IMPERIAL IRWMP
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 10

Improve Water Quality

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Chapter 10. Improve Water Quality

California Water Plan Update 2009 Improve Water Quality Management Objective includes the following resources management strategies 14 through 19, as follows:

1. Drinking Water Treatment and Distribution
2. Groundwater and Aquifer Remediation
3. Matching Water Quality to Use
4. Pollution Pretention
5. Salt and Salinity Management
6. Urban Runoff Management

The Imperial IRWMP is required to be consistent with the State's Water Quality Control Plan (RWQCB, 2006) for the Colorado River Basin Region[1]. The Water Quality Control Plan (Basin Plan) defines the beneficial uses for the water bodies in the Imperial Region, establishes water quality standards and objectives to protect the designated beneficial uses, and includes implementation plans to improve water quality where it is impaired.[2]

As described in Chapter 6, some CWP Update 2009 strategies for the Improve Water Quality management objective were moved to reflect the Imperial Region conditions and objectives. The Matching Quality to Use strategy was moved to Increase Water Supply Management (Chapter 7), and Urban Runoff Management is included in Improve Flood Management (Chapter 9).

10.1 Drinking Water Treatment and Distribution

The Water Forum has prioritized Drinking Water Treatment and Distribution strategies because of the critical water quality needs of DACs in the Region. This strategy includes planning and development of facilities to provide a safe, high-quality drinking water supply in compliance with state and federal requirements to protect public health and safety.[3] Opportunities and constraints were discussed at a Water Forum-sponsored Improving Water Quality Workshop on May 17, 2011. The Water Forum adopted the following findings at their March 2012 meeting.

[1] Proposition 84 & Proposition 1E Integrated Regional Water Management Guidelines, Pgs 41-42.
[2] RWQCB, 2006, Basin Plan Table 2-2: Beneficial Uses of Surface Waters in the East Colorado River Basin.
[3] Chapter 17 Title 22 of California Code or Regulations, California Department of Public Health requirements, Environmental Protection Agency Clean Water Act and/or in accordance with Public Utilities Commission General Order 103.

10.1.1 Findings

- When applying for IRWMP grant monies, to the extent possible, identify common needs when developing regional priorities.
    - Define opportunities to interconnect the drinking water treatment systems to reduce the risks of catastrophic supply interruption.
    - Address raw and treated water storage needs and opportunities.
    - Encourage and support multiple connections to potable and new water delivery and storage facilities from IID and/or other sources for municipal water purveyors.
- *Consider opportunities* to consolidate drinking water treatment facilities.
- Imperial Region disadvantaged communities (DACs) need technical, management and financial support to design projects, so they are ready to proceed to compete for state and/or federal funds.
- The Imperial IRWMP should be used to inventory project-level investments to:
    - Address public health or environmental emergencies.
    - Repair, rehabilitate, or replace treatment, collection, and/or distribution systems.
    - Attain compliance with applicable state and/or federal regulatory requirements.
    - Meet applicable local service levels and future requirements consistent with the respective agencies' General Plans.
- Use the Imperial IRWMP to match projects to available funds.
- Establish how local rates and assessments should be used to meet local matching fund requirements for state and/or federal grants.
- Develop the region's political capital to minimize local competition, establish regional priorities, and define integration opportunities and approaches for generating local funds to leverage state and federal monies and invest in needed infrastructure.

10.1.2 Planning Principles

Utilities must be well managed locally to ensure long-term sustainability of collection, treatment, and distribution systems. The local water and wastewater utilities must be well maintained and operated with sufficient local funding. The Water Forum expressed support for the following water quality planning principles:

- Strong professional staff that are viewed as advocates for clean and safe water in the community and on the state and federal levels. In addition, utilities must have employee development and training programs that ensure that utility staff has the skills needed to manage, operate and maintain the utility using best management practices.
- Full cost-of-service pricing systems that encourage local communities to establish rates that reflect, to the maximum extent practicable, the system's true life-cycle costs, including debt service, and that can support long-term management needs.

- Sustainable management approaches, including asset management and environmental management systems that proactively ensure long-term viability of each component of the system while simultaneously ensuring compliance with local, state, and federal environmental regulations.
- A culture of constant innovation and research into new technologies and management approaches that support best management practices – including conservation, efficiency, and reuse – and a system to ensure transparency and public participation so the utility remains accountable to ratepayers and the general public.

The Water Forum recognizes that even if local utilities do all of the above and are managing their systems using best management practices, federal and state assistance in financing infrastructure will continue to be essential for many Imperial Region communities. In addition, significant and continuing state and federal investment is needed to help Imperial Region agencies meet their obligations under the Clean Water Act and the Safe Drinking Water Act. Specifically, the Water Forum supports the following:

- Reauthorize and fund Clean Water and Safe Drinking Water State Revolving Fund Programs with appropriations that reflect financing needed to meet requirements.
- Improve administration of State Revolving Loan Fund to (1) streamline the application process, (2) provide increased flexibility for the State to determine project eligibility and environmental compliance standards with public input, (3) encourage innovative partnerships that bring diverse stakeholders together for more effective broad-based solutions, and (4) reduce paperwork burdens on communities.
- Flexible forms of need-based financing to assist communities that do not have the rate base to support conventional or State Revolving Fund (SRF) loan financing costs, including extended loan terms, loan forgiveness programs and grants. DACs in the Imperial Region face costly environmental challenges and expenses to correct problems and/or meet regulatory and security requirements.
- Affordability criteria that are more comprehensive should be developed by the State to use in allocating SRF financing.
- Increase federal support for California to administer clean water programs, including:
    - Support for technical assistance to small communities.
    - Federal investment for research and development of treatment and infrastructure technologies and asset management strategies that improve the life-cycle of drinking water treatment systems.
    - Support development of a program to educate the public about the benefits and economic importance of water and wastewater infrastructure.

