TOTAL MAXIMUM DAILY LOAD AND IMPLEMENTATION PLAN FOR DISSOLVED OXYGEN IN THE NEW RIVER AT THE INTERNATIONAL BOUNDARY

Imperial County, California

California Regional Water Quality Control Board
Colorado River Basin Region
Palm Desert, California

May 20, 2010

THIS PAGE LEFT BLANK INTENTIONALLY

Table of Contents

LIST OF APPENDICES

LIST OF ABBREVIATIONS

§	Section
^{0}C	Degree Celsius
Basin Plan	Water Quality Control Plan for the Colorado River Basin Region
BECC	Border Environment Cooperation Commission
BOD	Biochemical Oxygen Demand
BTAC	New River/ Mexicali Sanitation Program Binational Technical Advisory Committee
CalBECC	California Border Environment Cooperation Commission
CAN	Comision Nacional del Agua (Mexican National Water Commission)
CCNRC	City of Calexico New River Committee
CCTFNR	Citizens Congressional Task Force on the New River
CEA	Comision Estatal de Agua
CESPM	Comision Estatal de Servicios Publicos de Mexicali
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CILA	Comisión Internacional de Limites y Aguas
CMD	Cubic Meter Per Day
CMS	Cubic Meter Per Second
CWA	Federal Clean Water Act
CWC	California Water Code
DO	Dissolved Oxygen
EIR	Environmental Impact Report
EIS	Environmental Impact Study
EH	Evan Hewes Highway
FRSH	Freshwater Replenishment
IB	International Boundary
IBC	IB Commission
IBWC	IB and Water Commission
IID	Imperial Irrigation District
km	Kilometer
LAs	Load Allocations
mg/L	Milligrams per liter
MGD	Million Gallons per Day
Ml	Milliliter
MM	Millimeter
MOS	Margin of Safety
MP	Management Practice
NADBank	North American Development Bank
NAFTA	North American Free Trade Agreement
NH_3	Ammonia
NPDES	National Pollutant Discharge Elimination System
NPS	Non point source pollution
OAL	Office of Administrative Law
ºF	Degrees Fahrenheit

QAPP	Quality Assurance Project Plan
RARE	Preservation of Rare, Threatened, or Endangered Species
REC I	Water Contact Recreation
REC II	Water Non-Contact Recreation
Regional Board	Colorado River Basin Regional Water Quality Control Board
RWQCB	Regional Water Quality Control Board
SAHOPE	Secretaria de Asentamiento Humanos y Obras Públicas del Estado
SEDESOL	Secretaría de Desarrollo Social
SEDUE	Secretaría de Desarrollo Urbano y Ecologia
SEMARNAP	Secretaria del Medio Ambiente Recursos Naturales y Pesca
SLRC	San Luis Rio Colorado
SMR	Self Monitoring Report
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USDA	U.S. Department of Agriculture
USEPA	U.S.Environmental Protection Agency
USGS	U.S. Geological Survey
USIBWC	U.S. Section of the International Boundary and Water Commission
WARM	Warm Freshwater Habitat
WILD	Wildlife Habitat
WLAs	Waste Load Allocations
WQOs	Water Quality Objectives
WQSs	Water Quality Standards
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

SUMMARY

This staff report supports a New River Dissolved Oxygen (DO) TMDL Basin Plan Amendment that addresses impairment (or pollution) of low DO in the 12 mile (19.3 km) reach of the New River downstream of the International Boundary (IB). The DO impairment has been determined to be caused mainly by waste discharges from Mexico.

The federal Clean Water Act (CWA) (33 U.S.C. Section 1251 et seq.) requires states to adopt Water Quality Standards (WQSs) for navigable waters to protect the public health or welfare, enhance the quality of water and serve other specified purposes. WQSs consist of designated uses (or beneficial uses), water quality criteria (or objectives) (WQOs) to protect the beneficial uses, and an anti-degradation (non-degradation) policy.

CWA Section 303(d) requires all states to identify and list certain impaired (or polluted) water bodies that are not meeting WQSs after applying CWA best available practicable control technology requirements to effluent discharges. For those impaired water bodies identified and listed (the 303(d) List), the CWA requires states to develop total maximum daily loads (TMDLs) for the pollutants that are causing or are expected to cause violations of the applicable WQS. An implementation plan is developed to attain WQSs for those impaired waters.

The U.S. Environmental Protection Agency (USEPA) has oversight of the CWA Section 303(d) program and must approve or disapprove the State's 303(d) List and each TMDL. USEPA is ultimately responsible for issuing a TMDL, if the State fails to do so in a timely manner. CWA Section 303(e) requires states to implement their USEPA-approved TMDLs through their Continuing Planning Process.

A TMDL uses numeric targets to reduce pollutant loads to meet water quality objectives that protect designated beneficial uses. A TMDL quantifies the amount of a pollutant that a water body can receive and still meet WQSs, and allocates pollutant loadings of that water body to point and nonpoint sources. A TMDL also incorporates seasonal variations and a Margin of Safety (MOS) to account for uncertainties concerning the relationship between pollutant loads and in-stream water quality. TMDL load allocations can be expressed in terms of mass per time, toxicity, concentration, or other appropriate measures that relate to a state's WQSs.

The DO WQO for the New River is a minimum of 5.0 (five) milligrams per liter (mg/l) at any time. This TMDL proposes that the DO WQO of 5.0 mg/l be the numerical target to be met.

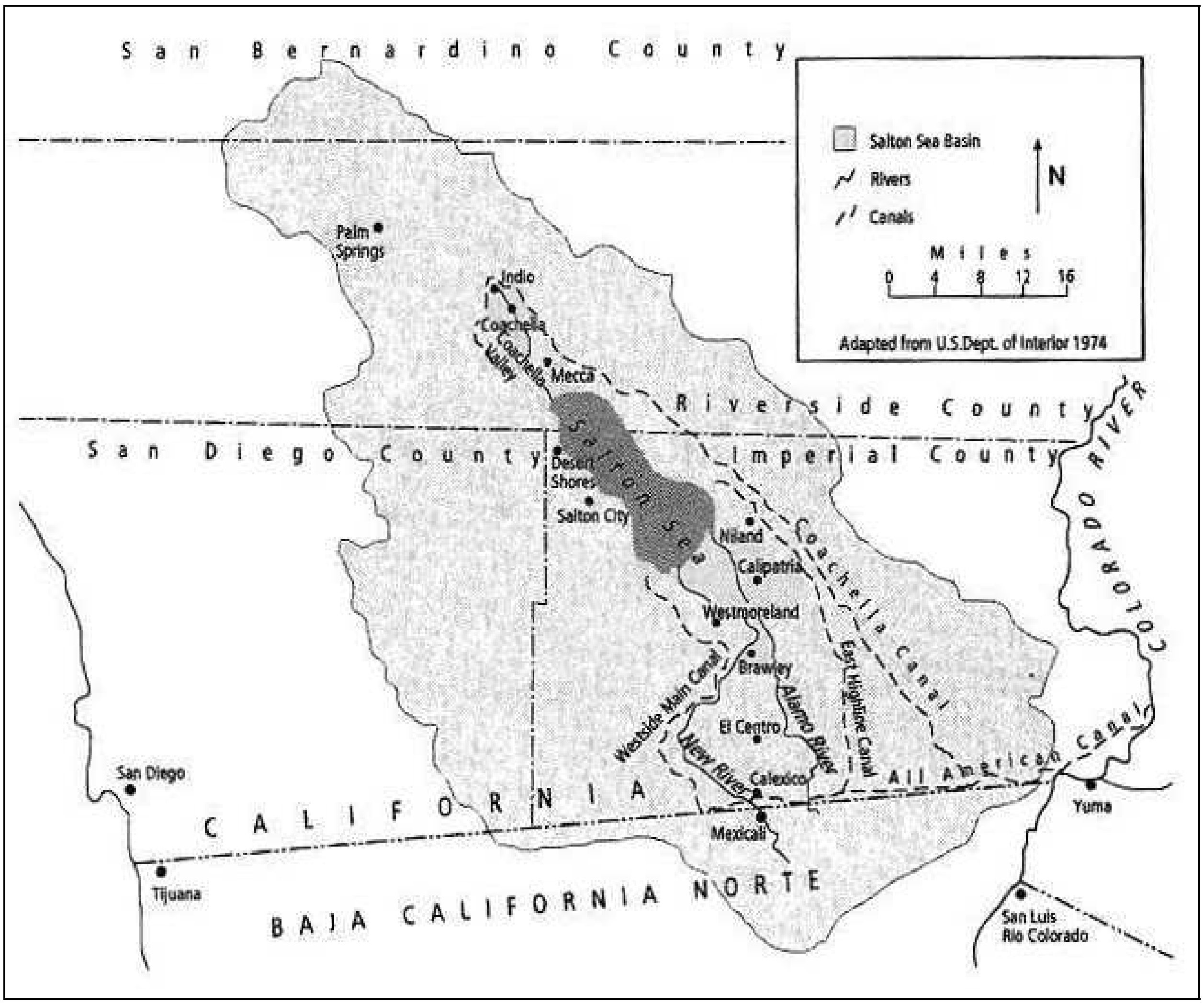
DO is not considered a pollutant, but is an indicator parameter for water quality. The main pollutants of concern that cause in-stream low DO are biochemical oxygen demand (BOD) and ammonia (NH_3). This New River DO TMDL identifies the maximum amount (or loads) of NH_3 and BOD that can be discharged to the New River at the IB without violating the New River's applicable WQSs for DO.

The New River originates in Mexicali Valley, Mexico (Figure S1). It flows approximately 20 miles (32.2 km) through the city of Mexicali, Mexico, crosses the IB, continues through the city of Calexico, California, in the U.S., and travels northward about 60 miles

(96.56 km) until it empties into the Salton Sea. The Salton Sea is California's largest inland surface water. The New River watershed is approximately 500,000 acres (202,350 hectares) in size: 200,000 acres (80,940 hectares) of Imperial Valley farmland in the U.S.; and 300,000 acres (121,410 hectares) in Mexico, including the Mexicali metropolitan area and agricultural land in Mexicali Valley.

The climate of the New River watershed is hot, with dry summers, occasional thunderstorms, and gusty high winds. Average annual rainfall is less than 3 inches (76.2 mm), and temperatures are in excess of 100 ºF (38 ºC) for more than 100 days per year. Major soils associations in the New River watershed are within the "wet" series of poorly drained soils.

Figure S1: Map of the New River within the Salton Sea Transboundary Watershed (Cohen et al. 1999)



Sources of flows to the New River are urban and agricultural runoff, and treated municipal and industrial wastes from the Mexicali Valley, Mexico, and the Imperial Valley, California, U.S. In 2008, average flows for the New River at the IB and at the outlet to the Salton Sea were about 3.36 and 15.61 cubic meters per second (cms), respectively.

DO averages for the New River at the IB ranged from 0.8 to 2.8 mg/l from 1997 to 2002. Data and source analysis for this TMDL determined that Mexicali Valley in Mexico is the most significant source of materials causing New River DO impairments. The Las Arenitas Wastewater Treatment Plant (WWTP), which started operations in March 2007, was designed to prevent Mexicali's remaining untreated sewage from discharging into the New River. As a result, DO levels in the impaired section of the New River improved significantly, but they continue to violate the DO WQO of 5.0 mg/l at any time. Annual DO concentrations averages for the New River at the IB from both the Regional Board and the U.S. Section of the International Boundary and Water Commission (USIBWC) were about 4.4 and 4.3 mg/l for 2008, and 5.6 and 5.9 mg/l for 2009, respectively.

As previously indicated, this TMDL proposes to eliminate low DO impairment in the first 12 mile (19.3 km) reach of the New River downstream of the IB by ensuring that the DO WQO of 5.0 mg/l at any time is attained for this reach. To accomplish this WQO, the TMDL specifies allowable loads of BOD and NH_3 to the sources of DO impairments. The allowable loads are based on steady-state New River DO QUAL2K Model projections, scientific literature, monitoring data, and best professional judgment. The Model proposes loads of 5 mg/l of BOD and 0.5 mg/l of NH_3 for the New River at the IB. These loads will address sources in Mexico. BOD and NH_3 load allocations, expressed as a concentration (mg/l) and as a mass/day (kilogram (kg)/day), are summarized in Table S1. The mass/day load allocations shown in Table S1 are based on the 2007 average flows of 125 cubic feet per second (cfs) or 3.54 cms measured at the IB.

Table S1: New River DO TMDL BOD and NH_3 Load Allocations by Sources

Source	BOD Loads (mg/l)	BOD Loads (kg/day)	NH_3 Loads (mg/l)	NH_3 Loads (kg/day)
Mexico (New River at IB)	5	1529	0.5	153

Phase 1 of TMDL implementation (first three years after USEPA approval) requests that the federal government (USIBWC and USEPA):

- Consider measures to assist Mexico to ensure that discharges from Mexico do not violate or contribute to a violation of this TMDL; and
- Continue to conduct water quality monitoring in the New River at the IB.

This TMDL also recommends actions for other third party cooperating agencies and organizations with an interest in the New River's water quality. Staff of the California Regional Water Quality Control Board, Colorado River Basin Region (Regional Board) will track TMDL implementation, monitor water quality progress, enforce provisions, and propose modifications of the TMDL to the Regional Board, if necessary, in accordance with a time schedule.

This TMDL is expected to achieve applicable WQSs for DO in the New River at the IB by the end of Phase 1. If DO WQSs for the New River are not achieved by the end of Phase 1, and as more New River water quality data are collected and evaluated, additional actions may need to be taken in Phase 2 (second three years after USEPA approval) to control pollutant sources and to achieve WQSs, including revising and implementing TMDL allocations.

CHAPTER 1: PROJECT DEFINITION

The federal Clean Water Act (CWA) requires states to adopt Water Quality Standards (WQSs) for navigable waters to protect the public health or welfare, enhance the quality of water and serve the purposes of the CWA. (CWA Section 303(c)(2)(A); Title 40 Code of Federal Regulations (CFR) Sections 131.10-131.11.) WQSs consist of designated uses (or beneficial uses), water quality criteria (or objectives) (WQOs) to protect the beneficial uses, and an anti-degradation (non-degradation) policy. (40 CFR 131.3(i), 131.6.) "Serve the purposes of the CWA" is defined as meaning that WQSs should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in an on the water, and take into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes including navigation. (CWA Sections 101(a)(2) and 303(c); 40 CFR 131.2.)

CWA Section 303(d) requires all states to identify and list certain impaired (or polluted) water bodies that are not meeting WQSs after applying CWA best available practicable control technology requirements to effluent discharges. (CWA Section 303(d)(1)(A); 40 CFR 130.7.) For those impaired water bodies identified and listed pursuant to CWA Section 303(d) (the 303(d) List), the CWA requires states to develop total maximum daily loads (TMDLs) for the pollutants that are causing or are expected to cause violations of the applicable WQS. (CWA Section 303(d)(1)(C); 40 CFR 130.7(b)(4).)

The U.S. Environmental Protection Agency (USEPA) has oversight of the CWA Section 303(d) program and must approve or disapprove the State's 303(d) List and each TMDL. USEPA is ultimately responsible for issuing a TMDL, if the State fails to do so in a timely manner. CWA Section 303(e) requires states to implement their USEPA-approved TMDLs through their Continuing Planning Process

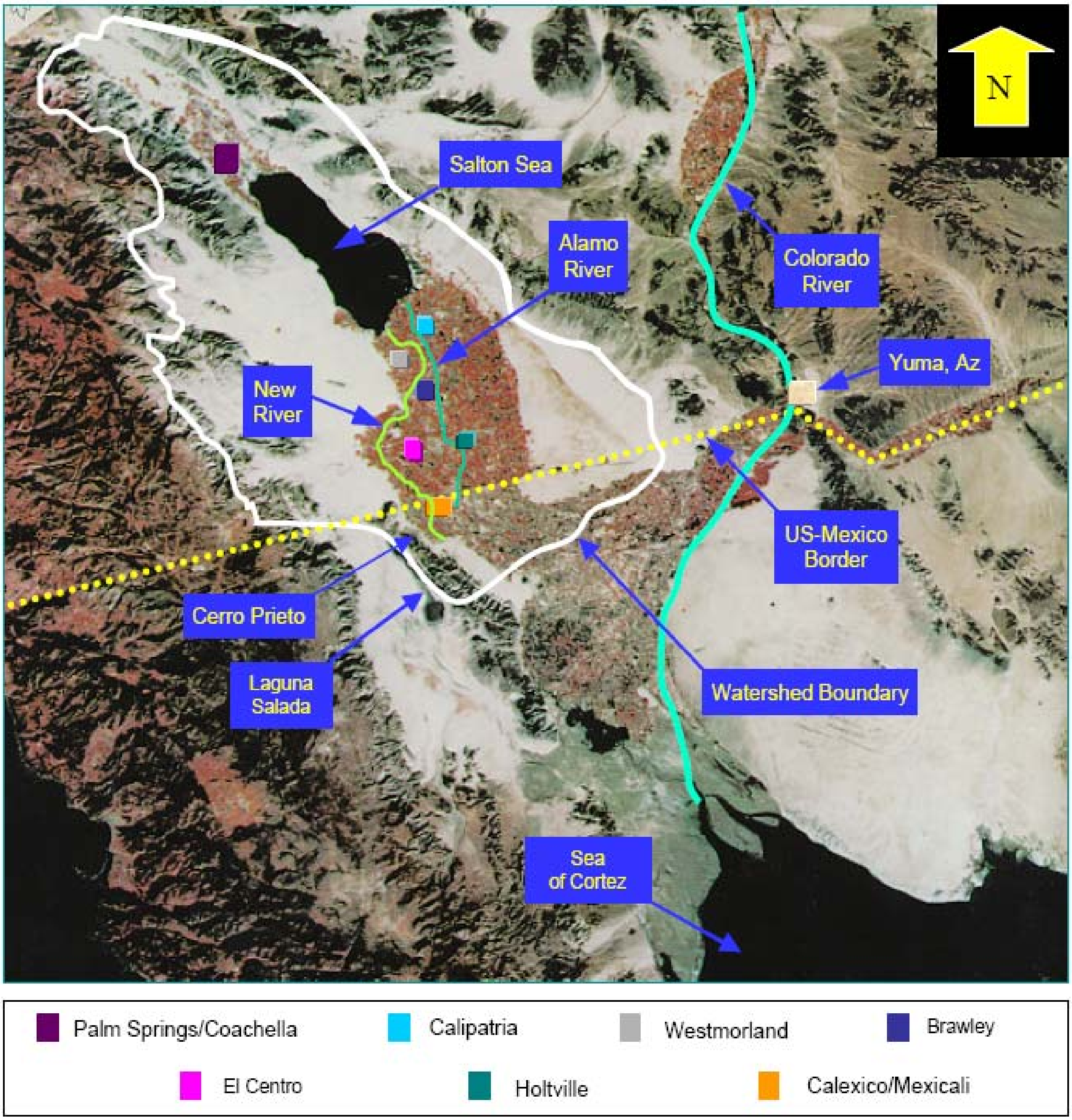
A TMDL includes one or more numerical targets that represent attainment of the applicable WQSs with seasonal variations and a margin of safety, which takes into account the lack of knowledge concerning the relationship between effluent limitations and water quality. (CWA Section 303(d)(1)(C); 40 CFR 130.7(c)(1).) TMDL determinations also must take into account critical conditions for stream flow, loading, and water quality parameters. (40 CFR 130.7(c)(1).) Accordingly, a TMDL is a written water quality management plan to attain and maintain WQSs in all seasons by limiting the amount of loadings into the impaired water body from point sources, nonpoint sources, and natural background sources. (CWA Sections 303(d)(1), 303(e); 40 CFR 130.2(e)-(i), (k)).

In 2002, the state of California placed the New River on the 303(d) List for impairment caused by Organic Enrichment/Low Dissolved Oxygen (DO). This TMDL is the first step for improving DO levels in the New River. The first 12 mile (19.3 km) reach of the New River downstream of the IB has been prioritized over other New River reaches because of the proximity to the major waste sources that originate in Mexico, as shown by modeling and data analysis.

The New River originates in Mexico (Figure 1.1). The New River flows approximately 20 miles (32.2 km) through the city of Mexicali, Mexico, crosses the IB, continues through the city of Calexico, California, in the U.S., and travels northward about 60 miles (96.56

km) until it empties into the Salton Sea. The Salton Sea is California's largest inland surface water. Sources of flows to the New River are urban and agricultural runoff, and treated municipal and industrial wastes from the Mexicali Valley, Mexico, and the Imperial Valley, California, U.S.

Figure 1.1: Salton Sea Transboundary Watershed (Gruenberg 1998)



1.1: WATER QUALITY STANDARDS (WQSs) AND THE TMDL PROCESS

Pursuant to the CWA and implementing regulations in 40 CFR, WQSs consist of:

1- Designated beneficial uses (BUs);
2- Specified numeric or narrative water quality objectives (WQOs) that protect these BUs; and
3- Anti-degradation requirements to ensure that existing uses and the level of water quality necessary to protect the existing uses are maintained and protected. (CWA Section 303; 40 CFR Parts 130, 131.)

As previously noted, CWA Section 303(d)(1)(A) requires all states to identify surface waters impaired by pollution (i.e., that do not meet WQSs after applying CWA best available practicable technology control requirements to effluent discharges) and to establish TMDLs for pollutants that are causing or are expected to cause the impairments. The USEPA has oversight of the CWA Section 303(d) program and must approve or disapprove the State's 303(d) List and each specific TMDL developed for those water bodies listed. Following USEPA's approval of a state's TMDL, states implement their TMDLs through their CWA Section 303(e) Continuing Planning Process.

A TMDL quantifies the amount of a pollutant that a water body can receive and still meet WQSs, and allocates pollutant loadings of that water body to point sources, nonpoint sources, and natural background sources. Accordingly, a TMDL is the sum of the individual waste load allocations (WLAs) for point sources, and load allocations (LAs) for nonpoint sources and natural background sources. A TMDL also incorporates seasonal variations and a Margin of Safety (MOS), which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. (CWA Section 303(d)(1)(C); 40 CFR 130.7(c)(1).) TMDL load allocations can be expressed in terms of mass per time, toxicity, concentration, or other appropriate measures that relate to a state's WQSs. (40 CFR 130.2(i).)

The Porter-Cologne Water Quality Control Act, codified in California Water Code (CWC) Section 13000 et seq., established the regulatory control structure for protecting water quality in the state. CWC Section 13001 identifies the State Water Resources Control Board (SWRCB) and all nine Regional Water Quality Control Boards (RWQCBs) as the principal state agencies responsible for the coordination and control of water quality. Pursuant to this statutory mandate and the requirements of CWA Sections 303(d) and 305(b), the Regional Board is required to:

- Identify the Region's water bodies that do not comply with WQSs;
- Rank the impaired water bodies, taking into account the severity of pollution and the uses made of such waters; and
- Establish TMDLs for those pollutants causing the impairments to ensure that impaired waters attain and maintain their WQOs to protect their designated BUs.

To take effect, TMDLs must be reviewed and approved by various regulatory agencies. First, the draft TMDL is submitted to the Regional Board for its review and approval. (CWC Section 13240.) Then, the TMDL is forwarded to the SWRCB for its review and approval. (CWC Section 13245.) Because TMDLs have regulatory effect, they are subject to the rulemaking provisions of the state's Administrative Procedure Act (Gov. Code Section 11340 et seq.) Accordingly, the TMDLs must be submitted to the

California Office of Administrative Law (OAL) for its review and approval. Finally, USEPA must also approve the TMDL if the TMDL concerns waters of the U.S., which are subject to the CWA. The TMDL becomes legally effective only after OAL, or if applicable, USEPA, approval. (CWC Section 13245; CWA Section 303(d)(2); 40 CFR 131.5.)

1.2: NEW RIVER DO TMDL

As noted above, in 2002 the state of California listed the New River for impairment caused by Organic Enrichment/Low DO pursuant to CWA Section 303(d). The DO WQO for the New River is a minimum of 5.0 milligrams per liter (mg/l), as established by the state of California, to protect the following BUs: warm freshwater habitat (WARM); wildlife habitat (WILD); preservation of rare, threatened, or endangered species (RARE); water contact recreation (REC I); non-contact water recreation (REC II); and freshwater replenishment (FRSH). (Water Quality Control Plan, Colorado River Basin – Region 7 (Basin Plan).) Appendix A summarizes New River BUs and WQOs. The Basin Plan can be viewed at:

<http://www.waterboards.ca.gov/coloradoriver/publications_forms/publications/docs/basinplan_2006.pdf/>

In July 2003, USEPA approved the 303(d) listing of the New River for Organic Enrichment/Low DO. Primary sources of pollutants that caused this listing were untreated or partially treated urban and industrial wastewater discharged to the New River and its tributaries in Mexicali, Mexico, as shown by Regional Board monthly data collected from the New River at the IB from 1997 to 2002. Average Annual DO data for the IB were 2.8, 1.5, 0.8, 1.3, 1.69, and 1.13 mg/l for 1997, 1998, 1999, 2000, 2001, and 2002, respectively. These data can be viewed at:

<http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/new_river/>

These low DO levels were the result of about 5 to 20 million gallons per day (mgd) (18,930 to 75,710 cmd) of raw sewage being discharged into the New River in Mexicali, Mexico, as reported by Regional Board monthly reports from bi-national observation tours of the New River watershed in Mexicali (Regional Board, 2002 and 2003).

