Appendix A

Detailed Study Area Descriptions

This Appendix provides more detailed descriptions of the geography and hydrology of the five transboundary regions that make up the study area. These summaries draw heavily on previous work on the U.S.-Mexico border project conducted by Parsons Engineering Science, Inc. (U.S. EPA, 2000), as well as USGS factsheets for three of the basins (Central Desert/Closed Basins: Papoulias et al., 1997; Rio Grande Basin: Blackstun et al., 1996; and Lower Rio Grande Basin: Buckler et al. 1997).

A.1 Pacific/Salton Sea Transboundary Basins

The Pacific/Salton Sea Basins contain watersheds that drain either to the Pacific Ocean or to inland seas. The basins drain an area of 14,000 square miles (36,000 km^2). These basins have a very dry, semiarid climate with few fresh water resources. Flow is primarily from east to west, with stream flows originating from precipitation in the mountains flowing toward the Pacific Ocean. The flow in these streams is controlled through a series of hydraulic structures, including reservoirs. The Tijuana River is one of the main streams in the basin and one of the City of Tijuana's major natural resources. The river flows northwest through the city of Tijuana before crossing into California near San Ysidro and then flowing into the Pacific Ocean. Figure A-1 shows the Pacific/Salton Sea Basins and their most important characteristics.

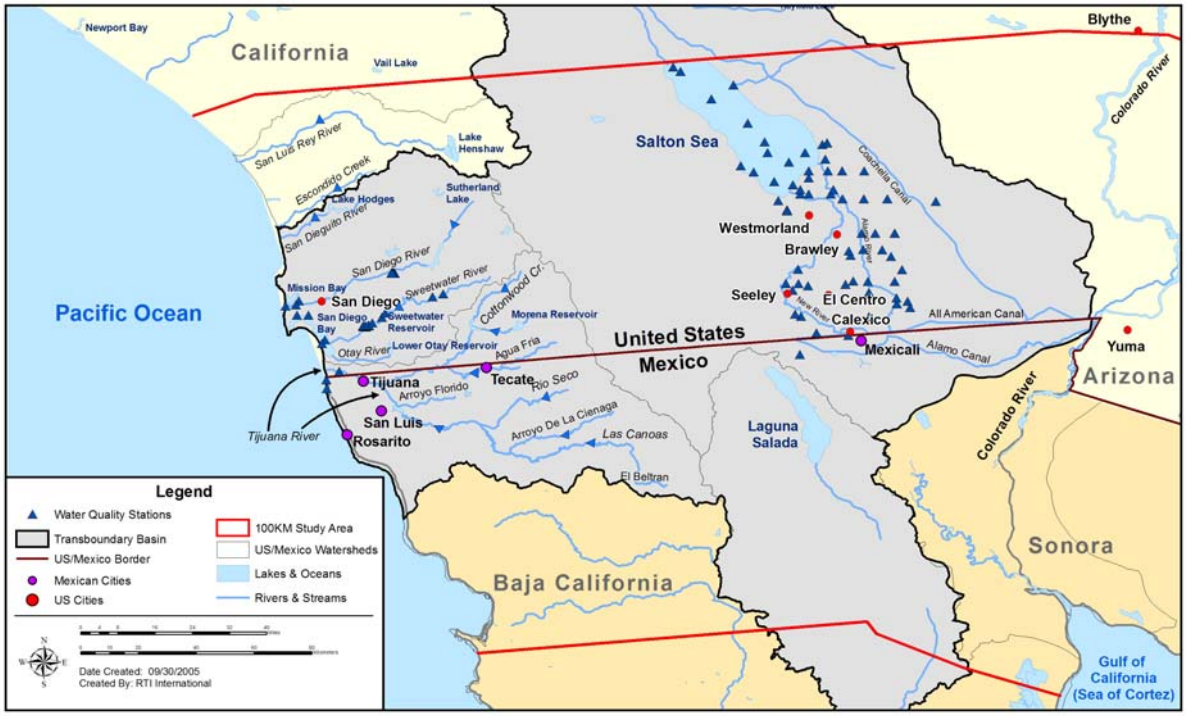

Figure A-1. Pacific/Salton Sea Basins.

A.1.1 Geography of the Pacific/Salton Sea Basins

The San Diego, Cottonwood-Tijuana, and Salton Sea watersheds are the most important watersheds within the Pacific/Salton Sea Basins. They also cover part of the North-East Baja California basin in Mexico.

The San Diego watershed encompasses San Diego County, parts of southwestern Riverside County, and southwestern Orange County. It comprises three distinct areas: the coastal plain, the central mountain valley area, and the eastern mountain valley area. The coastal plain ranges from sea level to about 1,200 feet (370 m) above sea level and extends for 10 miles (16 km) inland from the coast. The central mountain valley area is characterized by ridges and basins, which extend from the coastal plain northeast to the Elsinore fault zone. The basins range in elevation from 500 to 5,000 feet (150 to 1,500 m) above sea level, with the exception of the El Cajon area, where the mountain elevation reaches only 1,500 feet (1,500 m). To the northeast of the Elsinore fault zone, in the area known as the eastern mountain valley area, the valleys range from 1,000 to 3,500 feet (300 to 1,100 m) above sea level, while the surrounding peaks reach elevations of 4,000 to 7,500 feet (1,200 to 2,300 m).

South of San Diego, the Tijuana watershed is separated from the San Diego watershed by the San Isidro and San Miguel Mountain range at the southern end of the San Diego County, and by the Sierra Juarez in Mexico. The highest mountain elevation is Sierra Juarez at 6,500 feet (2,000 m) above sea level.

Land use varies considerably and ranges from urbanized areas to wilderness such as the Cleveland National Forest. Major cities include San Diego in California and Tijuana, Tecate, Rosarito, and Ensenada in Baja California. Smaller cities and towns include Descanso in California; various suburbs of San Diego; and Valle Bonito, San Luis, and La Joya in Baja California.

There are also numerous Indian lands on the U.S. side of the border, including the Campo, La Posta, Manzanita, Cuyapaipe, Barona Ranch, Capitan Grande, Cahuilla, Santa Rosa, Pechanga, Mission, Pala, Rincon, La Jolla, San Pasqual, Los Coyotes, Santa Ysabel, and Mesa Grande Reservations. The northern part of the basin encompasses the Camp Pendleton Marine Corps base, and further down along the coast are many scenic beach areas, on both the Mexican and U.S. sides of the border.

The Tijuana watershed serves as habitat for coastal shrubs and a chaparral ecosystem that extends from Baja California into California near the Pacific Ocean. This chaparral ecosystem gives way to pine forests and coastal vegetation along valleys and intermittent streams. Among the more serious threats to this ecosystem are erosion and slope instability. Increased sedimentation from urbanization and unregulated road development has negatively affected the flora and fauna and has also significantly affected other resources in the area. In addition to erosion and sedimentation concerns, estuarine and wetland areas have been reduced significantly in this basin, to the point where only 20 to 40 percent of the original wetland area remains intact. The watershed also contains several environmentally sensitive areas, such as the Tijuana River Estuary, which straddles the U.S.-Mexico border. The estuary is approximately 2,000 acres (800 hectares) of salt water marsh with several stretches of open water. The estuary is generally open

to the ocean, and its water quality generally is the same as that of the shoreline open ocean waters. However, during periods of excess runoff, a variety of wastes originating upstream in the Tijuana River in Mexico can be carried into the estuary. Tidal flushing is considered to be crucial to the estuary's health, and thus a program to control erosion, manage sediment, and strategically dredge parts of the estuary has been initiated.

In the North East Baja California basin, the major surface water is Laguna Salada. The Sierra Juarez range discharges surface runoff to the Laguna Salada. As the range slopes towards the Sea of Cortez, the mountains give way to sand dunes and wetlands. Of these dune areas, one of the most important is Constitution National Park, located south of Laguna Salada, which has been designated as a protected area by the Mexican government.

The Salton Sea watershed stretches north from the northeast section of Baja California in Mexico into the southeast portion of California in the United States. The watershed has a gross contributing drainage area of 7,500 square miles (19,000 km^2), most of which is in the United States. The western boundaries of the watershed are contiguous with the western boundaries of the Imperial Valley and the eastern side of the Anza Borrego area in California. To the north, the basin is bounded by the Salton Sea along California Route 10 from the San Bernardino National Forest through the Joshua Tree National Monument and to the Colorado River, which forms the eastern side of the boundary. The southern boundary of the watershed is formed as the Imperial Valley lowlands drop to the Sea of Cortez.

The watershed's central feature is the flat, fertile Imperial Valley. The Imperial Valley consists primarily of farming communities, although there are several larger cities in the basin, including the border city of Mexicali in Baja California, a thriving manufacturing center. The main communities in the watershed on the U.S. side of the border are Calexico, El Centro, and Brawley, which are all located along California Route 86 east of the New River. Other communities within the basin area on the California side of the border include Blythe, Indio, Palo Verde, Salton Sea, Seeley, and Westmorland.

A.1.2 Hydrology of the Pacific/Salton Sea Basins

The mountain ranges running along the coasts of California and Baja California divide the precipitation falling there: precipitation that falls on the western slopes flows toward the Pacific Ocean, and precipitation that falls on the eastern slopes flows east into the Imperial Valley and the lands below Mexicali and on into the Sea of Cortez. In California, a series of stream systems originating in the highlands flow west to the Pacific Ocean. These streams include the Aliso, San Juan, San Mateo, San Onofre, San Marcos, and Escondido Creeks, and the Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana Rivers. Most of these streams and creeks consist of both perennial and ephemeral segments, primarily because of man-made controls and impoundments throughout the watersheds. This has created a series of reservoirs and lakes, which include Vail, O'Neill, Henshaw, Hodges, and Sutherland Lakes, and the Lower Otay, Sweetwater, and San Dieguito Reservoirs. Further south, major streams in Mexico include the Santo Tomas Pino, Las Palmas, Las Cabaza, Agua Caliente, and El Baron.

Little rain falls within the basin, which is semi-arid. On the U.S. side of the border, 70 to 90 percent of the region's water has to be imported from northern California and the Colorado River. The basin is served by the Metropolitan Water District of Southern California (MWD), which serves more than 16 million people in the California coastal plain. The MWD manages the importation and distribution of water from the Colorado River and the California State Water Project. Small amounts of water are also available from the regional impoundments described above.

Despite the fact that most of the rivers flowing through this basin are not used for human water consumption, they are very important as natural systems that can carry pollutant loads and polluted runoff downstream. Of particular concern in this respect is the Tijuana River. The Tijuana River originates east of the city of Tijuana, Mexico, then flows west through the center of Tijuana, where it is heavily channelized. In Tijuana, the river is joined by the Alamar, another highly channelized watercourse. As the river flows west through Tijuana, it also bends north and flows near San Ysidro, California. The Tijuana River drains approximately 1,286 square miles (3,300 km^2), approximately two-thirds in Baja California and one-third in California. The river flows into the Pacific through the Tijuana Estuary, which is designated as a federal reserve by the U.S. government.

The primary hydrologic features of the Salton Sea watershed are the New River and Alamo rivers, which both flow north into the Salton Sea. The New River originates in Mexico near Mexicali, while the Alamo River intersects and receives flow from the All American Canal near Bond's Corner, California. Most of the west side of the Salton Sea basin drains to several individual internal sinks or playas, while the southern area generally drains to the Salton Sea.

The Salton Sea is the largest salt waterbody in the basin. The sea, which is located on the site of a prehistoric lake, was created in 1905 when the Colorado River breached an irrigation canal during a large flood and filled a natural depression between the Imperial and Coachella valleys in Riverside and Imperial Counties, California. The sea serves as a drainage reserve for irrigation return water and stormwater from the Coachella, Imperial, and Borrego valleys. It also receives water from the Mexicali Valley in Mexico. Replenishment of the Salton Sea comes predominantly from farm drainage and seepage, with occasional storm runoff from the Coachella Valley, Imperial Valley, and the Anza Borrego areas on the U.S. side of the border and from the Mexicali Valley on the Mexican side.

The Salton Sea is an extension of the Sea of Cortez drainage area and is 30 miles (48 km) long, about 10 to 15 miles (16 to 24 km) wide, and is 30 feet (9 m) deep on average. It has an area of approximately 360 square miles (930 km^2) and its surface elevation, although variable, is approximately 227 feet (69 m) below mean sea level. This basin has an average annual precipitation of about 2.6 inches (6.6 cm); however, in the Coyote Mountains west of the Salton Sea near Mountain Spring, California, average annual precipitation can reach 8 inches (20 cm).

The New River and Alamo River convey agricultural irrigation water from the farmlands in the Imperial Valley, surface runoff, and smaller flows from treated municipal and industrial wastewaters from the Imperial Valley.

The flow in the New River also contains agricultural drainage, treated and untreated sewage, and industrial waste discharges from Mexicali, Mexico. Surface waters mostly drain toward the Salton Sea and enter a series of canals, creeks, and washes in the Imperial Valley south of the Salton Sea. These waters are diverted on the north by the Little San Bernardino Mountains and Orocopia Mountains, on the west by the Anza Borrego Park (Vallecito and Santa Rosa Mountains), and on the east by the Chocolate Mountains.

The Colorado River is the most important waterway in the region because it supplies water for use within and outside the region. Regional drainage comes from an area of 280 square miles (730 km^2) on the west side of the Colorado River. Surface water is diverted by several dams (including the Parker, Palo Verde, and Imperial dams) into several canals and valleys. The Colorado is also the primary water source for irrigation, industrial, and domestic water via the All American Canal.

A.2 Colorado River/Sea of Cortez Transboundary Basins

The Colorado River/Sea of Cortez Basins contain watersheds that drain either to the Colorado River below the gaging station at Parker Dam, or to the Sea of Cortez (which is also known as the Sea of Cortez). These basins drain 22,590 square miles (59,000 km^2) and cover portions of the states of Arizona and Sonora.

The major surface waters in these basins are the lower Colorado River delta. From the north, the Colorado River flows into the basin through heavily urbanized areas near Yuma, Arizona, and San Luis Rio Colorado, Sonora, and then through wetlands before flowing into the Sea of Cortez. Presently, most of the water that the delta receives comes from agricultural drainage from the United States and Mexico, with little perennial flow in the lower Colorado River. Figure A-2 shows the Colorado River/Sea of Cortez Basins and their most important characteristics.

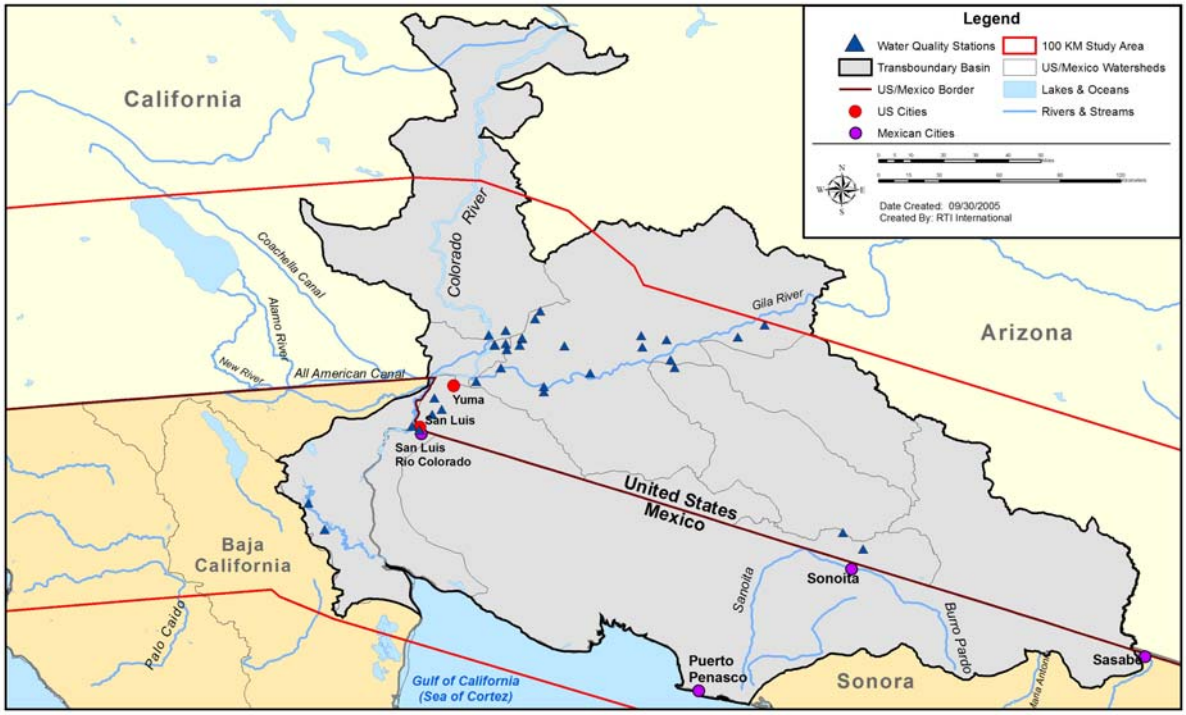

Figure A-2. Colorado River/Sea of Cortez Basins.

A.2.1 Geography of the Colorado/Sea of Cortez Basins

The Lower Gila, Gulf of California, and Colorado River watersheds are the most important watersheds within this transboundary region.

The Gulf of California watershed consists of horseshoe-shaped lowlands ringed by the Sierra Juarez and the Sierra San Pedro Martir mountain ranges to the west, and the Desierto de Altar (Sonoran Desert) and the Northwest Chihuahua highlands to the east. To the north, the Colorado River flows into the basin through a heavily urbanized area, and then through a series of swampy lowlands before ending in the Sea of Cortez. The watershed encompasses the eastern part of the Mexican State of Baja California and northwestern and northern parts of the State of Sonora.

Reaching heights of up to 6,500 feet (2,000 meters), the Sierra Juarez mountain range is part of the coastal range of California and Baja California that extends from the tip of Baja California north well into central California. In the border area, the Sierra Juarez extend approximately 31 miles (50 km) west and 93 miles (150 km) south of Mexicali, Baja California. The range discharges surface runoff to the Lower Colorado River delta and the Sea of Cortez to the east. As the range slopes towards the Sea of Cortez, the mountains give way to sand dunes and wetlands.

The most important features of the basin are the Colorado River and the Desierto de Altar. The Colorado River begins in the United States and flows for more than 1,200 miles

(1,900 km) to the international border, where it enters Mexico on the east side of Mexicali and continues for 100 miles (160 km) before ending in the Sea of Cortez. At one time, the Colorado delta at the Sea of Cortez was a vast area of wetlands and salt flats that covered more than 3,800 square miles (9,800 km^2) of Sonora Desert. Historically, the delta was an important estuary that supported coastal vegetation and fresh, brackish, and intertidal wetlands. However, the delta has been significantly altered by human activity, principally through the development and diversion of water for upstream use. Perennial flow from the Colorado is minimal, and most of the water that the delta receives is from agricultural drainage from the United States and Mexico, as well as periodic flood flow.

The Sonora Desert includes parts of south-central and southwestern Arizona as well as southeastern California, and extends into Sonora to the shores of the Sea of Cortez. The desert has an extremely rough topography and supports diverse flora and fauna communities. There are a series of lands in the basin managed and protected by federal and state agencies, including the Alto Golfo de California, the Delta del Rio Colorado, La Purica National Forest, El Pinacate, Sierra de los Ajos, Sierra Buenos Aires, Sierra San Antonio, and others.

The Colorado River drains approximately 246,000 square miles (640,000 km^2) in Wyoming, Utah, Colorado, Nevada, California, New Mexico, and Arizona in the United States and is important economically, ecologically, and culturally to the western U.S. As the river flows southwest through northern Arizona, it flows through Lake Mead and then turns south to form the borders between Nevada, California, and Arizona. The Colorado enters the border area as it flows past Blythe, California, and then continues south through Yuma, Arizona. As it crosses the border to Mexico, the Colorado becomes the International Boundary between Baja California in Mexico and Arizona in the United States. The river then flows through the Morelos Diversion Structure near San Luis Rio Colorado, Baja California, Mexico and into the Sea of Cortez near Golfo de Santa Clara, Mexico. At this point, the Colorado forms the boundary between the Mexican states of Baja California and Sonora.

In the border area, the Colorado River basin ranges from the eastern part of California east of the Chocolate, Chuckwalla, and McCoy Mountains, and extends east into New Mexico at the headwaters of the Gila River in the Gila National Forest. To the south, the basin is defined by the mesas and plateaus of the New Mexico and Arizona highlands. As the Colorado crosses the border below Yuma, it empties into the wide, low Sea of Cortez delta.

Land use in the Lower Colorado River basin in the border area consists primarily of agricultural and grazing tracts, although large parcels of land belong both to the U.S. government (including several military ranges and four National Wildlife Refuges [the Cibola, the Imperial, the Kofa, and the Cabeza Prieta refuges]). The Colorado River, Yuma, and Cocopah Indian Reservations are also located along the reaches of the Lower Colorado. As the river flows across the border into Mexico, the land becomes much more urbanized between Mexicali, Baja California, to the west, and San Luis Rio Colorado, Sonora, to the east. Further to the east, in the Santa Cruz and San Pedro subbasins, most of the privately-owned land is devoted to grazing, although there are also a variety of mine operations in the area. However, as with the land around Yuma, much of the land in these subbasins is owned by the U.S. government or by Indian tribes. Reservations in the Santa Cruz subbasin include the Papago, the San Xavier, the Ak-Chin Maricopa, and the Gila River, while the San Carlos Indian Reservation lies along the northern

part of the San Pedro River where it joins the Gila River. Wilderness areas in the subbasins include the Coronado National Forest and several other designated wilderness areas.

The Lower Colorado River basin and its subbasins contain several major U.S. and Mexican cities, including Yuma, Arizona; the suburbs of Tucson, Arizona, in Pima County; San Luis Rio Colorado, Sonora, Mexico; and the cities of Agua Prieta and Cananea in the San Pedro subbasin, and Nogales in the Santa Cruz subbasin, Sonora. The primary communities in the Sea of Cortez basin are the Sonoran cities of Altar, Arizpe, Bavispe, Caborca, Imuris, Magdalena de Kino (Magdalena), Puerto Penasco, Santa Ana, Sasabe, and Sonoyta, and the Arizona city of Lukeville, which is located at the border within Organ Pipe Cactus National Monument. Several of these cities, including Sasabe and Sonoyta, are border cities, while Caborca and Altar are located further within Sonora. Only one of these cities, Puerto Penasco, lies on the Sea of Cortez.

A.2.2 Hydrology of the Colorado/Sea of Cortez Basins

Flow in the Sea of Cortez occurs as smaller streams drain from the higher areas to the east and west of the basin and flow directly into the Sea of Cortez, while flow from the northern plateaus is directed into the Colorado River, and then into the Sea of Cortez. The major surface waters in the basin are the Colorado River and its delta. The lower Colorado River in turn supports the Cienaga de Santa Clara; Sonoita Creek; and the Santa Cruz, Magdalena, San Pedro, and Yaqui Rivers. Perennial flow from the Colorado is minimal, with most of the flow resulting from agricultural drainage from the United States and Mexico, as well as periodic flood flow. Residual flows from the Colorado River into Mexico, irrigation return flows, and highly concentrated briny waters have negatively affected the ecology of the upper Sea of Cortez and the Cienaga de Santa Clara.

Drainage into the Sea of Cortez also comes from the higher lands to the east. Some surface water drainage flows southwest from elevations of up to 8,300 feet (2,500 meters) from the areas between Nogales and Agua Prieta. This flow forms smaller tributaries among the different mountain ranges and eventually discharges through several creek systems into the Sea of Cortez.

The Lower Colorado River basin in the border area consists of the Lower Colorado and many smaller streams and washes, some perennial and some ephemeral, that flow across the border. These include the Nogales Wash near Nogales, Arizona; the Greenbush Draw near Naco, Arizona; and the Whitewater Draw near Douglas, Arizona. The basic flow regimes in the basin occur as the Santa Cruz and San Pedro Rivers (which both originate in the highland areas of the northern Sonora Desert, Mexico) flow north across the border and into the Gila River, which itself originated in the Gila National Forest and flows from east to west across the southern part of Arizona. The Gila empties into the Lower Colorado near Yuma, Arizona.

The Lower Colorado River and its tributaries are the main source of water for the entire lower southwest United States. The Lower Colorado proper supports 700,000 acres (280,000 hectares) of farmland in the Imperial, Coachella, Bard, and Palo Verde Valleys of California. The river supplies water to 25 million people throughout its watershed, and almost all of the river's flow is allocated for use to specific consumers. Current river usage agreements guarantee 8.5 million acre-feet (10.5 billion m^3) per year of water to the Lower Colorado Basin and 1.5

million acre-feet (1.9 billion m^3) per year to Mexico. A series of dams and reservoirs store water for consumer use, but the use is such that, in periods of low flow, the flow of the river can be reduced significantly. The river is diverted and controlled by a series of drains and irrigation canals, including the East and West Main Canals, the Main Drain, the A Canal, and the Mohawk Canal. These canals distribute water, as necessary, to agricultural operations in the surrounding areas. Return flows from these canals re-establish flows in the river; however, in conjunction with agricultural runoff, these return flows are thought to contribute to salinity problems in the river.

A.3 Central Desert/Closed Transboundary Basins

The Central Desert and Closed Basins consist of the Mexican Highlands watersheds and the Mimbres and Animas watersheds. Figure A-3 shows the Central Desert and Closed Basins and their most important characteristics. The Mexican Highlands Basin contains watersheds that drain to rivers in southern Arizona, southwestern New Mexico, northern Sonora, or the extreme northwestern tip of Chihuahua. The Mimbres/Animas Basin contains watersheds that drain internally in southern New Mexico and northern Chihuahua. Together, these watersheds drain 34,290 square miles (89,000 km^2) (Woodward and Durall, 1996).

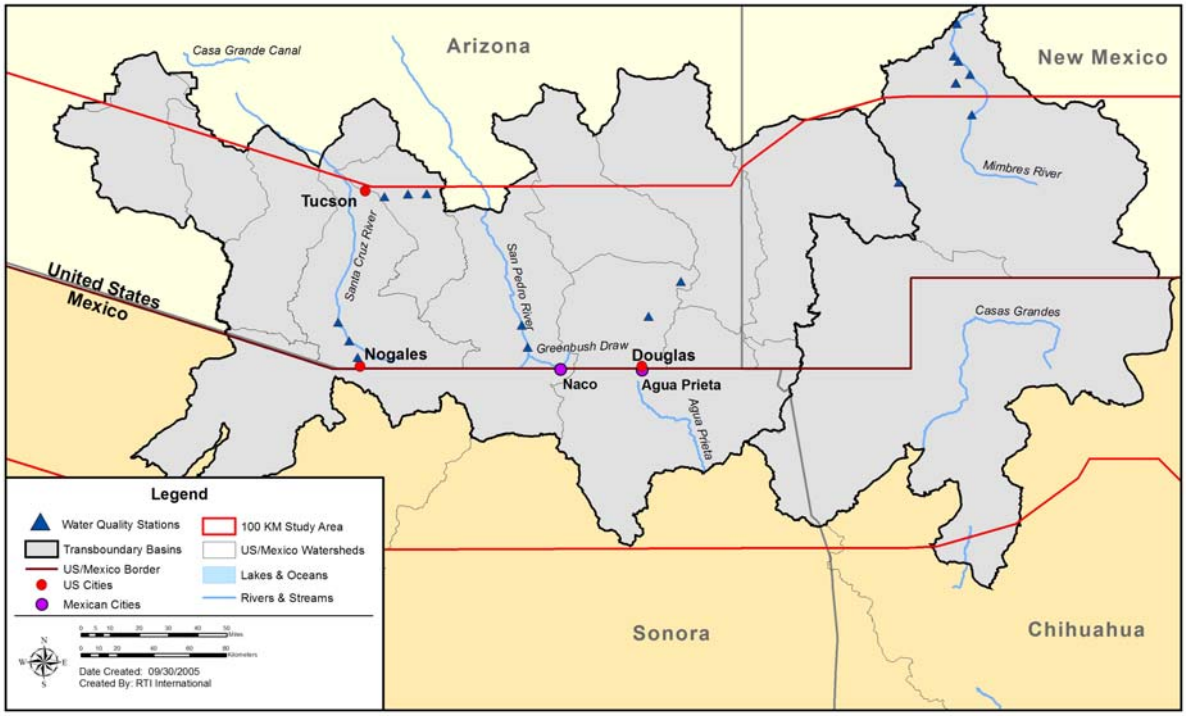

Figure A-3. Central Desert/Closed Basins.

A.3.1 Geography of the Central Desert/Closed Basins

The Mexican Highlands watersheds are characterized by broad valleys or basins separated by steeply rising mountain ranges. Each basin is essentially an independent hydrologic

system. The watersheds drain to rivers in southern Arizona, southwestern New Mexico, northern Sonora, and the northwestern tip of Chihuahua.

The Mexican Highlands watersheds are classified as desert. However, this desert area, unlike many others, is renowned for its lush vegetation and diverse aquatic habitats, remnants from a time when the area was wetter. The uniqueness of this desert has attracted humans since early history. The U.S. and Mexican 1990 censuses estimated the population of the area to be about 935,000. Selected regions in the Mexican Highlands area have experienced intense human pressure with subsequent effects on its water resources and associated plant, fish, and wildlife species. (Papoulias et al., 1997)

The Mimbres and Animas watersheds consist mostly of topographically closed basins with piedmont and basin-floor alluvial surfaces grading to central playa (ephemeral lake) depressions that are designated "bolsons." All stream systems are ephemeral, except in the valleys of Animas Creek (New Mexico Environment Department, 2002).

The area is further subdivided into the Mimbres, Playas, and Marmel watersheds. The eastern part of the area is contiguous with the Upper Rio Grande basin area. This area is known as the Central Closed Basin area. Most flows in the Central Closed Basin area are intermittent, and all of the surface flows within the basin's boundaries are self-contained. The Central Closed Basin consists of several subbasins. The Rio Grande-Mimbres subbasin extends from the Elephant Butte Reservoir to the junction of Mexico, New Mexico, and Texas at the International Boundary, and includes parts of the Jornada del Muerto highlands, the Mimbres River, Playas, and other closed areas west of the Rio Grande. The Rio Grande-Caballo area includes the Caballo Mountains; the southern reaches of the Jornada del Muerto highlands; and the cities of Las Cruces, New Mexico, and El Paso, Texas. On the Mexican side of the border, the basin encompasses the northwestern part of the state of Chihuahua. This area is defined to the west by the Sierra Madre Occidental Mountain Range, which begins almost from the Sonora-Chihuahua Border and extends south. Within the Sierra Madre Occidental are several smaller mountain ranges, including the Sierra Boca Grande, the El Fresnal, the Gapulin, the Encendida, the America, the La Catarina, the Las Tunas, the El Nido, and the Los Arados ranges.

The basin area is a topographically closed, high plateau area with few ephemeral streams that drain internally and do not contribute flow to any of the surrounding basins. Its boundaries are formed by the Continental Divide on the west, the Rio Grande Basin to the north and east, and the Chihuahua Highlands and Route 45 from Ciudad Juarez to the city of Chihuahua to the south. The northern part of the basin area consists of wooded areas with elevations from 6,500 to 10,000 feet (2,000 to 3,000 m); moving further south, the topography changes to desert and semi-arid plains. To the east of the basin, in the northern section of Chihuahua, are several wetland areas called El Barreal. Climatologically, the basin ranges from sub-humid in the north to dry and arid in the south. Annual rainfall ranges from 25 inches (64 cm) in the northern wooded areas to 8 to 10 inches (20 to 25 cm) in the southern elevations.

Land in the basin area is primarily desert, and urbanized areas make up the majority of developed and utilized land. However, range and open land also make up a significant portion of the basin.

The principal cities within this region in the United States are Columbus and Sunland Park, New Mexico. In Mexico, the principal cities are Las Palomas, Ascension, and Janos Nuevo Casas Grandes, and General Rodrigo M. Quevedo, Chihuahua.

A.3.2 Hydrology of the Central Desert/Closed Basins

The most important major rivers include the Gila, Santa Cruz, and San Pedro Rivers. In addition, many smaller streams and washes, some perennial and some ephemeral, flow across the border. These include the Nogales Wash near Nogales, Arizona; the Greenbush Draw near Naco, Arizona; and the Whitewater Draw near Douglas, Arizona. The basic flow regimes in the basin occur as the Santa Cruz and San Pedro Rivers, which both originate in the highland areas of the northern Sonora Desert, Mexico, flow north across the border and into the Gila River, which itself originates in the Gila National Forest and flows from east to west across the southern part of Arizona. The Gila empties into the Lower Colorado near Yuma, Arizona.

The Santa Cruz River originates in the Coronado National Forest west of Nogales, Arizona, and flows south into Mexico before looping back towards the United States near Nogales, Sonora, Mexico. At Nogales, the river flows north through the city, across the border, and into the United States. The river's drainage area is approximately 8,200 square miles (21,000 km^2), with populations concentrated in the Pima County suburbs of Tucson and in the cross-border community of Nogales. Because of the extensive use of groundwater throughout the basin, most parts of the river flow only as a result of runoff or wastewater discharge. However, some tributary streams remain perennial. Of the tributary streams and washes, one of particular concern is the Nogales Wash, which is often composed of raw wastewater and sewage discharged from Nogales on the Mexican side of the border.

The San Pedro River originates in Mexico in a ranching, agriculture, and mining area, and flows into the United States near Palominas, Arizona. The San Pedro River then flows north for almost 100 miles (160 km) before reaching the Gila River. The basin encompasses approximately 3,740 square miles (9,700 km^2), with most of the land owned by the State of Arizona. The population centers in the San Pedro subbasin are primarily small towns, and include Naco, Bisbee, Tombstone, Willcox, and Douglas, Arizona, and the larger communities of Agua Prieta, Cananea, and Naco, Sonora, Mexico. As with the Santa Cruz subbasin, there are several smaller waterbodies of concern in the San Pedro subbasin, including the Whitewater Draw, which drains the town of Douglas, Arizona, and flows into Mexico where it discharges into the Agua Prieta River; and the Greenbush Draw, which drains the Bisbee-Naco area into the San Pedro River.

During the early part of the 20th century, surface water in the basin was almost fully appropriated; thus, further augmentation of water supplies has had to depend almost entirely on groundwater resources. Extensive development of groundwater depletes stream flow, captures natural discharge, and decreases water levels in the aquifer, resulting in reduced stream flows and spring flows and decreased riparian habitat. The Santa Cruz and San Pedro Rivers are the dominant streams in the basin. Their flows largely depend on precipitation in the mountains in Arizona and Mexico. Near their headwaters, certain reaches of these rivers flow continuously, but their flows decrease dramatically as the rivers travel northward. For example, the Santa Cruz River near Nogales, Sonora, generally flows continuously. However, the natural flow in the river

typically does not reach the Nogales International Wastewater Treatment Plant (located along the river about 6 miles [10 km] north of Nogales, Arizona). Flow downstream from the treatment plant is composed entirely of effluent return, and this water rarely flows past the Santa Cruz County line (located about 12 miles [19 km] downstream from the treatment plant) before it completely seeps into the subsurface. (Papoulias et al., 1997)

An important perennial river in this basin is the Mimbres River, which flows only in the upper reaches outside of the border area. The Bear Canyon Reservoir, which is fed by the Mimbres River at Bear Canyon, lies in the northern part of the basin; it is capable of impounding 700 acre-feet (860,000 m^3) of water for conservation storage and recreation. The principal rivers in Northwest Chihuahua are the Rio Casa Grandes, the Rio Santa Maria, and the Rio Santa Clara. There are also several lakes in this region, including Laguna Colorado, Laguna Victorio, Laguna de Santa Maria, Laguna de la Ascension, Laguna de Guzman, Laguna Fierro, Laguna Redonda, Laguna la Vieja, Laguna Seca, Laguna Encinitas, and Laguna San Rafael. The Ochenta y Nueve irrigation district also lies in the basin.

Unlike the other major basins straddling the U.S.-Mexico border region, no perennial streams flow across the border in this basin. While some ephemeral streams, such as the Wamels Draw and other unnamed streams, flow across the border during runoff events, few streams flow perennially in the entire basin.

Groundwater is the major source of water within the basin. Four underground basins (the Mimbres, the Animas Valley, the Playas Valley, and the Nutt-Hockett Aquifers) have been identified on the U.S. side of the border. Of these aquifers, the Animas Valley, the Playas Valley, and the Nutt-Hockett aquifers lie in the border region. The Animas Valley aquifer encompasses approximately 426 square miles (1,100 km^2) underneath Hidalgo County and parts of Arizona in the Colorado River basin; the Playas Valley aquifer underlies 515 square miles (1,300 km^2) in Hidalgo County; and the Nutt-Hockett underlies approximately 133 square miles (340 km^2) in portions of Luna, Sierra, and Dona Ana Counties. Because of the lack of reliable alternative water sources, safeguarding groundwater from pollution is a critical issue within this basin.

The conflicts resulting from competition for the region's limited water resources are well illustrated in the Santa Cruz River Basin. Competing water needs and uses include municipal, domestic, industrial, and agricultural uses; irrigation; and support of riparian habitat and fish and wildlife. The withdrawal of groundwater, the basin's principal source of supply for municipal, industrial, and agricultural uses, is greater than natural basin recharge. The two largest population centers occur in the Santa Cruz River Basin: Tucson (about 579,000 people) and the sister cities of Nogales-Nogales (about 137,000 people). As a result, more than 75 percent of the people in the subarea live in the Santa Cruz River Basin. The Nogales-Nogales area also supports one of the largest maquiladora clusters along the U.S.-Mexico border. About 26,000 acres (11,000 hectares) of agricultural lands are irrigated in the basin upstream from Tucson, including about 2,300 acres (930 hectares) in Mexico. (Papoulias et al., 1997)

Overdraft of groundwater supplies is a major concern to the basin because of the rapid growth rates in this region of the border. Increased groundwater withdrawal from the Tucson Basin has resulted in increased well pumping costs, reduced groundwater quality, decreased well

capacities due to the consolidation of sand in the aquifer, and the potential for land surface subsidence. Groundwater-surface water interactions in the area are poorly understood, but as groundwater withdrawals exceed natural recharge, greater volumes of surface flows from the Santa Cruz River will be drawn into the aquifer and eventually the river will run dry. Subsidence and aquifer overdraft also concern federal land managers, and the results on wetlands and springs could directly affect the ability to protect ecological resources. (Papoulias et al., 1997)

Water in the San Pedro River is supplied by flow from Mexico and by discharge from the adjacent aquifer. The San Pedro Riparian National Conservation Area is a narrow corridor of riparian habitat hosting a wide variety of plant and animal species. The water requirements of the San Pedro Riparian National Conservation Area, municipalities, industry, the military, and agriculture in the San Pedro Basin must all be met from the same, limited resource. The issues of the San Pedro Basin include (1) maintenance of sufficient river flows for the protection of the riparian environment, (2) resolution of conflicting water-use interests and the legal determination of water rights, and (3) identification of the effects of water-resource development in the basin within the upper reaches in Mexico. (Papoulias et al., 1997)

These water quantity issues are exacerbated by problems associated with insufficient data for the San Pedro River System. At present, there is a poor understanding of the origin of surface flows, groundwater-surface water interaction, and the importance of the riparian system. We are only beginning to understand the significance of large riparian cottonwood and willow forests to the biological health of the river system. (Papoulias et al., 1997)

The area contains two National Wildlife Refuges, each dependent on a sustaining water supply. The fish and wildlife resources of San Bernardino National Wildlife Refuge are inextricably tied to the water resources of the San Bernardino artesian basin, more than half of which is in Mexico. Another system of great importance to wildlife, particularly to migratory birds, is the Arivaca Oenega (a type of wetland) of Arivaca Creek within the Buenos Aires National Wildlife Refuge. In addition, springs and intermittent drainages support approximately 30 acres (12 hectares) of riparian habitat at the Fort Bowie National Historic Site, 180 acres (73 hectares) within the Chiricahua National Monument, and more than 300 acres (120 hectares) of riparian wetland habitat, including 101 acres (41 hectares) of Oak Riparian Forest in the Coronado National Memorial. (Papoulias et al., 1997)

Federal (United States) bureaus are participating in the Arizona adjudication of water rights, particularly as it addresses the issues of allocation and ground- and surface-water interaction in the Mexican Highlands. Under Arizona law, uses of surface water must adhere to the doctrine of prior appropriation (the rule of “first in time, first in right”), and most groundwater uses are limited by the doctrine of reasonable use. The reasonable-use doctrine provides no limits on the quantity and timing of withdrawal. The U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. National Park Service have submitted claims in adjudications to protect water rights for surface- and groundwater uses, including uses that maintain riparian habitat. The U.S. Bureau of Indian Affairs has supported Gila River Indian Community claims, and the U.S. Bureau of Reclamation has Central Arizona Project authority on the San Pedro River. This adjudication, referred to as the Gila River Adjudication, will resolve several issues that are significant to management of the San Pedro Riparian National Conservation Area. (Papoulias et al., 1997)

A.4 Upper Rio Grande Transboundary Basins

The Rio Grande/Rio Bravo Basin on the U.S.-Mexico Border is defined as the area from the Elephant Butte Reservoir to the Falcon Reservoir. The Rio Grande Basin drains 76,480 square miles (200,000 km^2) (Woodward and Durall, 1996). Figure A-4 shows the Rio Grande Basins and their most important characteristics.

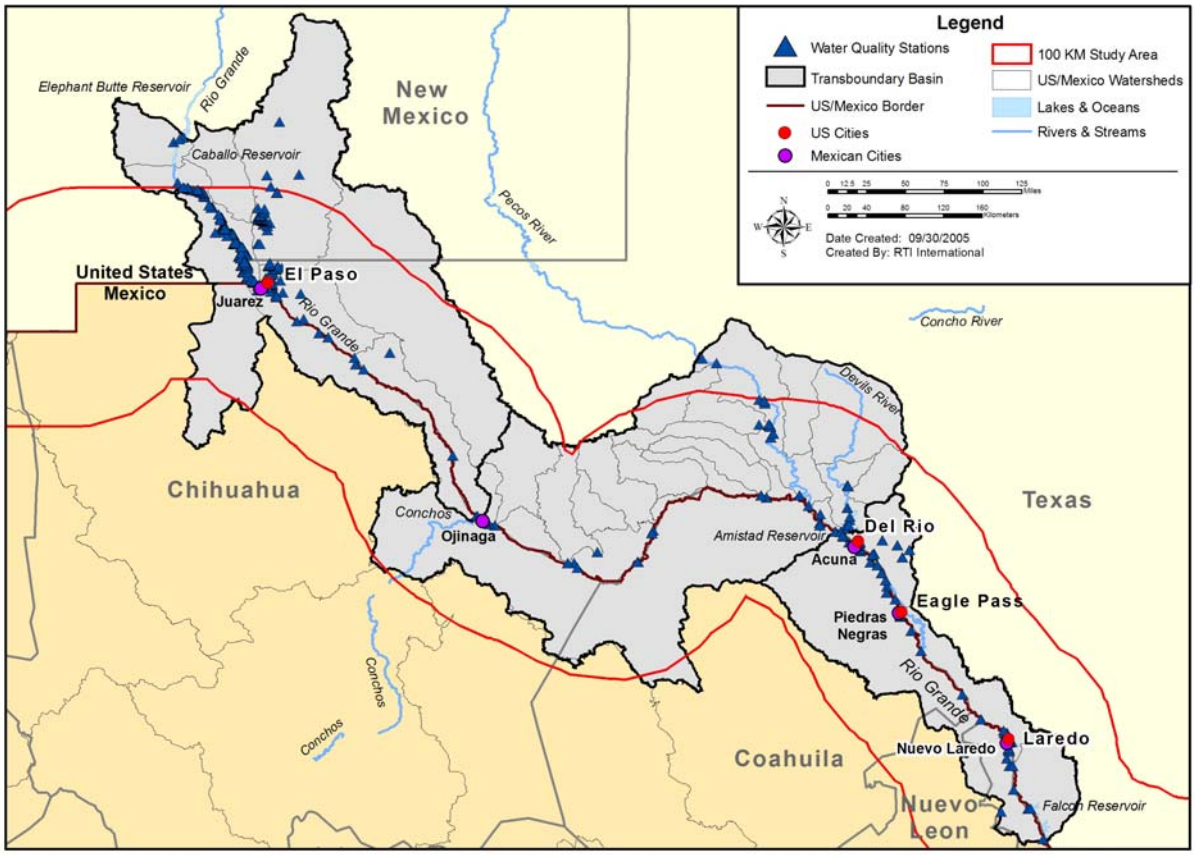

Figure A-4. Upper Rio Grande Basins.

A.4.1 Geography of the Upper Rio Grande Basins

The Rio Grande basin extends from the Rio Grande's headwaters in the San Juan Mountains of southern Colorado all the way to its end in the Gulf of Mexico in the Mexican state of Tamaulipas and the U.S. state of Texas. The Rio Grande is approximately 1,900 miles (3,100 km) long and drains an area of 182,215 square miles (470,000 km^2) in three U.S. states (Colorado, New Mexico, and Texas) and five Mexican states (Chihuahua, Coahuila, Durango, Nuevo Leon, and Tamaulipas). As the river flows through El Paso, Texas, it begins to define the International Boundary between Mexico and the United States, and does so until its mouth at the Gulf of Mexico. In this area along the International Boundary, the river is also known by its Mexican name, the Rio Bravo.

In the border area, the Rio Grande/Rio Bravo basin stretches from New Mexico to the International Falcon Reservoir, which lies in the northwestern portions of Tamaulipas, Mexico, and the southwestern part of Texas, near Zapata and Falcon, Texas, and Nuevo Ciudad Guerrero, Tamaulipas. Below the International Falcon Reservoir, the hydrography of the Rio Grande basin changes, and thus this area of the basin has been defined as a separate basin, designated the Lower Rio Grande Basin. The Lower Rio Grande Basin is discussed fully in Section A.5.

The Rio Grande basin as defined in the border area is bounded by the official 100-km border designation about 65 miles (105 km) north of the border, below the elephant Butte Reservoir near the towns of Salem and Hatch, New Mexico. Near this northern boundary, the Rio Grande flows through the Mesilla Valley, at an approximate elevation of 3,700 feet (1,100 m) above sea level. As the Rio Grande flows south, it becomes the border between New Mexico and Texas, and then, at El Paso, Texas, it becomes the International Boundary between Mexico and the United States. As it flows to the Gulf of Mexico, the Rio Grande/Rio Bravo basin encompasses all or part of 31 western Texas counties. The Rio Grande/Rio Bravo valley encompasses a narrow strip of land bordered by the Guadalupe, Davis, and Santiago mountain ranges in western Texas, and a series of ranges along the eastern reaches of Chihuahua, including the Sierra La Armagosa, Sierra San Jose del Prisco, Sierra La Lagrima, Sierra Pilares, Sierra, Sierra La Esperanza, and the Sierra El Peguis. As the river flows south past the International Amistad Reservoir, its floodplain widens as the valleys between the Sierra Madre Occidental and the Serranias del Burro of Coahuila, Nuevo Leon, and Tamaulipas give way to lower valleys supporting the tributaries of the river. On the U.S. side of the border, the Rio Grande river valley widens below the Edwards Plateau of northwestern Texas. Below the Reservoir, the lower lands and valleys become wide enough to support more agricultural uses.

The Rio Grande section from Rio Conchos to Amistad Reservoir area is hot, and the climate varies from semiarid to arid. Average annual rainfall (1961–90) ranged from about 11 inches (28 cm) per year at Presidio, Texas., to about 19 inches (48 cm) per year at the upper elevations of the Chisos Mountains in Big Bend National Park. This sparsely populated area (1990 U.S. population less than 40,000) is predominantly open range and is divided between the Basin and Range and Great Plains physiographic provinces. The Basin and Range province, from Big Bend National Park westward, is characterized by isolated mountain ranges separated by desert basins characteristic of the northern Chihuahua Desert. (Blackstun et al., 1996)

Both sides of the international border have protected areas. The Maderas del Carmen and Cañon de Santa Elena in Mexico contain nearly 1.2 million acres (490,000 hectares). Although much of this land is privately held, the Mexican government has given these areas special environmental status. Although much of the land in Texas is privately owned, the U.S. National Park Service (NPS) and the Texas Parks and Wildlife Department (TPWD) protect significant areas along the border including Big Bend National Park (NPS), the Rio Grande Wild and Scenic River (NPS), and Amistad National Recreation Area and Big Bend Ranch State Park (TPWD). (Blackstun et al., 1996)

In the northern reaches of the basin in New Mexico, the Rio Grande flows through portions of the Chihuahua Desert, where precipitation is less than 8 inches (20 cm) per year and annual evaporation may be more than 1,000 percent of this annual input. As the river flows southeast, rainfall increases, ranging from approximately 12 inches (30 cm) per year at Fort

Stockton to 20 inches (51 cm) at Laredo to over 25 inches (64 cm) at Brownsville. As described above, most of the Rio Grande is semi-arid desert scrub land with vegetation consisting of shrubs, short grasses, and cacti. At the higher elevations along some isolated peaks, small forests of oak, juniper, and pine can be supported. The basin supports several biotic communities in both the scrub desert ecosystems, as well as in the riparian corridor of the river itself. The river is also an important ecosystem and is home to as many as 80 species of northern Chihuahua desert fish species. The Rio Grande/Rio Bravo basin also contains many protected lands, including the Canon de Santa Elena Reserve in Chihuahua, the Maderas del Carmen area in Coahuila, and Big Bend National Park and the Big Bend Natural Ranch Area in Texas.

Land use in this area of the Rio Grande/Rio Bravo basin is primarily devoted to rangeland, agriculture, light industrial uses, mining, and urban areas. As discussed above, the availability of water determines almost all of the land uses in the basin. In areas where water control devices allow the regulation and storage of water, larger human populations can be sustained and industries can flourish. In other areas, the use of canals to transport water supports ranching, rangeland, and agricultural practices. Areas with no water control most likely remain as scrub desert.

Major cities in the Rio Grande basin are primarily composed of five pairs of sister cities (El Paso/Ciudad Juarez, Presido/Ojinaga, Del Rio/Ciudad Acuna, Eagle Pass/Piedras Negras, and Laredo/Nuevo Laredo) located along the Rio Grande/Rio Bravo. These pairs of sister cities account for the largest population segments in the basin. In addition, because of their proximity to each other and their location on the International Boundary, these communities represent the interrelated natures of the cross-border economies, populations, and environmental issues characteristic of the border area

In addition to these incorporated communities, unincorporated “colonias” play a significant role in water issues and infrastructure planning in the Rio Grande/Rio Bravo basin. Colonias are permanent communities that have been built for the most part without basic infrastructure, including water and wastewater systems. Colonia communities are located throughout New Mexico and Texas, and are estimated to have a population of over 300,000. While most colonias are located in Hidalgo, Starr, Cameron, and Willacy Counties in southeastern Texas, 25 percent lie along the Rio Grande/Rio Bravo basin in the border area. Most of the colonias in this area lie in Maverick County near Eagle Pass. Because of their proximity to the Rio Grande, and their lack of basic infrastructure to ensure safe drinking water and adequate disposal of wastes, the colonias can have a major effect on water quality and other water issues. Some Texas cities have already begun to incorporate the colonias into their strategic planning, and a number of entities, including EPA, the U.S. Department of Agriculture, the U.S. Department of Housing and Urban Development, and the States of New Mexico and Texas have already initiated various programs to upgrade infrastructure in the colonias.

A.4.2 Hydrology of the Upper Rio Grande Basins

The primary waterbodies in the Rio Grande basin are the Rio Grande/Rio Bravo River and its major tributaries, including the Rio Concho, the Rio Salado, and the Rio San Rodrigo in Mexico, and the Pecos and Devils Rivers in Texas. Pecos River and Devils River contribute flow directly to Amistad Reservoir. Other surface water features include springs, ephemeral and

intermittent streams, and tinajas (water pockets often below small waterfalls). The Rio Grande flows through deep, steep-walled canyons of limestone, forming a ribbonlike oasis of riverine and riparian environment sand providing a stark comparison to the adjacent desert landscape. The Rio Conchos watershed in its entirety contains almost half the entire Rio Grande drainage area in Mexico. (Blackstun et al., 1996)

The Rio Grande/Rio Bravo has also been dammed in several places to create reservoirs, including the International Amistad Reservoir and the International Falcon Reservoir. Two reservoirs, the Centenario and the San Miguel Reservoirs, are also located west of the Rio Grande/Rio Bravo, below the International Amistad Reservoir between Ciudad Acuna and Piedras Negras, Coahuila, Mexico.

The hydrography of the Rio Grande/Rio Bravo basin has been substantially altered by humans. The entire basin area is semi-arid, and human populations can only be supported in areas with reliable water supplies. The extremely high demand for water throughout the basin has resulted in a complex series of dams, reservoirs, canals, diversions, and other man-made structures that control, divert, and store water for human use, including drinking water supplies, agricultural irrigation water supply, and other uses. These control structures are located throughout the basin, and in fact begin outside of the border area in the upper reaches of the Rio Grande. The increasingly competitive natures of water interests have made the hydrography of the Rio Grande/Rio Bravo a matter of increasing concern, both economically and ecologically, with many regional planning decisions affected by both the quantity and quality of water available.

Flow in the Rio Grande/Rio Bravo has historically been the result of spring snowmelts in the upper reaches of the river, as well as localized inputs from summer thunderstorms. With the exception of the major rivers, many of the tributaries flowing into the Rio Grande are intermittent streams that flow only during the wet period of the year. As a result of this water balance, most flow in each segment of the basin is basically controlled by man-made diversions in the segment upstream. Thus, flow through El Paso is controlled by releases from the Elephant Butte Reservoir in New Mexico, flow through Ciudad Acuna and Del Rio is controlled by the International Amistad Reservoir upstream, and flow to the lower Rio Grande/Rio Bravo is controlled by the International Falcon Reservoir. Between these water storage structures are a series of water diversion structures that divert the water to localized uses. Water is diverted in the El Paso/Ciudad Juarez area by the American Canal and the Acequia Madre; flow around Del Rio is diverted by the Maverick Canal; and flow below the International Falcon Reservoir is diverted by the Anzalduas and other canals.

The related processes of controlled flows from dams and reservoirs, outflows into canals, and inflows from tributaries and canal return flows, make the flows of the Rio Grande/Rio Bravo inconsistent from location to location and over time. Between El Paso and the International Amistad Reservoir, the Acequia Madre and American Canals remove 322,000 acre-feet (397 million m^3), while various creeks and rivers add 1,354,000 acre-feet (1.67 billion m^3) to the flows, creating a net gain in flow of 1,032,000 to 1,426,000 acre-feet (1.27 billion to 1.76 billion m^3) per year into the International Amistad Reservoir. In a similar fashion, between the International Amistad and International Falcon Reservoirs, outflows are 1,050,000 acre-feet

(1.3 billion m^3) per year, and inflows are 1,649,000 acre-feet (2.0 billion m^3) per year, nearly half of which are Maverick Canal return flows.

The construction of dams and implementation of flood-control practices, channelization, increased water diversions, and displacement of native cottonwood and willow with tamarisk (salt cedar) have resulted in the Rio Grande becoming seasonally intermittent between Fort Quitman, about 70 miles (110 km) southeast of El Paso/Ciudad Juarez, and Presidio. On the Rio Grande upstream from the area, Elephant Butte and Caballo Reservoirs (in southern New Mexico), impound and release virtually all Rio Grande flows for urban, industrial, and agricultural uses in the El Paso/Ciudad Juarez region. Existing water rights, international treaties, and operational policies administered by the Rio Grande Compact Commission limit Rio Grande flow from this region. The limited return flows to the Rio Grande from these uses have significantly degraded water quality. Those return flows are significantly reduced between Fort Quitman and Presidio as they pass through a reach overgrown with tamarisk and are evapotranspired. This often results in little or no surface flow from the Rio Grande entering the subarea from above the Rio Conchos. (Blackston et al., 1996)

Water quantity, water quality, and aquatic-biological characteristics within the Rio Conchos area are heavily influenced by the Rio Conchos. In the Rio Conchos watershed, upstream from the area, expanding agricultural, mining, and timber harvesting activities as well as urban and industrial development affect both the quantity and quality of Rio Grande flows through the area. (Blackston et al., 1996)

The Pecos and Devils Rivers are tributaries at Amistad Reservoir. The natural discharge of saline groundwater into the Pecos River in New Mexico also affects the water quality of Amistad Reservoir. (Blackston et al., 1996)

The availability of streamflows sufficient in variability, magnitude, and duration to protect natural resources that are dependent on these flows is the most serious water quantity issue in this subarea. If sufficient streamflow is not available to fully support and satisfy all competing water needs, the issue of water quality becomes academic. Before 1915, the Rio Grande flowed unimpeded through relatively undisturbed lands in the sparsely populated subarea. At Presidio/Ojinaga, a dramatic change in the river is visible due to the dominating influence of inflow from the Rio Conchos. The Rio Conchos typically supplies the largest percentage of Rio Grande flows allocated by Mexico in accordance with the 1944 Treaty between the United States and Mexico. The total annual flow of the Rio Conchos averaged 737,000 acre-feet (909 million m^3) through the 1980s, more than five times the flow of the Rio Grande measured just above its confluence with the Rio Conchos. Also, the flood-peak histories of the Rio Grande and Rio Conchos are dramatically different, even though both rivers are heavily regulated. (Blackston et al., 1996).

Dams on the Rio Conchos are operated primarily for water storage. Consequently, the Rio Conchos sometimes experiences high peak flows—71,300 cubic feet per second (cfs) (2,020 m^3/sec) in 1978 and 45,900 cfs (1,300 m^3/sec) in 1991. As flood control becomes an issue in the developing Rio Conchos watershed, changes in the annual volume and peak levels of streamflow entering the Rio Grande could affect the long-term maintenance of existing aquatic

and riparian habitats and further affect the variability of the flow regime downstream. (Blackston et al., 1996)

Flow from the Pecos and Devils Rivers' watersheds directly enters Amistad Reservoir. The Rio Grande, which was impounded at Amistad Dam in 1969, has a drainage area of 123,142 square miles (320,000 km^2) at the IBWC streamflow gage located 2.2 miles (3.5 km) downstream from the dam. Relative contributions of flow to the reservoir for the period 1968–1993 are as follows: the Rio Grande above the Pecos River, about 66 percent (1,836 cfs, or 52 m^3/sec), the Pecos River, about 11 percent (298 cfs, or 8.4 m^3/sec), and the Devils River, about 23 percent (656 cfs, or 19 m^3/sec). Mean annual flow from Amistad Reservoir is 2,454 cfs (69 m^3/sec). Although the Devils River watershed is only about 12 percent of the size of the Pecos River watershed, its mean annual flow is more than twice that of the Pecos. Reasons for significant differences in water yields from the two watersheds are as follows: (1) the Pecos River watershed is mostly arid, whereas the Devils River watershed is mostly semiarid; (2) along much of its length, the Pecos River contains alluvial deposits which allow recharge to groundwater by seepage from the river, whereas the Devils River lies almost entirely within incised limestone canyons, resulting in less groundwater recharge; (3) spring discharge accounts for a higher baseflow for the Devils River, and water diversions for irrigation are greater along the Pecos River. (Blackston et al., 1996)

Groundwater is a source of baseflow for streams in the subarea, and its interaction with surface water accounts for differences in water yields between watersheds. The Edwards-Trinity aquifer system is the principal source of water for domestic, livestock, and public supply east of Big Bend National Park. Although surface water is fully developed, use of water from the Edwards-Trinity aquifer system for irrigation over the subarea is limited due to the poor soils and the generally rocky terrain. In the Big Bend area, groundwater occurs in alluvial deposits along the Rio Grande and intermittent streams. These areas provide important sources of water for wildlife and habitat for the endangered Big Bend Gambusia. (Blackstun et al., 1996)

In some areas sufficient yields can be obtained for domestic, stock, and public water supply uses. Geothermal springs are also a local tourist attraction in Big Bend National Park. River rafting and other forms of recreation are popular along the Rio Grande; contact recreation occurs both in the river and at hot springs along the river's edge in the subarea. (Blackstun et al., 1996)

A.5 Lower Rio Grande Transboundary Basin

The Lower Rio Grande Valley—below Falcon Reservoir to the Gulf of Mexico basin contains watersheds that drain either to that reach of the Rio Grande, to the lower reach of the Rio San Juan below the gaging station at Santa Rosalia, or to Arroyo Colorado in southern Texas. It drains an area of 10,240 square miles (27,000 km^2). Figure A-5 shows the Lower Rio Grande Basin and its most important characteristics.

A.5.1 Geography of the Lower Rio Grande Basin

The Lower Rio Grande Basin is physiographically characterized as Gulf Coastal Plain. This basin encompasses a total of 10,240 square miles (27,000 km^2), of which 6,155 square

miles (16,000 km^2) are in Mexico and 4,085 square miles (11,000 km^2) are in the United States. A small portion (approximately 174 square miles, or 450 km^2) of this area is under the ownership or administration of the U.S. Federal Government. Federally owned or managed areas include the Santa Ana, Lower Rio Grande Valley, and Laguna Atascosa National Wildlife Refuges administered by the U.S. Fish and Wildlife Service, and the Palo Alto Battlefield National Historic Site administrated by the U.S. National Park Service. (Buckler et al., 1997)

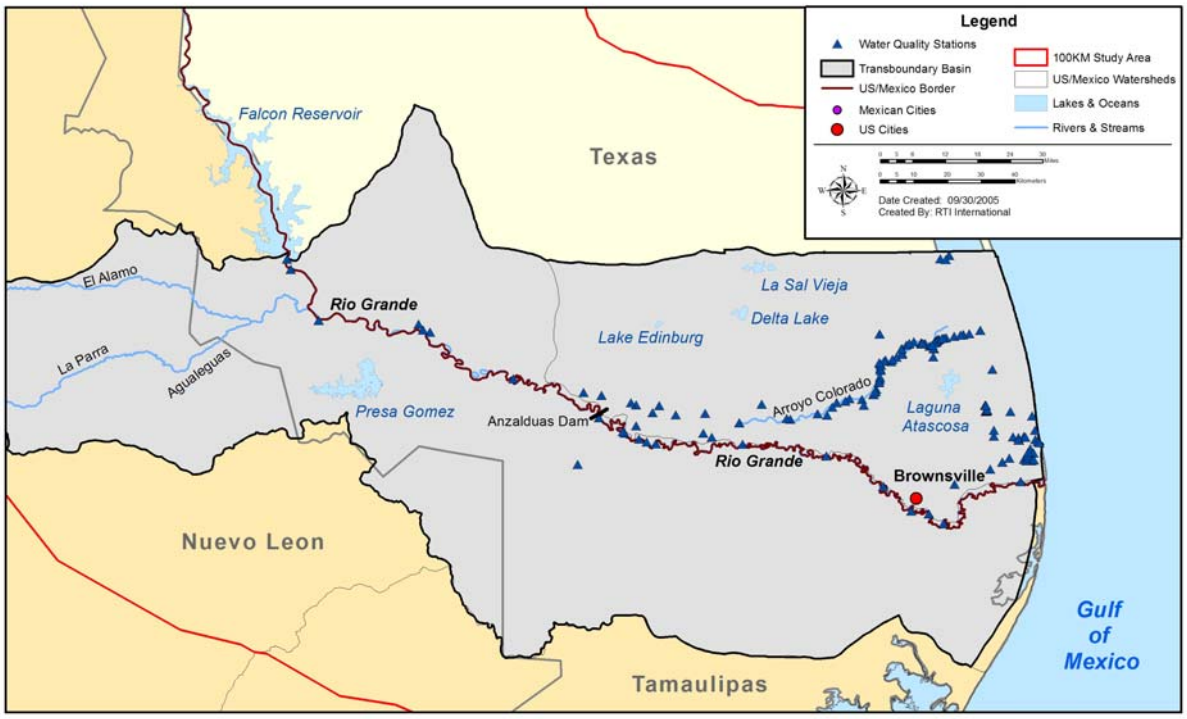

Figure A-5. Lower Rio Grande Basin.

From Falcon Reservoir, the Rio Grande/Rio Bravo flows southeastward approximately 275 river miles (440 km), terminating in the coastal wetlands and marshes of the Gulf of Mexico, including the Laguna Madre off the coasts of Texas and Tamaulipas. Among the unique habitats of this segment of the U.S.-Mexico border are the resacas (oxbow lakes) of the Lower Rio Grande Valley. The basin is classified as Tamaulipan brushland, which is characterized by dense, woody, and thorny vegetation and a high degree of biological diversity. Vegetation is taller and more lush in riparian areas than in the drier uplands and provides not only important nesting and feeding habitat, but also serves as corridors for more rainfall than most other basins of the border, with an average annual rainfall of about 26 inches (66 cm) at the mouth of the river and about 16 inches (41 cm) at Falcon Dam. As in other border basins, the water resources and associated plant, fish, and wildlife communities of the Lower Rio Grande Valley are increasingly subject to the pressures of human activities. (Buckler et al., 1997)

Vegetation, climate, and temperatures are similar on both sides of the border. Along the coastal area, marshes and wetlands dominate the landscape; moving up the watershed, these wet areas give way to oak forests, and then to arid scrub areas near the Falcon Reservoir. The basin supports a unique biotic community that includes several rare plant communities and numerous

species of mammals, snakes, lizards, and tortoises. Annual rainfall averages about 26 inches (66 cm) in the lower Rio Grande Valley.

Land use in this area of the Lower Rio Grande ranges from semi-arid open scrub lands below the Falcon Reservoir to agricultural lands and then wetlands and other protected areas. Urban areas also represent a large proportion of the land in this basin. Alluvial soils along the upper reaches of this basin are ideal for irrigated crops, and the region is a major producer of vegetables, sorghum, and cotton. Traveling further downstream in the basin, the land becomes marsh and wetland and has been left primarily undeveloped. However, these wetland areas are widely used for recreation, including fishing. The Lower Rio Grande also contains several wildlife refuges, including the Santa Ana National Wildlife Refuge between McAllen and Brownsville, and the Laguna Atascosa National Wildlife Refuge north of the Rio Grande delta on the Gulf of Mexico.

Major cities in the Lower Rio Grande Basin include Mier, Ciudad Miguel Aleman, Ciudad Camargo, Gustavo Diaz Ordaz, Reynosa, and Matamoros in Tamaulipas. In Texas, the primary population centers are Roma, Rio Grande City, McAllen, Harlingen, and Brownsville. The total 2000 population of these cities is estimated to be in excess of 1,500,000.

A.5.2 Hydrology of the Lower Rio Grande Basin

Water supplies in the Lower Rio Grande are very limited, and increasing demands for water from both sides of the border put a heavy burden on the river, as well as on the water managers that must both protect and utilize the river's resources. Use of groundwater to meet usage demands will also likely increase, making it imperative that water quality in the Rio Grande, its tributaries, estuaries, bays, resacas, and also groundwater aquifers below the Gulf of Mexico basin be protected.

In the upper part of the basin, just below the Falcon Reservoir in northwestern Starr County, the Lower Rio Grande is confined to a narrow course and the flood plain is less than a mile (1.6 km) wide. However, as the river flows southeast, it widens, with the flood plain reaching a width of 6 miles (10 km) in the middle reaches in Hidalgo County. Near its mouth on the Gulf of Mexico, the river enters a broad delta characterized by wetlands, salt marshes, and open waters and lakes.

Other major rivers in this basin are the Rio Alamo and the Rio San Juan, which discharge into the Rio Grande/Rio Bravo near Mier and near Ciudad Camargo, respectively. One of the major tributaries to the Rio Grande is the Arroyo Colorado, which is the major drainage way in the lower Rio Grande Valley and it is separated into two segments, the above tidal reach and the tidal reach. Originally this was a tributary to the Rio Grande/Rio Bravo, but it was dredged in the lower reach and channels built in several places. The flow in the above tidal section is mainly for irrigation return flows and domestic waste effluent. The creek drains into the Laguna Madre and becomes the estuary for the Rio Grande.

The Rio Grande discharges directly into the Gulf of Mexico, except during high flows, when much of the water is diverted into flood channels throughout the Reynosa/Matamoros corridor and then directly into the Laguna Madre. This canal system serves a dual purpose;

besides providing flood control, the canal system also distributes water throughout the region. These canals play a major role in the hydrology and water balance of the Lower Rio Grande and the Gulf of Mexico basin.

