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# Canadian River Basin Highlights Report 2008



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Texas Commission on Environmental Quality





In 1991, The Texas Legislature passed the *Texas Clean Rivers Act (Senate Bill 818)*. The Act was intended to move Texas toward comprehensive water resources planning and management to ensure the integrity of the state's water supply over the long term.

The Act established the **Texas Clean Rivers Program** or **CRP**, which is a state fee-funded program for water quality monitoring, assessment, and public outreach. It provides the opportunity to approach water quality issues within a watershed or river basin locally and regionally through coordinated efforts among diverse organizations.

The **CRP** has proven to be a huge success as it has evolved into an ongoing, systematic, quality-controlled monitoring system that helps protect and improve the surface water quality in Texas. It began by contracting with 15 partner agencies, which included twelve river authorities, one water district, one federal agency, and one council of government. For nearly 17 years, this group has successfully managed the surface water quality in Texas by developing monitoring programs and assessing the results of the monitoring.

The goals of **CRP** parallel those of the Red River Authority of Texas and the TCEQ and their mutual efforts to share this expertise with the public. Responding to the stakeholders, focusing on priority issues and keeping abreast of regulatory mandates enables the Authority and the TCEQ to reach the **CRP** goals.

These goals are updated periodically through a collaborative effort of the TCEQ, the partner agencies, and stakeholders throughout the state to ensure the program maintains a contemporary focus on water quality. The program's **Long Term Plan** outlines the major objectives and strategies for how the program will achieve its goal. Implementation of the **Long Term Plan** is manifested in the guidance document developed by TCEQ project management staff with input from the partner agencies.

## CANADIAN RIVER BASIN WATERSHED MANAGEMENT PROGRAM

To assist in planning, monitoring, geographically analyzing and disseminating data, the Authority divided the Canadian River Basin into **five** reaches (see **Figure 1**). A five-year rotational approach was developed to adequately monitor the aquatic health of the basin. A methodology was developed, so that every five years, the monitoring emphasis will rotate to a different reach. Using this rotational approach will provide that sufficient data will be collected, to monitor the health of the basin. The reach of focus for 2007 was **Reach 3**, however due to a lack of available water, monitoring resources were reallocated. The water quality in each reach will be discussed later in this report.

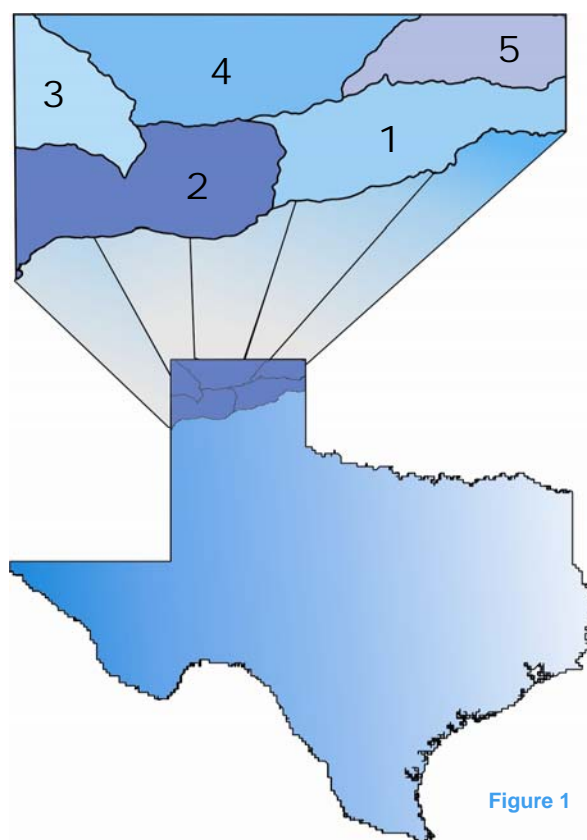


Figure 1



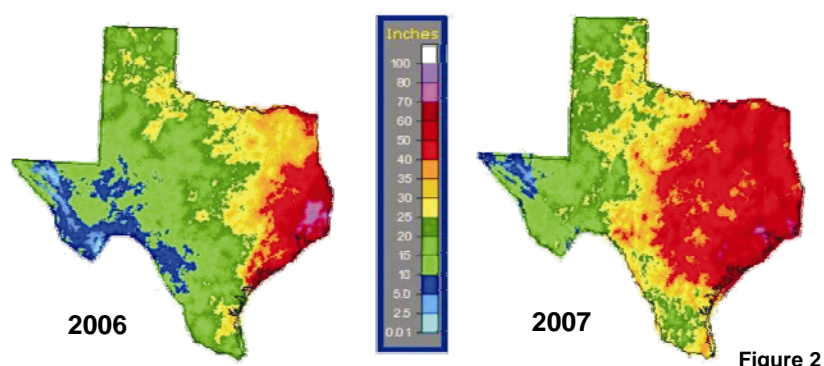


## WATER QUALITY IN THE CANADIAN RIVER BASIN

In order to protect water quality we must define it, measure it and identify sources of pollution so that water quality management plans can be implemented to protect or restore it.

Although there is an issue of excessive levels of chloride in some water bodies, the water quality in the **Canadian River Basin** is generally good and the majority of the basin supports aquatic life and recreational uses. Water quality as defined for our purposes is a term used to describe the chemical, physical and biological characteristics of water as it is compared to a set of standards. In the Canadian River Basin this means it is suitable for drinking, we can water our stock with it, we can irrigate our fields, we can play in it and we can eat the fish we catch from its waters. Or simply put, it is safe. Taking care of our water is a complex undertaking requiring the cooperation of many organizations, both governmental and non-governmental, and citizens working together to protect and restore our water resources.