The history of New River pollution is associated with Mexicali population growth and the inception of irrigated agriculture in the Imperial and Mexicali valleys (Gruenberg, 1998). In 1920, the total population of Mexicali was 6,200. By 1955, approximately 25,000 people lived in Mexicali. Raw sewage from Mexicali was discharged into the New River at that time, generating an odor near the IB that was often overpowering. Flow in the New River increased considerably in 1956 due to the increase in agriculture in Mexicali Valley and the resultant discharge of irrigation return flows to the New River and its tributaries. These irrigation return flows diluted the raw sewage temporarily, alleviating the odor at the IB until the 1960s, when sewage loading to the New River increased with Mexicali population growth. In 1987, the California Department of Public Health (formerly, California Department of Health Services) posted the New River as a public health hazard (California Department of Health Services, 1987).

Besides Organic Enrichment/Low DO, the New River is also on the 303(d) List for impairments by chlordane, chlorpyrifos, copper, Dichloro-Diphenyl-Trichloroethane (DDT), diazinon, dieldrin, mercury, nutrients, pathogens, Polychlorinated Biphenyls (PCBs), sediment, selenium, toxicity, trash, and Volatile Organic Compounds (VOCs). New River TMDLs for pathogens, silt, and trash have been adopted by the Regional Board and approved by the SWRCB, OAL, and USEPA (Table 1.1). These three TMDLs are currently being implemented.

Table 1.1: New River TMDL Approval Dates

	New River Pathogen TMDL	New River Silt TMDL	New River Trash TMDL
Regional Board Adoption	10/10/01	6/26/02	6/21/06
SWRCB Approval	3/21/02	11/19/02	4/18/07
OAL Approval	5/3/02	1/13/03	8/2/07
USEPA Approval	8/14/02	3/31/03	9/24/07

Regional Board staff is proposing that this TMDL address the impairment of the New River in the first 12 mile (19.3 km) reach downstream of the IB caused by low DO. This TMDL has been developed in accordance with the state of California's Impaired Waters Guidance issued in June 2005 (SWRCB, 2005) and the USEPA Region 9's TMDL Guidance published in January 2000 (USEPA, 2000).

A New River DO QUAL2K Model was developed by Tetra Tech, Inc., to assist Regional Board staff on Data and Source Analysis, Linkage Analysis, and Load Allocations in terms of parameters that cause low DO, such as BOD and NH_3. This model is discussed in Chapter 7 and Appendix F of this proposed TMDL.

1.3: MANAGEMENT AND IMPLEMENTATION MEASURES

A TMDL implementation plan to achieve WQSs is proposed. This approach provides immediate assessment of known sources causing low DO while allowing time for additional monitoring to assess TMDL implementation, effectiveness, and the need for revision. The implementation focuses on monitoring and addressing known and potential causes of low DO from Mexico.

This TMDL is expected to achieve applicable WQSs for DO in the New River at the IB by the end of Phase 1 (first three years after USEPA approval). If DO WQSs for the New River are not achieved by the end of Phase 1, and as more New River water quality data are collected and evaluated, additional actions may need to be taken in Phase 2 (second three years after USEPA approval) to control pollutant sources and to achieve WQSs, including revising and implementing the TMDL allocations.

Las Arenitas WWTP in Mexico, which started operation in March 2007, certainly improved DO levels in the impaired section of the New River. However, it is too early at this stage to quantify the full beneficial effect the Las Arenitas WWTP will have on the water quality of the New River in the 12 mile (19.3 km) reach at issue. Regional Board staff, USEPA, and USIBWC will continue monitoring the New River at the IB and assessing changes in water quality.

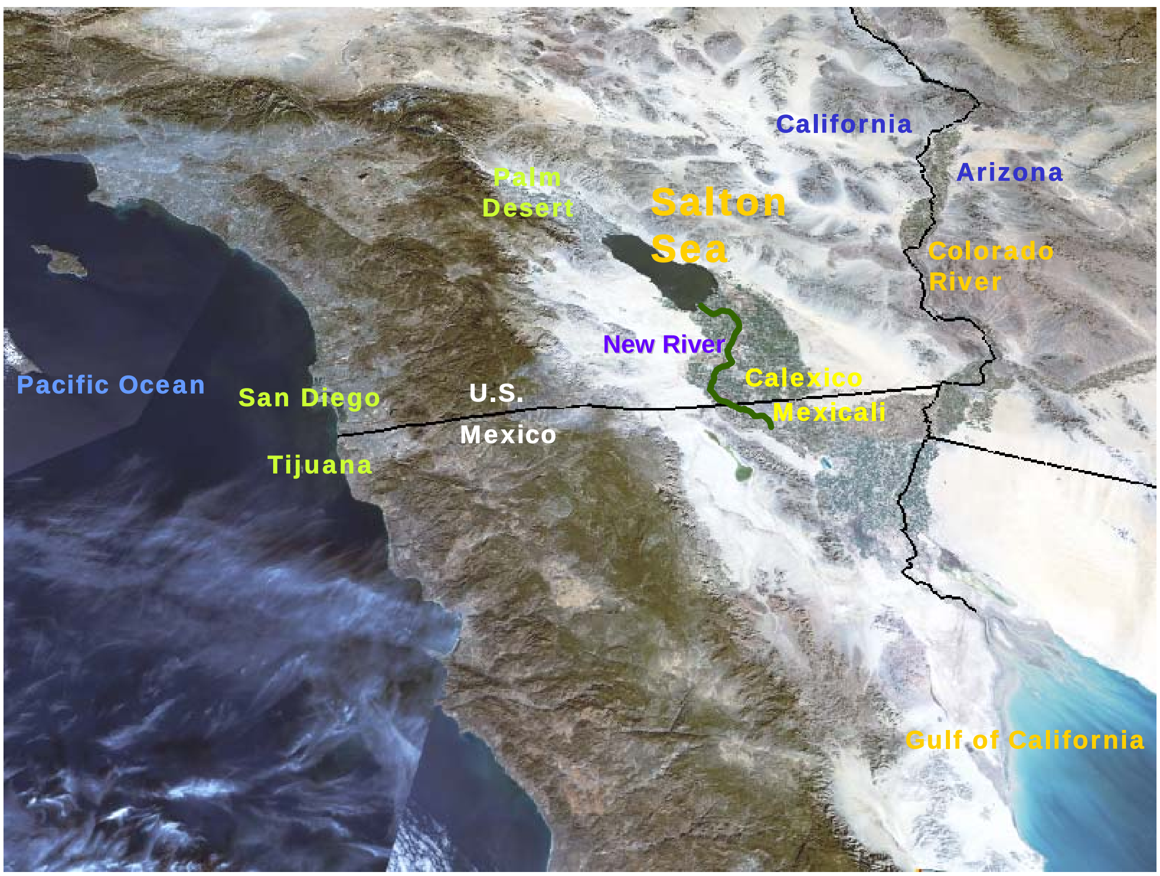
CHAPTER 2: WATERSHED DESCRIPTION

2.1: HYDROLOGICAL SETTING

Salton Sea Transboundary Watershed

The New River Watershed is located within the Salton Sea Transboundary Watershed, which is located in the Sonoran desert region in the southeastern corner of California in both the U.S. and Mexico (Figure 2.1). The Salton Sea Transboundary Watershed encompasses one-third of the Colorado River Basin Region (about 21,652 square kilometers), and contains most of the Region's 303(d)-listed impaired surface waterbodies. Most of the Salton Sea Transboundary Watershed is in Imperial County, California, U.S., but it also receives drainage from the Coachella Valley in Riverside County, U.S., and the Mexicali Valley in Mexico (via the New River).

<u>Figure 2.1:</u> Map of the New River in Mexico and the US



The Salton Sea Transboundary Watershed has been identified as a Category I (impaired) Watershed under the 1998 California Unified Watershed Assessment. Major waterbodies in the Salton Sea Transboundary Watershed include the Salton Sea, the Alamo River, the New River, the Imperial Valley Agricultural Drains, and the Coachella Valley Stormwater Channel (CVSC). Other waterbodies of importance include San Felipe Creek and Salt Creek, which provide critical habitat for the endangered desert pupfish. Aquatic and wildlife habitat uses that developed incidental to the importation of water into the desert are designated as beneficial uses in the Region's Water Quality Control Plan (Basin Plan).

The Salton Sea Transboundary Watershed's most striking feature is the Salton Sea. The Salton Sea is California's largest lake and is known for its sport fishery and recreational uses. The Salton Sea receives most of its flows from Imperial County (via the Alamo River, the New River, and the Imperial Valley Agricultural Drains). The Salton Sea also receives flows from CVSC and the New River section in Mexicali Valley. Annual flows from both the New River and the Alamo River into the Salton Sea for 2001 to 2008 are shown in Table 2.1.

Table 2.1: Annual flows in Cubic Meter per Second (cms) from both the New River and the Alamo River into the Salton Sea for 2001 to 2008 (Source: USGS)

Year	2001	2002	2003	2004	2005	2006	2007	2008	Average
Alamo River Flows (cms)	25.10	25.60	23.64	23.49	23.48	24.00	24.69	22.59	**24.07**
New River Flows (cms)	17.92	16.95	15.97	17.02	17.64	16.51	16.25	15.61	**16.73**

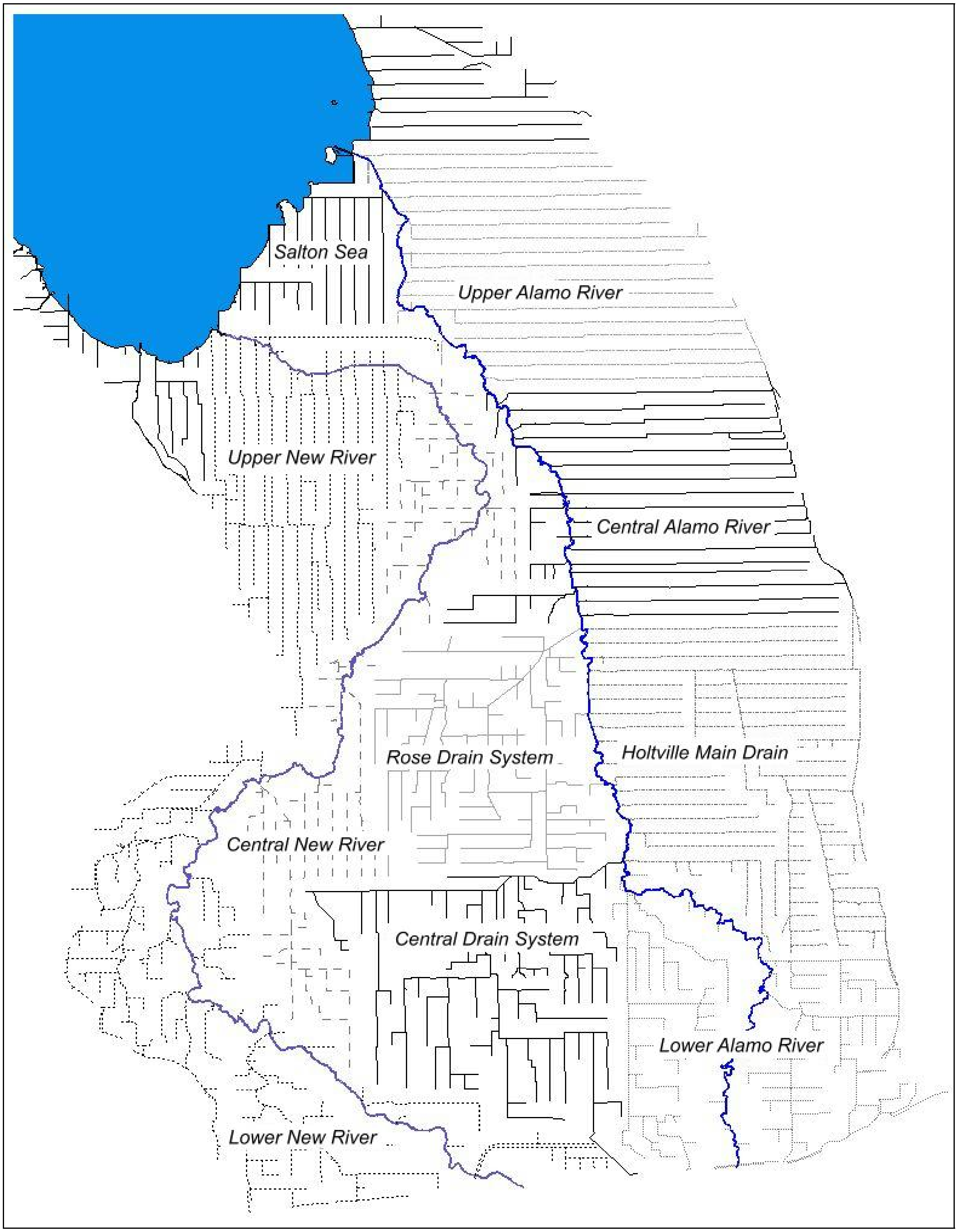
The surface of the Salton Sea lies approximately 231.5 feet (70.6 meter) below mean sea level (MSL). The Salton Sea is a terminal lake, which means that there is no natural outflow of the lake. The only way that water is lost from the lake is through evaporation, which leaves behind salts that concentrate over time. According to the U.S. Bureau of Reclamation (BOR), salinity of the Salton Sea is approximately 51 mg/l (BOR, 2009). Salinity of the Pacific Ocean near San Diego is about 33 mg/l.

Imperial Valley watersheds, which include the New River watershed in the U.S., the Alamo River watershed, and the Imperial Valley Drains watershed, are shown in Figure 2.2.

The Origin of the Salton Sea, New River, and Alamo River

The Salton Sea, New River, and Alamo River (Figures 2.1 and 2.2) were formed due to a catastrophic flood event that began on October 11, 1905, when a temporary diversion for irrigation water from the Colorado River to the Imperial Valley failed during flood conditions (Gruenberg, 1998). As a result, the entire flow of the Colorado River was diverted to the Salton Basin for 16 months. The breach in the dike was not able to be repaired until February 1907. The Colorado River then resumed its former course, flowing across the IB into the Gulf of California.

Figure 2.2: **Map of Imperial County Farm Bureau Designated "Drainsheds"**



Under normal circumstances, the Salton Sea would have dried up like its ancient predecessor, Lake Cahuilla. However, the Salton Sea's accidental creation coincided with agricultural and urban development in the Coachella, Imperial, and Mexicali valleys. Since then, agricultural return flows and domestic/municipal wastes have sustained the Salton Sea, New River, and Alamo River.

The New River

The New River is located within the Salton Sea Transboundary Watershed in Mexico and the U.S. The New River receives water from a watershed that is approximately 500,000 acres (202,350 hectares) in size, covering 200,000 acres (80,940 hectares) of Imperial Valley farmland in the U.S. (Figure 2.1) and 300,000 acres (121,410 hectares) of Mexico, including the Mexicali metropolitan area and agricultural land in Mexicali Valley (Figures 2.3 and 2.4). The New River originates in the Mexicali Valley (Mexico), approximately 20 miles (32 kilometers) south of the IB. Within the U.S., the New River is approximately 60 miles (96 kilometers) long, and flows in a northern direction terminating at the Salton Sea.

The bottom width of the New River ranges from 5.0 meter (m) at the IB to 14.0 m at the outlet to the Salton Sea, and has a continuous side slope of 0.24 m/m. Sediment analysis of the New River substrates at the IB are mainly made up of fine sand (38% sediment dry weight) and silt (35%) particles. The amount of the smaller silt-sized particles increases in the downstream direction. At the river's outlet to the Salton Sea, silt makes up to 49% of the sediments by dry weight.

The average flows of the New River at the IB from Mexican sources and at the outlet to the Salton Sea from both Mexican sources and U.S. sources are shown in Figures 2.5 and 2.6, and Tables 2.2 and 2.3,).

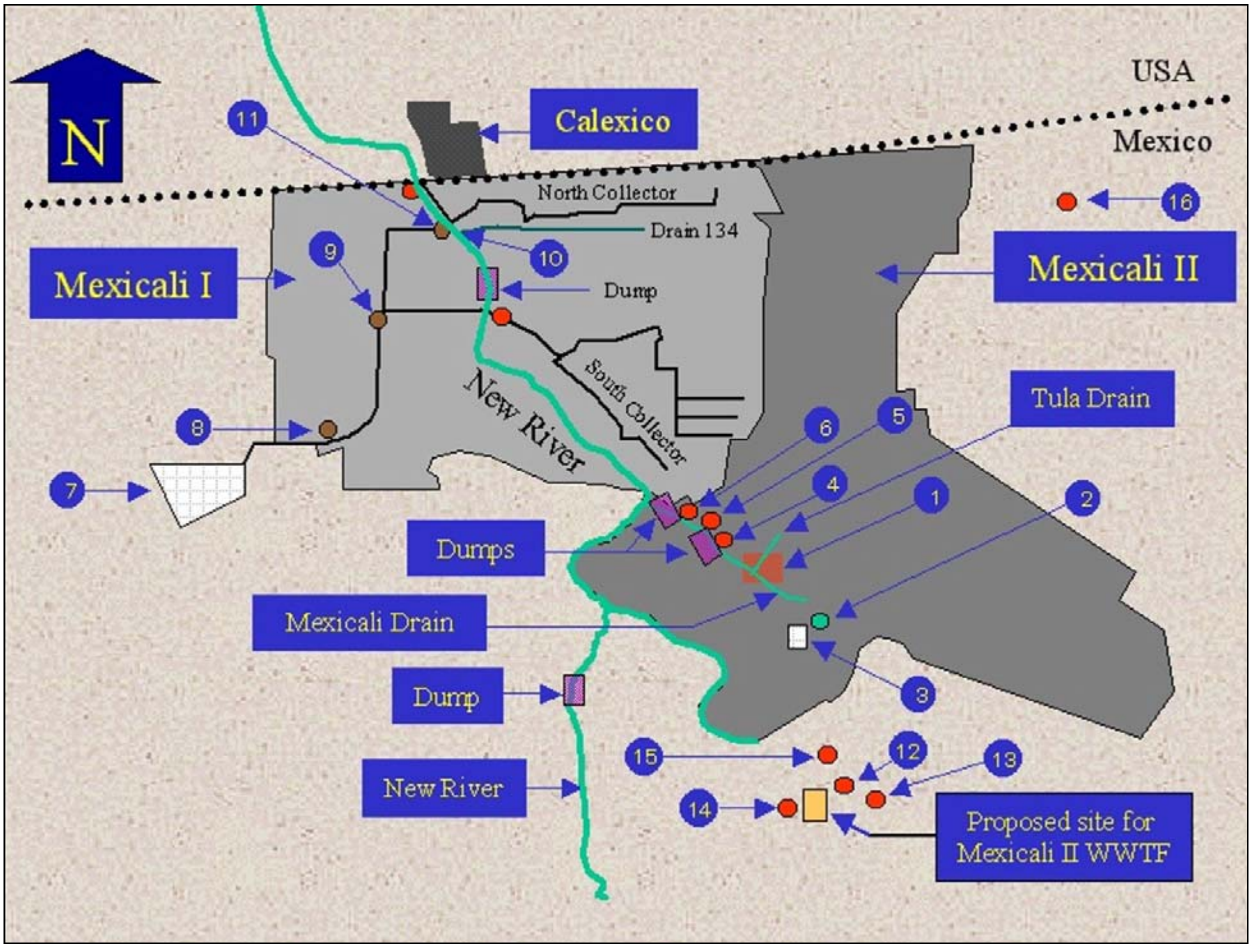
Sources of flow from Mexico (≈ 3.43 cms) for 2007 and 2008 are:

- treated industrial and domestic wastewater (≈ 30%);
- agricultural runoff in the Mexicali Valley (≈ 60%); and
- urban runoff including stormwater runoff (≈ 10%).

The average flow into the New River from U.S. sources for 2007 and 2008 was about 12.19 cms. This value was estimated by averaging the amount of flow at the New River's outlet to the Salton Sea and subtracting the average flow from Mexico. Sources of flow from the U.S. to the New River are:

- agricultural runoff (≈ 96%);
- municipal and industrial wastewater (≈ 3%); and
- urban runoff including stormwater runoff (<1%).

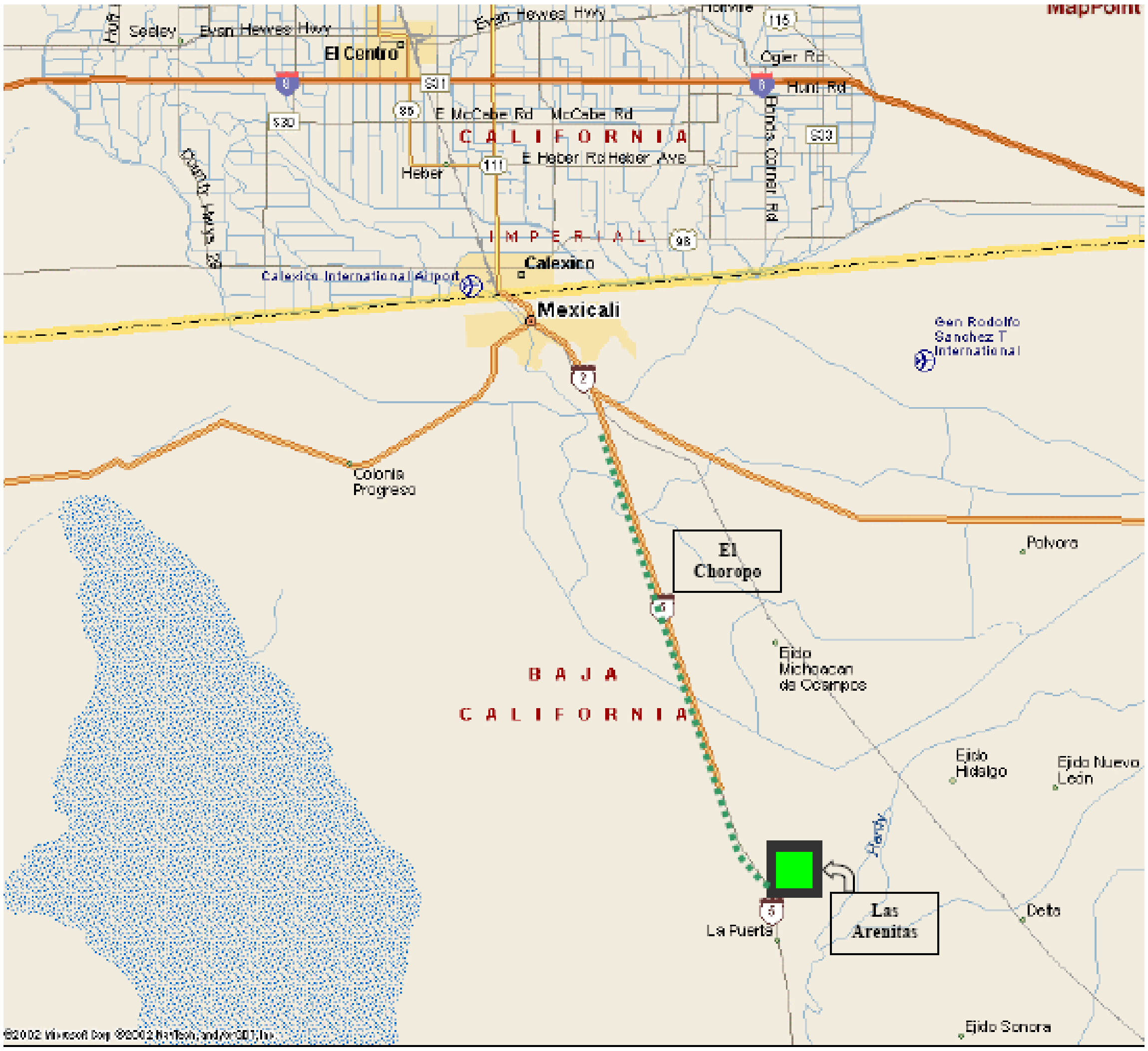
Figure 2.3: Map of Main Sewage Infrastructure Affecting the New River in the Mexicali Metropolitan Area. (Note that the Proposed Location for the Mexicali II WWTP in this Map was changed. The WWTP was built as Las Arenitas WWTP, and its location is shown in Figure 2.4.)