Flow in the Lower Rio Grande through the Gulf of Mexico basin is controlled through releases from the International Falcon Reservoir. Throughout the basin on both sides of the border, other water structures, such as reservoirs and dams, control and store flow to meet the region's water needs. In addition to their functions as storage facilities, these structures are used for flood control, irrigation, water supply, and power generation. As noted above, these water diversion structures play a major role in the hydrography of the region. Below the Falcon Reservoir, various diversions remove approximately 994,000 acre-feet (1.2 billion m^3) of water annually from the Rio Grande on the U.S. side of the border, while approximately 987,000 acre-feet (1.2 billion m^3) of water are diverted annually to the Anzalduas Canal in Mexico. Even with the approximately 500,000 acre-feet (620 million m^3) of inflow from the Rio Alamo, Rio San Juan, and irrigation return flows from the Mexican side of the border, this still leaves a deficit of 1.5 million acre-feet (1.9 billion m^3) of water in the Lower Rio Grande.

Mexico's Rio Conchos and Rio San Juan have been the primary sources of water for this section of the Lower Rio Grande for several decades. Flow in these rivers is being rapidly diminished by increasing demands in their upper watersheds. The Rio Conchos supplies many cities in northwestern Mexico, while Monterrey (Mexico's second largest city) is drawing much of the Rio San Juan's water. (Buckler et al., 1997)

Within the basin, the rapidly growing cities of Reynosa, McAllen, Brownsville, and Matamoros are placing increasing demands on the Rio Grande for freshwater. Groundwater is usually not a suitable alternative water source for these urban areas due to high salinity, and elsewhere in the basin there is concern that increased future water demands could exacerbate the problem due to saltwater encroachment into the aquifer. Within the basin, a high percentage of the surface water supply is currently allocated to agriculture, and increased municipal and industrial demands are raising concerns as to whether sufficient water supplies will be available during dry periods. (Buckler et al., 1997)

Surface flow in the Rio Grande below Falcon Reservoir is highly controlled. Falcon Reservoir, which is the most downstream of the major international storage reservoirs, was authorized for construction by the U.S.-Mexico Water Treaty of 1944. The reservoir has a storage capacity of about 2.7 million acre-feet (3.3 billion m^3) and a maximum storage capacity of about 4 million acre-feet (4.9 billion m^3). Much of the water released from the reservoir is diverted during April, May, and June to satisfy irrigation needs. Average diversions during January through June exceed the total annual flow in the Rio Grande at Brownsville. (Buckler et al., 1997)

Water for use in the United States is diverted along the river by local irrigation districts and stored in holding ponds. Most of the water for use in Mexico is diverted at Anzalduas Dam. The most downstream tributary to the river is located 10 miles (16 km) west of Mission, Texas. A low ridge extends from the southern edge of the upland plain near Mission in Hidalgo County preventing runoff in the area north of the ridge from flowing to the river. Much of the eastern part of the valley is drained by small coastal streams, the Arroyo Colorado, resacas, and drainage

ditches that flow into the Laguna Madre. Two floodways, constructed by IBWC to receive excess floodwater, dissect the valley. A small portion (less than 10 percent) of the water withdrawn for irrigation is returned to the Rio Grande. (Buckler et al., 1997)

The Arroyo Colorado carries much of the natural drainage and irrigation return flows to the Laguna Madre just north of the Laguna Atascosa. Much of the drainage from the northeastern parts of the study area is carried to the Laguna Madre by the Raymondville Drain. As a result of these diversions, the Rio Grande itself delivers only a portion of the water in the basin to the Gulf of Mexico. (Buckler et al., 1997)

The principal flow to the Laguna Atascosa National Wildlife Refuge is through the Cayo Atascoso. The Cayo Atascoso flows into Laguna Atascosa, which is the largest lake on the refuge. The Cayo Atascoso continues past the northern side of the refuge and ultimately discharges into the Arroyo Colorado. Although the Cayo Atascoso continues past Laguna Atascosa, sediment has been deposited near the outlet of the laguna to such an extent that it can no longer be completely drained. The refuge also receives agricultural drainwater through the Resaca de los Cuates. (Buckler et al., 1997)

Groundwater in the area is obtained from the Gulf Coast aquifer system of Texas and is produced in small volumes from Eocene-age strata and the Miocene-age Oakville Sandstone. Moderate to large volumes come from the Evangeline and Chicot aquifers (part of the Gulf Coast aquifer system) in Cameron, Hidalgo, and Willacy Counties. These aquifers are hydraulically connected and function as a unit. (Buckler et al., 1997)

Water levels in the area have declined dramatically since the 1950s due to irrigation pumpage and severe drought. In 1985, the total pumpage of groundwater in the Lower Rio Grande Valley was 17,268 acre-feet (21.3 million m^3). Total surface water use was 824,250 acre-feet (1.0 billion m^3). Surface water has been, and will continue to be, the most important source of water supply for the basin. (Buckler et al., 1997)

The four southernmost counties of Texas have one of the highest diversities of plants and animals in the continental United States, which sustains ecotourism in south Texas and northeastern Mexico. Seven of the eleven biotic communities in these counties are riparian or partially riparian. Additionally, the extreme lower section of the river supports a very diverse estuarine community and serves as a valuable nursery area for sport and commercial species of shrimp, crabs, and fish. (Buckler et al., 1997)

The Santa Ana, Lower Rio Grande Valley, and Laguna Atascosa National Wildlife Refuge in this basin provide habitat to a wide variety of species and serve as important wintering and production habitat for migratory waterfowl and neotropical birds. (Buckler et al., 1997)

The natural resources under protection in the Lower Rio Grande Valley are closely associated with both the coastal estuary systems and the flows of the Rio Grande and its associated floodplain wetland systems. Maintenance of many of these wetland resources, in particular the resacas, requires a natural cycling of flood events, which no longer regularly occurs in the system due to water management practices. (Buckler et al., 1997)

Increased municipal and agricultural demands for water have significantly decreased the quantity of water available for refuge wetlands. Additionally, agricultural systems and water control structures now intercept overland flow that historically inundated much of the river floodplain. Annual average flow in the lower part of the Rio Grande has been reduced by 30 to 50 percent by water diversions, and over the past decades, several fish species have disappeared from the river. Additionally, river-dependent natural stands of plants, such as the Sabal Palm and the Montezuma Bald Cypress, have been reduced to remnant numbers. (Buckler et al., 1997)

A.6 References

Blackstun, D., L. Woosley, and M. Flora. 1996. *Water Resources Issues in the Rio Grande-Rio Conchos to Amistad Reservoir Subarea.* U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 3.

Buckler, D., D. Papoulias, G. Ozuna, D. Woodward, M. Flora, and L. Ditto. 1997. *Water Resources Issues in the Lower Rio Grande Valley – Below Falcon Reservoir to the Gulf of Mexico Subarea*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 4.

Papoulias, D., D. Woodward, M. Flora, and D. Buckler, D. 1997. *Water Resources Issues in the Mexican Highlands Sub-area*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 2.

U.S. EPA (Environmental Protection Agency). 2000. *U.S.-Mexico Border Surface Water Quality and Public Health Assessment Report.* Prepared by Parsons Engineering Science, Inc., for the Office of Water. January.

Woodward, D.G., and R.A. Durall. 1996. *United States-Mexico Border Area, As Delineated By a Shared-Water Resources Perspective*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 1.

Appendix B

U.S.-Mexico Border Waters Repository Data Dictionary

B.1 Introduction

This Appendix provides the data dictionary for the U.S-Mexico Waters Repository, which describes each table in the database. Each table consists of a number of fields or columns. Field information includes field name, type, size, whether the field value is required, and a field description. Each table has a primary key, indicated with a "PK" next to the field. The primary key is the column or columns that uniquely identify a row in a table.

B.2 Design Objectives

RTI's design team sought to satisfy the following objectives in designing the repository:

- Provide a database structure that is compatible with existing systems (most importantly STORET) but simple enough to facilitate data entry and maintenance.
- Include data elements that comply with EPA's data-standardization efforts.
- Include data elements that add value to the water quality information in the context of this project. These data elements must provide additional information that is not contained in existing systems such as STORET. Examples of these data elements are ecoregions and transboundary regions.

To meet these objectives, RTI based the Repository design primarily on EPA's STORET data dictionary and business rules. STORET is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA, and other U.S. federal agencies, as well as by universities, private citizens, and many others. RTI simplified STORET's design and incorporated the most important data elements into the U.S.-Mexico Border Waters Repository design (U.S. EPA, 2005).

Figure B-1 shows a high-level representation of the U.S.-Mexico Border Waters Repository. The boxes reflect major categories of data that characterize the data collection process. As part of the data collection process, organizations carry out station visits to sampling stations. At the sampling stations, they conduct monitoring activities that then generate results (U.S. EPA, 2003). The repository contains a variety of data tables for each element in this process.

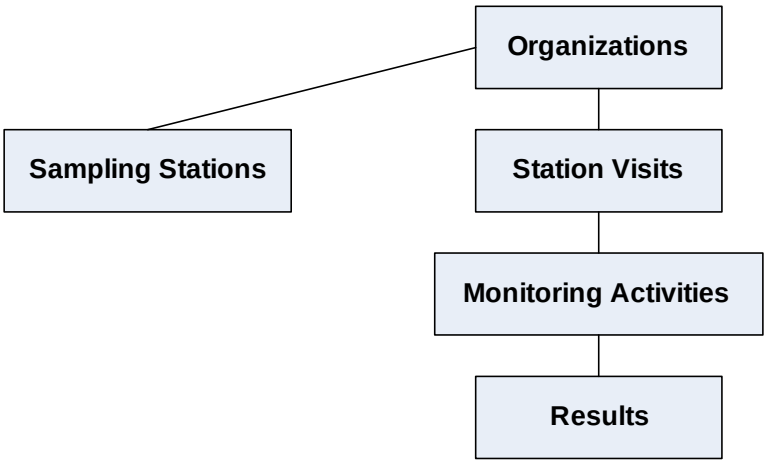

Figure B-1. High-level components of the U.S.-Mexico Border Waters Repository.

Similarly to STORET—as stated in STORET's business rules (U.S. EPA, 2003)—the U.S.-Mexico Border Waters Repository may contain many organizations. Each organization is at the top of its own data and information pyramid, which includes not only its own description, but also the descriptions of its stations, visits, monitoring activities, and associated results.

B.2.1 Environmental Sampling, Analysis, and Results Standard

The U.S.-Mexico Border Waters Repository design incorporated many of the standards described in EPA's Environmental Sampling, Analysis, and Results (ESAR) protocol. The ESAR standard is still under development and is applicable to cataloging and exchanging information about projects, sampling stations/locations, sample collection activities, analyses, and results. This standard defines the data elements that describe projects, sampling stations/locations, sample collection activities, analytical processes and results, and any ancillary information needed to accompany environmental data (U.S. EPA, 2004).

Examples of data elements from ESAR are as follows:

- **Organization Description**—organization identifier, name, description, etc.
- **Organization Electronic Address**—electronic address text and type
- **Organization Physical Address**—address type, location address, state, country, etc.
- **Monitoring Location Identity**—identifier, name, type, description, etc.
- **Monitoring Activity**—identifier, type, media, media subdivision, end date, end time, depth/altitude measure, etc.
- **Sample**—collection method, collection equipment, holding container material, holding container color, preservation thermal code, etc.

- **Result**—detection condition, characteristic name, sample fraction, value measure, units, statistical base, value type, weight basis, time basis, temperature basis, particle size, comments, etc.

B.2.2 Latitude/Longitude Standard

The U.S.-Mexico Border Waters Repository design incorporated many of the data elements listed in EPA's final version of the Latitude/Longitude standard. Latitude and longitude information is provided for the monitoring stations. The Latitude/Longitude standard represents a clarification and update of the EPA locational data policy originally outlined in the Method Accuracy Description (MAD) documentation. The MAD codes were developed by the Locational Data Policy (LDP) Sub-Work Group to meet EPA's needs to standardize the coding of geographic coordinates and associated attributes for method, accuracy, and description codes for all environmental measurements (U.S. EPA, 2004).

Data elements included in the repository are as follows:

- Latitude measure
- Longitude measure
- Source map scale number
- Horizontal accuracy measure
- Horizontal collection method
- Horizontal reference datum.

B.3 Data Dictionary

B.3.1 Table: T_ORGANIZATION

Description: An organization is a state, federal, local, academic, commercial, or other group united for a particular purpose. An organization may establish sampling stations where readings for a characteristic are taken.

Field Name	Type	Size	Required	Description
T_ORGANIZATION_ID (PK)	Long Integer	4	Yes	A system-generated value used to uniquely identify an occurrence of this table.
ORGANIZATION_TYPE	Text	30		Text that describes the type of organization.
ORGANIZATION_NAME	Text	60	Yes	The formal full length of the Organization.
SHORT_NAME	Text	20		The short name or abbreviation for the organization.

(continued)

Field Name	Type	Size	Required	Description
DESCRIPTION_TEXT	Text	254		The text describing details of the organization that users may wish to provide. For example, this field may be used to describe the purpose, mission, or goals of the Organization.
CONTACT_NAME	Text	30		The name of the person who is the contact for this Organization
CONTACT_ADDRESS_TYPE	Text	8		Address Type: 'Location', 'Mailing', or 'Shipping'.
CONTACT_ADDRESS	Text	50		The contact mail address of the Organization
CONTACT_PHONE	Text	50		The telephone number for the contact person on this Organization
CONTACT_LOCALITY_NAME	Text	30		The name of a city, town, village or other locality where the contact person is located.
TL_STATE_ID	Text	8		The foreign key to TL_STATE implements: "A state can have many organizations."
TL_TRIBAL_GROUP_ID	Text	3		The foreign key to TL_TRIBAL_GROUP implements: "The organization may be a tribal group."
ELECTRONIC_ADDRESS	Text	120		A resource address, usually consisting of the access protocol, the domain name, and optionally, the path to a file or location.
ELECTRONIC_ADDRESS_TYPE	Text	8		The name that describes the electronic address type.
LAST_UPDATE	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: "This table can be modified by many Users."

B.3.2 Table: T_STATION

Description: Information about the monitoring site where data were collected. In this version, each station can only have one latitude/longitude point.

Field Name	Type	Size	Required	Description
T_STATION_ID (PK)	Text	30	Yes	A system-generated value used to uniquely identify an occurrence of this table.
T_ORGANIZATION_ID	Long Integer	4	Yes	The foreign key to T_ORGANIZATION implements: "One Organization may have many Stations."
TL_COUNTRY_ID	Text	2	Yes	The foreign key to TL_COUNTRY implements "One Country may have many Stations."
TL_STATE_ID	Text	8	Yes	The foreign key to TL_STATE implements "One State may have many Stations."
TL_USCOUNTY_ID	Long Integer	4		The foreign key to TL_USCOUNTY implements "One County in the United States may have many Stations."
TL_USGS_CU_ID	Text	8		The foreign key to TL_USGS_CU implements "One US Cataloging Unit in the United States may have many Stations."
TL_MEX_BASIN_ID	Integer	2		The foreign key to TL_MEX_BASIN implements "One Mexican basin may have many Stations."
TL_BINATIONAL_REGION_ID	Long Integer	4		The foreign key to TL_BINATIONAL_REGION_ID implements "One trans-boundary watershed may have many Stations."
TL_LEVEL_II_ECOREGION_ID	Text	4		The foreign key to TL_LEVEL_II_REGION implements "One Level II Region in North America may have many Stations."
IDENTIFICATION_CODE	Text	15		The alpha-numeric code assigned by the owning Organization which uniquely identifies the Station within the Organization.
STATION_NAME	Text	60		The name by which an Organization refers to a Station.
STATION_TYPE	Text	20		The word describing the station type. Permitted values are stored in table TL_PERMITTED_VALUE.
ESTABLISHMENT_DATE	Date	8		The date the Station was established.
DESCRIPTION_TEXT	Memo	0		The Organization user-defined description of a Station. May include distance to left shore or right shore to the Station.
STATION_BINARY_OBJECT	Long Binary	0		The actual binary object representing the station.

(continued)

Field Name	Type	Size	Required	Description
STATION_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
STATION_OBJECT_FILETYPE	Text	6		File type associated with the attached file.
LAST_UPDATE	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: "This table can be modified by many Users."

B.3.3 Table: T_ABSLOCATION

Description: The latitude and longitude of points associated with a station where a sample is taken.

Field Name	Type	Size	Required	Description
T_STATION_ID (PK)	Text	30	Yes	The foreign key to T_STATION implements "One Station have only one Absolute Location Points."
LAT_DIRECTION	Text	1	Yes	The direction of the latitude measurement. "N" denotes a positive value of the latitude. "S" denotes a negative value of the latitude.
LAT_DEC_DEG_MSR	Double	8	Yes	The measure of latitude in decimal degrees (-90.0000 to 90.0000) indicating angular distance North or South of the Equator.
LONG_DIRECTION	Text	1	Yes	The direction of the longitude measurement. "E" denotes a positive value of the latitude." W" denotes a negative value of the latitude.
LONG_DEC_DEG_MSR	Double	8	Yes	The measure of longitude in decimal degrees (-180.0000 to 180.0000) indicating angular distance East or West of the prime meridian.
SOURCEMAP_SCALE_NUMBER	Long Integer	4		The number that represents the proportional distance on the ground for one unit of measure on the map or photo.
DIST_TO_US_MEX_BORDER	Double	8		Shortest distance from station to US-Mexico border in meters.
HORZTL_ACCURACY_MSR	Double	8		The measure of the accuracy (in meters) of the latitude and longitude coordinates.
HORZTL_COLLECT_METHOD	Text	60		The text that describes the method used to determine the latitude and longitude coordinates for a point on the Earth. Permitted values are stored in table TL_PERMITTED_VALUE.
HORZTL_REF_DATUM	Text	60		The name that describes the reference datum used in determining latitude and longitude coordinates. Permitted values are stored in table TL_PERMITTED_VALUE.

(continued)

Field Name	Type	Size	Required	Description
LOCATION_BINARY_OBJECT	Long Binary	0		The actual binary object representing the absolute location.
LOCATION_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
LOCATION_OBJECT_FILETYPE	Text	6		File type associated with the attached file.
LAST_UPDATED	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: "This table can be modified by many Users."

B.3.4 Table: T_STATION_VISIT

Description: This table represents a period of time spent at a station during which measurements, observations, and/or sampling activities may take place.

Field Name	Type	Size	Required	Description
T_STATION_VISIT_ID (PK)	Text	50	Yes	T_Station_ID&VisitID number
T_STATION_ID	Text	50	Yes	The foreign key to T_STATION implements: "One Station may receive many Station Visits."
ARRIVAL_DATE	Date	8	Yes	Date that the Station Visit commenced.
ARRIVAL_TIME	Date	8		Time at which the Station Visit commenced.
ARRIVAL_TIME_ZONE	Text	50		Time zone in which the visit arrival time is reported. Permitted values are stored in table TL_PERMITTED_VALUE.
DEPARTURE_DATE	Date	8		Date that the Station Visit is concluded.
DEPARTURE_TIME	Date	8		Time at which the Station Visit ended.
DEPARTURE_TIME_ZONE	Text	50		Time zone in which the visit Departure time is reported. Permitted values are stored in table TL_PERMITTED_VALUE.
COMMENT_TEXT	Memo	0		Free text attribute where field notes may be recorded.
LAST_UPDATE	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: "This table can be modified by many Users."

B.3.5 Table: T_SAMPLE

Description: Samples are quantities of material (e.g., water, sediment, biota) presumed to be representative of the environment. May be collected in the field or created from other samples for the purpose of analyses to identify constituents or pollutants.

Field Name	Type	Size	Required	Description
T_SAMPLE_ID (PK)	Text	60	Yes	T_station_ID&T_STATION_VISIT_ID&T_SAMPLE_ID
T_STATION_VISIT_ID	Text	50	Yes	The foreign key to T_STATION_VISIT implements: "Many Samples may be taken during one Station Visit."
LAB_NAME	Text	60		The name of the laboratory where the sample is analyzed.
SAMPLING_LAB_COMMENT	Text	150		Free text for any comments from the lab on this Sample.
SAMPLING_METHOD	Text	60		The sampling method used when collecting this Sample. Permitted values are stored in table TL_PERMITTED_VALUE.
SAMPLING_METHOD_COMMENT	Text	150		Free text for adding comments on the sampling method.
SAMPLING_CONDITION	Text	30		Weather condition when Sample was taking. Permitted values are stored in table TL_PERMITTED_VALUE.
SAMPLE_COLLECTION_EQUIPMENT	Text	40		The equipment used in collecting the sample. Permitted values are stored in table TL_PERMITTED_VALUE.
SAMPLE_HOLDING_CONTAINER_MATERIAL	Text	35		The material from which the sample container is made. Permitted values are stored in table TL_PERMITTED_VALUE.
SAMPLE_HOLDING_CONTAINER_COLOR	Text	15		The color of the sample container. Permitted values are stored in table TL_PERMITTED_VALUE.
MEDIUM_TYPE_NAME	Text	20		The name of the medium or matrix where the activity occurred during the Station Visit. Examples: Air, Sediment, Water. Permitted values are stored in table TL_PERMITTED_VALUE.

(continued)

Field Name	Type	Size	Required	Description
MEDIUM_SUB_DIVISION	Text	20		Name or code indicating the environmental matrix as a subdivision of the sample media. Permitted values are stored in table TL_PERMITTED_VALUE.
RELTV_DEPTH_NAME	Text	15		The name that indicates the approximate location within the water column at which the activity occurred. Permitted values are stored in table TL_PERMITTED_VALUE.
DEPTH_REF_POINT	Text	30		The text that describes the reference point from which the depth is measured, typically "Surface." Permitted values are stored in table TL_PERMITTED_VALUE.
DEPTH_TO_ACTIVITY	Double	8		Distance in meters from the reference point to the point in the water column at which the activity is conducted.
TEMP_PRESERV_TYPE	Text	25		A default for the name of the type of temperature based physical preservation. Permitted values are stored in table TL_PERMITTED_VALUE.
SAMPLE_OBJECT	Long Binary	0		The binary object with information about the sample.
SAMPLE_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
SAMPLE_OBJECT_FILETYPE	Text	6		File type associated with the attached file.
LAST_UPDATE	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: "This table can be modified by many Users."

B.3.6 Table: T_RESULT

Description: Information about an environmental characteristic determined as a result of either field measurements, observations or analytical procedures performed on samples. This will be the largest table in the database.

Field Name	Type	Size	Required	Description
T_RESULT_ID (PK)	Text	70	Yes	Source&ID number
T_CHARACTERISTIC_ID	Long Integer	4	Yes	The foreign key to T_CHARACTERISTIC implements "One Characteristic may be the thing measured or reported for many Results."
T_DATA_SOURCE_ID	Long Integer	4	Yes	The foreign key to T_DATA_SOURCE implements "One Data Source may be the source of many Results.
T_SAMPLE_ID	Text	60	Yes	The foreign key to T_SAMPLE implements "One Sample may produce many Results.
T_ANALYTICAL_METHOD_ID	Text	50		The foreign key to T_ANALYTICAL_METHOD implements: "An Analytical Method may have been used to obtain many Results."
VALUE_TEXT	Text	30	Yes	The alpha-numeric representation of the result of analyzing, measuring, or observing a Characteristic.
VALUE_MEASURE	Double	8	Yes	The numeric representation of the result of analyzing a Characteristic with an analytical procedure.
T_UNIT_MEASURE_ID	Long Integer	4	Yes	The foreign key to T_UNIT_MEASURE implements "One Unit of Measure may be the unit of measure for many Results.
DESCRIPTION_TEXT	Memo	0		Long free text associated with a Result in this database.
DETECTION_CONDITION	Text	40		The textual descriptor of a result. Permitted values are stored in table TL_PERMITTED_VALUE.
DETECTION_QUANT_LEVEL_TYPE	Text	35		Text describing the type of detection or quantitation level used in the analysis of a characteristic. Permitted values are stored in table TL_PERMITTED_VALUE.
WEIGHT_BASIS_TYPE	Text	15		The name that represents the form of the sample or portion of the sample which is associated with the result value (e.g., wet weight, dry weight, ash-free dry weight).

(continued)

Field Name	Type	Size	Required	Description
TEMPERATURE_BASIS_TYPE	Text	12		The name that represents the controlled temperature at which the sample was maintained during analysis, e.g. 25 deg BOD analysis.
PARTICLE_SIZE_BASIS_TYPE	Text	15		User defined free text describing the particle size class for which the associated result is defined.
DUR_BASIS_TYPE	Integer	2		The period of time (in days) over which a measurement was made. For example, BOD can be measured as 5 day or 20 day BOD.
SAMPLE_FRAC_TYPE	Text	15		The text name of the portion of the sample associated with results obtained from a physically partitioned sample. Examples: dissolved, suspended, total. Permitted values are stored in table TL_PERMITTED_VALUE.
STATISTIC_TYPE	Text	20		A statistic or calculation type which described the reported result (e.g. average, mode). Permitted values are stored in table TL_PERMITTED_VALUE.
VALUE_TYPE_NAME	Text	10		A name that represents the process which was used in the determination of the result value (e.g., actual, estimated, calculated). Permitted values are stored in table TL_PERMITTED_VALUE.
ANALYSIS_DATE	Date	8		The date on which laboratory analysis of the sample for this particular result was performed.
RESULT_OBJECT	Long Binary	0		The binary object with information about the methodology used to extract data from this source.
RESULT_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
RESULT_OBJECT_FILETYPE	Text	6		File type associated with the attached file.
LAST_UPDATE	Date	8	Yes	System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8	Yes	The foreign key to TL_USER implements: “This table can be modified by many Users.”

B.3.7 Table: T_ANALYTICAL_METHOD

Description: Allows for the optional association of an analytical method employed either in the lab or in the field with any result.

Field Name	Type	Size	Required	Description
T_ANALYTICAL_METHOD_ID (PK)	Text	50	Yes	ID Code, unique within Context, which identifies the formally documented method used to obtain the result. Methods may have been used either in the Field or in the Lab. These are methods or procedures which yield results.
ANALYTICAL_METHOD_ORGANIZATION	Text	120		Name of the organization which published the method used to obtain the result. Methods may have been used either in the Field or in the Lab.
ANALYTICAL_METHOD_NAME	Text	150		Free text name of the method used to obtain the result. Methods may have been used either in the Field or in the Lab.
ANALYTICAL_METHOD_OBJECT	Long Binary	0		The binary object with information about the analytical method used to obtain the result.
ANALYTICAL_METHOD_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
ANALYTICAL_METHOD_OBJECT_FILETYPE	Text	6		File type associated with the attached file.

B.3.8 Table: T_DATA_SOURCE

Description: This table holds information about the source (non-primary sources) where data come from. Sources could be existing databases such as STORET, the (U.S.) National Water Information System (NWIS), or the (Mexico) Comisión Nacional del Agua (CNA) data repositories.

Field Name	Type	Size	Required	Description
DATA_SOURCE_ID (PK)	Long Integer	4		A system-generated value used to uniquely identify an ocurrence of this table.
SOURCE_NAME	Text	50		The name and type of the source for data. Example: STORET, NWIS, etc. Source types are: database, organization, etc. Permitted values are stored in table TL_PERMITTED_VALUE.

(continued)

Field Name	Type	Size	Required	Description
EXTRACT_DATE	Date	8		Date when data was extracted from secondary source.
EXTRACT_USER_ID	Text	8		A code that identifies the specific person extracting the data. A foreign key to TL_USER implements: "Data from an existing source can be extracted by many Users"
LAST_UPDATED	Date	8		System generated value that represents the calendar date and time on which this information was posted to the database or when a subsequent modification was made.
TL_USER_ID	Text	8		A foreign key to TL_USER implements: "This table can be modified by many Users." The person who extracts the data from an existing database does not necessarily enter the data in this database.
EXTRACT_METHODOLOGY	Long Binary	0		The binary object with information about the methodology used to extract data from this source. It could be stored in text or PDF format.
EXTRACT_METHOD_OBJECT_FILENAME	Text	255		Name of the attached binary object (file), including file extension.
EXTRACT_METHOD_OBJECT_FILETYPE	Text	6		File type associated with the attached file.

B.3.9 Table: TL_CHARACTERISTIC

Description: A lookup table imported from STORET. Characteristic is the name of the "thing" being investigated. For example, in an analysis for phosphorus, the name of the characteristic is phosphorus.

Field Name	Type	Size	Required	Description
T_CHARACTERISTIC_ID (PK)	Long Integer	4	Yes	A system-generated value used to uniquely identify an ocurrence of this table.
TL_GEN_CHAR_ID	Long Integer	4	Yes	The foreign key to TL_GENERIC_CHARACTERISTIC implements: "One Generic Characteristic may group together many Characteristics."
ORIGINAL_CHAR_ID	Text	20	Yes	Original characteristic ID from the originating database.
ORIGINAL_SOURCE	Text	20	Yes	Original database name where characteristic name is taken from.

(continued)

Field Name	Type	Size	Required	Description
UNIT_TYPE	Text	5	Yes	The category that represents the braod class of a related set of units. Examples: Volume, Concentration, Mass, Area, Velocity, Flow.
SEARCH_NAME	Text	110	Yes	The standardized form of the name as determined by EPA for use in searching the list of environmental characteristics. All caps for consistent search reports.
DISPLAY_NAME	Text	110	Yes	The name of the environmental characteristic as it is to be displayed on windows and reports.
D_SCR_TYPE_CD	Text	4		The code that represents the type of data to be displayed. See STORET data dictionary for Domain/Permitted Values.
PROC_REQ_IND_CD	Text	1		A code indicating whether an analytical procedure is required for a result for this Characteristic.
VALID_FOR_QC_IND	Text	1		A code indicating whether this Characteristic is a valid report for QC samples.
SAMP_FRAC_REQ_CD	Text	1		A code indicating whether a sample fraction is required for this Characteristic. This will be used primarily for Chemical Characteristics.

B.3.10 Table: TL_GENERIC_CHARACTERISTIC

Description: A lookup table with the generic characteristics to group the characteristics in TL_characteristics.

Field Name	Type	Size	Required	Description
TL_GEN_CHAR_ID (PK)	Long Integer	4	Yes	Automatic generated identification code for each Generic Characteristic.
GEN_CHAR_NAME	Text	50	Yes	Name of the generic characteristic grouping more than one Characteristic of similar nature.
GEN_CHAR_DESC	Text	70	Yes	Description of the Generic Characteristic

B.3.11 Table: TL_BINATIONAL_REGION

Description: The 8 transboundary watersheds as defined by the Department of the Interior's U.S.-Mexico Field Coordinating Committee in 1996. Surface-water drainage basins were used as the primary basis for defining and delineating the extent of the border area.

Field Name	Type	Size	Required	Description
TL_BINATIONAL_REGION_ID (PK)	Long Integer	4	Yes	Identification code for the binational subareas
BINATIONAL_REGION_NAME	Text	70	Yes	Binational subareas that have similar hydrologic and physiographic features and defined by the United States Department of the Interior U.S.-Mexico Border Field Coordinating Committee.
BINATIONAL_REGION_DESC	Text	100	Yes	Description of the binational subarea

B.3.12 Table: TL_COUNTRY

Description: A lookup table with list of country names and the ISO 3166-1-alpha-2 code elements.

Field Name	Type	Size	Required	Description
TL_COUNTRY_ID (PK)	Text	2	Yes	ISO 3166-1-alpha-2 code elements given in ISO 3166-1.
COUNTRY_NAME	Text	50	Yes	Country name in English

B.3.13 Table: TL_LEVEL_II_ECOREGION

Description: The 52 level II ecological regions provide a more detailed description of the large ecological areas nested within the level I regions. These are useful for national and subcontinental overviews of physiography, wildlife, and land use.

Field Name	Type	Size	Required	Description
TL_LEVEL_II_ECOREGION_ID (PK)	Text	4	Yes	The North American Commission for Environmental Cooperation classification code of ecological regions.
ECOREGION_NAME_ENG	Text	60	Yes	Ecological region in English
ECOREGION_NAME_SP	Text	60	Yes	Ecological region in Spanish

B.3.14 Table: TL_MEX_BASIN

Description: A lookup table with information on the Mexican Hydrologic Units.

Field Name	Type	Size	Required	Description
TL_MEX_BASIN_ID (PK)	Integer	2	Yes	Unique identifier for a Mexican Hydrologic Unit
BASIN_NAME	Text	50	Yes	Text for basin name.

B.3.15 Table: TL_PERMITTED_VALUE

Description: A lookup table with permitted values for specific fields in some tables of this database. The TABLE_NAME and COLUMN_NAME fields of this table are used to cross reference the field to which given permitted values will apply.

Field Name	Type	Size	Required	Description
TL_PERMITTED_VALUE_ID (PK)	Long Integer	4	Yes	A system-generated value used to uniquely identify an occurrence of this table.
TABLE_NAME	Text	30	Yes	Table name where permitted value is required.
COLUMN_NAME	Text	30	Yes	Column name where permitted value is required.
SEQUENCE_NUMBER	Integer	2	Yes	A sequence number used for ordering the display of a list of permitted values for a specific table and field as referenced.
PERMITTED_VALUE	Text	255	Yes	The text that describes the permitted value to be entered in a given table for a given field on this database.
VALUE_DESC	Text	255		Text description or definition for the term held in the PERMITTED_VALUE column.

B.3.16 Table: TL_STATE

Description: A lookup table that stores information about states in the United States and Mexico.

Field Name	Type	Size	Required	Description
TL_STATE_ID (PK)	Text	8	Yes	State abbreviation (two-letter abbreviation in the US)
TL_STATE_NAME	Text	30	Yes	US state name
TL_COUNTRY_ID	Text	2	Yes	The foreign key to TL_COUNTRY implements "One Country has many States."
US_REGION	Text	2		US Region where US state is located.
US_STATE_FIPS_CODE	Text	2		Federal Information Processing Standards (FIPS) Code in the US for a state.

B.3.17 Table: TL_TRIBAL _GROUP

Description: A lookup table with tribal group codes that represent the American Indian tribe or Alaskan Native entity.

Field Name	Type	Size	Required	Description
TL_TRIBAL_GROUP_ID (PK)	Text	3	Yes	Unique code to represent the American Indian tribe or the Alaskan native entity.
TRIBAL_GROUP_NAME	Text	255	Yes	Text description for the tribal group.

B.3.18 Table: TL_UNIT_MEASURE

Description: A lookup table imported from STORET. This table defines the domain of valid values for units of measure.

Field Name	Type	Size	Required	Description
TL_UNIT_MEASURE_ID (PK)	Long Integer	4	Yes	A system-generated value used to uniquely identify an occurrence of this table.
UNIT_TYPE	Text	10	Yes	The category that represents the broad class of a related set of units. Examples: Volume, Concentration, Mass, Area, Velocity, Flow.
SHORT_NAME	Text	50	Yes	The abbreviation for the name of the unit of measure.
DESCRIPTION_TEXT	Text	50		The full name of the unit of measure.

B.3.19 Table: TL_US_COUNTY

Description: A lookup table with U.S. county information.

Field Name	Type	Size	Required	Description
TL_USCOUNTY_ID (PK)	Long Integer	4	Yes	A system-generated value used to uniquely identify an occurrence of this table.
TL_STATE_ID	Text	8	Yes	The foreign key to TL_STATE implements "One State in the United States has many Counties."
FIPS_COUNTY_CODE	Text	3	Yes	Federal Information Processing Standards (FIPS) Code in the US for this county.
COUNTY_NAME	Text	70	Yes	County name

B.3.20 Table: TL_USER

Description: A lookup table with user information. Users are allowed to view, enter, and/or modify data depending on the privileges given on this table.

Field Name	Type	Size	Required	Description
TL_USER_ID (PK)	Text	8	Yes	Unique text identifier for a user of this database
USER_NAME	Text	40	Yes	Full name of user of this database
VIEW_DATA	Boolean	1	Yes	User can view data
ENTER_DATA	Boolean	1	Yes	User can insert new data
UPADTE_DATA	Boolean	1	Yes	User can update existing data

B.3.21 Table: TL_USGS_CU

Description: A lookup table with USGS 8-digit HUCs identifying the hydrologic units in the United States. The United States is divided and subdivided into successively smaller hydrologic units: regions, subregions, accounting units, and cataloging units.

Field Name	Type	Size	Required	Description
TL_USGS_CU_ID (PK)	Text	8	Yes	First 2 digits: regional area defined by the U.S. WRC; second 2 digits are subregions defined by IHRC; third 2 digits are NWDN Accounting Units and last 2 digits are cataloging units maintained by OWDC.
DESCRIPTION	Text	255	Yes	Text description for this cataloging unit.
AREA	Double	8		Area in sq. miles for this cataloging unit.
STATES	Text	255		States in the US where cataloging unit is located.

B.3.22 Table: TL_METADATA _TABLE

Description: A lookup table to include all tables that are part of this database and their descriptions. This lookup table will support future graphical user interfaces for this database.

Field Name	Type	Size	Required	Description
TABLE_NAME (PK)	Text	50	Yes	Unique table name of table in this database
TABLE_DESCRIPTION	Memo	0	Yes	Text describing table functionality in this database
IS_LOOKUP	Boolean	1		Whether or not this table is a lookup table
IS_CROSSWALK	Boolean	1		Whether or not this table is a cross-walk table
IS_PARENT	Boolean	1		Whether or not this table is a parent table
HAS_PARENT	Boolean	1		Whether or not this table has a parent table
PARENT_NAME	Text	50		Parent table name if this table has a parent table

B.3.23 Table: TL_METADATA _COLUMN

Description: A lookup table to include all columns from all tables that are part of this database and their descriptions. This lookup table will support future graphical user interfaces for this database.

Field Name	Type	Size	Required	Description
TABLE_NAME (PK)	Text	50	Yes	Unique table name of table in this database
COLUMN_NAME	Text	100	Yes	Column name of column within table in this database
COLUMN_DESCRIPTION	Memo	0	Yes	Text describing column functionality within table in this database
IS_PRIMARY_KEY	Boolean	1		Whether or not this column is part of the primary key of table
IS_UNIQUE_KEY	Boolean	1		Whether or not this column is part of a unique key in table
DISPLAY_ORDER	Integer	2		Order in which column is located within column

B.4 Repository Structure

Figure B-2 shows a more detailed diagram of the U.S.-Mexico Border Waters Repository structure. This is an Entity Relational Diagram that includes only the most important tables.

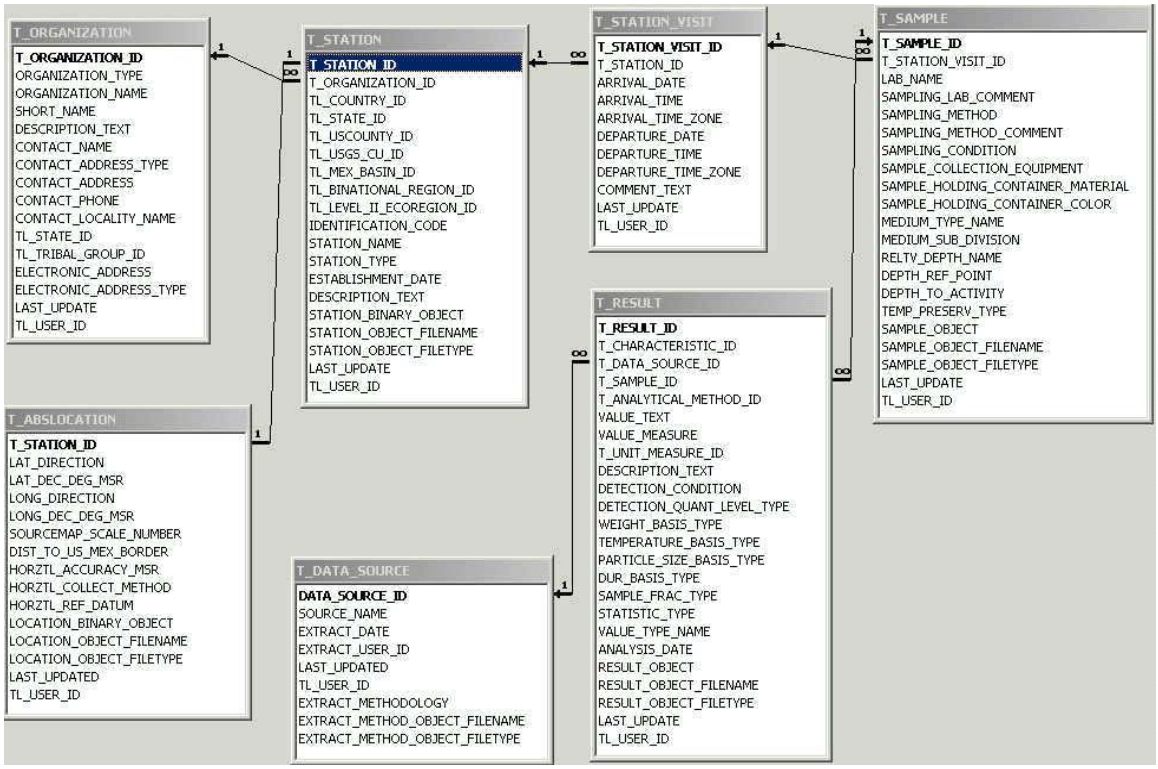

Figure B-2. U.S.-Mexico Border Waters Repository entity relationship diagram.

B.5 References

U.S. EPA (Environmental Protection Agency). 2003. *STORET v2.0 Business Rules*. Office of Wetlands, Oceans and Watersheds.

U.S. EPA (Environmental Protection Agency). 2004. *Environmental Data Registry: Data Standards* (EPA online information. Web site: http://oaspub.epa.gov/edr/epastd$.startup. Accessed October 25, 2005.

U.S. EPA (Environmental Protection Agency). 2005. *STORET System Updates: Factsheets* (EPA online information). Web site: http://www.epa.gov/storet/updates.html#factsheets. Accessed October 25, 2005.

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Appendix C

Water Quality Indicators Included in the U.S.-Mexico Border Waters Repository

This Appendix includes a list of all "generic water quality indicators" included in a lookup table within the U.S.-Mexico Border Waters Repository. Each one of these generic water quality indicators points to a group of water quality indicators found in the original data sources. For some of these generic indicators, this Appendix includes tables with the corresponding original indicators as found in the data sources.

C.1 Data Collection Process

RTI included surface water data on the parameters of interest in the Repository if they met the following criteria:

- Collected in 1992 or later
- Collected from stations located within 100 km of the U.S.-Mexico border
- Included latitude and longitude coordinates.

This section explains the methods used to download data from the most important online data sources. All data were subject to the QA/QC procedures described in Section 3.1.5.

C.1.1 STORET Modernized

STORET is the U.S. Environmental Protection Agency's (EPA's) largest computerized environmental data system. It is a repository for water quality, biological, and physical data collected by federal, state, and local agencies; Native American tribes; volunteer groups; academics; and others. STORET contains data collected beginning in 1999, along with older data that have been properly documented and migrated from the STORET Legacy Data Center. For the area near the U.S.-Mexico border, STORET contains no data from Texas, very little data from New Mexico and California, and a significant amount of data from Arizona.

RTI performed the following steps to download Modernized STORET data:

1. Opened "http://www.epa.gov/STORET/dw_home.html."
2. Under "STORET Regular Results," clicked on "Regular Results by Geographic Location."
3. For California and New Mexico, downloaded data for each state. For Arizona, conducted separate downloads for each county along the border because the data sets were large.

4. Downloaded data from 1992 to 2004 for the selected parameters.

5. Imported the data sets for California and New Mexico into a processing database and filtered them to select only stations that were located in counties along the border.

6. Further refined the stations list by using ArcView to map all the stations that were in counties of interest and that had data for the parameters of concern during the years of concern. Dropped from the data set any station that was not within the 100 km buffer.

C.1.2 Legacy STORET

The STORET Legacy Data Center is the world's largest repository of ambient water quality data. The database holds more than 200 million water sample observations from about 700,000 sampling sites for both surface water and groundwater. However, the data in Legacy STORET are of undocumented quality. Further, the data in this system are static and only include data from 1999 and earlier. All newer data are stored in STORET Modernized.

To collect data from Legacy STORET, RTI performed the following steps:

1. Opened "http://www.epa.gov/storpubl/legacy/gateway.htm."

2. At the bottom of this Web page, clicked on "Download" by STATE, ALL STORET Legacy DATA for each state, via a compressed self-extracting tab-delimited flat file. This option directed RTI to U.S. EPA's FTP (file transfer protocol) site, where there were executable files available for download for all 50 U.S. states.

3. Downloaded executable files for Texas, California, New Mexico, and Arizona.

4. Unzipped executable files to RTI's server. Organized text files by county, with separate files in each county for station information and water quality data.

5. Imported text files for the counties along the border into a processing database.

6. After all the separate text files were appended into a single stations table, filtered out stations that did not contain data for the period of concern (1992 to present).

7. Checked the remaining stations to determine whether they contained data for a number of parameters.

8. Further refined the stations list by using ArcView to map all stations that were in counties of interest and that had data for the parameters of concern during the years of concern. Dropped from the data set any station that was not within the 100 km buffer.

C.1.3 National Water Information System (NWIS)

The United States Geological Survey (USGS) has collected water resources data at approximately 1.5 million sites in the United States, Puerto Rico, and Guam. Water quality data are available for both surface water and groundwater. Flow data are also available but were not

downloaded at this time. NWIS-Web makes available current and historical data. Other programs within USGS, such as the National Water Quality Assessment Program (NAWQA) and the National Stream Quality Accounting Network (NASQAN), make their data available through NWIS-Web. Users can retrieve data by category—such as surface water, groundwater, or water quality—and by geographic area. On subsequent pages, users can further refine their searches by selecting specific information and defining the output desired.

RTI's procedure for acquiring NWIS data was as follows:

9. Opened the NWIS Web site "http://waterdata.usgs.gov/nwis."

10. Clicked on "Water Quality," and then clicked on "Samples."

11. For the site-selection criteria, checked the "Latitude-Longitude" box.

12. Used the following coordinates to create a latitude-longitude box for the area of interest: North latitude = 33.8; East longitude = -96.0; South latitude = 24.7; West longitude = -118.3.

13. Entered the years of interest, 1992 to 2004.

14. Because the data set created was too large to download, downloaded smaller data sets separately by adding the border state into the query criteria.

15. Imported downloadable tab-delimited text files created by NWIS-Web into a processing database.

16. Removed stations that are not in the U.S. counties that fall within the 100 km buffer.

17. Included stations that had data for selected parameters.

18. Further refined the stations list by using ArcView to map the all the stations that were in counties of interest and that had data for the parameters of concern during the years of concern. Dropped from the data set any station that was not within the 100 km buffer.

C.1.4 Texas Commission on Environmental Quality

The Texas Council on Environmental Quality (TCEQ) contracts out its monitoring requirements from the Clean Water Act to various smaller organizations, such as the International Boundary and Water Commission (IBWC). As part of these contract requirements, IBWC must make its data available to the public, and it does so by posting Excel files on the Clean Rivers Program Web site. The IBWC also must submit its data to TCEQ, which must make the data publicly available on its Web site. Therefore, the TCEQ and IBWC Clean Rivers Program should have overlapping data, with the TCEQ Web site containing more data, because it includes organizations other than the IBWC, such as USGS. Therefore, a download of TCEQ data retrieves all the data for the IBWC Clean Rivers Program in addition to the TCEQ data.

The IBWC-originated results are differentiated by having "IBWC" in the T_SAMPLE.LAB_NAME field in this database.

RTI downloaded TCEQ data for the following Level III ecoregions of Texas: regions 21, 22, 23, 24, and 25, which border Mexico.

C.1.5 Southwest Consortium for Environmental Research and Policy (SCERP) Data

SCERP provided two data sets in Microsoft Excel format, one for the New River and one for wastewater. We imported these files directly into Microsoft Access.

C.1.6 Comisión Nacional del Agua (CNA) Data

CNA provided its data to us in Microsoft Excel format. We imported the data directly into Microsoft Access.

C.1.7 Comisión Internacional de Límites y Aguas (CILA) Data

CILA provided some of its data to us in Microsoft Excel format. We imported those data into Microsoft Access using a tab-delimited format. We also downloaded additional data from CILA's Web site. RTI's procedure for acquiring CILA data from the Web site was as follows:

1. Opened the CILA Web site "http://cila.sre.gob.mx."

2. Clicked on "Calidad del Agua" [Water Quality]

3. Clicked on "Estudio Binacional sobre el Monitoreo Intensivo de la Calidad de las Aguas del Rio Bravo en el Tramo de Nuevo Laredo, Tamaulipas-Laredo Texas, entre Mexicoico Estados Unidos del 6 al 16 de noviembre de 2000 (Informe Completo)" (the first link). [Binational Study on the Intensive Monitoring of the Water Quality of the Rio Grande in Laredo, Tamaulipas/Laredo Texas between Mexico and the United States, November 6–16, 2000 (Complete Report)] This Nuevo Laredo/Laredo area report was the only report containing data that met all the criteria noted above.

4. Saved the PDF (Adobe portable document format) file for the above report.

5. Scanned tables containing analysis results from U.S. laboratories (Tables 9, 11, 13, 15, and 17). All data in these tables met the date, location, and location coordinates criteria, so no data were filtered out.

6. Processed the scanned data using OCR (optical character reader) software and performed a 100 percent QC check of the resulting file against the hardcopy, correcting any OCR errors.

7. Added station location coordinates from Table 3 of the downloaded PDF file.

C.2 Generic Water Quality Indicators

The original sources of water quality data vary both in the methods used and the means by which they name the analyses in the data. Data were stored in the same format as the original data source, preserving the water quality indicator name and units, as well as the original water quality indicator ID. We created lookup tables in the database to link the source-specific indicator names to a standardized name (e.g., chlorophyll a) so that we could analyze data for a particular indicator regardless of the different source-specific names. These lookup tables can be easily modified to add new source-specific names as needed.

Table C-1 lists the 23 generic indicator designations associated with the 12 parameters we collected for the Repository. The 12 parameters are shown in bold. Where more than one generic indicator was associated with a parameter, those are listed indented under the bolded parameter name. If only one generic indicator was associated with the parameter, it had the same name as the parameter and only the bolded parameter is listed.

Most of the 23 generic indicators had multiple designations in the source data. Table C-1 also identifies the indicators with multiple designations and provides a cross reference to the more detailed table (Tables C-2 through C-22) listing the multiple designations. For each indicator with multiple designations, Tables C-2 to C-22 (one table per indicator) describe how the variable was assigned in the border waters database in terms of its description and units.

C.3 References

Nelson, R. 2004. "Texas monitoring data." Personal communication from Ryan Nelson, International Boundary and Water Commission (IBWC), to Eric Solano, RTI. October 27.

Table C-1. Generic Indicators by Parameter

Parameter Generic Indicator Name	Detail Table for Indicators with Multiple Designations
Fecal coliform	
Fecal coliform	Table C-2
Fecal streptococci	Table C-3
Chlorophyll a	Table C-4
Sulfate	Table C-5
Conductivity/TDS	
TDS	Table C-6
Conductivity	Table C-7
Chloride	Table C-8
DO	Table C-9
COD	Did not have multiple designations
Nutrients	
Inorganic Nitrogen	Table C-10
Phosphorus	Table C-11
Organic Nitrogen	Table C-12
Nitrogen	Table C-13
Nitrite	Table C-14
Orthophosphate	Table C-15
Nitrate	Table C-16
Ammonia	Table C-17
Nitrite+Nitrate	Table C-18
BOD	Table C-19
pH	Table C-20
Temperature	Table C-21
Total suspended solids	
TSS	Did not have multiple designations
Total Solids	Table C-22

Table C-2. Water Quality Indicators in Repository Related to "Fecal Coliform"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1042	Fecal coliform, M-FC MF (0.7 micron) method, water	NWIS	cfu/100ml
1090	Escherichia coli	STORET	cfu/100ml
1090	Escherichia coli	STORET	MPN/100ml
1090	Escherichia coli	STORET	none
1091	Fecal Coliform	STORET	#/100ml
1091	Fecal Coliform	STORET	cfu/100ml
1091	Fecal Coliform	STORET	cpu/100ml
1091	Fecal Coliform	STORET	MPN/100ml
1091	Fecal Coliform	STORET	none
1164	E. COLI, GEOMETRIC MEAN (#/100ML)	LegSTORET	#/100ml
1165	FECAL COLIFORM GEOMETRIC MEAN (COLONIES/100ML)	LegSTORET	#/100ml
1166	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML	LegSTORET	#/100ml
1167	E. COLI, MTEC, MF, #/100 ML	LegSTORET	#/100ml
1170	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	LegSTORET	MPN/100ml
1181	FECAL COLIFORM MPN/100ML 5/2,3 DIL FERMENT METHO	LegSTORET	MPN/100ml
1274	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C	LegSTORET	m-Endo agar LES/100 Ml
1277	COLIFORM,TOT,MPN,CONFIRMED TEST,35C (TUBE 31506)	LegSTORET	MPN/100ml
1283	FECAL COLIFORM,MEMBR FILTER,M-FC AGAR,44.5C,24HR	LegSTORET	m-FC agar/100ml
1285	FECAL COLIFORM,MPN,EC MED,44.5C (TUBE 31614)	LegSTORET	MPN
1288	FECAL COLIFORM,MPN,BORIC ACID LACTOSE BR,43C,48HR	LegSTORET	MPN
1291	FECAL COLIFORM, MF,M-FC, 0.7 UM	LegSTORET	m-FC agar/100ml
1363	FECAL COLIFORM, GENERAL (PERMIT)	LegSTORET	none
1434	Fecal Coliform (CPU/100 ml)	SCERP-New River	cpu/100ml
1440	Fecals	SCERP-Wastewater	Fecals
1457	COLIFORM, TOTAL	CNA	cpu/100ml
1457	COLIFORM, TOTAL	CNA	MPN/100ml
1475	Coliform F	CILA	cfu/100ml

Table C-3. Water Quality Indicators in Repository Related to "Fecal Streptococci"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1043	Fecal streptococci, KF streptococcus MF method, water	NWIS	cfu/100ml
1169	FECAL STREPTOCOCCI, MBR FILT,KF AGAR,35C,48HR	LegSTORET	#/100ml
1459	Fecal streptococci	CNA	MPN/100ml

Table C-4. Water Quality Parameters in U.S.-Mexico Waters Repository Related to "Chlorophyll a"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
227	Chlorophyll a, uncorrected for pheophytin	STORET	none
227	Chlorophyll a, uncorrected for pheophytin	STORET	ug/l [a]
1044	Chlorophyll a, periphyton, chromatographic-fluorometric method	NWIS	mg/m^2
1172	Chlorophyll a ug/l spectrophotometric acid. method	Legacy STORET	ug/l
1179	Chlorophyll a, phytoplankton ug/l, chromo-flouro	Legacy STORET	ug/l
1296	Chlorophyll a ug/l fluorometric corrected	Legacy STORET	ug/l
1297	Chlorophyll a ug/l trichromatic uncorrected	Legacy STORET	ug/l
1303	Chlorophyll a,% of(pheophytin a+chl a),spec-acid.	Legacy STORET	%
1309	Chlorophyll a (mg/l)	Legacy STORET	mg/l
1473	Chlorophyll a	CILA	ug/l

[a] Micrograms per liter.

Table C-5. Water Quality Indicators in Repository Related to "Sulfate"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1047	Sulfate, water, filtered	NWIS	mg/l
1161	SULFATE (MG/L AS SO4)	LegSTORET	mg/l
1186	SULFATE, SO4, SED, DRY WT, WTR EXTRACT, (MG/KG)	LegSTORET	mg/kg
1207	SULFATE (AS S) WHOLE WATER, MG/L	LegSTORET	mg/l
1265	SULFATE, DISSOLVED (MG/L AS SO4)	LegSTORET	mg/l
1429	Sulfate (SO4)	SCERP-New River	mg/l
1444	sulfate	SCERP-Wastewater	mg/l
1471	Dissolved Sulfate	CNA	mg/l

Table C-6. Water Quality Indicators in Repository Related to "TDS"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
553	Dissolved Solids	STORET	mg/l
1176	SOLIDS,TOTAL, DISS, ELECTRICAL-CONDUCTIVITY,MG/L	LegSTORET	mg/l
1177	SOLIDS, DISSOLVED-SUM OF CONSTITUENTS (MG/L)	LegSTORET	mg/l
1431	Total Filter Residue (TDS)	SCERP-New River	mg/l
1445	TDS	SCERP-Wastewater	mg/l

Table C-7. Water Quality Indicators in Repository Related to "Conductivity"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
266	Specific conductance	STORET	none
266	Specific conductance	STORET	umho/cm
266	Specific conductance	STORET	uS/cm
1072	Specific conductance, water, unfiltered	NWIS	uS/cm
1081	Specific conductance, water, unfiltered, laboratory	NWIS	uS/cm
1110	SPECIFIC CONDUCTANCE,FIELD (UMHOS/CM @ 25C)	LegSTORET	umho/cm
1111	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	LegSTORET	umho/cm
1115	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR AVG	LegSTORET	umho/cm
1116	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MAX	LegSTORET	umho/cm
1117	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MIN	LegSTORET	umho/cm
1417	Conductivity (uohms/cm)	SCERP-New River	umho/cm

Table C-8. Water Quality Indicators in Repository Related to "Chloride"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1046	Chloride, water, filtered	NWIS	mg/l
1087	Chloride	STORET	mg/l
1087	Chloride	STORET	none
1159	CHLORIDE (MG/L AS CL)	LegSTORET	mg/l
1264	CHLORIDE, DISSOLVED IN WATER MG/L	LegSTORET	mg/l
1425	Chloride (Cl)	SCERP-New River	mg/l
1437	Cl	SCERP-Wastewater	mg/l

Table C-9. Water Quality Indicators in Repository Related to "DO"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
502	Oxygen, (O2)	STORET	mg/l
502	Oxygen, (O2)	STORET	none
1073	Dissolved oxygen, water, unfiltered	NWIS	mg/l
1074	Dissolved oxygen, water, unfiltered	NWIS	%
1089	Dissolved oxygen (DO)	STORET	%
1089	Dissolved oxygen (DO)	STORET	mg/l
1089	Dissolved oxygen (DO)	STORET	none
1127	OXYGEN, DISSOLVED (MG/L)	LegSTORET	mg/l
1128	OXYGEN, DISSOLVED (PERCENT OF SATURATION)	LegSTORET	%
1189	DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	LegSTORET	mg/l
1190	DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	LegSTORET	mg/l
1191	DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	LegSTORET	mg/l
1211	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	LegSTORET	mg/l
1418	Dissolved Oxygen (mg/l)	SCERP-New River	mg/l

Table C-10. Water Quality Indicators in Repository Related to "Inorganic Nitrogen"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1249	NITROGEN, INORGANIC, TOTAL (MG/L AS N)	LegSTORET	mg/l

Table C-11. Water Quality Indicators in Repository Related to "Phosphorus"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1063	Phosphorus, water, unfiltered	NWIS	mg/l
1064	Phosphorus, water, filtered	NWIS	mg/l
1101	Phosphorus	STORET	mg/kg
1101	Phosphorus	STORET	mg/l
1101	Phosphorus	STORET	none
1102	Phosphorus as P	STORET	mg/l
1102	Phosphorus as P	STORET	none
1154	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	LegSTORET	mg/l
1155	PHOSPHORUS, DISSOLVED (MG/L AS P)	LegSTORET	mg/l
1252	PHOSPHOROUS DISSOLVED TOTAL WHATMAN GF/F MG/L P	LegSTORET	mg/l
1443	P	SCERP-Wastewater	mg/l
1477	Total Phosphorus	CILA-south/north	mg/l

Table C-12. Water Quality Indicators in Repository Related to "Organic Nitrogen"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1239	NITROGEN, ORGANIC, TOTAL (MG/L AS N)	LegSTORET	mg/l
1241	NITROGEN, ORGANIC, DISSOLVED (MG/L AS N)	LegSTORET	mg/l
1462	NITROGEN, ORGANIC	CNA	mg/l

Table C-13. Water Quality Indicators in Repository Related to "Nitrogen"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
554	Nitrogen ion (N)	STORET	mg/l
1058	Ammonia plus organic nitrogen, water, filtered	NWIS	mg/l
1059	Ammonia plus organic nitrogen, water, unfiltered	NWIS	mg/l
1094	Nitrogen, Kjeldahl	STORET	mg/kg
1094	Nitrogen, Kjeldahl	STORET	mg/l
1094	Nitrogen, Kjeldahl	STORET	none
1147	NITROGEN, KJELDAHL, DISSOLVED (MG/L AS N)	LegSTORET	mg/l
1148	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	LegSTORET	mg/l
1235	NITROGEN, TOTAL (MG/L AS N)	LegSTORET	mg/l
1432	Total Nitrogen (TN)	SCERP-New River	mg/l
1447	TKN	SCERP-Wastewater	mg/l

Table C-14. Water Quality Indicators in Repository Related to "Nitrite"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1054	Nitrite, water, filtered	NWIS	mg/l
1055	Nitrite, water, unfiltered	NWIS	mg/l
1098	Nitrogen, Nitrite (NO2) as N	STORET	mg/l
1098	Nitrogen, Nitrite (NO2) as N	STORET	none
1099	Nitrogen, Nitrite (NO2) as NO2	STORET	mg/l
1099	Nitrogen, Nitrite (NO2) as NO2	STORET	none
1099	Nitrogen, Nitrite (NO2) as NO2	STORET	ug/l
1144	NITRITE, DISSOLVED (MG/L AS N)	LegSTORET	mg/l
1145	NITRITE NITROGEN, TOTAL (MG/L AS N)	LegSTORET	mg/l
1356	NITRITE NITROGEN,TOTAL (MG/L AS NO2)	LegSTORET	mg/l
1427	Nitrite-Nitrogen (NO2-N)	SCERP-New River	mg/l

Table C-15. Water Quality Indicators in Repository Related to "Orthophosphate"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1065	Orthophosphate, water, filtered	NWIS	mg/l
1066	Orthophosphate, water, unfiltered	NWIS	mg/l
1100	Phosphate	STORET	mg/l
1100	Phosphate	STORET	none
1103	Phosphorus, orthophosphate as P	STORET	mg/l
1103	Phosphorus, orthophosphate as P	STORET	none
1104	Phosphorus, orthophosphate as PO4	STORET	mg/l
1104	Phosphorus, orthophosphate as PO4	STORET	none
1104	Phosphorus, orthophosphate as PO4	STORET	ug/l
1157	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	LegSTORET	mg/l
1178	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	LegSTORET	mg/l
1255	PHOSPHATE, ORTHO (MG/L AS PO4)	LegSTORET	mg/l
1269	PHOSPHATE, TOTAL, LAND MG/KG	LegSTORET	mg/kg
1271	ORTHOPHOSPHATE,DRY WEIGHT,LAND MG/KG	LegSTORET	mg/kg
1272	PHOSPHATE HYDROLYZED, DRY WEIGHT, LAND MG/KG	LegSTORET	mg/kg
1327	ORTHOPHOSPHORUS AS P, WATER MG/L	LegSTORET	mg/l
1328	ORTHOPHOSPHATE AS P, WATER MG/L	LegSTORET	mg/l
1329	PHOSPHATE, TOTAL AS P, WATER MG/L	LegSTORET	mg/l
1343	PHOSPHATE,TOTAL,COLORIMETRIC METHOD (MG/L AS P)	LegSTORET	mg/l
1428	Phosphate (PO4-P)	SCERP-New River	mg/l
1460	PHOSPHATE, SOLUBLE	CNA	mg/l
1461	PHOSPHATE, TOTAL	CNA	mg/l
1463	Orthophosphate	CNA	mg/l

Table C-16. Water Quality Indicators in Repository Related to "Nitrate"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1056	Nitrate, water, filtered	NWIS	mg/l
1095	Nitrogen, Nitrate (NO3) as N	STORET	mg/l
1095	Nitrogen, Nitrate (NO3) as N	STORET	none
1096	Nitrogen, Nitrate (NO3) as NO3	STORET	mg/l
1096	Nitrogen, Nitrate (NO3) as NO3	STORET	none
1096	Nitrogen, Nitrate (NO3) as NO3	STORET	ug/l
1146	NITRATE NITROGEN, TOTAL (MG/L AS N)	LegSTORET	mg/l
1244	NITRATE NITROGEN, DISSOLVED (MG/L AS N)	LegSTORET	mg/l
1354	NITRATE NITROGEN,TOTAL (MG/L AS NO3)	LegSTORET	mg/l
1355	NITRATE NITROGEN, DISSOLVED (MG/L AS NO3)	LegSTORET	mg/l
1426	Nitrate-Nitrogen (NO3-N)	SCERP-New River	mg/l

Table C-17. Water Quality Indicators in Repository Related to "Ammonia"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
446	Nitrogen, ammonium (NH4) as NH4	STORET	ug/l
1052	Ammonia, water, filtered	NWIS	mg/l
1053	Ammonia, water, unfiltered	NWIS	mg/l
1086	Ammonia, unionized	STORET	mg/l
1086	Ammonia, unionized	STORET	none
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	STORET	mg/l
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	STORET	none
1093	Nitrogen, ammonia as N	STORET	mg/kg
1093	Nitrogen, ammonia as N	STORET	mg/l
1093	Nitrogen, ammonia as N	STORET	none
1141	NITROGEN, AMMONIA, DISSOLVED (MG/L AS N)	LegSTORET	mg/l
1142	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	LegSTORET	mg/l
1143	AMMONIA, UNIONIZED (MG/L AS N)	LegSTORET	mg/l
1267	NITROGEN-NITRATE IN WATER PERCENT	LegSTORET	%
1352	NITROGEN, AMMONIA, TOTAL (MG/L AS NH4)	LegSTORET	mg/l
1422	Ammonia Nitrogen (NH3-N)	SCERP-New River	mg/l
1448	Total NH4-N	SCERP-Wastewater	mg/l

Table C-18. Water Quality Indicators in Repository Related to "Nitrite+Nitrate"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
1060	Nitrite plus nitrate, water, unfiltered	NWIS	mg/l
1061	Nitrite plus nitrate, water, filtered	NWIS	mg/l
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	STORET	mg/kg
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	STORET	mg/l
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	STORET	none
1140	NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)	LegSTORET	mg/l
1151	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)	LegSTORET	mg/l
1152	NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)	LegSTORET	mg/l
1270	NITRATE + NITRITE,DRY WT,LAND MG/KG	LegSTORET	mg/kg
1442	NO2-N and NO3 -N	SCERP-Wastewater	mg/l
1474	Nitrite plus nitrate	CILA	mg/l

Table C-19. Water Quality Indicators in Repository Related to "BOD"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
85	BOD, Biochemical oxygen demand	STORET	mg/l
85	BOD, Biochemical oxygen demand	STORET	none
1129	BIOCHEM OXY DEM,INHIB, DISS(MG/L,5DAY-20C, CBOD)	LegSTORET	mg/l
1130	BIOCHEM OXY DEM,NIT INHIB,TOT (MG/L,20 DAY-20C)	LegSTORET	mg/l
1131	BIOCHEM OXY DEM,NIT INHIB DISS(MG/L,20 DAY-20C)	LegSTORET	mg/l
1132	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C	LegSTORET	mg/l
1133	BIOCHEM OXY DEM NIT INHIB, TOT (MG/L, 5 DAY-20C)	LegSTORET	mg/l
1182	BOD, CARBONACEOUS, 5 DAY, 20 DEG C	LegSTORET	mg/l
1423	Biological Oxygen Demand (BOD)	SCERP-New River	mg/l
1436	BOD	SCERP-Wastewater	mg/l

Table C-20. Water Quality Indicators in Repository Related to "pH"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
29	pH	STORET	none
1076	pH, water, unfiltered, field	NWIS	none
1077	pH, water, unfiltered, laboratory	NWIS	none
1118	PH, S.U., 24HR MAXIMUM VALUE	LegSTORET	none
1119	PH, S.U., 24HR, MINIMUM VALUE	LegSTORET	none
1135	PH (STANDARD UNITS)	LegSTORET	none
1136	PH (STANDARD UNITS) LAB	LegSTORET	none
1233	PH, FIELD, STANDARD UNITS SU	LegSTORET	none

Table C-21. Water Quality Indicators in Repository Related to "Temperature"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
257	Temperature, water	STORET	deg C
257	Temperature, water	STORET	deg F
257	Temperature, water	STORET	none
480	Temperature, air	STORET	deg C
480	Temperature, air	STORET	none
1067	Temperature, water	NWIS	deg C
1068	Temperature, air	NWIS	deg C
1105	TEMPERATURE, WATER (DEGREES CENTIGRADE)	LegSTORET	deg C
1106	TEMPERATURE, AIR (DEGREES CENTIGRADE)	LegSTORET	deg C
1112	TEMPERATURE, WATER (DEGREES CENTIGRADE, 24HR AVG	LegSTORET	deg C
1113	WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	LegSTORET	deg C
1114	TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	LegSTORET	deg C
1420	Temperature (deg C)	SCERP-New River	deg C
1446	Temp	SCERP-Wastewater	deg C

Table C-22. Water Quality Indicators in Repository Related to "Total Solids"

Water Quality Indicator ID	Indicator Display Name	Original Source	Units
216	Total Solids	STORET	mg/l
216	Total Solids	STORET	none

Appendix D

Water Quality Comparisons against Benchmarks

This Appendix summarizes the water quality standards in each U.S. border state and Mexico and shows the comparisons of some water quality indicators from the U.S.-Mexico Waters Repository to those standards.

