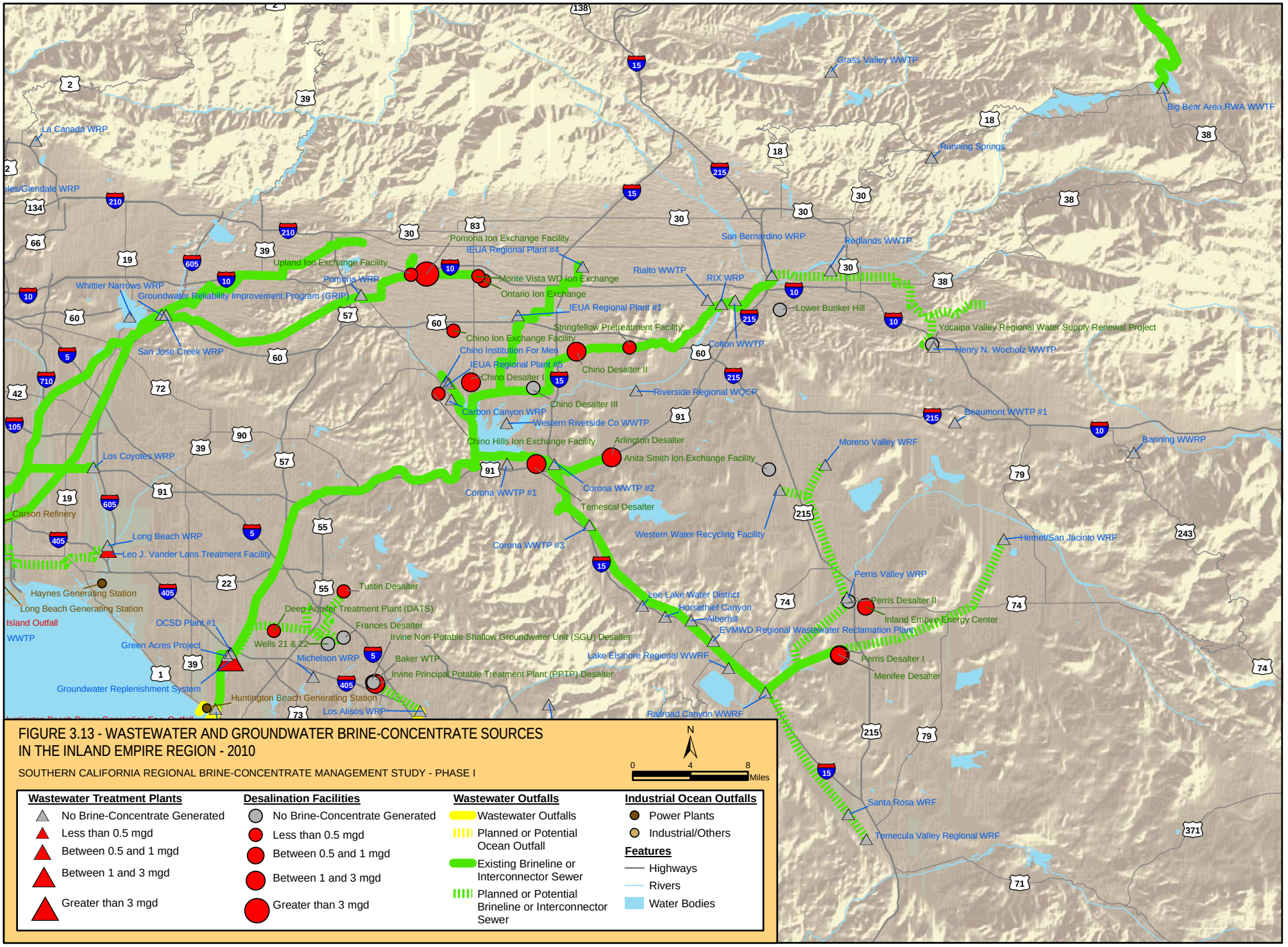


FIGURE 3.13 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE INLAND EMPIRE REGION - 2010

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

N

0 4 8 Miles

Wastewater Treatment Plants
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Between 1 and 3 mgd
- Greater than 3 mgd