The Water Forum supports strategies that encourage participation by the general public and the business community to ensure clean and safe water for the Imperial Region, including:

- Water suppliers entering partnerships and cooperative relationships with the business community to develop innovative, cost-effective solutions to infrastructure sustainability.

- Public-private partnership decisions that are made locally based on what local officials determine is most appropriate for preserving and enhancing water supply systems.
- Elected officials and non-governmental organizations, including public health organizations, advocacy groups, business associations and other civic organizations, playing a leadership role in highlighting the importance of water infrastructure and continued investment in it.
- A continued commitment to public outreach to increase the public's support for investment in infrastructure for a clean, safe water supply.

10.1.3 Imperial Region Conditions

Surface water imported from the Colorado River provides the vast majority of water in the region. IID supplies wholesale water to all Imperial Region cities and developed communities except Ocotillo though an open channel, gravity system that transports untreated Colorado River water to delivery gates (turnouts) for each water supplier for treatment. Water treatment and distribution facilities vary from city to city but the basic process is similar throughout the IID service area. Wholesale raw water is received from IID canals is stored prior to treatment and distribution. A treatment facility typically includes a screening and filtration system. After screening, the water goes through clarifiers and additional filtration to remove smaller particles. After being filtered and clarified, the water undergoes disinfection to remove viruses and bacteria, and can be pumped directly into the distribution system or stored in treated water reservoirs.

In remote areas, some residents have untreated canal water plumbed into their homes for nonpotable uses and are required to have a drinking water contract with a water company. To comply with US Environmental Protection Agency (USEPA) requirements and avoid termination of canal water service, residents in the IID service area who do not receive treated water service must obtain alternative water service for drinking and cooking from a state-approved provider. To avoid penalties that could exceed $25,000 a day, IID strictly enforces this rule. The section tracks nearly 4,000 raw water service accounts required by the California Department of Public Health (CDPH) to have alternate drinking water service. IID maintains a small-acreage pipe and drinking water database, and provides an annual compliance update to CDPH (IID, 2007),

Table 10-1 lists laterals and canals that provide water to Imperial Region water treatment plants. Of the communities listed in Table 10-1, only Brawley, Calexico, El Centro, and Imperial have redundant connections to multiple canals. Heber is upgrading its water treatment plant and a redundant pipeline connection will be constructed to provide water from the Central Main Canal. This project will begin construction once funding is secured.

Table 10-2 lists the annual average daily demand flow through water treatment facilities in the region. The table also includes design capacity, planned future capacity, and type of storage available in each community.

Table 10-1. Canals that Provide Water to Water Treatment Plants

Imperial Region Cities	Canals that Supply the Water Treatment Plants
Brawley	Mansfield Canal and Central Main Canal
Calexico	Date Canal and Dahlia Lateral1
Calipatria[*]	C West Lateral Gate 38
El Centro	Date Canal anal and Dahlia Lateral 1
Heber[*]	Dogwood Canal Gate 37
Holtville[*]	Pear Lateral
Imperial	Newside Canal and Dahlia Canal
Niland[*]	C West Lateral Gate 38
Seeley[*]	Elder Canal
Westmorland[*]	Westmorland Canal

[*] Communities in italics do not have recommended redundancy.

Source: Service area plans for Holtville (Oct 2006), Brawley (Feb 2007), Calipatria (Nov 2004), Westmorland (Mar 2005); URWMP for Calexico (Mar 2007), El Centro (Mar 2006), Imperial (Dec 2005).

Table 10-2. Imperial Region Water Treatment Plants

Imperial Region City/Community	Average Daily Demand (MGD)	Capacity (MGD)	Future Capacity (MGD)	Raw Water Storage (MG)	Treated Water Storage (MG)
El Centro	7.8	21	63	40	10
Calexico	6.7	16	16	25	8
Brawley	8.4	15	30	35	9
Imperial	1.8	7	7	10	6
Calipatria[*]	2.5	6	8	9	9
Holtville	3	3.15	6	9	3.9
Westmorland	0.7	2	4	2	1.05
Heber	1.1	2	16	5.8	5.5
Seeley	0.29	0.75	---	2	1.3
Niland[*]	---	---	---	---	---

* Southern California Water Company services both Calipatria and Niland

+ From Service Area Plans, 2004-2007

Stakeholders were identified early in the process through interviews conducted by the IRWMP Facilitator, Dale Schafer, and during the disadvantaged communities (DAC) outreach (GEI, 2011). Water treatment plant and water distribution network concerns faced by almost all of the communities include:

- Inadequate treated water storage
- Inadequate fire flows
- Aging and inadequate water distribution networks
- Limited financial capacity to plan and fund improvements

IID recommends that each city have enough storage capacity to meet seven to 10 days of peak month demand in case of canal shutdowns for required maintenance or catastrophic supply interruption. Many cities and smaller communities do not have the minimum required storage capacity and it is recommended that this capacity be expanded improve water supply reliability.