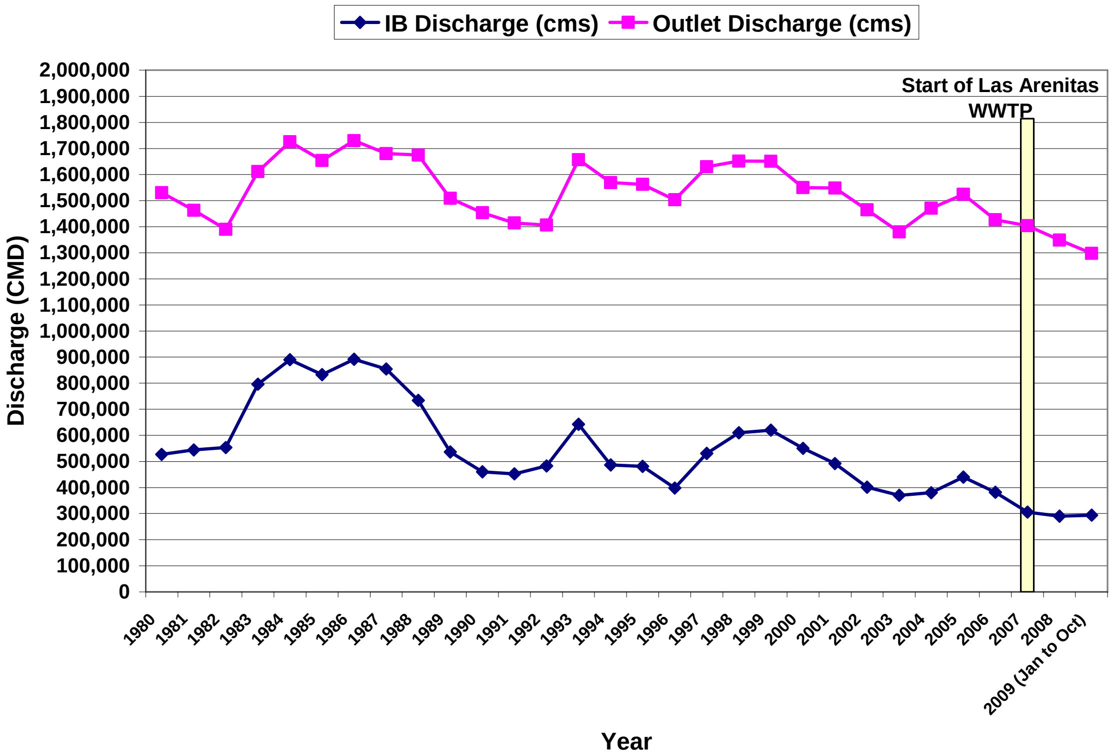
Mexicali Sewage Infrastructure Identification

1.Industrial Area: Hidrogenadora Nacional (Conasupo), Quimica Organica, Quipac, Vitromex	7. Zaragoza Lagoons (Mexicali I WWTP)	13. Steel recycling plant
2. Gonzalez-Ortega Lift Station	8. Pumping Plant No. 3	14. Slaughterhouse discharge
3. Gonzalez-Ortega Lagoons (Mexicali II WWTP)	9. Pumping Plant No. 1	15. Maseca
4. Kenmex	10. Drain 134	16. Fabrica de Papel San Francisco
5. Collector Mexicali II bypass	11. Pumping Plant No. 2 and Right Bank Lift Station	
6. Collector Nutrimex bypass	12. Hog farm discharge	

Figure 2.4: Map that Shows Location of Las Arenitas WWTP in Mexico



<u>Figure 2.5:</u> Annual Flows for New River at IB and Outlet to the Salton Sea



<u>Figure 2.6:</u> Monthly Flows for New River at IB and Outlet to the Salton Sea

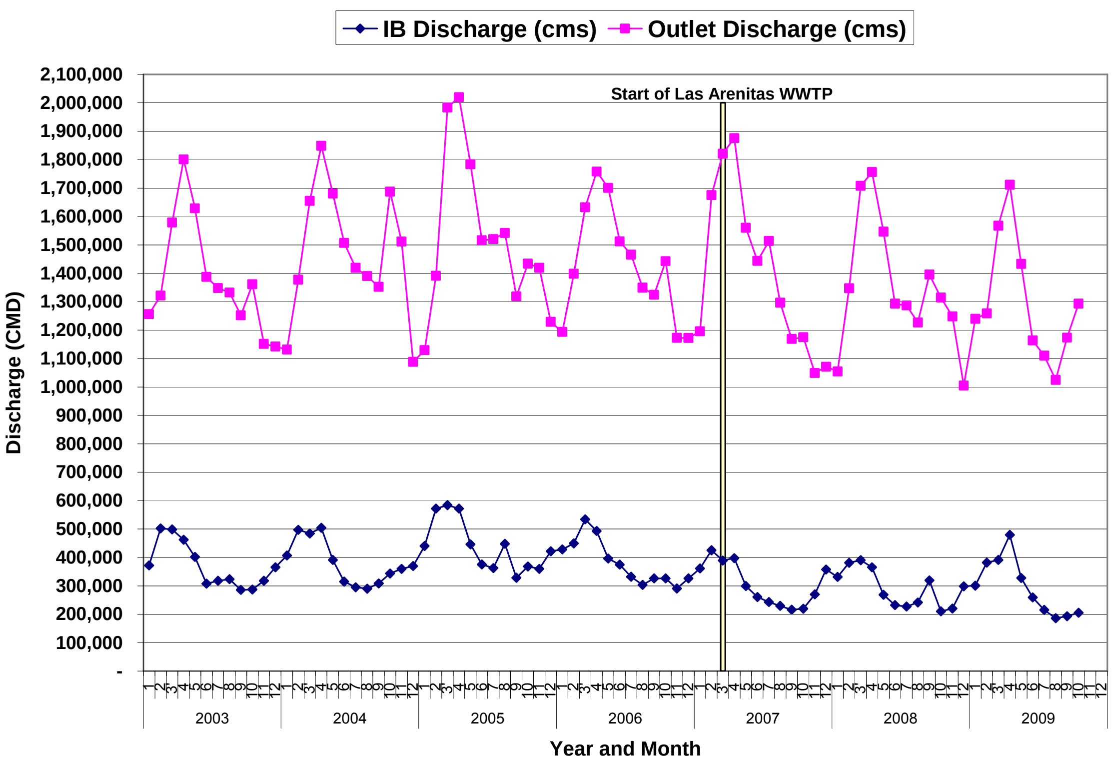


Table 2.2: Flow in the New River at IB in Cubic Meter per Second (cms). (Source: USGS)

Year	Month												Mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1980	5.29	5.96	6.07	6.58	5.70	5.14	5.87	6.81	6.97	6.50	6.03	6.27	**6.10**
1981	6.50	5.74	6.26	7.27	7.31	6.33	6.75	7.39	6.30	5.48	5.21	5.04	**6.30**
1982	6.81	6.62	7.95	7.47	7.08	4.99	5.29	6.92	6.50	4.82	4.40	7.99	**6.40**
1983	7.13	9.32	9.38	9.11	8.09	7.25	8.57	12.30	11.30	10.48	8.20	9.42	**9.21**
1984	9.74	9.57	9.88	11.73	11.02	9.08	11.16	12.47	10.02	9.46	9.44	10.11	**10.31**
1985	8.36	10.13	9.33	10.87	10.59	8.48	9.32	9.58	10.47	9.10	9.40	10.00	**9.64**
1986	9.77	10.52	11.19	12.79	10.18	9.06	10.52	10.45	9.96	9.65	9.21	10.60	**10.32**
1987	10.34	10.63	10.84	10.52	10.27	8.05	9.05	10.18	9.95	9.44	9.37	10.07	**9.89**
1988	9.53	8.55	9.32	10.44	8.43	7.66	7.99	10.85	7.20	7.14	6.48	8.33	**8.49**
1989	7.97	6.95	6.89	6.74	7.03	5.82	5.48	6.64	5.57	5.22	5.04	5.10	**6.20**
1990	6.44	6.06	5.77	5.42	5.00	5.09	4.56	5.56	5.00	4.86	4.66	5.52	**5.33**
1991	6.27	5.08	5.45	5.37	5.27	4.93	5.05	5.20	5.48	4.35	4.31	6.13	**5.24**
1992	5.33	6.51	7.78	7.98	6.04	4.37	4.04	6.06	4.31	4.21	3.76	6.66	**5.59**
1993	8.86	7.36	9.87	10.31	7.81	6.14	6.20	6.25	6.23	5.82	6.92	7.52	**7.44**
1994	6.14	7.60	7.69	6.06	7.25	5.48	3.93	4.79	4.99	4.43	3.45	5.80	**5.64**
1995	7.75	6.58	5.37	5.59	6.00	5.44	5.61	4.16	4.31	4.75	4.66	6.60	**5.57**
1996	4.57	5.53	6.01	5.33	6.89	4.69	3.99	3.93	4.62	3.55	3.07	3.16	**4.61**
1997	5.11	5.64	7.01	6.64	5.86	5.24	4.79	5.58	7.24	5.93	5.87	8.85	**6.15**
1998	7.19	9.10	9.59	9.34	6.53	6.19	6.04	7.24	5.67	5.64	5.89	6.29	**7.06**
1999	6.74	6.98	8.14	8.46	7.62	6.70	7.15	7.57	6.13	6.29	6.86	7.48	**7.18**
2000	7.83	7.22	7.55	6.91	6.63	6.17	5.60	5.78	5.26	5.71	5.54	6.22	**6.37**
2001	6.87	7.22	8.39	6.86	5.60	4.69	4.94	4.95	4.65	4.22	4.79	5.14	**5.69**
2002	5.43	5.77	5.70	5.85	5.19	4.14	3.75	3.93	3.93	3.58	3.87	4.54	**4.64**
2003	4.30	5.81	5.77	5.35	4.65	3.56	3.68	3.74	3.30	3.32	3.67	4.23	**4.28**
2004	4.70	5.75	5.60	5.84	4.53	3.65	3.41	3.35	3.57	3.97	4.17	4.28	**4.40**
2005	5.09	6.62	6.76	6.62	5.16	4.35	4.20	5.18	3.80	4.26	4.16	4.88	**5.09**
2006	4.95	5.20	6.18	5.70	4.58	4.33	3.84	3.51	3.78	3.77	3.36	3.77	**4.42**
2007	4.18	4.92	4.50	4.60	3.46	3.02	2.81	2.66	2.50	2.54	3.13	4.14	**3.54**
2008	3.83	4.41	4.52	4.23	3.11	2.69	2.63	2.79	3.69	2.43	2.55	3.45	**3.36**
2009	3.48	4.41	4.53	5.55	3.79	3.00	2.49	2.15	2.24	2.38			**3.40**
Mean	**6.55**	**6.93**	**7.31**	**7.38**	**6.56**	**5.52**	**5.62**	**6.27**	**5.83**	**5.44**	**5.43**	**6.47**	

Table 2.3: Flow in the New River at Outlet to Salton Sea (cms) (Source: USGS)

Year	Month												Mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1980	14.87	14.49	18.90	23.14	18.93	16.15	17.62	19.72	19.49	18.02	15.91	15.29	**17.71**
1981	15.40	16.50	19.14	22.31	18.82	16.13	17.25	18.55	17.00	15.47	13.89	12.67	**16.93**
1982	15.79	16.07	18.25	20.47	17.61	13.30	13.55	15.84	15.03	14.50	12.69	19.95	**16.09**
1983	14.97	17.34	20.42	21.80	19.17	16.62	17.20	21.36	20.28	19.88	17.40	17.36	**18.65**
1984	17.43	19.48	21.35	24.16	22.08	18.65	20.43	21.33	19.90	19.78	17.89	17.14	**19.97**
1985	15.06	18.55	19.75	23.03	21.89	17.95	19.05	19.65	20.53	19.03	18.71	16.50	**19.14**
1986	18.23	18.83	22.24	24.89	21.64	18.76	19.43	19.14	20.06	21.12	18.04	17.89	**20.02**
1987	17.93	19.71	21.34	23.05	21.55	17.38	17.56	19.26	19.14	20.15	17.78	18.53	**19.45**
1988	18.98	18.74	22.53	24.49	20.63	17.79	17.73	21.23	17.95	18.49	16.61	17.39	**19.38**
1989	16.80	17.54	19.19	20.74	19.08	16.57	16.66	17.77	17.05	17.75	15.71	14.68	**17.46**
1990	15.79	16.89	18.98	19.87	18.42	16.63	16.17	17.11	16.10	16.45	14.60	14.87	**16.82**
1991	15.15	15.79	16.65	19.35	18.94	17.15	16.42	16.74	16.31	15.81	14.45	13.68	**16.37**
1992	13.57	14.95	18.99	21.51	19.84	15.88	15.02	16.32	15.02	16.45	13.46	14.35	**16.28**
1993	19.46	15.17	22.67	26.97	21.67	18.19	17.72	18.32	17.84	17.95	16.72	17.42	**19.17**
1994	16.82	17.72	21.72	23.27	22.09	18.14	17.00	17.97	16.88	16.88	14.31	15.18	**18.16**
1995	15.12	16.90	20.53	22.84	21.21	19.86	19.21	18.16	16.80	17.05	14.22	15.02	**18.08**
1996	14.25	17.17	20.76	22.07	21.18	18.66	17.41	16.63	17.16	16.44	14.22	12.79	**17.40**
1997	14.14	17.87	22.04	22.38	20.20	18.68	18.55	19.63	20.66	18.13	17.12	16.99	**18.87**
1998	16.66	17.39	23.47	25.01	21.18	17.96	19.33	19.92	17.15	18.56	16.71	16.05	**19.12**
1999	16.77	17.44	22.54	22.85	22.29	19.80	18.65	18.94	17.14	18.69	17.12	17.00	**19.10**
2000	16.80	17.25	20.54	21.66	20.70	18.63	17.61	17.34	16.50	17.72	15.35	15.17	**17.94**
2001	15.23	17.53	19.93	22.81	20.95	17.86	18.67	18.38	17.20	16.73	15.20	14.54	**17.92**
2002	14.71	16.85	19.33	21.01	19.92	17.25	16.99	17.16	16.31	16.33	14.09	13.48	**16.95**
2003	14.54	15.30	18.27	20.84	18.85	16.05	15.60	15.42	14.49	15.76	13.32	13.22	**15.97**
2004	13.10	15.95	19.16	21.40	19.45	17.44	16.43	16.09	15.65	19.54	17.50	12.59	**17.02**
2005	13.07	16.11	22.96	23.37	20.64	17.55	17.60	17.85	15.27	16.60	16.43	14.23	**17.64**
2006	13.81	16.19	18.89	20.35	19.68	17.51	16.96	15.62	15.33	16.70	13.58	13.57	**16.51**
2007	13.84	19.39	21.07	21.71	18.06	16.71	17.51	15.00	13.53	13.60	12.14	12.40	**16.25**
2008	12.20	15.59	19.77	20.33	17.90	14.97	14.90	14.20	16.15	15.21	14.45	11.63	**15.61**
2009	14.35	14.57	18.14	19.81	16.58	13.47	12.85	11.86	13.58	14.97			**15.02**
Mean	**15.49**	**16.98**	**20.32**	**22.25**	**20.04**	**17.26**	**17.24**	**17.75**	**17.05**	**17.33**	**15.50**	**15.23**	

Sewage Services in the Mexicali Metropolitan Area

Current sewage service for the Mexicali metropolitan area that affects the New River is divided into two areas, Mexicali I and Mexicali II (Figures 2.3 and 2.4). Mexicali I is located in the northwest area of Mexicali. The Mexicali II area is located in the northeast area of Mexicali.

Wastewater from Mexicali I is treated by the Zaragoza WWTP with a capacity of about 25 million gallons per day (MGD) (1.10 cms). The treated wastewater is discharged into the New River through agricultural drains. Wastewater from Mexicali II is treated by the Las Arenitas WWTP (Figure 2.4) which has a capacity of about 20 MGD (0.90 cms). The Las Arenitas WWTP became fully operational in March 2007. Prior to the completion of the Las Arenitas WWTP, untreated wastewater from Mexicali II was being discharged into a drain that flows into the New River. Currently, the treated wastewater from the Las Arenitas WWTP is not discharged into the New River watershed. Rather, it is discharged into a drain called the Hardy River that flows south towards the Gulf of California in Mexico. Las Arenitas WWTP is designed to prevent remaining municipal untreated sewage from the Mexicali II area from being discharged into the New River and its tributary drains.

Land Uses in Imperial County, California, U.S.

The U.S. section of the New River at the IB is located in Imperial County. The county covers about 4,597 square miles (11,906 square kilometers, 1,190,660 hectares, or 2,942,080 acres) (County of Imperial, 2008). About 74% of county lands are undeveloped desert and mountain areas, mostly under federal or state ownership. About 18% of county lands are irrigated for agriculture, totaling about 534,000 acres located mostly in the Imperial Valley. The Salton Sea covers about 7% of the county. Developed areas (e.g., cities, communities, and support facilities) occupy less than 1% of county land. Table 2.4 shows Imperial County land use distribution.

Imperial County has an agricultural-based economy, and produces over $1.5 billion dollars annually (Imperial County Agricultural Commissioner, 2008). Imperial Valley contains about 500,000 acres of irrigated land in production (Figure 2.7). The Imperial Irrigation District (IID) distributes up to 3.1 million acre-feet (3.8 billion cubic meters)/year of irrigation water from the Colorado River to Imperial County irrigated lands. (Source: <http://www.iid.com/Water/>.) The water is delivered to farmland via a gravity driven system of supply canals and ditches. This water is applied to nearly level land for irrigation and salinity control. Without this irrigation water, it would not be possible to farm in the Imperial Valley because of its low precipitation (less than 3 inches or 76.2 mm per year). Major Valley crops are alfalfa, wheat, bermuda grass, sudan grass, and sugar beets, based on the amount of land in production. (Imperial County Agricultural Commissioner, 2008.) One in three Imperial Valley jobs is agriculture-related. (Source: <http://www.iid.com/Water/IrrigationDrainageServices/>.)

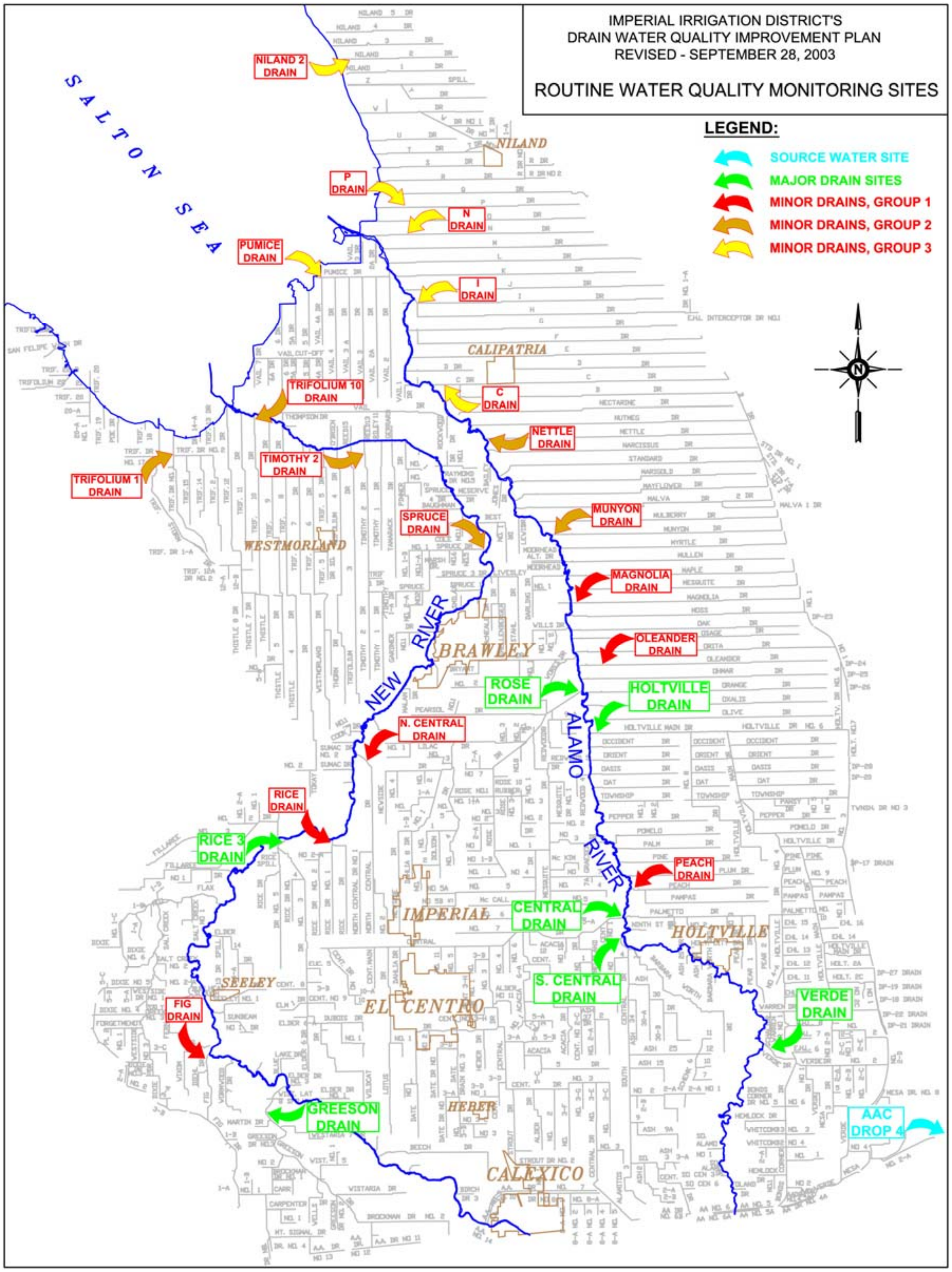
Table 2.4. Imperial County Land Use Distribution (in acres) [Source: Planning & Development Services Department, County of Imperial, 2008]

Land Use	Acres
Irrigated (Agriculture)	
Imperial Valley	512,163
Bard Valley	14,737
Palo Verde	7,428
TOTA	534,328 (18.2%)
Developed	
Incorporated	9,274
Unincorporated	8,754
TOTAL	18,028 (0.60%)
Desert and Mountains	
Federal	1,459,926
State	37,760
Indian	10,910
Private	669,288
TOTAL	2,177,884 (74.0%)
Other	
Salton Sea	211,840 (7.2%)
IMPERIAL COUNTY TOTAL	2,942,080 Acres

Weather

The Imperial Valley has a typical desert climate. The climate is dry, with hot summer temperatures, occasional thunderstorms, and gusty high winds with sandstorms. The area is one of the most arid in the United States, with an average annual rainfall of less than 3 inches (7.62 centimeter, cm), and temperatures in excess of 100 ºF (37.74 ^{0}C) for more than 100 days per year. The average January temperature is 54 ºF (12.21 ^{0}C), and the average July temperature is 92 ºF (33.3 ^{0}C). Evapotranspiration rates for the Imperial Valley can exceed 7 feet per year, and in hot summer months, can be one-third inch per day. The frost-free period was greater than 300 days per year for 9 of 10 years, and greater than 350 days per year for 3 (2.134 meter, m) of 10 years (Setmire et al., 1990). The frost-free period coupled with the irrigation waters delivered by IID make it possible to farm year-round in Imperial Valley.

Figure 2.7: Map of Main Sources of Water to the New River Inside the U.S. (IID Drain Water Quality Improvement Plan Drain Map)



Soil

The soils in the Imperial Valley are alluvial deposits formed when the lower Colorado River deposited its sediment load as it flowed into the Salton Basin, the geological depression where the Salton Sea is located. All of the major soils associations within the Imperial Valley are within the "wet" series of poorly drained soils due to their low (less than 0.5 inches per hour or 12.7 mm/h) permeabilities. Because of the poor drainage, a tile system consisting of collector pipes are installed 10 to 15 feet below the soil to capture the excess water as it percolates through the soil. The tile system then discharges this water (referred to as "tile water") into drains. The following three general soil associations dominate Imperial Valley: Imperial; Imperial-Holtville-Glenbar; and Meloland-Vint-Indio. (U.S.Department of Agriculture Soil Conservation Service (USDASCS), 1981.) The soil association descriptions below are excerpted from a report titled "Soil Survey of the Imperial County California Imperial Valley Area" (USDASCS, 1981).

Imperial Soil Association: The Imperial soil association is comprised of nearly level, moderately well drained silty clay. This unit consists of very deep, calcareous soils formed in alluvial deposits. The largest area of the unit is around the town of Calipatria. Smaller areas are scattered throughout the lake basin. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less then 2%. Elevation levels range from about 230 feet below to 30 feet above MSL. The unit is about 85 percent Imperial Soils and 15 percent minor soils. Imperial soils have a pinkish gray silty clay surface layer. Underlying this layer is pinkish gray, light brown silty clay. Minor soils are the well drained Glenbar, Holtville, Meloland, and Indio soils.

Imperial-Holtville-Glenbar Soil Association: The Imperial-Holtville-Glenbar soil association is nearly level, moderately well drained and well drained silty clay, silty clay loam, and clay loam. This map unit consists of very deep calcareous soils formed in alluvial deposits throughout the lake basin. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less than 2%. Elevation is about 230 feet below to 30 feet above MSL. The unit is about 40 percent Imperial soils, 20 percent Holtville soils, 20 percent Glenbar soils, and 20 percent minor soils:

Imperial soils are moderately well drained. They have a pinkish gray silty clay surface layer. Underlying this layer is pinkish gray and light brown silty clay.
Holtville soils are well drained. They have light brown silty clay loam or silty clay layers about two feet thick. Underlying these are stratified very pale brown silt loam and loamy very fine sand.

Glenbar soils are well drained. They have a pinkish gray clay loam or silty clay loam surface layer. Underlying this is stratified light brown clay loam and silty clay loam.

Minor soils are the well drained Meloland, Indio, and Vint soils, and the somewhat excessively drained Rositas soils.

Meloland-Vint-Indio Soil Association: The Meloland-Vint-Indio soil association is nearly level, well drained fine sand, loamy very fine sand, fine sandy loam, very fine sandy loam, loam and silt loam. This map unit consists of very deep, calcareous soils formed in alluvial deposits and in eolian material. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less than 2%. Elevation is about 230 feet below to 30 feet above MSL. The map unit is about 30 percent Meloland soils, 25 percent Vint soils, 20 percent Indio soils, and 25 percent minor soils:

Meloland soils have a light brown, very fine sandy loam or fine sand surface layer. Underlying this is stratified very pale brown loamy fine sand and silt loam to a depth of about 2 feet. Below this is pink silty clay.

Vint soils have a light brown loamy very fine sand, fine sandy loam, or very fine sandy loam surface layer. Underlying this is stratified pink and light brown loamy fine sand.

Indio soils have a pinkish gray loam or very fine sandy loam surface layer. This is underlain by stratified very pale brown and pink layers of silt loam and loamy very fine sand.

Minor soils are the somewhat excessively well drained Holtville, Antho, and Glenbar.

2.2: ECOLOGICAL SETTING

Downstream reaches of the New River provide important habitat for many kinds of wildlife. However, the New River at the IB is so polluted by multiple constituents that many species no longer exist there or occur in very low numbers. Poor water quality at the IB continues to impact the New River all the way to the Salton Sea due to pollutants (e.g., pathogens) carried by organic matter.

The New River pollutant problem is most severe at the IB. Very few bottom-dwelling invertebrates can survive in the New River from the IB to nearly nine miles downstream—only three species, sometimes represented by only one organism, were detected in one study (Setmire, 1984). Invertebrate populations continue to increase in numbers and diversity downstream (Setmire, 1984).