The Canadian River Basin and a large portion of Texas received a much needed above average rainfall throughout the spring and summer of 2007. This rainfall has all but erased the effects of the massive wildfires that struck the area in late 2006. The spring rains fell at the right times and the right amounts, reducing the impact of erosion during the flood events which followed in the summer months.



**Figure 2** shows a comparison of precipitation for 2006 and 2007. As shown, the **Canadian River Basin** received slightly more rainfall in 2007 as compared to the 2006 totals. This slight increase did not help the dry conditions in the basin, although individual rainfall events did provide some storm water runoff in the basin's two major reservoirs.

*Courtesy of the Southern Regional Climate Center*

**Table 1** shows the capacity of major reservoirs in the **Canadian River Basin** versus the current percentage of capacity as of December 2007. Consistent seasonal rainfall has helped farmers and ranchers this year by increasing soil moisture, but has not significantly raised lake levels in many of the area lakes. The lake levels rose slightly after the heavy rains early in the spring and early summer however only months later, most were back to levels where they were before the rains began.

**Table 1 — Reservoir Capacities  
in the Canadian River Basin**

Reservoir	Conservation Storage Capacity	
	Total Ac/Ft	% Ac/Ft
Lake Meredith	500,000	10 %
Palo Duro Reservoir	60,897	1%

\* as of December 2007 — Texas Water Development Board



## Salty Water

Rising chloride levels in the **Canadian River Basin** are an ongoing issue in water quality. An area in New Mexico, just downstream from Ute Dam near Logan, has been identified as being a major contributor of hyper-saline water in the Canadian River System.

Studies by the *Bureau of Reclamation* and consultants have indicated that approximately **70%** of the chlorides reaching **Lake Meredith** originate in this localized area, filtering into the river channel from a shallow brine aquifer under artesian pressure. Water in the brine aquifer is roughly as salty as sea-water. The *Lake Meredith Salinity Control Project* was designed to intercept the flow with wells drilled along the river, and then dispose the brine by deep well injection or other means. The effectiveness of the project is a means of reclaiming full benefit of the resource. Treated discharges are monitored closely to ensure the impact to receiving waters is compatible with the ecosystem and maintains balance with natural habitats. Since the project was started in 2001, a total of 290 million gallons of brine have been intercepted. Additional information on the *Lake Meredith Salinity Control Project* can be found at [www.crmwa.com](http://www.crmwa.com).

While regional activities can impact the local watersheds, site specific problems are intensified by the larger scale influences of naturally occurring and manmade activities.

Watershed runoff from urban and agricultural activities is the major contributor of pollution in the **Canadian River Basin**. Control programs, such as storm water run-off monitoring and the inclusion of more stringent requirements in livestock permits, are being implemented to reduce adverse impacts to watersheds from these types of pollution.







## IMPACT AND RESPONSE TO WATER QUALITY ISSUES

With the **Canadian River Basin** growing and developing rapidly both in the larger urbanized areas and the agricultural areas, the constant demand on the available water resources, both ground and surface water, have been taxed. The Panhandle Water Planning Group Region A (PWPG-A) was tasked with developing plans and strategies to meet the water needs of the citizens of the Panhandle of Texas.

In an effort to reduce the affects of these conditions throughout the basin, several strategies have been identified. Overall strategies include; conservation and reuse of water, expansion and enhancement of existing supplies or acquiring new supplies, brush control, and control of naturally occurring brines. Irrigation strategies specifically identified for farming in the basin include: precipitation enhancement, an evapotranspiration network for scheduling irrigation, installation of low energy precision application equipment, changes in crop variety, and implementation of conservation tillage methods, as well as aquifer management. For more information about groundwater needs and usages, the PWPG-A has posted their **2006 Regional Water Plan**, detailing the strategies to meet the needs for the next 50 years at [www.panhandlewater.org](http://www.panhandlewater.org).

## SURFACE WATER QUALITY MONITORING

The collection, management, and assessment of water quality data within the Canadian River Basin are integral components of the Clean Rivers Program. Water quality can be difficult to measure, since it consists of an immense network of branching rivers, springs, creeks, lakes, etc. Each water body can contain dramatically different levels of pollution. Water quality issues influence human and environmental health, so the more we monitor our water the better we will be able to recognize and prevent contamination problems.

The Authority holds a Coordinated Monitoring Meeting annually. This allows for the coordination of sites, parameters of concern, and frequency of collection with other agencies and program participants that assist in planning, data collection and analysis. This meeting allows for the development of a monitoring schedule that reduces duplicative efforts, which in turn maximizes the funds available for sampling. It is an essential element in the successful planning process of the basin and is open to any interested group or entity that would like to attend and/or participate in monitoring in the Canadian River Basin. A summary of the monitoring schedule for 2007 is listed in **Table 2** or a more detailed Coordinated Monitoring Schedule for the Canadian River Basin can be found at <http://cms.lcra.org>.



Selected **physical**, **chemical**, and **biological** parameters collected by the Environmental Services Division (ESD) of the Authority are analyzed either in the field or at the Authority's environmental laboratory. The results of the analyses are entered into the data repository, which contains years of quality-assured water resource information in the Canadian River Basin.