Many of the water distribution systems were installed in the 1960s and have been slowly upgraded. Older pipe segments consist of cast iron pipe or asbestos lined cement pipe. Older cast iron pipe is heavily corroded from alkaline soils and water in the region. Also, solids in water tend to accumulate in cast iron pipe over time, causing a decrease in effective pipe diameter which, in one case, has reduced the capacity by half (City of Holtville, 2006). Since the 1980s, polyvinyl chloride (PVC) pipe has been used due to its relatively low cost and long life expectancy.

Many of the cities and some communities have developed flow models to identify which pipe segments are undersized and require replacement. Replacement provides for future growth and helps provide recommended fire flows. Developers are required by local communities to install 8-inch pipe segments in new development to keep future replacement pipe to a minimum.

Water rates in most Imperial Region water systems are not adequate to address new regulatory requirements, maintain the facilities, or generate adequate reserves for replacements. Financing major improvements to the water distribution network is a hurdle these communities have to face.

10.1.4 Opportunities – DAC Projects, Regional Facilities, Training Programs

This section discusses opportunities and potential alternatives to address identified water quality challenges and needs.

10.1.4.1 Develop Disadvantaged Communities (DAC) Projects

All of the Cities except the City of Imperial are disadvantaged communities (DACs) that can access State grants and low interests loans. Some funding is specifically set aside for disadvantaged communities, but is contingent on project's inclusion in the Region's IRWMP. Two major funding programs for California public water systems include the Drinking Water State Revolving Fund (DWSRF) and Proposition 84, which could help improve water distribution networks.

The Imperial IRWMP can be used to define, quantify and integrate drinking water supply system infrastructure and financing needs so that regional funding priorities can be established.

At the May 2011 Improving Water Quality Workshop, drinking water treatment and distribution project concepts and integration themes were discussed. The objective was to identify where the Cities had a need in common and where a regional program could be developed, and demonstrate success for the IRWMP process. Regional themes identified included:

- System interconnection
- Raw and treated water storage
- Water distribution system improvements
- Multiple connections to IID canals
- Integrating projects under themes of Increased Reliability and Catastrophic Supply Interruption

The workshop participants also identified specific projects including:

- Connecting Imperial Valley College to the City of Imperial
- Connecting Niland to Calipatria for wastewater treatment
- Connecting Westmorland to Brawley
- Creating an intertie between the El Centro and Imperial drinking water systems
- Upgrading school district wastewater treatment facilities

10.1.4.2 Investigate Consolidation of Drinking Water Treatment Systems into Regional Facilities

Consolidation of drinking water treatment systems and developing long term plans for cost-effective consolidation or regionalization of facilities should be considered. Prior studies evaluated consolidation of drinking water treatment facilities (Black and Veatch, 1992), which reviewed both regional drinking water and wastewater treatment facilities. This report found that:

> *Regional facilities are in the best interest of the Imperial Valley because they would provide services where they are needed on an area-wide basis. The Regional approach is also desirable because it provides economy of scale and eliminates duplication of effort*.

The Black and Veatch report also stated that all contacted city representatives agreed that regional plants would benefit the region because rates would be stabilized and future regulations would be met by a central administrative entity.

A separate report, prepared for the Imperial Valley Treated Water Task Force (Black and Veatch, 1994), presented results of a feasibility study of four proposed alternative methods to provide high quality, affordable treated drinking water to Imperial Valley residents. The four alternatives were developed by the Imperial Valley Treated Water Task Force, which also reviewed financial and institutional aspects of the alternatives. The Imperial Region has continued to maintain independent systems and has not further sought to create regional facilities.

10.1.4.3 Extending Drinking Water Distribution Systems to Rural Areas

Extending drinking water distribution systems to adjacent developed rural areas has been studied (CDM, 2006) (CDM, 2007). The CDM 2007 report demonstrated benefits of providing a safe and reliable water source to unserved households in unincorporated areas of the Region. However, the cost-effectiveness, defined as number of households that could be connected per dollar spent, of alternatives varied greatly. Given the probability that sufficient funding would not be available to implement all of the alternatives, a phased implementation approach was recommended.

A number of projects have been funded by Safe Drinking Water State Revolving Funds (DWSRF). However, limited funding has been received from the DWSRF for annexation projects. The City of Holtville is the only entity in the Imperial Region to use funding from the DWSRF to annex previously un-serviced or underserviced residences into their service area.

10.1.4.4 Expand Training and Professional Development Programs

At the Projects Work Group Meeting on November 16, 2011, participants raised discussed the need for trained, educated, and certificated staff to run drinking water and wastewater treatment plants. It was noted that experienced persons are retiring and it is hard to recruit, train and retain qualified staff. Imperial Valley Community College has Workforce Development Training Programs and water treatment courses students can take to meet the American Water Works Association training requirements and obtain certification. Additional course work, or certification for business and management, was identified as a potential opportunity to improve financial, technical, and management capacity of DAC public works staff. Opportunities to fund scholarships through economic development or other grants and to further design education and training programs were supported and it was recommended that a team be formed to identify specific educational and training programs and funding.