D.1 Water Quality Standards and Comparisons for the United States

For the U.S. side of the border, water quality standards vary by state. We reviewed published regulations in Arizona, California, New Mexico, and Texas on surface water quality standards. All four states established standards based on specific water quality objectives. Texas establishes water quality standards specific to river segments-specific. Water quality standards may differ for waterbodies with recreational purposes and waterbodies used for consumption purposes.

Table D-1 shows the water quality indicators for which the four U.S. states have established water quality standards. A single bullet in this table may represent a series of standards for a state for a water quality indicator. For more detailed information on all specific standards refer to the documents published by the States (ADEQ, 2003; CSWRCB, 1994a and 1994b; NMED, 2002; TNRCC, 2000). Tribes in the United States also issue their own water quality standards subject to EPA oversight and approval. Tribal water quality regulations may be considered in future assessments of water quality status using the Repository.

Table D-1. List of Water Quality Parameters with Legal Standards in U.S. Border States

Water Quality Parameter	State			
	Arizona	California[a]	New Mexico	Texas
Ammonia	•		•	
BOD_5		•		
Chloride (Cl)		•	•	•
COD		•		
Conductivity			•	
DO	•	•	•	•
Escherichia coli (*E. coli*)	•	•		•
Fecal Coliform Organisms	•	•	•	•
Hardness ($CaCO_3$)				•
Nutrients	•	•	•	
pH	•	•	•	•
Phosphorus	•	•		•

(continued)

Table D-1. (continued)

Water Quality Parameter	State			
	Arizona	California[a]	New Mexico	Texas
Sulfate (SO_4)			•	•
Temperature	•	•	•	•
Total dissolved solids	•	•	•	•
Toxic Materials	•	•	•	•
Turbidity	•		•	
Others	•	•	•	•

[a] Standards for the California border basins only.

In addition to state water quality standards in the United States, U.S. EPA has published recommended nutrients standards for rivers, streams, lakes, and reservoirs in the *National Strategy for the Development of Regional Nutrient Criteria* (U.S. EPA, 1998). EPA divided the United States into nutrient regions and proposed standards for each region. The border states fall in three of the Nutrient Regions:

- **Nutrient Region III** includes Arizona, California, New Mexico, and Southwest Texas to the Amistad Reservoir. Stations in the Pacific/Salton Sea, Colorado River/Sea of Cortez, and Central Desert transboundary regions and some stations in the Rio Grande transboundary region are located in Nutrients Region III.

- **Nutrient Region IV** includes Texas from the Amistad Reservoir to the Falcon Reservoir. Some stations in the Rio Grande transboundary region are located in Nutrients Region IV.

- **Nutrient Region X** includes the Texas-Louisiana Coastal and Mississippi Alluvial Plains and Texas from the Falcon Reservoir to the Gulf of Mexico. Stations on the Lower Rio Grande transboundary region are located in Nutrient Region X.

For those three regions, Table D-2 shows the nutrients criteria for rivers and streams and Table D-3 shows the nutrients criteria for lakes and reservoirs.

Table D-2. Nutrient Criteria for Rivers and Streams by Nutrient Region

Parameter	Region III	Region IV	Region X
Chlorophyll a (μg/L)	1.8	2.4	2.1
Secchi disc depth (m)	-	-	-
Total Nitrogen (mg/L)	0.38	0.56	0.76
Total Phosphorus (μg/L)	22	23	-
Turbidity (Nephelometric Turbidity Units)	2.34	4.21	17.50

Table D-3. Nutrient Criteria for Lakes and Reservoirs by Nutrient Region

Parameter	Region III	Region IV	Region X
Chlorophyll a (μg/L)	3.4	2.0	5.5
Secchi disc depth (m)	2.7	2.0	0.8
Total Nitrogen (mg/L)	0.40	0.44	0.57
Total Phosphorus (μg/L)	17	20	60
Turbidity (Nephelometric Turbidity Units)	-	-	-

D.1.1 Water Quality Comparisons for Arizona

The Arizona Department of Environmental Quality (ADEQ) reviews and approves on a triennial basis the Arizona Surface and Groundwater Quality Standards (ADEQ, 2003). Currently, ADEQ is preparing for its 2006 triennial review. Arizona establishes water quality standards for nontoxics, toxics, and radiochemicals based on designated uses. Arizona's regulations also include surface water quality nutrient standards, aquifer water quality standards, and groundwater standards for organic chemicals, pesticides, etc. Table D-4 shows some of the surface water quality standards approved by Arizona in 2003.

Table D-4. Water Quality Standards for Arizona

Parameter	Criteria	Comment
DO (mg/L)	≥ 7.0	Aquatic and wildlife uses
E. coli (CFU/100 ml)	≤ 580	Single sample maximum
Fecal coliform (CFU/100 ml)	≤ 800	Single sample maximum
Nitrate as nitrogen (NO_3 as N) (mg/L)	≤ 224	Water contact recreation
Nitrite as nitrogen (NO_2 as N) (mg/L)	≤ 14	Water contact recreation
pH	6.5–9.0	Aquatic and wildlife uses, water contact recreation
Total dissolved solids (mg/L)	≤ 1,000	U.S. EPA criteria—more sensitive crops
Turbidity (Nephelometric Turbidity Units)	≤ 50 NTU	Aquatic and wildlife uses, streams and lakes

Tables D-5 to D-7 compare Repository data on chlorophyll a, dissolved oxygen, and pH, respectively, to these standards.

Table D-5. Water Quality Comparisons for Arizona: Chlorophyll-a (Water Quality Indicator ID: 227)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-100183	SCROS-A	6	5	83%
ModSTORET-100000	SCARI-A	4	4	100%
ModSTORET-100035	SCLAK-B	1	1	100%
ModSTORET-100034	SCLAK-A	1	1	100%

Table D-6. Water Quality Comparisons for Arizona: Dissolved Oxygen (Water Quality Indicator IDs: 1073, 1089, 1127 and 1211)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-100000	SCARI-A	33	16	48%
ModSTORET-100183	SCROS-A	22	19	86%
ModSTORET-100035	SCLAK-B	6	2	33%
ModSTORET-101177	SCCIE010.20	4	1	25%
ModSTORET-101080	SCRED002.17	4	1	25%
ModSTORET-101176	SCCIE014.39	4	2	50%
ModSTORET-101178	SCCIE002.66	4	2	50%
ModSTORET-101179	SCCIE001.49	4	2	50%
ModSTORET-101152	SCSAB004.39	4	1	25%
NWIS_321836111064800	BARREL SPRINGS STOCK TANK	3	2	67%
ModSTORET-100938	RMRUC005.63	3	1	33%
ModSTORET-100653	SPSPR095.71	3	1	33%
ModSTORET-100639	UGSCV002.26	3	2	67%
ModSTORET-100281	SPSPR077.66	3	2	67%
ModSTORET-100275	SPSPR113.55	3	1	33%
NWIS_321227110331201	D-14-17 13DDA	3	3	100%
NWIS_321344110320601	D-14-18 07DAB	3	3	100%
NWIS_320842109252401	D-15-28 12ACC1	2	2	100%
ModSTORET-100937	UGCAV006.55	2	1	50%
NWIS_313144111271501	CARPENTER TANK AT BUENOS AIRES NWR	1	1	100%
NWIS_313530109302701	POOL AT LESLIE CREEK AT LESLIE CANYON NWR	1	1	100%
NWIS_321156110420001	LOMA VERDE WASH AT SAGUARO NP	1	1	100%
NWIS_321157110362901	CHIMENEA CREEK AT SAGUARO NP	1	1	100%

Table D-7. Water Quality Comparisons for Arizona: pH (Water Quality Indicator IDs: 29, 1076, 1077, 1135 and 1136)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-100000	SCARI-A	39	8	21%
ModSTORET-100183	SCROS-A	34	15	44%
ModSTORET-100872	SCTHC004.01	1	1	100%
ModSTORET-59761	GARRETT RANCH	2	1	50%
NWIS_312250110041901	GREENBUSH DRAW PRECIP	10	2	20%
NWIS_313756110240801	UPPER BABOCOMARI PRECIP	12	4	33%
NWIS_321344110320601	D-14-18 07DAB	6	2	33%

D.1.2 Water Quality Comparisons for California

California has adopted water quality criteria on a regional basis. The *Water Quality Control Plan for the Colorado River Basin* (CSWRCB, 1994a) and the *Water Quality Control Plan for the San Diego Basin* (CSWRCB, 1994b) were used as references for water quality criteria in the border area of California. General water quality objectives for the Colorado River Basin apply for all waters of the region. These include aesthetic, toxicity, temperature, pH, bacteria, and other general standards. Specific surface waters objectives are also enforced for the Colorado River above and below the Imperial Dam and for the New River. The designated water quality control plan for the San Diego Basin includes different water quality objectives: temperature control, agricultural supply beneficial use, ammonia control, contact and noncontact recreation, shellfish harvesting, etc. Table D-8 shows the water quality standards for the Colorado River Basin, Table D-9 for the New River at the International Boundary, and Table D-10 for the San Diego Basin.

Table D-8. Water Quality Standards for the Colorado River Basin

Parameter	Criteria	Comment
Dissolved oxygen (mg/L)	≥ 8.0	For Warm uses and Cold uses
Escherichia coli (*E. coli*) (#/100 mL)	≤ 400	For water contact recreation (for noncontact water recreation the value is 2,000)
Fecal coliform (#/100 mL)	≤ 200	For water contact recreation
pH	6.0–9.0	Regional waters are somewhat alkaline
Total dissolved solids (mg/L)	≤ 4,500	Maximum at Imperial Valley Drains and New River

Table D-9. Water Quality Standards for the New River at the International Boundary

Parameter	New River at Boundary	Lagoon Discharge Canal	New River Upstream of Discharge Canal
BOD5	-	30 mg/L filtered (monthly grab sample)	30 mg/L unfiltered (monthly 12-hr composite sample)
COD	-	70 mg/L filtered	100 mg/L unfiltered (monthly 12-hr composite sample)
DO	5.0 mg/L (daily grab sample)	-	-
Fecal coliform organisms	-	-	30,000 colonies per 100 ml, with no single sample to exceed 60,000 colonies per 100mL
pH	6.0–9.0	-	-

Table D-10. Water Quality Standards for the San Diego Basin

Parameter	Criteria	Comment
Ammonia (mg/L)	≤ 0.025	Nonionized
Dissolved oxygen (mg/L)	≥ 5.0	For warm uses (for cold uses it must be ≥ 6)
E. coli (MPN/100 mL)	≤ 235	For water contact recreation (designated beach)
Fecal coliform (MPN/100 mL)	≤ 400	For water contact recreation (for noncontact water recreation the value is 4,000)
pH	6.5 to 8.5	Inland surface waters

Tables D-11 to D-17 compare Repository data on total phosphorus, total nitrogen, chlorophyll a, pH, dissolved oxygen, fecal coliform, and ammonia, respectively, to these standards.

Table D-11. Water Quality Comparisons for California: Total Phosphorus (Water Quality Indicator ID: 1154)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21CAL-4-LL-SD-06	LINDO LAKE PARK WEST BASIN NE-BANK / CALIFORNIA / SAN DIEGO	3	3	100%
11NPSWRD-JOTR_NPS_BOSP	BOLSTER CANYON SPRING / COLORADO RIVER / DEAD BASIN	2	2	100%
21CAL-4-LL-SD-01	LINDO LAKE PARK EAST BASIN SE-BANK / CALIFORNIA / SAN DIEGO	2	2	100%
21CAL-4-LL-SD-07	LINDO LAKE PARK WEST BASIN N-BANK / CALIFORNIA / SAN DIEGO C	2	2	100%
21CAL-4-LL-SD-10	LINDO LAKE PARK WEST BASIN NW-BANK / CALIFORNIA / SAN DIEGO	2	2	100%
21CAL-4-LL-SD-13	LINDO LAKE PARK WEST BASIN S-BANK / CALIFORNIA / SAN DIEGO C	2	2	100%
11NPSWRD-JOTR_NPS_SSPL	STUBBE SPRING LOWER / COLORADO RIVER / DEAD BASIN	1	1	100%
21CAL-4G-LL-WW-01	LINDO LAKE PARK EAST BASIN SE-BANK / CALIFORNIA / SAN DIEGO	1	1	100%
21CAL-4-LL-LW-01	LINDO LAKE PARK EAST BASIN SE-CENTER / CALIFORNIA / SAN DIEG	1	1	100%
21CAL-4-LL-LW-02	LINDO LAKE PARK EAST BASIN NW-CENTER / CALIFORNIA / SAN DIEG	1	1	100%
21CAL-4-LL-LW-03	LINDO LAKE PARK WEST BASIN E-CENTER / CALIFORNIA / SAN DIEGO	1	1	100%
21CAL-4-LL-LW-04	LINDO LAKE PARK WEST BASIN W-CENTER / CALIFORNIA / SAN DIEGO	1	1	100%
21CAL-4-LL-LW-05	LINDO LAKE PARK WEST BASIN SW-CENTER / CALIFORNIA / SAN DIEG	1	1	100%

Table D-12. Water Quality Comparisons for California: Total Nitrogen (Water Quality Indicator ID: 1148)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
11NPSWRD-JOTR_NPS_BOSP	BOLSTER CANYON SPRING / COLORADO RIVER / DEAD BASIN	2	2	100%
11NPSWRD-JOTR_NPS_SSPL	STUBBE SPRING LOWER / COLORADO RIVER / DEAD BASIN	1	1	100%
21CAL-4-LL-SD-01	LINDO LAKE PARK EAST BASIN SE-BANK / CALIFORNIA / SAN DIEGO	4	4	100%
21CAL-4-LL-SD-06	LINDO LAKE PARK WEST BASIN NE-BANK / CALIFORNIA / SAN DIEGO	6	6	100%
21CAL-4-LL-SD-07	LINDO LAKE PARK WEST BASIN N-BANK / CALIFORNIA / SAN DIEGO C	4	4	100%
21CAL-4-LL-SD-10	LINDO LAKE PARK WEST BASIN NW-BANK / CALIFORNIA / SAN DIEGO	4	4	100%
21CAL-4-LL-SD-13	LINDO LAKE PARK WEST BASIN S-BANK / CALIFORNIA / SAN DIEGO C	4	4	100%

Table D-13. Water Quality Comparisons for California: Chlorophyll-a (Water Quality Indicator ID: 227)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-CA99-0047	San Diego Bay	3	1	33%
ModSTORET-CA99-0048	San Diego Bay	3	2	67%
ModSTORET-CA99-0044	Mission Bay	2	2	100%
ModSTORET-CA99-0045	San Diego River	1	1	100%

Table D-14. Water Quality Comparisons for California: pH (Water Quality Indicator IDs: 29, 1076, 1077, 1135 and 1136)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_324114115551801	017S010E11H PRECIP	4	1	25%
NWIS_324130117002501	SWEETWATER RES NR PUMP TOWER UPPER	178	7	4%
NWIS_324131117000101	SWEETWATER RES CTR OF MIN POOL UPPER	174	10	6%
NWIS_324209116585001	SWEETWATER RES E END RES FILL BNDRY UPPER	35	5	14%
NWIS_324703116473101	LOVELAND RES NR DAM SITE 1 UPPER	298	27	9%
NWIS_325428114282601	014S022W32Q PRECIP	3	2	67%
NWIS_331259116214501	011S006E16N PRECIP	4	1	25%

Table D-15. Water Quality Comparisons for California: Dissolved Oxygen (Water Quality Indicator IDs: 1073, 1089, 1127 and 1211)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_324703116473101	LOVELAND RES NR DAM SITE 1 UPPER	265	210	79%
NWIS_324130117002501	SWEETWATER RES NR PUMP TOWER UPPER	161	126	78%
NWIS_324131117000101	SWEETWATER RES CTR OF MIN POOL UPPER	159	128	81%
NWIS_324209116585001	SWEETWATER RES E END RES FILL BNDRY UPPER	33	11	33%
NWIS_324311116565901	SWEETWATER R A LOW FLOW BARRIER A SWEETWATER RES	9	5	56%

Table D-16. Water Quality Comparisons for California: Fecal Coliform (Water Quality Indicator ID: 1042)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_10254670	ALAMO R AT DROP 3 NR CALIPATRIA CA	11	11	100%
NWIS_11022200	LOS COCHES C NR LAKESIDE CA	1	1	100%
NWIS_11022480	SAN DIEGO R A MAST RD NR SANTEE CA	1	1	100%

Table D-17. Water Quality Comparisons for California: Ammonia (Water Quality Indicator IDs: 1052, 1058, 1059)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_10254005	SALTON SEA NR WESTMORLAND CA	4	4	100%
NWIS_10254670	ALAMO R AT DROP 3 NR CALIPATRIA CA	22	22	100%
NWIS_324018115355201	BROCKMAN DR NO 2 AB CONF NR CALEXICO CA	1	1	100%
NWIS_324320115260401	SOUTH CENTRAL DR A FAWCETT RD NR CALEXICO CA	1	1	100%
NWIS_324324115384601	WISTARIA DR NO 7 NR GREESON DR NR MT SIGNAL CA	1	1	100%
NWIS_324350115395000	GREESON DR NR NEW R CA	2	2	100%
NWIS_324504115182201	VERDE DR A CHELL RD NR HOLTVILLE CA	1	1	100%
NWIS_324531115260401	SOUTH CENTRAL DR A HILFIKER RD NR HOLTVILLE CA	1	1	100%
NWIS_324545115204800	VERDE DR NR CONFLUENCE W ALAMO R CA	2	2	100%
NWIS_324611115182101	WARREN DR NO. 2 ON HUNT RD NR HOLTVILLE CA	1	1	100%
NWIS_324650115205200	WARREN DR NR ALAMO R	2	2	100%
NWIS_324752115260200	SOUTH CENTRAL DRAIN NR ALAMO R	2	2	100%
NWIS_324818115401701	ELDER 14 DR S OF EL CENTRO NAVAL STA NR SEELEY CA	1	1	100%
NWIS_324904115372401	CENTRAL DR NO 10 AB CONF NR EL CENTRO CA	1	1	100%
NWIS_324923115302601	CENTRAL DR BETWEEN CENTRAL DR 6&7 NR EL CENTRO CA	1	1	100%
NWIS_324930115413101	ELDER 14 DRAIN NR NEW R NR SEELEY CA	2	2	100%
NWIS_324931115391301	RICE DRAIN NO. 5 A ATEN RD NR SEELEY CA	1	1	100%
NWIS_324956115211401	PALMETTO DR A BRIDENSTEIN RD NR HOLTVILLE CA	1	1	100%
NWIS_324956115261701	CENTRAL DR/ROSITAS WASTE NR HOLTVILLE CA	2	2	100%
NWIS_324958115290101	MESQUITE DR NO 6 AB CONF NR HOLTVILLE CA	1	1	100%
NWIS_324959115255201	PALMETTO C ON MORRISN RD NR ALAMO R NR HOLTVILLE C	2	2	100%

(continued)

Table D-17. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_325207115195201	HOLTVILLE DR NO. 1 ON WRIGHT RD NR HOLTVILLE CA	1	1	100%
NWIS_325210115391601	RICE DRAIN NO. 5 NR NEW R NR SEELEY CA	2	2	100%
NWIS_325354115310001	014S014E27N01SLYS S-154 AT 19 FT	2	2	100%
NWIS_325354115310002	014S014E27N02SLYS S-154 AT 14 FT	2	1	50%
NWIS_325354115310003	014S014E27N03SLYS S-154 AT 9 FT	2	1	50%
NWIS_325434115215501	HOLTVILLE MAIN DRAIN A COOPER RD NR HOLTVILLE CA	1	1	100%
NWIS_325449115293001	MESQUITE DR NR HWY S27 NR ALAMORIO CA	1	1	100%
NWIS_325538115294800	ROSE DRAIN A PUMP STA CA	2	2	100%
NWIS_325548115233301	HOLTVILLE DR NO. 8 A ADAMS RD NR ALAMORIO CA	1	1	100%
NWIS_325552115270900	HOLTVILLE DR NR ALAMO CA	2	2	100%
NWIS_325853115245101	OSAGE DR W OF HASTIAN RD NR ALAMORIO CA	1	1	100%
NWIS_325854115272601	OSAGE DR NR ALAMO R NR ALAMORIO CA	2	2	100%
NWIS_325855115211301	OSAGE DR ON SILLIMAN RD NR HOLTVILLE CA	2	2	100%
NWIS_325855115211302	OSAGE CANAL ON SILLIMAN RD NR HOLTVILLE CA	2	2	100%
NWIS_330307115412101	TRIFOLIUM DR NO. 2 A BANNISTER RD NR CALIPATRIA CA	1	1	100%
NWIS_330454115413301	TRIFOLIUM DRAIN NO. 2 A BAKER RD NR WESTMORLAND CA	1	1	100%
NWIS_330459115430101	TRIFOLIUM NO1 DRAIN AT OUTLET TO SALTON SEA, CA	2	2	100%
NWIS_330520115305901	NETTLE DRAIN NR ALAMO R NR CALIPATRIA CA	2	2	100%
NWIS_330521115265901	NETTLE DRAIN A HWY 115 NR CALIPATRIA CA	1	1	100%
NWIS_330522115223701	NETTLE DR W OF E HIGHLINE CANAL NR CALIPATRIA CA	1	1	100%
NWIS_330615115331101	VAIL DRAIN ON VAIL RD NR WESTMORLAND CA	1	1	100%
NWIS_330616115361701	VAIL DR ON VAIL RD E OF GENTRY RD NR CALIPATRIA CA	1	1	100%
NWIS_330617115385201	VAIL DRAIN A LACK RD NR CALIPATRIA CA	2	2	100%

(continued)

Table D-17. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
NWIS_330703115324001	C DR NR ALAMO R NR CALIPATRIA CA	1	1	100%
NWIS_330706115385201	VAIL 6 DRAIN A BOWLES RD NR CALIPATRIA CA	1	1	100%
NWIS_330758115392601	VAIL CUT OFF DR AT YOUNG RD OUTLET TO SALTON SEA	4	4	100%
NWIS_330835115434501	SALTON SEA IN NEW R DELTA CA	2	2	100%
NWIS_330915115361701	VAIL 3-A DRAIN A KUNS RD NR NILAND CA	1	1	100%
NWIS_331023115473701	SALTON SEA IN SAN FELIPE C DELTA CA	2	2	100%
NWIS_331034115334501	K DRAIN A BRANDT RD NR ALAMO R NR NILAND CA	2	2	100%
NWIS_331034115371800	PUMICE DRAIN NR SALTON SEA CA	2	2	100%
NWIS_331036115265801	K DRAIN A WIEST RD NR NILAND CA	1	1	100%
NWIS_331036115310501	K DRAIN A HWY 111 NR NILAND CA	1	1	100%
NWIS_331215115410001	SALTON SEA BETWEEN S BASIN AND NEW ALAMO R DELTA	2	2	100%
NWIS_331246115341301	P DR 0.5 MI E OF CONF WITH P LATERAL NR NILAND CA	1	1	100%
NWIS_331400115380001	SALTON SEA IN ALAMO R DELTA CA	2	2	100%
NWIS_331400115450001	SALTON SEA NR CENTER OF S BASIN CA	2	2	100%
NWIS_331532115344401	WASH AT DAVIS RD NR W DRAIN NR NILAND CA	1	1	100%
NWIS_331600115453001	SALTON SEA A CENTER OF S BASIN CA	2	2	100%
NWIS_331930115484001	SALTON SEA NR CENTER OF LAKE BETWEEN N AND S BASIN	2	2	100%
NWIS_332400115553001	SALTON SEA A CENTER OF N BASIN CA	2	2	100%
NWIS_332637115512001	SALTON SEA IN SALT C DELTA CA	2	2	100%
NWIS_332908116011501	SALTON SEA BETWEEN N BASIN AND WHITEWATER RIVER	11	11	100%
NWIS_332958116023501	SALTON SEA IN WHITEWATER R DELTA CA	2	2	100%

D.3 Water Quality Comparisons for New Mexico

The New Mexico Water Quality Control Commission established surface water quality standards for interstate and intrastate surface waters (NMED, 2002). General standards are established to sustain and protect existing or attainable uses of surface waters of the state. These general standards apply to all surface waters of the state at all times, unless a specified standard is provided elsewhere on a river segment. Specific standards for a river segment depend on the designated use and flow level. Table D-18 shows the highest standards across the state.

Table D-18. Water Quality Standards for New Mexico

Parameter	Criteria	Comment
Chloride (mg/L) (1)	≤ 25	Highest standard across the state
Dissolved oxygen (mg/L)	≥ 5.0	Most uses
Fecal coliform (CFU/100 ml)	≤ 200	Highest standard across the state
pH	6.6–8.8	In most reaches of Rio Grande Basin
Sulfate (mg/L) (1)	≤ 150	Highest standard across the state
Total dissolved solids (mg/L) [a]	≤ 500	Highest standard across the state
Turbidity (Nephelometric Turbidity Units)	≤ 10 NTU	Fisheries

[a] Rio Grande Basin—The main stem of the Rio Grande, from Taos Junction bridge upstream to the New Mexico-Colorado State line.

Tables D-19 to D-27 compare Repository data on total phosphorus, total nitrogen, chlorophyll a, dissolved oxygen, fecal coliform, sulfate, chloride, pH, and total dissolved solids, respectively, to these standards.

Table D-19. Water Quality Comparisons for New Mexico: Total Phosphorus (Water Quality Indicator ID: 1154)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-LRG101.000110	RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE / WESTERN G	19	19	100%
21NMEX-LRG046	RIO GRANDE AT PICACHO AVE IN LAS CRUCES / WESTERN GULF / UPP	19	19	100%
21NMEX-LRG053	RIO GRANDE AT NM HIGHWAY 226 NEAR BERINO / WESTERN GULF / UP	17	17	100%
21NMEX-LRG101.000101	RIO GRANDE BELOW SUNLAND PARK / /	16	16	100%
21NMEX-LRG101.000125	RIO GRANDE NEAR MESQUITE ON HIGHWAY 192 BRIDGE / WESTERN GUL	16	16	100%
21NMEX-LRG046.5	RIO GRANDE AT BRIDGE NEAR LA MESILLA / WESTERN GULF / UPPER	15	15	100%
21NMEX-LRG101.000109	RIO GRANDE AT SANTA TERESA / /	14	14	100%
21NMEX-LRG047	RIO GRANDE AT MESILLA DIVERSION DAM / WESTERN GULF / UPPER R	14	14	100%
21NMEX-LRG045.5	RIO GRANDE AT NM HWY 430 NEAR DONA ANA / WESTERN GULF / UPPE	13	13	100%
21NMEX-SWC804.006048	MIMBRES RIVER AT COONEY CAMPGROUND CROSSING 150A / WESTERN G	13	13	100%
21NMEX-LRG046.3	LAS CRUCES WWTP EFFLUENT DITCH AT RIO GRANDE / WESTERN GULF	12	12	100%
21NMEX-LRG101.000107	SUNLAND PARK WWTF EFFLUENT / /	12	12	100%
21NMEX-SWC803.002530	MIMBRES RIVER UPSTREAM OF HWY 90 BRIDGE / WESTERN GULF / UPP	9	9	100%
21NMEX-SWC803.002501	MIMBRES RIVER ABOVE CONFLUENCE WITH GALLINAS CR. / WESTERN G	9	9	100%
21NMEX-SWC804.003035	MIMBRES RIVER ABOVE MIMBRES GAGE / WESTERN GULF / UPPER RIO	9	9	100%
21NMEX-LRG103.002030	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE / /	7	7	100%
21NMEX-SWC803.002001	GALLINAS CREEK ABOVE MIMBRES RIVER / WESTERN GULF / UPPER RI	6	6	100%
21NMEX-SWC803.000105	MIMBRES RIVER FOUR MILES S. OF DWYER / WESTERN GULF / UPPER	5	5	100%
21NMEX-LRG101000109.5	RIO GRANDE AT BORDERLAND ROAD BRIDGE / WESTERN GULF / UPPER	5	5	100%

(continued)

Table D-19. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-LRG101000107.5	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL / WESTERN GULF / UP	5	5	100%
21NMEX-LRG058	RIO GRANDE AT AMERICAN DAM / RIO GRANDE /	5	5	100%
21NMEX-LRG101.000103	10 M ABOVE EL PASO ELECTRIC OUTFALLS 001 003 / WESTERN GULF	4	4	100%
21NMEX-LRG101000108	RIO GRANDE BELOW WEST DRAIN / WESTERN GULF / UPPER RIO ABOVE	4	4	100%
21NMEX-LRG101000109.7	RIO GRANDE AT VINTON ROAD BELOW ANTHONY / WESTERN GULF / UPP	4	4	100%
21NMEX-LRG101000139	RIO GRANDE BELOW I-10 BRIDGE NEAR LAS CRUCES / WESTERN GULF	4	4	100%
21NMEX-LRG103.002020	RIO GRANDE BELOW WILLIAMS / /	4	4	100%
21NMEX-LRG101.000102	100 M BELOW EL PASO ELECTRIC 001 003 / WESTERN GULF / UPPER	4	4	100%
21NMEX-BEARCANYONDAM	SLIGHTLY E. OF DAM CENTER 1/8 DISTANCE FROM DAM / COLORADO R	3	3	100%
21NMEX-OT01AP.STINKY	LAKE STINKY / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS RI	1	1	100%
21NMEX-DA01AN.S-LUCERO	SAMPLE STATION ON WEST END OF LAKE VIA MISSLE RA / WESTERN G	1	1	100%
21NMEX-DA02AO.N-LUCERO	SAMPLE STATION NEXT TO RANGE RD 10 ON MISSLE RNG / WESTERN G	1	1	100%
21NMEX-DA03BI.DAVIES	STATION ON W END OF TANK 1/4 MI E. OF ROAD. / WESTERN GULF M	1	1	100%
21NMEX-HI01AK.SACATONP	PLAYA LAKE DUE N FROM DUNES OF N LORDSBURG PLAYA / COLORADO	1	1	100%
21NMEX-HI02AL.NLORD	N LORDSBURG PLAYA / COLORADO RIVER /	1	1	100%
21NMEX-LCRSSC.TSCC05	SKELETON CANYON CREEK / /	1	1	100%
21NMEX-SWCANC.TCLD20	CLANTON DRAW AT GRAY RANCH HEADQUARTERS / /	1	1	100%
21NMEX-SWCANC.TCDC30	CLOVERDALE CREEK / /	1	1	100%
21NMEX-SWCANC.TDAC10	DOUBLE ADOBE CREEK / /	1	1	100%
21NMEX-OT02BJ.MALPAISP	STATION APPROX. 100 YDS S OF SPRING IN POOL AREA / WESTERN G	1	1	100%

Table D-20. Water Quality Comparisons for New Mexico: Total Nitrogen (Water Quality Indicator ID: 1148, 1235)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO002	1529 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO003	1705 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO019	Calle Ruiz #215-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	3	2	67%
21NMBHO-BHO022	417 Koenig--Mesquite / WESTERN GULF / UPPER RIO GRANDE ABOVE	2	1	50%
21NMBHO-BHO024	428 Moonlight--San Miguel / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO026	1198 Wanabe Road #3--Mesquite 88048 / WESTERN GULF / UPPER	2	1	50%
21NMBHO-BHO050	1313 W Main St--La Union / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO061	1095 Sierra Vista--Berino / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO092	5405 Santa Teresita--Santa Teresa 88008 / WESTERN GULF / UP	1	1	100%
21NMBHO-BHO094	643 Pinabetes--Las Cruces 88001 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO095	388 Meadow Park--Fair Acres / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO098	7335 Harvey Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO105	17835 N Hwy 85--Radium Springs 88005 / WESTERN GULF / UPPER	1	1	100%
21NMBHO-BHO106	2268 Alta Mira--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO111	Hwy 28--San Miguel / WESTERN GULF / UPPER RIO GRANDE ABOVE P	1	1	100%
21NMBHO-BHO119	2601 W O'Hara Rd--Anthony 88021 / WESTERN GULF / UPPER RIO	2	1	50%
21NMBHO-BHO124	441 Minter Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO125	11859 Jarmen Dr.--Mesquite 88048 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO126	456 Wannabe Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	2	1	50%
21NMBHO-BHO133	110 Ashtray Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%

(continued)

Table D-20. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO135	1660 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO137	2460 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO138	1060 Road Runner Rd--Las Cruces 88005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO140	711 Long River Lane--Fair Acres / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO141	730 Tamaris --Rio Grande Estates / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-M004	DEMING,NM / /	1	1	100%
21NMEX-BEARCANYONDAM	SLIGHTLY E. OF DAM CENTER 1/8 DISTANCE FROM DAM / COLORADO R	6	6	100%
21NMEX-DA01AN.S-LUCERO	SAMPLE STATION ON WEST END OF LAKE VIA MISSLE RA / WESTERN G	2	2	100%
21NMEX-DA02AO.N-LUCERO	SAMPLE STATION NEXT TO RANGE RD 10 ON MISSLE RNG / WESTERN G	2	2	100%
21NMEX-DA03BI.DAVIES	STATION ON W END OF TANK 1/4 MI E. OF ROAD. / WESTERN GULF M	2	2	100%
21NMEX-HI01AK.SACATONP	PLAYA LAKE DUE N FROM DUNES OF N LORDSBURG PLAYA / COLORADO	2	2	100%
21NMEX-HI02AL.NLORD	N LORDSBURG PLAYA / COLORADO RIVER /	2	2	100%
21NMEX-HI03AM.SLORD	S LORDSBURG PLAYA / COLORADO RIVER /	2	2	100%
21NMEX-LRG045.5	RIO GRANDE AT NM HWY 430 NEAR DONA ANA / WESTERN GULF / UPPE	26	26	100%
21NMEX-LRG046	RIO GRANDE AT PICACHO AVE IN LAS CRUCES / WESTERN GULF / UPP	36	31	86%
21NMEX-LRG046.3	LAS CRUCES WWTP EFFLUENT DITCH AT RIO GRANDE / WESTERN GULF	24	24	100%
21NMEX-LRG046.5	RIO GRANDE AT BRIDGE NEAR LA MESILLA / WESTERN GULF / UPPER	28	28	100%
21NMEX-LRG047	RIO GRANDE AT MESILLA DIVERSION DAM / WESTERN GULF / UPPER R	28	28	100%
21NMEX-LRG053	RIO GRANDE AT NM HIGHWAY 226 NEAR BERINO / WESTERN GULF / UP	34	34	100%
21NMEX-LRG058	RIO GRANDE AT AMERICAN DAM / RIO GRANDE /	10	10	100%
21NMEX-LRG101.000101	RIO GRANDE BELOW SUNLAND PARK / /	32	32	100%

(continued)

Table D-20. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-LRG101.000102	100 M BELOW EL PASO ELECTRIC 001 003 / WESTERN GULF / UPPER	8	8	100%
21NMEX-LRG101.000103	10 M ABOVE EL PASO ELECTRIC OUTFALLS 001 003 / WESTERN GULF	8	8	100%
21NMEX-LRG101.000107	SUNLAND PARK WWTF EFFLUENT / /	24	24	100%
21NMEX-LRG101.000109	RIO GRANDE AT SANTA TERESA / /	27	27	100%
21NMEX-LRG101.000110	RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE / WESTERN G	37	36	97%
21NMEX-LRG101.000125	RIO GRANDE NEAR MESQUITE ON HIGHWAY 192 BRIDGE / WESTERN GUL	32	32	100%
21NMEX-LRG101000107.5	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL / WESTERN GULF / UP	10	10	100%
21NMEX-LRG101000108	RIO GRANDE BELOW WEST DRAIN / WESTERN GULF / UPPER RIO ABOVE	8	8	100%
21NMEX-LRG101000109.5	RIO GRANDE AT BORDERLAND ROAD BRIDGE / WESTERN GULF / UPPER	10	10	100%
21NMEX-LRG101000109.7	RIO GRANDE AT VINTON ROAD BELOW ANTHONY / WESTERN GULF / UPP	8	8	100%
21NMEX-LRG101000139	RIO GRANDE BELOW I-10 BRIDGE NEAR LAS CRUCES / WESTERN GULF	8	8	100%
21NMEX-LRG103.002020	RIO GRANDE BELOW WILLIAMS / /	4	3	75%
21NMEX-LRG103.002030	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE / /	8	6	75%
21NMEX-OT01AP.STINKY	LAKE STINKY / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS RI	2	2	100%
21NMEX-OT02BJ.MALPAISP	STATION APPROX. 100 YDS S OF SPRING IN POOL AREA / WESTERN G	2	2	100%
21NMEX-SWC803.000105	MIMBRES RIVER FOUR MILES S. OF DWYER / WESTERN GULF / UPPER	10	6	60%
21NMEX-SWC803.002001	GALLINAS CREEK ABOVE MIMBRES RIVER / WESTERN GULF / UPPER RI	12	5	42%
21NMEX-SWC803.002501	MIMBRES RIVER ABOVE CONFLUENCE WITH GALLINAS CR. / WESTERN G	18	7	39%
21NMEX-SWC803.002530	MIMBRES RIVER UPSTREAM OF HWY 90 BRIDGE / WESTERN GULF / UPP	18	13	72%
21NMEX-SWC804.003035	MIMBRES RIVER ABOVE MIMBRES GAGE / WESTERN GULF / UPPER RIO	18	4	22%
21NMEX-SWC804.006048	MIMBRES RIVER AT COONEY CAMPGROUND CROSSING 150A / WESTERN G	26	7	27%
21NMEX-SWCANC.TCLD20	CLANTON DRAW AT GRAY RANCH HEADQUARTERS / /	2	2	100%

Table D-21. Water Quality Comparisons for New Mexico: Chlorophyll-a (Water Quality Indicator IDs: 1172, 1297)

Data Points	Values Exceeding	Station ID	Station Name	Indicator ID
21NMEX-BEARCANYONDAM	SLIGHTLY E. OF DAM CENTER 1/8 DISTANCE FROM DAM / COLORADO R	4	4	100%
21NMEX-DA03BI.DAVIES	STATION ON W END OF TANK 1/4 MI E. OF ROAD. / WESTERN GULF M	2	2	100%
21NMEX-HI01AK.SACATONP	PLAYA LAKE DUE N FROM DUNES OF N LORDSBURG PLAYA / COLORADO	2	2	100%
21NMEX-LRG101.000102	100 M BELOW EL PASO ELECTRIC 001 003 / WESTERN GULF / UPPER	2	2	100%
21NMEX-LRG101.000110	RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE / WESTERN G	2	2	100%
21NMEX-LRG101.000125	RIO GRANDE NEAR MESQUITE ON HIGHWAY 192 BRIDGE / WESTERN GUL	2	2	100%
21NMEX-LRG101000107.5	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL / WESTERN GULF / UP	2	2	100%
21NMEX-LRG101000109.5	RIO GRANDE AT BORDERLAND ROAD BRIDGE / WESTERN GULF / UPPER	2	2	100%
21NMEX-OT01AP.STINKY	LAKE STINKY / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS RI	2	2	100%

Table D-22. Water Quality Comparisons for New Mexico: Dissolved Oxygen (Water Quality Indicator ID: 1127, 1211, 1191, 1089, 1073, 1189, 1190)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-BEARCANYONDAM	SLIGHTLY E. OF DAM CENTER 1/8 DISTANCE FROM DAM / COLORADO R	26	17	65%
21NMEX-SWC804.006048	MIMBRES RIVER AT COONEY CAMPGROUND CROSSING 150A / WESTERN G	9	3	33%
21NMEX-LRG103.002030	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE / /	3	1	33%
21NMBHO-BHO043	301 Mendez--La Union 88021 / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO051	398 Alvarez--La Union / WESTERN GULF / UPPER RIO GRANDE ABOV	1	1	100%
21NMBHO-BHO050	1313 W Main St--La Union / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO049	125 N. Alvarez--La Union / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO048	125 N. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO047	105 N. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO046	412 S. Virginia--La Union / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO052	1626 Paloma--La Union / WESTERN GULF / UPPER RIO GRANDE ABOV	1	1	100%
21NMBHO-BHO044	324 S. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO055	1400 Main St--La Union 88021 / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO042	1526 Amador--La Union 88021 / WESTERN GULF / UPPER RIO GRAN	1	1	100%
21NMBHO-BHO041	272 South Virginia--La Union 88021 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO040	413 Mendez--La Union 88021 / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO045	412 S. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO066	124 Miranda St--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO054	immediately west of BHO053--La Union / WESTERN GULF / UPPER	1	1	100%
21NMBHO-BHO037	Mustang Dr--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE PEC	1	1	100%

(continued)

Table D-22. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO056	701 Lopez Rd--Chamberino 88027 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO057	601 Medina--Chamberino 88027 / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO058	201 Lopez --Chamberino 88027 / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO059	4372 S Hwy 28--San Pablo 88005 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO060	4169 Sauco Ln.--San Pablo 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO061	1095 Sierra Vista--Berino / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO062	near valley view dairy-- / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO063	946 Lechuga--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	1	1	100%
21NMBHO-BHO064	733 Lechuga Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO065	795 Lechuga Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO053	1201 Main --La Union / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO019	Calle Ruiz #215-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	1	1	100%
21NMBHO-BHO003	1705 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO004	1400 Burke Road--Las Cruces 80005 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO005	1230 Burke Rd--Las Cruces 80005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO006	1120 Burke Rd--Las Cruces 80005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO007	231 Boggy Lane--Mesilla Park 88047 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO008	201 Boggy Lane--Mesilla Park 88047 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO009	320 Boggy Lane--Mesilla Park 88047 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO010	330 Boggy Lane--Mesilla Park 88047 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO011	4633 Lamar Rd--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%

(continued)

Table D-22. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO012	4597 Lamar Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO013	near Lamar Rd--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO014	El Farro St. #4443-- / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO039	304 Provencio Rd.--Chamberino / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO018	Ashtray Road-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO038	216 Lopez St--Chamberino / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO020	Ashtray Road-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO021	Ashtray Road-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO023	(Moonlight) Rt 1 Box 479--La Mesa / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO024	428 Moonlight--San Miguel / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO025	538 Costilla Pl-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	1	1	100%
21NMBHO-BHO028	Vistosos Loop #2--Berino / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO029	Calle Vistoso Loop #35--Berino / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO030	1093 Sierra Vista--Berino / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO032	6821 Portilla Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABO	1	1	100%
21NMBHO-BHO035	810 Lechuga Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO036	7524 Mustang--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE P	1	1	100%
21NMBHO-BHO071	133 Boone Circle--Anthony 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO016	846 Pajara Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO133	110 Ashtray Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO116	1800 Overcast Rd--Anthony / WESTERN GULF / UPPER RIO GRANDE	1	1	100%

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Table D-22. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO119	2601 W O'Hara Rd--Anthony 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO120	2510 W O'Hara Rd--Anthony / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO121	2500 O'Hara Rd--Anthony 88021 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO122	7717 Hwy 28-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO123	Hwy 28 & O'Hara-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	1	1	100%
21NMBHO-BHO124	441 Minter Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO126	456 Wannabe Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO128	11816 Hatheway--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO129	11781 Jarmen Dr--Mesquite 88048 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO130	Hwy 192/County Rd B43--Mesquite 88048 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO067	1045 Miranda Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOV	1	1	100%
21NMBHO-BHO132	216 W. San Miguel--Mesquite 88048 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO111	Hwy 28--San Miguel / WESTERN GULF / UPPER RIO GRANDE ABOVE P	1	1	100%
21NMBHO-BHO134	1530 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO135	1660 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO136	3719 Bales Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO137	2460 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO138	1060 Road Runner Rd--Las Cruces 88005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO139	1240 Burke Road--Las Cruces 88005 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO140	711 Long River Lane--Fair Acres / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO141	730 Tamaris --Rio Grande Estates / WESTERN GULF / UPPER RIO	1	1	100%

(continued)

Table D-22. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO142	3500 West View --Las Cruces / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO143	553 Fairpark Rd--Fair Acres / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO144	11836 Jarmon --Mesquite 88048 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMEX-DA03BI.DAVIES	STATION ON W END OF TANK 1/4 MI E. OF ROAD. / WESTERN GULF M	1	1	100%
21NMBHO-BHO131	12409 Railroad Dr--Mesquite 88048 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO088	Iglesias Rd--Mesilla Park / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO068	Lara Rd--Chamberino / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO072	150 Boone Circle--Anthony 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO073	138 Boone Circle--Anthony 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO074	2001 Washington--Anthony 88021 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO075	1508 W. Washington--Anthony 88021 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO076	1509 W. Washington--Anthony 88021 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO077	1505 W. Washington--Anthony 88021 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO079	1401 W. Washington--Anthony 88021 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO080	Pancho Place-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO081	6040 Pancho Place-- / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO083	6090 Mariachi Place--Mesilla Park / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO085	3810 Mariachi Place--Mesilla Park 88047 / WESTERN GULF / UP	1	1	100%
21NMBHO-BHO114	Hwy 28--1/2 mi south of Dairy--Santa Teresa / WESTERN GULF /	1	1	100%
21NMBHO-BHO087	6009 South Main--Mesilla Park / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO113	McNutt and Borderland--Santa Teresa / WESTERN GULF / UPPER R	1	1	100%

(continued)

Table D-22. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO089	2292 Old Hwy (Las Palmaras)-- / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO092	5405 Santa Teresita--Santa Teresa 88008 / WESTERN GULF / UP	1	1	100%
21NMBHO-BHO094	643 Pinabetes--Las Cruces 88001 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO095	388 Meadow Park--Fair Acres / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO096	837 Clark Lane--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO097	705 Clark Lane--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO098	7335 Harvey Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO102	13140 N Hwy 85--Radium Springs / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO106	2268 Alta Mira--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO108	18924 S. Hwy 28--San Miguel 88058 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO110	Hwy 28--San Miguel / WESTERN GULF / UPPER RIO GRANDE ABOVE P	1	1	100%
21NMBHO-BHO001	1205 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO086	Opal Rd-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%

Table D-23. Water Quality Comparisons for New Mexico: Fecal Coliform (Water Quality Indicator IDs: 1166, 1091)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-NM0020010	Hatch WWTP	2	2	100%
ModSTORET-NM0020109	Silver City WWTP	2	1	50%
ModSTORET-NM0023311	Las Cruces WWTP	2	2	100%

Table D-24. Water Quality Comparisons for New Mexico: Sulfate (Water Quality Indicator ID: 1161)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-LRG046.5	RIO GRANDE AT BRIDGE NEAR LA MESILLA / WESTERN GULF / UPPER	7	3	43%
21NMEX-LRG101.000109	RIO GRANDE AT SANTA TERESA / /	6	6	100%
21NMEX-LRG046	RIO GRANDE AT PICACHO AVE IN LAS CRUCES / WESTERN GULF / UPP	6	3	50%
21NMEX-LRG101.000110	RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE / WESTERN G	6	6	100%
21NMEX-LRG053	RIO GRANDE AT NM HIGHWAY 226 NEAR BERINO / WESTERN GULF / UP	5	4	80%
21NMEX-LRG101.000101	RIO GRANDE BELOW SUNLAND PARK / /	5	5	100%
21NMEX-LRG101.000125	RIO GRANDE NEAR MESQUITE ON HIGHWAY 192 BRIDGE / WESTERN GUL	4	2	50%
21NMEX-LRG045.5	RIO GRANDE AT NM HWY 430 NEAR DONA ANA / WESTERN GULF / UPPE	4	2	50%
21NMEX-LRG103.002020	RIO GRANDE BELOW WILLIAMS / /	4	1	25%
21NMEX-LRG047	RIO GRANDE AT MESILLA DIVERSION DAM / WESTERN GULF / UPPER R	4	2	50%
21NMEX-LRG046.3	LAS CRUCES WWTP EFFLUENT DITCH AT RIO GRANDE / WESTERN GULF	4	1	25%
21NMEX-LRG101.000107	SUNLAND PARK WWTF EFFLUENT / /	4	4	100%
21NMBHO-BHO019	Calle Ruiz #215-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PE	3	3	100%
21NMBHO-BHO126	456 Wannabe Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	2	2	100%
21NMBHO-BHO106	2268 Alta Mira--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	2	2	100%
21NMBHO-BHO047	105 N. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	2	2	100%
21NMBHO-BHO026	1198 Wanabe Road #3--Mesquite 88048 / WESTERN GULF / UPPER	2	2	100%
21NMBHO-BHO093	McNutt-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	2	2	100%
21NMBHO-BHO035	810 Lechuga Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	2	2	100%
21NMBHO-BHO022	417 Koenig--Mesquite / WESTERN GULF / UPPER RIO GRANDE ABOVE	2	2	100%
21NMBHO-BHO054	immediately west of BHO053--La Union / WESTERN GULF / UPPER	1	1	100%

(continued)

Table D-24. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO085	3810 Mariachi Place--Mesilla Park 88047 / WESTERN GULF / UP	1	1	100%
21NMBHO-BHO056	701 Lopez Rd--Chamberino 88027 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO057	601 Medina--Chamberino 88027 / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO058	201 Lopez --Chamberino 88027 / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO081	6040 Pancho Place-- / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO060	4169 Sauco Ln.--San Pablo 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO061	1095 Sierra Vista--Berino / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO062	near valley view dairy-- / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO064	733 Lechuga Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO067	1045 Miranda Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABOV	1	1	100%
21NMBHO-BHO079	1401 W. Washington--Anthony 88021 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO059	4372 S Hwy 28--San Pablo 88005 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO099	6900 N Hwy 85--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO003	1705 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO005	1230 Burke Rd--Las Cruces 80005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO023	(Moonlight) Rt 1 Box 479--La Mesa / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO028	Vistosos Loop #2--Berino / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO029	Calle Vistoso Loop #35--Berino / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO030	1093 Sierra Vista--Berino / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO038	216 Lopez St--Chamberino / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%
21NMBHO-BHO032	6821 Portilla Rd--Vado / WESTERN GULF / UPPER RIO GRANDE ABO	1	1	100%
21NMBHO-BHO050	1313 W Main St--La Union / WESTERN GULF / UPPER RIO GRANDE A	1	1	100%

(continued)

Table D-24. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMBHO-BHO037	Mustang Dr--Vado / WESTERN GULF / UPPER RIO GRANDE ABOVE PEC	1	1	100%
21NMBHO-BHO088	Iglesias Rd--Mesilla Park / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO040	413 Mendez--La Union 88021 / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO041	272 South Virginia--La Union 88021 / WESTERN GULF / UPPER R	1	1	100%
21NMBHO-BHO043	301 Mendez--La Union 88021 / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO048	125 N. Virginia--La Union 88021 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO031	121 Warthem--Berino / WESTERN GULF / UPPER RIO GRANDE ABOVE	1	1	100%
21NMBHO-BHO142	3500 West View --Las Cruces / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO096	837 Clark Lane--Las Cruces / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO135	1660 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO136	3719 Bales Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO137	2460 Burke Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO138	1060 Road Runner Rd--Las Cruces 88005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO139	1240 Burke Road--Las Cruces 88005 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO132	216 W. San Miguel--Mesquite 88048 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO141	730 Tamaris --Rio Grande Estates / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO130	Hwy 192/County Rd B43--Mesquite 88048 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO143	553 Fairpark Rd--Fair Acres / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO144	11836 Jarmon --Mesquite 88048 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMEX-DA01AN.S-LUCERO	SAMPLE STATION ON WEST END OF LAKE VIA MISSLE RA / WESTERN G	1	1	100%
21NMEX-DA02AO.N-LUCERO	SAMPLE STATION NEXT TO RANGE RD 10 ON MISSLE RNG / WESTERN G	1	1	100%
21NMEX-OT01AP.STINKY	LAKE STINKY / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS RI	1	1	100%

(continued)

Table D-24. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
21NMEX-OT02BJ.MALPAISP	STATION APPROX. 100 YDS S OF SPRING IN POOL AREA / WESTERN G	1	1	100%
21NMEX-SWC000.000050	APPROX 400 FT BELOW NM0027375 RIODEARENAS MHP / SOUTHWESTERN	1	1	100%
21NMBHO-BHO140	711 Long River Lane--Fair Acres / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO103	13633 N Hwy 85--Radium Springs / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO090	1023 Grace-- / WESTERN GULF / UPPER RIO GRANDE ABOVE PECOS	1	1	100%
21NMBHO-BHO092	5405 Santa Teresita--Santa Teresa 88008 / WESTERN GULF / UP	1	1	100%
21NMBHO-BHO094	643 Pinabetes--Las Cruces 88001 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO095	388 Meadow Park--Fair Acres / WESTERN GULF / UPPER RIO GRAND	1	1	100%
21NMBHO-BHO002	1529 Road Runner Ln--Las Cruces 80005 / WESTERN GULF / UPPE	1	1	100%
21NMBHO-BHO098	7335 Harvey Rd--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO133	110 Ashtray Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO100	6335 N Hwy 85--Las Cruces 88005 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO089	2292 Old Hwy (Las Palmaras)-- / WESTERN GULF / UPPER RIO GRA	1	1	100%
21NMBHO-BHO105	17835 N Hwy 85--Radium Springs 88005 / WESTERN GULF / UPPER	1	1	100%
21NMBHO-BHO108	18924 S. Hwy 28--San Miguel 88058 / WESTERN GULF / UPPER RI	1	1	100%
21NMBHO-BHO116	1800 Overcast Rd--Anthony / WESTERN GULF / UPPER RIO GRANDE	1	1	100%
21NMBHO-BHO124	441 Minter Rd--Mesquite 88048 / WESTERN GULF / UPPER RIO GR	1	1	100%
21NMBHO-BHO125	11859 Jarmen Dr.--Mesquite 88048 / WESTERN GULF / UPPER RIO	1	1	100%
21NMBHO-BHO128	11816 Hatheway--Mesquite 88048 / WESTERN GULF / UPPER RIO G	1	1	100%
21NMBHO-BHO129	11781 Jarmen Dr--Mesquite 88048 / WESTERN GULF / UPPER RIO	1	1	100%
21NMEX-SWC000.000055	APPROX 20 FT ABOVE NM0027375 RIODEARENAS MHP / SOUTHWESTERN	1	1	100%

Table D-25. Water Quality Comparisons for New Mexico: Chloride (Water Quality Indicator IDs: 1087, 1159)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
ModSTORET-NM0020681	Truth or Consequences WWTP	3	3	100%
ModSTORET-NM0023311	Las Cruces WWTP	1	1	100%
ModSTORET-NM0020109	Silver City WWTP	1	1	100%
ModSTORET-NM0020010	Hatch WWTP	1	1	100%

Table D-26. Water Quality Comparisons for New Mexico: pH (Water Quality Indicator IDs: 29, 1076, 1077, 1135, 1136)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
SCERP-West Mesa WWTF	West Mesa Wastewater Treatment Facility	8	6	75%

Table D-27. Water Quality Comparisons for New Mexico: Total Dissolved Solids (Water Quality Indicator ID: 1445)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
SCERP-West Mesa WWTF	West Mesa Wastewater Treatment Facility	31	31	100%

D.1.4 Water Quality Comparisons for Texas

The Texas Commission on Environmental Quality, formerly known as the Texas Natural Resource Conservation Commission has issued detailed surface water quality standards for the State of Texas (TNRCC, 2000). General criteria apply to surface water in the state and specifically apply to substances attributed to waste discharges or the activities of humans. General criteria are superseded by specific exemptions. Specific toxic materials must meet criteria for protecting aquatic life and human health. Site-specific uses and criteria exist for contact and noncontact recreation for both freshwater and saltwater. Criteria exist for the domestic water supply. Application of standards depends also on low flow conditions, mixing zones, minimum analytical levels, etc. The regulations also include definitions of low flow for each river segment in Texas. The standards corresponding to the International Amistad Reservoir are shown in Table D-28. These standards are the strictest among all river segments on the Rio Grande Basin.

Table D-28. Water Quality Standards for Texas

Parameter	Criteria	Comment
Chloride (mg/L) (1)	≤ 150	International Amistad Reservoir
Dissolved oxygen (mg/L)	≥ 5.0	International Amistad Reservoir
E. coli (CFU/100 ml)	≤ 126	International Amistad Reservoir
Fecal Coliform (CFU/100 ml)	≤ 200	International Amistad Reservoir
pH	6.5–9.0	International Amistad Reservoir
Sulfate (mg/L) (1)	≤ 270	International Amistad Reservoir
Total Dissolved Solids (mg/L)	≤ 800	International Amistad Reservoir

Tables D-29 to D-35 compare Repository data on chlorophyll a, fecal coliform, sulfate, chloride, dissolved oxygen, *e. coli*, and total dissolved solids, respectively, to these standards.

Table D-29. Water Quality Comparisons for Texas: Chlorophyll-a (Water Quality Indicator ID: 1172)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	59	55	93%
TCEQ-15817	RIO GRANDE AT WEBB/ZAPATA CO	57	49	86%
TCEQ-13560	RIO GRANDE AT MOODY RANCH	45	29	64%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	44	32	73%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	43	40	93%
TCEQ-13181	RIO GRANDE AT US 281	42	31	74%
TCEQ-13228	RIO GRANDE AT SANTA ELENA CNY	41	37	90%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	41	30	73%
TCEQ-13072		38	34	89%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	38	35	92%
TCEQ-13073		38	34	89%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	37	33	89%
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	35	34	97%
TCEQ-15528	RIO GRANDE 1.3KM DWNSTRM WWTP	31	24	77%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	26	24	92%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	25	20	80%
TCEQ-13446	LAGUNA MADRE GIWW CM 129	25	11	44%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	24	24	100%
TCEQ-13185		23	23	100%
TCEQ-13086		21	19	90%
TCEQ-13079		21	21	100%
TCEQ-13082		21	18	86%
TCEQ-16445	ARROYO COLORADO AT DILWORTH R	21	18	86%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	20	19	95%
TCEQ-13071	ARROYO COLORADO AT CM 22	20	14	70%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	19	16	84%
TCEQ-13257	PECOS RIVER AT US 67	19	14	74%
TCEQ-15114	PECOS R. ABOVE US 290	19	16	84%
TCEQ-13039		19	17	89%
TCEQ-13246	PECOS R. NR. VAL VERDE CO. LN	18	14	78%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	18	12	67%
TCEQ-13782	ARROYO COLORADO CM 16	18	14	78%
TCEQ-13056		18	10	56%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	18	17	94%
TCEQ-13225	RIO GRANDE AT FM 2627	17	11	65%
TCEQ-13559	ARROYO COLORADO AT CM27, MI 1	17	15	88%

(continued)

Table D-29. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13184		17	17	100%
TCEQ-13084		17	14	82%
TCEQ-17113	DRAINAGE DITCH HARDING RANCH	17	8	47%
TCEQ-13459	SOUTH BAY NEAR SHIP CM 17	17	5	29%
TCEQ-13460	BROWNSVILLE SHIP CHANNEL CM 3	17	7	41%
TCEQ-14875	BROWNSVILLE SHIP CHANNEL	17	15	88%
TCEQ-13448	LAGUNA MADRE AT GIWW	16	10	63%
TCEQ-15892	AMISTAD RESERV RIO GRANDE ARM	15	8	53%
TCEQ-15814	RIO GRANDE AT INTL BRIDGE #2	15	11	73%
TCEQ-15893	AMISTAD RESERV DEVILS R ARM	14	7	50%
TCEQ-13285	PORT ISABEL AT SH 100	14	5	36%
TCEQ-15820	SAN FELIPE CK AT WEST SPRINGS	14	5	36%
TCEQ-13206	RIO GRANDE AT US 277	14	9	64%
TCEQ-15529	RIO GRANDE UPSTR HASKELL WWTP	13	13	100%
TCEQ-13202	RIO GRANDE LAREDO WTP PUMP	13	7	54%
TCEQ-14942	DOLAN SPRGS AT DEVILS R CONFL	13	1	8%
TCEQ-13835		12	4	33%
TCEQ-13103		10	8	80%
TCEQ-13270	SAN FELIPE CK AT GUYLER CONFL	10	3	30%
TCEQ-17407	RIO GRANDE UPSTRM OF CANDELAR	10	10	100%
TCEQ-17596	RIO GRANDE AT APACHE RANCH	10	10	100%
TCEQ-17114	HIDALGO POTW OUTFALL	9	9	100%
TCEQ-17115	MISSION POTW DISCHARGE DITCH	9	6	67%
TCEQ-17247	RIO GRANDE UPSTRM OF FM 1015	9	5	56%
TCEQ-17111	DONNA POTW DISCHARGE DITCH	9	2	22%
TCEQ-16379	PECOS RIVER BELOW US90W BRIDG	9	7	78%
TCEQ-13223	RIO GRNADE AT FOSTER RANCH	9	2	22%
TCEQ-17112	MERCEDES POTW DISCHARGE DITC	8	7	88%
TCEQ-15818	FALCON RES AT SAN YGNACIO WTP	8	6	75%
TCEQ-15274	RIO GRANDE AT IBWC WEIR DAM	8	1	13%
TCEQ-15821	SAN FELIPE CK AT BLUEHOLE GAT	7	2	29%
TCEQ-13189		7	7	100%
TCEQ-13179	RIO GRANDE AT RIVER BEND	5	4	80%
TCEQ-13116		4	4	100%
TCEQ-14870	LAGUNA MADRE NEAR LAGUNA VIST	4	2	50%
TCEQ-16288	RIO GRANDE AT SABAL PALM	3	2	67%
TCEQ-14871	BROWNSVILLE SHIP CHANNEL	3	2	67%
TCEQ-14865	SOUTH BAY	3	2	67%
TCEQ-13255	PECOS RIVER AT FM 1901	1	1	100%

Table D-30. Water Quality Comparisons for Texas: Fecal Coliform (Water Quality Indicator IDs: 1091, 1166, 1181)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
CNA-PSRB-02	Km 0+000, PUENTE INTERNACIONAL CD. JUÁREZ	1	1	100%
CNA-PSRB-04	PUENTE INTERNACIONAL FORT-HANKOK	1	1	100%
CNA-PSRB-23	PUENTE INTERNACIONAL 1. NUEVO LAREDO	8	8	100%
CNA-PSRB-24	R. BRAVO-PARQUE INDUSTRIAL ACUÑA	9	2	22%
CNA-SSRB-25	PUENTE INTERNACIONAL REYNOSA	6	1	17%
CNA-SSRB-36	PUENTE INT. CAMARGO	4	1	25%
TCEQ-13039		6	5	83%
TCEQ-13056		6	5	83%
TCEQ-13072		25	9	36%
TCEQ-13073		21	7	33%
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	26	21	81%
TCEQ-13079		16	12	75%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	26	25	96%
TCEQ-13082		17	17	100%
TCEQ-13084		8	5	63%
TCEQ-13086		17	16	94%
TCEQ-13103		6	4	67%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	35	14	40%
TCEQ-13181	RIO GRANDE AT US 281	34	13	38%
TCEQ-13185		22	2	9%
TCEQ-13196	RIO GRANDE BELOW LAREDO	30	24	80%
TCEQ-13201		29	24	83%
TCEQ-13202	RIO GRANDE LAREDO WTP PUMP	44	12	27%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	43	24	56%
TCEQ-13206	RIO GRANDE AT US 277	14	2	14%
TCEQ-13225	RIO GRANDE AT FM 2627	11	3	27%
TCEQ-13228	RIO GRANDE AT SANTA ELENA CNY	26	8	31%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	35	27	77%
TCEQ-13270	SAN FELIPE CK AT GUYLER CONFL	6	4	67%
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	109	95	87%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	11	6	55%
TCEQ-13285	PORT ISABEL AT SH 100	7	1	14%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	22	1	5%
TCEQ-13559	ARROYO COLORADO AT CM27, MI 1	10	2	20%
TCEQ-13560	RIO GRANDE AT MOODY RANCH	44	23	52%

(continued)

Table D-30. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13782	ARROYO COLORADO CM 16	10	1	10%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	79	32	41%
TCEQ-15528	RIO GRANDE 1.3KM DWNSTRM WWTP	110	73	66%
TCEQ-15529	RIO GRANDE UPSTR HASKELL WWTP	94	65	69%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	1	1	100%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	28	16	57%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	35	15	43%
TCEQ-15813	RIO GRANDE AT CP&L POWER PLAN	17	2	12%
TCEQ-15814	RIO GRANDE AT INTL BRIDGE #2	45	37	82%
TCEQ-15815	RIO GRANDE AT MASTERSON RD	31	26	84%
TCEQ-15817	RIO GRANDE AT WEBB/ZAPATA CO	38	13	34%
TCEQ-15818	FALCON RES AT SAN YGNACIO WTP	6	3	50%
TCEQ-15820	SAN FELIPE CK AT WEST SPRINGS	1	1	100%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	12	10	83%
TCEQ-16445	ARROYO COLORADO AT DILWORTH R	17	15	88%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	11	2	18%
TCEQ-17000	RIO GRANDE PRESIDIO RR BRIDGE	21	20	95%
TCEQ-17001	RIO GRANDE PRESIDIO/OJINAGA	20	4	20%
TCEQ-17111	DONNA POTW DISCHARGE DITCH	9	8	89%
TCEQ-17112	MERCEDES POTW DISCHARGE DITC	9	9	100%
TCEQ-17113	DRAINAGE DITCH HARDING RANCH	8	6	75%
TCEQ-17114	HIDALGO POTW OUTFALL	9	9	100%
TCEQ-17115	MISSION POTW DISCHARGE DITCH	9	8	89%

Table D-31. Water Quality Comparisons for Texas: Sulfate (Water Quality Indicator ID: 1161)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	118	38	32%
TCEQ-15528	RIO GRANDE 1.3KM DWNSTRM WWTP	113	47	42%
TCEQ-15529	RIO GRANDE UPSTR HASKELL WWTP	94	34	36%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	81	24	30%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	59	57	97%
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	59	57	97%
TCEQ-15817	RIO GRANDE AT WEBB/ZAPATA CO	57	1	2%
TCEQ-13560	RIO GRANDE AT MOODY RANCH	51	1	2%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	51	6	12%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	46	2	4%
TCEQ-13079		46	43	93%
TCEQ-13181	RIO GRANDE AT US 281	45	3	7%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	45	2	4%
TCEQ-13228	RIO GRANDE AT SANTA ELENA CNY	43	41	95%
TCEQ-13073		38	37	97%
TCEQ-13072		38	36	95%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	38	31	82%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	38	37	97%
TCEQ-13185		33	1	3%
TCEQ-13223	RIO GRNADE AT FOSTER RANCH	30	21	70%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	26	22	85%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	25	25	100%
TCEQ-13446	LAGUNA MADRE GIWW CM 129	25	25	100%
TCEQ-13184		24	2	8%
TCEQ-16445	ARROYO COLORADO AT DILWORTH R	21	20	95%
TCEQ-13086		21	20	95%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	21	21	100%
TCEQ-13082		21	21	100%
TCEQ-13071	ARROYO COLORADO AT CM 22	20	18	90%
TCEQ-13240	PECOS RIVER NEAR LANGTRY	20	19	95%
TCEQ-15114	PECOS R. ABOVE US 290	19	19	100%
TCEQ-13257	PECOS RIVER AT US 67	19	19	100%
TCEQ-13039		19	16	84%
TCEQ-13056		19	11	58%

(continued)

Table D-31. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13782	ARROYO COLORADO CM 16	18	18	100%
TCEQ-13246	PECOS R. NR. VAL VERDE CO. LN	18	18	100%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	18	10	56%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	18	4	22%
TCEQ-13084		17	17	100%
TCEQ-13225	RIO GRANDE AT FM 2627	17	15	88%
TCEQ-14875	BROWNSVILLE SHIP CHANNEL	17	17	100%
TCEQ-13459	SOUTH BAY NEAR SHIP CM 17	17	17	100%
TCEQ-13448	LAGUNA MADRE AT GIWW	17	17	100%
TCEQ-13460	BROWNSVILLE SHIP CHANNEL CM 3	17	17	100%
TCEQ-13559	ARROYO COLORADO AT CM27, MI 1	17	17	100%
TCEQ-17113	DRAINAGE DITCH HARDING RANCH	17	17	100%
TCEQ-13285	PORT ISABEL AT SH 100	14	14	100%
TCEQ-17407	RIO GRANDE UPSTRM OF CANDELAR	10	10	100%
TCEQ-13103		10	6	60%
TCEQ-17596	RIO GRANDE AT APACHE RANCH	10	1	10%
TCEQ-17247	RIO GRANDE UPSTRM OF FM 1015	10	2	20%
TCEQ-17115	MISSION POTW DISCHARGE DITCH	9	8	89%
TCEQ-17114	HIDALGO POTW OUTFALL	9	3	33%
TCEQ-16379	PECOS RIVER BELOW US90W BRIDG	9	6	67%
TCEQ-17111	DONNA POTW DISCHARGE DITCH	9	8	89%
TCEQ-17112	MERCEDES POTW DISCHARGE DITC	9	9	100%
TCEQ-18196	UNNAMED DITCH SOUTH OF FM 510	5	4	80%
TCEQ-13116		4	3	75%
TCEQ-14870	LAGUNA MADRE NEAR LAGUNA VIST	4	4	100%
TCEQ-14871	BROWNSVILLE SHIP CHANNEL	3	3	100%
TCEQ-14865	SOUTH BAY	3	3	100%
TCEQ-16288	RIO GRANDE AT SABAL PALM	3	2	67%
TCEQ-13255	PECOS RIVER AT FM 1901	1	1	100%