**Table 2 – Overview of Coordinated Monitoring Schedule - 2007**

Agency	Reach	Cont Flow	24-Hr DO	Metals Water	Organ Water	Metals Sed	Organ Sed	Conv	Ind Bact	Instant Flow	Field	RT	IS	DI	SS
RRA	I							16	16	16	16	4			
TCEQ	I			4	2			8	8	8	8	2			
CRMWA	I														
USGS	I	365										1			
<b>Total Reach I</b>		365		4	2			24	24	24	24	7			
RRA	II							16	20	16	20	2			
TCEQ	II							16	16	8	16	4			
CRMWA	II							36	132			12			
USGS	II	365						6			365	1			
<b>Total Reach II</b>		365						74	168	24	401	22			
RRA	III														
TCEQ	III							4	4		4	1			
CRMWA	III														
USGS	III														
<b>Total Reach III</b>								4	4		4	1			
RRA	IV														
TCEQ	IV							2	2		2	1			
CRMWA	IV														
USGS	IV	365										1			
<b>Total Reach IV</b>		365						2	2		2	2			
RRA	V							8	8	8	8	2			
TCEQ	V							4	4		4	1			
CRMWA	V														
USGS	V	365										1			
<b>Total Reach V</b>		365						12	12	8	12	4			
<b>Basin Total</b>		<b>1,460</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>116</b>	<b>210</b>	<b>56</b>	<b>443</b>	<b>36</b>	<b>0</b>	<b>0</b>	<b>0</b>

Cont Flow Continuous Flow

24-Hr DO 24-Hour Dissolved Oxygen

Metals Water Metals in Water

Organ Water

Organics in Water

Metals Sed

Metals in Sediment

Conv

Conventional Parameters

Ind Bact

Indicator Bacteria

Instant Flow

Instantaneous Flow Measurements

Field

Field Parameters

RT

Routine Sampling

IS

Intensive/Systematic Sampling

DI

Diurnal Sampling

SS

Special Studies

*\*Continuous flow measurements by the USGS are recorded on an hourly basis.*

Regular monitoring is necessary to collect quality-assured data to complete an assessment of water quality conditions and impairments. There are four types of monitoring in the Canadian River Basin performed by the Authority, the CRMWA, the TCEQ and the USGS.

- Routine** monitoring is the traditional type of monitoring conducted at regular intervals every year at key sites. This is the typical type of monitoring conducted by the Authority.
- Systematic Watershed** is typically defined by sampling that is of short duration (1 to 2 years) and is designed to screen waters that are rarely monitored.
- Permit Support** monitoring identifies specific areas where additional information on water quality and quantity is needed for the permitting process.
- Special Studies** typically involves a monitoring and assessment plan that is designed to answer a specific question.



There are two primary types of data collected at each sampling site: *field and conventional*. Field parameters are physical and chemical water quality characteristics that can be measured on-site and be utilized as real time indicators of the water quality at each site. Conventional parameters are collected, preserved, and taken back to the laboratory for processing and analysis. **Table 3** provides a list of some of the more common field and conventional parameters that are currently being collected in the Canadian River Basin. The quality-assured data collected by the Authority undergoes rigorous checks and are entered into the Authority's database and made available on the Authority's website at [www.rra.dst.tx.us/data/SWQM](http://www.rra.dst.tx.us/data/SWQM).