10.1.5 Imperial Region Constraints

This section discusses constraints associated with water quality challenges and needs.

Primary constraints are related to:

- Most cities and smaller utility districts lack the technical, managerial, and financial capacity to prepare engineering plans and implement projects.
- Increased costs to maintain, operate, and repair existing treatment plants and distribution facilities.
- The cost to maintain and replace aging and failing water and wastewater pipes are not known by the public, impacting willingness to pay and funding for system maintenance.
- Increased state and federal regulatory compliance requirements and costs.
- Resources to plan, engineer, and obtain environmental compliance for projects to meet future needs, or to seek and obtain grants are lacking.
- Ability and willingness to pay higher rates is limited.

Many projects are single-purpose and are intended to serve an individual community, and though they provide water quality and supply benefits within the region, many do not provide multiple benefits, partners, or water management strategies. The Cities are operating independently and there may not be the political will to evaluate regional facilities or consolidations. Increased regulatory requirements and increasing costs to capitalize, operate, administer, and maintain facilities may move independent operators to review economies of scale.

Because all Cities in the Imperial Region except the City of Imperial are economically disadvantaged, drinking water treatment and distribution projects are eligible for regional funding under Proposition 84. However, the needs are far greater than available Proposition 84 funds, placing these communities in competition with each other for the available funding.

10.1.6 Relation to Other Water Management Strategies

- **Local Land Use Planning and Management** - The general plans and capital facilities plans must be consistent with existing or planned treatment plant capacity so new development can be provided drinking water and wastewater services.
- **Urban Water Use Efficiency** - A water conservation program could also alleviate or delay some of the costs to upgrade distribution systems or treatment plants. This would also help to keep water rates low and the level of service high.

10.2 SALT AND SALINITY MANAGEMENT

The CDWR Salt and Salinity Management Strategy is described in the CWP as a way to manage total dissolved solids (TDS) in a water supply so that the ability to put water to beneficial uses is not adversely impacted (CDWR, 2009a). The salt level can limit the use of available supply if the water is degraded beyond its ability to be put to use, or it may increase the treatment costs necessary to allow the water to be used.

10.2.1 Findings

- Salt and salinity management are essential in the Imperial Region due to the salt content in the Colorado River water (1 ton of salt per acre-foot of imported water).
- Salt and salinity management are integrated with the other management strategies or as part of existing practices and programs, and no new activities or actions have been identified.
    - In the IID service area, growers incorporate leaching, subsurface tile drainage, soil amendments and other salinity management practices as a part of their regular farming activity.
    - Programs, both private and public, support growers in managing the salt that comes in with Colorado River water supplies. The QSA/Transfer Agreements include mitigation flow to the Salton Sea (2003-2017).[4]

[4] In 2001, an Amended Joint Petition of the Imperial Irrigation District and the San Diego Water Authority was filed with the

  - Desalination RMS (Chapter 7) includes a clause addressing removal of salts from drain water, brackish groundwater, and/or other water sources and anticipates requirements for brine disposal.
  - Stakeholders have proposed desalinization projects as part of IRWMP implementation.
  - Recycled Municipal Water RMS (Chapter 7) includes projects and programs that could change drain flows and potentially affect salinity. Decreased drain flow or increased salinity may require mitigation for identified impacts.

- Regional stakeholders should actively engage in efforts to address the Salton Sea to realize benefits and avoid impacts to the region.
- Imperial Region is not recommending additional new programs or projects related to salt and salinity management as part of the IRWMP.

10.2.2 Imperial Region Conditions – Policy, Environment, Salinity Sources, Management

10.2.2.1 Policy Environment

The Basin Plan of the Colorado River Basin Regional Water Quality Control Board (Region 7) defines RWQCB activities to protect water quality consistent with the established beneficial uses of the waters within the Imperial Region. The Basin Plan designates the beneficial uses of water (e.g.; agriculture, municipal, industrial) and establishes standards and objectives to protect water quality. Salinity is a constituent that can limit designated beneficial uses, and the Basin Plan has goals and objectives based on total dissolved solids (TDS) concentrations for water bodies based on the designated beneficial use. The general objective for TDS, found in Chapter 3 – Section H of the Basin Plan, states the following:

> *Discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such an increase in total dissolved solids does not adversely affect beneficial use of receiving waters.*

Additionally, discharges from agricultural sources shall not cause concentration of TDS in surface waters to exceed the limits in Table 10-3.