Table D-32. Water Quality Comparisons for Texas: Chloride (Water Quality Indicator ID: 1159, 1046, 1087)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	117	40	34%
TCEQ-15528	RIO GRANDE 1.3KM DWNSTRM WWTP	107	41	38%
TCEQ-15529	RIO GRANDE UPSTR HASKELL WWTP	88	32	36%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	77	27	35%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	59	54	92%
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	59	57	97%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	51	36	71%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	46	1	2%
TCEQ-13079		46	44	96%
TCEQ-13181	RIO GRANDE AT US 281	45	19	42%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	45	18	40%
TCEQ-13228	RIO GRANDE AT SANTA ELENA CNY	43	36	84%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	38	38	100%
TCEQ-13073		38	38	100%
TCEQ-13072		38	38	100%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	36	34	94%
TCEQ-13185		33	3	9%
TCEQ-13223	RIO GRNADE AT FOSTER RANCH	30	11	37%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	26	17	65%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	25	25	100%
TCEQ-13196	RIO GRANDE BELOW LAREDO	25	1	4%
TCEQ-13446	LAGUNA MADRE GIWW CM 129	25	25	100%
TCEQ-13184		24	6	25%
TCEQ-13082		21	21	100%
TCEQ-16445	ARROYO COLORADO AT DILWORTH R	21	20	95%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	21	21	100%
TCEQ-13086		21	21	100%
TCEQ-13071	ARROYO COLORADO AT CM 22	20	19	95%
TCEQ-13240	PECOS RIVER NEAR LANGTRY	20	20	100%
TCEQ-15114	PECOS R. ABOVE US 290	19	19	100%
TCEQ-13056		19	18	95%
TCEQ-13039		19	18	95%
TCEQ-13257	PECOS RIVER AT US 67	19	19	100%
TCEQ-13246	PECOS R. NR. VAL VERDE CO. LN	18	18	100%

(continued)

Table D-32. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13782	ARROYO COLORADO CM 16	18	18	100%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	18	3	17%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	18	18	100%
TCEQ-13448	LAGUNA MADRE AT GIWW	17	17	100%
TCEQ-13459	SOUTH BAY NEAR SHIP CM 17	17	17	100%
TCEQ-13460	BROWNSVILLE SHIP CHANNEL CM 3	17	17	100%
TCEQ-13559	ARROYO COLORADO AT CM27, MI 1	17	17	100%
TCEQ-13225	RIO GRANDE AT FM 2627	17	8	47%
TCEQ-13084		17	17	100%
TCEQ-14875	BROWNSVILLE SHIP CHANNEL	17	17	100%
TCEQ-17113	DRAINAGE DITCH HARDING RANCH	17	17	100%
TCEQ-15892	AMISTAD RESERV RIO GRANDE ARM	16	4	25%
CNA-PSRB-04	PUENTE INTERNACIONAL FORT-HANKOK	14	10	71%
TCEQ-13285	PORT ISABEL AT SH 100	14	14	100%
CNA-PSRB-02	Km 0+000, PUENTE INTERNACIONAL CD. JUÁREZ	14	4	29%
TCEQ-17247	RIO GRANDE UPSTRM OF FM 1015	10	4	40%
TCEQ-17596	RIO GRANDE AT APACHE RANCH	10	1	10%
TCEQ-17407	RIO GRANDE UPSTRM OF CANDELAR	10	10	100%
TCEQ-13103		10	9	90%
TCEQ-16379	PECOS RIVER BELOW US90W BRIDG	9	9	100%
TCEQ-17111	DONNA POTW DISCHARGE DITCH	9	9	100%
TCEQ-17112	MERCEDES POTW DISCHARGE DITC	9	9	100%
TCEQ-17114	HIDALGO POTW OUTFALL	9	9	100%
TCEQ-17115	MISSION POTW DISCHARGE DITCH	9	9	100%
CNA-SSRB-36	PUENTE INT. CAMARGO	6	6	100%
TCEQ-13179	RIO GRANDE AT RIVER BEND	5	4	80%
TCEQ-18196	UNNAMED DITCH SOUTH OF FM 510	5	5	100%
TCEQ-14870	LAGUNA MADRE NEAR LAGUNA VIST	4	4	100%
TCEQ-13116		4	3	75%
TCEQ-16288	RIO GRANDE AT SABAL PALM	3	3	100%
TCEQ-14871	BROWNSVILLE SHIP CHANNEL	3	3	100%
TCEQ-14865	SOUTH BAY	3	3	100%

Table D-33. Water Quality Comparisons for Texas: Dissolved Oxygen (Water Quality Indicator IDs: 1211, 1127, 1089, 1073)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
CNA-PSRB-02	Km 0+000, PUENTE INTERNACIONAL CD. JUÁREZ	10	4	40%
CNA-PSRB-04	PUENTE INTERNACIONAL FORT-HANKOK	10	3	30%
TCEQ-13039		19	2	11%
TCEQ-13056		18	9	50%
TCEQ-13071	ARROYO COLORADO AT CM 22	55	17	31%
TCEQ-13072		232	161	69%
TCEQ-13073		153	98	64%
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	40	6	15%
TCEQ-13079		44	2	5%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	39	1	3%
TCEQ-13082		20	3	15%
TCEQ-13084		15	4	27%
TCEQ-13086		20	2	10%
TCEQ-13103		9	1	11%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	55	12	22%
TCEQ-13179	RIO GRANDE AT RIVER BEND	5	1	20%
TCEQ-13181	RIO GRANDE AT US 281	47	1	2%
TCEQ-13185		24	1	4%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	60	1	2%
TCEQ-13209	RIO GRANDE BELOW AMISTAD DAM	18	6	33%
TCEQ-13223	RIO GRNADE AT FOSTER RANCH	28	1	4%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	66	2	3%
TCEQ-13257	PECOS RIVER AT US 67	19	4	21%
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	130	1	1%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	14	1	7%
TCEQ-13285	PORT ISABEL AT SH 100	36	1	3%
TCEQ-13446	LAGUNA MADRE GIWW CM 129	57	1	2%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	50	8	16%
TCEQ-13448	LAGUNA MADRE AT GIWW	44	5	11%
TCEQ-13460	BROWNSVILLE SHIP CHANNEL CM 3	96	2	2%
TCEQ-13559	ARROYO COLORADO AT CM27, MI 1	55	27	49%
TCEQ-13560	RIO GRANDE AT MOODY RANCH	56	2	4%
TCEQ-13782	ARROYO COLORADO CM 16	55	13	24%
TCEQ-13835		197	41	21%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	89	7	8%

(continued)

Table D-33. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-14871	BROWNSVILLE SHIP CHANNEL	28	9	32%
TCEQ-14875	BROWNSVILLE SHIP CHANNEL	64	7	11%
TCEQ-15114	PECOS R. ABOVE US 290	19	1	5%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	13	1	8%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	62	9	15%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	47	1	2%
TCEQ-15892	AMISTAD RESERV RIO GRANDE ARM	171	16	9%
TCEQ-15893	AMISTAD RESERV DEVILS R ARM	120	18	15%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	21	1	5%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	31	1	3%
TCEQ-17111	DONNA POTW DISCHARGE DITCH	8	6	75%
TCEQ-17113	DRAINAGE DITCH HARDING RANCH	17	9	53%
TCEQ-17114	HIDALGO POTW OUTFALL	8	3	38%
TCEQ-17115	MISSION POTW DISCHARGE DITCH	8	4	50%
TCEQ-17247	RIO GRANDE UPSTRM OF FM 1015	10	2	20%
TCEQ-17621	RIO GRANDE 5 MI. DS OF SANTA	4	1	25%
TCEQ-17643	DRAINAGE DITCH AT FM 1846	13	2	15%
TCEQ-17644	DRAINAGE DITCH AT FM 2062	12	1	8%
TCEQ-17650	ARROYO COLORADO TIDAL P OF HA	40	25	63%
TCEQ-18196	UNNAMED DITCH SOUTH OF FM 510	5	1	20%

Table D-34. Water Quality Comparisons for Texas: E. coli (Water Quality Indicator IDs: 1167, 1170, 1090)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-13272	RIO GRANDE AT COURCHESNE BRDG	39	37	95%
TCEQ-15814	RIO GRANDE AT INTL BRIDGE #2	31	23	74%
TCEQ-15528	RIO GRANDE 1.3KM DWNSTRM WWTP	32	21	66%
TCEQ-15815	RIO GRANDE AT MASTERSON RD	23	18	78%
TCEQ-13177	RIO GRANDE AT EL JARDIN PUMP	28	17	61%
TCEQ-13201		21	17	81%
TCEQ-13205	RIO GRANDE NR US277/EAGLE PAS	26	17	65%
TCEQ-15795	RIO GRANDE AT ALAMO CTRL STRU	20	17	85%
TCEQ-13560	RIO GRANDE AT MOODY RANCH	26	16	62%
TCEQ-15529	RIO GRANDE UPSTR HASKELL WWTP	24	15	63%
TCEQ-13196	RIO GRANDE BELOW LAREDO	22	14	64%
TCEQ-13081	ARROYO COLORADO MAIN FLOODWAY	19	13	68%
TCEQ-14465	RIO GRANDE AT RIVERSIDE CANAL	19	12	63%
TCEQ-15808	RIO GRANDE ABOVE PHARR BRIDGE	23	10	43%
TCEQ-13181	RIO GRANDE AT US 281	24	8	33%
TCEQ-17000	RIO GRANDE PRESIDIO RR BRIDGE	14	8	57%
CILA_Monitoreo_ Laredo-2	Rio Bravo en Masterson Road	7	7	100%
CILA_Monitoreo_ Laredo-5	Rio Bravo 1.6 Km (1 milIa) abajo del Arroyo Coyotes (PIT ARN	7	7	100%
TCEQ-13084		10	6	60%
TCEQ-13086		7	6	86%
TCEQ-15704	RIO GRANDE AT TORNILLO-CASETA	7	6	86%
TCEQ-13074	ARROYO COLORADO /PT.HARLINGEN	15	5	33%
TCEQ-13228	RIO GRANDE AT SANTA ELENA CNY	24	5	21%
TCEQ-13229	RIO GRANDE BELOW RIO CONCHOS	18	5	28%
TCEQ-13276	RIO GRANDE ABOVE ANTHONY DRAI	12	5	42%
TCEQ-13072		8	4	50%
TCEQ-13079		5	4	80%
TCEQ-13082		7	4	57%
TCEQ-13185		24	4	17%
TCEQ-13202	RIO GRANDE LAREDO WTP PUMP	28	4	14%
TCEQ-13071	ARROYO COLORADO AT CM 22	4	3	75%
TCEQ-13103		6	3	50%
TCEQ-16141	ARROYO COLORADO & COMMERCE ST	4	3	75%

(continued)

Table D-34. (continued)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
TCEQ-16445	ARROYO COLORADO AT DILWORTH R	7	3	43%
TCEQ-16730	RIO GRANDE VILLAGE BOAT RAMP	19	3	16%
TCEQ-13073		2	2	100%
TCEQ-13246	PECOS R. NR. VAL VERDE CO. LN	13	2	15%
TCEQ-13270	SAN FELIPE CK AT GUYLER CONFL	4	2	50%
TCEQ-13116		1	1	100%
TCEQ-13225	RIO GRANDE AT FM 2627	6	1	17%
TCEQ-13447	LAGUNA MADRE GIWW AND ARROYO	1	1	100%
TCEQ-13782	ARROYO COLORADO CM 16	1	1	100%
TCEQ-15114	PECOS R. ABOVE US 290	8	1	13%
TCEQ-15817	RIO GRANDE AT WEBB/ZAPATA CO	17	1	6%
TCEQ-16288	RIO GRANDE AT SABAL PALM	2	1	50%
TCEQ-17001	RIO GRANDE PRESIDIO/OJINAGA	14	1	7%
TCEQ-17247	RIO GRANDE UPSTRM OF FM 1015	10	1	10%
TCEQ-17596	RIO GRANDE AT APACHE RANCH	10	1	10%

Table D-35. Water Quality Comparisons for Texas: Total Dissolved Solids (Water Quality Indicator ID: 1445)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
CNA-PSRB-02	Km 0+000, PUENTE INTERNACIONAL CD. JUÁREZ	14	5	36%
CNA-PSRB-04	PUENTE INTERNACIONAL FORT-HANKOK	14	14	100%
CNA-SSRB-36	PUENTE INT. CAMARGO	6	6	100%

D.2 Water Quality Standards and Comparisons for Mexico

Table D-36 shows Mexico's ecological criteria for water quality (Norm 13) for various water types/uses.

Table D-36. Water Quality Standards for Mexico: Ecological Criteria[a]

Parameter	Drinking water supply source	Recreation with direct contact	Agri-cultural irrigation	Livestock	Fresh water	Marine waters (coastal areas)
Chlorides (as Cl-)	250.0	-	147.5	-	250.0	-
Dissolved solids	500.0	-	500.0 [b]	1,000.0	-	-
Dissolved Oxygen[c]	4.0	-	-	-	5.0	5.0
Electrical conductivity (mmhos/cm)	-	-	1.0[d]	-	-	-
Elementary phosphorus	-	-	-	-	0.0001	0.0001
Fecal coliform	1,000.0	[e]	1,000.0	-	[e]	[e]
Fluorides (as F-)	1.5	-	1.0	2.0	1.0	0.5
Nitrates (NO3 as N)	5.0	-	-	90.0	-	0.04
Nitrites (NO2 as N)	0.05	-	-	10.0	-	0.002
pH[f]	5.0 – 9.0	-	4.5 – 9.0	-	[g]	[g]
Phosphates (as PO4)	0.1	-	-	-	[h]	0.002
Sulfates (SO4)	500.0	-	130.0	-	0.005	-
Suspended solids	500.0	-	50.0	-	[i]	[i]
Temperature (C)	Natural Conditions + 2.5	-	-	-	Natural Conditions + 1.5	Natural Conditions + 1.5
Total Solids	1,000.0	-	-	-	-	-

[a] Maximum levels in mg/L except when another unit is indicated

[b] The concentration of dissolved solids that have no harmful effect on any cultivation is from 500 mg/l, in sensitive cultivation it is from between 500 and 1000 mg/l in many harvests that require special handling it is between 1000 and 2000 mg/l and for cultivation of tolerant plants in permeable soils it is between 2000 and 5000 mg/l required by special handling.

[c] For dissolved oxygen, the established levels shall be considered minimums.

[d] The level takes into consideration the use of water under average conditions of soil texture, speed of infiltration, drainage, irrigation-plate used, climate and the tolerance of cultivation to salts. Considerable deviance from the average value of these variables may make use of this water unsafe.

e Organisms shall not exceed 200 as the most probable number in 100 milliliters (NMP/100ml) in fresh or marine water, and no more than 10% of the monthly samples may exceed 400 NMP/100ml.

[f] For Hydrogen potential (pH), the established level shall be considered minimums and maximums.

[g] There can be no variations greater than 0.2 pH units, using the normal seasonal value as a base.

[h] The total phosphates, measured as phosphorus, shall not exceed 0.005 mg/l in tributaries to lakes or reservoirs or 0.025 mg/l inside the lake or reservoir, in order to prevent the development of undesirable biological species and control accelerated eutrophication; in the case of rivers and streams, concentrations of up to 0.1 mg/l are permitted.

[i] Suspended solids (including sediments) along with color shall not reduce the depth of the level of light compensation for photosynthetic activity more than 10% over the normal value.

Tables D-37 to D-38 compare Repository data on pH and dissolved oxygen, respectively, to these standards.

Table D-37. Water Quality Comparisons for Mexico: pH (Water Quality Indicator ID: 29, 1076, 1135, 1118, 1119, 1233, 1136, 1077)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
CILA-WWTP-Planta Sur		35	1	3%
CNA-PSBC-17	RÍO COLORADO-YURIMURY	72	1	1%
CNA-PSBC-20	CANAL ALIMENTADOR DEL AC. RÍO COLORADO-TIJUANA	96	1	1%
SCERP-New River-CD-04	Dren Tula Oeste	8	1	13%

Table D-38. Water Quality Comparisons for Mexico: Dissolved Oxygen (Water Quality Indicator ID: 1211, 1127, 1089, 1073)

Station ID	Station Name	Data Points	Values Exceeding	Percentage values exceeding
CNA-SSBC-09	DESC. RÍO ARDÍ (RÍO COLORADO)	49	2	4%
CNA-PSBC-20	CANAL ALIMENTADOR DEL AC. RÍO COLORADO-TIJUANA	48	2	4%
CNA-PSRB-18	PUENTE INTERNACIONAL VIEJO MATAMOROS	18	1	6%
CNA-SSRB-26	RÍO BRAVO a.a. DE CD. ACUÑA, POBLADO BALCONES	2	1	50%

D.3 References

ADEQ (Arizona Department of Environmental Quality). 2003. *Arizona's Surface and Groundwater Quality Standards.* Available at http://www.azdeq.gov/environ/water/assessment/ download/305-02/acstand.pdf (accessed October 26, 2005).

CSWRCB (California State Water Resources Control Board). 1994a. *Water Quality Control Plan for the Colorado River Basin*. September.

CSWRCB (California State Water Resources Control Board). 1994b. *Water Quality Control Plan for the San Diego Basin.*

NMED (New Mexico Environment Department). 2002. *State of New Mexico Standards for Interstate and Intrastate Surface Waters*. Available at http://www.nmenv.state.nm.us/NMED_regs/ swqb/20_6_4_nmac.html (accessed October 26, 2005).

TNRCC (Texas Natural Resource Conservation Commission). 2000. *Chapter 307: Texas Surface Water Quality Standards*. Numerals 307.1-307.10.

U.S. EPA (Environmental Protection Agency). 1998. *National Strategy for the Development of Regional Nutrient Criteria*. Office of Water.

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Appendix E

Water Quality Trends Scenarios

E.1 Introduction

This Appendix presents water quality trends analyses for twelve case studies organized by transboundary region. The purpose of these case studies is to illustrate a very basic approach to identifying water quality trends and the effects of seasonality on measured values for a given parameter. The U.S.-Mexico Border Waters Repository shows an important increase in the number of monitoring stations reporting values along the U.S-Mexico Border in the last 5 to 6 years. Given its robust and flexible structure, the Repository is the most appropriate tool to store, maintain, and retrieve this information for future years. More detailed and statistically sound trends analyses can be performed in the future if data continue to be collected at the same rate as in the last 5 or 6 years. At this time, there is not enough data to draw conclusions on water quality trends for each transboundary region as a whole.

The analyses presented in this Appendix are grouped by transboundary region rather than by state because waterbodies within the same region share common characteristics and it makes more sense to select groups of rivers and waterbodies by hydrologic unit rather than by state for analysis.

The remainder of this Appendix is organized as follows:

- Section E.2 explains the methodology used to identify water quality trends
- Section E.3 includes two case scenarios for the Pacific/Salton Sea Region
- Section E.4 includes two case studies for the Colorado River/Sea of Cortez Region
- Section E.5 includes two case studies for the Central Desert/Closed Basins Region
- Section E.6 includes four case studies for the Rio Grande Region
- Section E.7 includes two case studies for the Lower Rio Grande Region.

Table E-1 shows how the case studies within this entire section are organized by transboundary regions. The case studies were selected based on data availability in the U.S.-Mexico Border Waters Repository. Those stations with most data points for a given water quality indicator were chosen for the case studies.

Table E-1. Case Studies for Water Quality Trends Analyses

Case Study	Water Quality Indicator	Station
Pacific/Salton Sea (Section E.3)		
1	Specific Conductance	NWIS-3247-0311-6473-101
2	DO	NWIS-3247-0311-6473-101
Colorado/Sea of Cortez (Section E.4)		
3	Total Hardness as $CaCO_3$	CNA-PSBC-14
4	DO	CNA-PSBC-14
Central Desert/Closed Basins (Section E.5)		
5	DO	ModSTORET-100034
6	DO	ModSTORET-100035
Rio Grande (Section E.6)		
7	DO	TCEQ-13272
8	Sulfate	TCEQ-13272
9	Specific Conductance	TCEQ-15892
10	Specific Conductance	TCEQ-13205
Lower Rio Grande (Section E.7)		
11	Specific Conductance	TCEQ-13072
12	DO	TCEQ-13072

E.2 Methodology

Water quality trends analyses are important for detecting change in water quality status for a given waterbody over time. Water quality trends may help decision makers determine the appropriate actions to prevent the future impairment of specific waterbodies.

Water quality trends analyses require large data sets comprising data points that have been consistently recorded over time in a given river point or segment. Furthermore, water quality on a river segment may be affected by a number of factors, including precipitation intensity, discharges, flow peaks, and many other climatic events. Seasonality certainly must be included in water quality status and trends analyses, because water quality is affected by seasonal events.

Quantitative trends analyses require appropriate methodologies and algorithms to capture effects of seasonality, account for missing data, accommodate measurements below detection limits, and resolve other data problems. For example, the Tau-Kendall methodology is often used to perform trends analyses. However, applying that technique is time consuming and computationally intensive, and it may not be the best technique for initial analyses where data are somewhat limited (as in this project). For these reasons, complex quantitative trends measures were not used.

Instead, initial water quality trends analyses were limited to visual inspection of plots of all values for each indicator between 1993 and 2003 (Figure E-1 provides an example). For a

given water quality indicator at a specific station, all values were plotted, and outliers were identified and eliminated. Stations with at least 50 data points for a given water quality indicator in the study period were selected for the scenarios. Basic statistics were calculated for the data set after removing outliers. Given the importance of seasonality effecting water quality values, univariate statistics were calculated for data points measured at different times of the year during the study period. Box and whisker diagrams were used to show the differences in the data point distributions at different times of the year.

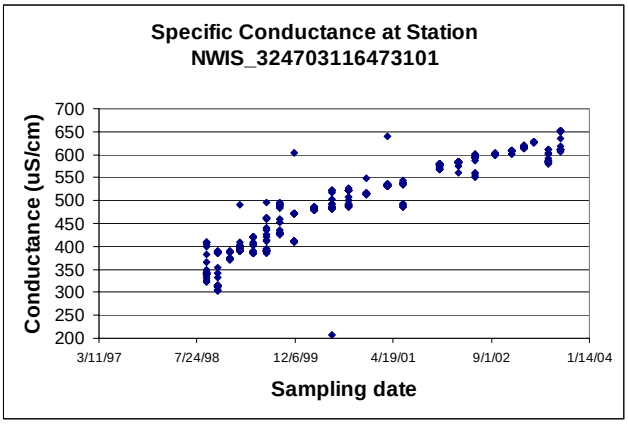

Figure E-1. Example of a simple plot

E.3 Case Studies for the Pacific/Salton Sea Transboundary Region

Two case studies were included for this region. Each case study is defined by a water quality indicator measured at a given station. Water quality trends and seasonality were assessed for both scenarios and are summarized in Figures E-2 through E-7 and Tables E-2 and E-3. Additional trends were assessed for other stations and are summarized in Tables E-4 and E-5.

E.3.1 General Characteristics

The Pacific/Salton Trough Region contains seven basins that drain either to the Pacific Ocean or to inland seas. It drains 14,000 square miles (36,000 km^2). The basin has a very dry, semiarid climate with few fresh water resources. Flow in the basin is primarily from east to west, with stream flows originating from precipitation in the mountains flowing toward the Pacific Ocean. The flow in these streams is controlled through a series of hydraulic structures, including reservoirs. The Tijuana River is one of the main streams in the basin and one of the City of Tijuana's major natural resources. The river flows northwest through the city of Tijuana before crossing into California near San Ysidro and flowing into the Pacific Ocean.

Case Study 1: Specific Conductance at Station NWIS_324703116473101

Case Study 1 is defined by the following attributes:

- Water Quality Indicator: Specific Conductance, water, unfiltered. Indicator ID: 1072. Measured in microsiemens per centimeter (µS/cm).
- Station ID: NWIS_324703116473101
- Station Location: Latitude: 32.78422009 N; Longitude: 116.79279994 E
- Station Name: LOVELAND RES NR DAM SITE 1 UPPER
- Owning Organization: Arizona Department of Environmental Quality's Legacy & Modernized STORET data.

Figure E-2 shows the plot of values measured within the study period, once the outliers have been removed from the data set. A slight increasing trend can be observed on this plot.

Figure E-3 shows the cumulative normal distribution for this data set indicating about an 80 percent probability of measuring a specific conductance value of 400 µS/cm or greater at this station. As a reference, the specific conductance of distilled water is about 1 µS/cm, which is low, and that of seawater is about 50,000 µS/cm.

Table E-2 shows an average value of 493 µS/cm and a standard deviation of 95 µS/cm.

Table E-2 also shows the differences in the statistics for the seasonal values measured at this station. Averages are similar for both seasons but the distribution of values is a little spread out in March. Figure E-4 shows the March and September seasonal distributions for this water quality indicator.

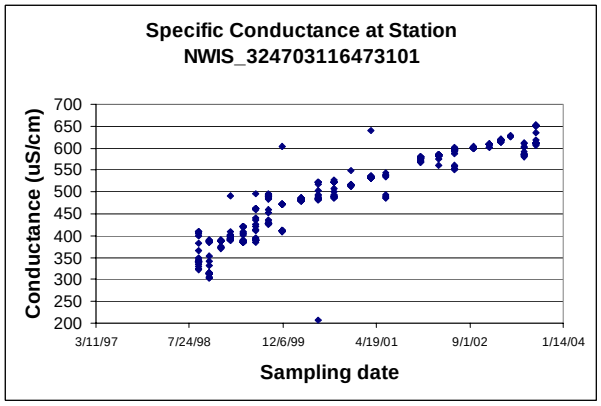

Figure E-2. Specific conductance values during the study period.

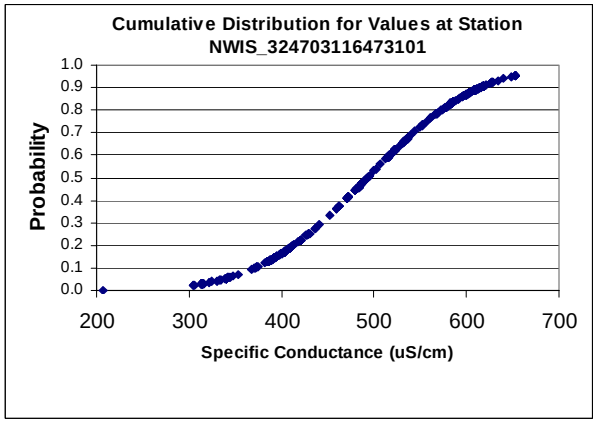

Figure E-3. Cumulative normal distribution for specific conductance values during the study period.

Table E-2. Statistics for Specific Conductance Values Measured at Station NWIS_324703116473101

Statistic	All Values	March Values	September Values
Count	468	90	90
Average	493	495	469
Median	492	487	488
Mode	608	481	602
Standard Deviation	95	72	91
Min	207	390	322
Quartile 1	403	403	409
Quartile 2	492	487	488
Quartile 3	584	537	523
Max	653	640	604
First Reading	10-Sep-98	02-Mar-99	10-Sep-98
Last Reading	20-Aug-03	19-Mar-02	18-Sep-02

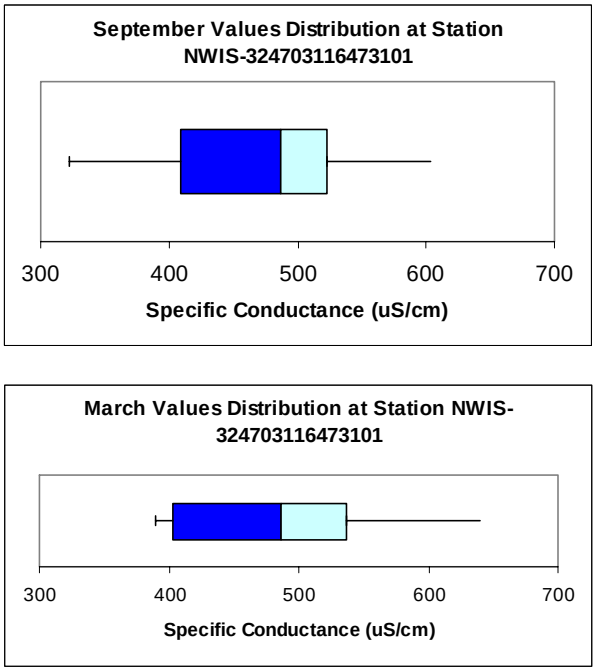

Figure E-4. Seasonal distributions for specific conductance values during the study period.

Case Study 2: DO at Station NWIS_324703116473101

Case Study 2 is defined by the following attributes:

- Water Quality Indicator: DO, water, unfiltered. Indicator ID: 1073. Measured in mg/L.
- Station ID: NWIS_324703116473101
- Station Location: Latitude: 32.78422009 N; Longitude: -116.79279994 E
- Station Name: LOVELAND RES NR DAM SITE 1 UPPER
- Organization Name: U.S. Geological Survey
- Data Source: Arizona Department of Environmental Quality's Legacy & Modernized STORET data.

Figure E-5 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be identified on this plot.

Figure E-6 shows the cumulative normal distribution for this data set indicating a 56 percent probability of measuring a DO value of about 5.0 mg/L or below at this station.

Table E-3 shows an average value of 4.4 mg/L and a standard deviation of 3.7 mg/L.

Table E-3 also shows the differences in the statistics for the seasonal values measured at this station. DO concentrations are greater in average in March than in September for this station. Figure E-7 shows the March and September seasonal distributions for this water quality indicator.

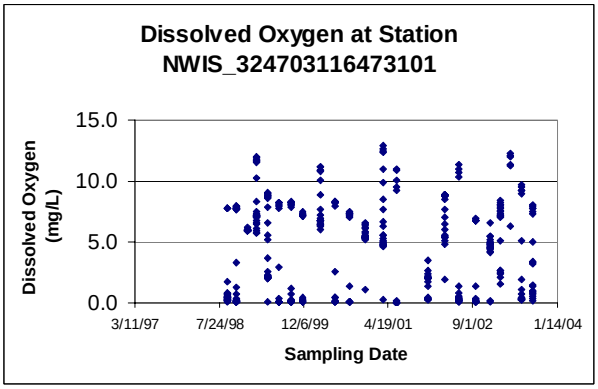

Figure E-5. DO values during the study period.

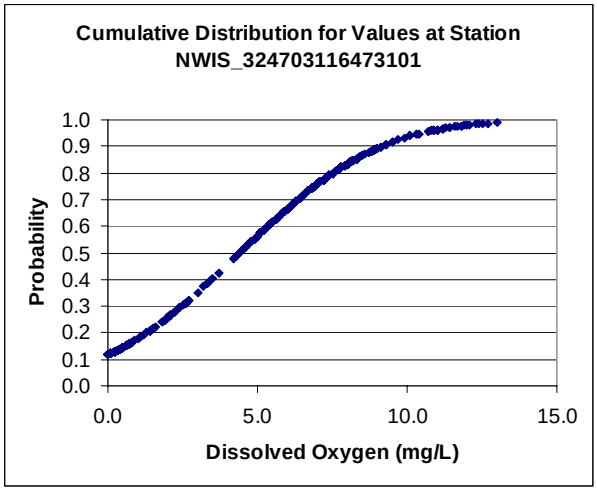

Figure E-6. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-3. Statistics for DO Values Measured at Station NWIS_324703116473101

Statistic	All Values	March Values	September Values
Count	462	90	86
Average	4.4	7.6	2.5
Median	5.1	7.1	0.4
Mode	0.1	8.9	0.1
Standard Deviation	3.7	2.5	3.3
Min	0.0	0.3	0.1
Quartile 1	0.3	6.0	0.1
Quartile 2	5.1	7.1	0.4
Quartile 3	7.3	8.9	6.8
Max	13.0	13.0	8.3
First Reading	10-Sep-98	02-Mar-99	10-Sep-98
Last Reading	20-Aug-03	19-Mar-02	18-Sep-02

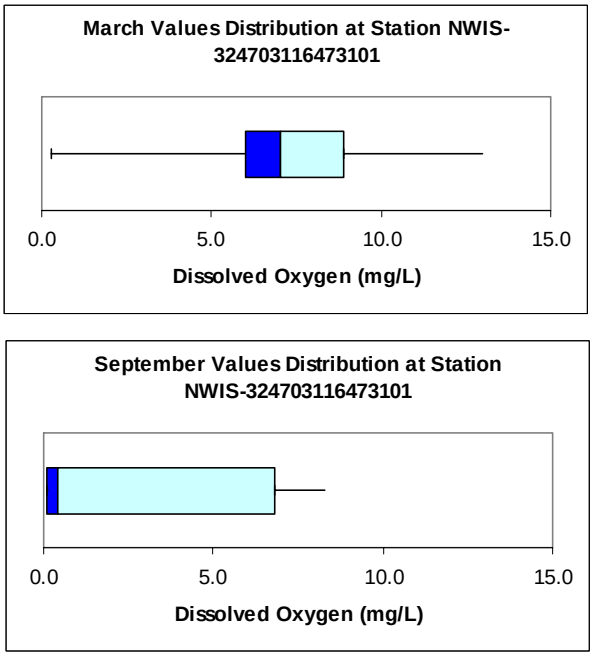

Figure E-7. Distributions for dissolved oxygen seasonal values during the study period.

Table E-4. Statistics for Water Quality Indicator Values Measured at Different Stations in Pacific/Salton Sea Transboundary Region

Statistic	Temp. (°C) at Station NWIS-3247-0311-6473-101	Conductance (µS/cm) at Station NWIS-3241-3111-7000-101	DO (mg/L) at Station NWIS-3241-3111-7000-101	Conductance (µS/cm) at Station NWIS-3241-2611-6595-701	DO (mg/L) at Station NWIS-3241-3011-7002-501
	Statistics Values				
Count	493	283	282	87	258
Average	14.5	916	5.5	791	5.7
Median	12.7	921	6.4	787	6.5
Mode	11.3	1040	0.2	795	0.1
Standard Deviation	4.2	114	3.2	37	3.3
Min	10.4	740	0.1	736	0.1
Quartile 1	11.5	796	2.8	766	3.2
Quartile 2	12.7	921	6.4	787	6.5
Quartile 3	15.7	1030	7.6	796	7.8
Max	27.0	1120	12.0	875	15.1
First Reading	10-Sep-98	09-Sep-98	09-Sep-98	10-Sep-98	09-Sep-98
Last Reading	20-Aug-03	19-Aug-03	19-Aug-03	12-Jul-99	19-Aug-03
Trend	Increasing	Increasing	Not identifiable	Increasing	Not identifiable

Table E-5. Location of Additional Stations in the Pacific/Salton Sea Region

Station ID	Location	Name	State	Owning Organization
NWIS-3241-3111-7000-101	Lat: 32.69199773, Lon: -117.00113737	SWEETWATER RES CTR OF MIN POOL UPPER	California	U.S. Geological Survey
NWIS-3241-2611-6595-701	Lat: 32.69060889, Lon: -117.0000262	SWEETWATER RES NR RECREATION AREA UPPER	California	U.S. Geological Survey
NWIS-3241-3011-7002-501	Lat: 32.69171991, Lon: -117.0078043	SWEETWATER RES NR PUMP TOWER UPPER	California	U.S. Geological Survey

E.4 Case Studies for the Colorado River/Sea of Cortez Transboundary Region

Two case studies were included for this region. Each case study is defined by a water quality indicator measured at a given station in this region. Water quality trends and seasonality were assessed for both scenarios and are summarized in Figures E-8 through E-13 and Tables E-6 and E-7. Additional trends were assessed for other stations and are summarized in Table E-8.

E.4.1 General Characteristics

The Colorado River/Sea of Cortez Region contains 11 basins that drain either to the Colorado River below the gaging station at Parker Dam or to the Sea of Cortez. The region drains 22,590 square miles (58,500 km^2). It covers portions of the states of Arizona, Sonora, and Chihuahua and consists of lowlands flanked by the Sierra Juarez and the Sierra San Pedro Martir mountain ranges to the west and the Desierto de Altar (Sonoran Desert) and the Northwest Chihuahua highlands to the east.

The major surface waters in the region are the lower Colorado River delta and the Laguna Salada. From the north, the Colorado River flows into the basin through heavily urbanized areas near Yuma, Arizona, and San Luis Rio, Colorado, Sonora, and then through wetlands before flowing into the Sea of Cortez.. Most of the water that the delta receives comes from agricultural drainage from the United States and Mexico, with little perennial flow in the lower Colorado River.

Case Study 3: Total Hardness at Station CNA-PSBC-14

Case Study 3 is defined by the following attributes:

- Water Quality Indicator: Hardness, Total (as $CaCO_3$), measured in mg/L. Indicator ID: 1158
- Station ID: CNA-PSBC-14
- Station Location: Latitude: 32.5 N; Longitude: -114.8167 E
- Station Name: Canal Sánchez Taboada
- Country: Mexico
- Owning Organization: Comisión Nacional del Agua.

Figure E-8 shows the plot of values measured within the study period once the outliers have been removed from the data set. A slight decreasing trend can be spotted on this plot.

Figure E-9 shows the cumulative normal distribution for this data set indicating a 100 percent probability of measuring a total hardness value greater than 120 mg/L, which is considered very hard water.

Table E-6 shows an average value of 723 mg/L and a standard deviation of 60 mg/L.

Table E-6 also shows the differences in the statistics for the seasonal values measured at this station. Total Hardness values are greater in average in June through August than in December through February for this station. Values in December through February are more spread out. Figure E-10 shows the December–February and the June–August seasonal distributions for total hardness at Station CNA-PSBC-14.

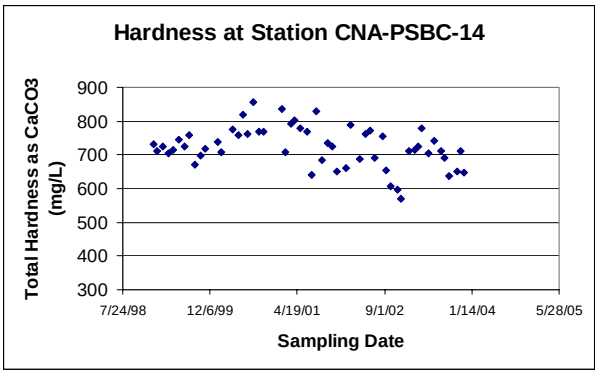

Figure E-8. Total hardness values during study period.

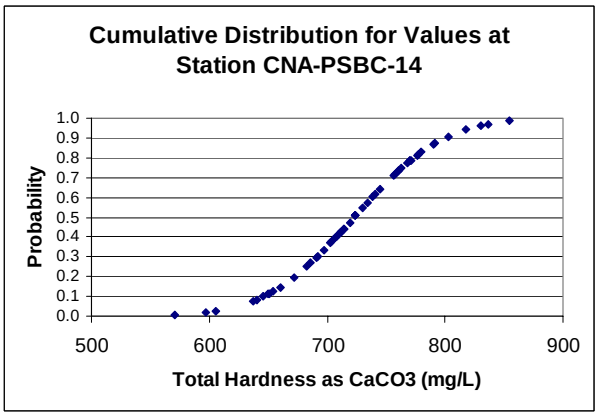

Figure E-9. Cumulative normal distribution for total hardness values during study period.

Table E-6. Statistics for Total Hardness Values Measured at Station CAN-PSBC-14

Statistic	All Values	Dec–Feb Values	Jun–Aug Values
Count	55	13	13
Average	723	706	754
Median	724	710	760
Mode	724	-	-
Standard Deviation	60	67	60
Min	571	571	640
Quartile 1	692	660	711
Quartile 2	724	710	760
Quartile 3	766	730	771
Max	855	837	855
First Reading	19-Jan-99	19-Jan-99	08-Aug-00
Last Reading	02-Dec-03	02-Dec-03	12-Aug-03

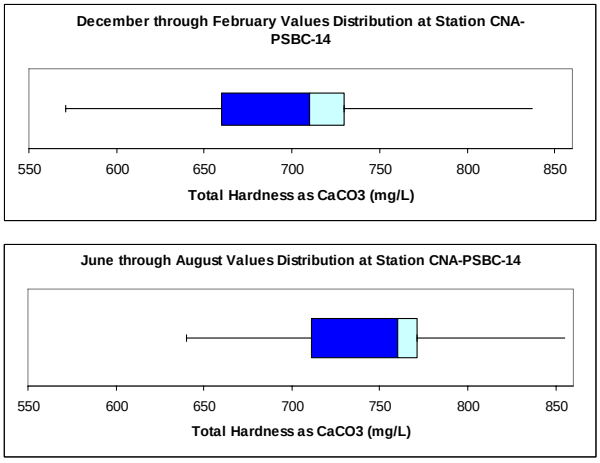

Figure E-10. Seasonal distributions for total hardness values during the study period.

Case Study 4: DO at Station CNA-PSBC-14

Case Study 4 is defined by the following attributes:

- Water Quality Indicator: DO, measured in mg/L. Indicator ID: 1089
- Station ID: CNA-PSBC-14
- Station Location: Latitude: 32.5 N; Longitude: -114.8167 E
- Station Name: Canal Sánchez Taboada
- Country: Mexico
- Owning Organization: Comisión Nacional del Agua.

Figure E-11 shows the plot of values measured within the study period once the outliers have been removed from the data set. A slight declining trend can be spotted on this plot.

Figure E-12 shows the cumulative normal distribution for this data set indicating a 100 percent probability of getting a value higher than 5 mg/L and a 73 percent probability of getting a value higher than 8 mg/L.

Table E-7 shows an average value of 8.4 mg/L and a standard deviation of 1.2 mg/L.

Table E-7 also shows the differences in the statistics for the seasonal values measured at this station. DO values are greater on average in the December–February season. Figure E-13 shows the December–February and the June–August seasonal distributions for this water quality indicator.

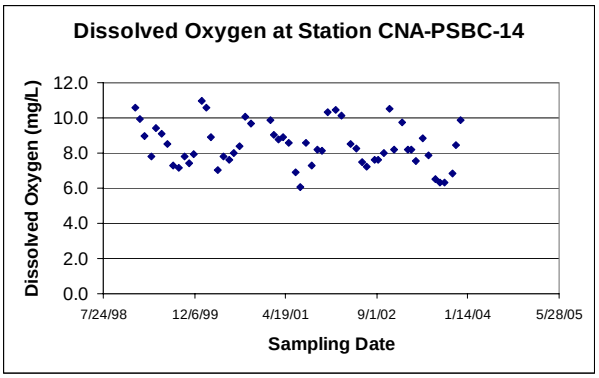

Figure E-11. Dissolved oxygen values during study period.

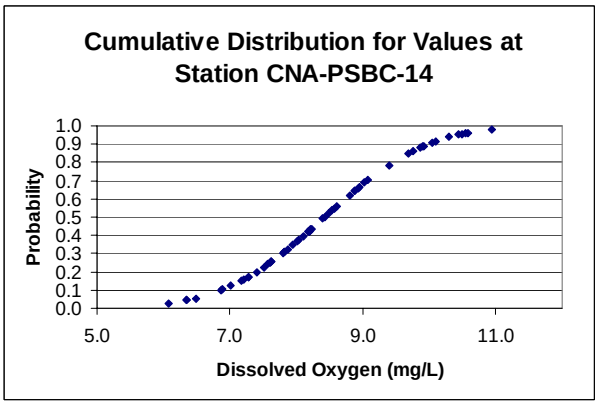

Figure E-12. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-7. Statistics for Dissolved Oxygen Values Measured at Station CNA-PSBC-14

Statistic	All Values	Dec–Feb Values	Jun–Aug Values
Count	57	14	15
Average	8.4	9.7	7.6
Median	8.2	9.9	7.6
Mode	7.8	-	-
Standard Deviation	1.2	1.0	0.9
Min	6.1	8.0	6.1
Quartile 1	7.6	9.2	7.0
Quartile 2	8.2	9.9	7.6
Quartile 3	9.1	10.4	8.2
Max	11.0	11.0	9.1
First Reading	19-Jan-99	19-Jan-99	08-Jun-99
Last Reading	02-Dec-03	02-Dec-03	12-Aug-03

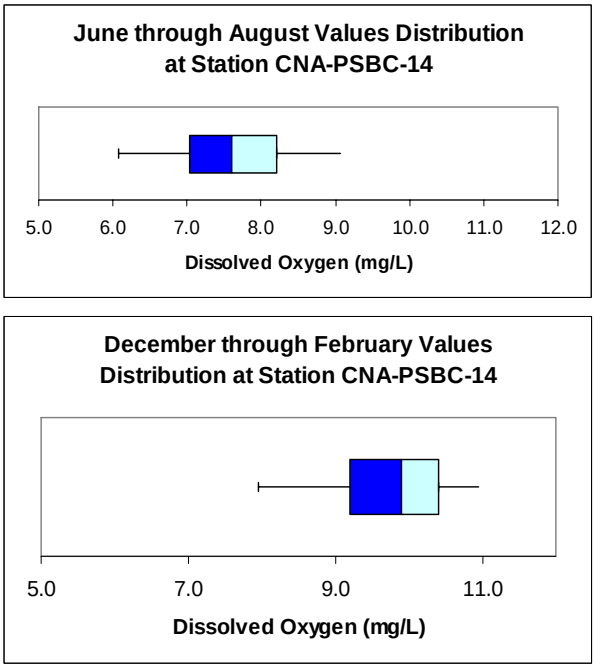

Figure E-13. Distributions for suspended volatile solids seasonal values during the study period.

Table E-8. Statistics for Water Quality Indicator Values Measured at Different Stations in the Colorado River/Sea of Cortez Transboundary Region

Statistic	Total Solids (mg/L) at Station CNA-PSBC-14	Conductance (µS/cm) at Station CNA-PSBC-14	Chloride (mg/L) at Station CNA-PSBC-14	BOD[a] (mg/L) at Station CNA-PSBC-14	COD[b] (mg/L) at Station CNA-PSBC 14
	Statistics Values				
Count	57	57	54	57	57
Average	2,675	3,824	561	2.0	50
Median	2,744	3,880	627	1.4	50
Mode	2,847	4,210	637	1.1	50
Standard Deviation	339	484	212	1.7	21
Min	1,256	1,999	3	0.5	9
Quartile 1	2,607	3,590	574	1.1	39
Quartile 2	2,744	3,880	627	1.4	50
Quartile 3	2,862	4,195	670	2.3	60
Max	3,114	4,650	808	9.4	118
First Reading	19-Jan-99	19-Jan-99	19-Jan-99	19-Jan-99	19-Jan-99
Last Reading	02-Dec-03	02-Dec-03	02-Dec-03	02-Dec-03	02-Dec-03
Trend	Decreasing	Decreasing	Decreasing	Decreasing	Not identifiable

[a] BOD: Biochemical Oxygen Demand
[b] COD: Chemical Oxygen Demand

E.5 Case Studies for the Central Desert/Closed Basins Transboundary Region

Two case studies were included for this region. Each case study is defined by a water quality indicator measured at a given station in this region. Water quality trends and seasonality were assessed for both scenarios and are summarized in Figures E-14 through E-19 and Tables E-9 and E-10. Additional trends were assessed for other stations and are summarized in Tables E-11 and E-12. Both case studies fall in the Mexican Highlands portion of the region; there was inadequate data to conduct a case study in the Mimbres/Animas basins.

E.5.1 General Characteristics

The Mexican Highlands basins contain 14 basins that drain to rivers in southern Arizona, southwestern New Mexico, northern Sonora, or the extreme northwestern tip of Chihuahua. The Mimbres/Animas basins contain 5 basins that drain internally in southern New Mexico and northern Chihuahua. The Mexican Highlands region drains 21,840 square miles (56,600 km^2) and the Mimbres/Animas region drains 12,450 square miles (32,200 km^2) (Woodward and Durall, 1996).

The Mexican Highland Region, although is classified as desert, contains vegetation and diverse aquatic habitats. The Santa Cruz and San Pedro Rivers are the dominant streams in the region. Their flows largely depend on precipitation in the mountains in Arizona and Mexico. Near their headwaters, certain reaches of these rivers flow continuously, but their flows decrease dramatically as the rivers travel northward. The Santa Cruz river near Nogales, Sonora, generally flows continuously, but the natural flow in the river does not reach the Nogales International Wastewater Treatment Plant (located along the river about 6 miles north of Nogales, Arizona). Flow downstream from the treatment plant is composed of effluent return, and this water rarely flows past the Santa Cruz County line (Papoulias et al, 1997).

The Mimbres and Animas basin system consists mostly of topographically closed basins with piedmont and basin-floor alluvial surfaces grading to central playa (ephemeral-lake) depressions that are designated “bolsons.” All stream systems in the basins are ephemeral, except in the valleys of Animas Creek (NMED, 2002).

Case Study 5: DO at Station ModSTORET-100034

Case Study 5 is defined by the following attributes:

- Water Quality Indicator: DO, measured in mg/L. Indicator ID: 1089
- Station ID: ModSTORET-10034
- Station Location: Latitude: 32.1862411 N; Longitude: -110.81672 E
- Station Name: SCLAK-A
- Owning Organization: Arizona Department of Environmental Quality.

Figure E-14 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be spotted on this plot.

Figure E-15 shows the cumulative normal distribution for this data set indicating a 40 percent probability of measuring a DO value of 5.0 mg/L or less at this station.

Table E-9 shows an average value of 5.8 mg/L and a standard deviation of 3.3 mg/L.

Table E-9 also shows the differences in the statistics for the seasonal values measured at this station. Although values for July and August were available only for 1998, one can see that the average values in December–February are much larger than in June–August. Figure E-16 shows the December–February and the June–August seasonal distributions for DO at Station ModSTORET-100034.

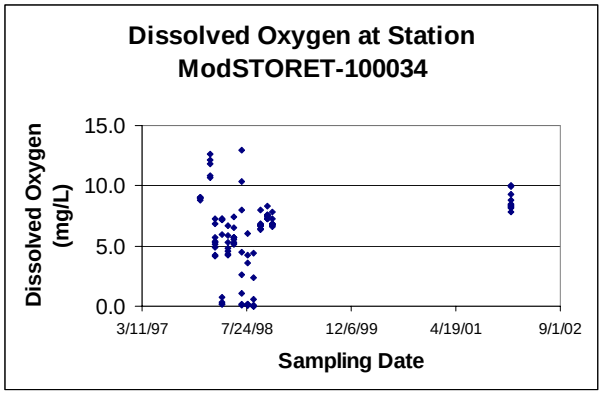

Figure E-14. Dissolved oxygen values during the study period.

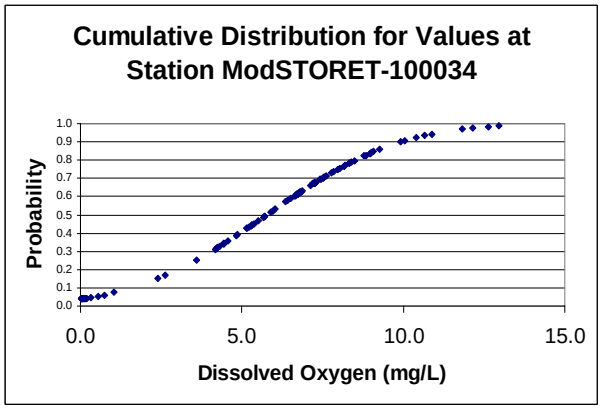

Figure E-15. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-9. Statistics for Dissolved Oxygen Values Measured at Station ModSTORET-100034

Statistic	Value	Dec–Feb Values	Jun–Aug Values
Count	108	29	26
Average	5.8	8.3	2.4
Median	6.7	8.5	0.2
Mode	0.0	-	0.0
Standard Deviation	3.3	2.3	3.5
Min	0.0	4.2	0.0
Quartile 1	4.3	6.8	0.1
Quartile 2	6.7	8.5	0.2
Quartile 3	7.6	9.3	4.1
Max	13.0	12.6	13.0
First Reading	12-Dec-97	12-Dec-97	01-Jul-98
Last Reading	9-Jan-02	09-Jan-02	27-Aug-98

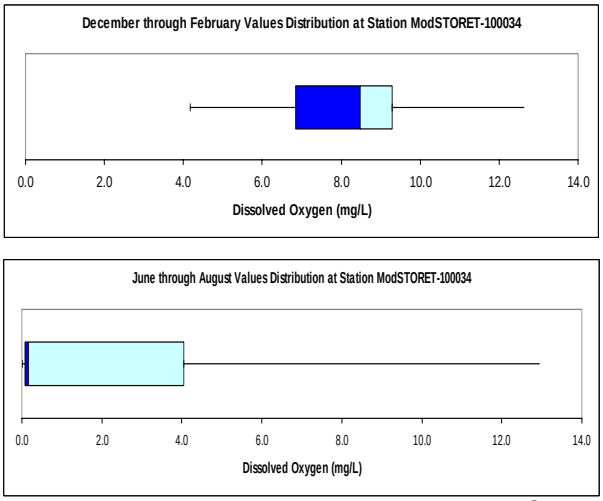

Figure E-16. Seasonal distributions for dissolved oxygen values during study period.

Case Study 6: DO at Station ModSTORET-100035

Case Study 6 is defined by the following attributes:

- Water Quality Indicator: DO, measured in mg/L. Indicator ID: 1089
- Station ID: ModSTORET-10035
- Station Location: Latitude: 32.1862411 N; Longitude: -110.81672 E
- Station Name: SCLAK-B
- Owning Organization: Arizona Department of Environmental Quality.

Figure E-17 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be spotted on this plot.

Figure E-18 shows the cumulative normal distribution for this data set indicating a 25 percent probability of measuring a DO value of 5.0 mg/L or less at this station.

Table E-10 shows an average value of 6.6 mg/L and a standard deviation of 2.5 mg/L.

Table E-10 also shows the differences in the statistics for the seasonal values measured at this station. Values in December–February are also larger in average than the values in June–August. Figure E-19 shows the December–February and June–August seasonal distributions for DO at Station ModSTORET-100035.

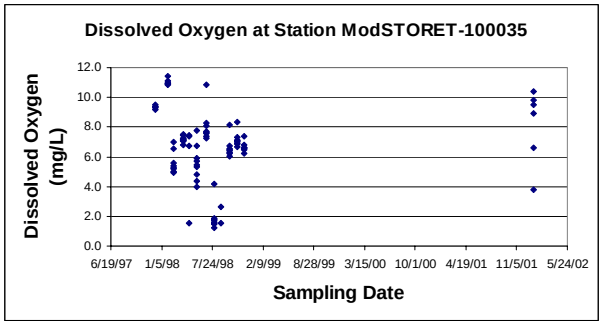

Figure E-17. Dissolved oxygen values during the study period.

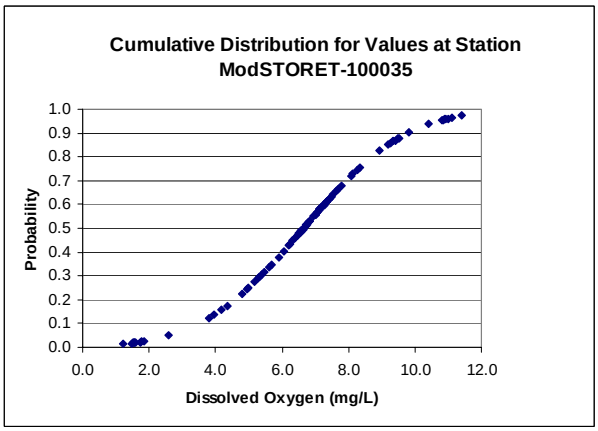

Figure E-18. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-10. Statistics for Dissolved Oxygen Values Measured at Station ModSTORET-100035

Statistic	Value	Dec–Feb Values	Jun–Aug Values
Count	88	25	18
Average	6.6	8.3	4.7
Median	6.8	9.3	3.4
Mode	7.1	-	-
Standard Deviation	2.5	2.4	3.3
Min	1.2	3.8	1.2
Quartile 1	5.6	5.6	1.6
Quartile 2	6.8	9.3	3.4
Quartile 3	7.7	10.4	7.6
Max	11.4	11.4	10.8
First Reading	12-Dec-97	12-Dec-97	01-Jul-98
Last Reading	09-Jan-02	09-Jan-02	27-Aug-98

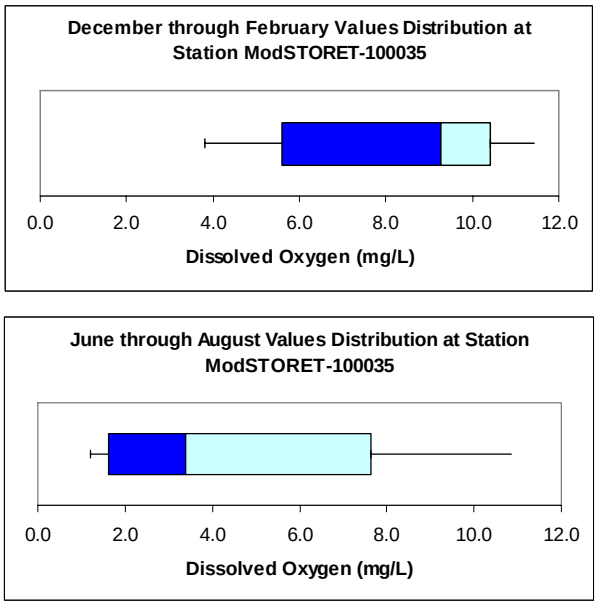

Figure E-19. Seasonal distributions for dissolved oxygen values during study period.

Table E-11. Statistics for Water Quality Indicator Values Measured at Different Stations in the Central Desert/Closed Basins Transboundary Region[a]

Statistic	DO (mg/L) at Station ModSTORET-100000	pH at Station ModSTORET-100034	Conductance (µS/cm) at Station ModSTORET-100034	DO (mg/L) at Station ModSTORET-100028	Conductance (µS/cm) at Station ModSTORET-100035
	Statistics Values				
Count	63	122	122	64	105
Average	5.5	8.4	450	7.8	451
Median	6.9	8.4	488	8.7	493
Mode	0.1	9.0	277	8.8	277
Standard Deviation	4.4	0.6	141	3.2	136
Min	0.1	6.9	274	0.1	274
Quartile 1	0.2	8.1	307	7.4	307
Quartile 2	6.9	8.4	488	8.7	493
Quartile 3	9.1	8.9	534	9.4	527
Max	12.9	9.8	715	14.9	717
First Reading	03-Dec-97	13-Aug-93	13-Aug-93	13-Aug-93	13-Aug-93
Last Reading	28-Aug-01	09-Jan-02	09-Jan-02	25-Nov-98	09-Jan-02
Trend	Not identifiable	Not identifiable	Increasing	Not identifiable	Increasing

[a] These stations are all in the Mexican Highlands basins; there were not enough data points for the Mimbres/Animas basins in the Repository for analysis.

Table E-12. Location of Additional Stations in the Central Desert/Closed Basins Transboundary Region

Station ID	Location	Name	State	Owning Organization
ModSTORET-100000	Lat: 31.53289, Lon: -111.25345	SCARI-A	Arizona	Arizona Department of Environmental Quality
ModSTORET-100028	Lat: 32.180138, Lon: -111.00752	SCKEN-A	Arizona	Arizona Department of Environmental Quality

E.6 Case Studies for the Rio Grande Transboundary Region

Four case studies were included for this region. Each case study is defined by a water quality indicator measured at a given station in this region. Water quality trends and seasonality were assessed for all four scenarios and are summarized in Figures E-20 through E-31 and Tables E-13 through E-16. Additional trends were assessed for other stations and are summarized in Tables E-17 through E-20.

E.6.1 General Characteristics

The Rio Grande/Rio Bravo Basin is subdivided into three regions. The Rio Grande-Elephant Butte Reservoir to above Rio Conchos Region contains 14 basins that drain to that reach of the Rio Grande below the gaging station at Elephant Butte dam. The Rio Grande-Rio Conchos to Amistad Reservoir Region contains 32 basins that drain either to that reach of the Rio Grande, to the lower reach of the Rio Conchos below the now suspended Falomir gaging station (near the Luis Leon Dam), or to the lower reach of the Pecos River below the gaging station at Girvin. The Rio Grande below Amistad Reservoir to Falcon Reservoir Region contains 13 basins that drain either to that reach of the Rio Grande or to the lower reach of the Rio Salado below the gaging station at Las Tortillas. The Rio Grande-Elephant Butte Reservoir to above Rio Conchos Region includes 28,940 square miles (75,000 km^2); the Rio Grande-Rio Conchos to Amistad Reservoir Region includes 34,630 square miles (89,700 km^2); and the Rio Grande below Amistad Reservoir to Falcon Reservoir Region includes 12,910 square miles (33,400 km^2) (Woodward and Durall, 1996).

The entire Rio Grande Basin extends 1,896 miles (3,051 km) from the river's headwaters in the San Juan Mountains of southern Colorado to near its mouth in the Gulf of Mexico. The Rio Grande/Rio Bravo drains an area of approximately 182,215 square miles (471,937 km^2) in the three U.S. states of Colorado, New Mexico, and Texas and the five Mexican states of Chihuahua, Coahuila, Durango, Nuevo Leon, and Tamaulipas. Major cities along the Rio Grande within the transboundary region include five sister city pairs: El Paso, TX/Juarez, Chihuahua; Presidio, TX/Ojinaga, Chihuahua; Del Rio, TX/Acuña, Coahuila; Eagle Pass, TX/Piedras Negras, Coahuila; and Laredo, TX/Nuevo Laredo, Tamaulipas.

The primary water courses in these regions are the Rio Grande/Rio Bravo and its tributaries, including the Rios Conchos, Salado, San Juan, and San Rodrigo in Mexico, and the Pecos and Devil's Rivers in Texas. On the main stream are the Amistad and the Falcon Reservoirs. A feature of this region is the extent of control on the natural flow of the river including dams, reservoirs, canals, and diversions for water supply and flow control. Flow in the lower Rio Grande has become dependent on controlled releases and "return flows" back to the river from agricultural and other commercial water uses (U.S. EPA, 2001).

Case Study 7: DO at Station TCEQ13272 (Rio Grande-Elephant Butte Reservoir to above Rio Conchos Region)

Case Study 7 is defined by the following attributes:

- Water Quality Indicator: DO, measured in mg/L. Indicator ID: 1127
- Station ID: TCEQ-13272
- Station Location: Latitude: 31.802778 N; Longitude: -106.540276 E
- Station Name: RIO GRANDE AT COURCHESNE BRDG
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-20 shows the plot of values measured within the study period once the outliers have been removed from the data set. A stable tendency around the average value of 8.0 mg/L can be seen on this plot.

Figure E-21 shows the cumulative normal distribution for this data set indicating only a 1 percent probability of measuring a DO value of 5.0 mg/L or less at this station.

Table E-13 shows an average value of 8.0 mg/L and a standard deviation of 1.5 mg/L.

Table E-13 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in March are larger in average than the values measured in September. Figure E-22 shows the March and September seasonal distributions for DO at Station TCEQ-13272.

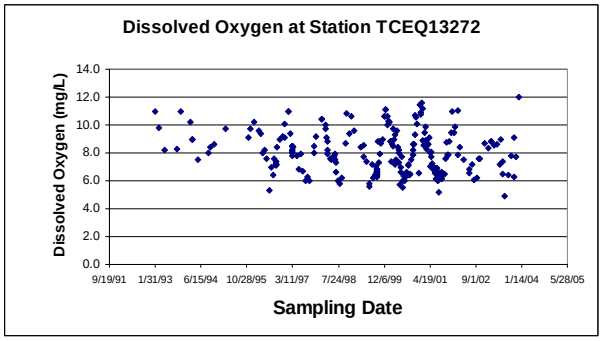

Figure E-20. Dissolved oxygen values during the study period.

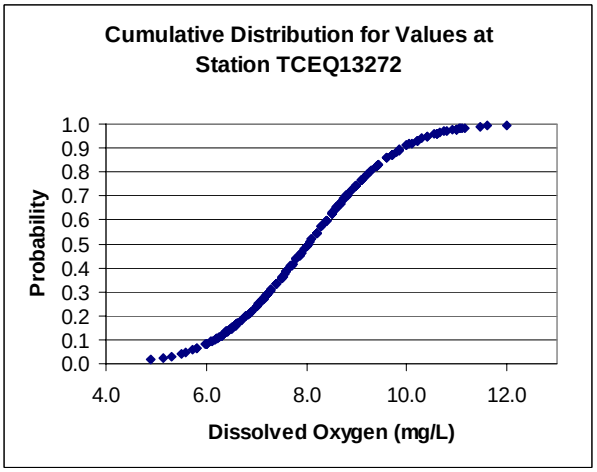

Figure E-21. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-13. Statistics for Dissolved Oxygen Values Measured at Station TCEQ13272

Statistic	All Value	March Values	September Values
Count	252	36	43
Average	8.0	8.7	7.0
Median	7.9	8.6	7.2
Mode	7.2	8.5	7.2
Standard Deviation	1.5	0.6	0.6
Min	4.9	7.8	6.0
Quartile 1	6.9	8.4	6.5
Quartile 2	7.9	8.6	7.2
Quartile 3	8.9	9.0	7.2
Max	12.0	10.0	8.8
First Reading	27-Jan-93	09-Mar-93	28-Sep-93
Last Reading	16-Dec-03	18-Mar-03	23-Sep-03

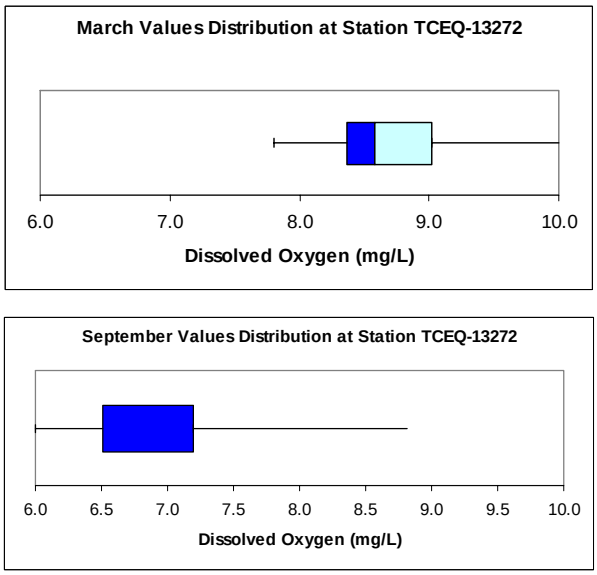

Figure E-22. Seasonal distributions for dissolved oxygen values during the study period.

Case Study 8: Sulfate at Station TCEQ13272 (Rio Grande-Elephant Butte Reservoir to above Rio Conchos Region)

Case Study 8 is defined by the following attributes:

- Water Quality Indicator: Sulfate as SO4, measured in mg/L. Indicator ID: 1161
- Station ID: TCEQ-13272
- Station Location: Latitude: 31.802778 N; Longitude: -106.540276 E
- Station Name: RIO GRANDE AT COURCHESNE BRDG
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-23 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be spotted on this plot.

Figure E-24 shows the cumulative normal distribution for this data set indicating an 87 percent probability of measuring a Sulfate value of 150 mg/L or greater at this station.

Table E-14 shows an average value of 275 mg/L and a standard deviation of 114 mg/L.

Table E-14 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in February are slightly larger in average and more spread out than the values measured in September. Figure E-25 shows the February and September seasonal distributions for Sulfate at Station TCEQ-13272.

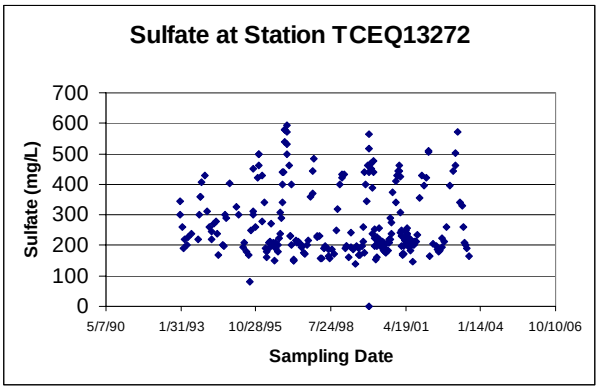

Figure E-23. Sulfate values during the study period.