**Table 3 — Collected Water Quality Parameters**

<b>FIELD PARAMETERS</b>	
<i>Collected and processed in the field laboratory. Results are expressed in mg/L except as noted.</i>	
Temperature	The temperature of water at the time of collection. An important physical relationship exists between the amount of dissolved oxygen in a body of water and its temperature. Simply put, the warmer the water, the less dissolved oxygen.
pH	The hydrogen-ion activity of water caused by the breakdown of water molecules and the presence of dissolved acids and bases. pH determines whether a water body is acidic, neutral, or basic. The pH of the water can affect the toxicity of many substances.
DO	Dissolved Oxygen (DO) – The oxygen that is freely available in water. DO is vital to fish and other aquatic life and the prevention of odors. Traditionally, adequate ranges of dissolved oxygen levels have been accepted as the single most important indicator of a water body's ability to support desirable aquatic life.
Conductivity	A measurement of the electrical current carrying capacity of water. Dissolved substances, such as salts, have the ability to conduct electrical current. Conductivity is a measure of how salty the water is. Salty water has a high conductivity. This can be used as an indicator of how much dissolved solids are polluting the water.
Turbidity	A measure of clarity of a water sample expressed in NTU's (Nephelometric Turbidity Units). The higher the turbidity, the muddier the water.
Flow	The velocity of the water body at the time of sampling, expressed in CFS (cubic feet per second) or how fast the water is moving. Flow combined with other parameters can be a good indicator of water quality.
Flow Measurement Method	The manner in which flow is measured, usually by gage or electrical device.
<i>E. coli</i>	The current indicator bacteria to determine if the water body is suitable for contact recreation. It is expressed in MPN (most probable number) per 100 mL of water. High results on the <i>E. coli</i> test can indicate a potential pollution problem. <i>E. coli</i> is used as an indicator because it can be potentially harmful to people.
Water Clarity	Clearness of the water as it appears in the water body at the time of sampling.
Water Odor	Odor of the water, if any. Odors can aid in discovering problems in a water body.
Weather	Listing of basic weather conditions at the time of sampling. This information is useful if a problem is weather related.
Days Since Last Significant Precipitation	The number of either estimated or actual days since the last beneficial rainfall event.
<b>CONVENTIONAL PARAMETERS</b>	
<i>Processed by the Authority's ESD and subcontract laboratories. Results are expressed in mg/L except as noted.</i>	
Alkalinity	A measure of the acid-neutralizing or buffering capacity of water.
Ammonia	Naturally occurring in surface and wastewater, and is produced by the breakdown of compounds containing organic nitrogen. Elevated ammonia levels are a good indicator of organic pollution.
Calcium	Dissolved metal associated with chloride, sulfate, and alkalinity.
Chloride	One of the major inorganic ions in water and wastewater. Concentrations can be increased by industrial processes. High chloride concentrations can affect metallic objects, growing plants, and make water unsuitable for drinking. Chloride compounds, often known as salts, can be an indicator of natural or manmade pollution, as in the case of oil field brines.
Chlorophyll <i>a</i>	A photosynthetic pigment which is found in all green plants. The concentration of chlorophyll <i>a</i> is used to estimate phytoplankton biomass in surface water. Results are expressed in µg/L (micrograms per liter).
COD	Chemical Oxygen Demand (COD) — A measure of the amount of oxygen required to oxidize all compounds in the water. COD is an indicator of how much organic load is placed on the oxygen in a water body.
Nitrate+Nitrite Nitrogen	Naturally occurring nutrient compounds that algae use for growth. In elevated concentrations can be used as an indicator of human caused pollution.
Orthophosphorus	Is a soluble form of phosphorus (PO <sub>4</sub> ) that is applied to urban and agricultural land as fertilizers and is often found in storm water runoff
Pheophytin	An important degradation product of chlorophyll <i>a</i> and interferes with the measurement of chlorophyll <i>a</i> . It is used to determine a more accurate measure of chlorophyll <i>a</i> . Results are expressed in µg/L (micrograms per liter).
Sulfate	Usually dissolved into waters from rocks and soils containing gypsum, iron sulfides, and other sulfur compounds. Sulfides are widely distributed in nature and in high concentrations, sulfate can affect drinking water.
TOC	Total Organic Carbon (TOC) is all of the organic carbon portions, in a water body.
TDS	Total Dissolved Solids (TDS) – A measure of solids, both organic and inorganic, dissolved in water.
Total Phosphorus	An essential nutrient to the growth of organisms and can be the nutrient that limits the primary productivity of water. In excessive amounts from wastewater, agricultural drainage, and certain industrial wastes, it also contributes to the eutrophication of lakes and other water bodies. Phosphorus is commonly known as a man made pollutant.
TSS	Total Suspended Solids (TSS) – A measure of the total suspended solids in water, both organic and inorganic.
VSS	Volatile Suspended Solids (VSS) – A portion of the TSS that is lost after cooking at high temperatures. This represents the organic part of the TSS.



## National Environmental Laboratory Accreditation Program (NELAP)

In 2001, the 77th Texas Legislature passed HB 2912, requiring that all data used by the TCEQ for commission decisions regarding permits or other authorizations, compliance matters, enforcement actions, or corrective actions be from a NELAC accredited environmental laboratory.

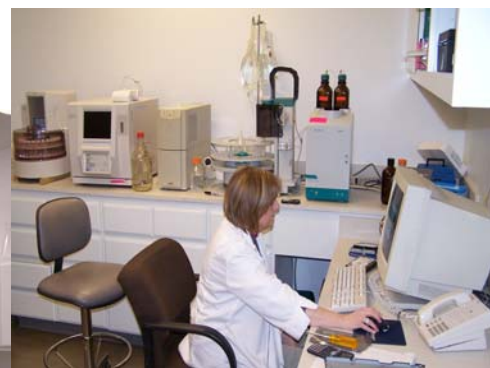
HB 2912 also transferred authority for environmental laboratory accreditation and drinking water certification from the Texas Department of Health to the TCEQ and required that the state's environmental testing laboratory accreditation program be consistent with NELAC. This transfer of authority became effective on September 1, 2001.



Red River Authority's new facilities located at 3000 Hammon Road in Wichita Falls

Prior to NELAC, the existing state programs varied widely in scope and requirements. The NELAC Standard provides uniform requirements for accreditation of environmental laboratories to ensure that decisions being made are based on data that is scientifically accurate.

The deadline for all environmental laboratories that submit data to the TCEQ to become NELAC accredited is June 1, 2008. Since April of 2006, the Authority has been working diligently on obtaining its NELAC accreditation. To assist the Authority's Environmental Laboratory in becoming NELAC accredited, the Authority relocated its laboratory to its new facilities in Wichita Falls. The new facility expanded the capabilities of the Authority's Laboratory to meet the NELAC requirements. Laboratory personnel are continuing to attend NELAC training workshops to prepare for the NELAC accreditation. The Authority's Environmental Services Laboratory has completed the application process and is awaiting notification of its on-site assessment by the TCEQ.







## WATER QUALITY DATA ASSESSMENT

The water quality data collected by the Authority, its partners and the TCEQ are assessed every two years in even numbered years, as required by law. This review of water quality data is designed to compare water quality conditions in classified stream segments, against established water quality standards, (see [Table 4](#) for a complete list of stream segments in the Canadian River Basin). Water quality standards are set by the TCEQ in an effort to ensure water in Texas is safe for public use, able to adequately protect aquatic life, and yet allow for urban and economic growth. Information and a list of surface water quality standards for all water bodies in Texas can be found on the TCEQ website at [www.tceq.state.tx.us/nav/eq/eq\\_swqs.html](http://www.tceq.state.tx.us/nav/eq/eq_swqs.html).