State Water Resources Control Board for approval of a long-term transfer of conserved water pursuant to an agreement between IID and SDCWA, as well as a petition by IID to change the purpose and place of use and the point of diversion under Permit No. 7643 (Application 7482). Additional details can be accessed from the SWRCB project archives website. In October 2011, IID and the San Diego County Water Authority filed a joint petition requesting changes to the State Water Resources Control Board's Revised Order WRO 2002-0013. These changes would allow for an early-start approach to ecosystem enhancement and preservation while assisting in the ongoing efforts to mitigate impacts on the Salton Sea from the 2003 Quantification Settlement Agreement.
Source: IID website: "State Water Resources Control Board" 7 Jul 2012.<http://www.iid.com/index.aspx?page=212>

Table 10-3.Surface Water Quality Salinity Limits

Receiving Waters	TDS (mg/L)	
	Annual Average	Maximum
New River	4,000	4,500
Alamo River	4,000	4,500[5]

The general and measurable objective for the Salton Sea is "to reduce the present level of salinity (44,000 mg/L), and stabilize it at 35,000 mg/L unless it can be demonstrated that a different level of salinity is optimal for the sustenance of the Sea's wild and aquatic life."[6]

Given the extreme desert climate, irrigated agriculture in the Salton Sea watershed requires drainage to remove irrigation water applied to leach salts from the root zone of the irrigated lands and away from the irrigated area. To protect the agricultural industry in the Salton Sea watershed, President Coolidge declared specific sections of land under the Salton Sea to be withdrawn from settlement, location, sale, or entry, and reserved for the purposes of creating a drainage reservoir. These declarations were provided in Public Water Reserve No. 90-1 signed in March 1924 and Public Water Reserve No. 114 signed in February 1928. These orders designated the lands below -220 feet mean sea level (msl) at the Salton Sea to be used as a repository to receive and store agricultural, surface, and subsurface drainage waters from Imperial and Coachella valleys.

In 1968, the California legislature adopted a statute declaring the primary use of the Salton Sea to be for the collection of agricultural drainage water, seepage, and other flows (Assembly Bill 461, 1968; Statutes 1968, Chapter 392). The Basin Plan reflects this designation (RWQCB, 2006) stating:

> *The primary purpose of the Salton Sea and the agricultural drains in the Imperial, Palo Verde, Coachella, and Bard Valleys (sic) is for collection, transport, and/or storage of drainage (including subsurface) waters from irrigated cropland in order to maintain adequate soil salinity balance for agriculture in the Region. Although this is clearly the primary purpose of these waters, this cannot be recognized as a beneficial use since federal regulations specify that waste transport or assimilation cannot be designated as a beneficial use for any waters of the United States (as per Clean Water Act, 40 CFR Section 131.10 (a)).*

The SWRCB has an Antidegradation Policy (SWRCB, 1968) that applies only to high quality waters and requires that existing high quality be maintained to the maximum extent possible. The policy allows lowering the quality if the change is consistent with maximum benefit to people of the state, will not unreasonably affect present and potential beneficial uses, and will not result in water quality lower than applicable standards.

[5] Water Quality Control Plan, Colorado River Basin-Region 7, CH 3, Section II-H, Pgs. 3-2 and 3-3. 17 Nov 1993. <http://www.waterboards.ca.gov/coloradoriver/publications_forms/publications/docs/basinplan_2006.pdf>.
[6] Water Quality Control Plan, Colorado River Basin-Region 7, Chapter 3, Section III-C, Pg. 3-7.

10.2.2.2 Salt and Salinity Sources and Sinks in the Region

As described in Chapter 5, salinity in Colorado River water delivered to IID has averaged 744 mg/L over the 21 years from 1989 to 2009. This means that slightly over one ton of salt is imported with every acre-foot of delivered water. If not managed, the salts would accumulate in the agricultural soils in the Imperial Region, impacting irrigation uses, soil productivity, and crop production. Irrigation practices, on-farm drains, and IID's regional drainage system are designed to manage salt. The drainage network consisting of over 1,400 miles of drainage ditches used to collect surface runoff and subsurface drainage from 32,227 miles of tile drains underlying 462,202 acres of farmland conveys drainage water to the New River, Alamo River, which flow to the Salton Sea, while some discharge directly to the Salton Sea. IID drain water over the period 2003-2009 ranged from a low of 1,300 mg/L to a high of over 4,000 mg/L, with an average of 2,245 mg/L. The salinity of the New River, Alamo River, and groundwater was described in Chapter 7.

The Salton Sea, like all closed-basin lakes, is saline due to the accumulation of salts through evaporation, which averages eight feet (84 inches) per year in the Imperial Region. Prior to the 1905 inflow of the entire discharge of the Colorado River to the Salton Sea, large amounts of salts had accumulated on the ancestral sea bed which lies below sea level with no external drainage. The Salton Sea was a dry lake bed where local runoff would collect, the water would evaporate and the dissolved solids would be left. There is evidence that the basin has been occupied periodically by multiple lakes. Once inundated by the current sea, these salts rapidly dissolved. This re-dissolution of salts, combined with high evaporation rates and minimal inflows, caused the salinity to quickly rise to above 40,000 mg/L by 1925. The salinity decreased in the late 1920s, as irrigated agriculture drainage flows entered the Salton Sea. During the 1930s, agricultural activity declined, and the salinity increased to more than 43,000 mg/L. As agricultural activities increased in the 1940s and 1950s, the salinity decreased to near marine, or ocean, salinity (35,000 mg/L with a range from 30,000 to 40,000 mg/L). In the 50 years through 2006, the average Salton Sea salinity has slowly risen to over 48,000 mg/L (CDWR, 2006). Average salinity in the Sea in 2010 was 51,829 mg/L (CRA, USACE, 2011).