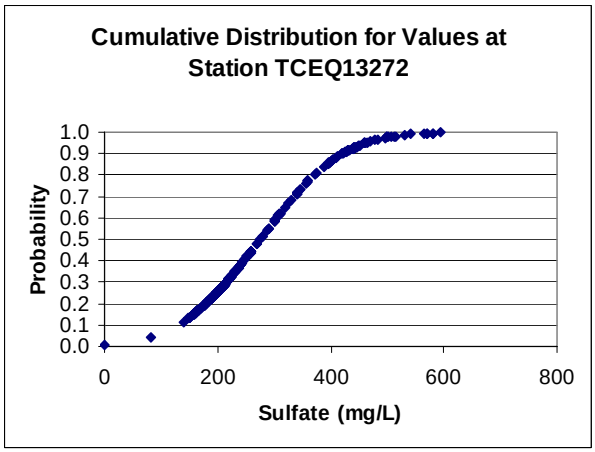

Figure E-24. Cumulative normal distribution for sulfate values during the study period.

Table E-14. Statistics for Sulfate Values Measured at Station TCEQ13272

Statistic	All Value	February Values	September Values
Count	249	24	21
Average	275	326	259
Median	223	284	240
Mode	210	260	300
Standard Deviation	114	113	62
Min	1	189	173
Quartile 1	197	231	217
Quartile 2	223	284	240
Quartile 3	346	430	300
Max	594	511	452
First Reading	21-Jan-93	18-Feb-93	16-Sep-93
Last Reading	19-Aug-03	18-Feb-03	17-Sep-02

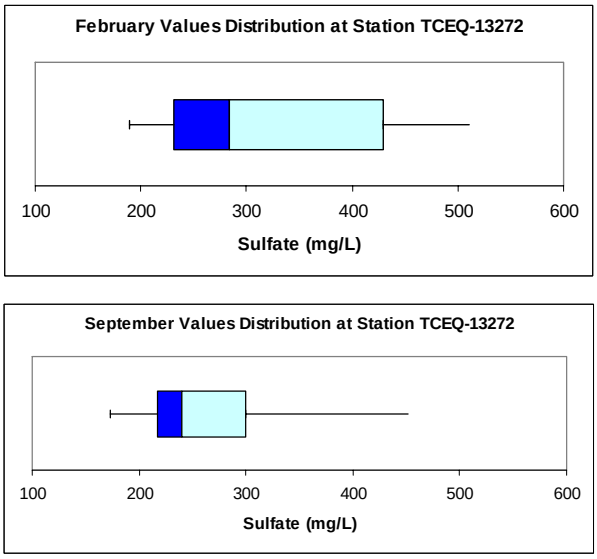

Figure E-25. Distributions for sulfate seasonal values during the study period

Case Study 9: Specific Conductance at Station TCEQ-15892 (Rio Grande-Rio Conchos to Amistad Reservoir Region)

Case Study 9 is defined by the following attributes:

- Water Quality Indicator: Specific Conductance, field (UMHOS/CM @ 25C). Indicator ID: 1110
- Station ID: TCEQ-15892
- Station Location: Latitude: 29.625278 N; Longitude: -101.251114 E
- Station Name: AMISTAD RESERV RIO GRANDE ARM
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-26 shows the plot of values measured within the study period once the outliers have been removed from the data set. A slight decreasing trend can be seen on this plot.

Figure E-27 shows the cumulative normal distribution for this data set indicating a 95 percent probability of measuring a specific conductance value of about 1,000 µS/cm or greater at this station.

Table E-15 shows an average value of 1,125 µS/cm and a standard deviation of 79 µS/cm.

Table E-15 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in March are larger in average and more spread out than the values measured in October. Figure E-28 shows the March and October seasonal distributions for Conductance at Station TCEQ-15892.

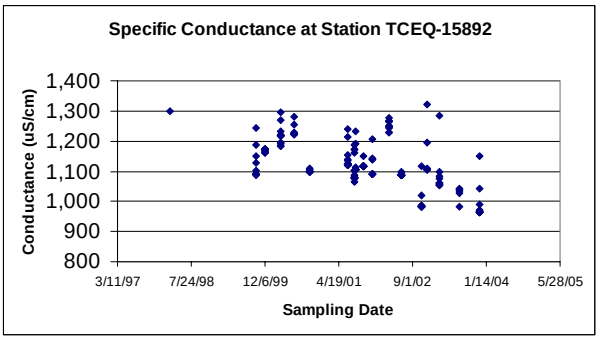

Figure E-26. Specific conductance values during the study period.

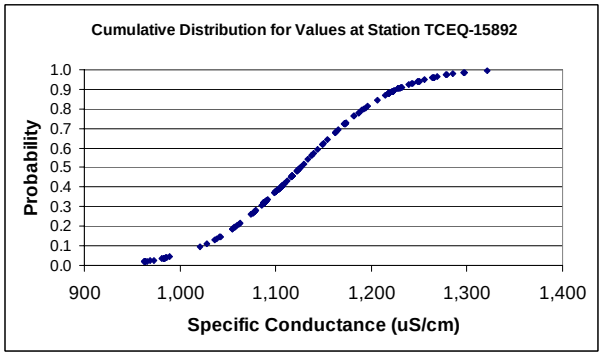

Figure E-27. Cumulative normal distribution for specific conductance values during the study period.

Table E-15. Statistics for Specific Conductance Values Measured at Station TCEQ15892

Statistic	All Values	March Values	October Values
Count	187	35	44
Average	1,125	1,195	1,089
Median	1,109	1,219	1,100
Mode	1,117	1,219	1,117
Standard Deviation	79	82	58
Min	963	1,055	983
Max	1,087	1,141	1,089
Quartile 1	1,109	1,219	1,100
Quartile 2	1,173	1,257	1,117
Quartile 3	1,321	1,298	1,242
First Reading	05-Mar-98	05-Mar-98	06-Oct-99
Last Reading	02-Dec-03	05-Mar-03	29-Oct-02

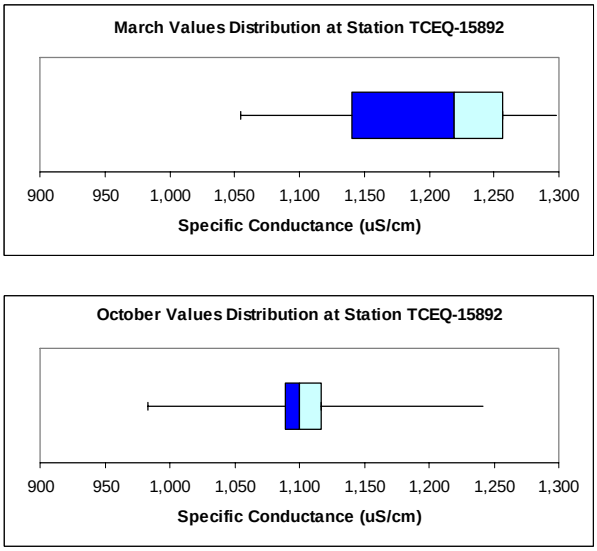

Figure E-28. Seasonal distributions for specific conductance values during the study period.

Case Study 10: Specific Conductance at Station TCEQ-13205 (Rio Grande—below Amistad Reservoir to Falcon Reservoir Region)

Case Study 10 is defined by the following attributes:

- Water Quality Indicator: Specific Conductance, field (UMHOS/CM @ 25C). Indicator ID: 1110
- Station ID: TCEQ-13205
- Station Location: Latitude: 28.663334 N; Longitude: -100.5 E
- Station Name: RIO GRANDE NR US277/EAGLE PASS
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-29 shows the plot of values measured within the study period once the outliers have been removed from the data set. A slight decreasing trend can be spotted on this plot.

Figure E-30 shows the cumulative normal distribution for this data set indicating a 60 percent probability of measuring a Specific conductance value of about 1,000 µS/cm or greater at this station.

Table E-16 shows an average value of 1,023 µS/cm and a standard deviation of 97 µS/cm.

Table E-16 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in June–August are larger in average and less spread out than the values measured in December–February. Figure E-31 shows the December–February and June–August seasonal distributions for Conductance at Station TCEQ-13205.

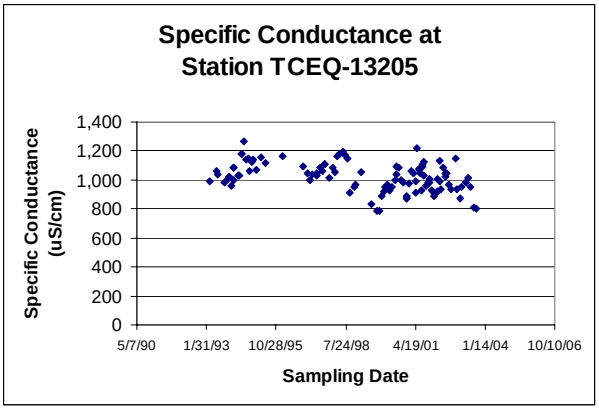

Figure E-29. Specific conductance values during the study period.

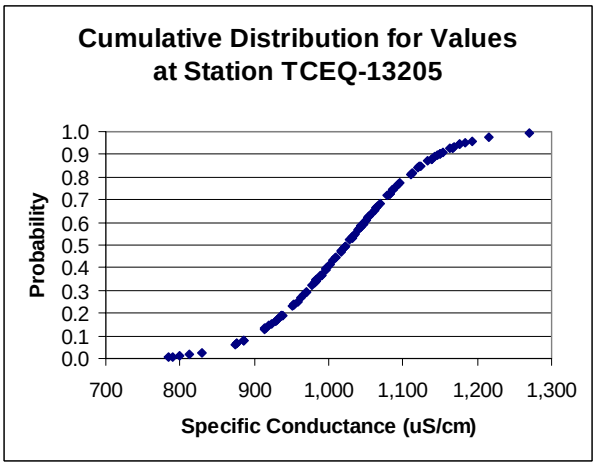

Figure E-30. Cumulative normal distribution for specific conductance values during the study period.

Table E-16. Statistics for Specific Conductance Values Measured at Station TCEQ-13205

Statistic	All Values	Dec–Feb Values	Jun–Aug Values
Count	108	33	32
Average	1,023	988	1,064
Median	1,026	996	1,065
Mode	954	1,009	1,177
Standard Deviation	97	78	96
Min	784	874	813
Max	957	923	1,035
Quartile 1	1,026	996	1,065
Quartile 2	1,087	1,053	1,121
Quartile 3	1,270	1,138	1,270
First Reading	23-Mar-93	01-Dec-93	17-Jun-93
Last Reading	10-Sep-03	12-Feb-03	13-Aug-03

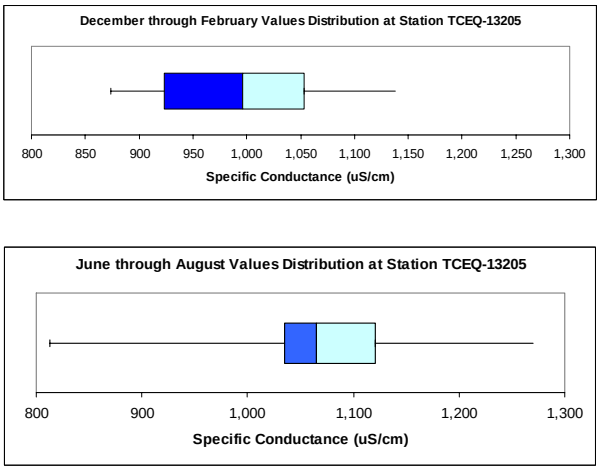

Figure E-31. Seasonal distributions for specific conductance values during study period.

Table E-17. Statistics for Water Quality Indicator Values Measured at Different Stations in the Rio Grande-Elephant Butte Reservoir to above Rio Conchos Region

Statistic	Chloride (mg/L) at Station TCEQ-13272	Conductance (µS/cm) at Station TCEQ-13272	Total Nitrogen (mg/L) at Station TCEQ-13272	Fecal Coliform (#/100 ml) at Station TCEQ-13272	pH at Station TCEQ-15528
	Statistics Values				
Count	251	175	155	151	146
Average	157.5	1,469	0.2	1,236	8.3
Median	119.0	1,190	0.1	567	8.3
Mode	110.0	1,170	0.1	300	8.2
Standard Deviation	99.9	765	0.3	1,649	0.4
Min	1.0	288	0.0	1	6.5
Quartile 1	94.0	1,058	0.1	219	8.1
Quartile 2	119.0	1,190	0.1	567	8.3
Quartile 3	190.0	1,760	0.2	1,535	8.5
Max	752.0	8,490	1.9	9,700	9.7
First Reading	21-Jan-93	27-Jan-93	27-Jan-93	27-Jan-93	20-Nov-97
Last Reading	18-Nov-03	16-Dec-03	16-Dec-03	16-Dec-03	16-Dec-03
Trend	Stable	Increasing	Increasing	Not identifiable	Increasing

Table E-18. Statistics for Water Quality Indicator Values Measured at Different Stations in the Rio Grande-Rio Conchos to Amistad Reservoir Region

Statistic	DO (mg/L) at Station TCEQ-15892	pH at Station TCEQ-15892	Conductance (µS/cm) at Station TCEQ-13835	DO (mg/L) at Station TCEQ-13835	Conductance (µS/cm) at Station TCEQ-15893
	Statistics Values				
Count	197	197	197	197	141
Average	7.9	8.1	1,001	7.0	553
Median	8.0	8.1	1,019	7.8	534
Mode	7.8	8.1	1,030	8.0	435
Standard Deviation	1.9	0.2	74	2.8	160
Min	0.3	7.5	820	0.1	327
Quartile 1	7.2	8.0	965	6.1	416
Quartile 2	8.0	8.1	1,019	7.8	534
Quartile 3	9.1	8.3	1,059	8.9	691
Max	11.1	8.5	1,171	11.7	932
First Reading	05-Mar-98	05-Mar-98	21-Jun-00	21-Jun-00	06-Oct-99
Last Reading	02-Dec-03	02-Dec-03	02-Dec-03	02-Dec-03	02-Dec-03
Trend	Stable	Not identifiable	Decreasing	Not identifiable	Not identifiable

Table E-19. Statistics for Water Quality Indicator Values Measured at Different Stations in the Rio Grande below Amistad Reservoir to Falcon Reservoir Region

Statistic	DO (mg/L) at Station TCEQ-13205	pH at Station TCEQ-13205	Conductance (µS/cm) at Station TCEQ-13560	DO (mg/L) at Station TCEQ-13560	Chloride (mg/L) at Station TCEQ-13209
	Statistics Values				
Count	114	113	107	106	102
Average	8.5	8.1	998	9.1	151.8
Median	8.3	8.0	1,010	9.2	150.0
Mode	10.7	8.0	1,013	9.0	160.0
Standard Deviation	2.0	0.7	140	2.4	20.8
Min	3.9	6.9	94	2.1	60.9
Quartile 1	7.1	7.7	946	7.3	138.4
Quartile 2	8.3	8.0	1,010	9.2	150.0
Quartile 3	9.7	8.2	1,056	10.9	160.0
Max	15.4	10.5	1,312	15.2	200.0
First Reading	23-Mar-93	23-Mar-93	16-Mar-93	16-Mar-93	20-Jan-93
Last Reading	11-Dec-03	11-Dec-03	13-Nov-03	13-Nov-03	12-Sep-02
Trend	Stable	Stable	Decreasing	Stable	Decreasing

Table E-20. Location of Additional Stations in the Rio Grande Transboundary Region

Station ID	Location	Name	State	Owning Organization
TCEQ-15528	Lat: 31.752777, Lon: -106.418892	RIO GRANDE 1.3KM DWNSTRM WWTP	Texas	Texas Commission on Environmental Quality
TCEQ-13835	Lat: 29.458334, Lon: -101.05722	AMISTAD RESERVOIR AT BUOY #1. Ambient monitoring station.	Texas	Texas Commission on Environmental Quality
TCEQ-15893	Lat: 29.601389, Lon: -100.976112	AMISTAD RESERV DEVILS R ARM	Texas	Texas Commission on Environmental Quality
TCEQ-13560	Lat: 29.291945, Lon: -100.876114	RIO GRANDE AT MOODY RANCH	Texas	Texas Commission on Environmental Quality
TCEQ-13209	Lat: 29.416666, Lon: -101.033333	RIO GRANDE BELOW AMISTAD DAM	Texas	Texas Commission on Environmental Quality

E.7 Case Studies for the Lower Rio Grande Transboundary Region

Two case studies were included for this region. Each one is defined by a water quality indicator measured at a given station in the region. Water quality trends and seasonality were assessed for the scenario and are summarized in Figures E-32 through E-37 and Tables E-21 and E-22. Additional trends were assessed for other stations and summarized in Tables E-23 and E-24.

E.7.1 General Characteristics

The Lower Rio Grande Valley Region (below Falcon Reservoir to the Gulf of Mexico) contains 11 basins that drain either to that reach of the Rio Grande, to the lower reach of the Rio San Juan below the gaging station at Santa Rosalia, or to Arroyo Colorado in southern Texas. It drains an area of 10,240 square miles (26,500 km^2).

This region is physiographically characterized as Gulf Coastal Plain. From Falcon Reservoir, the Rio Grande/Rio Bravo flows southeastward approximately 275 river miles (443 km), ending in the coastal wetlands and marshes of the Gulf of Mexico, including the Laguna Madre off the coasts of Texas and Tamaulipas. Among the unique habitats of this segment of the U.S.-Mexico border are the “resacas” (oxbow lakes) of the Lower Rio Grande Valley. Surface water flow entering the Lower Rio Grande Valley Region via the Rio Grande mainstream is greatly influenced by water management practices and upstream control structures. Mexico’s Rio Conchos and Rio San Juan have been the primary sources of water for this section of the Lower Rio Grande for several decades (Buckler et al., 1997).

Case Study 11: Specific Conductance at Station TCEQ-13072 (Lower Rio Grande)

Case Study 11 is defined by the following attributes:

- Water Quality Indicator: Specific Conductance, field (UMHOS/CM @ 25C). Indicator ID: 1110
- Station ID: TCEQ-13072
- Station Location: Latitude: 26.235277 N; Longitude: -97.584724 E
- Station Name: No name. Tidal Stream
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-32 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be spotted on this plot.

Figure E-33 shows the cumulative normal distribution for this data set indicating an 80 percent probability of measuring a Specific conductance value of 10,000 µS/cm or greater at this station, which is expected for a tidal saline water.

Table E-21 shows an average value of 21,669 µS/cm and a standard deviation of 15,074 µS/cm.

Table E-21 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in June–August are larger in average and more spread out than the values measured in December–February. Figure E-34 shows the December–February and June–August seasonal distributions for Conductance at Station TCEQ-13072.

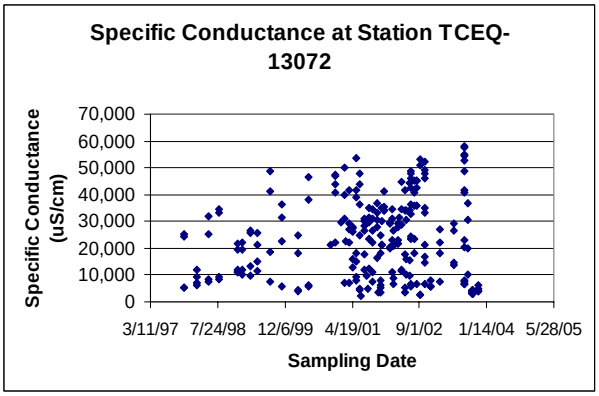

Figure E-32. Specific conductance values during the study period.

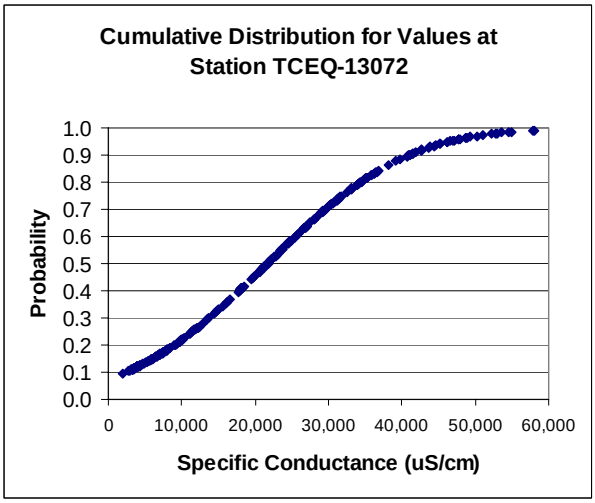

Figure E-33. Cumulative normal distribution for specific conductance values during the study period.

Table E-21. Statistics for Specific Conductance Values Measured at Station TCEQ-13072

Statistic	All Values	Dec–Feb Values	Jun–Aug Values
Count	264	48	70
Average	21,669	23,831	28,489
Median	21,168	22,043	30,458
Mode	11,280	11,280	-
Standard Deviation	15,074	12,133	16,164
Min	2,019	6,410	2,019
Max	6,970	11,818	12,236
Quartile 1	21,168	22,043	30,458
Quartile 2	33,055	31,926	42,294
Quartile 3	57,972	50,254	57,972
First Reading	20-Nov-97	19-Feb-98	05-Aug-98
Last Reading	17-Nov-03	05-Feb-03	27-Aug-03

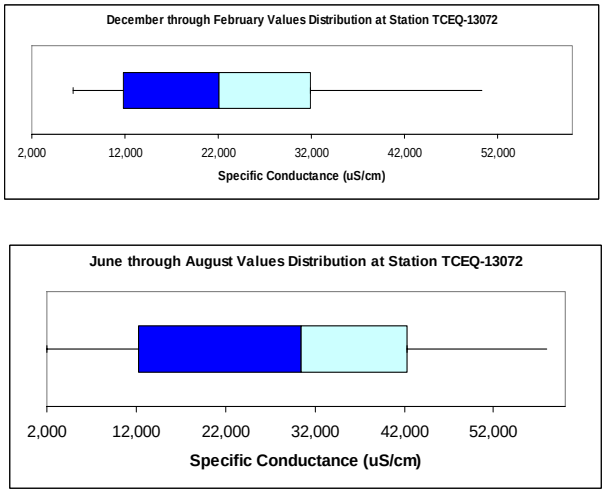

Figure E-34. Seasonal distributions for specific conductance values during study period.

Case Study 12: DO at Station TCEQ-13072 (Lower Rio Grande)

Case Study 12 is defined by the following attributes:

- Water Quality Indicator: DO (mg/L). Indicator ID: 1127
- Station ID: TCEQ-13072
- Station Location: Latitude: 26.235277 N; Longitude: -97.584724 E
- Station Name: No name. Tidal Stream
- Owning Organization: Texas Commission on Environmental Quality.

Figure E-35 shows the plot of values measured within the study period once the outliers have been removed from the data set. No trend can be spotted on this plot.

Figure E-36 shows the cumulative normal distribution for this data set indicating a 70 percent probability of measuring a DO value of 5.0 mg/L or less at this station.

Table E-22 shows an average value of 3.4 mg/L and a standard deviation of 2.7 mg/L.

Table E-22 also shows the differences in the statistics for the seasonal values measured at this station. Values measured in December–February are larger in average than the values measured in June–August. Figure E-37 shows the December–February and June–August seasonal distributions for DO at Station TCEQ-13072.

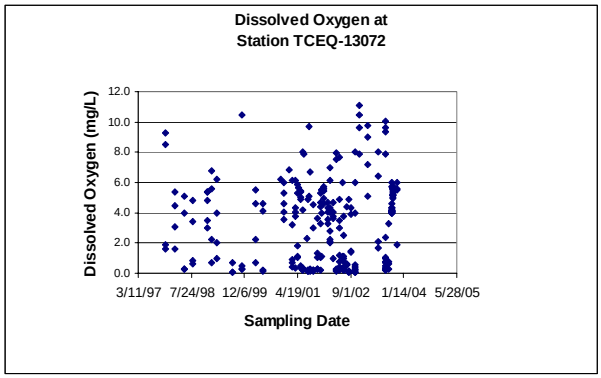

Figure E-35. Dissolved oxygen values during the study period.

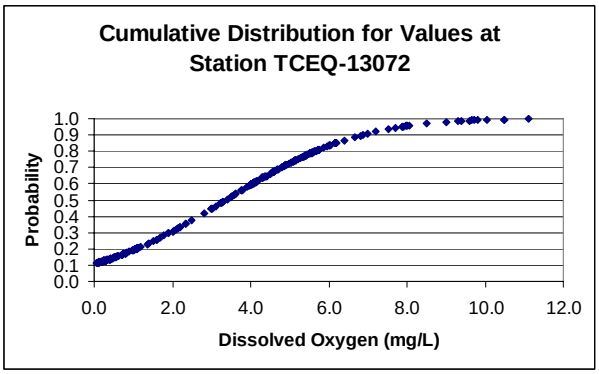

Figure E-36. Cumulative normal distribution for dissolved oxygen values during the study period.

Table E-22. Statistics for Dissolved Oxygen Values Measured at Station TCEQ-13072

Statistic	All Values	Dec–Feb Values	Jun–Aug Values
Count	256	47	69
Average	3.4	4.4	2.0
Median	3.8	4.5	0.6
Mode	4.0	5.4	0.2
Standard Deviation	2.7	2.0	2.9
Min	0.1	0.4	0.1
Max	0.6	3.2	0.2
Quartile 1	3.8	4.5	0.6
Quartile 2	5.3	5.5	3.3
Quartile 3	11.1	9.8	10.0
First Reading	20-Nov-97	19-Feb-98	05-Aug-98
Last Reading	17-Nov-03	05-Feb-03	27-Aug-03

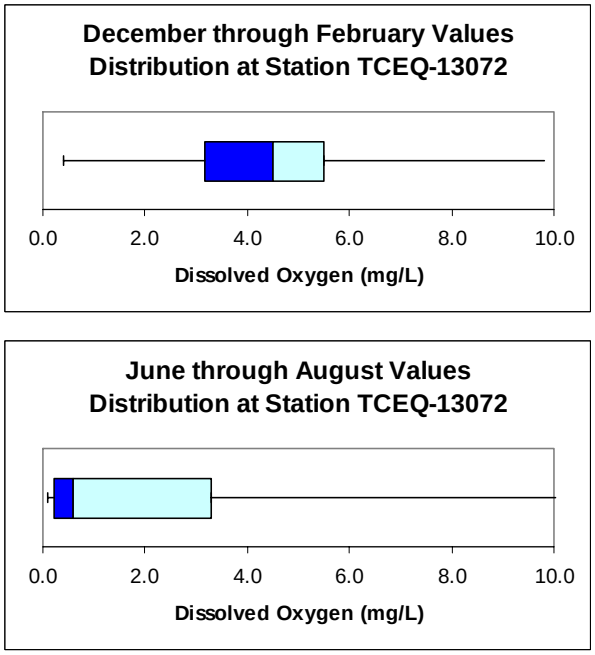

Figure E-37. Seasonal distributions for dissolved oxygen values during study period.

Table E-23. Statistics for Water Quality Indicator Values Measured at Different Stations in the Lower Rio Grande Transboundary Region

Statistic	pH at Station TCEQ-13072	Conductance (µS/cm) at Station TCEQ-13460	pH at Station TCEQ-13460	DO (mg/L) at Station TCEQ-13460	Conductance (µS/cm) at Station TCEQ-13073
	Statistics Values				
Count	260	242	241	232	184
Average	7.7	49,916	8.1	6.7	24,460
Median	7.6	50,495	8.1	6.8	23,294
Mode	7.7	52,000	8.1	6.0	11,300
Standard Deviation	0.3	4,648	0.2	1.4	12,954
Min	6.7	26,760	7.6	2.7	2,560
Quartile 1	7.5	45,863	8.0	5.8	14,237
Quartile 2	7.6	50,495	8.1	6.8	23,294
Quartile 3	7.7	52,798	8.2	7.8	33,469
Max	9.3	60,000	8.9	11.4	57,930
First Reading	20-Nov-97	26-May-93	26-May-93	26-May-93	02-Dec-97
Last Reading	17-Nov-03	17-Dec-03	17-Dec-03	17-Dec-03	17-Nov-03
Trend	Stable	Increasing	Stable	Increasing	Stable

Table E-24. Location of Additional Stations in the Lower Rio Grande Transboundary Region

Station ID	Location	Name	State	Owning Organization
TCEQ-13460	Lat: 26.014723, Lon: -97.2575	BROWNSVILLE SHIP CHANNEL CM 3. Estuary.	Texas	Texas Commission on Environmental Quality
TCEQ-13073	Lat: 26.264999, Lon: -97.583054	ARROYO COLORADO TIDAL AT CAMP PERRY NORTH OF RIO HONDO.	Texas	Texas Commission on Environmental Quality

E.8 References

Buckler, D., D. Papoulias, G. Ozuna, D. Woodward, M. Flora, and L. Ditto. 1997. *Water Resources Issues in the Lower Rio Grande Valley – Below Falcon Reservoir to the Gulf of Mexico Subarea*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 4.

NMED (New Mexico Environment Department). 2002. *State of New Mexico Standards for Interstate and Intrastate Surface Waters*. Available at http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.html (accessed October 26, 2005).

Papoulias, D., D. Woodward, M. Flora, and D. Buckler, D. 1997. *Water Resources Issues in the Mexican Highlands Sub-area*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 2.

U.S. EPA (Environmental Protection Agency). 2001. *Status Report on the Water-Wastewater Infrastructure Program for the US-Mexico Borderlands*. Office of Water.

Woodward, D.G., and R.A. Durall. 1996. *United States-Mexico Border Area, As Delineated By a Shared-Water Resources Perspective*. U.S. Department of the Interior. U.S.-Mexico Border Field Coordinating Committee Fact Sheet 1.

Appendix F

Summary of 303(d), 305(b), and Fish Advisory Information for the U.S. Side of the Border

F.1 Introduction

RTI has gathered water quality assessment information for the U.S. side of the border region, specifically Clean Water Act section 305(b) assessments and section 303(d) lists of impaired waters. These publicly available sources are repositories for information about how well U.S. waters support their designated or desired uses. These uses are important factors in the public perception of the condition of U.S. waters and also reflect on the quality of surface water as it relates to public health. Section 305(b) and 303(d) data are collected every two years. The most recent 305(b) data available are for 2002. The most recent 303(d) data available are for 1998 for all U.S. states except New Mexico; the most recent 303(d) data available for New Mexico are for 2000. The 2002 303(d) data have not yet been approved and released to the public.

Because these sources do not represent primary water quality data, they cannot be entered into the database or analyzed alongside the other water quality data collected under this task. Given this situation, RTI summarized the information obtained for 305(b) and 303(d) in this Appendix. RTI also downloaded information from the National Listing of Fish Advisories (NLFA) database. Fish consumption advisory data are not useful in assessing trends in water quality in the border waters area for several reasons. Because sampling and analysis of fish tissues is a resource-intensive process, fish sampling is typically targeted to identify only those waterbodies where fish may have tissue concentrations of environmental contaminants of public health concern (U.S. EPA, 2003). Many states do not have adequate resources to conduct unbiased (random) sampling of waterbodies within their jurisdictions. In these states, samples are collected only for those waterbodies where contamination is known or suspected. In addition, some states use a rotating basin approach where waterbodies in one basin are targeted for sampling one year and waterbodies in another basin are targeted for sampling the next year. In some cases, all waterbodies in a state have not been sampled even after 5 to 10 years of sampling effort. Often, resources are so limited that only a single, one-time sampling of a waterbody is conducted, which precludes trend analysis of the data over several years. It is important, however, especially in areas where recreational or subsistence fishing is prevalent, that the public be informed of those waterbodies where consumption of fish may pose health risks either to sensitive populations such as pregnant women, nursing mothers or young children, or to the general population. State health departments need to communicate the risk of eating fish to those populations living in close proximity to these contaminated waterbodies. RTI summarized the information obtained for fish advisories and included this information in this Appendix.

Fish advisories, 303(d) programs, and 305(b) programs are applicable only to U.S. waters, so RTI's data collection and summary was for the U.S. side of the border only.

F.2 Clean Water Act (CWA) Section 303(d)

Section 303(d) is included in the 1972 amendments to the Clean Water Act. The regulations implementing Section 303(d) require states to develop lists of waterbodies that do not meet water quality standards and to submit updated lists to the U. S. Environmental Protection Agency (EPA) every two years. Water quality standards, as defined in the Code of Federal Regulations, include beneficial uses, water quality objectives, and antidegradation requirements. EPA is required to review impaired water body lists submitted by each state and approve or disapprove all or part of the list.

The 303(d) list of impaired waterbodies is the basis for development of TMDL (total maximum daily load) values. A TMDL is a pollutant load reduction plan developed to correct a particular impairment. TMDLs must document the nature of the water quality impairment, determine the maximum amount of a pollutant which can be discharged and still meet standards, and identify allowable loads from the contributing sources.

Tables F-1 through F-4 (at the end of the Appendix) list the waterbodies in Arizona, California, New Mexico, and Texas, respectively, that do not meet water quality standards for one or more pollutants and were submitted by the border area States and approved by EPA (in 1998 for Arizona, California, and Texas) or 2000 (New Mexico). The tables contain information for the waterbodies within the boundaries of the HUCs identified in the study area and list the pollutants responsible for the violation of the standards.

F.3 Clean Water Act (CWA) Section 305(b)

Section 305(b) is included in the 1972 amendments to the Clean Water Act. The regulations implementing Section 305(b) require States to develop an inventory of the water quality of all waterbodies in the state and to submit an updated report to the EPA every two years. The report includes a description of the nature and extent of nonpoint sources of pollutants. 305(b) regulations supplement 303(d) regulations in that they describe the water quality status of all waterbodies in the nation, not just the impaired waterbodies.

Specific information about the 2002 305(b) assessment cycle can be found online at http://oaspub.epa.gov/pls/tmdl/w305b_report_v2v.huc. Tables F-5 to F-8 present the water quality assessment data for 2002 for the watersheds identified in the border area for Arizona, California, New Mexico, and Texas, respectively. Waterbodies with a non-assessed water status were also included in the tables because they were considered in the information presented in later tables.

Tables F-9 to F-12 present the type and size of the waterbodies that are affected by the different pollutants for Arizona, California, New Mexico, and Texas, respectively. Tables F-13 to F-16 present the same information by probable sources contributing to water quality impairment. The data represent the totals by state and only consider watersheds within the border area for which this information was presented.

F.4 Summary of 303(d) and 305(b) Data

The impairments (based on the 303(d) data) and the likely causes (based on the 305(b) data) are summarized for each watershed by transboundary region here.

F.4.1 Pacific/Salton Sea Transboundary Basins

- **San Diego Watershed (HUC 18070304).** The Santa Ysabel Creek and Lake Hodges are impaired. The San Diego River is impaired. The Mission Bay is impaired. The San Diego Bay is threatened. South San Diego Bay wetlands are good. The San Diego Bay shoreline is impaired at various points: 32nd Street San Diego Naval Station, Chula Vista Marina, Downtown Anchorage, G Street Pier, North of 24th Street Marine Terminal, Seventh Street Channel, Shelter Island Shoreline Park, etc. The Sweetwater Marsh is threatened (estuary) while the Sweetwater Reservoir was not assessed. The Otay River is impaired and the Otay Reservoir is threatened. ***Causes of impairment:*** debris, habitat alterations, non-native fish/shellfish/zooplankton species, nonpriority organics, nutrients, odor threshold number, organic enrichment/low dissolved oxygen, pathogens/pathogens indicators, priority organics, salinity, sedimentation/siltation, sulfates and total toxics. ***Probable sources contributing to impairment:*** agricultural return flows, agriculture, boat discharges/vessel wastes, channel erosion, channelization, dairies, dam construction (other than upstream flood control projects), erosion/siltation, flow alterations from water diversions, habitat modification, hydromodification, illegal dumping, industrial point source discharge, land disposal, loss of riparian habitat, municipal (urbanized high density area), municipal point source, discharges, natural sources, nonpoint source, spills from trucks or trains, transient encampments, upstream impoundments, and wastewater.

- **Cottonwood-Tijuana Watershed (HUC 18070305).** The Cottonwood Creek is impaired. The Morena Reservoir is impaired. The Pacific Ocean Shoreline near Tijuana is impaired. The Tijuana River and Estuary are impaired. ***Causes of impairment:*** copper, habitat alterations, metals, non-native fish, organic enrichment, pesticides, and pH. ***Probable sources contributing to impairment:*** hydromodification, unknown nonpoint sources.

- **Salton Sea Watershed (HUC 18100200).** The Whitewater River is good. Both the Alamo and New Rivers are impaired (more than 50 miles of each river are impaired). The Coyote Creek is threatened but the San Felipe Creek is good. The Carrizo Creek is threatened. The Salt Creek is good. The Coachella Valley Drains are threatened and the Coachella Valley Storm Channel is impaired. The Salton Sea is impaired. ***Causes of impairment:*** debris, habitat alterations, metals, nutrients, organic enrichment, pathogens, pesticides, sedimentation/siltation, and selenium. ***Probable sources contributing to impairment:*** agriculture: irrigation tailwater and subsurface drainage, irrigated crops and natural sources.

F.4.2 Colorado River/Sea of Cortez Transboundary Basins

- **Lower Gila Watershed (HUC 15070201).** None of the Coyote Wash, Mohawk Wash, Copper, Fourth of July was assessed. The Gila River between the Coyote Wash and the Fortuna Wash is in good condition. The Painted Rock Borrow Pit Lake is impaired. ***Causes of impairment:*** dissolved oxygen (low) and total coliform. ***Probable sources contributing to impairment:*** construction stormwater discharges (permitted), impacts from hydro-structure flow regulation, irrigated crop production, municipal, post-development erosion and sedimentation.

F.4.3 Central Desert/Closed Basins

- **Upper San Pedro Watershed (HUC 15050202).** The San Pedro River is impaired along 15 miles between the Dragon Wash and the Tres Alamos Wash. The San Pedro River has been assessed in other sectors and it is in good condition. For example, from the Mexico Border to Charleston and from Charleston to Walnut Gulch, the San Pedro River is in good condition. ***Cause of impairment:*** nitrates. ***Probable sources contributing to impairment:*** Superfund sites and illegal dumping.

- **Upper Santa Cruz Watershed (HUC 15050301).** Portions of the Santa Cruz River have been assessed. Impaired sections include: Mexican Border to Nogales Wastewater Treatment Plant outfall, Nogales Wastewater Treatment Plant to Josephine canyon, Josephine Canyon to Tubac Bridge and from Tubac Bridge to Sopori Wash. The Sonoita Creek is impaired, 750 feet below Patagonia Wastewater Treatment Plant to Santa Cruz River. ***Causes of impairment:*** mercury, total coliform and zinc. ***Probable sources contributing to impairment:*** atmospheric deposition/toxics, impact from abandoned mine lands, mine tailing, municipal point source discharges and unmanaged pasture grazing.

- **Brawley Wash Watershed (HUC 15050304).** The Arivaca and Brawley Washes were not assessed but the Arivaca Lake is impaired. ***Cause of impairment:*** mercury. ***Probable source of impairment:*** atmospheric deposition.

- **Mimbres Watershed (HUC 13030202).** The Mimbres River is impaired at some locations. One location is downstream from Sheppard Canyon, which enters the Mimbres River about one mile upstream from the Town of Mimbres. Another impaired location is from Sheppard Canyon upstream to Cooney Campground. San Vicente Arroyo is not assessed. ***Cause of impairment:*** low dissolved oxygen. ***Probable source of impairment:*** dredge mining.

F.4.4 Rio Grande Transboundary Basin

- **Tularosa Valley Watershed (HUC 13050003).** Lake Lucero is impaired and located on White Sands National Monument. Three Rivers are impaired, from U.S. Highway 54 upstream to the White Mountain Wilderness boundary. ***Causes of impairment:*** conductivity and temperature. ***Probable sources contributing to impairment:*** agriculture, livestock and unmanaged pasture grazing.

- **El Paso-Las Cruces Watershed (HUC 13030102).** The Rio Grande from Leasburg Dam to Percha Dam and from the Texas Border to Leasburg has been assessed and is in good condition.

- **Rio Grande-Fort Quitman Watershed (HUC 13040100).** The Rio Grande is impaired upstream of Anthony Drain to International Dam. ***Causes of impairment:*** pathogens and bacteria. ***Probable sources contributing to impairment:*** agriculture, animal feeding, crop production, municipal point source discharge, and permitted run-off from confined animal feeding operations

- **Cibolo-Red Light Watershed (HUC 13040201).** The Rio Grande is impaired 25 miles downstream of upper segment boundary and from Guadalupe Bridge to Arroyo Diablo. ***Causes of impairment:*** bacteria/pathogens, chloride and total dissolved solids. ***Probable sources contributing to impairment:*** agriculture, channel erosion, crop production, impacts from hydrostructure flow, industrial point source discharge, irrigated crop production, municipal point source discharges and nonpoint sources.

- **Black Hills-Fresno Watershed (HUC 13040203).** The Rio Grande is impaired 25 downstream of upper segment boundary. ***Causes of impairment:*** bacteria/pathogens. ***Probable sources contributing to impairment:*** municipal point source discharges.

- **Big Bend Watershed (HUC 13040205).** The Rio Grande is impaired 25 miles downstream of upper segment boundary. ***Causes of impairment:*** bacteria/pathogens. ***Probable sources contributing to impairment:*** municipal point source discharges.

- **Reagan-Sanderson Watershed (HUC 13040208).** The Rio Grande has been assessed in portion of this watershed and it is in good condition.

- **Amistad Reservoir Watershed (HUC 13040212).** The Rio Grande has been assessed in portion of this watershed and it is in good condition. The International Amistad Reservoir waters have been assessed and are in good condition.

- **Upper Devils Watershed (HUC 13040301).** The Devils River has been assessed from Dry Devils River to Cedar Canyon and it is in good condition.

- **Lower Devils Watershed (HUC 13040302).** The Devils River from Cedar Canyon to Satan Creek is in good condition. Dolan Creek was not assessed. The International Amistad Reservoir waters have been assessed and are in good condition.

- **Lower Pecos Watershed (HUC 13070008).** The Lower Pecos River has been assessed from the upper segment boundary to Painted Canyon and it is in good condition. The Upper Pecos River is in good condition for the remainder of the segment.

- **Elm-Sycamore Watershed (HUC 13080001).** The Rio Grande is impaired 4.5 miles downstream of Highway 277. Other portions of Rio Grande have been assessed and are in good condition. ***Causes of impairment:*** bacteria/pathogens. ***Probable sources contributing to impairment:*** municipal point source discharges.

- **San Ambrosia-Santa Isabel Watershed (HUC 13080002).** The Rio Grande is impaired 3 miles downstream of Highway 277. It is also impaired from downstream of International Bridge 2 to pipeline crossing and from there to San Isidro pump station. Other portions of Rio Grande have been assessed and are in good condition. ***Causes of impairment:*** bacteria/pathogens. ***Probable sources contributing to impairment:*** municipal point source discharges.

- **International Falcon Reservoir Watershed (HUC 13080003).** The International Falcon Reservoir waters have been assessed and are in good condition. The Rio Grande is impaired from El Cenizo to San Isidro pump station and the remainder of the segment. ***Causes of impairment:*** bacteria/pathogens. ***Probable sources contributing to impairment:*** municipal point source discharges.

F.4.5 Lower Rio Grande Transboundary Basin

- **Los Olmos Watershed (HUC 13090001).** Portions of the Rio Grande have been assessed and are in good condition.

- **South Laguna Madre Watershed (HUC 12110208).** The Arroyo Colorado above tidal is impaired. Impaired segments include lower 4 miles of segment, 11 miles upstream to 4 miles downstream of US Highway 77 and upper 19 miles of segment. Arroyo Colorado tidal waters are in good condition. The Laguna Madre waters have been assessed and are in good condition. ***Causes of impairment:*** bacteria/pathogens, DDE and pesticides. ***Probable sources contributing to impairment:*** municipal point discharges and nonpoint sources.

F.5 Fish Consumption Advisories of the Border States in the United States

As of 2003, the four border states had issued 108 advisories in total to advise the residents of those states

- To consume the fish caught in the state waters with restrictions

- Not to consume any fish from the following waters, or

- To only catch and release fish for specific waters because of the pollutants accumulated in fish tissue.

The advisories are issued by each state for specific waters and specific population based on human health risk assessments using pollutant level in fish tissue analyses from the specific waters. EPA has annually compiled the listing of fish advisories issued by the states at the National Listing of Fish Advisories Web site: http://www.epa.gov/waterscience/fish/advisories/index.html. The advisories are further categorized as no consumption for general population (NCGP), no consumption for sensitive population (NCSP), restricted consumption for general population (RGP), restricted consumption for sensitive population (RSP), and no kill zone (NKZ). Tables F-17 through F-20 list pollutants and advisory types for waterbodies under advisories in 2003.

For more detailed and up-to-date specific advisories from each state, please refer to the following links:

- **Arizona**: http://www.gf.state.az.us/h_f/fish_consumption.shtml
- **California**: http://www.oehha.ca.gov/fish.html
- **New Mexico**: http://www.nmenv.state.nm.us/swqb/Mercury.html
- **Texas**: http://www.tdh.state.tx.us/bfds/ssd/fiscount.html.

F.6 References

U.S. EPA (Environmental Protection Agency). 2003. *Summary of Responses to the 202 National Survey of Fish Advisory Programs*. EPA 823-R-03-007. Office of Water.

Table F-1. 303(d) Data for Arizona (1998)

Arizona	
Water Body	**Impairment**
ALUM GULCH	CADMIUM, COPPER, PH, ZINC
ARIVACA LAKE	MERCURY
COLORADO RIVER	TURBIDITY
GILA RIVER	TURBIDITY, ARSENIC, BORON, CHLORDANE, DDT, DDT METABOLITES, DIELDRIN, MERCURY, TOXAPHENE, TURBIDITY, PATHOGENS, FECAL COLIFORM, SELENIUM
HARSHAW WASH	COPPER, PH, ZINC
MULE GULCH	COPPER, PH, ZINC
NOGALES WASH & EAST NOGALES WASH	CHLORINE, E. COLI, FECAL COLIFORM, TURBIDITY
PAINTED ROCK LAKE (BORROW PIT)	CHLORDANE, DDT, DDT METABOLITES DIELDRIN, DISSOLVED OXYGEN, MERCURY, ORGANIC ENRICHMENT/LOW DISSOLVED, OXYGEN, PH, TOXAPHENE, TURBIDITY
PAINTED ROCK RESERVOIR	CHLORDANE, DDT, DDT METABOLITES, DIELDRIN, MERCURY, PH, TOXAPHENE, TOXICANTS, TURBIDITY
PENA BLANCA LAKE	MERCURY
SAN PEDRO RIVER	FECAL COLIFORM, NITRATES, PATHOGENS, TURBIDITY, BERYLLIUM, ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN
SANTA CRUZ RIVER	TURBIDITY, CYANIDE, CADMIUM, COPPER
SONOITA CREEK	DISSOLVED OXYGEN
THREE-R CANYON CREEK	BERYLLIUM, COPPER, PH, ZINC
WHITEWATER DRAW	ARSENIC, BERYLLIUM, COPPER, DISSOLVED OXYGEN, LEAD, MANGANESE, ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN, PATHOGENS, TURBIDITY, ZINC

Table F-2. 303(d) Data for California (1998)

California	
Water Body	**Impairment**
AGUA HEDIONDA LAGOON	HIGH COLIFORM COUNT, SEDIMENTATION/SILTATION
ALAMO RIVER	PESTICIDES, SEDIMENTATION/SILTATION, SELENIUM
ALISO CREEK	HIGH COLIFORM COUNT, PATHOGENS
ANAHEIM BAY	METALS, PESTICIDES
BUENA VISTA LAGOON	HIGH COLIFORM COUNT, NUTRIENTS, SEDIMENTATION/SILTATION
CHOLLAS CREEK	CADMIUM, COPPER, HIGH COLIFORM COUNT, LEAD, PATHOGENS, TOXICITY, ZINC
COACHELLA VALLEY STORM CHANNEL	BACTERIA, PATHOGENS
FAMOSA SLOUGH & CHANNEL	EUTROPHIC, NUTRIENTS, PH
HUNTINGTON HARBOUR	METALS, PATHOGENS, PESTICIDES
IMPERIAL VALLEY DRAINS	PESTICIDES, SEDIMENTATION/SILTATION, SELENIUM
LOS PENASQUITOS LAGOON	SEDIMENT, SEDIMENTATION/SILTATION
MISSION BAY	EUTROPHIC, HIGH COLIFORM COUNT, LEAD
NEW RIVER (R7)	BACTERIA, NUTRIENTS, PESTICIDES, SEDIMENTATION/SILTATION, VOLATILE ORGANICS/VOCS
NEWPORT BAY, LOWER	METALS, NUTRIENTS, PATHOGENS, PESTICIDES, PRIORITY ORGANICS
PACIFIC OCEAN, CORONADO HA 910.10	HIGH COLIFORM COUNT
PACIFIC OCEAN, DANA POINT HSA 901.14	HIGH COLIFORM COUNT
PACIFIC OCEAN, ESCONDIDO CREEK HA 904.60	HIGH COLIFORM COUNT
PACIFIC OCEAN, LAGUNA BEACH HSA 901.12	HIGH COLIFORM COUNT
PACIFIC OCEAN, LOWER SAN JUAN HSA	HIGH COLIFORM COUNT
PACIFIC OCEAN, SAN CLEMENTE HA 901.30	HIGH COLIFORM COUNT
PACIFIC OCEAN, SAN DIEGO HU 907.00	HIGH COLIFORM COUNT
PACIFIC OCEAN, SAN DIEGUITO HU 905.00	HIGH COLIFORM COUNT
PACIFIC OCEAN, SAN MARCOS HA 904.50	HIGH COLIFORM COUNT
PACIFIC OCEAN, SCRIPPS HA 906.30	HIGH COLIFORM COUNT
PACIFIC OCEAN, TIJUANA HU 911.00	HIGH COLIFORM COUNT

(continued)

Table F-2. (continued)

California	
Water Body	**Impairment**
PALO VERDE OUTFALL DRAIN	BACTERIA, PATHOGENS
RAINBOW CREEK	EUTROPHIC, NUTRIENTS, PH
SALTON SEA	NUTRIENTS, SALINITY, SELENIUM
SAN DIEGO BAY	BENTHIC IMPACTS, COPPER, SEDIMENT TOXICITY
SAN DIEGO BAY, LINDBERGH HSA 908.21	HIGH COLIFORM COUNT
SAN DIEGO BAY, TELEGRAPH HSA 909.11	HIGH COLIFORM COUNT
SAN DIEGO CREEK, REACH 1	METALS, NUTRIENTS, PESTICIDES, SEDIMENTATION/SILTATION
SAN DIEGO CREEK, REACH 2	METALS, NUTRIENTS, SEDIMENTATION/SILTATION, UNKNOWN TOXICITY
SAN ELIJO LAGOON	EUTROPHIC, HIGH COLIFORM COUNT, SEDIMENTATION/SILTATION
SAN JUAN CREEK (MOUTH)	HIGH COLIFORM COUNT, PATHOGENS
SAN JUAN CREEK LOWER	HIGH COLIFORM COUNT, PATHOGENS
SANTA MARGARITA LAGOON	EUTROPHIC, NUTRIENTS, PH
TECOLOTE CREEK	CADMIUM, COPPER, HIGH COLIFORM COUNT, LEAD, PATHOGENS, TOXICITY, ZINC
TIJUANA RIVER	CADMIUM, CHROMIUM, COPPER, CYANIDE, DEBRIS, EUTROPHIC, HIGH COLIFORM COUNT, LEAD, NUTRIENTS, ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN, PATHOGENS, PESTICIDES, PH, SOLIDS, SYNTHETIC ORGANICS, SYNTHETIC ORGANICS - PRIORITY TRACE ELEMENTS, TRASH, ZINC
TIJUANA RIVER ESTUARY	DEBRIS, EUTROPHIC, HIGH COLIFORM COUNT, LEAD, NICKEL, NUTRIENTS, PATHOGENS, PESTICIDES, PH, THALLIUM, TRASH
UPPER NEWPORT BAY ECOLOGICAL RESERVE	METALS, NUTRIENTS, PATHOGENS, PESTICIDES, SEDIMENTATION/SILTATION

Table F-3. 303(d) Data for New Mexico (2000)

New Mexico	
Water Body	**Impairment**
BEAR CREEK	METALS, REDUCTION OF RIPARIAN VEGETATION, STREAMBANK DESTABILIZATION
CARLISLE CREEK	METALS, REDUCTION OF RIPARIAN VEGETATION, STREAMBANK DESTABILIZATION
COLD SPRINGS CREEK	METALS
GALLINAS CREEK	TEMPERATURE, THERMAL MODIFICATIONS
GILA RIVER	STREAM BOTTOM DEPOSITS, TURBIDITY, STREAM BOTTOM DEPOSITS, TURBIDITY
HOT SPRINGS CREEK	UNKNOWN
MANGAS CREEK	NUTRIENTS, STREAM BOTTOM DEPOSITS
MIMBRES RIVER	STREAM BOTTOM DEPOSITS, TEMPERATURE, THERMAL MODIFICATIONS, AMMONIA (UN-IONIZED), DISSOLVED OXYGEN, ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN, PH, PHOSPHORUS, REDUCTION OF RIPARIAN VEGETATION, SILTATION, STREAM BOTTOM DEPOSITS, STREAMBANK DESTABILIZATION, TEMPERATURE, TURBIDITY
PECOS RIVER	BIOLOGICAL CRITERIA, BIOLOGICAL IMPAIRMENT, METALS, REDUCTION OF RIPARIAN VEGETATION, SALINITY/TOTAL DISSOLVED SOLIDS/CHLORIDES, SILTATION, STREAM BOTTOM DEPOSITS, STREAMBANK DESTABILIZATION, THERMAL MODIFICATIONS
THREE RIVERS	CONDUCTIVITY, PHOSPHORUS, SALINITY/TOTAL DISSOLVED SOLIDS/CHLORIDES, TEMPERATURE, THERMAL MODIFICATIONS
TULAROSA CREEK	METALS, REDUCTION OF RIPARIAN VEGETATION, STREAMBANK DESTABILIZATION, UNKNOWN

Table F-4. 303(d) Data for Texas (1998)

Texas	
Water Body	**Impairment**
ARROYO COLORADO ABOVE TIDAL	BISPHTHALATE, CHLORDANE, DDE, ISOPHORONE, NITROBENZENE, PATHOGENS, TOXAPHENE
ARROYO COLORADO TIDAL	ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN
FRIO RIVER ABOVE CHOKE CANYON RES	PATHOGENS
LAGUNA MADRE	PATHOGENS
LOWER PECOS RIVER	CHLORIDE, SULFATE, TOTAL DISSOLVED SOLIDS
NUECES/LOWER FRIO RIVER	PATHOGENS
RIO GRANDE BELOW AMISTAD RESERVOIR	PATHOGENS
RIO GRANDE BELOW FALCON RESERVOIR	PATHOGENS
RIO GRANDE BELOW RIVERSIDE DIVERSION	CHLORIDE, PATHOGENS, SULFATE, TOTAL DISSOLVED SOLIDS

Table F-5. 305(b) Data for Arizona (2002)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed: Whitewater Draw					
Abbot Canyon, headwaters-Whitewater Draw	HUC: 15080301	RIVER	9.78	MILES	NOT ASSESSED
Ash Creek	HUC: 15080301	RIVER	16.63	MILES	NOT ASSESSED
Big Bend Creek, headwaters-Leslie Creek	HUC: 15080301	RIVER	8.55	MILES	NOT ASSESSED
Brewery Gulch, Wildcat Canyon-Mule Gulch	HUC: 15080301	RIVER	1	MILES	IMPAIRED
Dixie Canyon, headwaters-Mexican Canyon	HUC: 15080301	RIVER	13.39	MILES	NOT ASSESSED
Dry Canyon, hdwt-Abbott Canyon	HUC: 15080301	RIVER	15.83	MILES	NOT ASSESSED
Dubacher Canyon	HUC: 15080301	RIVER	1	MILES	IMPAIRED
Gadwell Canyon, headwaters-Whitewater Draw	HUC: 15080301	RIVER	19.57	MILES	NOT ASSESSED
Glance Creek, headwaters-Whitewater Draw	HUC: 15080301	RIVER	10.97	MILES	NOT ASSESSED
Gold Gulch, headwaters-Mexico Border	HUC: 15080301	RIVER	6.44	MILES	NOT ASSESSED
Hendricks Gulch, headwaters-Mule Gulch	HUC: 15080301	RIVER	0.5	MILES	NOT ASSESSED
Johnson Canyon, headwaters-Whitewater Draw	HUC: 15080301	RIVER	9.53	MILES	NOT ASSESSED
Leslie Creek, headwaters-Whitewater Draw	HUC: 15080301	RIVER	24.51	MILES	NOT ASSESSED
Mexican Canyon, headwaters-Whitewater Draw	HUC: 15080301	RIVER	7.36	MILES	NOT ASSESSED
Mule Gulch, Bisbee WWTP-Whitewater Draw	HUC: 15080301	RIVER	8.32	MILES	IMPAIRED
Mule Gulch, headwaters to Bisbee WWTP outfall	HUC: 15080301	RIVER	0.85	MILES	IMPAIRED
Rucker Canyon Creek, headwaters-Whitewater Dr	HUC: 15080301	RIVER	10.41	MILES	GOOD
Soto Canyon, headwaters-Dixie Canyon	HUC: 15080301	RIVER	2.31	MILES	NOT ASSESSED
Unnamed (receives Bisbee-Douglas Airport WWTP outfall)	HUC: 15080301	RIVER	11.65	MILES	NOT ASSESSED
Whitewater Draw, *B-Gadwell Canyon	HUC: 15080301	RIVER	9.81	MILES	NOT ASSESSED
Whitewater Draw, Gadwell Canyon-Mule Gulch	HUC: 15080301	RIVER	22.18	MILES	NOT ASSESSED
Whitewater Draw, Mule Gulch-Mexico border	HUC: 15080301	RIVER	6.33	MILES	GOOD
Whitewater Draw, headwaters-*B	HUC: 15080301	RIVER	26.39	MILES	NOT ASSESSED
Winwood Draw, headwaters-Mule Gulch	HUC: 15080301	RIVER	1	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed Lower Gila					
B Canal, Gila Gravity Pump-Avenue 1 E in Yuma	HUC: 15030108	STREAM	7.68	MILES	NOT ASSESSED
Castle Dome Wash	HUC: 15070201	RIVER	17.39	MILES	NOT ASSESSED
Columbus Wash, headwaters-Gila River	HUC: 15070201	RIVER	22.66	MILES	NOT ASSESSED
Copper Wash, headwaters Gila River	HUC: 15070201	RIVER	26.15	MILES	NOT ASSESSED
Coyote Wash, headwaters-Gila River	HUC: 15070201	RIVER	35.89	MILES	NOT ASSESSED
Fortuna Wash, headwaters-Gila River	HUC: 15070201	RIVER	15.14	MILES	NOT ASSESSED
Fourth of July Wash, headwaters-Gila River	HUC: 15070201	RIVER	21.74	MILES	NOT ASSESSED
Gila Gravity Main Canal	HUC: 15070201	STREAM	20.3	MILES	NOT ASSESSED
Gila River, 4th July-Sentinel	HUC: 15070201	RIVER	10.34	MILES	NOT ASSESSED
Gila River, Copper-Hoodoo	HUC: 15070201	RIVER	3.87	MILES	NOT ASSESSED
Gila River, Coyote Wash-Fortuna Wash	HUC: 15070201	RIVER	28.25	MILES	GOOD
Gila River, Fortuna-Colorado River	HUC: 15070201	RIVER	6.37	MILES	NOT ASSESSED
Gila River, Hoodoo-Tenmile	HUC: 15070201	RIVER	15.25	MILES	NOT ASSESSED
Gila River, Painted Rock-4th July	HUC: 15070201	RIVER	4.31	MILES	NOT ASSESSED
Gila River, San Cristobal-Welton Canal	HUC: 15070201	RIVER	26.87	MILES	NOT ASSESSED
Gila River, Sentinel-Copper	HUC: 15070201	RIVER	8.87	MILES	NOT ASSESSED
Gila River, Tenmile-San Cristobal	HUC: 15070201	RIVER	17.39	MILES	NOT ASSESSED
Gila River, Welton Canal-Coyote Wash	HUC: 15070201	RIVER	3.66	MILES	NOT ASSESSED
Hoodoo Wash, 15070201-022-Gila River	HUC: 15070201	RIVER	22.58	MILES	NOT ASSESSED
Hoodoo Wash, headwaters-15070201-022	HUC: 15070201	RIVER	36.51	MILES	NOT ASSESSED
Mohawk Canal	HUC: 15070201	STREAM	48	MILES	NOT ASSESSED
Mohawk Wash	HUC: 15070201	RIVER	26.01	MILES	NOT ASSESSED
Painted Rock Borrow Pit Lake	HUC: 15070201	FRESHWATER LAKE	186.03	ACRES	IMPAIRED
Quigley Ponds	HUC: 15070201	FRESHWATER LAKE	32.33	ACRES	NOT ASSESSED
Redondo Lake	HUC: 15070201	FRESHWATER LAKE	11.54	ACRES	NOT ASSESSED
Sentinel Wash, headwaters-Gila River	HUC: 15070201	RIVER	15.84	MILES	NOT ASSESSED
Wellton Canal	HUC: 15070201	STREAM	17.4	MILES	NOT ASSESSED
Wellton Ponds	HUC: 15070201	FRESHWATER LAKE	3.25	ACRES	NOT ASSESSED
Wellton-Mohawk Canal	HUC: 15070201	STREAM	15	MILES	NOT ASSESSED
Watershed Lower Gila-Painted Rock Reservoir					