Low invertebrate populations at the IB lead to low fish populations, as many fish consume invertebrates. Low fish populations have negative impacts on fish-eating species, especially birds, at the IB. About 20 miles downstream of the IB, near the community of Seeley, the water quality of the New River begins to improve substantially, although the river is still impaired by a number of pollutants.

Downstream reaches of the New River exhibit more intricate food webs than are present at the IB. In downstream reaches, food webs incorporate many terrestrial and aquatic elements, including plants, invertebrates, fish, mammals, reptiles, amphibians, and birds. Organisms at the food web base are consumed by organisms at the next highest trophic level. These organisms then are consumed by the next highest trophic level, and so on until the top of the food web is reached. The base of the New River food web in downstream reaches includes plankton, detritus, and aquatic vegetation, which are consumed by aquatic invertebrates such as snails, water boatmen, and insect larvae. The aquatic invertebrates are consumed by crayfish, river clams, and fish. (Some fish also may consume plankton directly.) Birds and turtles are at the top of the food web, feeding on aquatic invertebrates, aquatic vegetation, crayfish, river clams, and fish. Generally, waterfowl and shorebirds are seen where the New River meets the Salton Sea. Birds are the most diverse wildlife group using the New River as indicated by abundance and species richness, and are most concentrated in downstream reaches. Relatively few bird species are present in the New River at the IB.

Riparian habitat is found along some parts of the New River, especially in downstream reaches. These riparian areas provide important habitat for songbirds. Riparian corridors are potential wildlife movement corridors, and thus are important aspects of habitat. The dominant plant species along these corridors is tamarisk (also known as salt cedar), an introduced species that has suffocated native vegetation. (Montgomery Consulting Engineers Inc., 1987.)

The New River contains state and federally endangered and threatened species. Fifteen special status wildlife and plant species (including one that is endangered and/or threatened) occur or potentially occur in the New River IB vicinity.

The New River empties into the Salton Sea, which is a critical stop for migrating birds on the ecologically important Pacific Flyway, a major migratory route connecting Canada and the U.S. to Mexico and Central America. Millions of birds, representing more than 350 species, winter at the Salton Sea in one of the few remaining wetland environments along the Pacific Flyway (U.S. Fish and Wildlife Service, 1997). Salton Sea bird communities represent a significant proportion of the breeding populations of many species. (Tetra Tech Inc., 2000.)

The New River supports a substantially different ecosystem than that of the Salton Sea, into which the river empties, despite the sea receiving agricultural discharges and other relatively freshwater flows from the New River, Alamo River, and agricultural drains. This is due to physical and chemical differences, the most important being the Salton Sea's high salinity level. The interface between the New River and the Salton Sea contains elements of both ecosystems, and serves as a transition zone where fresh and salt water intermix to form brackish water.

CHAPTER 3: SOURCE ANALYSIS

This chapter identifies and characterizes sources of oxygen demanding materials that result in low DO concentrations in the New River. Biochemical Oxygen Demand (BOD) and Ammonia (NH_3) from Mexico are found to be the main cause of low DO in the New River, as shown by analyses of available data to date and New River QUAL2K Water Quality computer model simulations. Loads of BOD and NH_3 to address New River DO impairments were developed by the QUAL2K Model simulations (see Chapter 7 and Appendix F).

3.1: METHODOLOGY

Chronic low levels of DO in the water column threaten fish and wildlife communities that utilize the New River as habitat downstream of the IB. Low DO is a result of complex chemical and biological processes that consume the available oxygen in the water column. In this context, DO is not considered a pollutant, but is considered an indicator parameter for water quality. The pollutants of concern are the constituents that exert a demand on the in-stream DO resources or contribute to processes that lead to oxygen depletion.

Processes that may deplete DO are bacterial decomposition of organic matter and stream eutrophication. Bacteria decomposers respond to increased organic matter with increased growth and biological activity. Increased biological activity leads to increased consumption of DO. Anthropogenic eutrophication arises when excessive amount of nutrients, mainly from sewage and agricultural runoff, stimulates growth of algal biomass. The increase in algal biomass leads to more organic matter sinking to the sediment. Bacteria then decompose the organic matter at river's bottom, consuming large amounts of oxygen during the process.

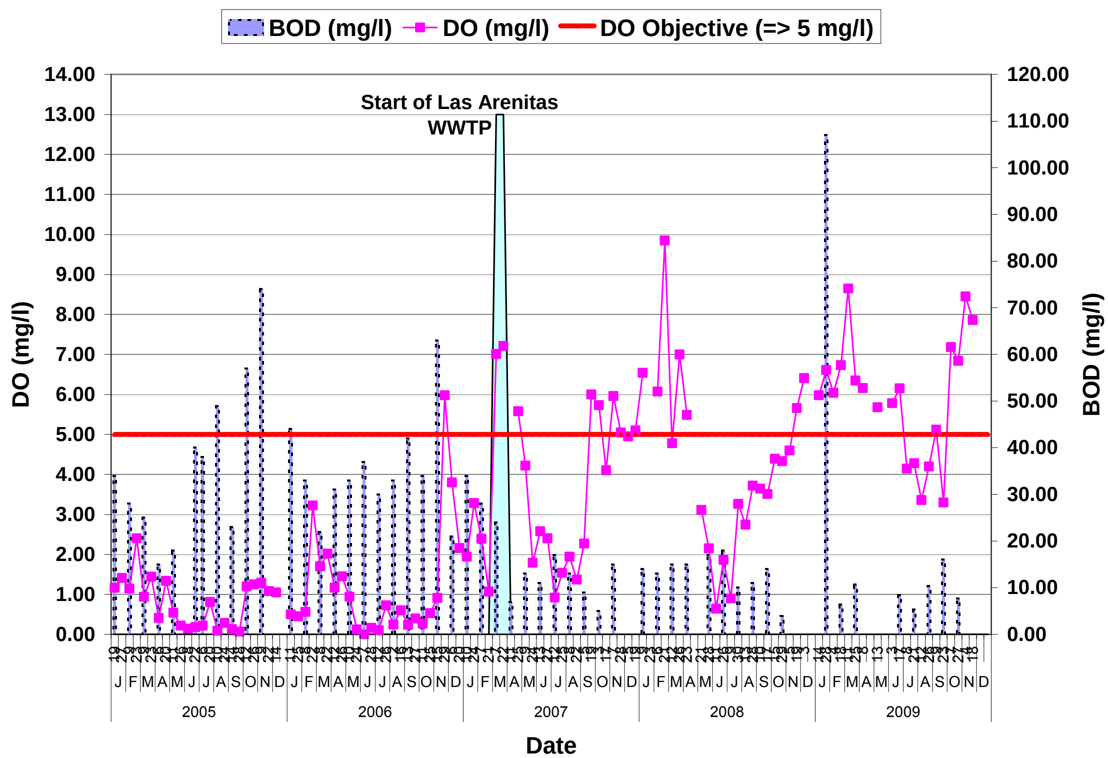
The source analysis evaluates the potential to consume DO in the New River by discharges from: waste discharge from Mexico; WWTPs regulated by the NPDES Permit Program; CAFOs; natural sources; and agricultural, storm water, and urban runoff. The source analysis indicates that waste discharges from Mexico are the primary source of oxygen demand in the New River and are the cause for the DO impairment at the IB and several miles downstream. An analysis of each source is described below.

3.2: SOURCES IN MEXICO

As previously mentioned, sewage service for the Mexicali metropolitan area, which affects the New River, is divided into two areas: Mexicali I and Mexicali II (Figures 2.3 and 2.4). Also, as explained in Chapters 1 and 2, prior to construction and operation of the Las Arenitas WWTP beginning in March 2007, untreated waste discharges in Mexico to the New River and tributary drains were the major sources of low DO in the New River downstream of the IB. These untreated wastes contained high amounts of organic matter that exerted a BOD, consuming in-stream DO. This resulted in chronic low DO conditions in the New River in the U.S. that persisted for more than 20 miles (32.2 km) downstream of the IB, which required the Regional Board in 2002 to list the New River as impaired by low DO.

Water quality data for the New River at the IB from January 2005 to November 2009 obtained from the USIBWC are shown in Appendix B. DO and BOD data are shown in Figure 3.1. Improvements in DO levels in the New River at the IB are apparent as a result of the Las Arenitas WWTP operation.

Figure 3.1: BOD and DO Concentration for the New River at IB. (Source: USIBWC)



3.3: NONPOINT SOURCES IN THE U.S.

Agricultural Runoff

In the U.S., the New River is largely sustained by agricultural return flows from the Imperial Valley in California. Agricultural return flows from Imperial Valley reach the New River through drains operated and maintained by the IID (IID) (Figure 2.7). Flood irrigation is the irrigation method of choice. Water running off the field into the drain without percolating into the soil is called tailwater, which may transport organic matter and plant nutrients from the fields to the drains. Water percolating through soil and into an underlying tile drainage system that is not absorbed by crops is called tilewater, which flushes salts from the soil.

Tailwater and tilewater can transport organic matter and nutrients from fields with grazing livestock, or fertilized with manure for growing crops, particularly after irrigation, which attracts birds to insects driven from the soil. Nevertheless, it appears that the potential that agricultural activities contribute oxygen demanding materials for New River DO is low relative to other sources from the U.S. and Mexico. This potential is low because measures being implemented pursuant to the New River Sedimentation/Siltation TMDL decrease transport of organic matter to the drains. For instance, wheat filter strips (Figure 3.2) are an effective agricultural management practice that lowers organic matter as well as total suspended solids (TSS) in tailwater.

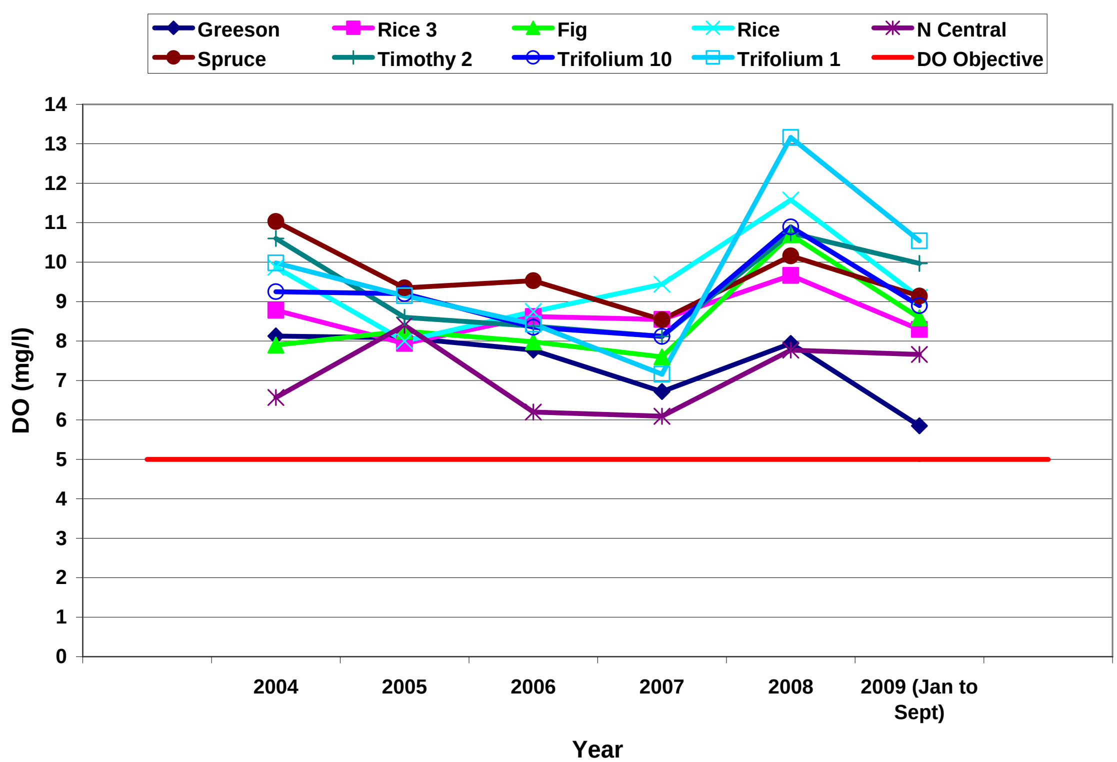
Figure 3.2: Wheat Filter Strip Management Practice

The low potential of agricultural runoff to adversely impact New River DO levels is supported by data submitted by the IID in 2009 from two main (Greeson and Rice 3) and seven minor (Fig, Rice, N Central, Spruce, Timothy 2, Trifolium 10, and Trifolium 1) agricultural drains in the New River Watershed near the outflow to the New River. These data reveal high DO levels (Table 3.1, Figure 3.3 and Appendix C).

Table 3.1: Average Annual DO Concentrations Calculated from Monthly and/or Quarterly DO Concentrations in the Agricultural Drains in the New River Watershed by Sample Site, February 2004 to September 2009 (Source: IID)

	Greeson	Rice 3	Fig	Rice	N Central	Spruce	Timothy 2	Trifolium 10	Trifolium 1
2004	8.13	8.78	7.90	9.87	6.57	11.03	10.60	9.25	9.98
2005	8.08	7.94	8.25	8.00	8.40	9.35	8.60	9.20	9.15
2006	7.77	8.62	7.98	8.75	6.20	9.53	8.38	8.35	8.43
2007	6.72	8.55	7.60	9.44	6.09	8.54	8.12	8.12	7.16
2008	7.94	9.66	10.69	11.58	7.77	10.16	10.74	10.89	13.16
2009 (Jan to Sept)	5.85	8.29	8.59	9.11	7.66	9.14	9.97	8.90	10.54
Average	**7.41**	**8.64**	**8.50**	**9.46**	**7.11**	**9.62**	**9.40**	**9.12**	9.73

Figure 3.3: Average Annual DO Concentrations Calculated from Monthly and/or Quarterly DO Concentrations in the Agricultural Drains in the New River Watershed by Sample Site, February 2004 to September 2009 (Source: IID)



Natural Sources

Natural sources of organic matter and plant nutrients include wildlife, wind deposition, and in-stream erosion. Natural sources may contribute oxygen demanding matter directly into the river, or indirectly through discharges to tributary drains. Turtles, birds, and other wildlife use farmland for sustenance, particularly farmland with grain crops. However, the amount of oxygen demand they contribute to the river appears insignificant relative to other sources from the U.S. and Mexico. Characterizing natural sources of oxygen demand will be extremely difficult to do until the high levels of BOD in the river at the IB are significantly reduced.

3.4: POINT SOURCES IN THE U.S.

Urban Runoff

Urban runoff includes those discharges from residential, commercial, industrial, and construction areas within the “Permit Area” and excludes those discharges from feedlots, dairies, farms, POTWs, and open space. The “Permit Area” is defined in the general permit issued by the SWRCB, “Water Quality Order No. 2003–0005–DWQ, NPDES General Permit No. CAS000004, Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4)” (hereafter, MS4 Permit). Urban runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into ”waters of the United States” (i.e., waters that are subject to CWA requirements (CWA Section 402; 40 CFR 122.2). Urban runoff drains directly into the New River or its tributary drains.

The cities of Westmorland and Calexico and the unincorporated community of Seeley do not have community-wide urban runoff collection and conveyance systems. However, several public entities have such systems, including: (a) Calexico Airport, which discharges directly into the New River, (b) the city of Brawley, which discharges 70% of its urban runoff to the New River and the other 30% to the City of Brawley WWTP (Brawley WWTP, 2009), and (c) the Naval Air Facility at El Centro, which discharges to the New River..

Urban runoff may possess an oxygen demand, but it is more likely to evaporate or infiltrate into the soil rather than drain into the New River, given the arid climate. In addition, lack of urban land use limits the generation of urban runoff. Less than 0.5% of the New River watershed in the Imperial Valley is urbanized. Both of these factors cause urban runoff not to be a potentially significant source of oxygen demand for New River DO resources inside the U.S.

Stormwater runoff results from intense storm events that often cause large-scale erosion in vulnerable areas. Most stormwater runoff draining into the New River is from farmland, public roads, construction activities, and residential communities. Intense storm events are uncommon, as evidenced by the area’s annual average precipitation of less than three inches. Stormwater runoff from the Imperial Valley accounted for less than 0.8% of the flow to the New River from 1994 to 1999 (California Regional Water Quality Control Board, Colorado River Basin Region, 2001). Most runoff percolates into the ground, evaporates, or collects in community sewers for treatment at WWTPs. Thus, stormwater runoff is not a significant source of oxygen demand, unless it contacts manure fertilizer.

Imperial Valley municipalities and the County of Imperial are enrolled in the MS4 Permit (MS4 Permittees). Their permit is posted at the following SWRCB website:

<http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml/>.

In addition to urban runoff, the MS4s receive flows from agricultural activities, open space, state and federal properties, and other non-urban land uses not under the control of the MS4 Permittees. The MS4 Permittees lack legal jurisdiction over storm water discharges into their respective MS4s from agricultural activities, California and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. Accordingly, the Regional Board recognized in the MS4 permit issued to the MS4 Permittees that they should not be held responsible for such facilities and/or their discharges.

NPDES Facilities

In addition to the water coming from agricultural drains in the Imperial Valley, six wastewater treatment facilities discharge pollutants into the impaired section of the New River pursuant to the National Pollutant Discharge Elimination System (NPDES) program. Table 3.2 lists BOD effluent limitations for the six NPDES WWTPs discharging into the impaired section of the New River.

Table 3.2: Current NPDES Permitted Effluent Limitations for Flow [in MGD and CMD] and BOD* [in mg/l]

Discharger	BOD 30 day (mg/L)	BOD 7 day (mg/L)	Facility Design Flow		Permit Numbers
			MGD	CMD	
City of Calexico WWTP	30	45	4.3	16,280	CA7000009
Seeley County Water District	45	65	0.25	946.4	CA0105023
Centinela State Prison	45	65	0.73	2,763	CA7000001
U.S. Naval Air Facility, El Centro	30	45	0.3	1,136	CA0104906
McCabe Union School District	30	45	0.015	56.78	CA0104281
Date Gardens Mobile Home Park	30	45	0.021	79.49	CA0104841
* There are no effluent limitations for DO and NH_3 in these NPDES permits. However, DO and NH_3 are addressed in the receiving surface water limitations section of the permit.					

DO receiving surface water limitations for the six facilities require that their discharges shall not cause the concentration of DO in the New River to fall below 5.0 mg/l. When the DO in the New River is already below 5 mg/l, the discharge shall not cause any further depression. NH_3 receiving surface water limitations for the six facilities require that their discharges shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Average Flow, DO, BOD, and NH_3 data for these six NPDES facilities are shown in Figures 3.4 to 3.7, Tables 3.3 to 3.6, and Appendix D.

Figure 3.4: Annual Average Effluent Flow for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009) on Log Scale

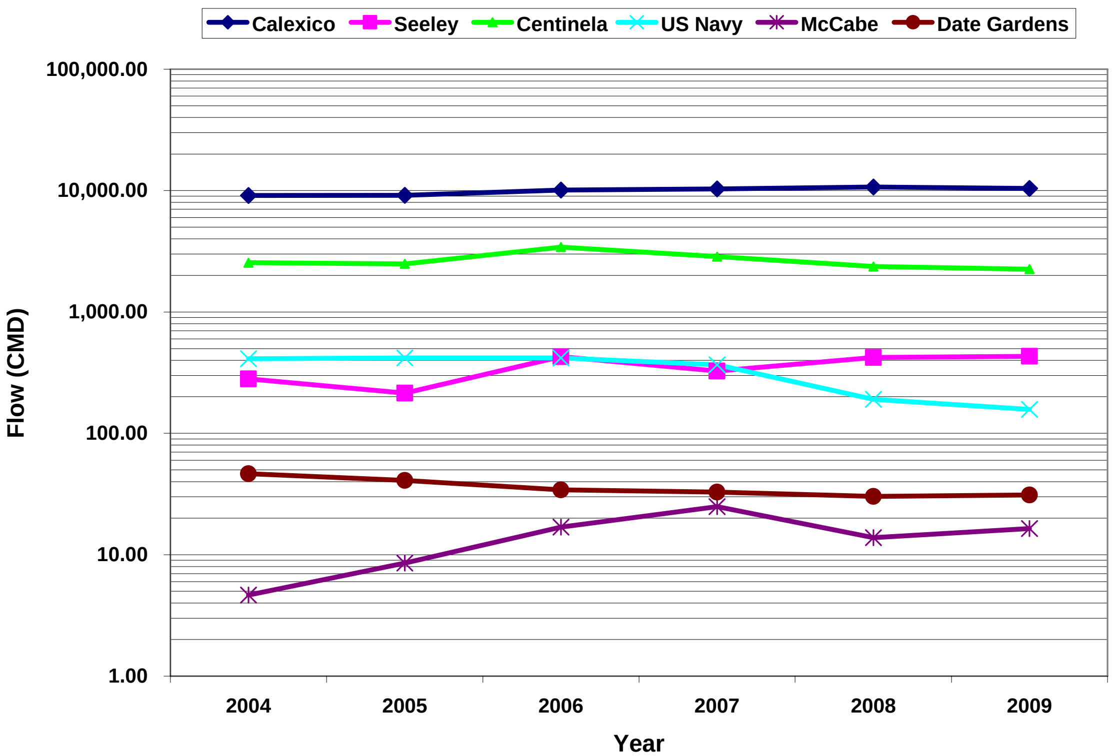


Table 3.3: Annual Average Effluent Flow for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

	Flow in cubic meters per day (CMD)					
Year						
	Calexico	**Seeley**	**Centinela**	**US Navy**	**McCabe**	**Date Gardens**
2004	9,102.24	280.75	2,550.44	411.35	4.66	46.43
2005	9,131.44	215.04	2,493.35	418.61	8.52	40.91
2006	10,110.60	427.53	3,428.35	417.66	16.88	34.20
2007	10,316.91	326.40	2,854.54	367.20	24.86	32.83
2008	10,697.03	421.66	2,366.50	190.94	13.82	30.24
2009	10,396.72	431.32	2,249.86	157.25	16.42	31.10
Average	**9959.16**	**350.45**	**2657.17**	**327.17**	**14.19**	**35.95**

Figure 3.5: Annual Average Effluent BOD for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

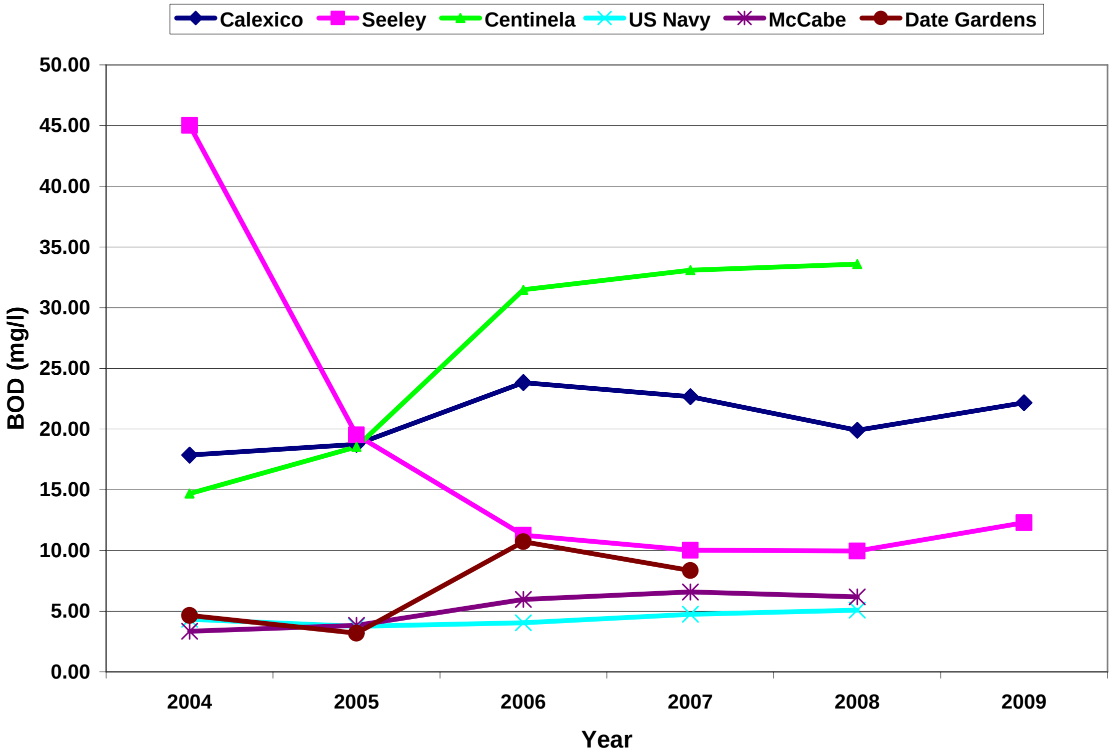


Table 3.4: Annual Average Effluent BOD for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

	BOD (mg/l)					
Year						
	Calexico	**Seeley**	**Centinela**	**US Navy**	**McCabe**	**Date Gardens**
2004	17.86	45.02	14.68	4.33	3.34	4.65
2005	18.73	19.52	18.53	3.74	3.83	3.18
2006	23.83	11.27	31.48	4.04	5.97	10.73
2007	22.67	10.03	33.09	4.53	6.58	6.45
2008	19.91	9.96	23.86	5.36	8.36	6.67
2009	22.18	12.29	10.03	7.36	7.26	8.43
Average	**20.86**	**18.01**	**21.95**	**4.89**	**5.89**	**6.69**

Figure 3.6: Annual Average Effluent NH_3 for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

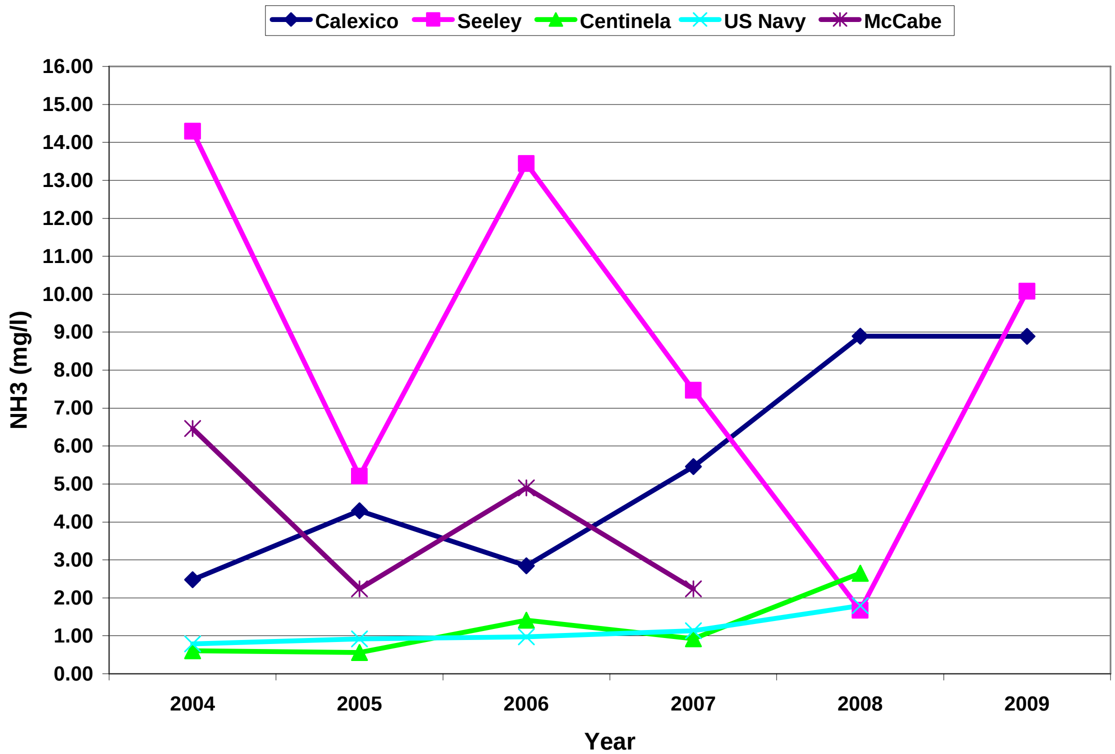


Table 3.5: Annual Average Effluent NH_3 for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

Year	NH3 (mg/l)					
	Calexico	Seeley	Centinela	US Navy	McCabe	Date Gardens*
2004	2.48	14.30	0.61	0.79	6.46	-
2005	4.29	5.21	0.56	0.92	2.24	-
2006	2.85	13.44	1.41	0.98	4.90	-
2007	5.46	7.47	0.92	1.13	2.24	-
2008	8.90	1.67	1.79	2.30	3.36	-
2009	8.89	10.08	0.51	3.53	3.36	-
Average	**5.48**	**8.69**	**0.97**	**1.61**	**3.76**	**-**

* There is no effluent limitation for NH_3 in this NPDES permit.