10.2.2.3 Salinity Management

Salinity management is often a matter of source control to reduce the loading of salt into an area. Options for source control are limited since the salts originate in the upper reaches of the Colorado River or are already present in the Imperial Region due to the nature of the Salton Sea and ancestral playa where water flowed, then evaporated, leaving large amounts of salt. The IID Definite Plan and System Conservation Program (Chapter 8) define how the Region will reduce water imports through efficiency conservation, continue high levels of agricultural productivity, manage incoming Colorado River salt loads, and demonstrate reasonable beneficial uses of IID's water supply. Reducing diversion and importation of Colorado River water reduces the salt load coming into the Imperial Region. At the same time, implementation of efficient agricultural water management practices will increase salinity in IID drains by an average of approximately 500 mg/L as the volume of tailwater is reduced.

10.2.2.4 Inter-Regional Salinity Management Efforts

Salinity control on the Colorado River could affect the quality of the Colorado River water received by the Imperial Region. There are number of federal efforts[7] to control Colorado River salinity sources or to reduce salinity to meet flow and quality obligations to Mexico. Any programs seeking to reduce salt in the upper watershed that reduced the salinity of water diverted into the All-American Canal would be beneficial to the Imperial Region by reducing the salt loads in the imported Colorado River supply.

10.2.3 Salinity and the Salton Sea Ecosystem

Chapter 11 describes efforts to manage the Salton Sea and respond to the increasing salinity.

10.2.4 Opportunities

Management of salt imported with Colorado River water has been factored into the water management regime in the Imperial Region since farming began in the early 1900s. Salt and salinity management is integrated with existing programs and no other standalone salt strategies have been identified for inclusion in the IRWMP (e.g., Agricultural Water Use Efficiency, Matching Quality to Use, etc.). No additional local or regional salt or salinity management actions are contemplated for the Imperial IRWMP

10.2.5 Constraints

While the inflows to the Salton Sea contain elevated concentrations of salt over Colorado River irrigation water, the main cause of salinity in the lake is concentrations of salts through evaporation. Efforts to manage the salinity concentrations in the inflow waters could reduce the amount of salt entering the system, but the salinity in the closed basin lake will continue to increase as salt levels accumulate as a result of evaporation. The Salton Sea Ecosystem Restoration Plan (California Natural Resource Agency, 2007) includes a number of alternatives that address the issue of increasing salt concentrations in the lake with various techniques, including blending of inflow and lake water and with differing configurations and sizes of habitat and open water areas. The plan also recognizes that the Salton Sea will be managed primarily as a saline water body and many of the alternatives include some variant of a saline brine sink as part of the design. All of the current alternatives to manage Salton Sea salinity are expensive; require an inter-regional solution, and local, state, and federal cooperation. While the State of California has legislatively assume responsibility for Salton Sea restoration; funding, specific roles and responsibilities, and a cost effective preferred alternative have not been identified.

Salt management on the Colorado River is an interstate and international issue. Constraints related to disposal of a residual brine stream from potential desalination are addressed in relation to specific projects in Chapter 7. Export of salts by constructing large conveyance facilities to bring in seawater and export highly saline Salton Sea water has not proven cost effective or feasible. The extent and magnitude of the salt problems are beyond the scope of work for the Imperial Region.

[7] <http://www.usbr.gov/uc/progact/salinity> for USBR Colorado River Salinity Control Program
<http://www.ussl.ars.usda.gov/lcrsan/index.htm> for USBR Lower Colorado Region Salinity Assessment Network
<http://www.nrcs.usda.gov/programs/salinity/>for NRCS Colorado River Basin Salinity Control Program

10.2.6 Relation to Other Strategies

- **Desalination and Groundwater Development -** Desalting brackish groundwater or drain water, and brine disposal are discussed in Chapter 7.
- **Agricultural Water Use Efficiency –** Salt and salinity management is integrated into the IID QSA/Transfer Agreement efficiency conservation programs.
- **Recycled Municipal Water -** Recycling municipal wastewater could reduce drain flows, increasing salinity and requiring mitigation.
- **Ecosystem Enhancement –** There is potential for regional mitigation banking to address impacts of recycling and desalination.

10.2.7 Support for Mitigating or Adapting to Climate Change

Additional salt and salinity management actions would not reduce or increase greenhouse gas emissions nor would they provide mitigation for climate change. Increased salt in Colorado River water could result in less agricultural yield and reduction in GHG emissions from farming operations and related businesses in the Region; however, the response might be increased leaching, which would result in no impact on GHG emissions.

The Imperial Region is vulnerable to any effects of climate change that would increase the salt load and salinity of Colorado River water. Vulnerabilities are related primarily to increased temperature, reduced precipitation, and changes to snowmelt and runoff rates in the watersheds, tributaries, and main stem of the Colorado River, and to whether the changes would affect salt and salinity levels in imported Colorado River supply. Increased salinity would negatively impact the quality of the supply, and decreases would improve the quality. For example, if irrigated areas upstream of the Imperial Dam lose supplies as a result of climate change and are no longer productive, then the salt loads could be reduced. Increased salinity would increase leaching requirements, agricultural water demand, and drain water salinity. Increased temperature and evaporation would also increase the evaporation from the Salton Sea, resulting in further increases to its salinity and shoreline recession.