Table 4—Canadian River Basin Segment Descriptions

Segment	Detailed Description
0101	Canadian River Below Lake Meredith - From the Oklahoma State Line in Hemphill County to Sanford Dam in Hutchinson County.
0101A	Dixon Creek (unclassified water body) - From the confluence of the Canadian River to the upstream perennial portion of the stream east of Borger in Hutchinson County.
0101B	Rock Creek (unclassified water body) - Perennial stream from the confluence with the Canadian River up to SH 136 in the City of Borger.
0102	Lake Meredith - From Sanford Dam in Hutchinson County to a point immediately upstream of the confluence of Camp Creek in Potter County, up to the normal pool elevation of 2936.5 feet (impounds Canadian River).
0102A	Big Blue Creek (an unclassified water body) - From confluence of Lake Meredith in Carson County to the upstream perennial portion of the stream in Moore County
0103	Canadian River Above Lake Meredith - From a point immediately upstream of the confluence of Camp Creek in Potter County to the New Mexico State Line in Oldham County.
0103A	East Amarillo Creek (unclassified water body) - From the confluence of the Canadian River to the upstream perennial portion of the stream northwest of Amarillo in Potter County.
0103B	Punta de Agua (an unclassified water body) - From the confluence of the Canadian River to the New Mexico State Line in Hartley County.
0104	Wolf Creek - From the Oklahoma State Line in Lipscomb County to a point 2.0 kilometers (1.2 miles) upstream of FM 3045 in Ochiltree County.
0105	Rita Blanca Lake - From Rita Blanca Dam in Hartley County up to the normal pool elevation of 3860 feet (impounds Rita Blanca Creek).
0199A	Palo Duro Reservoir (unclassified water body) - From Palo Duro dam up to the normal pool elevation of 2,892 feet north of Spearman in Hansford County (impounds Palo Duro Creek).

### Texas Water Quality Inventory and 2006 Texas 303(d) List

The TCEQ publishes the biennial assessment on its web site as the [Texas Water Quality Inventory \(TWQI\)](#) and [303\(d\) List](#). In the past, Texas published two different reports, often referred to as the [305 \(b\) Report](#) and the [303\(d\) List](#), since sections of the **Clean Water Act** required the assessment. Since 2002, the EPA has required both reports be published as one document, which still has essentially two main parts: the [TWQI](#) and the [303\(d\) List](#). Both reports must be approved by the EPA before being considered final.



The **2006 TWQI** and the **2006 303(d) List** are composed of a set of integrated documents which collectively include:

- ~ 2006 Water Bodies Evaluated
- ~ 2006 Water Body Assessments by River Basin
- ~ 2006 Index of Water Quality Impairments
- ~ 2006 Concerns
- ~ 2006 Sources of Pollution for Impairments and Concerns
- ~ 2006 New Listings
- ~ 2006 Delistings

Surface water quality is reviewed in accordance with the **2006 Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data**. The data are then analyzed and evaluated for the assessment utilizing the previous five year's data. These reports describe the status of Texas waters. It is based on historical surface water data and it identifies water bodies that are not meeting standards set for their use. For the purpose of the assessment, use support is reported for both segments and sub areas of segments. Sub areas are known as Assessment Units (AU). Each area of an AU is defined as the smallest geographic area of use support reported in the assessment. Segments can be made up of more than one AU. Support of criteria and uses are examined for each with regulatory decisions applying to each entire AU. Water quality standards and criteria are set to protect the attainable uses for each water body.

Water quality standards and criteria are set by the state and are composed of designated *uses* and their associated *criteria*. *Uses* and *criteria* are assigned to a segment, which is a water body with a specific location and defined dimensions. *Uses* provide for a suitable environment for fish and other aquatic life. Since there is usually more than one *use* applied to a segment, water quality may be adequate to support one *use*, but not another. *Criteria* are expressed in terms of desirable conditions, or as a measurable value and a parameter. If *criteria* are not attained, the *use* may be impaired. The combination of one particular parameter and one particular impaired *use* is called an impairment. If nonattainment of *criteria* is impending, the use may be considered as threatened. In some cases, a *concern* is identified where there are not enough data to determine if the standard was attained, but may show the water quality declining.

In most circumstances, the period of record for water quality data and information used in preparing the **2006 Texas Water Quality Inventory and 303(d) List** is December 1, 1999 through November 30, 2004. The entire report can be found on the TCEQ website at <http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/06twqi/twqi06.html>.





Water bodies, which through assessment procedures indicate they do not meet one or more standards are included on the **2006 303(d) List**. Water bodies on this list in the Canadian River Basin List include:

2006 Texas 303(d) List			
Segment	Water Body	Parameters	Year First Listed
0101A	Dixon Creek	Bacteria, Depressed Dissolved Oxygen	2000
0101B	Rock Creek	Bacteria	2006
0102	Lake Meredith	Chloride, Sulfate, Total Dissolved Solids Mercury in edible tissue	2006 2002
0103	Canadian River above Lake Meredith	Chloride	2006
0104	Wolf Creek	Bacteria	2006
0105	Rita Blanca Lake	pH	2006
0199A	Palo Duro Reservoir	Depressed Dissolved Oxygen	2000

Water bodies with pollutants or water quality conditions, which assessment procedures indicate are at or near exceeding screening levels are listed in the **2006 TWQI**. Water bodies in the Canadian River Basin which are included on the summary are:

2006 Texas Water Quality Inventory Water Bodies with Concerns for Use Attainment and Screening Levels			
Segment	Water Body	Parameter	Level of Concern
0101	Canadian River Below Lake Meredith	nitrate ammonia	CS CS
0101A	Dixon Creek	bacteria nitrate orthophosphorus chlorophyll-a	CN CS CS CS
0101B	Rock Creek	nitrate	CS
0102	Lake Meredith	chloride total dissolved solids sulfate chloride in finished drinking water total dissolved solids in finished drinking water mercury in fish tissue	CS CS CS CS CS CS
0103A	East Amarillo Creek	chlorophyll-a nitrate	CS CS
0105	Rita Blanca Lake	chlorophyll-a orthophosphorus total phosphorus	CS CS CS
0199A	Palo Duro Reservoir	Ammonia	CS