Figure 3.7: Annual Average Effluent DO for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

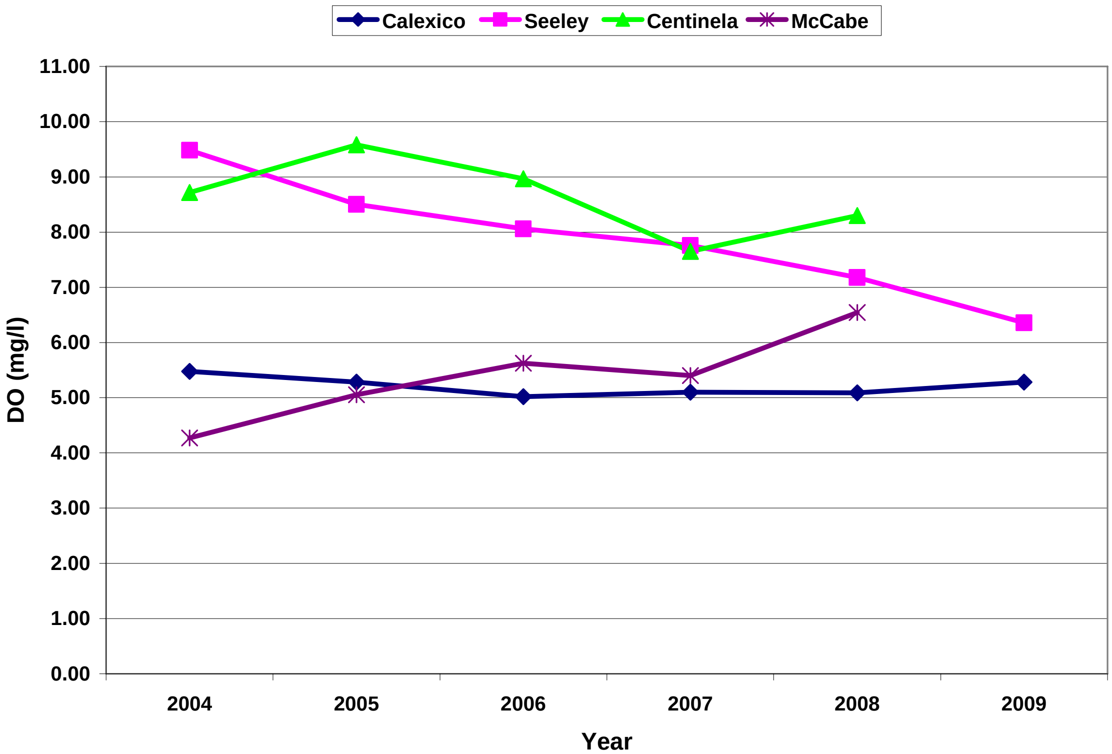


Table 3.6: Annual Average Effluent DO for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2009)

	DO (mg/l)					
Year						
	Calexico	Seeley	Centinela	US Navy	McCabe*	Date Gardens*
2004	5.48	9.48	8.72	-	4.27	-
2005	5.28	8.50	9.58	-	5.05	-
2006	5.02	8.06	8.97	-	5.63	-
2007	5.10	7.76	7.65	-	5.40	-
2008	5.09	7.18	7.83	-	6.21	-
2009	5.28	6.36	6.78	-	6.39	-
Average	**5.21**	**7.89**	**8.25**	**-**	**5.49**	**-**

- There are no effluent limitations for DO in these NPDES permits.

CONCENTRATED ANIMAL FEEDING OPERATIONS (CAFOs)

A "CAFO" is defined as any animal feeding operation that has more than 1,000 animal units (dairy cattle are considered 1.4 animal units and feeder cattle are considered 1.0 animal units). (40 CFR 122.23.) Pursuant to the CWA, all CAFOs are point sources and, as such, are subject to NPDES permitting requirements. Smaller animal feeding operations can also be designated as CAFOs by the permitting agencies after considering the criteria prescribed in 40 CFR 122.23(b)(1). The Regional Board has determined that all feedlots, dairies, heifer ranches, calf nurseries, and other similar facilities in the Region should be designated as CAFOs. Nine CAFOs are present in the U.S. portion of the New River watershed, and are regulated by the Regional Board in Board Order No. R7-2008-0800, "General NPDES Permit and General Waste Discharge Requirements for CAFOs." Table 2.7 provides information about these CAFOs, including their relative threat to water quality. These CAFOs are prohibited from discharging directly into agricultural drains and the New River.

Table 3.7: Concentrated Animal Feeding Operations in the New River Watershed

Site, Address, and Map Reference Number	Maximum Number of Animals	Distance to the New River or a Tributary	Threat to New River[1]
Brandenburg Feed Yard 903 West Highway 98, Calexico, 1	4,000	Adjacent to Greeson Drain	Moderate
New River Cattle 420 West Kubler Road, Calexico, 2	10,000	Adjacent to New River	High
Phillips Cattle Co. 910 Nichols Road, El Centro, 3	15,000	Adjacent to New River	High
Meloland Cattle Co. 907 Brockman Road, El Centro, 4	16,000	Adjacent to Wisteria Drain	Moderate
Jackson Feedlot 495 West Heber Road, El Centro, 5	15,000	1.5 miles	Low
El Toro Land and Cattle Co. 96 East Fawcett Road, Heber, 6	16,000	2 miles	Low
Kuhn Farms Dairy 1870 Jeffery Road, El Centro, 7	10,000	Adjacent to Dixie Drain #4	Moderate
Cameiro Heifer Ranch 195 West Corey Road, Brawley, 8	8,000	2 miles	Low
Ruegger and Ruegger Feedlot 604 Bannister Road, Westmorland, 9	2,500	Adjacent to Timothy Drain	Moderate

[1] Threat estimates are based on site size and proximity to surface water.

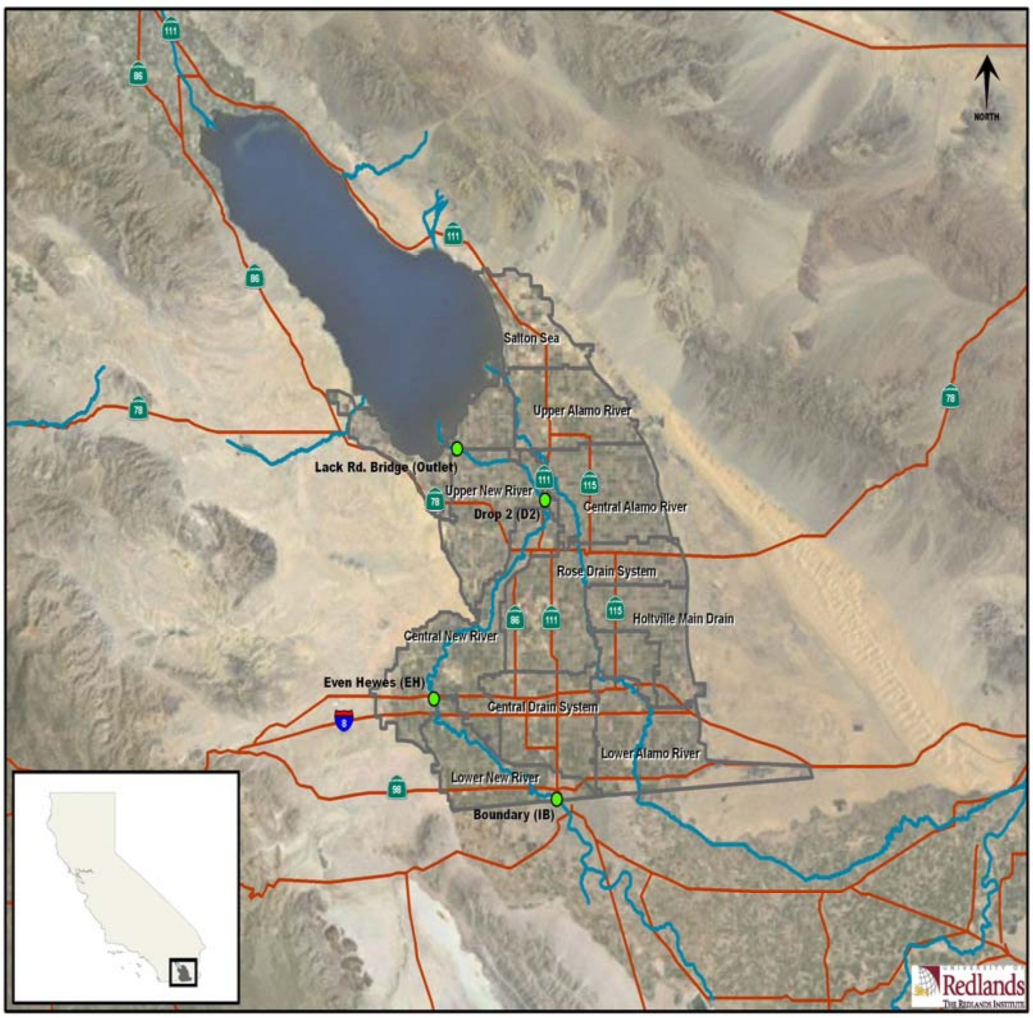
CAFOs are known sources of organic matter that may contaminate ground and surface waters via groundwater infiltration and conveyance, or stormwater runoff (Nishida, 2001). Groundwater infiltration and conveyance is the likely route in the case of the New River, given the low rainfall in the Imperial Valley. However, CAFOs along the New River have retention basins designed to retain runoff from a 24-hour storm event with a 25-year return frequency and berms to prevent runoff from leaving these facilities. These physical structures, together with an arid climate and low permeability soils common in the valley, diminish the potential that discharges from these facilities would exert a demand for in-stream DO, depleting New River DO resources.

CHAPTER 4: DATA ANALYSIS

Development of this TMDL started early 2003. Regional Board staff collected monthly water quality samples at four locations in the New River, from March 2003 to December 2009, to evaluate DO impairments (Figure 4.1). The four sampling locations are:

- New River at the IB;
- Evan Hewes Highway (EH), about 20 river miles downstream from the IB;
- Drop Structure 2 (D2), about 50 river miles downstream from the IB; and
- Outlet to the Salton Sea at Lack Road Bridge (Outlet), about 60 river miles downstream from the IB.

Figure 4.1: Map of Regional Board New River TMDL Sampling Locations. Note that "Evan Hewes Highway (EH)" is misspelled in this figure.



This TMDL also used water quality data from the Regional Board Border Program. These data were collected at the IB by Regional Board staff pursuant to an agreement between the USEPA and the State Water Resources Control Board. The primary objectives of this program are:

- Monitor and record water quality changes in the New River, as indicated by key indicator parameters;
- Help determine the effects (on the water quality at the IB) of the infrastructure improvement projects in Mexicali, Mexico;
- Help determine the extent of New River pollution and conformance with WQSs and U.S./Mexico international treaty agreements; and
- Obtain information that may be used in the development of more detailed studies, including TMDLs for the New River.

More water quality and flow data were obtained from other sources including the USIBWC, U.S. Geological Survey (USGS), IID (IID), and wastewater treatment plants (WWTPs) in the New River watershed inside the U.S.

4.1: FLOW DATA

Figures 2.5 and 2.6, and Tables 2.2. and 2.3 show New River flows at two locations (IB and Outlet to the Salton Sea) from January 1980 to October 2009, as reported by the USGS. In 2008, flow was about 3.36 cms at the IB and was about 15.61 cms at the Outlet to the Salton Sea. For the past 28 years, the Regional Board has observed flows from Mexico to be decreasing. As previously indicated, this TMDL is only for the 19.3 km (12 mile) impaired U.S. section of the New River beginning at the IB because sources of oxygen demanding materials are originating in Mexico. The flow data for the New River at the Salton Sea Outlet is just for information purposes.

4.2: WATER QUALITY DATA

Regional Board TMDL DO data for the New River four sampling locations from January 2003 to November 2009 are described in Figures 4.4 and 4.5, and Appendix E. Regional Board Border Program DO data for the New River at the IB from January 1997 to October 2009 can be viewed at:

<http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/new_river/dataindex.shtml/>.

The annual average for DO for the New River at the IB increased from 0.68 mg/l in 2003 to 4.41 mg/l in 2008. As a result, the DO annual average for the New River at the Evan Hewes Highway monitoring point increased from 1.76 mg/l in 2003 to 4.02 mg/l in 2008. These observations indicate that the New River still violates the Basin Plan's DO WQO of a minimum of 5.0 mg/l at any time.

Data analyses indicate that increased DO levels for the impaired section of the New River for 2007 and 2008 can be attributed to the commencement of operations of the Las Arenitas WWTP in March 2007. Figure 3.1, previously discussed, clearly shows the substantial positive effect the Las Arenitas WWTP has had on New River DO levels. The data also confirm that discharges from Mexico have a major influence on DO levels in the impaired section of the New River. Thus, proper operation and maintenance of the Las Arenitas WWTP is critical to addressing the New River's continuing low DO impairment problems. As previously discussed, increasing the DO concentrations in the New River to a minimum of 5.0 mg/l at any time is the goal of this TMDL. Consequently, more water quality data will be collected to determine the progress towards reaching this TMDL goal.

Figure 4.4: Monthly DO Concentrations for the New River at Four Sampling Locations

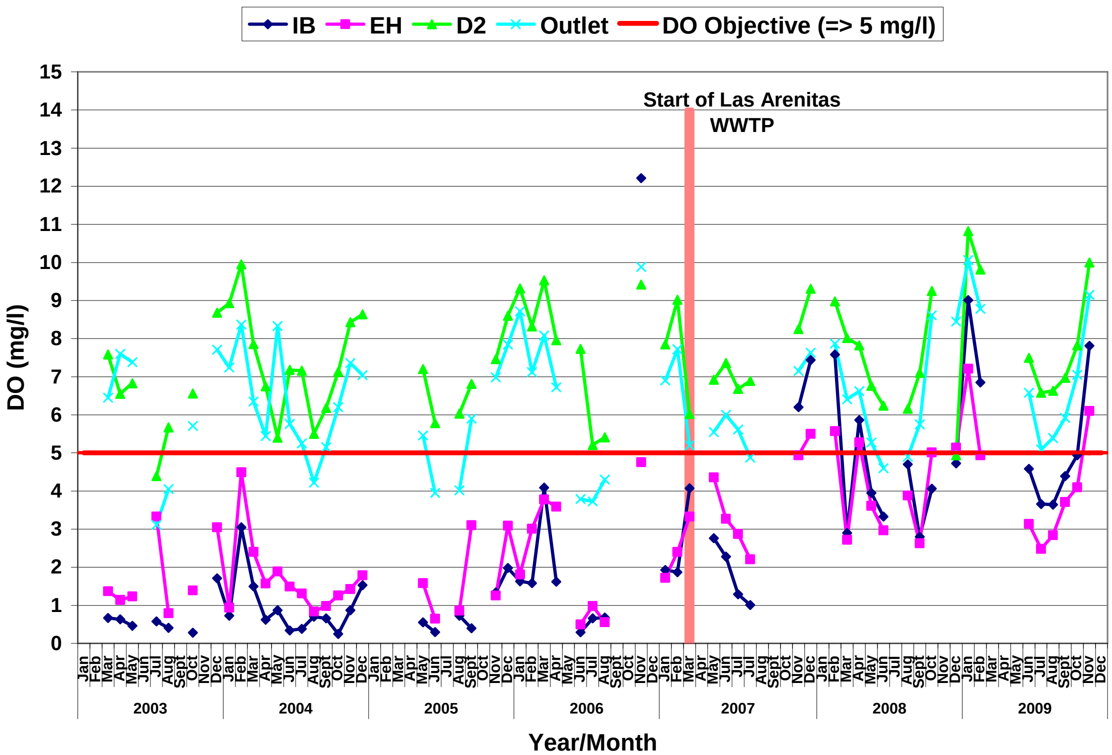
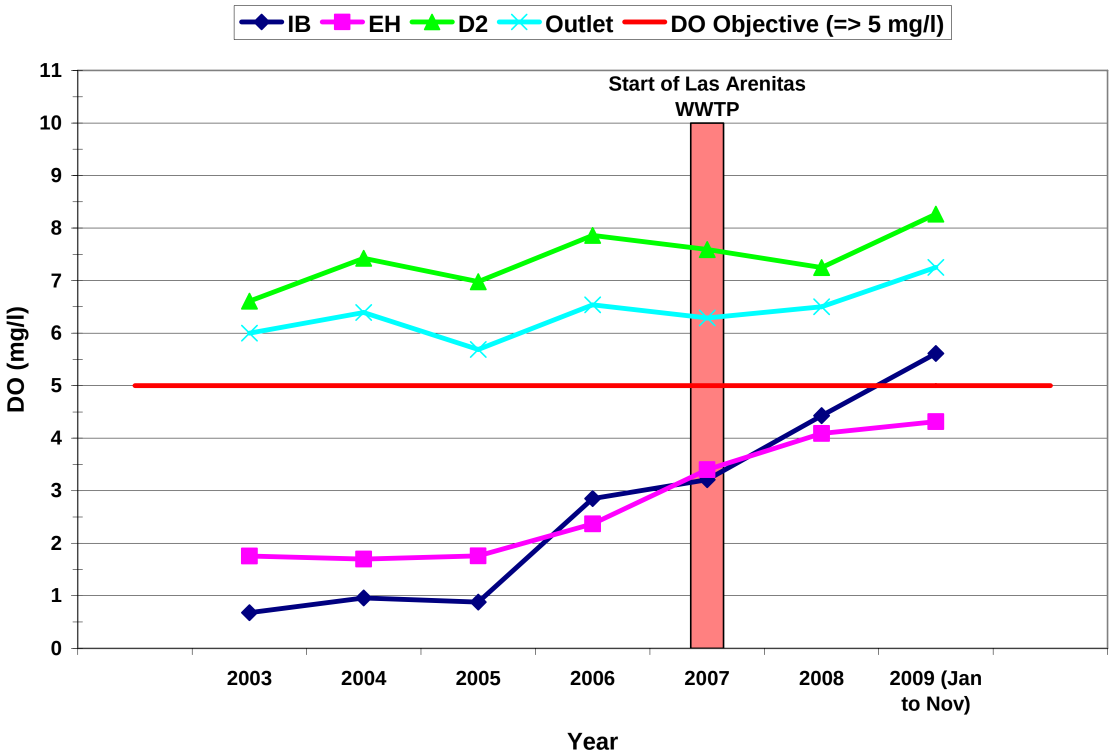


Figure 4.5: Annual DO Concentrations for the New River at Four Sampling Locations



CHAPTER 5: CRITICAL CONDITIONS AND SEASONAL VARIATIONS

Critical conditions are the set of environmental factors identified that must be taken into account to ensure attainment of WQOs under varying conditions. One typical critical condition is the time of year (season) that the water body is most vulnerable, which is often due to changes in climate or land usage.

The climate in the vicinity of the New River is hot, with warm winters, dry summers, occasional thunderstorms, and sandstorms with gusty high winds. The area is one of the most arid in the U.S. with an average annual rainfall of less than three inches and temperatures in excess of 100 ºF over one hundred days of the year. Average daily temperature is 54 ºF (12 ºC) in January and 92 ºF (33 ºC) in July. Evapotranspiration rates may exceed 84 inches per year, and one-third inch per day in hot summer months.

Flows from Mexico have been decreasing over the years due to increasing consumption of water, consumption of waste water by power plants, water transfer to other cities in Baja California, Mexico, and diversion of treated wastewater to a different watershed.

Land usage in the vicinity of the New River in Mexico is a combination of agricultural, industrial, and municipal uses. Currently, the average discharge volume of treated wastewater flow from Mexicali to the New River is about 1.10 cms (25 mgd). The average discharge volume from agricultural and industrial flows in the Mexicali Valley to the New River via agricultural tributary drains in 2008 was about 2.26 cms, which is the difference between total flow at the IB (3.36 cms from Table 2.2) and municipal flow. Agricultural discharges from Mexicali Valley vary depending on the time of year with decreased flows in winter due to decreased irrigation. Winter months may see an increase in other contaminant concentrations (e.g., bacteria, oil, chemicals) in the New River downstream of the IB due to the increase in activity at this time of the year. In contrast, the concentrations of dissolved oxygen are higher during the winter at the IB.

Prior to the completion of the Las Arenitas WWTP in March 2007, there was no significant critical condition/ seasonality for DO in the impaired section of the New River. Data showed year-round violations of DO WQOs immediately downstream of the IB, regardless of season or climate (Appendix F).

DO seasonal variations for the New River at four locations from 2003 to November 2009 are shown in Figures 5.1 to 5.4. Analyses of data suggest improved concentrations of DO in the impaired section of the New River, although the concentrations still violate the Basin Plan's DO WQO of a minimum 5.0 mg/l at any time. Because the materials, such as organic matter, that cause low DO may stay in the New River up to a few months, controlling these materials throughout the year is important. In addition, the New River flows at the IB should be managed on a whole-year basis because (a) the oxygen data do not appear to exhibit strong seasonal variability and (b) the warmer months have lower flows. In conclusion, there is currently no significant critical condition/seasonality for DO in the impaired section of the New River.