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Arlington Canal	HUC: 15070101	RIVER	15.88	MILES	NOT ASSESSED
Buckeye Canal	HUC: 15070103	STREAM	3.9	MILES	NOT ASSESSED
Buckeye Canal, Gila River-South Extension Canal	HUC: 15070101	STREAM	7.6	MILES	NOT ASSESSED
Gila River, Agua Fria River-Waterman Wash	HUC: 15070101	RIVER	11.94	MILES	NOT ASSESSED
Gila River, Centennial Wash-Rainbow Wash	HUC: 15070101	RIVER	5.12	MILES	NOT ASSESSED
Gila River, Gillespie Dam-Centennial Wash	HUC: 15070101	RIVER	5.28	MILES	IMPAIRED
Gila River, Hassayampa River-Gillespie Dam	HUC: 15070101	RIVER	7	MILES	NOT ASSESSED
Gila River, Rainbow Wash-Sand Tank Wash	HUC: 15070101	RIVER	16.92	MILES	NOT ASSESSED
Gila River, Salt River-Agua Fria River	HUC: 15070101	RIVER	3.69	MILES	NOT ASSESSED
Gila River, Sand Tank Wash-Painted Rock	HUC: 15070101	RIVER	18.65	MILES	NOT ASSESSED
Gila River, Waterman Wash-Hassayampa River	HUC: 15070101	RIVER	13.86	MILES	NOT ASSESSED
Painted Rock Reservoir - channel	HUC: 15070101	FRESHWATER LAKE	200	ACRES	NOT ASSESSED
Painted Rock Reservoir - playa	HUC: 15070101	FRESHWATER LAKE	53431.4	ACRES	NOT ASSESSED
Painted Rocks Reservoir, perennial water	HUC: 15070101	FRESHWATER LAKE	100	ACRES	NOT ASSESSED
Roosevelt Canal	HUC: 15070103	STREAM	8.35	MILES	NOT ASSESSED
Sand Tank Wash, headwaters-Gila River	HUC: 15070101	RIVER	31.3	MILES	NOT ASSESSED
Sauceda Wash, headwaters-Gila River	HUC: 15070101	RIVER	40.75	MILES	NOT ASSESSED
Unnamed (receives Gila Bend WWTP)	HUC: 15070101	RIVER	1.06	MILES	NOT ASSESSED
Waterman Wash, 15070101-013-Gila River	HUC: 15070101	RIVER	16.55	MILES	NOT ASSESSED
Waterman Wash, headwaters-15070101-012	HUC: 15070101	RIVER	27.87	MILES	NOT ASSESSED
Watershed Brawley Wash					
Alambre Wash, headwaters-Brawley Wash	HUC: 15050304	RIVER	14.8	MILES	NOT ASSESSED
Altar Wash, Arivaca Wash-Penitas Wash	HUC: 15050304	RIVER	7.24	MILES	NOT ASSESSED
Altar Wash, Penitas Wash-Alhambra Wash	HUC: 15050304	RIVER	15.49	MILES	NOT ASSESSED
Arivaca Creek, headwaters-Puertocito/Altar Wash	HUC: 15050304	RIVER	14.93	MILES	NOT ASSESSED
Arivaca Lake	HUC: 15050304	FRESHWATER LAKE	118.45	ACRES	IMPAIRED
Blanco Wash, headwaters-Los Robles Wash	HUC: 15050304	RIVER	19.17	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Brawley Wash, Alhambre Wash-Blanco Wash	HUC: 15050304	RIVER	34.91	MILES	NOT ASSESSED
Los Robles Wash, Blanco Wash-Santa Cruz River	HUC: 15050304	RIVER	18.59	MILES	NOT ASSESSED
Penitas Wash, headwaters-Altar Wash	HUC: 15050304	RIVER	13	MILES	NOT ASSESSED
Puertocito Wash, headwaters-Arivaca Wash	HUC: 15050304	RIVER	16.1	MILES	NOT ASSESSED
Watershed Rillito					
Agua Caliente Wash, Coronado Natl. Forest-Tanque Verde Creek	HUC: 15050302	RIVER	6.8	MILES	NOT ASSESSED
Agua Caliente Wash, headwaters-Coronado Natl. Forest border	HUC: 15050302	RIVER	6.93	MILES	NOT ASSESSED
Alamo Wash, headwaters-Rillito Creek	HUC: 15050302	RIVER	8.66	MILES	NOT ASSESSED
Atterbury Wash, headwaters-Pantano Wash	HUC: 15050302	RIVER	6.78	MILES	NOT ASSESSED
Bear Canyon Creek, headwaters-Sabino Canyon	HUC: 15050302	RIVER	11.49	MILES	NOT ASSESSED
Cave Creek, headwaters-Cienega Creek	HUC: 15050302	RIVER	5.89	MILES	NOT ASSESSED
Cienega Creek, Interstate 10 to Del Lago Dam	HUC: 15050302	RIVER	11.28	MILES	NOT ASSESSED
Cienega Creek, headwaters-Interstate 10	HUC: 15050302	RIVER	37.02	MILES	NOT ASSESSED
Davidson Canyon, headwaters-Pantano Wash	HUC: 15050302	RIVER	16.57	MILES	NOT ASSESSED
Empire Gulch, Empire Ranch Spring-Cienega Creek	HUC: 15050302	RIVER	4.32	MILES	NOT ASSESSED
Empire Gulch, headwaters-Empire Ranch Spring	HUC: 15050302	RIVER	8.3	MILES	NOT ASSESSED
Gardner Canyon Creek, headwaters-Cienega Creek	HUC: 15050302	RIVER	20.05	MILES	NOT ASSESSED
Lakeside Lake	HUC: 15050302	FRESHWATER LAKE	14.46	ACRES	GOOD
Lemmon Canyon Creek, headwaters-Sabino Canyon	HUC: 15050302	RIVER	4.74	MILES	NOT ASSESSED
Mescal Arroyo, headwaters-Pantano Wash	HUC: 15050302	RIVER	9.26	MILES	NOT ASSESSED
Municipal Park Lakes	HUC: 15050302	FRESHWATER LAKE	3.18	ACRES	NOT ASSESSED
Oak Tree Canyon, headwaters-Cienega Creek	HUC: 15050302	RIVER	9.38	MILES	NOT ASSESSED
Palisade Canyon Creek, headwaters-Sabino Canyon	HUC: 15050302	RIVER	4.29	MILES	NOT ASSESSED
Pantano Wash, Mesca Arroyo-Rincon Creek	HUC: 15050302	RIVER	8.17	MILES	NOT ASSESSED
Pantano Wash, Rincon-Rillito Creek	HUC: 15050302	RIVER	12.12	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Rillito Creek, *A-Santa Cruz River	HUC: 15050302	RIVER	10.35	MILES	NOT ASSESSED
Rillito Creek, headwaters-*A	HUC: 15050302	RIVER	1.86	MILES	NOT ASSESSED
Rincon Creek, headwaters-Pantano Wash	HUC: 15050302	RIVER	16.2	MILES	NOT ASSESSED
Rose Canyon Creek, headwaters-Bear Canyon Creek	HUC: 15050302	RIVER	1.1	MILES	NOT ASSESSED
Rose Canyon Lake	HUC: 15050302	FRESHWATER LAKE	7.29	ACRES	NOT ASSESSED
Sabino Canyon Creek, headwaters-Tanque Verde River	HUC: 15050302	RIVER	20.15	MILES	NOT ASSESSED
Soldier Lake	HUC: 15050302	FRESHWATER LAKE	0.22	ACRES	NOT ASSESSED
Sycamore Reservoir	HUC: 15050302	FRESHWATER LAKE	0.51	ACRES	NOT ASSESSED
Tanque Verde Creek, Wentworth Road-Rillito Creek	HUC: 15050302	RIVER	10.33	MILES	NOT ASSESSED
Tanque Verde Creek, headwaters-Wentworth Road	HUC: 15050302	RIVER	15.91	MILES	NOT ASSESSED
Williams Ranch Tanks	HUC: 15050302	FRESHWATER LAKE	0.97	ACRES	NOT ASSESSED
Watershed Upper Santa Cruz					
Airport Wash, headwaters-Santa Cruz River	HUC: 15050301	RIVER	4	MILES	NOT ASSESSED
Alum Gulch, headwaters-lat/long(313005/1104500)	HUC: 15050301	RIVER	1.86	MILES	IMPAIRED
Alum Gulch, lat/long (313005/1104510)-Sonoita Creek	HUC: 15050301	RIVER	3.92	MILES	NOT ASSESSED
Bear Grass Tank	HUC: 15050301	FRESHWATER LAKE	11.75	ACRES	NOT ASSESSED
Big Wash, headwaters-Canada del Oro	HUC: 15050301	RIVER	26.58	MILES	NOT ASSESSED
Bog Hole Tank	HUC: 15050301	FRESHWATER LAKE	0.46	ACRES	NOT ASSESSED
Canada del Oro, Big Wash-Santa Cruz River	HUC: 15050301	RIVER	10.83	MILES	NOT ASSESSED
Canada del Oro, headwaters-Big Wash	HUC: 15050301	RIVER	31.02	MILES	NOT ASSESSED
Cox Gulch, headwaters-Three R Canyon	HUC: 15050301	RIVER	2	MILES	IMPAIRED
Demetrie Wash, headwaters-Santa Cruz	HUC: 15050301	RIVER	14.58	MILES	NOT ASSESSED
Duquesne Wash, headwaters-Mexican border	HUC: 15050301	RIVER	6.22	MILES	NOT ASSESSED
Endless Mine tributary, headwaters-Harshaw Creek	HUC: 15050301	RIVER	1.5	MILES	NOT ASSESSED
Flux Canyon, headwaters-Alum Gulch	HUC: 15050301	RIVER	3.9	MILES	NOT ASSESSED
Harshaw Wash, headwaters-lat/long (315500/1104200)	HUC: 15050301	RIVER	10.31	MILES	IMPAIRED
Harshaw Wash, lat/long (315500/1104015)-Sonoita Creek	HUC: 15050301	RIVER	4.05	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Huachuca Tank	HUC: 15050301	FRESHWATER LAKE	0.31	ACRES	NOT ASSESSED
Humbolt Canyon, headwaters-Alum Gulch	HUC: 15050301	RIVER	3	MILES	NOT ASSESSED
Josephine Canyon, headwaters-Santa Cruz River	HUC: 15050301	RIVER	18.72	MILES	NOT ASSESSED
Julian Wash, headwaters-Santa Cruz River	HUC: 15050301	RIVER	7.07	MILES	NOT ASSESSED
Kennedy Lake	HUC: 15050301	FRESHWATER LAKE	9.62	ACRES	GOOD
Madera Canyon Creek, headwaters-Santa Cruz	HUC: 15050301	RIVER	12.84	MILES	NOT ASSESSED
Nogales Wash, Mexico border-Santa Cruz River	HUC: 15050301	RIVER	6.24	MILES	IMPAIRED
Parker Canyon Creek, headwaters-Mexico border	HUC: 15050301	RIVER	15.31	MILES	NOT ASSESSED
Parker Canyon Lake	HUC: 15050301	FRESHWATER LAKE	128.61	ACRES	GOOD
Patagonia Lake	HUC: 15050301	FRESHWATER LAKE	230.62	ACRES	GOOD
Peck Canyon Creek, headwaters-Santa Cruz	HUC: 15050301	RIVER	15.58	MILES	NOT ASSESSED
Pena Blanca Canyon Creek, Mexico bdr-Pena Blanca Lake	HUC: 15050301	RIVER	5	MILES	NOT ASSESSED
Pena Blanca Lake	HUC: 15050301	FRESHWATER LAKE	50.55	ACRES	IMPAIRED
Potrero Creek, Interstate 19-Nogales Wash	HUC: 15050301	RIVER	4.9	MILES	IMPAIRED
Potrero Creek, headwaters-Interstate 19	HUC: 15050301	RIVER	7.87	MILES	NOT ASSESSED
Providencia Canyon, headwaters-Santa Cruz	HUC: 15050301	RIVER	8.07	MILES	NOT ASSESSED
Redrock Canyon Creek, headwater-Harshaw Creek	HUC: 15050301	RIVER	12.66	MILES	NOT ASSESSED
Romero Canyon Creek, headwaters-Canada del Oro	HUC: 15050301	RIVER	7.96	MILES	NOT ASSESSED
Santa Cruz River West Branch, headwaters-Santa Cruz River	HUC: 15050301	RIVER	10.28	MILES	NOT ASSESSED
Santa Cruz River, Airport Wash-Roger Road WWTP outfall	HUC: 15050301	RIVER	7.08	MILES	NOT ASSESSED
Santa Cruz River, Canada del Oro-Guild Wash	HUC: 15050301	RIVER	8.63	MILES	NOT ASSESSED
Santa Cruz River, Josephine Canyon-Tubac Bridge	HUC: 15050301	RIVER	4.79	MILES	IMPAIRED
Santa Cruz River, Mexican border-Nogales WWTP outfall	HUC: 15050301	RIVER	16.98	MILES	IMPAIRED
Santa Cruz River, Nogales WWTP-Josephine Canyon	HUC: 15050301	RIVER	8.68	MILES	IMPAIRED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Santa Cruz River, Rillito Creek-Canada del Oro	HUC: 15050301	RIVER	0.95	MILES	NOT ASSESSED
Santa Cruz River, Roger Road WWTP outfall-Rillito Creek	HUC: 15050301	RIVER	2.91	MILES	NOT ASSESSED
Santa Cruz River, Sopori Wash-West Branch Santa Cruz	HUC: 15050301	RIVER	6.52	MILES	NOT ASSESSED
Santa Cruz River, Tubac Bridge-Sopori Wash	HUC: 15050301	RIVER	8.95	MILES	IMPAIRED
Santa Cruz River, West Branch Santa Cruz-Airport Wash	HUC: 15050301	RIVER	30.59	MILES	NOT ASSESSED
Santa Cruz River, headwaters-Mexico	HUC: 15050301	RIVER	13.87	MILES	NOT ASSESSED
Sonoita Creek, 750 feet below Patagonia WWTP-Santa Cruz Rive	HUC: 15050301	RIVER	18.58	MILES	GOOD
Sonoita Creek, Patagonia WWTP outfall-750 feet downstream	HUC: 15050301	RIVER	0.16	MILES	NOT ASSESSED
Sonoita Creek, headwaters-1 km below Route 82	HUC: 15050301	RIVER	13.3	MILES	NOT ASSESSED
Sopori Wash, headwaters-Santa Cruz River	HUC: 15050301	RIVER	19.68	MILES	NOT ASSESSED
Split Tank	HUC: 15050301	FRESHWATER LAKE	4.75	ACRES	NOT ASSESSED
Sutherland Wash, headwaters-Romero Canyon Creek	HUC: 15050301	RIVER	9.04	MILES	NOT ASSESSED
Temporal Gulch, hdwt-Sonoita Creek	HUC: 15050301	RIVER	14	MILES	NOT ASSESSED
Three R Canyon, A*-Sonoita Creek	HUC: 15050301	RIVER	3.3	MILES	NOT ASSESSED
Three R Canyon, headwaters-A*	HUC: 15050301	RIVER	4.63	MILES	IMPAIRED
Tinaja Wash, headwaters-Santa Cruz River	HUC: 15050301	RIVER	4.44	MILES	NOT ASSESSED
Unnamed (receives Oracle WWTP outfall)	HUC: 15050301	RIVER	4.49	MILES	NOT ASSESSED
Washington Gulch, hdwt-Duquesne Wash	HUC: 15050301	RIVER	3.5	MILES	NOT ASSESSED
Watershed Lower San Pedro					
Aravaipa Creek, Rattlesnake-Stowe Gulch	HUC: 15050203	RIVER	7.28	MILES	NOT ASSESSED
Aravaipa Creek, Stowe Gulch-end Aravaipa Canyon Wilderness	HUC: 15050203	RIVER	15.54	MILES	GOOD
Aravaipa Creek, end Aravaipa Canyon Wilderness-San Pedro Riv	HUC: 15050203	RIVER	12.6	MILES	NOT ASSESSED
Aravaipa Creek, headwaters-Rattlesnake Canyon	HUC: 15050203	RIVER	27.59	MILES	NOT ASSESSED
Bass Canyon Creek, headwater-Hotsprings	HUC: 15050203	RIVER	11.55	MILES	GOOD
Bass Canyon Tank	HUC: 15050201	FRESHWATER LAKE	2.78	ACRES	NOT ASSESSED
Booger Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	18.37	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Buehman Canyon Creek, headwaters-lat long (322431.5/1103208)	HUC: 15050203	RIVER	10.47	MILES	GOOD
Buehman Canyon Creek, lat/long (322431.5/1103208)-San Pedro	HUC: 15050203	RIVER	3.25	MILES	NOT ASSESSED
Camp Grand Wash, headwaters-San Pedro River	HUC: 15050203	RIVER	14.7	MILES	NOT ASSESSED
Copper Creek, Prospect Canyon-San Pedro River	HUC: 15050203	RIVER	8.27	MILES	NOT ASSESSED
Copper Creek, headwaters-Prospect Canyon	HUC: 15050203	RIVER	6.64	MILES	GOOD
Deer Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	15.65	MILES	NOT ASSESSED
Deer Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	7.72	MILES	NOT ASSESSED
Double R Canyon Creek	HUC: 15050203	RIVER	4.972	MILES	GOOD
Fourmile Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	13.38	MILES	NOT ASSESSED
Geesaman Wash, headwaters-Alder Wash	HUC: 15050203	RIVER	12.43	MILES	NOT ASSESSED
Gibb Wash, headwaters-San Pedro River	HUC: 15050203	RIVER	4.36	MILES	NOT ASSESSED
Horse Camp Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	7.81	MILES	NOT ASSESSED
Hot Springs Canyon Creek, headwaters-San Pedro River	HUC: 15050203	RIVER	25.92	MILES	GOOD
Mulberry Creek, headwaters-San Pedro River	HUC: 15050203	RIVER	17.58	MILES	NOT ASSESSED
Oak Grove Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	11.63	MILES	NOT ASSESSED
Paige Creek	HUC: 15050203	RIVER	17.69	MILES	NOT ASSESSED
Parsons Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	9.35	MILES	NOT ASSESSED
Peppersauce Wash, headwaters-San Pedro River	HUC: 15050203	RIVER	15.35	MILES	NOT ASSESSED
Rattlesnake Canyon, headwaters-San Pedro River	HUC: 15050203	RIVER	21.1	MILES	NOT ASSESSED
Redfield Canyon Creek, headwaters-San Pedro River	HUC: 15050203	RIVER	25.47	MILES	NOT ASSESSED
San Pedro River, 15050203-Hot Springs Canyon	HUC: 15050203	RIVER	17.12	MILES	NOT ASSESSED
San Pedro River, Aravaipa Creek-Gila River	HUC: 15050203	RIVER	14.8	MILES	GOOD
San Pedro River, Buehman Wash-Peppersauce Wash	HUC: 15050203	RIVER	16.43	MILES	NOT ASSESSED
San Pedro River, Hot Springs Creek-Redfield Canyon	HUC: 15050203	RIVER	13.18	MILES	GOOD
San Pedro River, Peppersauce Wash-Aravaipa Creek	HUC: 15050203	RIVER	21.27	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
San Pedro River, Redfield Canyon-Buehman Wash	HUC: 15050203	RIVER	0.1	MILES	NOT ASSESSED
Swamp Springs Canyon Creek	HUC: 15050203	RIVER	4.7	MILES	NOT ASSESSED
Turkey Creek, headwaters-Aravaipa Canyon Creek	HUC: 15050203	RIVER	10.36	MILES	NOT ASSESSED
Virgus Creek, headwaters-Aravaipa Creek	HUC: 15050203	RIVER	12.42	MILES	NOT ASSESSED
Watershed Upper San Pedro					
Babocomari Creek, Banning Creek-San Pedro River	HUC: 15050202	RIVER	32.66	MILES	NOT ASSESSED
Banning Creek, headwaters-San Pedro River	HUC: 15050202	RIVER	28.05	MILES	NOT ASSESSED
Blacktail Pond	HUC: 15050202	FRESHWATER LAKE	0.34	ACRES	NOT ASSESSED
Carr Canyon Creek, headwaters-San Pedro River	HUC: 15050202	RIVER	13.72	MILES	NOT ASSESSED
Dragoon Wash, headwaters-San Pedro River	HUC: 15050202	RIVER	20.4	MILES	NOT ASSESSED
East Gravel Pit Pond	HUC: 15050202	FRESHWATER LAKE	0.31	ACRES	NOT ASSESSED
Fly Pond	HUC: 15050202	FRESHWATER LAKE	0.28	ACRES	NOT ASSESSED
Garden Canyon Creek, headwaters-San Pedro River	HUC: 15050202	RIVER	12.05	MILES	NOT ASSESSED
Golf Course Pond	HUC: 15050202	FRESHWATER LAKE	2.53	ACRES	NOT ASSESSED
Gravel Pit Pond	HUC: 15050202	FRESHWATER LAKE	1.41	ACRES	NOT ASSESSED
Hidden Pond	HUC: 15050202	FRESHWATER LAKE	5	ACRES	NOT ASSESSED
Miller Canyon Creek, headwaters-San Pedro River	HUC: 15050202	RIVER	14.13	MILES	NOT ASSESSED
Officers Club Pond	HUC: 15050202	FRESHWATER LAKE	1.48	ACRES	NOT ASSESSED
Ramsey Canyon Creek, headwaters-San Pedro River	HUC: 15050202	RIVER	13.29	MILES	GOOD
San Pedro River, Babocomari Creek-Dragoon Wash	HUC: 15050203	RIVER	16.95	MILES	GOOD
San Pedro River, Charleston-Walnut Gulch	HUC: 15050202	RIVER	8.87	MILES	GOOD
San Pedro River, Dragoon Wash-Tres Alomos Wash	HUC: 15050202	RIVER	15.49	MILES	IMPAIRED
San Pedro River, Mexico border-Charleston	HUC: 15050202	RIVER	28.33	MILES	GOOD
San Pedro River, Tres Alomos Wash-15050203	HUC: 15050202	RIVER	5.59	MILES	NOT ASSESSED
San Pedro River, Walnut Gulch-Babocomari Creek	HUC: 15050202	RIVER	0.05	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Sycamore Pond I	HUC: 15050202	FRESHWATER LAKE	0.37	ACRES	NOT ASSESSED
Sycamore Pond II	HUC: 15050202	FRESHWATER LAKE	0.88	ACRES	NOT ASSESSED
Tres Alomos Wash, headwaters-San Pedro River River	HUC: 15050202	RIVER	28.48	MILES	NOT ASSESSED
Walnut Gulch, headwaters-San Pedro River	HUC: 15050202	RIVER	12.18	MILES	NOT ASSESSED
Woodcutters Pond	HUC: 15050202	FRESHWATER LAKE	0.45	ACRES	NOT ASSESSED
Watershed Willcox Playa					
Ash Creek, headwaters-High Creek	HUC: 15050201	RIVER	25.41	MILES	NOT ASSESSED
Big Creek, headwaters-Grant Creek	HUC: 15050201	RIVER	8.67	MILES	NOT ASSESSED
Bull Tank	HUC: 15050201	FRESHWATER LAKE	2.16	ACRES	NOT ASSESSED
Goudy Canyon Creek, headwaters-Grant Creek	HUC: 15050201	RIVER	9.63	MILES	NOT ASSESSED
Grant Creek, headwaters-High Creek	HUC: 15050201	RIVER	12.76	MILES	GOOD
High Creek	HUC: 15050201	RIVER	22.15	MILES	NOT ASSESSED
Moonshine Creek, headwaters-Post Creek	HUC: 15050201	RIVER	1.36	MILES	NOT ASSESSED
O B Draw	HUC: 15050201	RIVER	7.98	MILES	NOT ASSESSED
Pinery Creek	HUC: 15050201	RIVER	22.59	MILES	NOT ASSESSED
Post Creek, headwaters-Grant Creek	HUC: 15050201	RIVER	2.63	MILES	NOT ASSESSED
Riggs Flat Lake	HUC: 15050201	FRESHWATER LAKE	9.22	ACRES	NOT ASSESSED
Rock Creek, headwaters-Turkey Creek	HUC: 15050201	RIVER	14.99	MILES	NOT ASSESSED
Snow Flat Lake	HUC: 15050201	FRESHWATER LAKE	0.5	ACRES	NOT ASSESSED
Soldier Creek, headwaters-Post Creek	HUC: 15050201	RIVER	2.03	MILES	NOT ASSESSED
Turkey Creek (to Willcox Playa)	HUC: 15050201	RIVER	30.87	MILES	NOT ASSESSED
Ward Canyon Creek, headwaters-Turkey Creek	HUC: 15050201	RIVER	2.97	MILES	NOT ASSESSED
Willcox Playa	HUC: 15050201	FRESHWATER LAKE	29471.5	ACRES	NOT ASSESSED
Watershed San Simon					
Cave Creek South Fork, headwaters-Cave Creek	HUC: 15040006	RIVER	8.09	MILES	GOOD
Cave Creek, Coronado National Forest-New Mexico boundary	HUC: 15040006	RIVER	8.55	MILES	GOOD
Cave Creek, headwaters-Coronado National Forest	HUC: 15040006	RIVER	8.99	MILES	GOOD
Cima Creek, headwaters-Cave Creek	HUC: 15040006	RIVER	3.1	MILES	NOT ASSESSED
East Turkey Creek, headwaters-San Simon	HUC: 15040006	RIVER	13.59	MILES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Gold Gulch, headwaters-San Simon Creek	HUC: 15040006	RIVER	30.17	MILES	NOT ASSESSED
Highline Canal	HUC: 15040005	STREAM	25.27	MILES	NOT ASSESSED
Hot Well Draw, headwaters-San Simon Creek	HUC: 15040006	RIVER	27.89	MILES	NOT ASSESSED
Oak Draw, headwaters-San Simon Creek	HUC: 15040006	RIVER	18.04	MILES	NOT ASSESSED
San Simon Creek, Border-Hot Well Draw	HUC: 15040006	RIVER	39.99	MILES	NOT ASSESSED
San Simon Creek, Gold Gulch-Oak Draw	HUC: 15040006	RIVER	15.58	MILES	NOT ASSESSED
San Simon Creek, Hot Well Draw-Gold Gulch	HUC: 15040006	RIVER	12.06	MILES	NOT ASSESSED
San Simon Creek, Oak Draw-Gila River	HUC: 15040006	RIVER	14.38	MILES	NOT ASSESSED
Watershed Upper Gila-Mangas					
Apache Creek, New Mexico Boarder-Gila River	HUC: 15040002	RIVER	12.87	MILES	NOT ASSESSED
Bitter Creek, New Mexico Border-Gila River	HUC: 15040002	RIVER	10.52	MILES	NOT ASSESSED
Gila River, Apache Creek-Skully Creek	HUC: 15040002	RIVER	6.4	MILES	NOT ASSESSED
Gila River, Bitter Creek-Apache Creek	HUC: 15040002	RIVER	3.6	MILES	NOT ASSESSED
Gila River, Border-Bitter Creek	HUC: 15040002	RIVER	16.33	MILES	NOT ASSESSED
Gila River, Skully Creek-San Francisco River	HUC: 15040002	RIVER	15.24	MILES	GOOD
Skully Creek, headwaters-Gila River	HUC: 15040002	RIVER	10.71	MILES	NOT ASSESSED
Watershed Lower Colorado					
Colorado River, Gila-Main Canal	HUC: 15030107	RIVER	5.09	MILES	NOT ASSESSED
Colorado River, Imperial Dam-Gila River	HUC: 15030107	RIVER	13.85	MILES	NOT ASSESSED
Colorado River, Main Canal-Mexico border	HUC: 15030107	RIVER	32.19	MILES	GOOD
Hunter's Hole Backwater	HUC: 15030108	FRESHWATER LAKE	17.39	ACRES	NOT ASSESSED
Laguna Reservoir	HUC: 15030107	FRESHWATER LAKE	281.32	ACRES	NOT ASSESSED
Mittry Lake	HUC: 15030107	FRESHWATER LAKE	384.38	ACRES	NOT ASSESSED
YPG Pond	HUC: 15030107	FRESHWATER LAKE	26.39	ACRES	NOT ASSESSED
Watershed Imperial Reservoir					
A-10 Backwater	HUC: 15030104	FRESHWATER LAKE	23.57	ACRES	NOT ASSESSED
A-7 Backwater	HUC: 15030104	FRESHWATER LAKE	89.37	ACRES	NOT ASSESSED
Adobe Lake	HUC: 15030104	FRESHWATER LAKE	205.18	ACRES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Bee Lake	HUC: 15030104	FRESHWATER LAKE	15.9	ACRES	NOT ASSESSED
Butler Lake	HUC: 15030104	FRESHWATER LAKE	46.72	ACRES	NOT ASSESSED
Cibola Lake	HUC: 15030104	FRESHWATER LAKE	170.42	ACRES	NOT ASSESSED
Clear Lake	HUC: 15030104	FRESHWATER LAKE	41.54	ACRES	NOT ASSESSED
Colorado River, 15030104-2496-Yuma Wash	HUC: 15030104	RIVER	21.8	MILES	NOT ASSESSED
Colorado River, Bill Williams River-Osborne Wash	HUC: 15030104	RIVER	13.36	MILES	GOOD
Colorado River, Ehrenberg-Mohave Wash	HUC: 15030104	RIVER	11.15	MILES	NOT ASSESSED
Colorado River, Gould Wash-15030104-2496	HUC: 15030104	RIVER	23.71	MILES	NOT ASSESSED
Colorado River, Indian Wash-Imperial Dam	HUC: 15030104	RIVER	17.62	MILES	GOOD
Colorado River, McCallister Wash-Indian Wash	HUC: 15030104	RIVER	0.7	MILES	NOT ASSESSED
Colorado River, Mesa Drain-Ehrenberg	HUC: 15030104	RIVER	62.98	MILES	NOT ASSESSED
Colorado River, Mohave Wash-Gould Wash	HUC: 15030104	RIVER	4.77	MILES	NOT ASSESSED
Colorado River, Osborne Wash-Mesa Drain	HUC: 15030104	RIVER	7.65	MILES	NOT ASSESSED
Colorado River, Yuma Wash-McCallister Wash	HUC: 15030104	RIVER	2.5	MILES	NOT ASSESSED
Ehrenberg Wash, headwaters to Colorado River	HUC: 15030104	RIVER	11.36	MILES	NOT ASSESSED
Gould Wash, headwaters to Colorado River	HUC: 15030104	RIVER	25.88	MILES	NOT ASSESSED
Imperial Reservoir	HUC: 15030104	FRESHWATER LAKE	512.71	ACRES	NOT ASSESSED
Indian Wash, headwaters to Colorado River	HUC: 15030104	RIVER	25.15	MILES	NOT ASSESSED
Island Lake	HUC: 15030104	FRESHWATER LAKE	111.87	ACRES	NOT ASSESSED
Martinez Lake	HUC: 15030104	FRESHWATER LAKE	11.58	ACRES	NOT ASSESSED
McAllister Lake	HUC: 15030104	FRESHWATER LAKE	54.87	ACRES	NOT ASSESSED
McCallister Wash, headwaters to Colorado River	HUC: 15030104	RIVER	21.19	MILES	NOT ASSESSED
Mohave Wash, headwaters to Colorado River	HUC: 15030104	RIVER	25.35	MILES	NOT ASSESSED
Nortons Lake	HUC: 15030104	FRESHWATER LAKE	47.68	ACRES	NOT ASSESSED

(continued)

Table F-5. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Osborne Wash, headwaters - Colorado River	HUC: 15030104	RIVER	24.83	MILES	NOT ASSESSED
Pretty Water Lake	HUC: 15030104	FRESHWATER LAKE	10.73	ACRES	NOT ASSESSED
Yuma Wash, headwaters to Colorado River	HUC: 15030104	RIVER	18.51	MILES	NOT ASSESSED

Table F-6. 305(b) Data for California (2002)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Water Quality Assessment Data for Watershed Seal Beach Year 2002					
Anaheim Bay	ORANGE CO	BAY(S) & HARBOR	0.62815	SQUARE MILES	THREATENED
Anaheim Bay Marsh	HUC: 18070201	ESTUARY	1.49227	SQUARE MILES	IMPAIRED
Balboa Beach	HUC: 18070201	COASTAL WATERS	1.81906	MILES	IMPAIRED
Bolsa Bay Marsh	HUC: 18070201	ESTUARY	0.06899	SQUARE MILES	IMPAIRED
Bolsa Chica Ecological Reserve	ORANGE CO	ESTUARY	0.37337	SQUARE MILES	IMPAIRED
Bolsa Chica State Beach	HUC: 18070201	COASTAL WATERS	2.64146	MILES	IMPAIRED
Crystal Cove State Beach	HUC: 18070201	COASTAL WATERS	2.41527	MILES	IMPAIRED
Huntington Beach State Park	HUC: 18070201	COASTAL WATERS	5.78596	MILES	IMPAIRED
Huntington Harbour	HUC: 18070201	BAY(S) & HARBOR	0.34516	SQUARE MILES	IMPAIRED
Little Corona Del Mar Beach	HUC: 18070201	COASTAL WATERS	0.27047	MILES	IMPAIRED
Morning Canyon Creek	HUC: 18070201	RIVER	1.06678	MILES	NOT ASSESSED
Pelican Point Creek	HUC: 18070201	RIVER	0.79121	MILES	IMPAIRED
Seal Beach	HUC: 18070201	COASTAL WATERS	0.53491	MILES	IMPAIRED
Sunset Beach	HUC: 18070201	COASTAL WATERS	1.92489	MILES	IMPAIRED
Water Quality Assessment Data for Watershed Newport Bay Year 2002					
Buck Gully Creek	HUC: 18070201	RIVER	0.30451	MILES	IMPAIRED
Corona del Mar State Beach	HUC: 18070201	COASTAL WATERS	0.51967	MILES	IMPAIRED
Irvine Coast Refuge	HUC: 18070201	OCEAN	0.6326	SQUARE MILES	IMPAIRED
Los Trancos Creek (Crystal Cove Creek)	HUC: 18070201	RIVER	0.18987	MILES	IMPAIRED
Muddy Creek	HUC: 18070201	RIVER	3.69284	MILES	IMPAIRED
Newport Bay, Lower	HUC: 18070201	BAY(S) & HARBOR	1.19891	SQUARE MILES	IMPAIRED
Newport Bay, Upper (Ecological Reserve)	HUC: 18070201	ESTUARY	1.02018	SQUARE MILES	IMPAIRED
Newport Beach	HUC: 18070201	COASTAL WATERS	4.10127	MILES	IMPAIRED
Newport Beach Refuge	HUC: 18070201	OCEAN	0.13018	SQUARE MILES	GOOD
Pelican Hill Waterfall Creek	HUC: 18070201	RIVER	1.0575	MILES	IMPAIRED
Pelican Point Middle Creek	ORANGE CO	RIVER	1.31349	MILES	IMPAIRED
San Diego Creek Reach 1	HUC: 18070201	RIVER	7.83	MILES	IMPAIRED
San Diego Creek Reach 2	HUC: 18070201	RIVER	6.27476	MILES	IMPAIRED
San Joaquin Freshwater Marsh	HUC: 18070201	WETLANDS, FRESHWATER	494.277	ACRES	THREATENED
Santa Ana Delhi Channel	HUC: 18070201	RIVER	6.77845	MILES	IMPAIRED
Santa Ana River Mouth	HUC: 18070201	ESTUARY	0.02103	SQUARE MILES	GOOD

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Water Quality Assessment Data for Watershed Aliso-San Onofre Year 2002					
Aliso Creek	HUC: 18070301	RIVER	18.7746	MILES	IMPAIRED
Aliso Creek (mouth)	HUC: 18070301	ESTUARY	0.00045	SQUARE MILES	IMPAIRED
Cristianitos Creek	HUC: 18070301	RIVER	6.69275	MILES	IMPAIRED
Dana Point Harbor	ORANGE CO	BAY(S) & HARBOR	0.18666	SQUARE MILES	IMPAIRED
HEISLER PARK ECOLOGICAL RESERVE	HUC: 18070301	OCEAN	2.4	SQUARE MILES	GOOD
LOS FLORES CREEK ESTUARY	HUC: 18070301	ESTUARY	0.01563	SQUARE MILES	NOT ASSESSED
Laguna Canyon Channel	HUC: 18070301	RIVER	5.65584	MILES	NOT ASSESSED
Laguna Lakes	HUC: 18070301	FRESHWATER LAKE	8.41561	ACRES	IMPAIRED
Oso Creek (at Mission Viejo Golf Course)	HUC: 18070301	RIVER	1.03005	MILES	IMPAIRED
Oso Creek (lower)	HUC: 18070301	RIVER	4.00032	MILES	IMPAIRED
Pacific Ocean Shoreline, Aliso HSA	HUC: 18070301	COASTAL WATERS	0.65368	MILES	IMPAIRED
Pacific Ocean Shoreline, Dana Point HSA	HUC: 18070301	COASTAL WATERS	2.03017	MILES	IMPAIRED
Pacific Ocean Shoreline, Laguna Beach HSA	HUC: 18070301	COASTAL WATERS	1.77743	MILES	IMPAIRED
Pacific Ocean Shoreline, Lower San Juan HSA	HUC: 18070301	COASTAL WATERS	1.20934	MILES	IMPAIRED
Pacific Ocean Shoreline, San Clemente HA	HUC: 18070301	COASTAL WATERS	3.68966	MILES	IMPAIRED
Pacific Ocean Shoreline, San Joaquin Hills HSA	HUC: 18070301	COASTAL WATERS	0.62799	MILES	IMPAIRED
Prima Deshecha Creek	HUC: 18070301	RIVER	1.19837	MILES	IMPAIRED
SAN MATEO CREEK ESTUARY	HUC: 18070301	ESTUARY	0.04688	SQUARE MILES	NOT ASSESSED
San Juan Creek	HUC: 18070301	RIVER	1.01703	MILES	IMPAIRED
San Juan Creek (mouth)	HUC: 18070301	ESTUARY	0.00984	SQUARE MILES	IMPAIRED
Segunda Deshecha Creek	HUC: 18070301	RIVER	0.9246	MILES	IMPAIRED
Water Quality Assessment Data for Watershed Santa Margarita Year 2002					
De Luz Creek	HUC: 18070302	RIVER	13.5872	MILES	IMPAIRED
Fallbrook Creek	HUC: 18070302	RIVER	3.9353	MILES	IMPAIRED
Long Canyon Creek	HUC: 18070302	RIVER	8.31667	MILES	NOT ASSESSED
Murrieta Creek	HUC: 18070302	RIVER	11.859	MILES	IMPAIRED
Oceanside Harbor	HUC: 18070302	BAY(S) & HARBOR	0.08158	SQUARE MILES	THREATENED
Rainbow Creek	HUC: 18070302	RIVER	5.01928	MILES	IMPAIRED
Sandia Creek	HUC: 18070302	RIVER	1.45891	MILES	IMPAIRED
Santa Margarita Lagoon	HUC: 18070302	ESTUARY	0.04361	SQUARE MILES	IMPAIRED

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Santa Margarita River (Lower)	SAN DIEGO CO	RIVER	19.206	MILES	THREATENED
Santa Margarita River (Upper)	HUC: 18070302	RIVER	18.1389	MILES	IMPAIRED
Skinner Reservoir	HUC: 18070302	FRESHWATER LAKE	1088.85	ACRES	NOT ASSESSED
TUCALOTA CREEK	HUC: 18070302	RIVER	26	MILES	NOT ASSESSED
Temecula Creek	HUC: 18070302	RIVER	44.1067	MILES	NOT ASSESSED
Vail Lake	HUC: 18070302	FRESHWATER LAKE	248.88	ACRES	NOT ASSESSED
Water Quality Assessment Data for Watershed San Luis Rey-Escondido Year 2002					
Agua Caliente Creek	HUC: 18070303	RIVER	16.77	MILES	NOT ASSESSED
Agua Hedionda Creek	HUC: 18070303	RIVER	6.95492	MILES	IMPAIRED
Agua Hedionda Lagoon	SAN DIEGO CO	ESTUARY	0.01067	SQUARE MILES	IMPAIRED
Batiquitos Lagoon	HUC: 18070303	ESTUARY	0.67697	SQUARE MILES	NOT ASSESSED
Buena Vista Creek	HUC: 18070303	RIVER	11.2296	MILES	IMPAIRED
Buena Vista Lagoon	HUC: 18070303	ESTUARY	0.31609	SQUARE MILES	IMPAIRED
Cottonwood Creek (in west San Diego County)	HUC: 18070303	RIVER	1.87877	MILES	IMPAIRED
Encinitas Creek	HUC: 18070303	RIVER	3.01	MILES	THREATENED
Escondido Creek	HUC: 18070303	RIVER	26.0182	MILES	IMPAIRED
Guajome Lake	HUC: 18070303	FRESHWATER LAKE	33.434	ACRES	IMPAIRED
Henshaw, Lake	HUC: 18070303	FRESHWATER LAKE	2587.16	ACRES	NOT ASSESSED
Loma Alta Creek	HUC: 18070303	RIVER	7.76	MILES	THREATENED
Loma Alta Slough	HUC: 18070303	ESTUARY	0.01279	SQUARE MILES	IMPAIRED
Oceanside Harbor	HUC: 18070302	BAY(S) & HARBOR	0.08158	SQUARE MILES	THREATENED
Pacific Ocean Shoreline, Buena Vista Creek HA	HUC: 18070303	COASTAL WATERS	1.17928	MILES	IMPAIRED
Pacific Ocean Shoreline, Encinas HA 904.40	HUC: 18070303	COASTAL WATERS	1.2	MILES	NOT ASSESSED
Pacific Ocean Shoreline, Escondido Creek HA	HUC: 18070303	COASTAL WATERS	0.43677	MILES	IMPAIRED
Pacific Ocean Shoreline, Loma Alta HA	HUC: 18070303	COASTAL WATERS	1.08874	MILES	IMPAIRED
Pacific Ocean Shoreline, San Luis Rey HU	HUC: 18070302	COASTAL WATERS	0.49412	MILES	IMPAIRED
Pacific Ocean Shoreline, San Marcos HA	HUC: 18070303	COASTAL WATERS	0.49823	MILES	IMPAIRED
Reidy Canyon Creek	HUC: 18070303	RIVER	3.92035	MILES	IMPAIRED
San Dieguito Lake	HUC: 18070303	FRESHWATER LAKE	60.72	ACRES	NOT ASSESSED
San Elijo Lagoon	HUC: 18070303	ESTUARY	0.88407	SQUARE MILES	IMPAIRED

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
San Elijo Lake	HUC: 18070303	FRESHWATER LAKE	25.71	ACRES	THREATENED
San Luis Rey River	HUC: 18070303	RIVER	19.3488	MILES	IMPAIRED
San Marcos Creek	HUC: 18070303	RIVER	18.9939	MILES	NOT ASSESSED
San Marcos Lake	HUC: 18070303	FRESHWATER LAKE	17.46	ACRES	THREATENED
Water Quality Assessment Data for Watershed San Diego (HUC 18070304) Year 2002					
Alpine Creek	HUC: 18070304	RIVER	2.24	MILES	NOT ASSESSED
Alvarado Creek	HUC: 18070304	RIVER	5.0824	MILES	IMPAIRED
Boulder Creek	HUC: 18070304	RIVER	21.0734	MILES	IMPAIRED
Chocolate Creek	HUC: 18070304	RIVER	4.53559	MILES	IMPAIRED
Chollas Creek	HUC: 18070304	RIVER	1.15478	MILES	IMPAIRED
Chollas Reservoir	HUC: 18070304	FRESHWATER LAKE	17.4	ACRES	NOT ASSESSED
Cloverdale Creek	HUC: 18070304	RIVER	1.16865	MILES	IMPAIRED
Del Dios Creek	HUC: 18070304	RIVER	1.03628	MILES	NOT ASSESSED
Dulzura Creek	HUC: 18070304	RIVER	8.46384	MILES	IMPAIRED
El Capitan Lake	HUC: 18070304	FRESHWATER LAKE	1454.37	ACRES	NOT ASSESSED
Famosa Slough and Channel	HUC: 18070304	ESTUARY	0.04984	SQUARE MILES	IMPAIRED
Fanita Creek	HUC: 18070304	RIVER	2.0788	MILES	NOT ASSESSED
Felicita Creek	HUC: 18070304	RIVER	0.92182	MILES	IMPAIRED
Forester Creek	HUC: 18070304	RIVER	6.36044	MILES	IMPAIRED
Green Valley Creek	HUC: 18070304	RIVER	1.21523	MILES	IMPAIRED
Hatfield Creek	HUC: 18070304	RIVER	10.1317	MILES	IMPAIRED
Hodges, Lake	HUC: 18070304	FRESHWATER LAKE	1104.02	ACRES	IMPAIRED
KENDALL-FROST MISSION BAY MARSH	HUC: 18070304	ESTUARY	0.03906	SQUARE MILES	GOOD
King Creek	HUC: 18070304	RIVER	10.3946	MILES	IMPAIRED
Kit Carson Creek	HUC: 18070304	RIVER	0.98696	MILES	IMPAIRED
Los Penasquitos Creek	HUC: 18070304	RIVER	11.5502	MILES	IMPAIRED
Los Penasquitos Lagoon	HUC: 18070304	ESTUARY	0.73268	SQUARE MILES	IMPAIRED
Loveland Reservoir	HUC: 18070304	FRESHWATER LAKE	419.906	ACRES	NOT ASSESSED
MIRAMAR RESERVOIR	MIRAMAR RESERVOIR	FRESHWATER LAKE	162	ACRES	GOOD
Miramar Reservoir	HUC: 18070304	FRESHWATER LAKE	138.451	ACRES	IMPAIRED
Mission Bay	SAN DIEGO CO	BAY(S) & HARBOR	3.17447	SQUARE MILES	IMPAIRED
Murray Reservoir	HUC: 18070304	FRESHWATER LAKE	118.547	ACRES	IMPAIRED
Otay Reservoir, Lower	HUC: 18070304	FRESHWATER LAKE	1049.87	ACRES	THREATENED
Otay River	HUC: 18070304	RIVER	11	MILES	IMPAIRED

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Pacific Ocean Shoreline, Coronado	HUC: 18070304	COASTAL WATERS	10.3645	MILES	IMPAIRED
Pacific Ocean Shoreline, Miramar Reservoir HA	HUC: 18070304	COASTAL WATERS	0.38805	MILES	IMPAIRED
Pacific Ocean Shoreline, San Diego HU	HUC: 18070304	COASTAL WATERS	0.37391	MILES	IMPAIRED
Pacific Ocean Shoreline, San Diequito HU	HUC: 18070304	COASTAL WATERS	0.86356	MILES	IMPAIRED
Pacific Ocean Shoreline, Scripps HA	HUC: 18070304	COASTAL WATERS	3.93965	MILES	IMPAIRED
Pacific Ocean Shoreline, Torrey Pines State Beach	HUC: 18070304	COASTAL WATERS	0.68607	MILES	IMPAIRED
Padre Barona Creek	HUC: 18070304	RIVER	6.486	MILES	IMPAIRED
Paradise Creek Marsh	HUC: 18070304	ESTUARY	0.00855	SQUARE MILES	NOT ASSESSED
Paradise Creek, HSA 908.320	HUC: 18070304	RIVER	2.78	MILES	NOT ASSESSED
Paradise Valley	HUC: 18070304	RIVER	3.87	MILES	NOT ASSESSED
Point Loma Kelp Beds	HUC: 18070304	OCEAN	3.92363	SQUARE MILES	NOT ASSESSED
Proctor Valley Creek	HUC: 18070304	RIVER	3.14304	MILES	IMPAIRED
Rattlesnake Creek	HUC: 18070304	RIVER	5.84707	MILES	NOT ASSESSED
Rose Creek	HUC: 18070304	RIVER	13.2708	MILES	IMPAIRED
SAN DIEGO MARINE LIFE REFUGE	HUC: 18070304	OCEAN	0.14375	SQUARE MILES	GOOD
SAN DIEGO RIVER ESTUARY	HUC: 18070304	ESTUARY	0.5	SQUARE MILES	NOT ASSESSED
SAN DIEGO-LA JOLLA ECOLOGICAL REFUGE	HUC: 18070304	OCEAN	0.80938	SQUARE MILES	GOOD
SAN DIEGUITO LAGOON	HUC: 18070304	ESTUARY	0.46875	SQUARE MILES	NOT ASSESSED
SAN DIEGUITO RIVER	HUC: 18070304	RIVER	11	MILES	NOT ASSESSED
SOUTH SAN DIEGO BAY WETLANDS	HUC: 18070304	ESTUARY	3.75	SQUARE MILES	GOOD
Salt Creek	HUC: 18070304	RIVER	10.4783	MILES	NOT ASSESSED
San Diego Bay	HUC: 18070304	BAY(S) & HARBOR	15.6597	SQUARE MILES	THREATENED
San Diego Bay Shoreline, 32nd St San Diego Naval Station	HUC: 18070304	BAY(S) & HARBOR	0.16117	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, Chollas HSA 908.22	HUC: 18070304	COASTAL WATERS	5.84	MILES	NOT ASSESSED
San Diego Bay Shoreline, Chula Vista Marina	HUC: 18070304	COASTAL WATERS	0.40794	MILES	IMPAIRED

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
San Diego Bay Shoreline, Downtown Anchorage	HUC: 18070304	BAY(S) & HARBOR	0.01151	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, El Toyan HSA 908.31	HUC: 18070304	COASTAL WATERS	3.81	MILES	NOT ASSESSED
San Diego Bay Shoreline, G Street Pier	HUC: 18070304	COASTAL WATERS	0.4203	MILES	IMPAIRED
San Diego Bay Shoreline, La Nacion HSA 909.12	HUC: 18070304	COASTAL WATERS	3.98	MILES	NOT ASSESSED
San Diego Bay Shoreline, North of 24th Street Marine Termina	HUC: 18070304	BAY(S) & HARBOR	0.01483	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, Paradise HSA 908.32	HUC: 18070304	COASTAL WATERS	4	MILES	NOT ASSESSED
San Diego Bay Shoreline, Point Loma HSA 908.10	HUC: 18070304	COASTAL WATERS	9.84	MILES	NOT ASSESSED
San Diego Bay Shoreline, Seventh Street Channel	HUC: 18070304	BAY(S) & HARBOR	0.01408	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, Shelter Island Shoreline Park	HUC: 18070304	COASTAL WATERS	0.42293	MILES	IMPAIRED
San Diego Bay Shoreline, Tidelands Park	HUC: 18070304	COASTAL WATERS	0.38239	MILES	IMPAIRED
San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	HUC: 18070304	BAY(S) & HARBOR	0.01549	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at Americas Cup Harbor	HUC: 18070304	BAY(S) & HARBOR	0.1406	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at Harbor Island (East Basin)	HUC: 18070304	BAY(S) & HARBOR	0.12017	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at Harbor Island (West Basin)	HUC: 18070304	BAY(S) & HARBOR	0.20617	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at Laurel Street	HUC: 18070304	BAY(S) & HARBOR	0.01192	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at Marriot Marina	HUC: 18070304	BAY(S) & HARBOR	0.00448	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at North Island Aircraft Platform	HUC: 18070304	BAY(S) & HARBOR	0.15533	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, at South Bay Power Plant	HUC: 18070304	BAY(S) & HARBOR	0.02172	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, between Sampson and 28th Streets	HUC: 18070304	BAY(S) & HARBOR	0.08634	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, near Chollas Creek	HUC: 18070304	BAY(S) & HARBOR	0.02306	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, near Coronado Bridge	HUC: 18070304	BAY(S) & HARBOR	0.05801	SQUARE MILES	IMPAIRED

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
San Diego Bay Shoreline, near Switzer Creek	HUC: 18070304	BAY(S) & HARBOR	0.00862	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline, near sub base	HUC: 18070304	BAY(S) & HARBOR	0.02547	SQUARE MILES	IMPAIRED
San Diego Bay Shoreline; Kellogg Street Beach	HUC: 18070304	COASTAL WATERS	0.40321	MILES	IMPAIRED
San Diego Bay, Otay Valley HA 910.20	HUC: 18070304	COASTAL WATERS	1.71	MILES	NOT ASSESSED
San Diego Bay, Shelter Island Yacht Basin	HUC: 18070304	BAY(S) & HARBOR	0.23894	SQUARE MILES	IMPAIRED
San Diego River (Lower)	HUC: 18070304	RIVER	11.5654	MILES	IMPAIRED
San Diego River (Upper)	SAN DIEGO CO	RIVER	31.9639	MILES	IMPAIRED
San Vicente Reservoir	HUC: 18070304	FRESHWATER LAKE	1057.59	ACRES	NOT ASSESSED
Santa Maria Creek	HUC: 18070304	RIVER	17.0605	MILES	IMPAIRED
Santa Ysabel Creek	HUC: 18070304	RIVER	36.6407	MILES	IMPAIRED
Soledad Canyon	SAN DIEGO CO	RIVER	1.74663	MILES	IMPAIRED
Sorrento Valley Creek	HUC: 18070304	RIVER	1.05646	MILES	IMPAIRED
Sutherland Reservoir	HUC: 18070304	FRESHWATER LAKE	561.363	ACRES	IMPAIRED
Sweetwater Marsh	HUC: 18070304	ESTUARY	0.08922	SQUARE MILES	THREATENED
Sweetwater Reservoir	HUC: 18070304	FRESHWATER LAKE	924.92	ACRES	NOT ASSESSED
Sweetwater River	HUC: 18070304	RIVER	50.0227	MILES	NOT ASSESSED
Sycamore Canyon	HUC: 18070304	RIVER	15.9986	MILES	IMPAIRED
Tecolote Creek	HUC: 18070304	RIVER	6.6452	MILES	IMPAIRED
Water Quality Assessment Data for Watershed Cottonwood-Tijuana (HUC 18070305) Year 2002					
Barrett Lake	HUC: 18070305	FRESHWATER LAKE	125.39	ACRES	NOT ASSESSED
Cottonwood Cr	HUC: 18070305	RIVER	52.7281	MILES	IMPAIRED
Kitchen Creek	HUC: 18070305	RIVER	9.72454	MILES	NOT ASSESSED
Morena Reservoir	HUC: 18070305	FRESHWATER LAKE	103.574	ACRES	IMPAIRED
Noble Canyon Creek	HUC: 18070305	RIVER	4.70948	MILES	NOT ASSESSED
Pacific Ocean Shoreline, Tijuana HU	HUC: 18070305	COASTAL WATERS	2.99692	MILES	IMPAIRED
Pine Valley Creek (Upper)	HUC: 18070305	RIVER	2.90199	MILES	IMPAIRED
Scove Creek	HUC: 18070305	RIVER	4.99016	MILES	IMPAIRED
Tijuana River	HUC: 18070305	RIVER	5.83522	MILES	IMPAIRED
Tijuana River Estuary	HUC: 18070305	ESTUARY	2.06166	SQUARE MILES	IMPAIRED
Water Quality Assessment Data for Watershed Southern Mojave Year 2002					
ANTELOPE CREEK	HUC: 18100100	RIVER	16	MILES	GOOD
ARRASTRE CREEK	HUC: 18100100	RIVER	10	MILES	GOOD
AZALEA CREEK	HUC: 18100100	RIVER	4	MILES	GOOD

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
CRYSTAL CREEK	HUC: 18100100	RIVER	3	MILES	THREATENED
HOMER WASH	HUC: 18100100	RIVER	40	MILES	NOT ASSESSED
PIPES CANYON CREEK	HUC: 18100100	RIVER	12	MILES	NOT ASSESSED
Water Quality Assessment Data for Watershed Salton Sea Year 2002					
Alamo River	IMPERIAL CO	RIVER	57.2244	MILES	IMPAIRED
BIG MORONGO CREEK	HUC: 18100200	RIVER	15	MILES	GOOD
BOUNDARY CREEK	HUC: 18100200	RIVER	10	MILES	THREATENED
BROWN CREEK	HUC: 18100200	RIVER	2	MILES	NOT ASSESSED
Banner Creek	HUC: 18100200	RIVER	10.2	MILES	IMPAIRED
CARRIZO CREEK	HUC: 18100200	RIVER	45	MILES	THREATENED
COYOTE CREEK	HUC: 18100200	RIVER	26	MILES	THREATENED
Chino Canyon Creek	HUC: 18100200	RIVER	8.94	MILES	NOT ASSESSED
Coachella Valley Drains	HUC: 18100200	RIVER	34.34	MILES	THREATENED
Coachella Valley Storm Channel	HUC: 18100200	RIVER	68.58	MILES	IMPAIRED
DUTCH CREEK	HUC: 18100200	RIVER	3	MILES	GOOD
Falls Creek	HUC: 18100200	RIVER	5.74	MILES	GOOD
Finney Lake	HUC: 18100200	FRESHWATER LAKE	9.03	ACRES	THREATENED
GRAPEVINE CANYON CREEK	HUC: 18100200	RIVER	8	MILES	NOT ASSESSED
HATHAWAY CREEK	HUC: 18100200	RIVER	3	MILES	NOT ASSESSED
Imperial Valley Drains	HUC: 18100200	RIVER	1222.13	MILES	IMPAIRED
LITTLE MORONGO CREEK	HUC: 18100200	RIVER	15	MILES	GOOD
La Posta Creek	HUC: 18100200	RIVER	20.0165	MILES	NOT ASSESSED
MILLARD CANYON CREEK	HUC: 18100200	RIVER	5	MILES	GOOD
MISSION CREEK (R7)	HUC: 18100200	RIVER	15	MILES	GOOD
New River (Imperial)	HUC: 18100200	RIVER	66.3813	MILES	IMPAIRED
POTRERO CREEK	HUC: 18100200	RIVER	5	MILES	NOT ASSESSED
Palm Canyon Creek	HUC: 18100200	RIVER	22.43	MILES	NOT ASSESSED
Ramer Lake	HUC: 18100200	FRESHWATER LAKE	207.19	ACRES	THREATENED
SAN GORGONIO RIVER	HUC: 18100200	RIVER	30	MILES	NOT ASSESSED
Salt Creek	HUC: 18100200	RIVER	28.81	MILES	GOOD
San Felipe Creek	HUC: 18100200	RIVER	76.47	MILES	GOOD
Snow Creek (Riverside Co.)	HUC: 18100200	RIVER	3.31	MILES	GOOD

(continued)

Table F-6. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Sunbeam Lake	HUC: 18100200	FRESHWATER LAKE	27.53	ACRES	NOT ASSESSED
THOUSAND PALMS CANYON CREEK	HUC: 18100200	RIVER	1	MILES	GOOD
TUBB CANYON CREEK	HUC: 18100200	RIVER	3	MILES	NOT ASSESSED
TULE CREEK	HUC: 18100200	RIVER	15	MILES	THREATENED
TWIN PINES CREEK	HUC: 18100200	RIVER	3	MILES	THREATENED
Tahquitz Creek	HUC: 18100200	RIVER	13.21	MILES	THREATENED
VALLECITO CREEK	HUC: 18100200	RIVER	26	MILES	NOT ASSESSED
WALKER CREEK	HUC: 18100200	RIVER	8	MILES	THREATENED
WHITEWATER RIVER	HUC: 18100200	RIVER	25	MILES	GOOD
Wiest Lake	HUC: 18100200	FRESHWATER LAKE	41.61	ACRES	NOT ASSESSED
Willow Creek	HUC: 18100200	RIVER	2.51	MILES	NOT ASSESSED

Table F-7. 305(b) Data for New Mexico (2002)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Water Quality Assessment Data for Watershed Delaware Year 2002					
Delaware River (Pecos River to headwaters)	Enters Pecos River from west about 4 miles upstream from Texas.	RIVER	6.5	MILES	GOOD
Pecos River (TX border to Black River)	Black River enters Pecos River from west about 15 miles downstream from Carlsbad.	RIVER	30.18	MILES	IMPAIRED
Water Quality Assessment Data for Watershed Salt Basin Year 2002					
Sacramento River (Perennial reaches)	Drains Sacramento Mountains southeast of Alamogordo and flows to the south through the Town of Timberon..	RIVER	13.05	MILES	GOOD
Scott Able Creek (Sacramento River to headwaters)	Joins Sacramento River about seven miles southeast of Sunspot.	RIVER	1.43	MILES	GOOD
Water Quality Assessment Data for Watershed Tularosa Valley Year 2002					
Dog Canyon (Tularosa Creek to headwaters)	Flows west from the Sacramento Mountains escarpment 10 miles south of the City of Alamogordo.	RIVER	5.85	MILES	GOOD
Fresnal Canyon (La Luz Creek to headwaters)	Enters La Luz Creek from southeast, about four miles upstream from the Village of La Luz.	RIVER	12.91	MILES	GOOD
Karr Canyon (Fresnal Canyon to headwaters)	Enters Fresnal Canyon at the Town of High Rolls.	RIVER	6.59	MILES	GOOD
La Luz Creek (Tularosa Creek to headwaters)	Flows west into the Tularosa Basin at the Village of La Luz, a couple miles north of the City of Alamogordo.	RIVER	17.97	MILES	GOOD
Lake Lucero (North)	This lake is located on White Sands National Monument. 3895 feet elevation.	FRESH-WATER RESERVOIR	3420.7	ACRES	IMPAIRED
Lake Lucero (South)	This lake is located on White Sands National Monument. 3885 feet elevation.	FRESH-WATER RESERVOIR	1988.27	ACRES	IMPAIRED
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	Enters Tularosa Creek (Rio Tularosa) about 11 miles upstream from the Town of Tularosa.	RIVER	4.2	MILES	GOOD
San Andres Canyon (Tularosa Creek to headwaters)	Flows west from the Sacramento Mountains escarpment 8 miles south of the City of Alamogordo.	RIVER	7.8	MILES	GOOD
Three Rivers (Perennial HWY 54 to USFS except Mescalero)	From U.S. Highway 54 (about 15 miles north of the Town of Tularosa) upstream to the White Mountain Wilderness boundary.	RIVER	3.07	MILES	IMPAIRED
Tularosa Creek (Brazel Lake to Tularosa)	Tularosa Creek is also called the Rio Tularosa on some maps. This reach is between the Town of Tularosa and a couple of miles west, where the flow disappears into the sands.	RIVER	11.34	MILES	GOOD
Tularosa Creek (Tularosa to Mescalero Apache bnd)	Tularosa Creek is also called the Rio Tularosa on some maps. Headwaters on Mescalero Reservation, where fish culture occurs at a federal hatchery.	RIVER	13.1	MILES	IMPAIRED

(continued)

Table F-7. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Water Quality Assessment Data for Watershed Mimbres Year 2002					
Allie Canyon (Mimbres River to headwaters)	Allie Canyon enters the Mimbres River about four miles upstream from the Town of Mimbres.	RIVER	8.82	MILES	GOOD
Bear Canyon (Mimbres River to headwaters)	Bear Canyon enters the Mimbres River about two miles upstream from the Town of Mimbres.	RIVER	9.95	MILES	GOOD
Bear Canyon Reservoir	Located near the Mimbres River about 3 miles upstream from the Town of Mimbres. 6200 feet elevation.	FRESHWATER RESERVOIR	8.63	ACRES	IMPAIRED
Cold Springs Creek (Hot Springs Creek to headwaters)	Joins Hot Springs Creek (from northeast, about one mile upstream from the Mimbres River) to headwaters.	RIVER	9.71	MILES	IMPAIRED
Gallinas Creek (Mimbres River to headwaters)	Enters Mimbres River about seven miles downstream from the Village of San Lorenzo.	RIVER	20.27	MILES	IMPAIRED
Hanover Creek (Whitewater Creek to headwaters)	Hanover Creek upstream from Highway 152. Hanover Creek drains south to Whitewater Creek (near Bayard).	RIVER	4.31	MILES	GOOD
Hot Springs Creek (Mimbres River to headwaters)	Enters the Mimbres River about 8 miles downstream from the Village of San Lorenzo.	RIVER	10.52	MILES	IMPAIRED
McNight Canyon (Mimbres River to headwaters)	McNight Canyon (aka East Fork Mimbres River) enters the Mimbres River about seven miles upstream from the Town of Mimbres.	RIVER	14.91	MILES	GOOD
Mimbres River (Perennial reaches below Sheppard Canyon)	The Mimbre River downstream from Sheppard Canyon, which enters the Mimbres River about one mile upstream from the Town of Mimbres. This is the approximate location of the USGS gage.	RIVER	12.5	MILES	IMPAIRED
Mimbres River (Sheppard Canyon to Cooney Campground)	From Sheppard Canyon (near the Town of Mimbres) upstream to Cooney Campground (about 6 miles north on the Wall Lake road, 14 miles north of the town of Mimbres).	RIVER	14.27	MILES	IMPAIRED
San Vicente Arroyo	Flows southeast from near Silver City, discharging to Mimbres River about 17 miles upstream from the Town of Deming.	RIVER	41.79	MILES	NOT ASSESSED
Whitewater Creek (Mimbres River to headwaters)	Flows southeast and discharges to the Mimbres River about 19 miles upstream from the Town of Deming.	RIVER	26.11	MILES	GOOD
Water Quality Assessment Data for Watershed El Paso-Las Cruces Year 2002					
Rio Grande (Leasburg Dam to Percha Dam)	From Leasburg Dam to Percha Dam. Leasburg Dam is at Radium Springs, about 12 miles above Las Cruces.	RIVER	44.35	MILES	GOOD
Rio Grande (Texas border to Leasburg Dam)	Leasburg Dam is at Radium Springs, about 12 miles above Las Cruces.	RIVER	62.68	MILES	GOOD

Table F-8. 305(b) Data for Texas (2002)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed Lower Rio Grande					
Rio Grande Below Falcon Reservoir	25 miles upstream of Anzalduas Dam	STREAM	25	MILES	GOOD
Rio Grande Below Falcon Reservoir	Anzalduas Dam to US 281 in Hidalgo	STREAM	11	MILES	GOOD
Rio Grande Below Falcon Reservoir	Pharr International Bridge to downstream of the Santa Ana Wildlife Refuge	STREAM	25	MILES	IMPAIRED
Rio Grande Below Falcon Reservoir	US 281 to the Pharr International Bridge	STREAM	5.1	MILES	GOOD
Rio Grande Below Falcon Reservoir	25 miles upstream of Los Indios	STREAM	25	MILES	GOOD
Rio Grande Below Falcon Reservoir	25 miles upstream of the El Jardin Pump Station	STREAM	25	MILES	GOOD
Rio Grande Below Falcon Reservoir	Remainder of segment	STREAM	25.9	MILES	GOOD
Rio Grande Below Falcon Reservoir	25 miles upstream of River Bend Boat Ramp	STREAM	25	MILES	GOOD
Rio Grande Tidal	Upper 17.7 miles of segment	COASTAL WATERS	17.7	MILES	NOT ASSESSED
Rio Grande Tidal	25 miles upstream of SH 4	COASTAL WATERS	25	MILES	GOOD
Rio Grande Tidal	SH 4 to mouth of Rio Grande	COASTAL WATERS	6.3	MILES	NOT ASSESSED
Watershed Los Olmos					
Rio Grande Below Falcon Reservoir	2.5 miles downstream of Falcon Reservoir	STREAM	2.5	MILES	GOOD
Rio Grande Below Falcon Reservoir	2.5 miles downstream of Falcon Dam to Fronton	STREAM	12.5	MILES	GOOD
Rio Grande Below Falcon Reservoir	Fronton to Rio Grande City	STREAM	24	MILES	GOOD
Rio Grande Below Falcon Reservoir	25 miles upstream of Los Ebanos	STREAM	25	MILES	GOOD
Rio Grande Below Falcon Reservoir	25 miles upstream of Anzalduas Dam	STREAM	25	MILES	GOOD
Watershed International Falcon Reservoir					
Rio Grande Below Amistad Reservoir	El Cenizo to San Isidro pump station	STREAM	9	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	San Isidro pump station to segment boundary	STREAM	13	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	Remainder of segment	STREAM	63.2	MILES	GOOD

Table F-8. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed San Ambrosia-Santa Isabel					
Rio Grande Below Amistad Reservoir	25 miles upstream of U.S. 277 in Eagle Pass	STREAM	25	MILES	GOOD
Rio Grande Below Amistad Reservoir	3 miles downstream of U.S. 277	STREAM	3	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	25 miles upstream of IBWC weir dam near El Indio	STREAM	25	MILES	GOOD
Rio Grande Below Amistad Reservoir	25 miles upstream of Columbia Bridge	STREAM	25	MILES	GOOD
Rio Grande Below Amistad Reservoir	Columbia Bridge to Laredo water treatment plant	STREAM	29	MILES	GOOD
Rio Grande Below Amistad Reservoir	Laredo water treatment plant, downstream to International Bridge 2	STREAM	4.2	MILES	GOOD
Rio Grande Below Amistad Reservoir	Downstream of International Bridge 2 to pipeline crossing	STREAM	7.1	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	Pipeline crossing to downstream of El Cenizo	STREAM	5	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	El Cenizo to San Isidro pump station	STREAM	9	MILES	IMPAIRED
Watershed Elm-Sycamore					
Rio Grande Below Amistad Reservoir	Amistad Dam to 10 miles upstream of Hwy 277	STREAM	3	MILES	GOOD
Rio Grande Below Amistad Reservoir	10 miles upstream of Hwy 277 in Del Rio	STREAM	10	MILES	GOOD
Rio Grande Below Amistad Reservoir	4.5 miles downstream of Hwy 277	STREAM	4.5	MILES	IMPAIRED
Rio Grande Below Amistad Reservoir	25 miles upstream of U.S. 277 in Eagle Pass	STREAM	25	MILES	GOOD
San Felipe Creek	Entire segment	STREAM	9	MILES	GOOD
Watershed Independence					
Independence Creek (unclassified water body)	Upper end of creek to Surveyor Canyon	STREAM	71	MILES	NOT ASSESSED
Independence Creek (unclassified water body)	From Surveyor Canyon to the confluence with the Pecos River	STREAM	22	MILES	GOOD
Watershed Lower Pecos					
Lower Pecos River	Upper segment boundary to Big Hackberry Canyon	STREAM	26	MILES	GOOD
Lower Pecos River	Big Hackberry Canyon to Still Canyon	STREAM	38	MILES	GOOD
Lower Pecos River	Still Canyon to Painted Canyon	STREAM	25	MILES	GOOD
Upper Pecos River	U.S. 190 near Iraan to SH 290	STREAM	25	MILES	GOOD
Upper Pecos River	Remainder of segment	STREAM	234	MILES	GOOD
Watershed Lower Pecos-Red Bluff Reservoir					
Upper Pecos River	Red Bluff Dam to Narrow Bone Draw	STREAM	25	MILES	GOOD
Upper Pecos River	25 miles upstream of RR 1776	STREAM	25	MILES	GOOD

(continued)

Table F-8. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed Lower Devils					
Devils River	Cedar Canyon to Satan Creek	STREAM	25	MILES	GOOD
Dolan Creek (unclassified water body)	From Yellow Bluff (near origin of Dolan Spring) to confl. with Devils River	STREAM	1.2	MILES	NOT ASSESSED
Dolan Creek (unclassified water body)	Remainder of water body	STREAM	35.8	MILES	NOT ASSESSED
Watershed Upper Devils					
Devils River	Dry Devils River to Cedar Canyon	STREAM	42	MILES	GOOD
Watershed Amistad Reservoir					
Rio Grande Above Amistad Reservoir	Remainder of segment	STREAM	180	MILES	GOOD
Rio Grande Below Amistad Reservoir	Amistad Dam to 10 miles upstream of Hwy 277	STREAM	3	MILES	GOOD
Watershed Reagan-Sanderson					
Rio Grande Above Amistad Reservoir	25 miles upstream of the lower segment boundary	STREAM	25	MILES	GOOD
Rio Grande Above Amistad Reservoir	Remainder of segment	STREAM	180	MILES	GOOD
Watershed Big Bend					
Rio Grande Above Amistad Reservoir	25 miles downstream of upper segment boundary	STREAM	25	MILES	IMPAIRED
Rio Grande Above Amistad Reservoir	Fresno Creek to Santa Elena Canyon	STREAM	25	MILES	GOOD
Rio Grande Above Amistad Reservoir	25 miles upstream of Rio Grande Village	STREAM	25	MILES	GOOD
Rio Grande Above Amistad Reservoir	Rio Grande Village to La Linda	STREAM	33	MILES	GOOD
Rio Grande Above Amistad Reservoir	25 miles upstream of the lower segment boundary	STREAM	25	MILES	GOOD
Rio Grande Above Amistad Reservoir	Remainder of segment	STREAM	180	MILES	GOOD
Watershed Black Hills-Fresno					
Rio Grande Above Amistad Reservoir	25 miles downstream of upper segment boundary	STREAM	25	MILES	IMPAIRED
Watershed Cibolo-Red Light					
Rio Grande Above Amistad Reservoir	25 miles downstream of upper segment boundary	STREAM	25	MILES	IMPAIRED
Rio Grande Below Riverside Diversion Dam	Guadalupe Bridge to Arroyo Diablo	STREAM	26	MILES	IMPAIRED
Watershed Rio Grande-Fort Quitman					
Rio Grande Above International Dam	Upstream of Anthony Drain to International Dam	STREAM	10.1	MILES	IMPAIRED
Rio Grande Below International Dam	Entire segment	STREAM	15	MILES	GOOD

(continued)

Table F-8. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed South Laguna Madre					
Arroyo Colorado Above Tidal	Approx 14 miles upstream to approx. 11 miles downstream of FM 1015	STREAM	25	MILES	IMPAIRED
Arroyo Colorado Above Tidal	Upper 19 miles of segment	STREAM	19	MILES	IMPAIRED
Arroyo Colorado Above Tidal	Lower 4 miles of segment	STREAM	4	MILES	IMPAIRED
Arroyo Colorado Above Tidal	Approx. 11 miles upstream to approx. 4 miles downstream of US 77	STREAM	15	MILES	IMPAIRED
Arroyo Colorado Tidal	Lower 9.0 miles of segment	COASTAL WATERS	9	MILES	GOOD
Arroyo Colorado Tidal	Approx. 2 miles upstream to approx. 2 miles downstream of Marker 22	COASTAL WATERS	4	MILES	GOOD
Arroyo Colorado Tidal	Approx. 3 miles upstream to 2 miles downstream of Marker 27	COASTAL WATERS	5	MILES	GOOD
Arroyo Colorado Tidal	Approx. 1 mile upstream to 3 miles downstream of Camp Perry	COASTAL WATERS	4	MILES	GOOD
Arroyo Colorado Tidal	Upper 4 miles of segment	COASTAL WATERS	4	MILES	GOOD
Brownsville Ship Channel	Brownsville Ship Channel turning basin	ESTUARY	0.4	SQUARE MILES	NOT ASSESSED
Brownsville Ship Channel	Mid-portion of Brownsville Ship Channel	ESTUARY	0.6	SQUARE MILES	GOOD
Brownsville Ship Channel	Brownsville Ship Channel near the mouth	ESTUARY	0.5	SQUARE MILES	GOOD
Laguna Madre	Upper Laguna Madre near Packery Channel Park	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Area around Port Mansfield	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Area around the mouth of the Arroyo Colorado	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Area adjacent to the Laguna Atascosa National Wildlife Refuge	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Lower Laguna Madre near Laguna Heights and Laguna Vista	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	18.1 square miles near the Arroyo Colorado and along the ICWW	ESTUARY	18.1	SQUARE MILES	GOOD
Laguna Madre	Main portion of the Laguna Madre south of Port Mansfield	ESTUARY	134.8	SQUARE MILES	GOOD
Port Isabel Fishing Harbor (unclassified water body)	Entire estuary	ESTUARY	0.2	SQUARE MILES	GOOD
South Bay	Entire segment	ESTUARY	7.8	SQUARE MILES	GOOD

(continued)