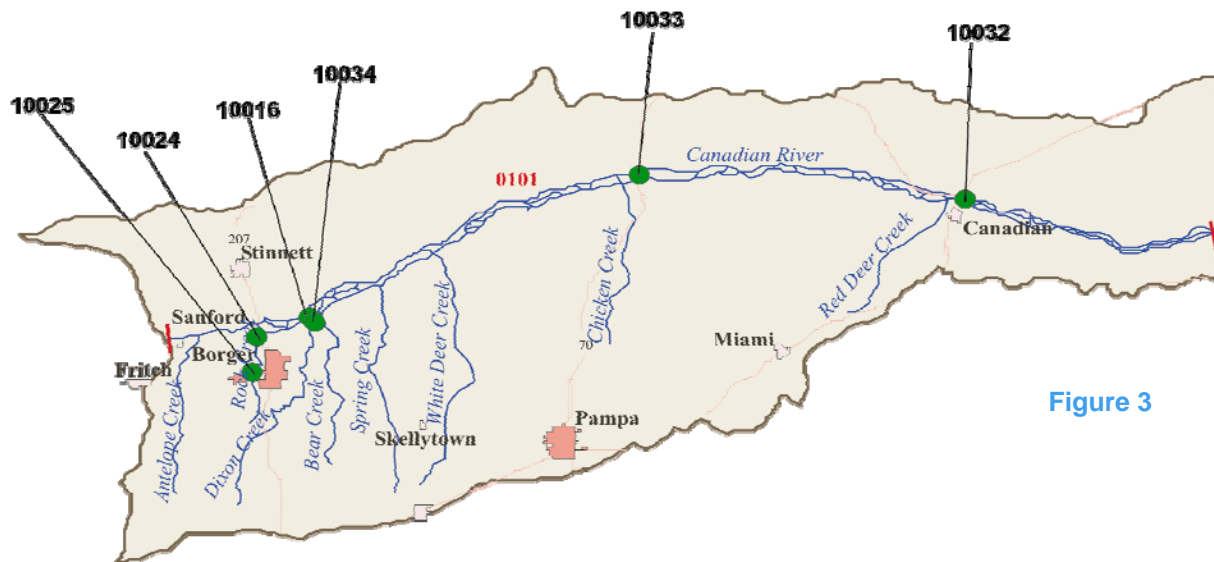
Level of Concern: **CN** - Concern for near-nonattainment of the Water Quality Criteria  
**CS** - Concern for water quality by screening levels





**Reach 1** of the Canadian River Basin encompasses an area about 90 miles long and 40 miles wide. It is located on the main stem of the Canadian River and represents a watershed from the Texas-Oklahoma state line upstream to the Sanford Dam on the Canadian River where it encompasses the northern portion of Hemphill County and the southernmost section of Lipscomb County. The largest cities within the reach are Pampa and Borger with populations of 17,887 and 14,302, respectively. Other towns include Canadian, Stinnett, Skellytown, Miami and Sanford.

There are many farms and ranches in **Reach 1** that produce cattle, swine, poultry, wheat, oats, corn, sorghum, hay, barley, alfalfa, and soybeans. Although there is some irrigated farm land, the majority of farm land consists of either dry land farming or range land for cattle. The soils range



from sandy alluvial, to dark, reddish clay loams that extend over flat plains to broken rocky ravines, where the plains break into the Canadian River Valley.

Included in **Reach 1** are 23 permitted municipal and industrial dischargers, five active permitted solid waste disposal sites, and four concentrated animal feeding operations. In addition, there are more than 1,200 ground water wells which utilize water from the Ogallala Aquifer.

Segments located in **Reach 1** include:

- 0101 – Canadian River below Lake Meredith
- 0101A – Dixon Creek
- 0101B – Rock Creek

During the reference period of September 1, 2006 through August 31, 2007, the Authority conducted 16 monitoring events and collected approximately 480 parameters from four water quality monitoring stations. The TCEQ conducted eight monitoring events and collected around 206 parameters from two water quality monitoring stations during the same reference period. In addition, the United States Geological Survey (USGS) took continuous flow measurements from one monitoring station.

**Figure 3** illustrates the monitoring coverage of **Reach 1** in 2007, where each monitoring station is designated by a five digit numeric code.



Elevated nutrient and bacteria levels are the main water quality issues found in **Reach 1**. Most of the elevated bacterial issues arise from run-off from pastures and fields or from animals congregating around available water sources. Sporadic rainfall events compound these issues, so that when it does rain, the run-off can increase these nutrient levels in the water bodies.

In the Canadian River below Lake Meredith, **Segment 0101** is divided into four Assessment Units (AU). The TCEQ found concerns for elevated ammonia and nitrate-nitrogen levels in the portion in Hutchinson County. The Authority's review of the data agreed with the assessment of the inventory. However, looking at the most recent data, the Authority found that there were some bacterial issues as well.

Most of the terrain surrounding this portion of the Canadian River is fairly rugged and sparsely populated. The flood plain of the river is generally very sandy and supports large numbers of cattle on the native grasses and scrubby trees that are found there. In the upper portions of the reach, the river is fed by two creeks; Dixon Creek and Rock Creek. Flow in Dixon Creek comes primarily from an industrial discharger and Rock Creek receives flow from a municipal discharger. Above the city of Borger, the Canadian River is generally dry. As the river flows eastward, springs contribute to the flow.