10.3 POLLUTION PREVENTION

For the vast majority of contaminants, it is generally accepted that a pollution prevention approach to water quality often is more cost-effective than end-of-the-pipe treatment of wastes or advanced domestic water treatment for drinking water. Pollution prevention measures usually are more cost-effective because they have lower initial capital costs and less ongoing operation and maintenance costs than traditionally engineered treatment systems. Pollution can originate from point or non-point sources. Point sources are well controlled. Water quality impairment in the Imperial Region comes primarily from non-point sources such as urban or agricultural runoff, or from sources originating across the Mexican border. This section describes programs with primary purposes to remediate water quality of existing impaired waters in the Imperial Region.

10.3.1 Findings

- Existing local, state, and federal laws, ordinances, regulations, and statutes are sufficient to control the sources of regulated contaminants within the Imperial Region.
- No additional pollution prevention actions were identified during initial Imperial IRWMP scoping or project definition and no further measures are anticipated for inclusion as part of the plan.
- The Water Forum and ongoing planning efforts should be used to identify, integrate, and coordinate existing non-regulatory programs where feasible.
- The Imperial County Farm Bureau Total Maximum Daily Load Program to meet silt discharge and other requirements consistent with the RWQCB's Colorado River Basin Plan is being voluntarily and successfully carried out by Imperial Region growers, and no program expansion or changes are anticipated as part of the Imperial IRWMP.
- IID's Drain Water Quality Improvement Program (DWQIP) provides for periodic monitoring of water quality for several constituents of concern in major IID drains, both within and outside of IID's service area. Resulting data are reported to the RWQCB.
- IID's Vegetation Management Plan supports the enhancement of water quality within the IID drainshed by reducing sediment loads in the drainage conveyance channels.
- There should be coordination with the New River Improvement Project efforts to remediate contaminated water and improve water quality flowing across the Mexican border into the United States via the New River (see Ecosystem Enhancement Restoration RMS).
- There should be coordination with the Citizen's Congressional Task force on the New River to continue to build and maintain wetlands and other nutrient remediation technologies such as algae production systems as funds allow.

10.3.2 Imperial Region Conditions

In 2002, the Colorado River Basin RWQCB adopted an updated Clean Water Act 303(d) list of water bodies where beneficial uses are impaired by a contaminant. Water quality standards set for the designated beneficial uses are exceeded due to elevated levels of one or more constituents in the following Imperial Region water bodies:

- The Alamo River, which includes suspended silt, pesticides, and selenium.
- The New River, which includes suspended silt, pesticides, nutrients, and several other contaminants that are discharged from a combination of industrial point sources, wastewater, and out-of-country sources [Mexico].
- The Imperial Region agricultural drains, which include suspended silt, pesticides, and selenium.
- The Salton Sea, which includes nutrients, selenium, and salinity. Non-point source pollution in this region also originates from sources other than agriculture including but not limited to abandoned mines, stormwater runoff, boating activities, alterations to land (e.g., urban development), and animal production activities.

In order to improve the water quality of impaired surface waters, the RWQCB developed Total Maximum Daily Load (TMDL) standards. A TMDL is the amount of a particular material that a water

body can absorb while remaining safe for people and wildlife. TMDLs established for the Imperial Region include:

- Alamo River - Sedimentation/Siltation TMDL
- New River Pathogen TMDL
- New River Sedimentation/Siltation TMDL
- New River Trash TMDL
- Imperial Valley Drains Sedimentation/Siltation TMDL

TMDLs being developed include the Salton Sea Nutrient TMDL, the New River Volatile Organic Compounds TMDL, and New River Oxygen TMDL.

The Imperial County Farm Bureau in collaboration with IID developed an award winning TMDL program, which they describe as follows:

> *. . . Imperial County Farm Bureau developed a voluntary compliance program to help defend growers from the onslaught of TMDLs. The TMDL program is voluntary, however nearly all farmers in Imperial Valley participate in the program because it offers growers and landowners a straightforward path to compliance with the mandatory TMDL regulation. Farmers implement a variety of Best Management Practices (BMPs) to reduce silt and mineral runoff on their own farms, and maintain a record of their efforts, and attend annual meetings to keep up-to-date and share information relating to BMPs and TMDL management on their farms.*
>
> *Since implementation, the Farm Bureau's TMDL program has prevented more than 33,000 tons of silt from entering the New and Alamo rivers, achieving the goal for the New River within three years. The program has seen a significant reduction at the Alamo River well ahead of the 12-year implementation schedule.*
>
> *Source: Imperial County Farm Bureau website. "TMDL Voluntary Compliance Program." 5* Jul 2012. <http://www.icfb.net/tmdl.html>

The Cities and County are responsible for addressing urban stormwater pollution through the National Pollution Discharge Elimination System (NPDES) permitting program administered by the RWQCB.