Table F-8. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Watershed Central Laguna Madre					
Laguna Madre	Upper Laguna Madre near Packery Channel Park	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Area around the mouth of Baffin Bay	ESTUARY	8	SQUARE MILES	NOT ASSESSED
Laguna Madre	Area around Port Mansfield	ESTUARY	8	SQUARE MILES	GOOD
Laguna Madre	Remainder of the Laguna Madre north of Port Mansfield	ESTUARY	162.5	SQUARE MILES	NOT ASSESSED
Watershed Baffin Bay					
Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada	Upper Baffin Bay near Los Olmos and Fernando Creek arms	ESTUARY	8	SQUARE MILES	GOOD
Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada	Lower Baffin Bay near Salvation Point and Black Bluff	ESTUARY	8	SQUARE MILES	GOOD
Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada	Remainder of segment	ESTUARY	33.8	SQUARE MILES	NOT ASSESSED
Petronila Creek Above Tidal	Lower 25 miles of segment	STREAM	25	MILES	IMPAIRED
Petronila Creek Above Tidal	Upper 19 miles of segment	STREAM	19	MILES	IMPAIRED
Petronila Creek Tidal	Entire segment	COASTAL WATERS	14	MILES	IMPAIRED
Watershed San Fernando					
Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada	Upper Baffin Bay near Los Olmos and Fernando Creek arms	ESTUARY	8	SQUARE MILES	GOOD
San Fernando Creek (unclassified water body)	Remainder of creek	COASTAL WATERS	20.6	MILES	NOT ASSESSED
San Fernando Creek (unclassified water body)	25 miles upstream of confluence with Cayo del Grullo	COASTAL WATERS	25	MILES	GOOD
Watershed Lower Frio					
Frio River Above Choke Canyon Reservoir	Lower 25 miles of segment	STREAM	25	MILES	IMPAIRED
Frio River Above Choke Canyon Reservoir	From 2 mi. downstream of SH 97 to 14 mi. upstream of SH 97 crossing	STREAM	16	MILES	GOOD
Frio River Above Choke Canyon Reservoir	25 mi. surrounding La Salle CR crossing north of SH 97	STREAM	25	MILES	GOOD
Frio River Above Choke Canyon Reservoir	25 miles surrounding IH 35	STREAM	25	MILES	GOOD
Nueces/Lower Frio River	Upper 10 miles of segment	STREAM	10	MILES	GOOD
Watershed Upper Frio					
Frio River Above Choke Canyon Reservoir	Lower 25 miles of segment	STREAM	25	MILES	IMPAIRED
Frio River Above Choke Canyon Reservoir	25 miles surrounding IH 35	STREAM	25	MILES	GOOD
Frio River Above Choke Canyon Reservoir	25 miles surrounding FM 187	STREAM	25	MILES	GOOD
Frio River Above Choke Canyon Reservoir	Remainder of segment	STREAM	42	MILES	GOOD
Leona River	Entire segment	STREAM	85	MILES	GOOD
Lower Sabinal River	Entire segment	STREAM	27	MILES	IMPAIRED

(continued)

Table F-8. (continued)

Water Name	Location	Water Type	Water Size	Unit	Water Status
Upper Frio River	25 miles surrounding SH 127	STREAM	25	MILES	GOOD
Upper Frio River	Remainder of segment	STREAM	22	MILES	GOOD
Upper Sabinal River	Entire segment	STREAM	48	MILES	GOOD
Watershed Middle Nueces					
Nueces River Above Frio River	25 miles surrounding SH 16	STREAM	25	MILES	GOOD
Nueces River Above Frio River	Remainder of segment	STREAM	80	MILES	GOOD
Nueces River Above Holland Dam	Lower 25 miles of segment	STREAM	25	MILES	GOOD
Watershed Upper Nueces					
Nueces River Above Holland Dam	Lower 25 miles of segment	STREAM	25	MILES	GOOD
Nueces River Above Holland Dam	25 miles around FM 190	STREAM	25	MILES	GOOD
Nueces River Above Holland Dam	Remainder of segment	STREAM	50	MILES	GOOD
Upper Nueces River	Lower 25 miles of segment	STREAM	25	MILES	GOOD
Upper Nueces River	25 miles surrounding RR 334 & US 55	STREAM	25	MILES	GOOD
Upper Nueces River	Remainder of segment	STREAM	73	MILES	GOOD
Watershed Nueces Headwaters					
Upper Nueces River	Remainder of segment	STREAM	73	MILES	GOOD
Watershed South Llano					
Llano River	Kimble County line to South Llano River	STREAM	28	MILES	GOOD
Llano River	South Llano to 5 miles north of US 377	STREAM	30	MILES	GOOD
Llano River	Remainder of segment	STREAM	69	MILES	GOOD

Table F-9. Pollutants Causing Impairment for the Arizona Watersheds in the Border Area

State Cause Name	Size of Assessed Waters with Listed Causes of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
COPPER	10.2	0.0	0.0	0.0	0.0	0.0
PH	8.3	0.0	0.0	0.0	0.0	0.0
OXYGEN, DISSOLVED	0.0	186.0	0.0	0.0	0.0	0.0
TOTAL COLIFORM	50.5	186.0	0.0	0.0	0.0	0.0
BORON	5.3	0.0	0.0	0.0	0.0	0.0
CADMIUM	1.9	0.0	0.0	0.0	0.0	0.0
CHLORINE	6.2	0.0	0.0	0.0	0.0	0.0
CYANIDE	8.7	0.0	0.0	0.0	0.0	0.0
MERCURY	0.0	50.6	0.0	0.0	0.0	0.0
TURBIDITY	6.2	0.0	0.0	0.0	0.0	0.0
ZINC	12.2	0.0	0.0	0.0	0.0	0.0

Table F-10. Pollutants Causing Impairment for the California Watersheds in the Border Area

State Cause Name	Size of Assessed Waters with Listed Causes of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
AROCHLOR	1,591.1	0.0	5.3	0.0	0.0	0.0
AZINPHOS-METHYL	101.8	1,361.0	17.6	0.0	0.0	0.0
BACTERIA INDICATORS	1,392.8	233,340.0	3.4	2.6	0.0	494.3
BIODIVERSITY IMPACTS	0.0	0.0	0.6	0.0	0.0	0.0
BROMODICHLOROMETHANE	1,523.8	233,348.4	3.8	23.3	0.0	0.0
CADMIUM, DISSOLVED	153.7	0.0	3.1	20.0	0.0	0.0
COPPER	7.8	103.6	1.7	2.6	0.0	0.0
NICKEL	1.2	0.0	2.4	2.6	0.0	0.0
SEDIMENTATION/SILTATION	1,453.1	241.9	3.0	0.0	0.0	0.0
ALGAE	95.1	0.0	0.0	0.0	0.0	494.3
BEACH POSTINGS	1,574.2	234,778.8	1.0	0.0	0.0	0.0
MERCURY	0.0	0.0	2.2	0.0	0.0	0.0
SALINITY	154.3	234,701.0	0.0	0.0	0.0	494.3
BIS(2ETHYLHEXYL) PHTHALATE	253.5	0.0	16.1	0.0	0.0	0.0
CADMIUM	9.0	0.0	0.5	0.0	0.0	0.0
IRON	59.8	0.0	0.0	0.0	0.0	0.0
SULFATES	89.7	118.6	0.0	0.0	0.0	0.0
TURBIDITY	8.3	0.0	0.0	0.0	0.0	0.0
BEACH POSTINGS & CLOSURES	284.3	50.9	6.2	0.0	0.0	0.0
LEAD	9.3	0.0	5.2	0.0	0.0	0.0
MANGANESE	53.1	0.0	0.0	0.0	0.0	0.0
NON-NATIVE FISH/SHELLFISH/ ZOOPLANKTON SPECIES	187.0	0.0	0.0	0.0	0.0	0.0
SELENIUM	1,345.7	233,340.0	0.0	0.0	0.0	0.0
ARSENIC	0.0	0.0	0.5	0.0	0.0	0.0
CADMIUM (TISSUE)	39.8	0.0	0.4	0.0	0.0	0.0
CHLORINE	0.0	0.0	0.0	0.0	0.0	0.0
ODOR THRESHOLD NUMBER	0.0	1,049.9	0.0	0.0	0.0	0.0
PH	6.4	103.6	0.0	0.0	0.0	0.0
TEMPERATURE, WATER	0.0	0.0	0.0	0.0	0.0	0.0
ZINC	7.8	0.0	0.1	0.0	0.0	0.0
ACID MINE DRAINAGE	10.2	103.6	0.0	0.0	0.0	0.0
BACTERIA	5.8	0.0	0.0	0.0	0.0	0.0
THALLIUM	0.0	0.0	2.1	0.0	0.0	0.0
TOTAL SUSPENDED SOLIDS (TSS)	0.0	0.0	2.1	0.0	0.0	0.0
BEACH CLOSURES	66.4	0.0	0.0	0.0	0.0	0.0

Table F-11. Pollutants Causing Impairment for the New Mexico Watersheds in the Border Area

State Cause Name	Size of Assessed Waters with Listed Causes of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
ALUMINUM - CHRONIC	57.0	0.0	0.0	0.0	0.0	0.0
BIOLOGICAL CRITERIA	30.2	0.0	0.0	0.0	0.0	0.0
PLANT NUTRIENTS	6.5	0.0	0.0	0.0	0.0	0.0
STREAM BOTTOM DEPOSITS	63.5	0.0	0.0	0.0	0.0	0.0
TEMPERATURE	80.3	0.0	0.0	0.0	0.0	0.0
CAUSE UNKNOWN	23.6	0.0	0.0	0.0	0.0	0.0
CONDUCTIVITY	3.1	0.0	0.0	0.0	0.0	0.0
MERCURY - CHRONIC	13.1	0.0	0.0	0.0	0.0	0.0
COPPER - ACUTE	9.7	0.0	0.0	0.0	0.0	0.0
DISSOLVED OXYGEN	14.3	8.6	0.0	0.0	0.0	0.0
FECAL COLIFORM	32.8	0.0	0.0	0.0	0.0	0.0
FISH GUIDELINES	0.0	8.6	0.0	0.0	0.0	0.0
NUTRIENTS	0.0	8.6	0.0	0.0	0.0	0.0
SEDIMENTATION/SILTATION	0.0	8.6	0.0	0.0	0.0	0.0
ZINC - ACUTE	9.7	0.0	0.0	0.0	0.0	0.0

Table F-12. Pollutants Causing Impairment for the Texas Watersheds in the Border Area

State Cause Name	Size of Assessed Waters with Listed Causes of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
BACTERIA/ PATHOGENS	265.7	0.0	0.0	0.0	0.0	0.0
CHLORIDE	70.0	0.0	0.0	0.0	0.0	0.0
TOTAL DISSOLVED SOLIDS	70.0	26000.0	0.0	0.0	0.0	0.0
DDE	63.0	0.0	0.0	0.0	0.0	0.0
PCBS	0.0	333.0	0.0	0.0	0.0	0.0
PESTICIDES	63.0	0.0	0.0	0.0	0.0	0.0
SULFATES	44.0	0.0	0.0	0.0	0.0	0.0
NITROGEN, NITRITE	27.0	0.0	0.0	0.0	0.0	0.0

Table F-13. Probable Sources Contributing to Impairment for the Arizona Watersheds in the Border Area

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
MILL TAILINGS	8.3	0.0	0.0	0.0	0.0	0.0
MINE TAILINGS	20.5	50.6	0.0	0.0	0.0	0.0
SUBSURFACE (HARDROCK) MININING	8.3	0.0	0.0	0.0	0.0	0.0
CONSTRUCTION STORMWATER DISCHARGE (PERMITTED)	0.0	186.0	0.0	0.0	0.0	0.0
IMPACTS FROM HYDROSTRUCTURE FLOW REGULATION/ MODIFICATION	0.0	186.0	0.0	0.0	0.0	0.0
IRRIGATED CROP PRODUCTION	5.3	186.0	0.0	0.0	0.0	0.0
MUNICIPAL (URBANIZED HIGH DENSITY AREA)	0.0	0.0	0.0	0.0	0.0	0.0
POST-DEVELOPMENT EROSION AND SEDIMENTATION	0.0	186.0	0.0	0.0	0.0	0.0
RESIDENTIAL DISTRICTS	0.0	186.0	0.0	0.0	0.0	0.0
SITE CLEARANCE (LAND DEVELOPMENT OR REDEVELOPMENT)	0.0	186.0	0.0	0.0	0.0	0.0
MUNICIPAL POINT SOURCE DISCHARGES	27.7	0.0	0.0	0.0	0.0	0.0
ATMOSPHERIC DEPOSITON - TOXICS	0.0	50.6	0.0	0.0	0.0	0.0
IMPACTS FROM ABANDONED MINE LANDS (INACTIVE)	12.2	50.6	0.0	0.0	0.0	0.0
MINE TAILINGS	12.2	50.6	0.0	0.0	0.0	0.0

(continued)

Table F-13. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	**Lakes, Ponds, Reservoir (Acres)**	**Bays, Estuaries (Square Miles)**	**Coastal Waters (Miles)**	**Great Lakes, Oceans, Near Coastal Waters (Square Miles)**	**Wetlands (Acres)**
RANGELAND (UNMANAGED PASTURE) GRAZING	22.4	0.0	0.0	0.0	0.0	0.0
SANITARY SEWER OVERFLOWS (COLLECTION SYSTEM FAILURES)	11.1	0.0	0.0	0.0	0.0	0.0
SOURCE UNKNOWN	25.7	0.0	0.0	0.0	0.0	0.0
SOURCES OUTSIDE STATE JURISTICTION OR BORDERS	28.1	0.0	0.0	0.0	0.0	0.0

Table F-14. Probable Sources Contributing to Impairment for the California Watersheds in the Border Area

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
AGRICULTURE-GRAZING	0.0	0.0	18.0	20.4	0.0	0.0
AGRICULTURE-IRRIGATION TAILWATER	107.4	0.0	10.9	33.2	0.0	0.0
ATMOSPHERIC DEPOSITON - TOXICS	0.0	0.0	1.0	20.0	0.0	0.0
LUST/LEAKING UNDERGROUND STORAGE TANKS	0.0	0.0	0.2	15.4	0.0	0.0
MUNICIPAL (URBANIZED HIGH DENSITY AREA)	196.5	1673.8	21.0	21.9	0.0	0.0
RANGE GRAZING-RIPARIAN AND/OR UPLAND	298.0	2860.7	3.8	3.3	0.0	0.0
SOURCE UNKNOWN	242.5	233383.2	2.5	13.1	0.0	0.0
CONCENTRATED ANIMAL FEEDING OPERATIONS (PERMITTED, POINT SOURCE)	0.0	0.0	1.0	0.0	0.0	0.0
CONTAMINATED SEDIMENTS	0.0	0.0	1.2	0.0	0.0	0.0
DISTURBED SITES (LAND DEVELOP.)	15.0	0.0	1.0	0.0	0.0	494.3
EXOTIC SPECIES	19.1	0.0	0.0	0.0	0.0	0.0
LANDFILLS	0.0	0.0	0.0	0.0	0.0	494.3
PASTURE GRAZING-RIPARIAN	32.6	0.0	1.0	0.0	0.0	0.0
SILVICULTURAL POINT SOURCES	14.1	0.0	0.0	0.0	0.0	0.0
SPILLS	89.6	233340.0	0.0	0.0	0.0	494.3
STORM SEWERS	68.6	0.0	0.0	0.0	0.0	494.3

(continued)

Table F-14. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
UPSTREAM IMPOUNDMENT	22.6	0.0	1.0	0.0	0.0	0.0
URBAN RUNOFF/STORM SEWERS	1527.1	234660.2	2.2	0.0	0.0	494.3
AGRICULTURAL RETURN FLOWS	20.4	0.0	0.0	0.0	0.0	0.0
CHANNELIZATION	12.8	0.0	0.0	0.0	0.0	0.0
CONSTRUCTION/LAND DEVELOPMENT	189.9	1104.0	0.0	0.0	0.0	0.0
FLOW ALTERATIONS FROM WATER DIVERSIONS	22.2	1104.0	0.0	0.0	0.0	0.0
INTERNAL NUTRIENT CYCLING (PRIMARILY LAKES)	0.0	0.0	0.2	0.4	0.0	0.0
LAND DISPOSAL	171.1	145.4	2.1	0.6	0.0	0.0
NURSERIES	90.4	0.0	0.0	0.0	0.0	0.0
OTHER	5.0	0.0	15.8	13.0	0.0	0.0
RANGE GRAZING-UPLAND	91.1	0.0	3.3	15.6	0.0	0.0
GROUNDWATER LOADINGS	13.3	1104.0	0.0	0.0	0.0	0.0
LAND APPLICATION OF WASTEWATER (NON-AGRICULTURAL)	0.0	0.0	0.2	0.0	0.0	0.0
MAJOR MUNICIPAL POINT SOURCE-DRY AND/OR WET WEATHER DISCHARGE	5.0	0.0	0.0	1.1	0.0	0.0
ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENCENTRALIZED SYSTEMS)	5.0	0.0	0.0	0.0	0.0	0.0
SURFACE MINING	19.4	0.0	0.0	0.0	0.0	0.0

(continued)

Table F-14. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
ABOVE GROUND STORAGE TANK LEAKS (TANK FARMS)	0.0	0.0	0.1	0.0	0.0	0.0
AGRICULTURE-ANIMAL	0.0	0.0	0.3	0.4	0.0	0.0
DAM CONSTRUCTION (OTHER THAN UPSTREAM FLOOD CONTROL PROJECTS)	11.0	0.0	0.0	0.0	0.0	0.0
DEBRIS AND BOTTOM DEPOSITS	3.1	0.0	0.0	0.0	0.0	0.0
INDUSTRIAL POINT SOURCE DISCHARGE	6.4	0.0	0.0	0.0	0.0	0.0
LOSS OF RIPARIAN HABITAT	6.7	0.0	0.0	0.0	0.0	0.0
MANURE LAGOONS	0.0	0.0	15.7	0.0	0.0	0.0
MUNICIPAL POINT SOURCE DISCHARGES	0.0	257.0	0.0	0.0	0.0	0.0
RAILROAD SLAG PILE	9.6	0.0	0.0	0.0	0.0	0.0
ROAD CONSTRUCTION	11.6	0.0	2.1	0.0	0.0	0.0
SPILLS FROM TRUCKS OR TRAINS	6.4	0.0	0.0	0.0	0.0	0.0
UPSTREAM IMPOUNDMENTS (E.G., PL-566 NRCS STRUCTURES)	11.0	0.0	0.0	0.0	0.0	0.0
URBAN RUNOFF--INDUSTRIAL PERMITTED	0.0	1104.0	0.0	0.0	0.0	0.0
LIVESTOCK (GRAZING OR FEEDING OPERATIONS)	2.9	0.0	0.0	0.0	0.0	0.0
PASTURE GRAZING-UPLAND	3.0	0.0	0.0	0.0	0.0	0.0
AGRICULTURE-SUBSURFACE DRAINAGE	1414.3	207.2	0.0	0.0	0.0	0.0

(continued)

Table F-14. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	**Lakes, Ponds, Reservoir (Acres)**	**Bays, Estuaries (Square Miles)**	**Coastal Waters (Miles)**	**Great Lakes, Oceans, Near Coastal Waters (Square Miles)**	**Wetlands (Acres)**
DREDGING (E.G., FOR NAVIGATION CHANNELS)	68.6	0.0	0.0	0.0	0.0	0.0
IRRIGATED CROP PRODUCTION	1345.7	233340.0	0.0	0.0	0.0	0.0
NATURAL SOURCES	36.0	0.0	0.0	0.0	0.0	0.0
SILVICULTURE	66.4	233340.0	0.0	0.0	0.0	0.0
SPECIALTY CROP PRODUCTION	66.4	0.0	0.0	0.0	0.0	0.0
URBAN RUNOFF--EROSION AND SEDIMENTATION	57.2	0.0	0.0	0.0	0.0	0.0

Table F-15. Probable Sources Contributing to Impairment for the New Mexico Watersheds in the Border Area

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
AGRICULTURE	80.3	0.0	0.0	0.0	0.0	0.0
CROP PRODUCTION (CROP LAND OR DRY LAND)	30.2	30.2	30.2	30.2	30.2	30.2
FLOW ALTERATIONS FROM WATER DIVERSIONS	30.2	0.0	0.0	0.0	0.0	0.0
HABITAT MODIFICATION (OTHER THAN HYDROMODIFICA-TION)	64.7	8.6	0.0	0.0	0.0	0.0
HYDROMODIFICATI ON	57.0	0.0	0.0	0.0	0.0	0.0
IRRIGATED CROP PRODUCTION	63.0	0.0	0.0	0.0	0.0	0.0
LIVESTOCK (GRAZING OR FEEDING OPERATIONS)	80.3	8.6	0.0	0.0	0.0	0.0
LOSS OF RIPARIAN HABITAT	64.7	8.6	0.0	0.0	0.0	0.0
NATURAL SOURCES	50.5	0.0	0.0	0.0	0.0	0.0
RANGELAND (UNMANAGED PASTURE) GRAZING	80.3	8.6	0.0	0.0	0.0	0.0
STREAMBANK MODIFICATIONS/ DESTABLIZATION	30.2	8.6	0.0	0.0	0.0	0.0
SOURCE UNKNOWN	23.6	0.0	0.0	0.0	0.0	0.0
ABANDONED MINING	20.3	0.0	0.0	0.0	0.0	0.0
ATMOSPHERIC DEPOSITON - TOXICS	0.0	8.6	0.0	0.0	0.0	0.0
CROP PRODUCTION (CROP LAND OR DRY LAND)	32.8	0.0	0.0	0.0	0.0	0.0
DREDGE MINING	14.3	0.0	0.0	0.0	0.0	0.0

(continued)

Table F-15. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	**Lakes, Ponds, Reservoir (Acres)**	**Bays, Estuaries (Square Miles)**	**Coastal Waters (Miles)**	**Great Lakes, Oceans, Near Coastal Waters (Square Miles)**	**Wetlands (Acres)**
DREDGING (E.G., FOR NAVIGATION CHANNELS)	26.8	0.0	0.0	0.0	0.0	0.0
MINE TAILINGS	9.7	0.0	0.0	0.0	0.0	0.0
RESOURCE EXTRACTION	44.3	0.0	0.0	0.0	0.0	0.0
SUBSURFACE MINING	9.7	0.0	0.0	0.0	0.0	0.0

Table F-16. Probable Sources Contributing to Impairment for the Texas Watersheds in the Border Area

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Waters (Miles)	Great Lakes, Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)
MUNICIPAL POINT SOURCE DISCHARGES	215.7	0.0	0.0	0.0	0.0	0.0
SOURCES OUTSIDE STATE JURISDICTION OR BORDERS	186.7	0.0	0.0	0.0	0.0	0.0
AGRICULTURE	36.1	0.0	0.0	0.0	0.0	0.0
CROP PRODUCTION (CROP LAND OR DRY LAND)	36.1	0.0	0.0	0.0	0.0	0.0
SOURCE UNKNOWN	166.0	26333.0	0.0	0.0	0.0	0.0
MUNICIPAL (URBANIZED HIGH DENSITY AREA)	104.0	0.0	0.0	0.0	0.0	0.0
CHANNEL EROSION/INCISION FROM UPSTREAM HYDROMODIFICA-TIONS	26.0	0.0	0.0	0.0	0.0	0.0
IMPACTS FROM HYDROSTRUCTURE FLOW REGULATION/MODIFICATION	26.0	0.0	0.0	0.0	0.0	0.0
INDUSTRIAL POINT SOURCE DISCHARGE	26.0	0.0	0.0	0.0	0.0	0.0
NON-POINT SOURCE	229.0	26666.0	0.0	0.0	0.0	0.0
ANIMAL FEEDING OPERATIONS (NPS)	10.1	0.0	0.0	0.0	0.0	0.0
PERMITTED RUNOFF FROM CONFINED ANIMAL FEEDING OPERATIONS (CAFOS)	10.1	0.0	0.0	0.0	0.0	0.0

(continued)

Table F-16. (continued)

State Source Name	Size of Assessed Waters with Probable Sources of Impairment					
	Rivers, Streams, Creeks (Miles)	**Lakes, Ponds, Reservoir (Acres)**	**Bays, Estuaries (Square Miles)**	**Coastal Waters (Miles)**	**Great Lakes, Oceans, Near Coastal Waters (Square Miles)**	**Wetlands (Acres)**
UNKNOWN POINT SOURCE	63.0	0.0	0.0	0.0	0.0	0.0
NATURAL CONDITIONS - WATER QUALITY STANDARDS USE ATTAINABILITY ANALYSES NEEDED	0.0	0.0	0.0	14.0	0.0	0.0
PETROLEUM/NATURAL GAS PRODUCTION ACTIVITIES (PERMITTED)	44.0	0.0	0.0	0.0	0.0	0.0
RESOURCES EXTRACTION	44.0	0.0	0.0	0.0	0.0	0.0

Table F-17. Fish Consumption Advisories in Arizona (2003)

Waterbody	Advisory extent	Pollutants	Advisory types
Alamo Lake	Mohave and LaPaz Counties	Mercury	NCSP, RGP, RSP
Arivaca Lake	Pima County	Mercury	NCGP
Coors Lake	Yavapai County near Bagdad	Mercury	NCSP, RGP, RSP
Dysart Drain	Canal drains to the Agua Fria River on the west side of Phoenix metro area (Maricopa County)	DDD, DDE, DDT	NCGP
Gila River	From above its confluence with the Salt River, SW to Painted Rock Barrow Pit Lake near Gila Bend	Chlordane, DDT, Dieldrin, Toxaphene	NCGP
Hassayampa River	Lower portion from Buckeye Canal to the Gila River (Maricopa County)	Chlordane, DDD, DDE, DDT, Dieldrin, Toxaphene	NCGP
Lake Mary - Upper and Lower	Coconino County	Mercury	NCGP, RGP
Long Lake	Coconino County	Mercury	NCGP
Lyman Lake	Apache County	Mercury	NCSP, RGP, RSP
Parker Canyon Lake	Cochise County	Mercury	NCSP, RGP, RSP
Pena Blanca Lake	Santa Cruz County	Mercury	NCGP
Salt River	Below or west of 59th Avenue in Phoenix	Chlordane, DDT, Dieldrin, Toxaphene	NCGP
Soldier Annex	Coconino County	Mercury	NCGP
Soldier Lake	Coconino County	Mercury	NCGP

Data source: http://map1.epa.gov/scripts/.esrimap?name=Listing&Cmd=Map.
NCGP= no consumption for general population; NCSP= no consumption for sensitive population; RGP= restricted consumption for general population; RSP =restricted consumption for sensitive population; NKZ= no kill zone.

Table F-18. Fish Consumption Advisories in California (2003)

Waterbody	Advisory extent	Pollutants	Advisory types
Alamitos Creek And Associated Percolation Ponds	Santa Clara County	Mercury	NCGP
Almaden Reservoir	Santa Clara County	Mercury	NCGP
Bear River	below Highway 20, Sierra Nevada foothills	Mercury	RGP, RSP
Belmont Pier/Pier J		DDT, PCBs (Total)	RGP
Black Butte Reservoir	Glenn and Tehama Counties	Mercury	RSP
Calero Reservoir	Santa Clara County (350 acres)	Mercury	NCGP
Camp Far West Reservoir	Sierra Nevada foothills	Mercury	NCSP, RGP, RSP
Clear Lake	Lake County (43,000 acres)	Mercury	NCSP, RGP
Deer Creek	Sierra Nevada foothills	Mercury	RGP, RSP
East Park Reservoir		Mercury	RSP
Grassland Area	Merced County	Selenium	NCSP, RGP
Guadalupe Creek And Associated Percolation Ponds	Santa Clara County (6 mi)	Mercury	NCGP
Guadalupe Reservoir	Santa Clara County (80 acres)	Mercury	NCGP
Guadalupe River And Associated Percolation Ponds	Santa Clara County (12 mi)	Mercury	NCGP
Harbor Park Lake	Los Angeles County (50 acres)	Chlordane, DDT	NCGP
Horseshoe Kelp		DDT, PCBs (Total)	RGP
Lake Berryessa	Napa County (20,700 acres)	Mercury	NCSP, RGP
Lake Combie	Sierra Nevada foothills	Mercury	RGP, RSP
Lake Englebright	Sierra Nevada foothills	Mercury	RGP, RSP
Lake Herman	Solano County (110 acres)	Mercury	NCSP, RGP
Lake Nacimiento	San Luis Obispo County	Mercury	NCSP, RGP
Lake Pillsbury	Lake County	Mercury	NCSP, RGP
Los Angeles Harbor/Long Beach Harbor-Cabrillo Pier		DDT, PCBs (Total)	NCGP, RGP
Los Angeles/Long Beach Breakwater Ocean Side		DDT, PCBs (Total)	RGP
Malibu Pier		DDT, PCBs (Total)	RGP
Malibu/Point Dume		DDT, PCBs (Total)	NCGP
New River	Imperial County	DDT	NCGP
Newport Pier		DDT, PCBs (Total)	RGP
Point Vicente, Palo Verdes-Northwest		DDT, PCBs (Total)	NCGP

(continued)

Table F-18. (continued)

Waterbody	Advisory extent	Pollutants	Advisory types
Redondo Pier		DDT, PCBs (Total)	RGP
Richmond Harbor Channel Area	Richmond Harbor Channel; Santa Fe Channel; Lauritzen Canal (San Francisco Bay)	DDT, Dieldrin, PCBs (Total)	NCGP
Rollins Reservoir	Sierra Nevada foothills	Mercury	RGP, RSP
Salton Sea	Imperial and Riverside Counties	Selenium	NCSP, RGP
San Francisco Bay Delta Region		Mercury, PCBs (Total)	NCGP, NCSP, RGP, RSP
San Pablo Reservoir	Contra Costa County	Not specified	RGP
Scotts Flat Reservoir	Sierra Nevada foothills	Mercury	RGP, RSP
Short Bank		DDT, PCBs (Total)	RGP
South Yuba River	below lake Spalding, Sierra Nevada foothills	Mercury	RGP, RSP
Stony Gorge Reservoir		Mercury	RSP
White's Point		DDT, PCBs (Total)	NCGP, RGP

Data source: http://map1.epa.gov/scripts/.esrimap?name=Listing&Cmd=Map.
NCGP= no consumption for general population; NCSP= no consumption for sensitive population; RGP= restricted consumption for general population; RSP =restricted consumption for sensitive population; NKZ= no kill zone.

Table F-19. Fish Consumption Advisories in New Mexico (2003)

Waterbody	Advisory extent	Pollutants	Advisory types
Abiquiu Reservoir	Rio Arriba County	Mercury	NCGP, NCSP, RGP, RSP
Avalon Lake	Eddy County	Mercury	RSP
Bear Canyon Reservoir	Grant County	Mercury	NCGP, NCSP, RGP, RSP
Brantley Reservoir	Eddy County	Mercury	NCGP, NCSP, RGP, RSP
Caballo Reservoir	Sierra County	Mercury	NCGP, NCSP, RGP, RSP
Carlsbad Municipal Lake	Eddy County	Mercury	NCGP, NCSP, RGP, RSP
Charette Lakes	Mora County	Mercury	NCGP, NCSP, RGP, RSP
Clayton Lake	Union County	Mercury	NCGP, NCSP, RGP, RSP
Cochiti Reservoir	Sandoval County	Mercury	NCGP, NCSP, RGP, RSP
Conchas Reservoir	San Miguel County	Mercury	NCGP, NCSP, RGP, RSP
Eagle Nest Lake	Colfax County	Mercury	NCSP, RGP, RSP
El Vado Reservoir	Rio Arriba County	Mercury	NCGP, NCSP, RGP, RSP
Elephant Butte Reservoir	Sierra and Socorro Counties	Mercury	NCGP, NCSP, RGP, RSP
Heron Reservoir	Rio Arriba County	Mercury	NCGP, NCSP, RGP, RSP
Lake Farmington (Beeline Lake)	San Juan County	Mercury	RSP
Lake Maloya	Colfax County	Mercury	RSP
Navajo Reservoir	Rio Arriba County	Mercury	NCGP, NCSP, RGP, RSP
San Juan River	Cudei to the mouth of the Mancos River	Mercury	NCSP, RGP, RSP
San Juan River	Hammond Diversion to the Hogback	Mercury	NCSP, RGP, RSP
San Juan River	The Hogback to Cudei	Mercury	RSP
Santa Rosa Reservoir	Guadalupe County	Mercury	NCGP, NCSP, RGP, RSP
Springer Lake	Colfax County	Mercury	NCGP, NCSP, RGP, RSP
Storrie Lake	San Miguel County	Mercury	NCSP, RGP, RSP
Stubblefield Reservoir	Colfax County	Mercury	NCGP, NCSP, RGP, RSP
Sumner Reservoir	De Baca County	Mercury	NCGP, NCSP, RGP, RSP
Ute Reservoir	Quay County	Mercury	NCGP, NCSP, RGP, RSP

Data source: http://map1.epa.gov/scripts/.esrimap?name=Listing&Cmd=Map.
NCGP= no consumption for general population; NCSP= no consumption for sensitive population; RGP= restricted consumption for general population; RSP =restricted consumption for sensitive population; NKZ= no kill zone.

Table F-20. Fish Consumption Advisories in Texas (2003)

Waterbody	Advisory extent	Pollutants	Advisory types
Arroyo Colorado, Llano Grande Lake and The Main Floodw	Arroyo Colorado, upstream of the Port of Harlingen, including Llano Grande Lake and the Main Floodway (Cameron and Hidalgo counties).	Chlordane, DDE, Toxaphene	RGP, RSP
B.A. Steinhagen Reservoir	All of B.A. Steinhagen Reservoir (Jasper and Tyler counties).	Mercury	RGP, RSP
Big Cypress Creek (Bayou)	Big Cypress Creek (Bayou)-located upstream of Caddo Lake (Harrison County).	Mercury	RGP, RSP
Caddo Lake	Harrison and Marlon Counties	Mercury	RGP, RSP
Clear Creek	Clear Creek upstream and west of Texas Highway 3 (Harris, Brazoria and Galveston counties).	Chlordane, Dichloroethane, Trichloroethane	NCGP
Donna Irrigation System	Donna Reservoir and its interconnecting canal system (Hidalgo County).	PCBs (Total)	NKZ
Echo Lake	All of Echo Lake (Tarrant County)	PCBs (Total)	NKZ
Fosdic Lake	All of Fosdic Lake (Tarrant County)	Chlordane, DDE, Dieldrin, PCBs (Total)	NKZ
Houston Ship Channel	The Houston Ship Channel upstream of the Lynchburg Ferry crossing and all contiguous waters, including the San Jacinto River below the U.S. Highway 90 bridge.	Chlorinated pesticides, PCBs (Total)	NCSP, RGP
Houston Ship Channel, And Upper Galveston Bay	The Houston Ship Channel and all contiguous waters, and upper Galveston Bay north of a line drawn from Red Bluff Point to the Five Mile Cut Marker to Houston Point (Harris and Chambers County).	Dioxin	NCSP, RGP
Lake Como	All of Lake Como (Tarrant County)	Chlordane, DDE, Dieldrin, PCBs (Total)	NKZ
Lake Daingerfield	All of Lake Daingerfield	Mercury	RGP, RSP
Lake Daingerfield	Morris County, All of Lake Daingerfield	Mercury	RGP, RSP
Lake Kimball	All of Lake Kimball (Hardin and Tyler counties).	Mercury	RGP, RSP
Lake Meredith	All of Lake Meredith	Mercury	RGP, RSP
Lake Worth	All of Lake Worth (Tarrant County)	PCBs (Total)	NCGP
Leon Creek		PCBs (Total)	NCGP
Mountain Creek Lake	All of Mountain Creek Lake (Dallas County).	PCBs (Total), Pesticides, Selenium	NKZ

(continued)

Table F-20. (continued)

Waterbody	Advisory extent	Pollutants	Advisory types
Pruitt Lake (Black Cypress Bayou)	All of Lake Pruitt (Cass county).	Mercury	RGP, RSP
Ratcliff Lake	All of Ratcliff Lake	Mercury	RGP, RSP
Sam Rayburn Reservoir	All of Sam Rayburn Reservoir (Jasper, Angelina, Nacogdoches, and San Augustine counties)	Mercury	RGP, RSP
Statewide: Gulf Of Mexico	All waters off the Texas coast (Jefferson, Chambers, Galveston, Brazoria, Matagorda, Calhoun, Refugio, Aransas, San Paticio, Nueces, Kleberg, Kenedy, Willacy, and Camerson counties).	Mercury	NCGP, RGP, RSP
Toledo Bend Reservoir	All of Toledo Bend Reservoir (Panola, Sabine, Shelby, and Newton counties).	Mercury	RGP, RSP
Trinity River	Trinity River from Texas State Highway 34 Bridge downstream to its confluence with the discharge canal of Cedar Creek Reservoir	Chlordane, DDE, PCBs (Total)	NCGP
Trinity River	Trinity River from the Interstate 20 Bridge in Dallas County downstream to the Texas State Highway 34 Bridge in Kaufman and Ellis Counties	Chlordane, DDE, PCBs (Total)	NKZ
Trinity River	Trinity River, from the 7th Street Bridge in Fort Worth downstream to the Interstate Highway 20 Bridge Southeast of Dallas (Dallas and Tarrant Counties).	Chlordane, PCBs (Total)	NKZ
Upper Lavaca Bay (Area Modified 01/13/2000, See Cox Bay	That area of Lavaca Bay inshore of a line beginning at the last point of land at the northeastern approach of the Lavaca Bay Causeway, then in a southwest direction to Aquatic Life Marker A to Aquatic Life Marker B to	Mercury	NKZ
Welsh Reservoir	All of Welsh Reservoir (Titus County). Note: persons consuming fish from this reservoir should not consume mineral dietary supplements with selenium exceeding 50 micrograms per day.	Selenium	NCSP, RGP, RSP

Data source: http://map1.epa.gov/scripts/.esrimap?name=Listing&Cmd=Map.
NCGP= no consumption for general population; NCSP= no consumption for sensitive population; RGP= restricted consumption for general population; RSP =restricted consumption for sensitive population; NKZ= no kill zone.

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Appendix G

Temporal Data Gaps in the U.S.-Mexico Borders Waters Repository

This Appendix shows tables summarizing data gaps for water quality indicators for the most recent years (2000 through 2003). Data gaps are represented by percentages of stations reporting at least 1 data point for a given semester.

Table G-1. Data Gaps for Each Water Quality Indicator for Each Transboundary Region During 2003

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2003								Period: Summer-Fall 2003							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
20	Chemical Oxygen Demand (COD)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
29	pH	0%	NR	0%	NR	50%	NR	0%	NR	0%	NR	0%	NR	33%	NR	0%	NR
85	BOD, Biochemical oxygen demand	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
204	Total Suspended Solids (TSS)	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
216	Total Solids	100%	100%	0%	NR	0%	0%	25%	75%	100%	100%	0%	NR	0%	0%	25%	75%
227	Chlorophyll a, uncorrected for pheophytin	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
257	Temperature, water	22%	100%	0%	NR	0%	0%	14%	75%	22%	100%	0%	NR	0%	0%	14%	75%
266	Specific conductance	50%	100%	0%	NR	0%	0%	25%	50%	100%	100%	0%	NR	0%	0%	25%	75%
446	Nitrogen, ammonium (NH4) as NH4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
480	Temperature, air	100%	100%	NR	NR	0%	0%	25%	75%	100%	100%	NR	NR	0%	0%	25%	75%
553	Dissolved Solids	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
554	Nitrogen ion (N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1042	Fecal coliform, M-FC MF (0.7 micron) method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1043	Fecal streptococci, KF streptococcus MF method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1044	Chlorophyll a, periphyton, chromatographic-fluorometric method	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1046	Chloride, water, filtered	0%	25%	24%	NR	0%	0%	NR	NR	0%	0%	24%	NR	0%	0%	NR	NR
1047	Sulfate, water, filtered	0%	25%	24%	NR	0%	0%	NR	NR	0%	0%	24%	NR	0%	0%	NR	NR
1052	Ammonia, water, filtered	0%	100%	27%	NR	NR	0%	NR	NR	0%	0%	27%	NR	NR	0%	NR	NR
1053	Ammonia, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1054	Nitrite, water, filtered	0%	50%	24%	NR	0%	0%	NR	NR	0%	0%	24%	NR	0%	0%	NR	NR
1055	Nitrite, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1056	Nitrate, water, filtered	0%	0%	0%	NR	0%	NR	NR	NR	0%	0%	0%	NR	0%	NR	NR	NR
1058	Ammonia plus organic nitrogen, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1059	Ammonia plus organic nitrogen, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1060	Nitrite plus nitrate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1061	Nitrite plus nitrate, water, filtered	0%	33%	27%	NR	NR	0%	NR	NR	0%	0%	27%	NR	NR	0%	NR	NR
1063	Phosphorus, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1064	Phosphorus, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1065	Orthophosphate, water, filtered	0%	50%	24%	NR	0%	0%	NR	NR	0%	0%	24%	NR	0%	0%	NR	NR
1066	Orthophosphate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1067	Temperature, water	7%	0%	31%	NR	NR	0%	NR	NR	7%	0%	31%	NR	NR	0%	NR	NR
1068	Temperature, air	0%	0%	14%	NR	NR	NR	NR	NR	0%	0%	14%	NR	NR	NR	NR	NR
1072	Specific conductance, water, unfiltered	6%	0%	28%	NR	0%	0%	NR	NR	6%	0%	28%	NR	0%	0%	NR	NR
1073	Dissolved oxygen, water, unfiltered	22%	0%	27%	NR	NR	NR	NR	NR	22%	0%	27%	NR	NR	NR	NR	NR
1074	Dissolved oxygen, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1076	pH, water, unfiltered, field	19%	0%	22%	NR	0%	0%	NR	NR	19%	0%	22%	NR	0%	0%	NR	NR
1077	pH, water, unfiltered, laboratory	6%	33%	27%	NR	NR	0%	NR	NR	7%	0%	27%	NR	NR	0%	NR	NR

(continued)

Table G-1. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2003							Period: Summer-Fall 2003								
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1081	Specific conductance, water, unfiltered, laboratory	6%	33%	27%	NR	NR	0%	NR	NR	7%	0%	27%	NR	NR	0%	NR	NR
1086	Ammonia, unionized	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1087	Chloride	100%	100%	0%	NR	0%	0%	13%	75%	100%	100%	0%	NR	0%	0%	13%	75%
1089	Dissolved oxygen (DO)	22%	100%	0%	NR	0%	0%	13%	75%	22%	100%	0%	NR	0%	0%	13%	75%
1090	Escherichia coli	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR
1091	Fecal Coliform	80%	100%	0%	NR	29%	0%	25%	75%	80%	100%	0%	NR	29%	0%	0%	0%
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1093	Nitrogen, ammonia as N	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1094	Nitrogen, Kjeldahl	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1095	Nitrogen, Nitrate (NO3) as N	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1096	Nitrogen, Nitrate (NO3) as NO3	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1098	Nitrogen, Nitrite (NO2) as N	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1099	Nitrogen, Nitrite (NO2) as NO2	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
1100	Phosphate	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1101	Phosphorus	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1102	Phosphorus as P	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1103	Phosphorus, orthophosphate as P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1104	Phosphorus, orthophosphate as PO4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1105	TEMPERATURE, WATER (DEGREES CENTIGRADE)	0%	0%	0%	0%	5%	32%	16%	31%	0%	0%	0%	0%	5%	30%	21%	20%
1106	TEMPERATURE, AIR (DEGREES CENTIGRADE)	0%	0%	0%	NR	70%	83%	29%	83%	0%	0%	0%	NR	60%	67%	59%	83%
1110	SPECIFIC CONDUCTANCE,FIELD (UMHOS/CM @ 25C)	NR	NR	NR	NR	47%	50%	25%	24%	NR	NR	NR	NR	47%	47%	33%	29%
1111	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1112	TEMPERATURE, WATER (DEGREES CENTIGRADE, 24HR AVG	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1113	WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1114	TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1115	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR AVG	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1116	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MAX	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1117	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MIN	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1118	PH, S.U., 24HR MAXIMUM VALUE	NR	NR	NR	NR	NR	0%	100%	17%	NR	NR	NR	NR	NR	100%	0%	83%
1119	PH, S.U., 24HR, MINIMUM VALUE	NR	NR	NR	NR	NR	0%	100%	33%	NR	NR	NR	NR	NR	100%	0%	83%
1127	OXYGEN, DISSOLVED (MG/L)	0%	0%	0%	0%	5%	33%	16%	20%	0%	0%	0%	0%	5%	31%	21%	23%
1128	OXYGEN, DISSOLVED (PERCENT OF SATURATION)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1129	BIOCHEM OXY DEM,INHIB, DISS(MG/L,5DAY-20C, CBOD)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1130	BIOCHEM OXY DEM,NIT INHIB,TOT (MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1131	BIOCHEM OXY DEM,NIT INHIB DISS(MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1132	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C	0%	NR	NR	0%	33%	0%	0%	0%	0%	NR	NR	0%	27%	0%	0%	0%
1133	BIOCHEM OXY DEM NIT INHIB, TOT (MG/L, 5 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1134	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	NR	NR	NR	NR	NR	NR	0%	0%	NR	NR	NR	NR	NR	NR	0%	0%
1135	PH (STANDARD UNITS)	0%	NR	0%	0%	5%	33%	16%	19%	0%	NR	0%	0%	5%	31%	21%	24%
1136	PH (STANDARD UNITS) LAB	9%	80%	0%	NR	0%	0%	10%	18%	9%	80%	0%	NR	0%	0%	10%	18%
1140	NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%

(continued)

Table G-1. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2003								Period: Summer-Fall 2003							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1141	NITROGEN, AMMONIA, DISSOLVED (MG/L AS N)	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%
1142	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	0%	0%	0%	0%	7%	32%	17%	21%	0%	0%	0%	0%	6%	32%	24%	25%
1143	AMMONIA, UNIONIZED (MG/L AS N)	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1144	NITRITE, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1145	NITRITE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	69%	34%	23%	32%	0%	NR	NR	NR	69%	34%	21%	37%
1146	NITRATE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	69%	34%	23%	32%	0%	NR	NR	NR	69%	34%	21%	38%
1147	NITROGEN, KJELDAHL, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1148	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	0%	0%	0%	0%	4%	31%	17%	21%	0%	0%	0%	0%	6%	31%	15%	24%
1151	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)	NR	0%	0%	0%	2%	3%	17%	8%	NR	0%	0%	0%	2%	8%	29%	10%
1152	NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%
1154	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	0%	0%	0%	0%	14%	32%	22%	23%	0%	0%	0%	0%	18%	32%	31%	26%
1155	PHOSPHORUS, DISSOLVED (MG/L AS P)	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%
1157	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%	0%	2%
1159	CHLORIDE (MG/L AS CL)	NR	0%	0%	0%	7%	31%	16%	23%	NR	0%	0%	0%	7%	31%	23%	26%
1161	SULFATE (MG/L AS SO4)	NR	0%	0%	0%	7%	31%	16%	24%	NR	0%	0%	0%	7%	31%	23%	27%
1164	E. COLI, GEOMETRIC MEAN (#/100ML)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1165	FECAL COLIFORM GEOMETRIC MEAN (COLONIES/100ML)	NR	NR	NR	NR	0%	NR	0%	0%	NR	NR	NR	NR	0%	NR	0%	0%
1166	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML	NR	NR	NR	0%	23%	39%	32%	12%	NR	NR	NR	0%	19%	23%	38%	7%
1167	E. COLI, MTEC, MF, #/100 ML	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1169	FECAL STREPTOCOCCI, MBR FILT,KF AGAR,35C,48HR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1170	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	NR	NR	NR	NR	70%	61%	87%	55%	NR	NR	NR	NR	90%	72%	87%	50%
1172	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	NR	NR	0%	0%	30%	33%	24%	23%	NR	NR	0%	0%	30%	33%	33%	27%
1176	SOLIDS,TOTAL, DISS, ELECTRICAL-CONDUCTIVITY,MG/L	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR
1177	SOLIDS, DISSOLVED-SUM OF CONSTITUENTS (MG/L)	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%
1178	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	0%	NR	NR	NR	53%	63%	33%	37%	0%	NR	NR	NR	53%	67%	47%	45%
1179	CHLOROPHYLL-A, PHYTOPLANKTON UG/L, CHROMO-FLOURO	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1181	FECAL COLIFORM MPN/100ML 5/2,3 DIL FERMENT METHO	NR	NR	NR	NR	NR	NR	NR	83%	NR	NR	NR	NR	NR	NR	NR	0%
1182	BOD, CARBONACEOUS, 5 DAY, 20 DEG C	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1186	SULFATE, SO4, SED, DRY WT, WTR EXTRACT, (MG/KG)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1189	DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	100%	20%	NR	NR	NR	NR	NR	100%	0%	50%
1190	DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	100%	20%	NR	NR	NR	NR	NR	100%	0%	50%
1191	DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	100%	20%	NR	NR	NR	NR	NR	100%	0%	50%
1207	SULFATE (AS S) WHOLE WATER, MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1211	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR
1223	OXYGEN DEMAND, TOTAL MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1233	PH, FIELD, STANDARD UNITS SU	100%	80%	0%	NR	0%	0%	0%	33%	100%	80%	0%	NR	0%	0%	0%	33%
1235	NITROGEN, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1239	NITROGEN, ORGANIC, TOTAL (MG/L AS N)	0%	NR	0%	0%	0%	NR	NR	NR	0%	NR	0%	0%	0%	NR	NR	NR
1241	NITROGEN, ORGANIC, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1244	NITRATE NITROGEN, DISSOLVED (MG/L AS N)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR

(continued)

Table G-1. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2003								Period: Summer-Fall 2003							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1249	NITROGEN, INORGANIC, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1252	PHOSPHOROUS DISSOLVED TOTAL WHATMAN GF/F MG/L P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1255	PHOSPHATE, ORTHO (MG/L AS PO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1264	CHLORIDE, DISSOLVED IN WATER MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1265	SULFATE, DISSOLVED (MG/L AS SO4)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1267	NITROGEN-NITRATE IN WATER PERCENT	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1269	PHOSPHATE, TOTAL, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1270	NITRATE + NITRITE,DRY WT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1271	ORTHOPHOSPHATE,DRY WEIGHT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1272	PHOSPHATE HYDROLYZED, DRY WEIGHT, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1274	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1277	COLIFORM,TOT,MPN,CONFIRMED TEST,35C (TUBE 31506)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1283	FECAL COLIFORM,MEMBR FILTER,M-FC AGAR,44.5C,24HR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR
1285	FECAL COLIFORM,MPN,EC MED,44.5C (TUBE 31614)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1288	FECAL COLIFORM,MPN,BORIC ACID LACTOSE BR,43C,48HR	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1291	FECAL COLIFORM, MF,M-FC, 0.7 UM	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%
1296	CHLOROPHYLL A UG/L FLUOROMETRIC CORRECTED	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1297	CHLOROPHYLL-A UG/L TRICHROMATIC UNCORRECTED	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1303	CHLOROPHYLL A,% OF(PHEOPHYTIN A+CHL A),SPEC-ACID.	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1309	CHLOROPHYLL A (MG/L)	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%
1319	SOLIDS,TOTAL SUSPENDED(GRAVIMETRIC), SUSP,WTR MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1327	ORTHOPHOSPHORUS AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1328	ORTHOPHOSPHATE AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1329	PHOSPHATE, TOTAL AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1338	SOLIDS, SUSP. - RESIDUE ON EVAP. AT 180 C (MG/L)	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1343	PHOSPHATE,TOTAL,COLORIMETRIC METHOD (MG/L AS P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1352	NITROGEN, AMMONIA, TOTAL (MG/L AS NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1354	NITRATE NITROGEN,TOTAL (MG/L AS NO3)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1355	NITRATE NITROGEN, DISSOLVED (MG/L AS NO3)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1356	NITRITE NITROGEN,TOTAL (MG/L AS NO2)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1362	SOLIDS, SUSPENDED, ASH FREE DRY WEIGHT MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1363	FECAL COLIFORM, GENERAL (PERMIT)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1372	COD KG/1000 GALLONS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1417	Conductivity (uohms/cm)	NR	NR	NR	NR	100%	NR	0%	NR	NR	NR	NR	NR	100%	NR	0%	NR
1418	Dissolved Oxygen (mg/l)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1420	Temperature (deg C)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1422	Ammonia Nitrogen (NH3-N)	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1423	Biological Oxygen Demand (BOD)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1425	Chloride (Cl)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

(continued)

Table G-1. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2003								Period: Summer-Fall 2003							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1426	Nitrate-Nitrogen (NO3-N)	0%	67%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	50%	100%
1427	Nitrite-Nitrogen (NO2-N)	100%	100%	NR	NR	0%	0%	33%	75%	100%	100%	NR	NR	0%	0%	33%	75%
1428	Phosphate (PO4-P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1429	Sulfate (SO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1431	Total Filter Residue (TDS)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1432	Total Nitrogen (TN)	NR	100%	NR	NR	50%	0%	0%	0%	NR	0%	NR	NR	50%	0%	0%	0%
1433	Total Suspended Solids	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1434	Fecal Coliform (CPU/100 ml)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1436	BOD	50%	100%	NR	NR	60%	0%	13%	75%	50%	100%	NR	NR	60%	0%	13%	75%
1437	Cl	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1438	COD	100%	100%	NR	NR	60%	0%	13%	75%	100%	100%	NR	NR	60%	0%	13%	75%
1440	Fecals	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1442	NO2-N and NO3 -N	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1443	P	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1444	sulfate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1445	TDS	100%	100%	NR	NR	33%	0%	13%	75%	100%	100%	NR	NR	33%	0%	13%	75%
1446	Temp	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	67%	NR	NR	NR
1447	TKN	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1448	Total NH4-N	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1449	TSS	100%	100%	NR	NR	60%	0%	13%	75%	100%	100%	NR	NR	60%	0%	13%	75%
1457	COLIFORM, TOTAL	80%	100%	NR	NR	0%	0%	25%	75%	80%	100%	NR	NR	0%	0%	0%	25%
1459	Fecal streptococci	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1460	PHOSPHATE, SOLUBLE	NR	0%	NR	NR	0%	0%	0%	0%	NR	0%	NR	NR	0%	0%	0%	0%
1461	PHOSPHATE, TOTAL	100%	100%	NR	NR	50%	0%	14%	75%	100%	100%	NR	NR	50%	0%	14%	75%
1462	NITROGEN, ORGANIC	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1463	Orthophosphate	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1471	Dissolved Sulfate	100%	100%	NR	NR	0%	0%	33%	75%	100%	100%	NR	NR	0%	0%	33%	75%
1473	Chlorophyll a	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1474	Nitrite plus nitrate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1475	Coliform F	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1477	Total Phosphorus	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR

Table G-2. Data Gaps for Each Water Quality Indicator for Each Transboundary Region During 2002

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2002								Period: Summer-Fall 2002							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
20	Chemical Oxygen Demand (COD)	NR	NR	NR	NR	33%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
29	pH	0%	NR	11%	NR	67%	NR	0%	NR	0%	NR	0%	NR	50%	NR	0%	NR
85	BOD, Biochemical oxygen demand	NR	NR	100%	NR	33%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
204	Total Suspended Solids (TSS)	0%	NR	18%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
216	Total Solids	100%	100%	100%	NR	60%	100%	75%	100%	100%	100%	0%	NR	40%	100%	75%	100%
227	Chlorophyll a, uncorrected for pheophytin	0%	NR	40%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
257	Temperature, water	22%	100%	8%	NR	100%	100%	43%	100%	22%	100%	0%	NR	100%	100%	43%	100%
266	Specific conductance	100%	100%	10%	NR	60%	100%	75%	100%	100%	100%	0%	NR	40%	100%	75%	100%
446	Nitrogen, ammonium (NH4) as NH4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
480	Temperature, air	100%	100%	NR	NR	100%	100%	75%	100%	100%	100%	NR	NR	100%	100%	75%	100%
553	Dissolved Solids	NR	NR	11%	NR	33%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
554	Nitrogen ion (N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1042	Fecal coliform, M-FC MF (0.7 micron) method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1043	Fecal streptococci, KF streptococcus MF method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1044	Chlorophyll a, periphyton, chromatographic-fluorometric method	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1046	Chloride, water, filtered	4%	0%	47%	NR	0%	0%	NR	NR	4%	25%	0%	NR	0%	67%	NR	NR
1047	Sulfate, water, filtered	4%	0%	47%	NR	0%	0%	NR	NR	4%	25%	0%	NR	0%	67%	NR	NR
1052	Ammonia, water, filtered	0%	0%	40%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	67%	NR	NR
1053	Ammonia, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1054	Nitrite, water, filtered	3%	0%	47%	NR	0%	0%	NR	NR	3%	50%	0%	NR	0%	67%	NR	NR
1055	Nitrite, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1056	Nitrate, water, filtered	100%	0%	100%	NR	0%	NR	NR	NR	100%	100%	0%	NR	0%	NR	NR	NR
1058	Ammonia plus organic nitrogen, water, filtered	0%	NR	55%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	67%	NR	NR
1059	Ammonia plus organic nitrogen, water, unfiltered	0%	NR	55%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	67%	NR	NR
1060	Nitrite plus nitrate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1061	Nitrite plus nitrate, water, filtered	0%	0%	40%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	67%	NR	NR
1063	Phosphorus, water, unfiltered	0%	NR	55%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	67%	NR	NR
1064	Phosphorus, water, filtered	0%	NR	55%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	67%	NR	NR
1065	Orthophosphate, water, filtered	6%	0%	47%	NR	0%	0%	NR	NR	6%	50%	0%	NR	0%	67%	NR	NR
1066	Orthophosphate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1067	Temperature, water	5%	0%	44%	NR	NR	0%	NR	NR	5%	0%	6%	NR	NR	0%	NR	NR
1068	Temperature, air	0%	0%	50%	NR	NR	NR	NR	NR	0%	0%	7%	NR	NR	NR	NR	NR
1072	Specific conductance, water, unfiltered	7%	0%	50%	NR	0%	0%	NR	NR	7%	33%	6%	NR	0%	0%	NR	NR
1073	Dissolved oxygen, water, unfiltered	17%	0%	40%	NR	NR	NR	NR	NR	17%	0%	0%	NR	NR	NR	NR	NR
1074	Dissolved oxygen, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1076	pH, water, unfiltered, field	22%	0%	44%	NR	0%	0%	NR	NR	22%	33%	0%	NR	0%	0%	NR	NR
1077	pH, water, unfiltered, laboratory	0%	0%	40%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	67%	NR	NR
1081	Specific conductance, water, unfiltered, laboratory	0%	0%	40%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	67%	NR	NR
1086	Ammonia, unionized	NR	NR	100%	NR	50%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1087	Chloride	100%	100%	11%	NR	60%	100%	38%	100%	100%	100%	0%	NR	40%	100%	38%	100%
1089	Dissolved oxygen (DO)	22%	100%	4%	NR	100%	100%	13%	75%	22%	100%	0%	NR	100%	100%	13%	75%
1090	Escherichia coli	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR
1091	Fecal Coliform	100%	100%	4%	NR	43%	0%	75%	100%	100%	100%	0%	NR	29%	0%	75%	100%
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1093	Nitrogen, ammonia as N	NR	NR	9%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1094	Nitrogen, Kjeldahl	NR	NR	9%	NR	50%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1095	Nitrogen, Nitrate (NO3) as N	NR	NR	11%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1096	Nitrogen, Nitrate (NO3) as NO3	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	NR	NR	9%	NR	50%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1098	Nitrogen, Nitrite (NO2) as N	NR	NR	14%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1099	Nitrogen, Nitrite (NO2) as NO2	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR

(continued)

Table G-2. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2002								Period: Summer-Fall 2002							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1100	Phosphate	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1101	Phosphorus	NR	NR	7%	NR	50%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1102	Phosphorus as P	NR	NR	11%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1103	Phosphorus, orthophosphate as P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1104	Phosphorus, orthophosphate as PO4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1105	TEMPERATURE, WATER (DEGREES CENTIGRADE)	0%	0%	0%	0%	5%	36%	19%	35%	0%	0%	0%	0%	5%	32%	26%	38%
1106	TEMPERATURE, AIR (DEGREES CENTIGRADE)	0%	0%	0%	NR	70%	83%	71%	58%	0%	0%	0%	NR	60%	83%	76%	100%
1110	SPECIFIC CONDUCTANCE,FIELD (UMHOS/CM @ 25C)	NR	NR	NR	NR	47%	53%	23%	30%	NR	NR	NR	NR	47%	44%	38%	33%
1111	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	NR	NR	NR	NR	0%	43%	50%	50%	NR	NR	NR	NR	0%	43%	50%	50%
1112	TEMPERATURE, WATER (DEGREES CENTIGRADE, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1113	WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1114	TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1115	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1116	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1117	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MIN	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1118	PH, S.U., 24HR MAXIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1119	PH, S.U., 24HR, MINIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	33%	NR	NR	NR	NR	NR	0%	0%	50%
1127	OXYGEN, DISSOLVED (MG/L)	0%	0%	0%	0%	5%	36%	19%	25%	0%	0%	0%	0%	5%	33%	27%	28%
1128	OXYGEN, DISSOLVED (PERCENT OF SATURATION)	0%	0%	0%	0%	0%	0%	9%	5%	0%	0%	0%	0%	0%	0%	0%	0%
1129	BIOCHEM OXY DEM,INHIB, DISS(MG/L,5DAY-20C, CBOD)	NR	NR	NR	NR	NR	NR	NR	24%	NR	NR	NR	NR	NR	NR	NR	24%
1130	BIOCHEM OXY DEM,NIT INHIB,TOT (MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1131	BIOCHEM OXY DEM,NIT INHIB DISS(MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1132	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C	0%	NR	NR	0%	27%	0%	0%	0%	0%	NR	NR	0%	33%	0%	0%	0%
1133	BIOCHEM OXY DEM NIT INHIB, TOT (MG/L, 5 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	26%	NR	NR	NR	NR	NR	NR	NR	26%
1134	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	NR	NR	NR	NR	NR	NR	0%	31%	NR	NR	NR	NR	NR	NR	0%	31%
1135	PH (STANDARD UNITS)	0%	NR	0%	0%	5%	36%	19%	24%	0%	NR	0%	0%	5%	33%	27%	28%
1136	PH (STANDARD UNITS) LAB	9%	80%	0%	NR	25%	40%	50%	41%	5%	80%	0%	NR	25%	40%	50%	41%
1140	NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)	NR	NR	NR	NR	45%	100%	19%	50%	NR	NR	NR	NR	73%	81%	43%	50%
1141	NITROGEN, AMMONIA, DISSOLVED (MG/L AS N)	NR	NR	0%	0%	0%	43%	100%	60%	NR	NR	0%	0%	0%	29%	100%	60%
1142	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	0%	0%	0%	0%	7%	34%	13%	29%	0%	0%	0%	0%	7%	28%	25%	29%
1143	AMMONIA, UNIONIZED (MG/L AS N)	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1144	NITRITE, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	43%	100%	60%	NR	NR	NR	NR	0%	29%	100%	60%
1145	NITRITE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	31%	0%	0%	0%	0%	NR	NR	NR	38%	0%	0%	0%
1146	NITRATE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	31%	0%	0%	0%	0%	NR	NR	NR	31%	0%	0%	0%
1147	NITROGEN, KJELDAHL, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	100%	100%	74%	NR	NR	NR	NR	0%	67%	100%	16%
1148	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	0%	0%	0%	0%	4%	35%	11%	29%	0%	0%	0%	0%	6%	31%	20%	29%
1151	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)	NR	0%	0%	0%	2%	8%	19%	23%	NR	0%	0%	0%	2%	5%	31%	23%
1152	NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)	NR	NR	0%	0%	0%	43%	100%	70%	NR	NR	0%	0%	0%	29%	100%	15%

(continued)

Table G-2. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2002								Period: Summer-Fall 2002							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1154	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	0%	0%	0%	0%	18%	36%	20%	32%	0%	0%	0%	0%	16%	32%	37%	32%
1155	PHOSPHORUS, DISSOLVED (MG/L AS P)	NR	NR	0%	0%	0%	43%	100%	70%	NR	NR	0%	0%	0%	29%	100%	15%
1157	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	NR	NR	0%	0%	0%	7%	5%	3%	NR	NR	0%	0%	0%	4%	5%	3%
1159	CHLORIDE (MG/L AS CL)	NR	0%	0%	0%	7%	35%	15%	32%	NR	0%	0%	0%	7%	31%	27%	32%
1161	SULFATE (MG/L AS SO4)	NR	0%	0%	0%	7%	35%	15%	33%	NR	0%	0%	0%	7%	31%	27%	33%
1164	E. COLI, GEOMETRIC MEAN (#/100ML)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1165	FECAL COLIFORM GEOMETRIC MEAN (COLONIES/100ML)	NR	NR	NR	NR	0%	NR	0%	0%	NR	NR	NR	NR	0%	NR	0%	0%
1166	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML	NR	NR	NR	0%	31%	36%	34%	40%	NR	NR	NR	0%	35%	27%	40%	36%
1167	E. COLI, MTEC, MF, #/100 ML	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1169	FECAL STREPTOCOCCI, MBR FILT,KF AGAR,35C,48HR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1170	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	NR	NR	NR	NR	90%	83%	78%	86%	NR	NR	NR	NR	90%	78%	91%	86%
1172	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	NR	NR	0%	0%	30%	35%	18%	32%	NR	NR	0%	0%	27%	29%	29%	32%
1176	SOLIDS,TOTAL, DISS, ELECTRICAL-CONDUCTIVITY,MG/L	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR
1177	SOLIDS, DISSOLVED-SUM OF CONSTITUENTS (MG/L)	NR	NR	0%	NR	NR	0%	NR	50%	NR	NR	0%	NR	NR	100%	NR	0%
1178	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	0%	NR	NR	NR	53%	71%	25%	52%	0%	NR	NR	NR	53%	58%	50%	52%
1179	CHLOROPHYLL-A, PHYTOPLANKTON UG/L, CHROMO-FLOURO	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1181	FECAL COLIFORM MPN/100ML 5/2,3 DIL FERMENT METHO	NR	NR	NR	NR	NR	NR	NR	83%	NR	NR	NR	NR	NR	NR	NR	83%
1182	BOD, CARBONACEOUS, 5 DAY, 20 DEG C	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1186	SULFATE, SO4, SED, DRY WT, WTR EXTRACT, (MG/KG)	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	0%
1189	DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	20%	NR	NR	NR	NR	NR	0%	0%	30%
1190	DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	20%	NR	NR	NR	NR	NR	0%	0%	30%
1191	DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	20%	NR	NR	NR	NR	NR	0%	0%	30%
1207	SULFATE (AS S) WHOLE WATER, MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1211	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR
1223	OXYGEN DEMAND, TOTAL MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1233	PH, FIELD, STANDARD UNITS SU	100%	80%	0%	NR	100%	100%	50%	67%	100%	80%	0%	NR	100%	100%	50%	67%
1235	NITROGEN, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1239	NITROGEN, ORGANIC, TOTAL (MG/L AS N)	0%	NR	0%	0%	0%	NR	NR	NR	0%	NR	0%	0%	0%	NR	NR	NR
1241	NITROGEN, ORGANIC, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1244	NITRATE NITROGEN, DISSOLVED (MG/L AS N)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1249	NITROGEN, INORGANIC, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1252	PHOSPHOROUS DISSOLVED TOTAL WHATMAN GF/F MG/L P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1255	PHOSPHATE, ORTHO (MG/L AS PO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1264	CHLORIDE, DISSOLVED IN WATER MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1265	SULFATE, DISSOLVED (MG/L AS SO4)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1267	NITROGEN-NITRATE IN WATER PERCENT	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

(continued)