Canadian River at US 70

**Dixon Creek, Segment 0101A**, a tributary of the Canadian River near Borger is divided into two AUs. They are identified as Dixon Creek upstream of Phillips and Dixon Creek downstream of Phillips. Dixon Creek is listed on the TCEQ's *2006 Texas Water Quality Inventory of Water Bodies* for not meeting contact recreation and aquatic life use standards.

Dixon Creek is also listed on the *2006 Texas Water Quality Inventory of Water Bodies* for having a concern for water quality by screening levels for the downstream AU for nitrate and orthophosphorus and the upstream AU for chlorophyll *a*. The Authority's review of the data agrees with this assessment.

Reviews of recent data by the Authority indicate that the issue of depressed dissolved oxygen levels in Dixon Creek has been alleviated, while the problem with the bacteria remains. Additionally, the concerns for excessive algal growth and nitrate may be the result of run-off, wildlife or livestock congregating around the creek or as a result of a by-product of the permitted dis-





charger. However, without flow from the permitted discharger, Dixon Creek would be an intermittent water body. An Aquatic Life Assessment has been conducted by the TCEQ above and below the discharger and the results are pending.

The 2006 Texas Water Quality Inventory of Water Bodies (March 19, 2007), has **Rock Creek, Segment 0101B**, divided into two Assessment Units. They are identified as fully supporting its overall uses and meeting all criteria, except having a Contact Recreation Use Concern for bacteria. Rock Creek is also located near Borger and receives



Dixon Creek



Rock Creek at Electric City

treated effluent discharge from a local municipality. It flows through areas of the Panhandle that could be called tortuous. As the creek winds its way to the flood plain of the Canadian River it weaves through fields, pastures and steep walled arroyos. Recent reviews of the water quality data by the Authority found elevated bacteria, nitrate and orthophosphate levels. These high data points could be originating from run-off, as well as from livestock and/or wildlife. The higher than normal nitrate levels that have been found in the upper portion of this unclassified segment may be attributed to a seep or leaching from a fertilizer manufacturing plant located in the upper reaches of Rock Creek. This plant is permitted for underground disposal. With all

the oilfield drilling, both recent and historic, it is possible that an unknown pathway is providing a way for contaminants to enter this watershed. It is well known that the older practices of drilling and closing old oil wells has been a major contributor to salt leach, seeps or scalds. Additionally, the highly corrosive nature of oil field brines is well known as a causative agent in degrading older uncapped well casings.

As one of two major contributors to the flow of the Canadian River in this portion of the segment, it is likely that most of the nutrient enrichment problems originate in Rock Creek. The results of the recent Aquatic Life Assessment on Dixon Creek will yield valuable information that could lead to rectification of the water quality problems in Rock Creek.







**Reach 2** is located from the Sanford Dam at Lake Meredith to the Texas-New Mexico state line and up to Oldham and Hartley Counties. Amarillo, the largest city in the Canadian River Basin, has a total population of over 174,000, and is dissected by both the Red and Canadian River Basins. **Reach 2** encompasses about a fourth of the northwestern portion of the city. The total population of the reach is approximately 120,000. The economics of the majority of the reach consist of agribusiness and oil and gas production. Amarillo is also home to a large refinery that produces copper, selenium, nickel, and tellurium. Also found only in this reach is the unique resource of free gaseous helium.

The reach contains 12 permitted municipal and industrial dischargers, seven active permitted solid waste disposal sites, and four concentrated animal feeding operations. In addition, there are more than 550 ground water wells in this reach that use water from the Ogallala and Dockum Aquifers.

**Reach 2** contains many farms and ranches which produce principally cattle, wheat, oats, corn, sorghum, hay, barley, alfalfa, and soybeans. The majority of the area is irrigated farm land, with some dry land farming or range land for cattle.

Segments located in **Reach 2** are:

- |   |                             |
|---|-----------------------------|
| 0102 – Lake Meredith                      | 0103A – East Amarillo Creek |
| 0102A – Big Blue Creek                    | 0103B – Punta de Agua Creek |
| 0103 – Canadian River above Lake Meredith |                             |

During the reference period of September 1, 2006 through August 31, 2007, the Authority conducted 20 monitoring events and collected approximately 540 parameters from five water quality monitoring stations. The TCEQ conducted 16 monitoring events and collected around 384 parameters from four water quality monitoring stations. The CRMWA conducted 144 monitoring events and collected around 600 parameters from 12 water quality monitoring stations. In addition, the USGS monitored one station collecting continuous flow measurements.

**Figure 4** illustrates the monitoring coverage of **Reach 2** for 2007, where each monitoring station is designated by a five digit numeric code.

The largest reservoir in the Canadian River Basin is Lake Meredith with a total flood pool storage capacity of 1,569,800 acre-feet and a surface area of 21,640 acres at an elevation of 3,011 feet above mean sea level. Water from Lake Meredith is distributed to eleven area cities located within parts of the Canadian, Red, and Brazos River Basins. Because of the elevated chloride and sulfate levels, the water from Lake Meredith is blended with high quality ground water. This blending is designed to maximize yield and to improve both quality and quantity of the water delivery to all of its member cities.