Desalination Facilities
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Between 1 and 3 mgd
- Greater than 3 mgd

Wastewater Outfalls
- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Industrial Ocean Outfalls
- Power Plants
- Industrial/Others

Features
- Highways
- Rivers
- Water Bodies

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TABLE 3.3
WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE INLAND EMPIRE REGION

Inland Empire Region		Current (as of end of 2008)		Planning Year 2010		Planning Year 2015		Planning Year 2020		Planning Year 2025		Planning Year 2030		Planning Year 2035		Planning Year Ultimate	
Facility Name	Facility Owner	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)
WASTEWATER TREATMENT PLANT INFORMATION																	
Big Bear Area RWA WWTF	Big Bear Area RWA	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.06	0.06	0.06
Grass Valley Wastewater Treatment Facility	Lake Arrowhead Community Services Department	-	-	-	-	-	-	-	-	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Santa Rosa WRF	Rancho California WD	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.005	0.005
GROUNDWATER CLEAN-UP AND DESALTER INFORMATION																	
Anita Smith Ion Exchange Facility	Western Municipal Water District		-	-	-	-	-	-	-	-	-	-	-	1.08	1.08	1.08	1.08
Arlington Desalter	Western Municipal Water District	0.87	0.87	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Chino Desalter I	Chino Basin Desalter Authority/ IEUA	1.90	2.00	1.90	2.00	2.20	2.30	2.20	2.30	2.20	2.30	2.20	2.30	2.20	2.30	2.20	2.30
Chino Desalter II	Chino Basin Desalter Authority/ Jurupa	1.20	1.20	1.20	1.20	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Chino Desalter III	Chino Basin Desalter Authority		-	-	-	-	-	-	-	-	-	-	-	1.43	1.43	1.43	1.43
Inland Empire Energy Center (IEEC)	Eastern Municipal Water District	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ion Exchange Facility (Chino Hills)	City of Chino Hills/ IEUA		-	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Lower Bunker Hill Desalter	Unknown		-	-	-	-	-	-	-	-	-	-	-	3.75	3.75	3.75	3.75
Menifee Desalter	Eastern Municipal Water District	0.92	1.57	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Perris Desalter I	Eastern Municipal Water District	0.68	1.50	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
Perris Desalter II	Eastern Municipal Water District		-	-	-	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.75	1.75	1.75	1.75

TABLE 3.3
WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE INLAND EMPIRE REGION (CONTINUED)

Inland Empire Region		Current (as of end of 2008)		Planning Year 2010		Planning Year 2015		Planning Year 2020		Planning Year 2025		Planning Year 2030		Planning Year 2035		Planning Year Ultimate	
Facility Name	**Facility Owner**	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)	Average Daily Brine/ Concentrate Flow (MGD)	Maximum Daily Brine/ Concentrate Flow (MGD)
Stringfellow Facility	California Department of Toxic Substances Control		-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temescal Desalter	City of Corona	1.76	2.05	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Yucaipa Valley Regional Water Supply Renewal Project	Yucaipa Valley Water District		-	-	-	-	-	-	-	-	-	-	-	3.00	3.00	3.00	3.00
Total		**7.83**	**9.68**	**10.66**	**10.76**	**13.62**	**13.72**	**13.62**	**13.72**	**13.70**	**13.80**	**13.70**	**13.80**	**23.60**	**23.70**	**23.60**	**23.70**