Figure 5.1: Seasonal Variation of DO for the New River at IB

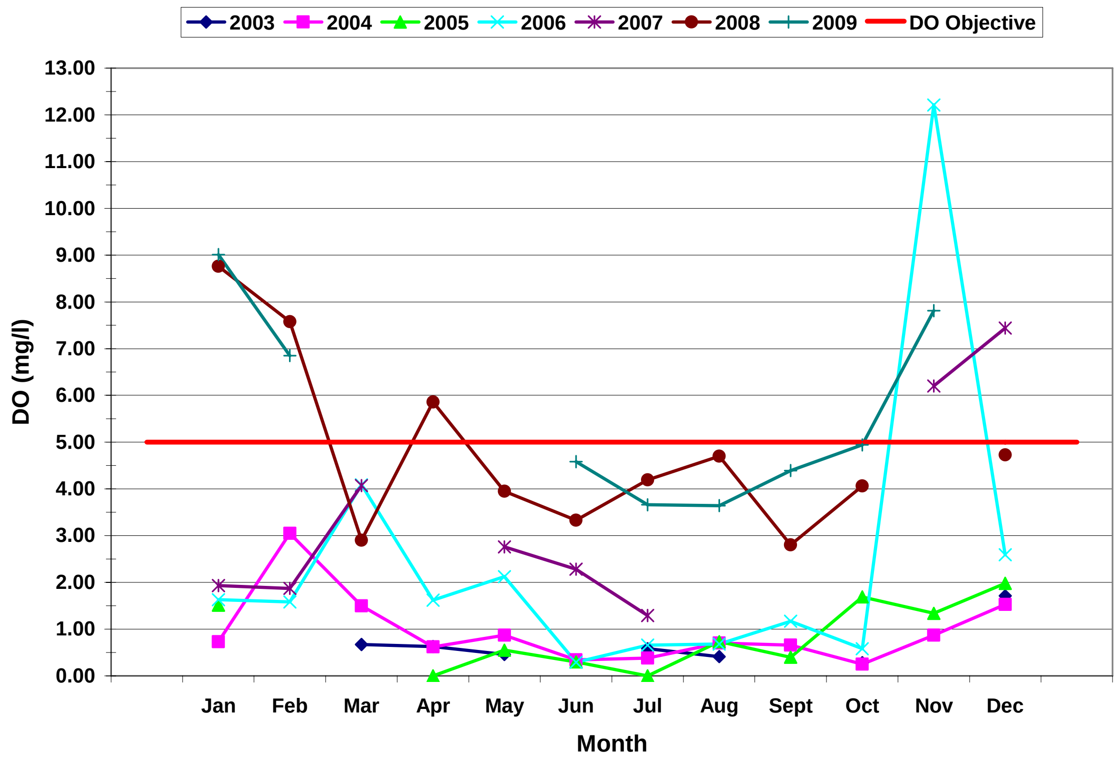


Figure 5.2: Seasonal Variation of DO for the New River at EH

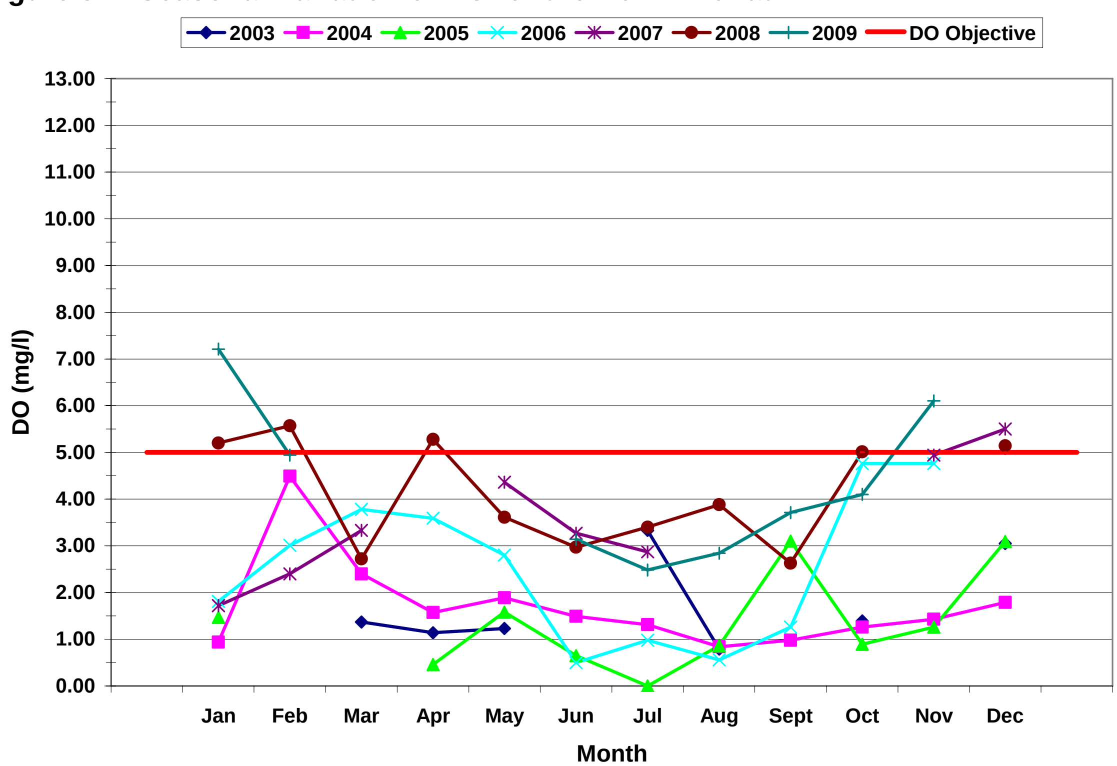


Figure 5.3: Seasonal Variation of DO for the New River at D2

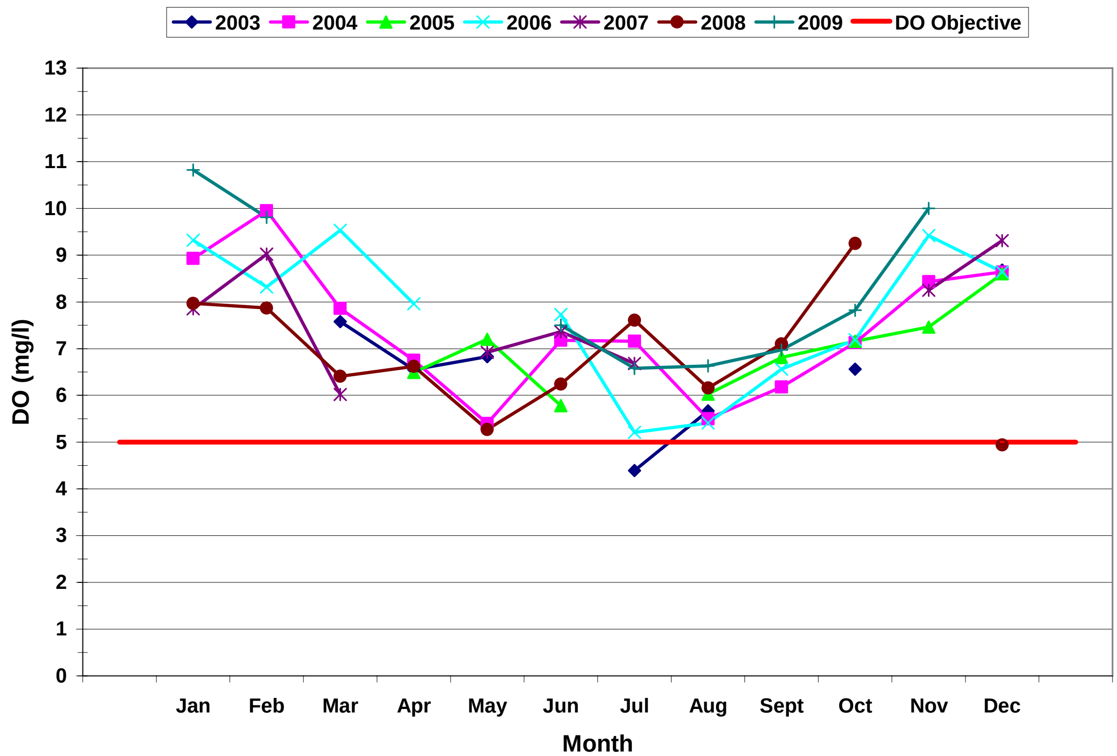
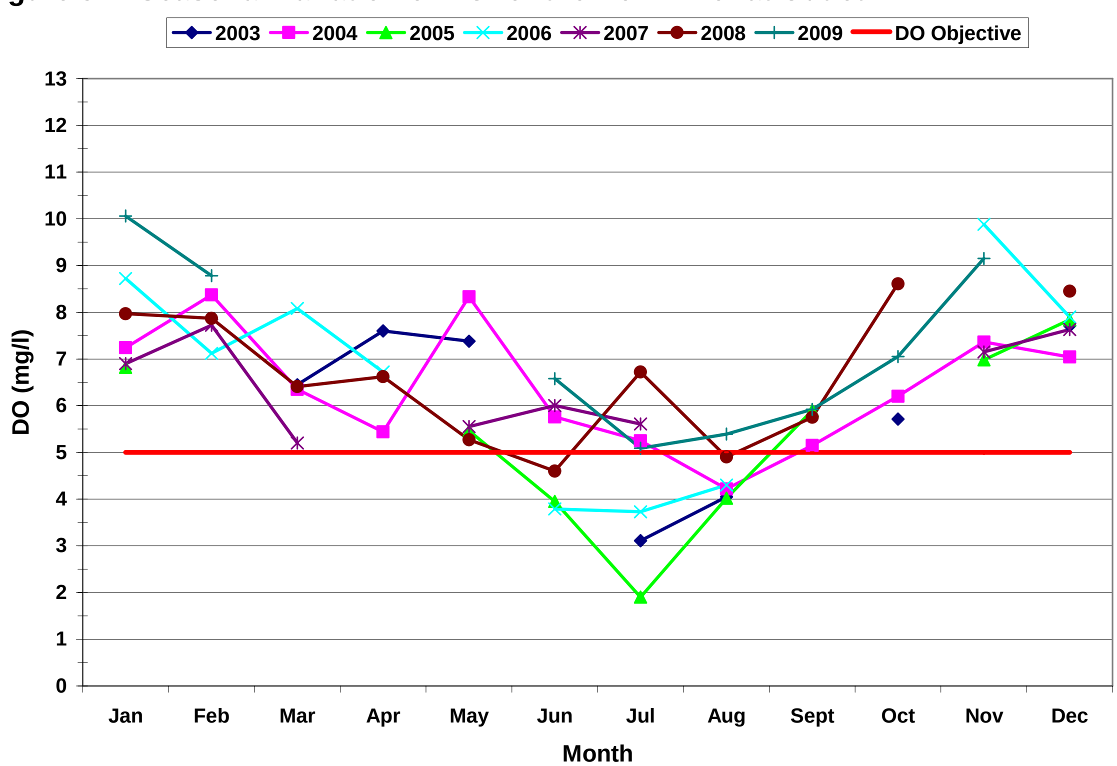


Figure 5.4: Seasonal Variation of DO for the New River at Outlet



CHAPTER 6: NUMERIC TARGET

This chapter describes the numeric targets that will be used to meet the WQO for DO to protect the New River's designated beneficial uses. Low DO levels threaten fish and wildlife communities and prevent the establishment of a healthy ecosystem. Most fish species in warm water streams require a minimum of 5.0 mg/l DO for optimum health. As previously stated, this is the DO WQO specified in the Basin Plan that must be met at any time in the New River. The DO numeric target is specified in Table 6.1.

Table 6.1: New River DO Numeric Target

Indicator	Numeric Target
Dissolved Oxygen (DO)	Greater than or equal to 5.0 mg/l at any time

The TMDL numeric target is applicable throughout the year for the entire stretch of the New River. Achieving this numeric target will protect the New River's beneficial uses.

The numeric target takes into account that the New River is a warm water system, and protects the most sensitive organisms, particularly during their vulnerable early life stages. Warm water streams are generally muddy with silt and sandy bottoms, and more turbid than coldwater streams (Waters, 1995). The DO just before dawn is usually considerably lower than the average daily DO. It is very likely that the DO fluctuations in the New River will drive the DO to very low levels at night when there's no photosynthesis, even if the daily steady state average is at or above the WQO.

BASIS FOR NUMERIC TARGET

As previously mentioned, DO is a measure of the amount of free oxygen available within a water body, and is necessary for aquatic life to survive. The USEPA has established water quality criteria for warm water to protect aquatic life (Table 6.1), including the vulnerable early life stages. The criteria for early life stages are more protective and reflected in the standard adopted by the Regional Board.

Table 6.1: Water quality criteria for ambient DO concentration (mg/L)

Method	Warm Water Criteria	
	Early Life Stages[a]	Other Life Stages
30 Day Mean	NA	5.5
7 Day Mean	6.0	NA
7 Day Mean Minimum	NA	4.0
1 Day Minimum[b]	5.0	3.0
Footnote a: Includes all embryonic and larval stages and all juvenile forms to 30 days following hatching. Footnote b: All minima should be considered as instantaneous concentrations to be achieved at all times.		
Source: Adapted from USEPA, 1986		

The oxygen content in a river is a function of oxygen sources and sinks. Sources for oxygen in the New River include:

- Re-aeration through agitation at drop structures;
- Photosynthesis;
- A decrease in temperature which increases the oxygen saturation potential and decreases microbial activity; and
- Dilution from drain discharges.

The sinks for oxygen in the New River include:

- Decomposition of organic matter;
- An increase in temperature, which causes oxygen vapor loss and increased microbial metabolism;
- Respiration by fish and other aquatic organisms; and
- An increase in salinity, which decreases oxygen solubility.

Waters with low DO often have foul odors from waste products generated by organisms living in low oxygen environments. Very low levels of DO may mobilize (i.e., dissolve) trace metals. The dissolution of trace metals increases the chance of uptake by aquatic species, which can lead to deleterious effects upon the aquatic organisms (Ogendi et al., 2007).

DO LEVELS IN THE NEW RIVER RELATIVE TO THE NUMERIC TARGET

Four sites were evaluated for DO in the New River from March 2003 to November 2009 (Figures 4.2, 4.3, 5.1, and 5.2, and Appendix E). DO levels vary among these sites, as evidenced by monitoring results reported for the IB and EH monitoring locations. For these two locations, DO concentrations were significantly below the numeric target, especially during the warm months.

CHAPTER 7: LINKAGE ANALYSIS AND ALLOCATIONS

This chapter describes the connection between numeric targets and load allocations, and the protection of beneficial uses in the first 12 mile (19.3 km) reach of the New River downstream from the IB. The relationship between source loading and the assimilative capacity of the New River at the IB is also described. Finally, this chapter identifies the New River DO TMDL allocations at the IB for point, nonpoint, and natural background sources that are necessary to attain WQSs.

A water quality model was used to evaluate the sources of materials causing the New River DO impairment, and to determine the permissible loads that the New River can receive without violating its applicable WQSs for DO. The data and modeling analyses showed that Mexico's sources are the major cause of low DO in the New River. The load allocations recommended by the New River QUAL2K Water Quality Model (see discussion below) for Mexico will be implemented first. As more New River water quality data are collected and evaluated, allocated loads may be revised, if necessary.

7.1: DISCUSSION OF NEW RIVER QUAL2K WATER QUALITY MODEL

As previously mentioned, Tetra Tech, Inc. (Tetra Tech) developed the steady-state New River QUAL2K Water Quality Model (Model) for the USEPA Region 9, San Francisco, California, that was used for this TMDL. The purpose of the Model was to assist Regional Board staff on Data and Source Analysis, Linkage Analysis, and Load Allocations in terms of parameters that cause low DO, such as BOD and NH_3 (Appendix F). The use of the Model can help estimate and predict DO concentrations in various locations of the New River at which monitoring data are not collected.

Steady-state models are applied to "critical" environmental conditions that represent extremely low assimilative capacity. For discharges to riverine systems, critical environmental conditions correspond to lower, upstream flows. The assumption behind steady-state modeling is that protection of water quality during critical conditions will be protective for the large majority of environmental conditions that occur throughout the river system. For this Model, only lower flow conditions were evaluated to determine the assimilative capacity of the New River for oxygen demanding materials because this represents the most critical condition. BOD and NH_3, expressed as mass per time, were chosen because the modeling showed BOD and NH_3 are the most influential parameters affecting DO levels in the New River and because variations in other parameters were shown to have only a minor influence.

The first priority in calibrating the Model was the determination of temperature, DO, carbonaceous BOD, and NH_3. The second priority was the consideration of other nutrients, conductivity, suspended solids, alkalinity, and pH. Phytoplankton, detritus, and pathogens were not calibrated due to limited data being available.

The Model concentrated on the critical condition months of June, July, and August for the IB where lower flow and higher temperature are characteristic. Calibration of the Model was completed for the study date of July 17, 2006, which corresponded to a critical condition of 30.5 °C (86.9 ^{0}F) headwaters temperature. Validation was performed for additional conditions, such as flow, occurring in June 2006 at a headwaters temperature of 28.5 °C (83.3 ^{0}F).

Several TMDL scenarios were evaluated by Tetra Tech, USEPA, and the Regional Board (Appendices F and H). The purpose for developing TMDL scenarios was: (1) to measure the potential improvement based on the Las Arenitas WWTP diversion of wastewater flows out of the New River basin upstream of the IB, and (2) to meet the water quality objective of a minimum of 5.0 mg/l DO at all times (Appendix F). Not all of the modeling scenarios described in the Tetra Tech report in Appendix F apply, however. For example, the “current conditions” scenario in the Tetra Tech report is outdated, and the “Future II” scenario does not accurately reflect the Regional Board’s assumptions of future flows. On the other hand, the “Future I” scenario in the report does reflect current critical conditions, except that the Regional Board uses a flow rate of 100 cfs and a DO concentration of 1.25 mg/L instead of Tetra Tech’s flow rate and DO concentration of 196.1 cfs and 5.0 mg/l, respectively. (See Table 4-2, Appendix F.) These values were used because they were recently observed in the critical summer months of lower flow at the IB.

Reduced BOD and improved DO at the IB have resulted in improved conditions in the New River, which previously exhibited DO in the range of 0-1 mg/L for 20 miles (32.2 km) downstream of the IB. DO is projected to remain between 1-2 mg/L in this reach during critical conditions, however. Therefore, to meet the numeric target of 5.0 mg/L at all times throughout the first 12 mile (19.3 km) reach of the New River downstream from the IB, additional improvements in water quality at the IB will be necessary.

Overall Approach

The overall approach was to model the existing BOD, DO, and NH_3 loads utilizing the Model, and then reduce loads of BOD and NH_3 loads until the DO WQO was met. For BOD and NH_3 the load was set by considering the observed relationships with DO as well as the simulated local pre-developed conditions. Several simulation scenarios were performed and are described in Appendix H. Only the most relevant simulation scenarios are discussed in this section.

Scenario 1: Current Critical Conditions

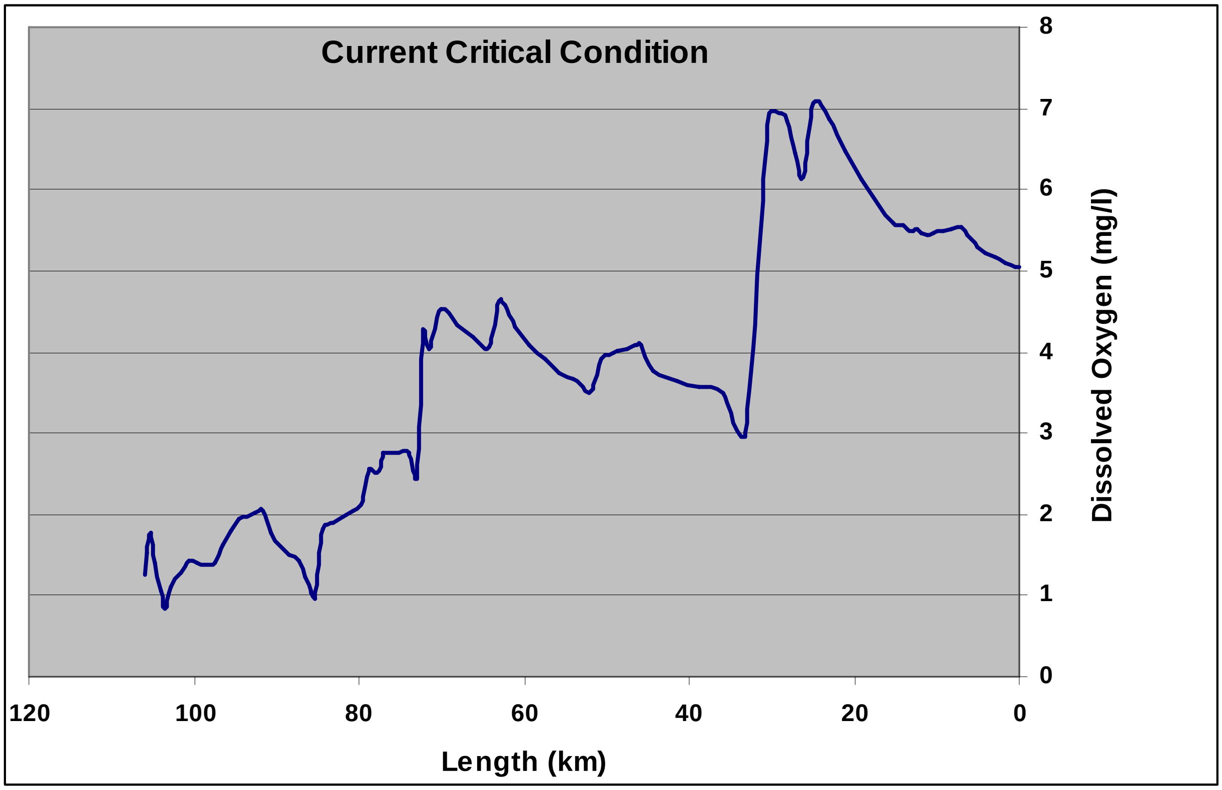
Figure 7.1 shows the Model’s results when current (post-Las Arenitas WWTP) critical conditions at the IB are input into the Model. The following assumptions were made for these conditions:

<u>Critical condition assumptions at the IB:</u>

Flow Rate = 2.832 m^3/sec (100 cfs) (based on July 2007 data)
DO = 1.25 mg/L (based on July 2007 data in Appendix E)
BOD = 19.5 mg/L (based on Table 4-2 in Appendix F)
NH_3= 4,650 ug/L or 4.65 mg/L, as N (based on Table 4-2 in Appendix F)

Length 105 km on Figure 7.1 represents the location on the New River at the IB and length 0 km represents the location on the New River at the outlet to the Salton Sea.

Figure 7.1: Current Critical Conditions Based on the Model



DO is generally between 1 and 2 mg/l for the first 25 kilometers (km). DO levels increase to between 2 and 4.5 mg/l for the next 50 km. For the remaining 30 km to the Salton Sea, DO sharply rises up to 7 mg/l and then drops to about 5 mg/l at the outlet to the Salton Sea (Length 0). Thus, for this last 30 km reach of the New River, the DO WQO is attained. DO levels downstream from the IB reflect organic matter decay and dilution from agricultural return flows. The Model clearly shows that the major influence on DO in the impaired portion of the New River is the IB inflow.

Actual Conditions in the New River

Preliminary results of monitoring the New River at the IB indicate that measurable water quality improvements have been achieved with commencement of operations at the Las Arenitas WWTP (Figures 3.1, 4.2, and 4.3, and Appendix E). The level of DO increases significantly as the New River travels 60 miles (105 km) from the IB to its terminus at the Salton Sea. Several factors account for the increase in DO, including bacteria die-off, seepage, dilution from treated WWTP effluent discharges, and agricultural flows (tailwater and tilewater).

In addition, an aeration structure located 500 feet (152 m) downstream of Evan Hewes Highway, and three weirs north of Brawley constructed for erosion control, rapidly mix and re-oxygenate the New River, thereby increasing DO and the assimilative capacity for organic matter (Setmire, 1984).

Scenario 2: No Flow from Mexico

In order to test the influence of Mexico's discharges on DO in the New River, flow at the border is reduced to zero in this modeling scenario (Figure 7.2). The "no flow from Mexico" scenario would reduce flow into the New River flow by 21.7 per cent.

Critical condition assumptions at the IB:

Flow Rate: 0 cfs
The other parameters are the same as Scenario 1.

Figure 7.2: Model DO Levels with No Flow from Mexico Scenario

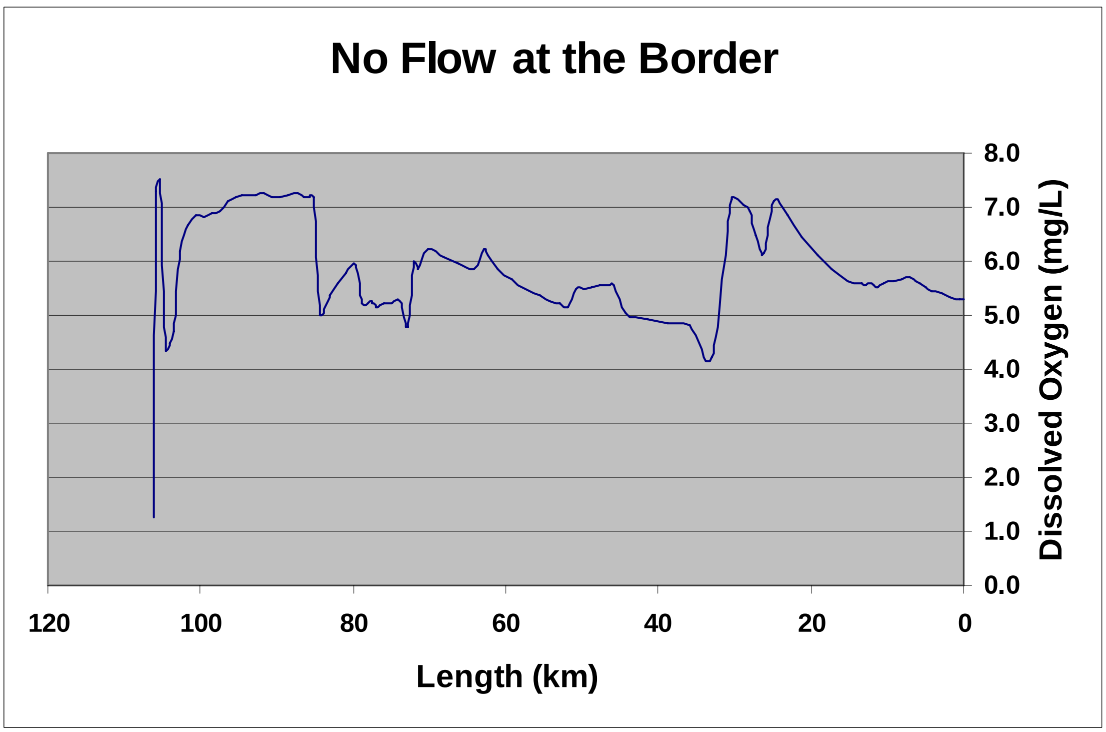


Figure 7.2 shows that reducing flow in the New River from Mexico to zero at the IB will result in the DO standard being attained, except for three locations where the DO drops below 5 mg/l, but remains above 4 mg/l for short distances.