Agricultural non-point sources of pollution are addressed in IID's DWQIP (IID, 2005), which specifies the actions that IID will take to help monitor and improve the quality of water within Imperial Region watersheds. The DWQIP includes a water quality monitoring program that will satisfy the requirements in the current Basin Plan, and additional requirements that may be incorporated into future revisions of the Basin Plan. In June 1994, IID developed a DWQIP in response to the Regional Board's demand for action regarding water quality impairments. The DWQIP was in effect until March 1998, at which time the RWQCB requested that these efforts be suspended until TMDLs could be developed and implemented for these water bodies. Following the development and implementation of the Alamo River Sedimentation/Siltation TMDL in September 2003, IID submitted a Revised DWQIP to the RWQCB, as required in the Region 7 Water Quality Control Plan.

The Revised DWQIP states that IID will perform monthly water quality monitoring within 14 drains throughout the service area for several constituents of concern and report these results to the RWQCB. IID will also perform special studies to determine water quality impacts caused by drain maintenance operations and supply the RWQCB with a list of current owners and tenants of agricultural land on an annual basis. IID has a network of water quality monitoring stations to test drain water quality. Since February 2004, IID has added 26 TMDL drain monitoring sites as part of the DWQIP.

Table 10-4 lists the sampling locations, constituents, frequency of sampling and responsible agency.

Table 10-4.Water Quality Monitoring Locations

Location	Monitored Constituents	Frequency	Agency
Source Water			
Imperial Dam	EC (salinity)	Daily	USBR
AAC Drop 1[1]	TDS, pH, Ca+, Mg, Na+K, CO_3, HCO_3, SO_4, Cl, Temp	Monthly	IID
Salton Sea (5 sites)	TDS, pH, Ca+, Mg, Na+K, HCO_3, SO_4, Cl	Semi-annually	IID
10 Sites: AAC, EHL, CM, WSM	Total coli. Fecal coli, E. coli	Monthly	IID
AAC (12 sites)[2]	Site load analyses	Monthly	IID
4 Sites: AAC, EHL, CM, WSM[3]	Title 22 Compliance	Yearly	IID
Drain Water			
Alamo R at US/Mexico Border	TDS, pH, Ca+, Mg, Na+K, CO_3, HCO_3, SO_4, Cl, Temp	Monthly	IID
Alamo R Outlet at Salton Sea			
New R Outlet at Salton Sea			
TMDL Drain Water[4]			
7 Main Drains:	DO, EC, pH, Field and Lab turbidity, TSS, NH_3-, NO_2-, NO_3, Kjeldahl-N, Orthophosphate Total P, Total hardness, Ca+, Mg, Total A, $HC0_3$+CO_3, SO_4	Monthly	IID
5 to Alamo River			
2 to New River			
18 minor drains:		Quarterly	IID
9 to Alamo River			
6 to New River			
4 Direct to Salton Sea			

[1] Collected by IID; Analysis by ATS Labs, Inc. Brawley, CA; Alamo River at US/Mexico Border to be discontinued Jan 2008 due to low flow (410.4 AF in 2008).

[2] Collected by IID; Analysis by IID.

[3] Physically collected and analysis by Clinical Lab of San Bernardino, CA, www.clinical-lab.com.

[4] Collected by IID; Analysis by Babcock Labs, Riverside, CA,< http://www.babcocklabs.com>Flow data collection at 6 minor drains: I, Nettle, Peach, North Central Spruce, and Timothy 2.

Source: IID 2007 Water Conservation Plan, p 32

The Calexico New River Committee is an organized community effort for New River cleanup. The committee is dedicated to eliminating the negative impacts of the New River which arise in and around Mexicali, Mexico and flow across the International border. It has successfully consolidated community and political support behind the New River Public Health Protection Project. The Calexico New River

Committee has identified a number of solutions, proposed improvements, a project concept, and development activities.

Calexico New River Committee is a member of the New River Improvement Project which is sponsored by the Secretary of Environmental Protection, California EPA = for more details see (also New River Improvement Project is an IRWMP stakeholder).
<http://www.calepa.ca.gov/border/newriver/Documents/TeamCharter.pdf >

10.3.3 Opportunities

No opportunities for new Pollution Prevention programs or expanding existing programs were identified by the Water Forum.

10.3.4 Constraints

Funding to expand or continue existing local programs or to create new programs is a constraint.

10.3.5 Relation to Other Strategies

- **Recycled Municipal Water** — Recycling municipal wastewater would increase treatment, improve water quality, and prevent pollution.
- **Ecosystem Restoration** — Chapter 11 discusses potential for regional mitigation banking to address impacts of recycling and desalination is discussed in, along with opportunities to improve water quality or prevent additional pollution from agricultural or urban runoff.
- **Regional Flood Control** — Integrating wetland and habitat into retention and detention ponds can improve the water quality of stormwater runoff.
- **Matching Water Quality to Use** — Chapter 7 discusses development of wetlands or algae production facilities to treat pollution and prevent pollution loading to the Salton Sea.

10.3.6 Support for Mitigating or Adapting to Climate Change

Pollution prevention was identified as potential mitigation for greenhouse gas emissions. Development of wetlands or algae production facilities could help sequester or recycle carbon and reduce nutrient contaminants in source water. Climate change could reduce the available water supply. Pollution prevention would help ensure the water quality of the available supply is protected.

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