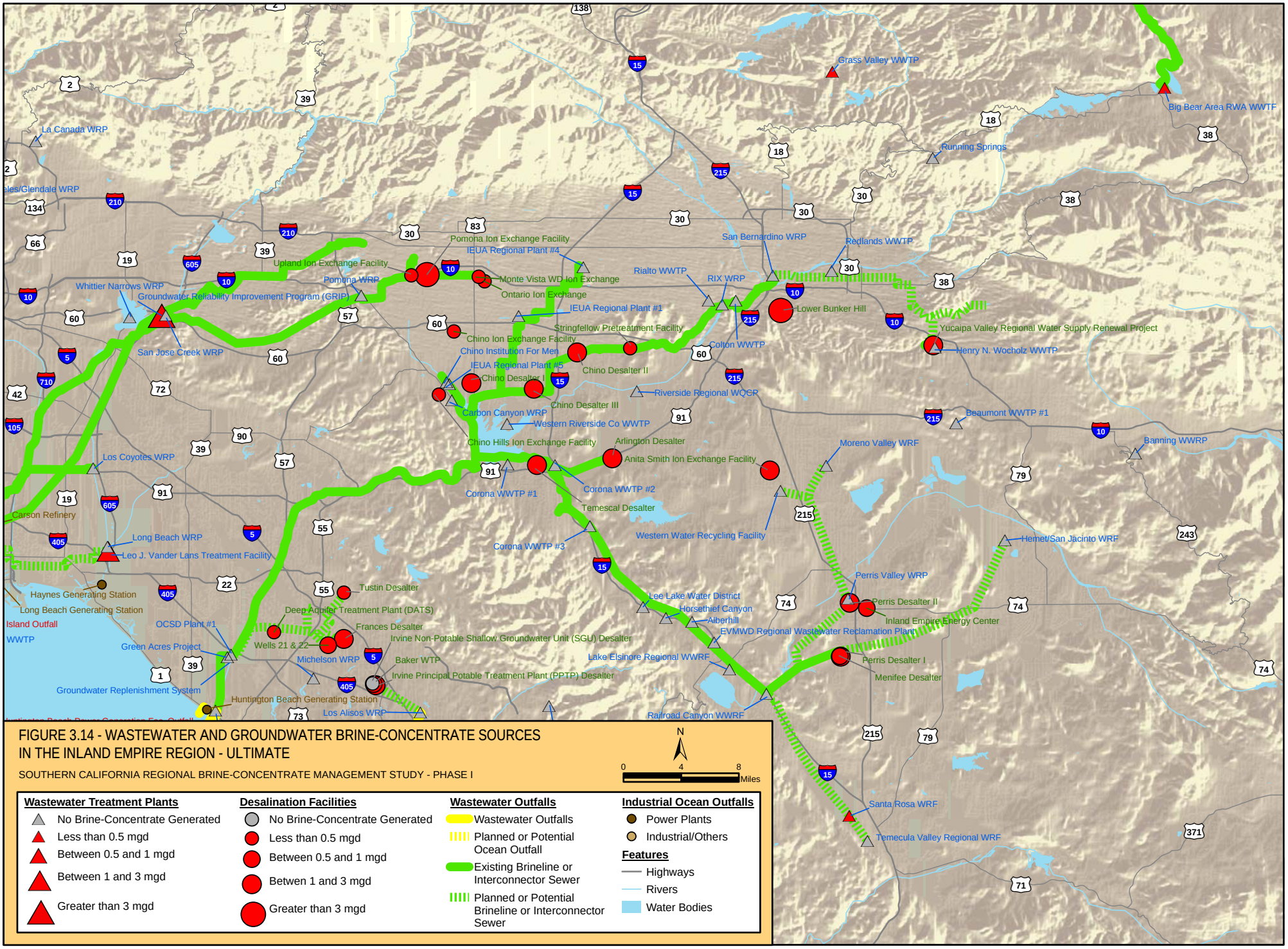

FIGURE 3.14 - WASTEWATER AND GROUNDWATER BRINE-CONCENTRATE SOURCES IN THE INLAND EMPIRE REGION - ULTIMATE

SOUTHERN CALIFORNIA REGIONAL BRINE-CONCENTRATE MANAGEMENT STUDY - PHASE I

Wastewater Treatment Plants
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Between 1 and 3 mgd
- Greater than 3 mgd

Desalination Facilities
- No Brine-Concentrate Generated
- Less than 0.5 mgd
- Between 0.5 and 1 mgd
- Betwen 1 and 3 mgd
- Greater than 3 mgd

Wastewater Outfalls
- Wastewater Outfalls
- Planned or Potential Ocean Outfall
- Existing Brineline or Interconnector Sewer
- Planned or Potential Brineline or Interconnector Sewer

Industrial Ocean Outfalls
- Power Plants
- Industrial/Others

Features
- Highways
- Rivers
- Water Bodies