7.2: LINKAGE ANALYSIS

As previously discussed, because DO is not a pollutant, the TMDL targets parameters causing low DO. The causative pollutants for the low DO are BOD and NH_3. The Model shows that BOD and NH_3 are the most influential parameters affecting DO levels in the New River. Variations in other parameters were shown to have a minor influence (Appendix F). BOD represents the decomposition of organic matter to carbon dioxide. NH_3 is an indicator for anthropogenic eutrophication. NH_3 is an oxygen-demanding constituent of waste water or waters with dissolved organic matter. The primary environmental effects of NH_3 are to reduce oxygen and to cause toxicity to fish at higher pH levels. A secondary environmental effect of NH_3 is anthropogenic eutrophication. This secondary effect occurs when excessive amounts of nutrients, mainly from sewage and agricultural runoff, stimulate algal growth. The increase in algal biomass subsequently leads to more organic matter sinking into the benthic water layers. Bacteria decompose the organic matter at river's bottom, consuming large amounts of oxygen.

Sewage discharges to the New River in Mexico due to inadequate sewer infrastructure that existed prior to the construction and operation of the Las Arenitas WWTP were the reason why the New River was required to be listed as impaired for DO at the IB and for more than 20 miles downstream. Bacteria decomposers respond to the increased organic matter with increased growth, and thus, there was an increased consumption of DO. Significant bacterial die-off may occur abruptly if the food supply (organic matter) is depleted or DO concentrations suddenly change (USEPA, 1986; Thomann and Mueller, 1987). Decomposer microorganisms may respond similarly or become dormant until favorable conditions return. While temporal variability is unknown, it is believed that a direct correlation exists between water temperature and river assimilative capacity or loading capacity (Pickett, 1997; USEPA, 1986; Mancini, 1978).

"Loading Capacity" is defined as "the greatest amount of loading that a water body can receive without violating WQSs." (40 CFR 130.2(f).) The Loading Capacity equals the TMDL. As previously discussed, a TMDL is the sum of the individual Wasteload Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background. (40 CFR 130.2(i).) A WLA is defined as the portion of a receiving water's loading capacity allocated to one of its existing or future point sources of pollution. (40 CFR 130.2(g).) Point sources are required to be regulated through the CWA NPDES permit program. (CWA Section 402.) A LA is defined as the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. (40 CFR 130.2(f).)

A Margin of Safety (MOS) is also a required component of a TMDL. The MOS accounts for the uncertainty about the relationship between effluent limitations and water quality and the quality of the receiving waterbody. (CWA Section 303(d)(1)(C).)

A TMDL can thus be expressed mathematically as follows:

$$\begin{aligned}\textbf{TMDL} &= \textbf{Loading Capacity}\\ &= \textbf{WLAs + LAs + MOS}\end{aligned}$$

The loading capacity of the New River at the IB is the greatest amount of DO indicators (BOD, NH_3) that the river can receive without exceeding the numeric target and WQSs. Therefore, the loading capacity is based on the numeric target of 5.0 mg/l DO at any time.

This TMDL has an implicit MOS, which is incorporated into the conservative processes used to develop the TMDL, and thus, is not quantified. The MOS is implicit in this TMDL process through the use of a conservative model input (temperature, DO concentrations, and flow). Conservative temperature values are employed through the use of the highest average maximum temperature that would normally occur under critical stream flow conditions. The DO concentrations and stream flow employed for summer reflects the lowest DO and flows that would normally occur during this critical condition period at the IB.

Attaining numeric targets is aided by the conservative analyses used for deriving LAs and WLAs, even for minor loading sources. Consequently, the loading capacity for this TMDL is based strictly on the numeric target for DO, which is expressed as a concentration (i.e., 5.0 mg/l).

To determine a receiving waterbody's assimilative capacity, the numeric target concentration must be converted to a pollutant load (e.g., kilogram (kg)/day) based on the amount of water flow, while also accounting for natural sources and a MOS. Using the DO WQO of 5.0 mg/L as the numeric target, a TMDL Model analysis was performed at critical conditions at the IB (warmer and lower flow months) to determine the loading capacity for the watershed. This was accomplished through a series of simulations aimed at meeting the DO target limit by varying source contributions (Appendix H).The Model was used to test sensitivity and explore different combinations of Mexico versus U.S. reductions during critical conditions for various parameters, including DO, BOD, NH_3, nitrogen and phosphorous (Appendices F and H).

Several scenarios that were explored to estimate the loading capacity did not show promise in meeting the DO WQO and will not be discussed in detail in this Staff Report. For example, some of these scenarios assumed the presence of additional weirs, with or without oxygen pumps, placed on the U.S. side of the border. These scenarios can be found in Appendix H.

The principal finding of the modeling scenarios in Appendix H shows that attainment cannot be achieved through U.S. reductions alone. Even if U.S. sources of BOD and NH_3 were reduced to zero, this would have little effect on DO in the first 20 miles of the New River past the IB and would only increase DO to above 5 mg/l for approximately 19% of the estimated total of 47 impaired miles.

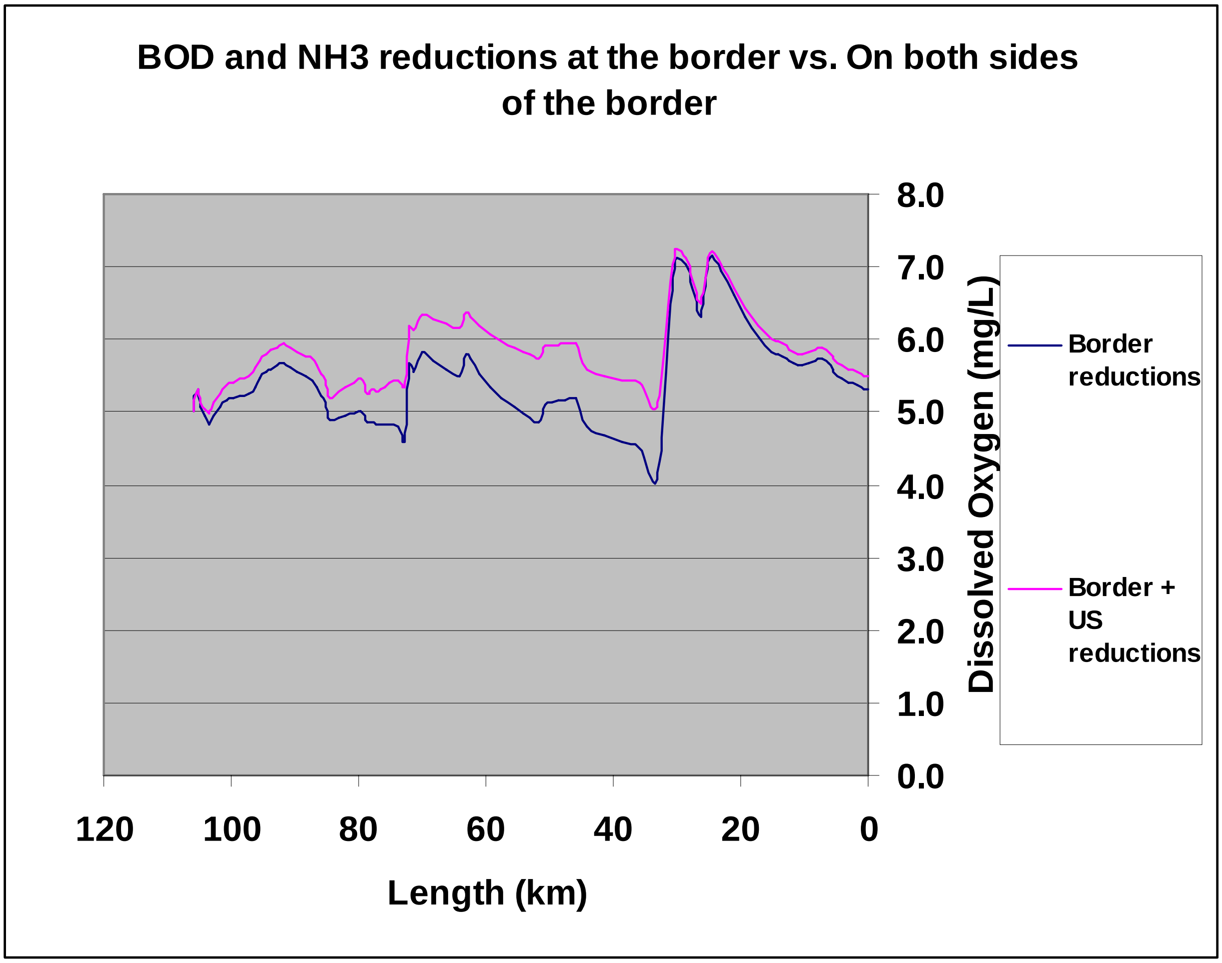
In the Model analysis, pollutant concentrations were set at levels necessary to maintain DO concentrations a minimum of 5.0 mg/L at any time throughout the entire reach of the New River. The Model predictions for in-stream pollutant concentrations were then compared to actual field data, as shown in Table 7.1 and Figure 7.3, below:

Table 7.1. TMDL BOD and NH_3 Load Scenarios for Achieving DO Standard in the New River (See Figure 7.3)
Scenario 3: Improvements in BOD and NH_3 from Mexico's effluent (Nutrient Removal + Filtration)
Assumptions for Scenario 3: At IB DO=5 mg/l, BOD=5 mg/l, NH_3=0.5 mg/l, Flow = 2.832 cms (100 cfs), and no U.S. source reductions
Scenario 4: Improvements in BOD and NH_3 from Mexico's effluent (Nutrient Removal + Filtration) plus U.S. source reductions
Assumptions for Scenario 4: In addition to the above assumptions, U.S. source reductions through N. Central Drain: 8.0 mg/L BOD at WWTPs and maximum 0.5 mg/L NH_3 at WWTPs and drains

These assumptions are based on wastewater treatment of the New River at the IB with nutrient removal and gravity filtration. (National Research Council, 1993.) Nitrogen removal is accomplished by an extension of the conventional biological system to incorporate the biochemical processes of nitrification and denitrification. Nitrification is the oxidation of NH_3 and organic nitrogen to nitrate nitrogen. Denitrification reduces nitrate nitrogen to nitrogen gas and releases it into the atmosphere. The combination of nutrient removal with a gravity filtration system removes additional quantities of Total Suspended Solids (TSS) along with other contaminants associated with TSS (such as BOD, nitrogen, and phosphorus). This system is used in some areas to produce water supplied for urban irrigation uses like the one used by the city of Orlando, Florida. The link to the city's program is as follows:

<http://www.cityoforlando.net/public_works/wastewater/reclaim.htm/>.

Figure 7.3: TMDL BOD and NH_3 Load Scenarios 3 (Border Reductions) and 4 (Border + U.S. Reductions) for Achieving DO Standard in the New River



As shown in Figure 7.3, the “Border Reductions” only scenario (Scenario 3, Table 7.1) would cause the DO standard to be attained through significant stretches of the New River. Deviations from the DO standard would occur only in five locations (totaling 32.6 km) in which DO drops below 5 mg/l, but remains above 4 mg/l.

Figure 7.3 also shows that the “Border plus U.S. Reductions” scenario (Scenario 4, Table 7.1) would be needed to raise the DO above 5 mg/l throughout the New River. Since this TMDL is only for the first 12 mile (19.3 km) impaired reach of the New River immediately downstream from the IB, Regional Board staff selected Scenario 3 as the most appropriate scenario for calculating allocations for Mexico to achieve New River DO WQSs.

7.3: WASTELOAD ALLOCATIONS AND LOAD ALLOCATIONS

WLAs and LAs for this TMDL are applicable only to the first 12 mile (19.3 km) impaired reach of the New River immediately downstream from the IB. This impaired reach of the New River was defined by modeling and data analyses.

7.4: SPECIFIC ALLOCATIONS BY SOURCES

The "Border Reductions Only" Scenario 3 in Table 7.1 and Figure 7.3, and the source analysis show that waste discharges in Mexico to the New River and tributary drains are the only source of DO impairment in the first 12 mile (19.3 km) reach of the New River downstream from the IB since the DO remains at or above 5.0 mg/L when the DO at the IB is assumed to be 5.0 mg/L. Since Scenario 1 reflects the actual current DO critical conditions in the New River, which are well below 5.0 mg/L at the IB, the impairment of the New River in this first 12 mile (19.3 km) reach downstream of the IB can only be attributed to DO-depleting sources originating in Mexico. Therefore, the "Border Reductions Only" scenario proposes BOD and NH_3 loads for sources inside Mexico. The allowable load may not be distributed among different drains and sources because the Regional Board has no jurisdiction over waste discharges originating in Mexico. Consequently, the full allowable load can only be designated to the waste sources crossing into the U.S. at the IB in the city of Calexico.

The TMDL DO numeric target of a minimum of 5.0 mg/L at any time is to be achieved within three years of USEPA approval of this DO TMDL.

Load Allocations for Mexico

To meet the Basin Plan's DO WQO of 5.0 mg/L at any time, the Model determined that the required load allocations for all discharges from Mexico at the IB need to be 5.0 mg/l or 1529 kg/day of BOD and 0.5 mg/l or 153 kg/day of NH_3 (Table 7.2). The mass/unit time values indicated are based on a flow rate of 3.54 cms (125 cfs) the average flow measured at the IB in 2007.

Table 7.2: IB Loading Calculation*
BOD Load
Daily Loading = Average Flow in 2007 (from Table 2.2) x BOD (from Linkage Analysis)
Daily Loading = (Flow Rate (cms) x (conversion factor to litter per day)**) x (BOD (mg/l) x (conversion factor to kg/l)***
Daily Loading = (3.54 cms X 86,400,000) (l/day)x (5 mg/l x 10^{-6}) (kg/l) = 1529.28 kg/day = **1529 kg/day**
NH_3 Load
Daily Loading = Average Flow in 2007 (from Table 2.2) x NH_3 (from Linkage Analysis)
Daily Loading = (3.54 cms X 86,400,000) (l/day) X (0.5 mg/l X 10^{-6}) (kg/l) = 152.93 kg/day = **153 kg/day**
* - one cubic meter (cm)= 1,000 liters (l)
* - one kilogram (kg) = 1,000,000 milligrams (mg)
** - conversion factor from cms to liters per day = (1000 liters x60 seconds x60 minutes x 24 hours = 86,400,000

7.5: POTENTIAL FUTURE GROWTH

The three most likely growth events that could affect DO concentrations and organic matter loading in the New River are: (1) population growth in the Imperial Valley; (2) population growth in the Mexicali area; (3) growth in the size and number of CAFOs; and (4) water transfers. The following sections discuss the potential impacts of these projected growth events on the DO WQO.

Population Growth in Imperial Valley

In the U.S. portion of the New River watershed, the annual population growth is projected at 3.3 % between 2000 and 2025. (U.S. Department of Transportation, 2003.) This growth will increase domestic wastewater discharged into the New River from the current 8.7 mgd (32,930 cmd) to a projected 13.8 mgd (52,240 cmd). Effluent from point sources and discharges from nonpoint sources will be required to meet the DO WQO. WWTP dischargers will continue to be required to consistently comply with their NPDES permits. Additionally, as WWTPs reach 80 percent of design capacity, they are required to submit a report to the Regional Board informing it of their plans to address future capacity and expansion needs.

Population Growth in the Mexicali Area

In the Mexican portion of the New River Watershed, which includes the city of Mexicali, population growth from 2004 to 2005 is about 2.4%. (California Center for Border and

Regional Economic Studies [CCBRES], 2007.) The population of the municipality of Mexicali for 2005 was about 900,000. The Las Arenitas WWTP with its capacity of 0.90 cms (20 MGD) was built in March 2007 to accommodate the eastern portion of Mexicali. Wastewater quality in the Mexicali area also improved due to sewage infrastructure projects built in the last two to five years. Local demand for treated wastewater will increase because of Mexicali's growing population. Mexico may decide to reuse the wastewater that it currently discharges into the New River, as observed with two power plants in Mexicali Valley, Mexico, that are on-line (Intergen and Sempra). Sewage water is treated in a wastewater treatment plant associated with the power plants before it is used for cooling purposes (U.S. Department of Energy, 2004.) Such a diversion of wastewater would decrease New River flows and might improve DO water quality at the IB, as discussed below.

Low flows result in lower DO and higher temperature, especially during the summer months. (USEPA: <http://cfpub.epa.gov/caddis/index.cfm/>.) For the New River at the IB and 12 miles (19.3 km) downstream of the IB, however, flow reductions accompanied by removing all remaining untreated municipal wastes from discharging into the New River resulted in increased DO concentrations (Figures 3.1, 4.4, and 4.5). The reduction of flows to the New River at the IB also results in a decrease of the Salton Sea's depth and shoreline exposure. Such a drop in water level may have a substantial change on the amount and quality of wetland habitat at the New River's outlet to the Salton Sea, significantly impacting numerous species there

Growth in the CAFO Sector

Existing CAFOs from outside Imperial County may relocate into the county due to expanding metropolitan populations in San Diego County, Orange County, Riverside County, and the San Joaquin and Sacramento valleys. This would result in growth in the CAFO sector for Imperial County. CAFO facilities will continue to be controlled through General NPDES permits, which generally prohibit pollutant discharges into surface waters and require containment of on-site wastewater, including contaminated runoff.[2]

Water Transfer

Imperial Valley cultivation acreage is projected to remain relatively constant at approximately 480,000 acres. However, irrigation deliveries will decrease as much as 300,000 AFY because of a water transfer agreement entered into by IID and the San Diego County Water Authority. The water to be transferred is irrigation water "conserved" by IID and Imperial Valley farmers. The New River's resulting flow would be about 300,000 AFY (370 million cubic meters per year), as described in more detail in the joint Environmental Impact Study (EIS)/Environmental Impact Report (EIR) prepared by IID to address potential environmental impacts resulting from the proposed water transfer. (IID, 2002.) This estimation is based on using the ratio of the New River flow at its delta with the Salton Sea to the total outflow of the New River-Alamo River-IID Drain

[2] If impacts from organic matter discharges from Mexico cannot be controlled, it may be difficult to measure acute impacts on DO caused by CAFOs downstream of the International Border.

system, and assuming as a worst case scenario that the 300,000 AFY reduction in irrigation deliveries will result in an equal decrease in total drain flow.

CHAPTER 8: PUBLIC PARTICIPATION

Public participation and stakeholder buy-in are vital to the success of developing and implementing a TMDL. Release of this draft TMDL will provide an opportunity for the public to provide input to the Regional Board. The TMDL will be formally established when it is adopted as an amendment to the Basin Plan in a public hearing. The public has had several opportunities to comment on and participate in the development of this Draft New River TMDL Staff Report, as described below.

SCOPING MEETING

Scoping meetings are a requirement of the California Environmental Quality Act (CEQA). (Pub. Resources Code Section 21083.9.) The purpose of scoping meetings is to solicit comments from the public and Responsible Agencies to help the Lead Agency determine the environmental scope of the environmental analysis that the Lead Agency will conduct. The Regional Board is the Lead Agency for this TMDL. A scoping meeting was held on May 14, 2003, in Calexico, California. Comments received from the public at the scoping meeting helped the Regional Board determine the scope of the environmental review and specific aspects of the analysis for this TMDL.

PUBLIC MEETING

A public meeting was held on December 10, 2003, in Calexico, California, to explain to stakeholders the TMDL process and the New River TMDLs. The meeting was a venue for dialogue between the Regional Board and stakeholders.

Prior to sending the TMDL for scientific peer review, a second meeting with NPDES permittees discharging into the impaired section of the New River was held on September 19, 2008, in Seeley, California, to discuss the effect the TMDL could have on these permittees.

REGULAR OBSERVATION TOURS OF THE NEW RIVER

Regional Board members and staff regularly participate in monthly binational observation tours of the New River drainage and wastewater collection system in Mexicali. The other participants of these binational observation tours are the USIBWC, Comission Estatal de Servicios Publicos de Mexicali (CESPM), Comission Estatal del Agua (CEA), Commission Internacional de Limites del Agua (CILA), Secretaria de Desarollo Urbano y de Ecologia (SIDUE), and the Office of California State Senator Denise Ducheny.

CHAPTER 9: IMPLEMENTATION PLAN

This chapter identifies the entities subject to this TMDL, and describes requested actions to be taken by those entities to achieve the TMDL. This chapter also describes Regional Board enforcement provisions and reporting requirements.

As previously discussed, this TMDL proposes to eliminate low DO impairment, and specifies allowable loads of BOD and NH_3 based on steady-state Model projections to accomplish this. Phase 1 of TMDL Implementation (2010 – 2012) focuses on monitoring and taking action to address the pollutants coming from Mexico that lead to low DO. If WQOs are not met by the end of Phase 1, additional actions will be implemented in Phase 2 of the TMDL (2013 – 2015) to achieve WQOs. When allowable loads of BOD and NH_3 are achieved, they are expected to eliminate the impairment. If the impairment continues after the two phases, the DO TMDL will be revised accordingly.

Because the Regional Board does not have jurisdictional authority to require Mexico, a sovereign nation, or the U.S. government to reduce waste that crosses the IB and impairs the New River, the Regional Board can only request cooperation from Mexico and the U.S. government to help it attain the DO WQO. As the Tetra Tech modeling scenarios demonstrated, the DO WQO cannot be attained solely through implementation measures taken on the U.S. side of the New River. The assistance and cooperation of Mexico is essential to attain the DO WQO. Therefore, the Regional Board respectfully requests Mexico to implement those actions necessary to prevent wastewater discharges into the New River in Mexicali that produce conditions that violate the TMDL.

The Regional Board also respectfully requests the U.S. government through the USEPA and the U.S. section of the IBWC to assist Mexico in helping the Regional Board achieve the DO WQO for the New River. In particular, the Regional Board, through this TMDL, requests that the USEPA and/or USIBWC:

- Consider and specify measures to assist Mexico to ensure that discharges from Mexico do not violate or contribute to a violation of this TMDL; and
- Continue to conduct water quality monitoring in the New River at the IB.

This TMDL also recommends actions to be taken by other third party cooperating agencies and organizations (Appendix G), which have an interest in the New River's water quality. This TMDL requests these other third party cooperating agencies and organizations increase their coordination of New River projects through a Memorandum of Understanding (MOU).

Regional Board staff will track TMDL implementation, monitor water quality progress, enforce provisions, and propose modifications of the TMDL to the Regional Board, if necessary, in accordance with a time schedule.

9.1: RECOMMENDED IMPLEMENTATION ACTIONS FOR USIBWC AND USEPA

Minute No. 264 of the Mexican-American Water Treaty, titled "*Recommendations for Solution of the New River Border Sanitation Problem at Calexico, California - Mexicali, Baja California Norte,*" was approved by the governments of the United States and Mexico, and made effective on December 4, 1980. Minute No. 264 specifies qualitative and quantitative standards for the New River at the International Boundary (Appendix A).

In October 1992, Minute No. 288 was signed by the USIBWC and CILA (the Mexican counterpart to USIBWC). Minute No. 288 established short- and long-term solutions for sanitation problems plaguing the New River at the International Boundary (Appendix G).

Pursuant to CWC Section 13225(d), the Regional Board requests enforcement by the USEPA and USIBWC of their respective water quality control laws. Specifically, the Regional Board encourages the USIBWC to continue to carry out its environmental duties and obligations specified in Minute 288 to implement the bi-national water treaties entered into between the U.S. and Mexico pertaining to the New River. In addition, the Regional Board requests both the USEPA and USIBWC to implement the actions listed in Table 9.1. If these measures do not achieve TMDL numeric targets within three years after USEPA approval (Phase 1), additional actions may need to be implemented in Phase 2 to address the remaining causes of low DO in the New River immediately downstream of the IB.

Table 9.1: Recommended Implementation Actions for USEPA and USIBWC to Address Waste Discharges from Mexico

Action	Description	Due Date
1- Develop and submit to the Regional Board a New River DO TMDL Implementation Report	Describe in a report to the Regional Board measures taken or proposed to ensure Mexico does not cause or contribute to violations of this TMDL. The report should specify the parties responsible for implementation, discuss financial options, and provide an implementation time schedule.	One (1) year after USEPA approval of the TMDL
2- Continue to conduct water quality and DO monitoring in the New River at the IB.	Submit monitoring data and reports to the Regional Board	On-going
3- Develop and submit to the Regional Board a New River DO TMDL Final Implementation Report	Describe in a final report to the Regional Board progress in completing implementation measures identified in Actions 1 and 2	Three (3) years after USEPA approval of the TMDL

9.2: RECOMMENDED IMPLEMENTATION ACTIONS FOR OTHER THIRD PARTY COOPERATING AGENCIES AND ORGANIZATIONS

The cooperation of other third party agencies and organizations, in addition to USEPA, USIBWC, and Mexico, is pivotal for TMDL compliance. These entities have technical expertise, resources, and organizational structures to effectively address the DO impairment in the New River at the IB. The U. S. government, through the USEPA and USIBWC, is the proper governmental entity to work directly with Mexico's officials to ensure waste discharges from Mexico do not cause or contribute to a violation of this TMDL. Actions taken by these federal agencies are extremely critical to the success of this TMDL. These "Other Third Party Cooperating Agencies and Organizations" include:

- U.S. members of the New River/ Mexicali Sanitation Program Bi-national Technical Advisory Committee (BTAC);
- North American Development Bank (NADBank);
- Border Environment Cooperation Commission (BECC);
- California Border Environment Cooperation Commission (CalBECC);
- City of Calexico New River Committee (CCNRC); and
- Citizens Congressional Task Force on the New River (CCTFNR).