Table G-2. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2002								Period: Summer-Fall 2002							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1269	PHOSPHATE, TOTAL, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1270	NITRATE + NITRITE,DRY WT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1271	ORTHOPHOSPHATE,DRY WEIGHT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1272	PHOSPHATE HYDROLYZED, DRY WEIGHT, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1274	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1277	COLIFORM,TOT,MPN,CONFIRMED TEST,35C (TUBE 31506)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1283	FECAL COLIFORM,MEMBR FILTER,M-FC AGAR,44.5C,24HR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR
1285	FECAL COLIFORM,MPN,EC MED,44.5C (TUBE 31614)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1288	FECAL COLIFORM,MPN,BORIC ACID LACTOSE BR,43C,48HR	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1291	FECAL COLIFORM, MF,M-FC, 0.7 UM	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%
1296	CHLOROPHYLL A UG/L FLUOROMETRIC CORRECTED	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1297	CHLOROPHYLL-A UG/L TRICHROMATIC UNCORRECTED	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1303	CHLOROPHYLL A,% OF(PHEOPHYTIN A+CHL A),SPEC-ACID.	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1309	CHLOROPHYLL A (MG/L)	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%
1319	SOLIDS,TOTAL SUSPENDED(GRAVIMETRIC), SUSP,WTR MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1327	ORTHOPHOSPHORUS AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1328	ORTHOPHOSPHATE AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1329	PHOSPHATE, TOTAL AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1338	SOLIDS, SUSP. - RESIDUE ON EVAP. AT 180 C (MG/L)	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1343	PHOSPHATE,TOTAL,COLORIMETRIC METHOD (MG/L AS P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1352	NITROGEN, AMMONIA, TOTAL (MG/L AS NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1354	NITRATE NITROGEN,TOTAL (MG/L AS NO3)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1355	NITRATE NITROGEN, DISSOLVED (MG/L AS NO3)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1356	NITRITE NITROGEN,TOTAL (MG/L AS NO2)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1362	SOLIDS, SUSPENDED, ASH FREE DRY WEIGHT MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1363	FECAL COLIFORM, GENERAL (PERMIT)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1372	COD KG/1000 GALLONS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1417	Conductivity (uohms/cm)	NR	NR	NR	NR	100%	NR	0%	NR	NR	NR	NR	NR	100%	NR	0%	NR
1418	Dissolved Oxygen (mg/l)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1420	Temperature (deg C)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1422	Ammonia Nitrogen (NH3-N)	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1423	Biological Oxygen Demand (BOD)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1425	Chloride (Cl)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1426	Nitrate-Nitrogen (NO3-N)	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%
1427	Nitrite-Nitrogen (NO2-N)	100%	100%	NR	NR	100%	100%	33%	50%	100%	100%	NR	NR	0%	0%	0%	0%
1428	Phosphate (PO4-P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1429	Sulfate (SO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1431	Total Filter Residue (TDS)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1432	Total Nitrogen (TN)	NR	0%	NR	NR	50%	0%	0%	0%	NR	0%	NR	NR	50%	0%	0%	0%

(continued)

Table G-2. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2002								Period: Summer-Fall 2002							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1433	Total Suspended Solids	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1434	Fecal Coliform (CPU/100 ml)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1436	BOD	100%	100%	NR	NR	100%	100%	38%	100%	100%	100%	NR	NR	100%	100%	38%	100%
1437	Cl	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1438	COD	100%	100%	NR	NR	80%	100%	38%	100%	100%	100%	NR	NR	100%	100%	38%	100%
1440	Fecals	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1442	NO2-N and NO3 -N	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1443	P	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1444	sulfate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1445	TDS	100%	100%	NR	NR	100%	100%	38%	100%	100%	100%	NR	NR	100%	100%	38%	100%
1446	Temp	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1447	TKN	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1448	Total NH4-N	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1449	TSS	100%	100%	NR	NR	100%	100%	38%	100%	100%	100%	NR	NR	100%	100%	38%	100%
1457	COLIFORM, TOTAL	100%	100%	NR	NR	0%	0%	75%	100%	100%	100%	NR	NR	0%	0%	75%	100%
1459	Fecal streptococci	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1460	PHOSPHATE, SOLUBLE	NR	0%	NR	NR	0%	0%	0%	0%	NR	0%	NR	NR	0%	0%	0%	0%
1461	PHOSPHATE, TOTAL	100%	100%	NR	NR	100%	100%	14%	50%	100%	100%	NR	NR	100%	100%	43%	100%
1462	NITROGEN, ORGANIC	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1463	Orthophosphate	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1471	Dissolved Sulfate	100%	100%	NR	NR	100%	100%	100%	100%	100%	100%	NR	NR	100%	100%	100%	100%
1473	Chlorophyll a	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1474	Nitrite plus nitrate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1475	Coliform F	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1477	Total Phosphorus	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR

Table G-3. Data Gaps for Each Water Quality Indicator for Each Transboundary Region During 2001

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2001								Period: Summer-Fall 2001							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
20	Chemical Oxygen Demand (COD)	NR	NR	NR	NR	33%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
29	pH	0%	NR	5%	NR	17%	NR	0%	NR	0%	NR	6%	NR	33%	NR	0%	NR
85	BOD, Biochemical oxygen demand	NR	NR	0%	NR	33%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
204	Total Suspended Solids (TSS)	0%	NR	9%	NR	NR	NR	NR	NR	0%	NR	13%	NR	NR	NR	NR	NR
216	Total Solids	100%	100%	0%	NR	60%	100%	100%	75%	100%	100%	0%	NR	40%	100%	100%	75%
227	Chlorophyll a, uncorrected for pheophytin	0%	NR	40%	NR	NR	NR	NR	NR	0%	NR	40%	NR	NR	NR	NR	NR
257	Temperature, water	22%	100%	4%	NR	100%	100%	57%	75%	22%	100%	5%	NR	100%	100%	57%	75%
266	Specific conductance	100%	100%	5%	NR	60%	100%	100%	75%	50%	100%	6%	NR	40%	100%	100%	75%
446	Nitrogen, ammonium (NH4) as NH4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
480	Temperature, air	100%	100%	NR	NR	100%	100%	100%	75%	100%	100%	NR	NR	100%	100%	100%	75%
553	Dissolved Solids	NR	NR	0%	NR	33%	NR	NR	NR	NR	NR	2%	NR	0%	NR	NR	NR
554	Nitrogen ion (N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1042	Fecal coliform, M-FC MF (0.7 micron) method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1043	Fecal streptococci, KF streptococcus MF method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1044	Chlorophyll a, periphyton, chromatographic-fluorometric method	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1046	Chloride, water, filtered	2%	25%	12%	NR	100%	0%	NR	NR	4%	0%	12%	NR	0%	0%	NR	NR
1047	Sulfate, water, filtered	2%	25%	12%	NR	100%	0%	NR	NR	4%	0%	12%	NR	0%	0%	NR	NR
1052	Ammonia, water, filtered	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1053	Ammonia, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1054	Nitrite, water, filtered	0%	0%	0%	NR	100%	0%	NR	NR	0%	0%	0%	NR	0%	0%	NR	NR
1055	Nitrite, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1056	Nitrate, water, filtered	50%	100%	100%	NR	100%	NR	NR	NR	100%	0%	100%	NR	0%	NR	NR	NR
1058	Ammonia plus organic nitrogen, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1059	Ammonia plus organic nitrogen, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1060	Nitrite plus nitrate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1061	Nitrite plus nitrate, water, filtered	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1063	Phosphorus, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1064	Phosphorus, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1065	Orthophosphate, water, filtered	3%	50%	12%	NR	100%	0%	NR	NR	6%	0%	12%	NR	0%	0%	NR	NR
1066	Orthophosphate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1067	Temperature, water	7%	0%	6%	NR	NR	0%	NR	NR	7%	0%	6%	NR	NR	0%	NR	NR
1068	Temperature, air	2%	0%	7%	NR	NR	NR	NR	NR	0%	0%	7%	NR	NR	NR	NR	NR
1072	Specific conductance, water, unfiltered	6%	33%	17%	NR	100%	0%	NR	NR	6%	0%	17%	NR	0%	0%	NR	NR
1073	Dissolved oxygen, water, unfiltered	13%	0%	0%	NR	NR	NR	NR	NR	17%	0%	0%	NR	NR	NR	NR	NR
1074	Dissolved oxygen, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1076	pH, water, unfiltered, field	15%	33%	11%	NR	100%	0%	NR	NR	22%	0%	11%	NR	0%	0%	NR	NR
1077	pH, water, unfiltered, laboratory	3%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1081	Specific conductance, water, unfiltered, laboratory	3%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1086	Ammonia, unionized	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1087	Chloride	100%	100%	5%	NR	60%	100%	50%	75%	100%	100%	5%	NR	40%	100%	50%	75%
1089	Dissolved oxygen (DO)	22%	100%	17%	NR	100%	100%	50%	75%	22%	100%	20%	NR	100%	100%	50%	75%
1090	Escherichia coli	NR	NR	28%	NR	NR	NR	0%	NR	NR	NR	32%	NR	NR	NR	0%	NR
1091	Fecal Coliform	100%	100%	21%	NR	43%	100%	100%	50%	100%	100%	21%	NR	29%	0%	75%	75%
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1093	Nitrogen, ammonia as N	NR	NR	5%	NR	NR	NR	NR	NR	NR	NR	6%	NR	NR	NR	NR	NR
1094	Nitrogen, Kjeldahl	NR	NR	5%	NR	0%	NR	NR	NR	NR	NR	6%	NR	0%	NR	NR	NR
1095	Nitrogen, Nitrate (NO3) as N	NR	NR	6%	NR	NR	NR	NR	NR	NR	NR	5%	NR	NR	NR	NR	NR
1096	Nitrogen, Nitrate (NO3) as NO3	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	NR	NR	5%	NR	0%	NR	NR	NR	NR	NR	5%	NR	0%	NR	NR	NR
1098	Nitrogen, Nitrite (NO2) as N	NR	NR	6%	NR	NR	NR	NR	NR	NR	NR	6%	NR	NR	NR	NR	NR
1099	Nitrogen, Nitrite (NO2) as NO2	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
1100	Phosphate	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR

(continued)

Table G-3. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2001								Period: Summer-Fall 2001							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1101	Phosphorus	NR	NR	20%	NR	0%	NR	NR	NR	NR	NR	18%	NR	0%	NR	NR	NR
1102	Phosphorus as P	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	2%	NR	NR	NR	NR	NR
1103	Phosphorus, orthophosphate as P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1104	Phosphorus, orthophosphate as PO4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1105	TEMPERATURE, WATER (DEGREES CENTIGRADE)	0%	0%	0%	0%	6%	32%	22%	35%	0%	0%	0%	0%	6%	39%	22%	23%
1106	TEMPERATURE, AIR (DEGREES CENTIGRADE)	0%	0%	0%	NR	90%	83%	71%	50%	0%	0%	0%	NR	90%	83%	76%	58%
1110	SPECIFIC CONDUCTANCE,FIELD (UMHOS/CM @ 25C)	NR	NR	NR	NR	58%	47%	31%	30%	NR	NR	NR	NR	58%	53%	31%	32%
1111	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	NR	NR	NR	NR	0%	86%	50%	33%	NR	NR	NR	NR	0%	100%	50%	50%
1112	TEMPERATURE, WATER (DEGREES CENTIGRADE, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1113	WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1114	TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1115	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1116	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1117	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MIN	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1118	PH, S.U., 24HR MAXIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1119	PH, S.U., 24HR, MINIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1127	OXYGEN, DISSOLVED (MG/L)	0%	0%	0%	0%	6%	29%	23%	25%	0%	0%	0%	0%	6%	38%	23%	27%
1128	OXYGEN, DISSOLVED (PERCENT OF SATURATION)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1129	BIOCHEM OXY DEM,INHIB, DISS(MG/L,5DAY-20C, CBOD)	NR	NR	NR	NR	NR	NR	NR	32%	NR	NR	NR	NR	NR	NR	NR	32%
1130	BIOCHEM OXY DEM,NIT INHIB,TOT (MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1131	BIOCHEM OXY DEM,NIT INHIB DISS(MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1132	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C	0%	NR	NR	0%	33%	0%	0%	0%	0%	NR	NR	0%	33%	0%	0%	0%
1133	BIOCHEM OXY DEM NIT INHIB, TOT (MG/L, 5 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	35%	NR	NR	NR	NR	NR	NR	NR	35%
1134	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	NR	NR	NR	NR	NR	NR	0%	41%	NR	NR	NR	NR	NR	NR	0%	41%
1135	PH (STANDARD UNITS)	0%	NR	0%	0%	6%	29%	23%	25%	0%	NR	0%	0%	6%	38%	23%	27%
1136	PH (STANDARD UNITS) LAB	9%	80%	0%	NR	25%	40%	60%	29%	5%	80%	0%	NR	25%	40%	60%	35%
1140	NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)	NR	NR	NR	NR	64%	75%	62%	50%	NR	NR	NR	NR	64%	94%	52%	50%
1141	NITROGEN, AMMONIA, DISSOLVED (MG/L AS N)	NR	NR	0%	0%	0%	43%	100%	40%	NR	NR	0%	0%	0%	43%	100%	40%
1142	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	0%	0%	0%	0%	8%	26%	22%	29%	0%	0%	0%	0%	8%	32%	21%	31%
1143	AMMONIA, UNIONIZED (MG/L AS N)	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1144	NITRITE, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	43%	100%	40%	NR	NR	NR	NR	0%	43%	50%	40%
1145	NITRITE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	0%	0%	0%	0%	0%	NR	NR	NR	0%	0%	0%	0%
1146	NITRATE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	0%	0%	0%	0%	0%	NR	NR	NR	0%	0%	0%	0%
1147	NITROGEN, KJELDAHL, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	100%	100%	89%	NR	NR	NR	NR	0%	100%	100%	95%
1148	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	0%	0%	0%	0%	5%	27%	30%	32%	0%	0%	0%	0%	5%	33%	26%	32%
1151	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)	NR	0%	0%	0%	3%	8%	31%	24%	NR	0%	0%	0%	6%	8%	31%	25%
1152	NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)	NR	NR	0%	0%	0%	43%	100%	85%	NR	NR	0%	0%	0%	43%	100%	85%
1154	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	0%	0%	0%	0%	20%	28%	33%	32%	0%	0%	0%	0%	22%	34%	30%	34%
1155	PHOSPHORUS, DISSOLVED (MG/L AS P)	NR	NR	0%	0%	0%	43%	100%	85%	NR	NR	0%	0%	0%	43%	100%	90%
1157	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	NR	NR	0%	0%	0%	7%	5%	2%	NR	NR	0%	0%	0%	7%	5%	2%
1159	CHLORIDE (MG/L AS CL)	NR	0%	0%	0%	9%	27%	24%	32%	NR	0%	0%	0%	9%	33%	23%	34%
1161	SULFATE (MG/L AS SO4)	NR	0%	0%	0%	9%	27%	24%	33%	NR	0%	0%	0%	9%	33%	23%	35%
1164	E. COLI, GEOMETRIC MEAN (#/100ML)	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1165	FECAL COLIFORM GEOMETRIC MEAN (COLONIES/100ML)	NR	NR	NR	NR	0%	NR	0%	0%	NR	NR	NR	NR	0%	NR	0%	0%
1166	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML	NR	NR	NR	0%	31%	34%	26%	48%	NR	NR	NR	0%	31%	41%	24%	48%
1167	E. COLI, MTEC, MF, #/100 ML	NR	NR	NR	NR	67%	0%	0%	0%	NR	NR	NR	NR	100%	100%	80%	100%
1169	FECAL STREPTOCOCCI, MBR FILT,KF AGAR,35C,48HR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1170	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	NR	NR	NR	NR	80%	39%	0%	32%	NR	NR	NR	NR	80%	44%	35%	73%
1172	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	NR	NR	0%	0%	33%	27%	31%	32%	NR	NR	0%	0%	33%	33%	29%	34%
1176	SOLIDS,TOTAL, DISS, ELECTRICAL-CONDUCTIVITY,MG/L	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR
1177	SOLIDS, DISSOLVED-SUM OF CONSTITUENTS (MG/L)	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%
1178	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	0%	NR	NR	NR	59%	54%	44%	52%	0%	NR	NR	NR	65%	67%	42%	57%

(continued)

Table G-3. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2001								Period: Summer-Fall 2001							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1179	CHLOROPHYLL-A, PHYTOPLANKTON UG/L, CHROMO-FLOURO	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1181	FECAL COLIFORM MPN/100ML 5/2,3 DIL FERMENT METHO	NR	NR	NR	NR	NR	NR	NR	80%	NR	NR	NR	NR	NR	NR	NR	0%
1182	BOD, CARBONACEOUS, 5 DAY, 20 DEG C	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1186	SULFATE, SO4, SED, DRY WT, WTR EXTRACT, (MG/KG)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%
1189	DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1190	DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1191	DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1207	SULFATE (AS S) WHOLE WATER, MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1211	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR
1223	OXYGEN DEMAND, TOTAL MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1233	PH, FIELD, STANDARD UNITS SU	50%	80%	0%	NR	100%	100%	75%	33%	100%	80%	0%	NR	100%	100%	75%	33%
1235	NITROGEN, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1239	NITROGEN, ORGANIC, TOTAL (MG/L AS N)	0%	NR	0%	0%	0%	NR	NR	NR	0%	NR	0%	0%	0%	NR	NR	NR
1241	NITROGEN, ORGANIC, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1244	NITRATE NITROGEN, DISSOLVED (MG/L AS N)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1249	NITROGEN, INORGANIC, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1252	PHOSPHOROUS DISSOLVED TOTAL WHATMAN GF/F MG/L P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1255	PHOSPHATE, ORTHO (MG/L AS PO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1264	CHLORIDE, DISSOLVED IN WATER MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1265	SULFATE, DISSOLVED (MG/L AS SO4)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1267	NITROGEN-NITRATE IN WATER PERCENT	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1269	PHOSPHATE, TOTAL, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1270	NITRATE + NITRITE,DRY WT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1271	ORTHOPHOSPHATE,DRY WEIGHT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1272	PHOSPHATE HYDROLYZED, DRY WEIGHT, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1274	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1277	COLIFORM,TOT,MPN,CONFIRMED TEST,35C (TUBE 31506)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1283	FECAL COLIFORM,MEMBR FILTER,M-FC AGAR,44.5C,24HR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR
1285	FECAL COLIFORM,MPN,EC MED,44.5C (TUBE 31614)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1288	FECAL COLIFORM,MPN,BORIC ACID LACTOSE BR,43C,48HR	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1291	FECAL COLIFORM, MF,M-FC, 0.7 UM	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%
1296	CHLOROPHYLL A UG/L FLUOROMETRIC CORRECTED	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1297	CHLOROPHYLL-A UG/L TRICHROMATIC UNCORRECTED	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1303	CHLOROPHYLL A,% OF(PHEOPHYTIN A+CHL A),SPEC-ACID.	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1309	CHLOROPHYLL A (MG/L)	0%	0%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%
1319	SOLIDS,TOTAL SUSPENDED(GRAVIMETRIC), SUSP,WTR MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1327	ORTHOPHOSPHORUS AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1328	ORTHOPHOSPHATE AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1329	PHOSPHATE, TOTAL AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1338	SOLIDS, SUSP. - RESIDUE ON EVAP. AT 180 C (MG/L)	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1343	PHOSPHATE,TOTAL,COLORIMETRIC METHOD (MG/L AS P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1352	NITROGEN, AMMONIA, TOTAL (MG/L AS NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1354	NITRATE NITROGEN,TOTAL (MG/L AS NO3)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1355	NITRATE NITROGEN, DISSOLVED (MG/L AS NO3)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1356	NITRITE NITROGEN,TOTAL (MG/L AS NO2)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1362	SOLIDS, SUSPENDED, ASH FREE DRY WEIGHT MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1363	FECAL COLIFORM, GENERAL (PERMIT)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1372	COD KG/1000 GALLONS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1417	Conductivity (uohms/cm)	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	100%	NR	0%	NR
1418	Dissolved Oxygen (mg/l)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1420	Temperature (deg C)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1422	Ammonia Nitrogen (NH3-N)	0%	75%	NR	NR	0%	0%	38%	50%	100%	100%	NR	NR	0%	0%	25%	50%
1423	Biological Oxygen Demand (BOD)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1425	Chloride (Cl)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1426	Nitrate-Nitrogen (NO3-N)	100%	67%	NR	NR	0%	0%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%

(continued)

Table G-3. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2001								Period: Summer-Fall 2001							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1427	Nitrite-Nitrogen (NO2-N)	100%	100%	NR	NR	100%	100%	33%	50%	100%	100%	NR	NR	100%	100%	100%	75%
1428	Phosphate (PO4-P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1429	Sulfate (SO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1431	Total Filter Residue (TDS)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1432	Total Nitrogen (TN)	NR	0%	NR	NR	0%	0%	0%	0%	NR	0%	NR	NR	50%	0%	0%	0%
1433	Total Suspended Solids	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1434	Fecal Coliform (CPU/100 ml)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1436	BOD	100%	100%	NR	NR	60%	100%	50%	75%	100%	100%	NR	NR	100%	100%	38%	75%
1437	Cl	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1438	COD	100%	100%	NR	NR	40%	100%	38%	50%	100%	100%	NR	NR	80%	100%	38%	75%
1440	Fecals	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1442	NO2-N and NO3 -N	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1443	P	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1444	sulfate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1445	TDS	100%	100%	NR	NR	100%	100%	50%	75%	100%	100%	NR	NR	100%	100%	38%	75%
1446	Temp	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	67%	NR	NR	NR
1447	TKN	NR	NR	NR	NR	100%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR
1448	Total NH4-N	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1449	TSS	100%	100%	NR	NR	60%	100%	50%	75%	100%	100%	NR	NR	100%	100%	38%	75%
1457	COLIFORM, TOTAL	100%	100%	NR	NR	100%	100%	100%	75%	100%	100%	NR	NR	0%	0%	75%	75%
1459	Fecal streptococci	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1460	PHOSPHATE, SOLUBLE	NR	0%	NR	NR	0%	0%	0%	0%	NR	0%	NR	NR	0%	0%	0%	0%
1461	PHOSPHATE, TOTAL	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	100%	100%	29%	25%
1462	NITROGEN, ORGANIC	100%	100%	NR	NR	0%	0%	75%	50%	100%	100%	NR	NR	0%	0%	50%	50%
1463	Orthophosphate	100%	100%	NR	NR	0%	0%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1471	Dissolved Sulfate	100%	100%	NR	NR	100%	100%	33%	50%	100%	100%	NR	NR	100%	100%	100%	75%
1473	Chlorophyll a	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1474	Nitrite plus nitrate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1475	Coliform F	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1477	Total Phosphorus	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR	NR	NR

Table G-4. Data Gaps for Each Water Quality Indicator for Each Transboundary Region During 2000

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2000								Period: Summer-Fall 2000							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
20	Chemical Oxygen Demand (COD)	NR	NR	NR	NR	67%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
29	pH	0%	NR	7%	NR	33%	NR	0%	NR	0%	NR	5%	NR	0%	NR	100%	NR
85	BOD, Biochemical oxygen demand	NR	NR	0%	NR	67%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
204	Total Suspended Solids (TSS)	0%	NR	15%	NR	NR	NR	NR	NR	0%	NR	11%	NR	NR	NR	NR	NR
216	Total Solids	50%	75%	0%	NR	80%	100%	25%	50%	50%	75%	0%	NR	40%	100%	25%	50%
227	Chlorophyll a, uncorrected for pheophytin	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	40%	NR	NR	NR	NR	NR
257	Temperature, water	11%	75%	7%	NR	100%	100%	14%	50%	22%	75%	5%	NR	100%	100%	57%	50%
266	Specific conductance	50%	75%	7%	NR	80%	100%	25%	50%	50%	75%	5%	NR	40%	100%	25%	50%
446	Nitrogen, ammonium (NH4) as NH4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
480	Temperature, air	50%	75%	NR	NR	100%	100%	25%	50%	100%	75%	NR	NR	100%	100%	25%	50%
553	Dissolved Solids	NR	NR	4%	NR	67%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
554	Nitrogen ion (N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1042	Fecal coliform, M-FC MF (0.7 micron) method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1043	Fecal streptococci, KF streptococcus MF method, water	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1044	Chlorophyll a, periphyton, chromatographic-fluorometric method	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1046	Chloride, water, filtered	2%	25%	0%	NR	100%	0%	NR	NR	4%	25%	12%	NR	100%	33%	NR	NR
1047	Sulfate, water, filtered	2%	25%	0%	NR	100%	0%	NR	NR	4%	25%	12%	NR	100%	33%	NR	NR
1052	Ammonia, water, filtered	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1053	Ammonia, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1054	Nitrite, water, filtered	1%	50%	0%	NR	100%	0%	NR	NR	0%	0%	6%	NR	0%	0%	NR	NR
1055	Nitrite, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1056	Nitrate, water, filtered	50%	100%	0%	NR	100%	NR	NR	NR	100%	100%	100%	NR	100%	NR	NR	NR
1058	Ammonia plus organic nitrogen, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1059	Ammonia plus organic nitrogen, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1060	Nitrite plus nitrate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1061	Nitrite plus nitrate, water, filtered	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	0%	NR	NR
1063	Phosphorus, water, unfiltered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1064	Phosphorus, water, filtered	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR
1065	Orthophosphate, water, filtered	3%	50%	0%	NR	100%	0%	NR	NR	6%	50%	12%	NR	100%	0%	NR	NR
1066	Orthophosphate, water, unfiltered	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1067	Temperature, water	8%	0%	6%	NR	NR	0%	NR	NR	5%	0%	6%	NR	NR	0%	NR	NR
1068	Temperature, air	0%	0%	7%	NR	NR	NR	NR	NR	0%	0%	7%	NR	NR	NR	NR	NR
1072	Specific conductance, water, unfiltered	9%	0%	6%	NR	100%	0%	NR	NR	7%	33%	17%	NR	100%	100%	NR	NR
1073	Dissolved oxygen, water, unfiltered	22%	0%	0%	NR	NR	NR	NR	NR	17%	0%	0%	NR	NR	NR	NR	NR
1074	Dissolved oxygen, water, unfiltered	100%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1076	pH, water, unfiltered, field	26%	0%	0%	NR	100%	0%	NR	NR	22%	33%	11%	NR	100%	100%	NR	NR
1077	pH, water, unfiltered, laboratory	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	33%	NR	NR
1081	Specific conductance, water, unfiltered, laboratory	0%	0%	0%	NR	NR	0%	NR	NR	0%	0%	0%	NR	NR	33%	NR	NR
1086	Ammonia, unionized	NR	NR	0%	NR	100%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR
1087	Chloride	100%	75%	7%	NR	80%	100%	13%	50%	100%	75%	5%	NR	40%	100%	63%	50%
1089	Dissolved oxygen (DO)	11%	75%	17%	NR	100%	100%	13%	50%	22%	75%	22%	NR	0%	0%	63%	50%
1090	Escherichia coli	NR	NR	24%	NR	NR	NR	0%	NR	NR	NR	28%	NR	NR	NR	100%	NR
1091	Fecal Coliform	80%	75%	21%	NR	57%	100%	0%	0%	100%	75%	29%	NR	0%	0%	0%	0%
1092	Nitrogen, ammonia (NH3) + ammonium (NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1093	Nitrogen, ammonia as N	NR	NR	8%	NR	NR	NR	NR	NR	NR	NR	8%	NR	NR	NR	NR	NR
1094	Nitrogen, Kjeldahl	NR	NR	8%	NR	100%	NR	NR	NR	NR	NR	9%	NR	0%	NR	NR	NR

(continued)

Table G-4. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2000								Period: Summer-Fall 2000							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1095	Nitrogen, Nitrate (NO3) as N	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	4%	NR	NR	NR	NR	NR
1096	Nitrogen, Nitrate (NO3) as NO3	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1097	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	NR	NR	7%	NR	100%	NR	NR	NR	NR	NR	8%	NR	0%	NR	NR	NR
1098	Nitrogen, Nitrite (NO2) as N	NR	NR	1%	NR	NR	NR	NR	NR	NR	NR	5%	NR	NR	NR	NR	NR
1099	Nitrogen, Nitrite (NO2) as NO2	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR
1100	Phosphate	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1101	Phosphorus	NR	NR	18%	NR	100%	NR	NR	NR	NR	NR	23%	NR	0%	NR	NR	NR
1102	Phosphorus as P	NR	NR	4%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1103	Phosphorus, orthophosphate as P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1104	Phosphorus, orthophosphate as PO4	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1105	TEMPERATURE, WATER (DEGREES CENTIGRADE)	0%	0%	0%	0%	4%	30%	18%	29%	0%	0%	0%	0%	6%	30%	17%	20%
1106	TEMPERATURE, AIR (DEGREES CENTIGRADE)	0%	0%	0%	NR	60%	83%	24%	33%	0%	0%	0%	NR	90%	83%	53%	33%
1110	SPECIFIC CONDUCTANCE,FIELD (UMHOS/CM @ 25C)	NR	NR	NR	NR	42%	42%	25%	19%	NR	NR	NR	NR	58%	42%	23%	24%
1111	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	NR	NR	NR	NR	50%	57%	50%	83%	NR	NR	NR	NR	0%	86%	50%	100%
1112	TEMPERATURE, WATER (DEGREES CENTIGRADE, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1113	WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1114	TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1115	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR AVG	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1116	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MAX	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1117	SPECIFIC CONDUCTANCE, UMHOS/CM, FIELD, 24HR MIN	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1118	PH, S.U., 24HR MAXIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1119	PH, S.U., 24HR, MINIMUM VALUE	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1127	OXYGEN, DISSOLVED (MG/L)	0%	0%	0%	0%	5%	29%	19%	17%	0%	0%	0%	0%	6%	29%	17%	21%
1128	OXYGEN, DISSOLVED (PERCENT OF SATURATION)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1129	BIOCHEM OXY DEM,INHIB, DISS(MG/L,5DAY-20C, CBOD)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	14%
1130	BIOCHEM OXY DEM,NIT INHIB,TOT (MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1131	BIOCHEM OXY DEM,NIT INHIB DISS(MG/L,20 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1132	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C	0%	NR	NR	0%	33%	0%	0%	0%	0%	NR	NR	0%	33%	0%	8%	0%
1133	BIOCHEM OXY DEM NIT INHIB, TOT (MG/L, 5 DAY-20C)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	15%
1134	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	NR	NR	NR	NR	NR	NR	0%	0%	NR	NR	NR	NR	NR	NR	0%	18%
1135	PH (STANDARD UNITS)	0%	NR	0%	0%	5%	29%	19%	19%	0%	NR	0%	0%	6%	29%	17%	23%
1136	PH (STANDARD UNITS) LAB	5%	60%	0%	NR	38%	10%	10%	12%	9%	60%	0%	NR	25%	40%	20%	18%
1140	NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)	NR	NR	NR	NR	64%	88%	43%	48%	NR	NR	NR	NR	64%	88%	48%	48%
1141	NITROGEN, AMMONIA, DISSOLVED (MG/L AS N)	NR	NR	0%	0%	0%	29%	100%	40%	NR	NR	0%	0%	0%	43%	100%	60%
1142	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	0%	0%	0%	0%	6%	30%	14%	18%	0%	0%	0%	0%	8%	28%	15%	23%
1143	AMMONIA, UNIONIZED (MG/L AS N)	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%
1144	NITRITE, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	29%	100%	40%	NR	NR	NR	NR	0%	43%	100%	60%
1145	NITRITE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	0%	0%	0%	0%	0%	NR	NR	NR	8%	0%	0%	0%
1146	NITRATE NITROGEN, TOTAL (MG/L AS N)	0%	NR	NR	NR	0%	0%	0%	0%	0%	NR	NR	NR	8%	0%	0%	0%
1147	NITROGEN, KJELDAHL, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	0%	67%	100%	11%	NR	NR	NR	NR	0%	100%	100%	53%
1148	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	0%	0%	0%	0%	5%	31%	20%	22%	0%	0%	0%	0%	5%	31%	30%	27%

(continued)

Table G-4. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2000								Period: Summer-Fall 2000							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1151	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)	NR	0%	0%	0%	1%	8%	5%	3%	NR	0%	0%	0%	2%	3%	12%	10%
1152	NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)	NR	NR	0%	0%	0%	29%	100%	10%	NR	NR	0%	0%	0%	43%	100%	50%
1154	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	0%	0%	0%	0%	14%	32%	22%	21%	0%	0%	0%	0%	20%	30%	24%	26%
1155	PHOSPHORUS, DISSOLVED (MG/L AS P)	NR	NR	0%	0%	0%	29%	100%	10%	NR	NR	0%	0%	0%	43%	100%	50%
1157	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	NR	NR	0%	0%	0%	4%	5%	2%	NR	NR	0%	0%	0%	7%	5%	3%
1159	CHLORIDE (MG/L AS CL)	NR	0%	0%	0%	6%	31%	16%	24%	NR	0%	0%	0%	8%	29%	18%	29%
1161	SULFATE (MG/L AS SO4)	NR	0%	0%	0%	6%	31%	16%	25%	NR	0%	0%	0%	8%	29%	18%	30%
1164	E. COLI, GEOMETRIC MEAN (#/100ML)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1165	FECAL COLIFORM GEOMETRIC MEAN (COLONIES/100ML)	NR	NR	NR	NR	0%	NR	0%	0%	NR	NR	NR	NR	0%	NR	0%	0%
1166	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML	NR	NR	NR	0%	31%	34%	34%	30%	NR	NR	NR	0%	31%	34%	28%	37%
1167	E. COLI, MTEC, MF, #/100 ML	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	67%	0%	0%	0%
1169	FECAL STREPTOCOCCI, MBR FILT,KF AGAR,35C,48HR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR
1170	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	NR	NR	NR	NR	0%	0%	0%	0%	NR	NR	NR	NR	0%	0%	0%	0%
1172	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	NR	NR	0%	0%	23%	31%	20%	20%	NR	NR	0%	0%	33%	29%	22%	25%
1176	SOLIDS,TOTAL, DISS, ELECTRICAL-CONDUCTIVITY,MG/L	0%	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR
1177	SOLIDS, DISSOLVED-SUM OF CONSTITUENTS (MG/L)	NR	NR	0%	NR	NR	0%	NR	0%	NR	NR	0%	NR	NR	0%	NR	0%
1178	ORTHPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	0%	NR	NR	NR	41%	63%	25%	33%	0%	NR	NR	NR	59%	58%	31%	42%
1179	CHLOROPHYLL-A, PHYTOPLANKTON UG/L, CHROMO-FLOURO	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1181	FECAL COLIFORM MPN/100ML 5/2,3 DIL FERMENT METHO	NR	NR	NR	NR	NR	NR	NR	80%	NR	NR	NR	NR	NR	NR	NR	0%
1182	BOD, CARBONACEOUS, 5 DAY, 20 DEG C	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1186	SULFATE, SO4, SED, DRY WT, WTR EXTRACT, (MG/KG)	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1189	DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	20%
1190	DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	20%
1191	DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	20%
1207	SULFATE (AS S) WHOLE WATER, MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1211	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR	0%	NR	NR	NR
1223	OXYGEN DEMAND, TOTAL MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1233	PH, FIELD, STANDARD UNITS SU	50%	60%	0%	NR	100%	100%	0%	0%	50%	60%	0%	NR	0%	0%	0%	0%
1235	NITROGEN, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1239	NITROGEN, ORGANIC, TOTAL (MG/L AS N)	0%	NR	0%	0%	0%	NR	NR	NR	0%	NR	0%	0%	0%	NR	NR	NR
1241	NITROGEN, ORGANIC, DISSOLVED (MG/L AS N)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1244	NITRATE NITROGEN, DISSOLVED (MG/L AS N)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1249	NITROGEN, INORGANIC, TOTAL (MG/L AS N)	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1252	PHOSPHOROUS DISSOLVED TOTAL WHATMAN GF/F MG/L P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1255	PHOSPHATE, ORTHO (MG/L AS PO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1264	CHLORIDE, DISSOLVED IN WATER MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1265	SULFATE, DISSOLVED (MG/L AS SO4)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR

Table G-4. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2000								Period: Summer-Fall 2000							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1267	NITROGEN-NITRATE IN WATER PERCENT	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1269	PHOSPHATE, TOTAL, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1270	NITRATE + NITRITE,DRY WT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1271	ORTHOPHOSPHATE,DRY WEIGHT,LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1272	PHOSPHATE HYDROLYZED, DRY WEIGHT, LAND MG/KG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1274	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1277	COLIFORM,TOT,MPN,CONFIRMED TEST,35C (TUBE 31506)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1283	FECAL COLIFORM,MEMBR FILTER,M-FC AGAR,44.5C,24HR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR
1285	FECAL COLIFORM,MPN,EC MED,44.5C (TUBE 31614)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1288	FECAL COLIFORM,MPN,BORIC ACID LACTOSE BR,43C,48HR	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%
1291	FECAL COLIFORM, MF,M-FC, 0.7 UM	NR	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	0%
1296	CHLOROPHYLL A UG/L FLUOROMETRIC CORRECTED	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1297	CHLOROPHYLL-A UG/L TRICHROMATIC UNCORRECTED	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1303	CHLOROPHYLL A,% OF(PHEOPHYTIN A+CHL A),SPEC-ACID.	NR	NR	0%	0%	0%	NR	NR	NR	NR	NR	0%	0%	0%	NR	NR	NR
1309	CHLOROPHYLL A (MG/L)	0%	100%	NR	NR	100%	100%	0%	0%	0%	0%	NR	NR	0%	0%	0%	0%
1319	SOLIDS,TOTAL SUSPENDED(GRAVIMETRIC), SUSP,WTR MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1327	ORTHOPHOSPHORUS AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1328	ORTHOPHOSPHATE AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1329	PHOSPHATE, TOTAL AS P, WATER MG/L	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1338	SOLIDS, SUSP. - RESIDUE ON EVAP. AT 180 C (MG/L)	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR
1343	PHOSPHATE,TOTAL,COLORIMETRIC METHOD (MG/L AS P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1352	NITROGEN, AMMONIA, TOTAL (MG/L AS NH4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1354	NITRATE NITROGEN,TOTAL (MG/L AS NO3)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1355	NITRATE NITROGEN, DISSOLVED (MG/L AS NO3)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1356	NITRITE NITROGEN,TOTAL (MG/L AS NO2)	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR
1362	SOLIDS, SUSPENDED, ASH FREE DRY WEIGHT MG/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1363	FECAL COLIFORM, GENERAL (PERMIT)	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1372	COD KG/1000 GALLONS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1417	Conductivity (uohms/cm)	NR	NR	NR	NR	0%	NR	0%	NR	NR	NR	NR	NR	0%	NR	100%	NR
1418	Dissolved Oxygen (mg/l)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1420	Temperature (deg C)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1422	Ammonia Nitrogen (NH3-N)	100%	25%	NR	NR	100%	100%	0%	0%	0%	50%	NR	NR	0%	0%	50%	0%
1423	Biological Oxygen Demand (BOD)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1425	Chloride (Cl)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1426	Nitrate-Nitrogen (NO3-N)	100%	100%	NR	NR	100%	100%	0%	0%	100%	100%	NR	NR	0%	0%	0%	0%
1427	Nitrite-Nitrogen (NO2-N)	0%	25%	NR	NR	100%	100%	33%	50%	0%	0%	NR	NR	100%	100%	33%	50%
1428	Phosphate (PO4-P)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1429	Sulfate (SO4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1431	Total Filter Residue (TDS)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1432	Total Nitrogen (TN)	NR	100%	NR	NR	50%	100%	0%	0%	NR	0%	NR	NR	0%	0%	0%	0%

(continued)

Table G-4. (continued)

Indicator ID	Indicator Name	Transboundary Region															
		Period: Winter-Spring 2000								Period: Summer-Fall 2000							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1433	Total Suspended Solids	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1434	Fecal Coliform (CPU/100 ml)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1436	BOD	50%	75%	NR	NR	40%	100%	13%	50%	100%	75%	NR	NR	0%	0%	63%	50%
1437	Cl	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1438	COD	100%	75%	NR	NR	40%	100%	13%	50%	100%	75%	NR	NR	40%	100%	63%	50%
1440	Fecals	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1442	NO2-N and NO3 -N	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1443	P	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1444	sulfate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR
1445	TDS	50%	75%	NR	NR	67%	100%	13%	50%	50%	75%	NR	NR	67%	100%	63%	50%
1446	Temp	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1447	TKN	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1448	Total NH4-N	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR
1449	TSS	50%	75%	NR	NR	40%	100%	13%	50%	100%	75%	NR	NR	40%	100%	63%	50%
1457	COLIFORM, TOTAL	80%	75%	NR	NR	100%	100%	25%	50%	100%	75%	NR	NR	0%	0%	25%	50%
1459	Fecal streptococci	100%	75%	NR	NR	100%	100%	0%	0%	100%	75%	NR	NR	0%	0%	0%	0%
1460	PHOSPHATE, SOLUBLE	NR	100%	NR	NR	100%	100%	0%	0%	NR	0%	NR	NR	0%	0%	0%	0%
1461	PHOSPHATE, TOTAL	100%	75%	NR	NR	50%	100%	0%	0%	100%	75%	NR	NR	0%	0%	57%	0%
1462	NITROGEN, ORGANIC	100%	75%	NR	NR	100%	100%	0%	0%	100%	75%	NR	NR	0%	0%	0%	0%
1463	Orthophosphate	100%	75%	NR	NR	100%	100%	0%	0%	100%	75%	NR	NR	0%	0%	67%	0%
1471	Dissolved Sulfate	100%	75%	NR	NR	100%	100%	33%	50%	100%	75%	NR	NR	100%	100%	33%	50%
1473	Chlorophyll a	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR
1474	Nitrite plus nitrate	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR
1475	Coliform F	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	100%	NR
1477	Total Phosphorus	NR	NR	NR	NR	0%	NR	NR	NR	NR	NR	NR	NR	0%	NR	NR	NR

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Appendix H

Mexico Border Reach File

The Mexico Border Reach File (MBRF) is a prototype product created using a method similar to the one used to create the U.S. National Hydrography Dataset (NHD), which is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs, and wells. Within the NHD, surface water features are combined to form "reaches," which provide the framework for linking water-related data to the NHD surface water drainage network.

The MBRF is limited to the border area in Mexico. The purpose of creating this prototype was to showcase its multiple potential uses for water resources management. By linking water-related data to the MBRF surface water drainage network, Mexican officials will be able to perform analyses and display these water-related data in upstream and downstream order. Decision makers will have a powerful tool to "reach index" water-related data into the MBRF. Reach indexing is the process of assigning a unique geographic identifier to a water-related event.

This prototype is by no means the equivalent of the U.S. NHD for Mexico. Creating a complete Mexico reach file for the entire country would require policy input from decision makers in the Mexican government. Integrating such a Mexico reach file and the U.S. NHD reach files would require the input of decision-makers in both countries.

H.1 Approach

The MBRF was derived from several initial shapefiles received from Mexico's Comisión Nacional del Agua (CNA). A shapefile is an editable spatial database format generated in the desktop software application ArcView that stores the location, shape, and attribute information of geographic features. The shapefiles used to develop the MBRF included linear and polygonal hydrographic features delineated at a scale of 1:250,000. Figure H-1 shows the hydrological regions on the U.S.-Mexico border included on the shapefile obtained from CNA.

To create an NHD-style data set, RTI appended the linework using tools in the NHD Create program (developed and provided to RTI by the U.S. Geological Survey [USGS]). Figure H-2 shows a screen shot of the NHD Create user interface. These tools are designed to append 1:24,000 Digital Line Graph (DLG) data sets that fall within a specific drainage basin boundary—typically an 8-digit catalog unit (CU). After the linework is appended, existing reach codes are conflated (transferred) from 1:100,000 NHD data onto the 1:24,000 linework.

The NHD Create tools are run under the umbrella of an ArcView 3.2a project and are a combination of Arc Macro Language (AML), Avenue, and C programs. The ArcView project contains an NHD Process Manager, which allows the user to guide the data through the NHD creation process. The steps start at the preprocessing stage, move through conflation, reach

creation, flow, leveling, and finally NHD dataset creation. Each step is divided into numerous substeps, complete with interactive tools and quality assurance/quality control (QA/QC) checks.

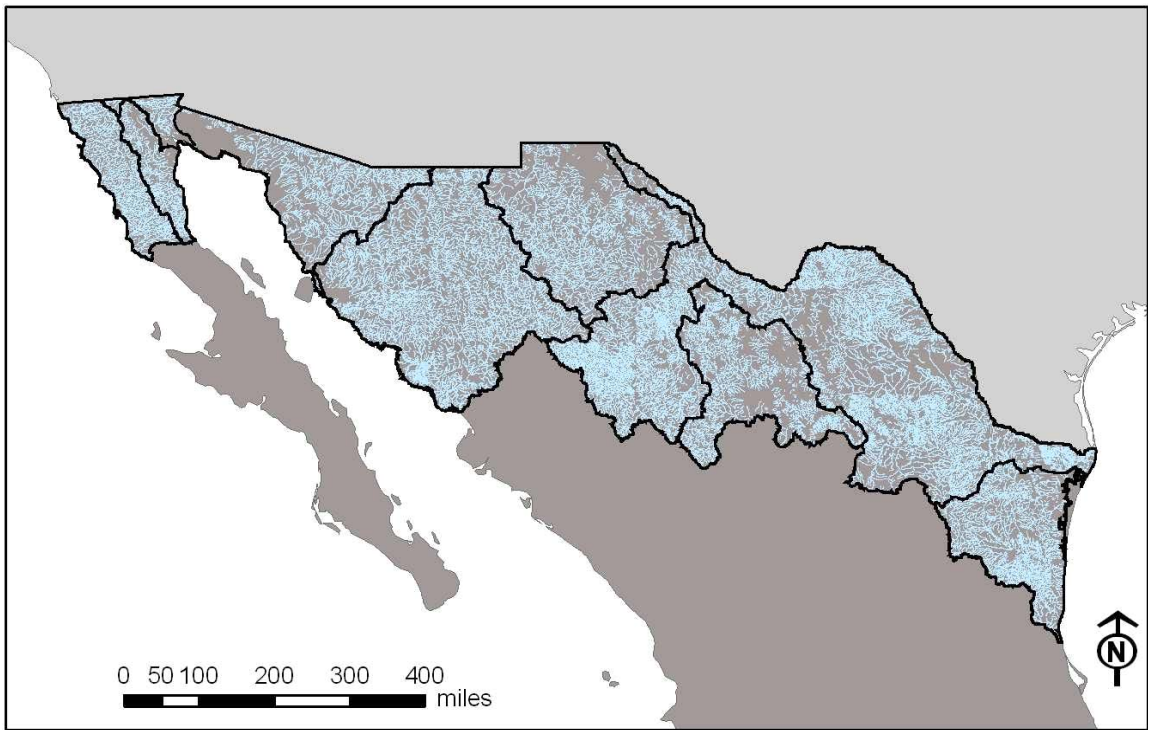

Figure H-1. Hydrological regions on the U.S.-Mexico border.

With respect to the MBRF base data, CNA had already appended the linework into a large national-scale file comprising the northern portion of Mexico. There were no CU boundaries, and no NHD data existed that could be conflated onto the Mexican linework. Despite these differences, it was possible to alter the attribute information stored on the nodes, lines, and polygons of the Mexican linework so that it looked identical to 1:24,000 DLG data. As long as the NHD Create software could operate on it, it did not matter that the linework represented an area outside the United States.

The original Mexican linework contained eight unique linear feature types and six unique polygon feature types. These were mapped to existing feature types in DLG using major and minor codes. For example, "*Corriente de agua, perenne*" translated to Perennial Stream/River. This, in turn, is represented in a DLG as a major1 code of 50 and a minor1 code of 0412. All features were translated in this fashion with no loss of content.

Once the Mexican layers were processed to look like DLG, the file was clipped using a shapefile containing large drainage basins as defined by the Mexican government. This resulted in eight drainage basins that flowed northward into the Rio Grande, Gulf of Mexico, Gulf of California, or Pacific Ocean, as shown in Figure H-1. These were roughly equivalent to accounting units (AU) on the U.S. side and were numbered using AU naming conventions. The Mexican AUs were then clipped using a 100-mile buffer around the U.S.-Mexico border. Where there was a segment representing the Rio Grande in the U.S. NHD, that segment was extracted from the NHD and inserted into the MBRF. The original segment on the MBRF corresponding to

that same segment from the NHD was deleted from the data set and the tributaries edited so that they joined the Rio Grande seamlessly. The AU coverage was also used to create individual AUs, which represented the Hydrologic Unit Code (HUC) boundary for processing through the NHD Create tools.

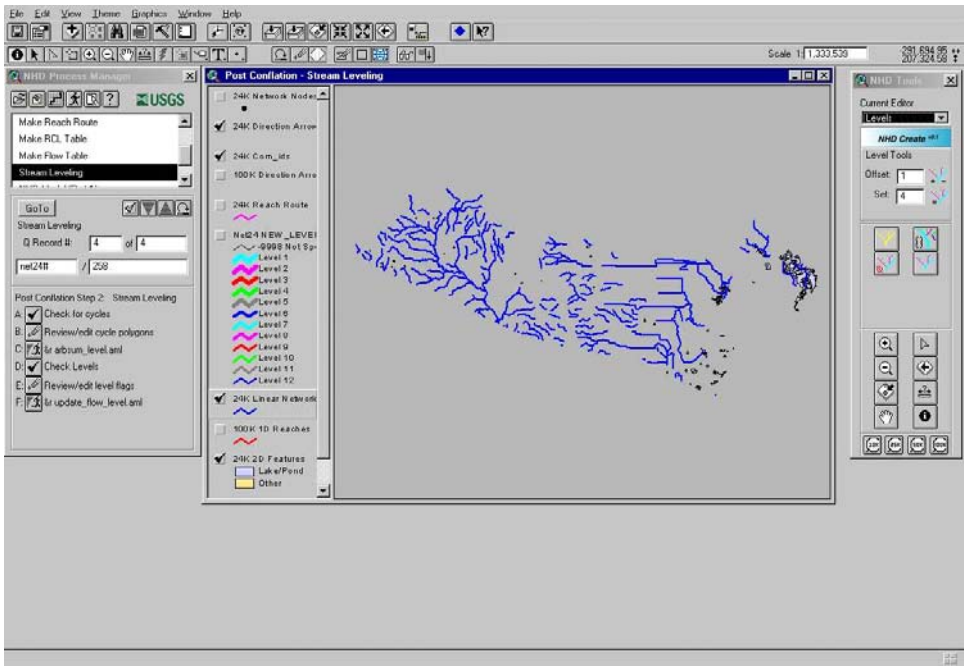

Figure H-2. An illustration of the NHD Create user interface.

CNA also provided point name data, which could be converted to something that emulates the U.S. Geographic Names Information System (GNIS). This was not done because the linework from CNA did not include name data and the level of effort to manually assign point names to linear features (and thereby name) a relatively small number of reaches using tools in NHD Create was deemed excessive.

The last piece of data that was needed for this approach was 1:100,000 NHD data. The NHD Create tool required an existing low-resolution layer that contained existing reach codes to be conflated. Because no such layer existed for Mexico, a CU from the south-central United States was used as a dummy data set to conflate existing reach codes to the Mexican linework. Because the data were not geographically coincident in any way, no reach codes were actually conflated; instead, all new reach codes were created.

Each AU of Mexican data was put through the process, and a prototype data set was created. Because of the nature of the input data and the lack of smaller scale NHD data to conflate, not every step was performed. As a result, while usable, the MBRF prototype may not have every characteristic of the U.S NHD.

H.2 Prototype

The prototype MBRF contains a standard NHD-style dataset consisting of three route systems (reach, drain, and landmark features), as well as three regions (reach, drain, and

landmark features). Although each feature class exists, the MBRF may or may not actually contain features within each feature class, because some of these features may simply not be found in a given AU. Also included in the data set are the ancillary information tables, such as "flow," "feature lookup," and "feature to polygon cross-tabulation." Figure H-3 shows an example of an MBRF AU showing stream levels.

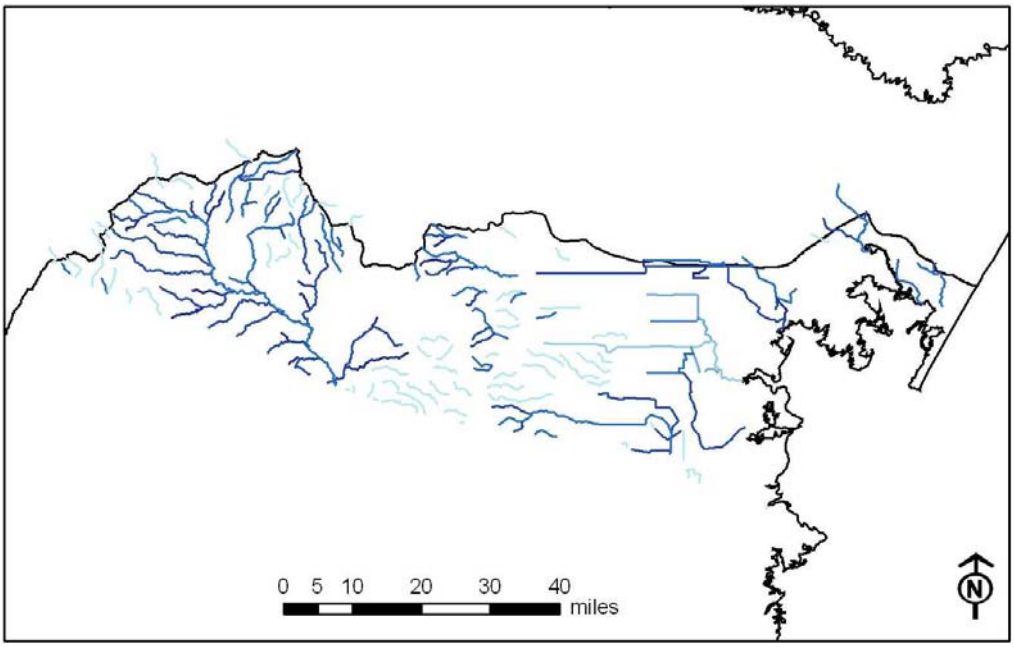

Figure H-3. Example of MBRF Accounting Unit showing stream levels.

In addition to the NHD coverage, there is also an NHD Digital Update Unit (NHDDUU) coverage. This contains the bounding polygon of the NHD data; in this case, it is the Mexican AU.

Reach indexing of point and linear events with the prototype MBRF was tested by using the U.S. Environmental Protection Agency's (EPA's) PC-based Reach Indexing Tool (PC-RIT). Each reach has a unique identifier, called a reach code, and this reach code can be used as a means to permanently reference a point or linear entities to the MBRF. The file can also be used for cartographic purposes as a background layer in mapmaking.

Small gaps in the network were connected, but where the connection was not obvious, no attempt was made to eliminate the gaps. Preliminary flow exists, but the flow has not been verified or edited. In addition, no flow relationships exist in many desert areas, because the majority of streams do not connect to major streams. While the linework has been edited to fit seamlessly with the border CUs in the United States, the data quality and scale cause the two to merge into a single data set with limited utility.

A more comprehensive editing process must be undertaken to verify network connectivity and flow. This will require the use of higher resolution source data and/or aerial photography.

H.3 Reach Indexing

The PC-RIT was used to index the stations on the Mexican side. Figure H-4 shows the eight CUs created as part of the MBRF. Point events were created on the MBRF for each station and stored in event tables for each CU.

Figure H-4. MBRF cataloging units.

Figure H-5 shows a representation of one CU (13990100). The green dots represent the supplied station locations and the orange dots represent the indexed points. The blue lines represent the linear events within MBRF for this CU. The areas in tan represent other CUs.

The latitude and longitude coordinates for each station were used as the primary information for the PC-RIT. If these coincided with a point within a reach in the MBRF network, the station was snapped to that point within the reach. If a station's coordinates did not coincide with any point within any reach in the MBRF network, a projection of the station point to the closest reach was taken and the station was snapped to the projected point on that reach. Figure H-6 illustrates how points on and not on a reach in the MBRF were indexed. Point TCEQ-13715 (in green near the top of the figure) is an example of a point that did not fall directly onto a reach in the MBRF. Therefore, a projection of that station on the closest reach on the MBRF was found (the red point near the top of the figure). Point CNA-SSRB-26 (the superimposed green and red points near the bottom of the figure) was indexed directly onto MBRF.

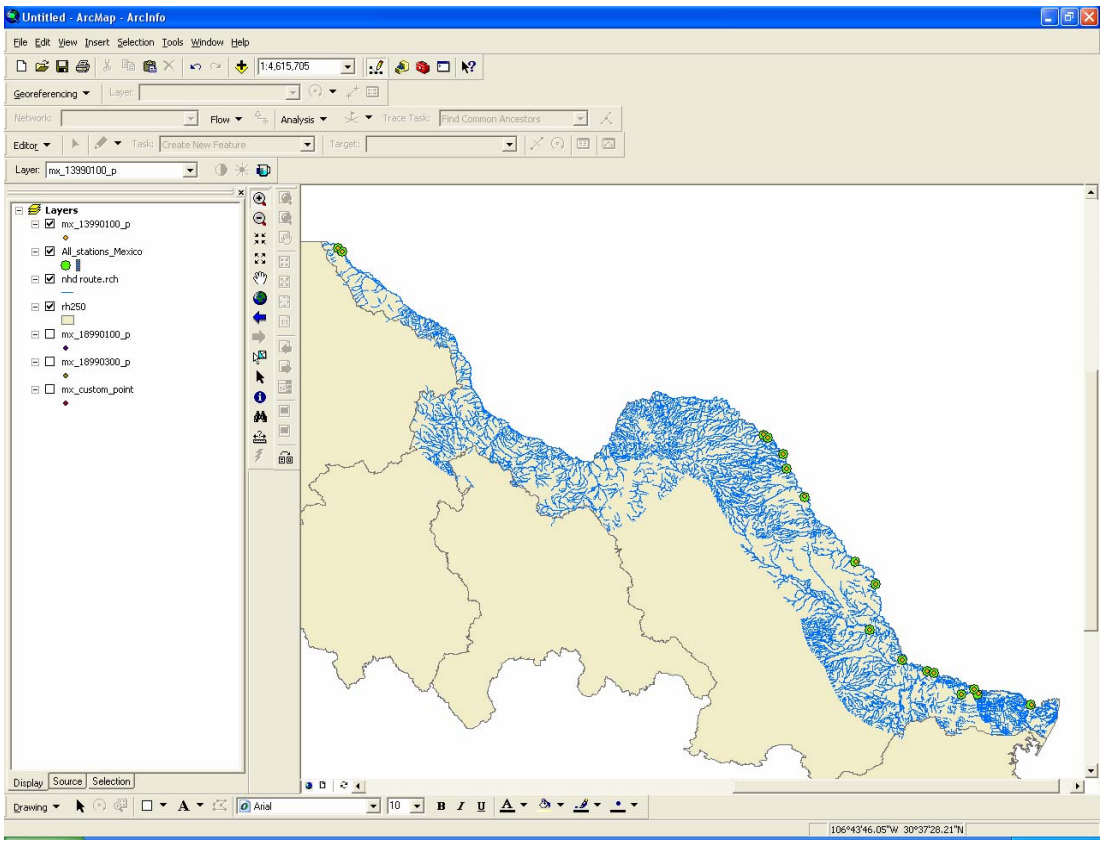

Figure H-5. Example cataloging unit (13990100).

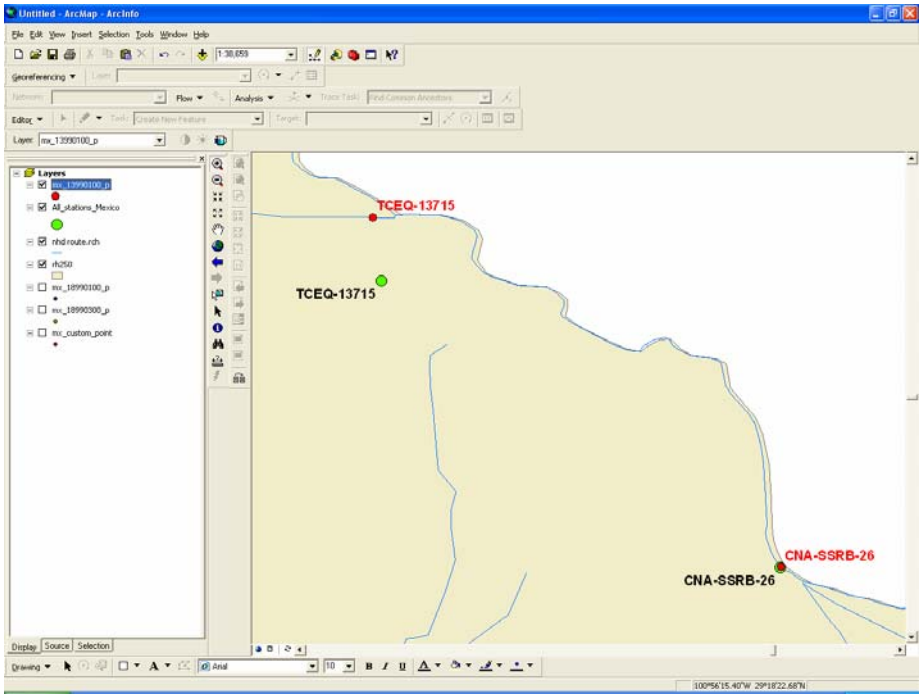

Figure H-6. Reach indexing of stations falling on and off a reach.

Figure H-7 shows a number of events occurring on CU 18990100. The green dots show the stations in Mexico. The latitude/longitude information for these stations was supplied by CNA or Comisión Internacional de Límites y Aguas (CILA) and was included in a shapefile. The red dots represent the stations that fell directly onto the MBRF. Stations SCERP-New River-NR-04XL and SCERP-New River-NR-05 were indexed to the same point on the MBRF. Stations SCERP-New River-CD-14, SCERP-New River-CD-01, and SCERP-New River-CD-14SD were also indexed to the same point on the MBRF.

The yellow dots represent stations that did not fall directly onto the MBRF. These stations are located on tributaries that are not on the MBRF; thus, they are too far away from the MBRF to accurately index and were not projected onto any existing reach. The PC-RITcalls such points "custom points." The PC-RIT does not index these points (in this case, to the MBRF) but creates a record on the MBRF tables to preserve the information. Three stations were designated as custom points: SCERP-New River-CD-03, SCERP-New River-CD-04, and SCERP-New River-CD-02E.

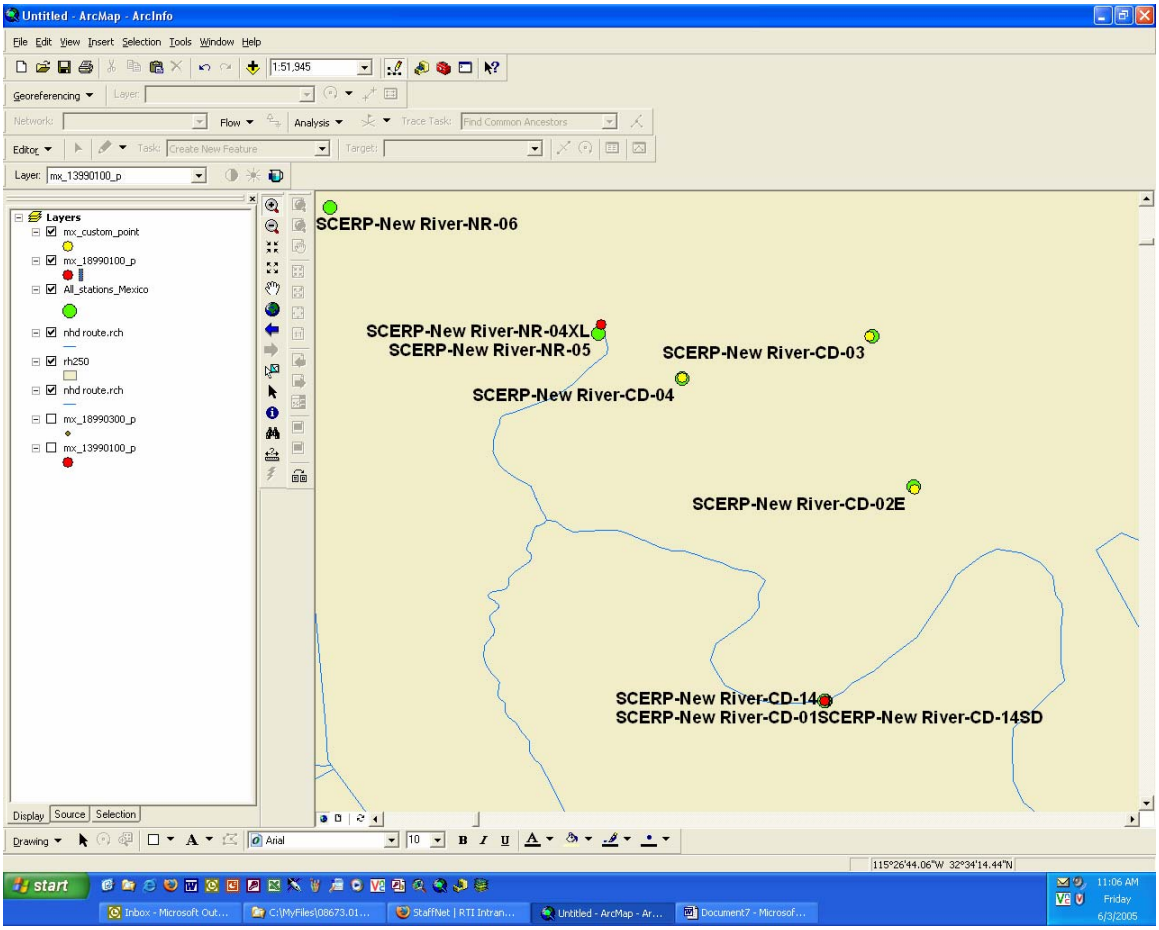

Figure H-7. Reach indexing of multiple stations to one point and Custom Points.

Figure H-8 shows an overview screen capture of the previously mentioned CU 18990100. The yellow dots represent custom points, the red dots represent indexed points, and the green dots represent the original station information. The blue lines represent the MBRF.

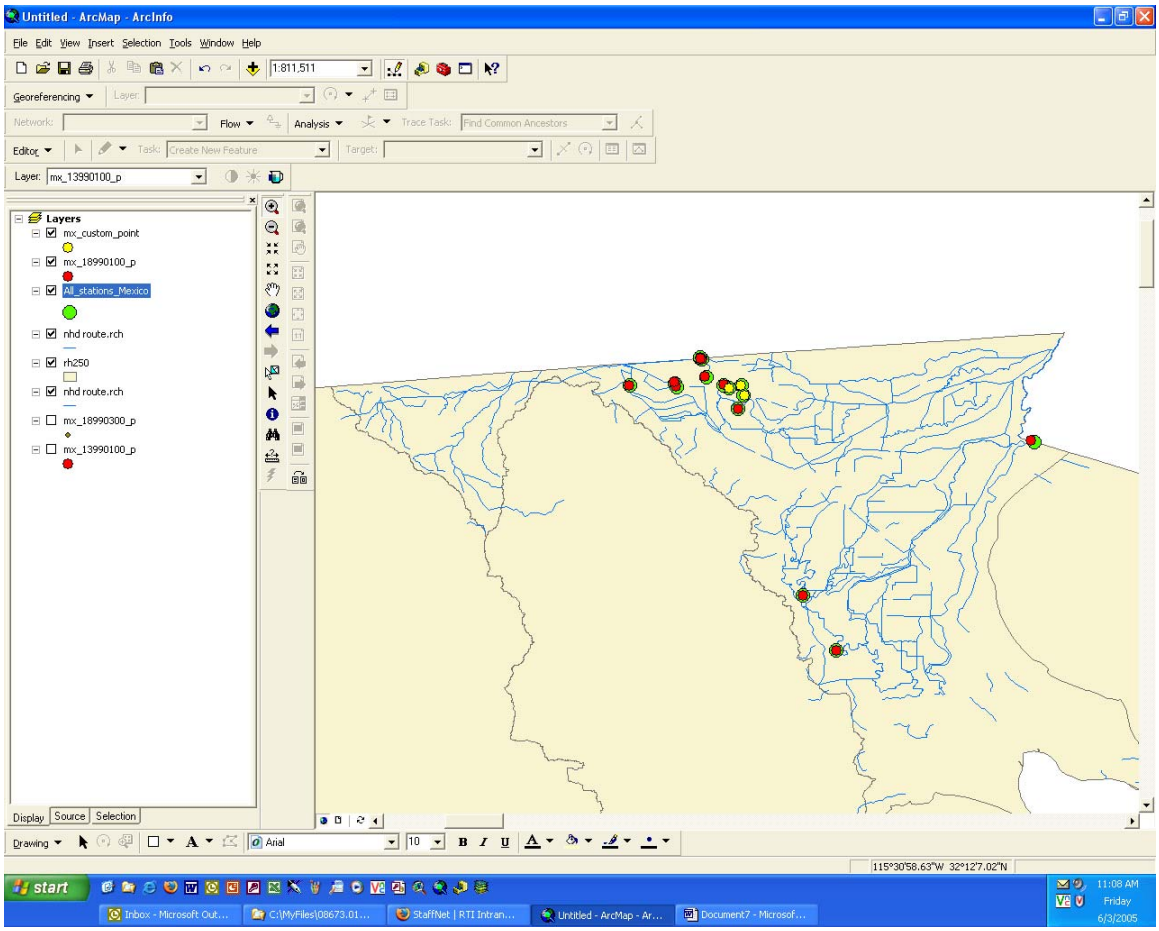

Figure H-8. Reach indexing of multiple stations to one point and Custom Points.