Table 9.2 lists implementation actions for the New River "Other Third Party Cooperating Agencies and Organizations."

<u>Table 9.2:</u> Recommended Implementation Actions for Other Third Party Cooperating Agencies and Organizations (BTAC, NADBank, BECC, CalBECC, CCNRC, CCTFNR) to Address Waste Discharges from Mexico

Action	Description	Requested Due Date
1- Develop, sign, and submit to the Regional Board a New River DO TMDL Memorandum of Understanding (MOU).	Develop, sign, and submit to the Regional Board an MOU to ensure coordination of New River IB projects. The MOU should address: 1. Establishment of a coordination committee consisting of one representative from each agency and the Regional Board; 2. Establishment of a coordination committee charter to ensure cooperation and communication between all agencies; 3. Compilation of a list of potential/ongoing projects and funding sources to address pollution in the New River/ IB area; and 4. Submission of semi-annual progress reports to the Regional Board.	Six (6) months after USEPA approval of TMDL
2- Develop and submit to the Regional Board New River DO TMDL Implementation Progress Reports.	Submit progress reports (through coordination committee) to the Regional Board describing status of projects and recommended actions to address pollution in the New River at the IB.	Semiannually, with the first report due 12 months after USEPA approval of TMDL

9.3: REGIONAL BOARD COMPLIANCE ENFORCEMENT

The State Water Resources Control Board's Water Quality Enforcement Policy specifies that prompt, consistent, predictable, and fair enforcement is necessary to correct violations of WQSs and the CWC, and to ensure responsible parties implement control measures in a timely manner. The Regional Board is cognizant of the legal, political, and social obstacles to effective enforcement against Mexico for polluting state waters. Nevertheless, the Regional Board has a statutory mandate to protect the quality of waters of the state. This statutory mandate is clearly expressed by the California Legislature in CWC Section 13000, third paragraph, as follows:

"The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all of the waters of the state; that the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state...."

Accordingly, the Regional Board is charged with exercising its full power and jurisdiction to protect the quality of waters in the state from degradation, regardless of whether that degradation originates from within or without the state. Towards this end, the Regional Board may use, to the extent of its jurisdiction, any of the following to promptly and effectively correct water quality threats:

- Issue enforcement orders pursuant to CWC Section 13304 to responsible parties failing to implement control measures to prevent or mitigate pollution or threatened pollution to surface waters;

- Issue enforcement orders pursuant to CWC Section 13301 to responsible parties violating Regional Board waste discharge requirements or prohibitions;

- Issue Administrative Civil Liability Complaints pursuant to CWC Section 13261, 13264, or 13268 to responsible parties failing to comply with Regional Board orders, prohibitions, and requests; and

- Refer recalcitrant violators of Regional Board orders and prohibitions to the District Attorney or Attorney General for criminal prosecution or civil enforcement.

Enforcement may be based on water quality results and/or the extent to which responsible parties implement control measures.

9.4: TMDL REVIEW SCHEDULE

Annual Reports

Annual reports shall be provided to the Regional Board describing progress toward milestone attainment. The Annual Reports shall assess:

- monitoring results;
- water quality improvement;
- implementation actions and effectiveness; and
- recommendations for further actions, including more stringent enforcement.

Triennial Review

The Regional Board must hold public hearings for reviewing applicable WQSs, and modifying/adopting the standards as appropriate pursuant to CWA Section 303 and 40 CFR Part 130. Also, the Regional Board must formulate and periodically review (and update as necessary) Regional Board Basin Plans pursuant to CWC Section 13240. Following adoption by the Regional Board, Basin Plan amendments and supporting documents are reviewed and approved by the SWRCB, the California Office of Administrative Law and, if the Basin Plan amendment concerns waters subject to the CWA as this TMDL does, USEPA.

The first TMDL review will occur during a Regional Board public hearing scheduled three years after USEPA approval of the TMDL at the approximate time of TMDL compliance. The Regional Board may consider more stringent regulatory mechanisms for a second implementation phase (the second three years of implementation) if the TMDL is not achieved at this time. The TMDL review will evaluate attainment of numeric targets, and include the same components assessed in annual reports. The schedule for TMDL review is provided in Table 9.3.

<u>Table 9.3:</u> TMDL Review Schedule*

Activity	Date*
Begin First TMDL Review	Two Years after USEPA Approval
Terminate First TMDL Review, Conduct Regional Board Public Hearing, and Begin Second TMDL Review	Three Years after USEPA Approval
Terminate Second TMDL Review, Conduct Regional Board Public Hearing, and Begin Third TMDL Review	Six Years after USEPA Approval
Etc.	
* Dates are contingent upon Regional Water Board resources. Subsequent reviews will occur concurrently with Triennial Reviews.	

Public hearings will be held at least once every three years to review this TMDL. At these hearings, the Regional Board will:

- review monitoring results;
- review progress toward milestone attainment;
- consider approval of proposed management practices;
- consider enforcement action, if necessary; and
- consider revision of TMDL components.

This proposed review schedule demonstrates the Regional Board's commitment to periodic review and refinement of this TMDL via the Basin Plan amendment process.

9.5: PROPOSED BASIN PLAN AMENDMENT

Regional Board staff recommends that the Regional Board amend the Basin Plan to include this TMDL and implementation plan to achieve compliance with WQS. This Staff Report:

- Identifies low DO impairment prompting TMDL development;
- Identifies and quantifies sources and causes of low DO in the New River at the IB;
- Specifies in-stream numeric targets for DO for the New River at the IB to ensure attainment of WQS;
- Allocates allowable loads in terms of BOD and NH_3 for pollutant sources to attain numeric targets and WQS; and
- Provides an implementation plan to achieve TMDL compliance.

CHAPTER 10: MONITORING PLAN

Regional Board staff will track TMDL implementation, monitor water quality progress, and revise the TMDL or implementation plan as necessary to:

- Address any uncertainties that may have existed during TMDL development;
- Ensure successful implementation; and
- Ensure the TMDL is effective, given changes to the watershed due to TMDL development.

Two types of monitoring will be performed: water quality monitoring and implementation tracking. The monitoring will be conducted pursuant to a Quality Assurance Project Plan (QAPP) that is modeled after and consistent with existing QAPPs for monitoring the New River at the IB and for the Surface Water Ambient Monitoring Program (SWAMP). The program will begin one month after USEPA approves the TMDL.

WATER QUALITY MONITORING

The implementation plan requires water quality monitoring to:

- verify TMDL compliance;
- characterize the physiochemical conditions, and
- determine the need for TMDL revision.

Monitoring objectives evaluate:

- attainment of WQOs;
- effectiveness of implementation;
- in-stream water quality; and
- temporal and spatial water quality trends.

Parameters sampled are given below and contingent on funding. At a minimum, sampling will occur in the U.S. at the following five locations: International Boundary[3] (IB), Evan Hewes Highway (EH), Forrester Road (FR), Drop Structure 2 (D2), and the New River's outlet to the Salton Sea (Outlet). Data from other agencies will be utilized, if determined to be acceptable. The frequency of monitoring is shown in brackets.

- flow [Quarterly]
- DO [Monthly]
- temperature [Monthly]
- pH [Monthly]

[3] It is impractical to take water quality samples at the IB because infrastructure (e.g., treatment lagoons, drains) empties into the New River at this location, causing mixing and aeration. This situation is atypical in the New River, and may yield misleading results. The closest site to the Border used for the IB and SWAMP water quality monitoring programs is located in the New River at the IID Bridge, near the U.S. Geological Survey water quality gage, about 0.5 miles (805 m) north of the IB. Locations closer to the IB will be explored for this TMDL, and monitored if appropriate.

- BOD [Monthly]
- organic matter [Monthly]
- TSSs (EPA Method No. 160.2) [Monthly]
- chemical oxygen demand [Monthly]
- NH_3 [Monthly]
- Nitrate (NO3) [Monthly]
- Nitrite (NO2) [Monthly]
- Total nitrogen (TN) [Monthly]
- Total phosphorous [Monthly]
- Inorganic phosphorous [Monthly]

IMPLEMENTATION TRACKING PROGRAM

The Implementation Plan requires a tracking program to assess the effectiveness of current measures, and to evaluate progress attaining TMDL targets. Implementation progress reports will be provided to the Regional Board annually.

MEASURES OF SUCCESS AND FAILURE SCENARIOS

Measures of Success

The primary measure of success for TMDL implementation is attainment of numeric targets for DO in the New River. Another measure of success is the level of TMDL compliance.

Failure Scenarios

The only failure scenario for TMDL implementation is the failure to achieve the numeric DO WQO of 5.0 mg/L at any time in the 12 mile (19.3 km) section of the New River downstream from the IB. Cooperation from Mexico, in terms of its maintaining Las Arenitas WWTP and identifying and preventing other waste dischargers from violating the TMDL, is essential to the success of the TMDL Implementation Plan. As we indicated earlier, the Regional Board does not have the authority to require actions by the U.S. government or Mexico. The Regional Board can only request these actions and increase public awareness and pressure for compliance. If the DO WQO is not attained by the end of the first phase (the first three years after USEPA approval), the Regional Board will consider taking additional actions for the second phase (the following three years). A river wastewater treatment plant in the U.S. could be one of these actions, if feasible and appropriate.

CHAPTER 11: ECONOMIC CONSIDERATIONS

11.1: LEGAL REQUIREMENTS

Regional Boards must consider several factors when establishing water quality objectives in water quality control plans (Basin Plans). (CWC Section 13241.) Among those factors to be considered are economic considerations. (CWC Section 13241(d).) This TMDL does not establish a water quality objective. Rather, it seeks to implement a plan to attain the water quality objective for DO of 5.0 mg/L already established in the Basin Plan. Therefore, a consideration of economics pursuant to CWC Section 13241 is not required for this TMDL.

Regional Boards must also estimate the cost of any agricultural water quality control program prior to implementation, and must identify potential sources of financing for that program. (CWC Section 13141.) This TMDL does not establish any new requirements or standards for agriculture. Thus, this requirement does not apply.

Finally, when Regional Boards amend their Basin Plans, they must comply with the California Environmental Quality Act (CEQA) (Pub. Resources Code (PRC) Section 21000 et seq.) and its implementing CEQA Guidelines (Cal. Code Regs., Title 14, Section 15000 et seq.). (PRC Section 21080.) Pursuant to PRC Section 21080.5(c), the Secretary for the Natural Resources Agency has certified the Basin Planning program of the State Water Resources Control Board and the Regional Boards as being exempt from the requirement to prepare environmental documents under CEQA. (CEQA Guidelines Section 15251(g); Cal. Code Regs., Title 23, Section 3782.) As a result of this certification, the State and Regional Water Boards prepare “Substitute Environmental Documents” (SEDs) In lieu of the traditional CEQA environmental documents of an initial study, negative declaration, or environmental impact report. The SEDs must be prepared in accordance with the State Water Board’s regulations on exempt regulatory programs. (Cal. Code Regs., Title 23, Sections 3775-3782.)

In general, CEQA requires the Water Boards to consider economic factors only in connection with a physical change in the environment. (CEQA Guidelines Section 15064(e).) But CEQA also imposes certain requirements on the Water Boards when they adopt rules or regulations, such as the regulatory provisions of Basin Plans that establish performance standards or treatment requirements. (PRC Sections 21159, 21159.4; CEQA Guidelines Section 15187.) In such instances, the Water Boards must perform an environmental analysis of the reasonably foreseeable methods of compliance with that rule or regulation. (*Id*.) This environmental analysis must take into account a reasonable range of factors, including economic factors. (PRC Section 21159(c); CEQA Guidelines Section 15187(d).)

Although “performance standard” is not defined in CEQA, it is defined in the Administrative Procedure Act (APA) (Gov. Code Section 11340 et seq.), which governs the adoption or revision of any policy, plan, or guideline adopted by the Water Boards after June 1, 1992. (Gov. Code Section 11353.) “Performance standard” is defined as “a regulation that describes an objective with the criteria stated for achieving the objective.” (Gov. Code Section 11342.570.) This TMDL describes criteria to achieve the DO water quality objective of 5.0 mg/L in terms of waste load allocations for point sources, and load allocations for nonpoint sources and natural background sources. Thus, this TMDL's numerical target for DO, along with the waste load and load allocations, may be considered a "performance standard."

Because the TMDL DO numerical target and waste load and load allocations comprise a "performance standard," the requirements of PRC Section 21159 apply. Accordingly, the Regional Board must conduct an environmental analysis of the reasonably foreseeable methods of compliance with these waste load and load allocations to achieve the DO target of 5.0 mg/L, and must consider economic factors for those compliance methods. In other words, the Regional Board must determine: (1) whether the allocations are being attained; (2) if not, what methods of compliance are reasonably foreseeable to attain the allocations; and (3) what the costs are for those methods of compliance.

The environmental analysis must also include, at a minimum, (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures relating to those impacts; and (3) an analysis of reasonably foreseeable alternative means of compliance with the rule or regulation, which would avoid or eliminate the identified impacts. (PRC Section 21159(a)(1)-(3); CEQA Guidelines 15187(c)(1)-(3).) This environmental analysis follows.

11.2: USEPA AND USIBWC

This TMDL Implementation Plan consists of enforcement of existing laws, regulations, and treaties. The TMDL requests that parties responsible for addressing International Boundary issues (i.e., the USIBWC and the USEPA) specify and implement plans to comply with existing laws and regulations regarding the wastes discharged to the New River that cause the low DO levels, and continue to conduct water quality and DO monitoring in the New River at the IB.

As previously discussed, the numerical target for DO of a minimum of 5.0 mg/L at any time in the first 12 mile (19.3 km) reach of the New River downstream from the IB is not being attained. Also, as noted, monitoring data collected from March 2003 through November 2009 show that DO concentrations were significantly below the numerical target, especially during the warm months of the year (Figures 4.2, 4.3, and 5.1, and Appendix E).

Finally, as previously explained, conservative analyses were used to derive the WLA and LA. An implicit MOS was also incorporated in these analyses and thus, was not quantified. All of these allocations were used to derive the loading capacity of the New River at the IB. That loading capacity was based strictly on meeting the numerical target for DO of at least 5.0 mg/L at any time at the IB. Because the modeling analyses showed that waste discharges in Mexico to the New River and tributary drains are the only source of DO impairment in the first 12 mile (19.3 km) reach downstream from the IB, the allowable load cannot be distributed among different drains and sources in Mexico. This is due to the fact that the Regional Board lacks jurisdiction over waste discharges originating in Mexico. Consequently, the full allowable load was required to be designated to the waste sources crossing into the U.S. at the IB.

The DO was determined to be influenced by two indicator pollutants, BOD and NH_3. As a result, the modeling analyses were conducted to calculate the BOD and NH_3 levels necessary to ensure that a DO of 5.0 mg/L or more would be met at the IB. Those levels were 5.0 mg/L and 0.5 mg/L, respectively. The daily loading calculations were based on an average measured flow in the New River at the IB for 2007 of 3.54 cms. This yielded daily loading values for BOD of 1529 kg/day and for NH_3 of 153 kg/day.

To achieve the BOD and NH_3 concentrations of 5.0 mg/L and 0.5 mg/L, which are necessary to ensure that the DO concentration of a minimum of 5.0 mg/L is met at any time at the IB, the Regional Board needs Mexico's continuing assistance to reduce the BOD and NH_3 loadings from Mexico into the New River. Because the USEPA and USIBWC are the only agencies with the direct authority to assist Mexico in its water quality protection efforts, it is essential that these federal governmental agencies work in concert with Mexico. This work includes continuing their joint international monitoring and other programmatic efforts, and taking the actions requested in this TMDL. Only then can the Regional Board ensure that the DO WQO for the New River will be timely attained. The elements of this work are described below in terms of the reasonably foreseeable methods of compliance with the DO WQO established by this Basin Plan amendment.

The reasonably foreseeable methods of compliance to attain these loadings and the DO numerical target were discussed in Chapter 9, "Implementation Plan." To recap, these methods include having the USEPA and/or the USIBWC: (1) consider and specify measures to assist Mexico to ensure that discharges from Mexico into the New River and its tributaries do not violate or contribute to a violation of the DO WQO of a minimum of 5.0 mg/L at the IB; and (2) continue to conduct water quality monitoring in the New River at the IB to gage how well these implementation measures are working to attain this DO WQO, and to submit monitoring data and reports to the Regional Board.

To track the USEPA's and USIBWC's efforts in this regard, the Regional Board also requested that these federal agencies develop and submit to the Regional Board an Implementation Report one year after USEPA approval of the TMDL, and a Final Implementation Report three years after USEPA approval. The Regional Board requested that the initial Report describe measures taken or proposed to be taken regarding Mexico's efforts to control DO-depleting discharges to the New River, specify the parties responsible for implementation, discuss financial options, and provide a time schedule for implementation. The Regional Board requested that the Final Report describe the progress in its on-going monitoring program, monitoring data and report submittal, and all of the measures and actions taken to assist Mexico in its efforts to help the Regional Board attain its DO WQO at the IB.

The costs for these methods of compliance are difficult to estimate at this time since they will depend in large part on what additional efforts the USEPA and/or USIBWC may take to assist Mexico in its water quality protection measures, and what additional measures Mexico decides to implement in that regard. Of course, the on-going and continuing monitoring program would impose no new costs and, presumably, have been and will continue to be adequately funded. Because CEQA does not require agencies to engage in speculation or conjecture when conducting an environmental analysis, which includes an analysis of economic factors, the Regional Board cannot, and is not required to, speculate any further as to any additional costs of compliance that may incurred with programs that have yet to be developed by and with Mexico. (CEQA Guidelines Section 15187(d).)

The other elements of the environmental analysis required by PRC Section 21159 and CEQA Guidelines Section 15187--(1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures relating to those impacts; and (3) an analysis of reasonably foreseeable alternative means of compliance with the rule or regulation, which would avoid or eliminate the identified impacts—are discussed separately in the CEQA Environmental Checklist and Analysis document.

11.3: OTHER THIRD PARTY COOPERATING AGENCIES AND ORGANIZATIONS

As previously noted in Chapter 9.2, the cooperation of other third party agencies and organizations, in addition to the USEPA and USIBWC, is pivotal for TMDL compliance because these entities have the technical expertise, resources, and organizational structures to effectively address the DO impairment problems in the New River at the IB. These entities are also listed in Chapter 9.2.

The reasonably foreseeable methods of compliance to attain the DO WQO of a minimum of 5.0 mg/L at any time at the IB vary somewhat from the methods being used or to be proposed by the USEPA and/or USIBWC due to the different regulatory status and structure of these entities. As a result of these differences and the fact that there are quite a few of these entities, the Regional Board has requested these other third parties enter into a MOU to ensure coordination of New River projects they are conducting or may propose to conduct, and that they submit the MOU to the Regional Board within six months after USEPA approval of this TMDL. The Regional Board has also requested that the MOU address: (1) the establishment of a coordination committee to ensure cooperation and communication between all agencies and organizations; (2) the compilation of a list of on-going and potential New River pollution projects and funding sources; and (3) the submission of semi-annual progress reports to the Regional Board. The Regional Board also requested that these third parties develop and submit semi-annual progress reports, with the first report submitted 12 months after USEPA approval of the TMDL.

As with the cost evaluation of the USEPA and USIBWC compliance methods, the cost evaluation for complying with these Regional Board requests is difficult to gage for similar reasons. Until the Regional Board has received the requested MOU, it cannot know exactly what programs may be proposed to be undertaken and by which of these third parties. Until then, it would be pure speculation to develop any cost estimate. Presumably, however, any proposed new programs would be based on the third parties' own internal cost analyses to determine whether they had the funding sources necessary to conduct such programs. Moreover, since the Regional Board has no jurisdiction over these third parties, it can only request that they take these actions. Consequently, there are no "hard" costs associated with these methods of compliance since they would be undertaken voluntarily, if at all.

REFERENCES

Brawley WWTP, 2009. Phone Conversation between Nadim Zeywar (Regional Water Board staff) and Robin Mireles (city of Brawley, Public Work Office, Ph: 760-344-5800)
California Center for Border and Regional Economic Studies (CCBRES). 2007. Population Demographics for the Imperial and Mexicali Valleys. CCBRES Bulletin, vol.8, no. 3&4. San Diego State University-Imperial Valley Campus, Calexico, CA.
California Department of Health Services. February 1987. Wastewater Disinfection for Health Protection, Sanitary Engineering Branch.
California Regional Water Quality Control Board, Colorado River Basin Region. 2001. Alamo River Silt Total Maximum Daily Load, Appendix C: Source Analysis Data and Calculations. California Regional Water Quality Control Board, Colorado River Basin Region. Palm Desert, CA
California Regional Water Quality Control Board, Colorado River Basin Region. January 2002, May 2003. Binational Observation Tour of the New River – May 2003. Report. California Regional Water Quality Control Board, Colorado River Basin Region, Palm Desert, CA.
California Regional Water Quality Control Board, Colorado River Basin Region. 2002. Special Observation Tour of the New River – January 2002. Report. California Regional Water Quality Control Board, Colorado River Basin Region, Palm Desert, CA.
California Regional Water Quality Control Board, Colorado River Basin Region. 2003. Special Observation Tour of the New River – May 2003. Report. California Regional Water Quality Control Board, Colorado River Basin Region, Palm Desert, CA.
California State Water Resources Control Board. 2005. State of Clifornia, S,B. 469 TMDL Guidance, A Process for Addressing Impaired Waters in California. June 2005. http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/iw_guidance.pdf
Cohen, M., Morrison, J., Glenn, E. 1999. Haven or Hazard: The Ecology and Future of the Salton Sea. Pacific Institute for Studies in Development, Environment, and Security, Oakland, California.
County of Imperial. 2008. Land Use Element of the Imperial County General Plan. Planning & Development Services Department, County of Imperial. January 29, 2008.
Gruenberg, A.P. 1998. A Historical Overview of New River Pollution in Mexico. California Regional Water Quality Control Board, Colorado River Basin Region.
Imperial County Agricultural Commissioner. 2008. Imperial County 2008 Agricultural Crop and Livestock Report. Imperial County Agricultural Commissioner. El Centro, CA
IID. 2002. IID Water Conservation and Transfer Project Final Environmental Impact Report/Environmental Impact Statement Habitat Conservation Plan. IID, El Centro, CA. http://www.iid.com/Water_Index.php?pid=624
Mancini, J.L., 1978. Numerical Estimates of Coliform Mortality Rates Under Various Conditions. Journal of the Water Pollution Control Federation, 50:2477-2484.
Montgomery, J.M., Consulting Engineers. 1987. New River Pollution Abatement Report Recommended Projects for California Regional Water Quality Control Board Colorado River Basin – Region 7, December, 1987.
Nishida, J. 2001. Concentrated Animal Feeding Operations (CAFOs). Testimony Before the U.S. House of Representatives Committee on Transportation and Infrastructure. Subcommittee on Water Resources and Environment. http://www.house.gov/transportation/water/05-16-01/nishida.html
National Research Council, 1993. Managing Wastewater in Coastal Urban Areas. National Reaserch Council. Friday, April 16, 1993.
Ogendi, George M., Hannigan, Robyn E., and Farris, Jerry L. 2007. Toxicity of Metal-Enriched Black Shale-Draining Surface Waters to Ceriodaphnia dubia, and Pimephales promales. Journal of Agricultural, Food, and Environmental Sciences. Volume 1, Issue 1, 2007.
Pickett, Paul J. 1997. Lower Skagit River Total Maximum Daily Load Water Quality Study. Washington State Department of Ecology, Environmental Investigations and Laboratory Services

Program, Publication No. 97-326a.
Setmire, J.G. 1984. Water quality in the New River from Calexico to the Salton Sea, Imperial County, California. Water Supply Paper 2212. 42 pp. USGS.
Setmire, J.G., Wolfe, J.C., and Stroud, R.K. 1990. Reconnaissance Investigation of Water Quality, Bottom Sediment, and Biota Associated with Irrigation Drainage in the Salton Sea Area, California, 1986-87. U.S. Geological Survey Water-Resources Investigations Report 89-4102.
SWRCB, 2000. State of California, S.B. 469 TMDL Guidance, A Process for Addressing Impaired Waters in California. California State Water Resources Control Board, 1001 I Street, Sacramento, CA 95814. http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/iw_guidance.pdf.
Thomann R.V. and Muller J.A. 1987. Principles of Surface Water Quality Modeling and Control. New York: Harper & Row, Pub., Inc.
U.S.Department of Agriculture Soil Conservation Service. 1981. Soil Survey of Imperial County, California, Imperial Valley Area
U.S.Department of Energy. 2004. Imperial-Mexicali 230-kV Transmission Lines, Draft Environmental Impact Statement, DOE/EIS-0365. U.S. Department of Energy, Washington, DC.
U.S. Department of Transportation. 2003. Imperial Valley (California) Corridors Initiative. http://www.fhwa.dot.gov/planning/econDev/caimpcor.htm
U.S. Fish and Wildlife Service, Salton Sea National Wildlife Refuge. 1997. Wildlife Use of Agricultural Drains in the Imperial Valley, California. Calipatria, California.
USEPA. 2000. Guidance for Developing TMDLs in California. EPA Region 9, January 7, 2000. http://www.epa.gov/region09/water/tmdl/303d-pdf/caguidefinal.pdf.
USEPA. 1986. Quality Criteria for Water. Office of Water Regulations and Standards, Washington, DC. EPA 440/5-86-001.
USGS. 2008. Surface Water Data for California: Monthly Streamflow Statistics. http://water.usgs.gov./ca/nwis/monthly
Waters, T.F. 1995. Sediment in Streams, Sources, Biological Effects and Control. American Fisheries Society, Bethesda, Maryland.