**Lake Meredith, Segment 0102**, has two assessment units, and is listed on the *2006 Texas Water Quality Inventory of Water Bodies* as having a public water supply concern for chloride, sulfate, and total dissolved solids in the lake and in finished drinking water. The Authority's review of the data agrees with this assessment. The elevated parameters are due to evaporation and to the inflow of highly saline waters from the Canadian River into the lake. Prior studies have determined that a major contributor of the saline water originates from a shallow brine aquifer under artesian pressure that filters into the river channel. As we have previously

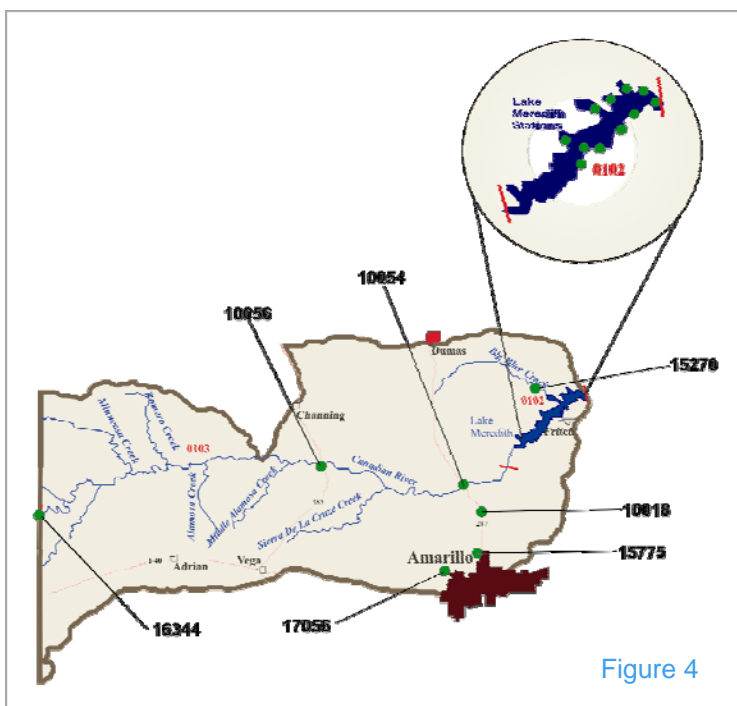


Figure 4



stated, since 2001, the Canadian River Municipal Water Authority (CRMWA) *Lake Meredith Salinity Control Project* had disposed of over **290 million** gallons of briny water. Additional information on the project can be found on the CRMWA website at [www.crmwa.com/lmscp2.htm](http://www.crmwa.com/lmscp2.htm).

Lake Meredith was also first listed on the *2002 Texas 303(d) List* for not supporting its fish consumption use due to elevated mercury levels found in walleye. Mercury forms toxic compounds, such as methyl-mercury, that are known to accumulate in fish at the top of the food chain. Walleye, being a longer lived creature, is the cool-water sport fish in Lake Meredith that is predominant predator in the food chain. As walleye grow and mature, they consume smaller, shorter-lived contaminated prey species, thus accumulating the methyl-mercury in its tissues over time. The Environmental Protection Agency (EPA) has stated that consumption of mercury contaminated species such as walleye may cause health problems in pregnant women, infants, and young children. The source of the mercury is questionable, however the EPA has speculated that such sources are most likely coming from the exhaust of refineries and coal fired power plants. The exhausts travel the prevailing winds, settling in water bodies, and contaminating the food chains. The EPA is currently implementing nationwide, intensive surveys on affected water bodies to scientifically ascertain the mercury sources. For more information regarding mercury and emission rules, see the EPA's website at [www.epa.gov/mercury/control\\_emissions/decision.htm](http://www.epa.gov/mercury/control_emissions/decision.htm).

**Canadian River above Lake Meredith, Segment 0103,** Overall water quality in this segment is good. The *2006 Texas Water Quality Inventory of Water Bodies* lists Canadian River above Lake Meredith as exceeding its general use for chloride. The Authority's review of the data agrees with this assessment. The elevated chloride is due to an upwelling of briny water from a shallow aquifer under artesian pressure that filters into the river channel. The *Lake Meredith Salinity Control Project* implemented by the CRMWA will aid in the reduction of salt entering the lake. Additional information on this project can be found by contacting the CRMWA at [www.crmwa.com/lmscp2.htm](http://www.crmwa.com/lmscp2.htm).

Also included in **Reach 2** is **East Amarillo Creek, Segment 0103A.** The *2006 Texas Water Quality Inventory of Water Bodies* lists East Amarillo Creek as fully supporting its overall uses and meeting all criteria. However, it is listed as having a concern for nitrate and chlorophyll *a*. East Amarillo Creek originates in northern Amarillo where the city has impounded the headwaters of the creek into a series of small impoundments, collectively known as Thompson Park Lake. Storm water run-off and natural drainage from the City of Amarillo supply the creek with flow. Overall water quality conditions in East Amarillo Creek have been fair. However, the recent screening of data revealed elevated levels of bacteria, nitrate and chlorophyll *a*. The creek receives run-off from urban areas, as well as from rural areas of northern Amarillo and Potter County. The Authority's preliminary observations of new data from Thompson Park Lake indicate the bacteria and elevated nutrients may be entering the creek somewhere below the lake. More research and additional data are needed to identify the actual sources of these problems.



**Segment 0103B, Punta de Agua Creek,** data were not available for the Authority to screen for the reference period. Punta de Agua Creek was determined to be dry most of the time and monitoring efforts were utilized elsewhere to maximize the program resources.

**Big Blue Creek, Segment 0102A,** the *2006 Texas Water Quality Inventory of Water Bodies* lists Big Blue Creek, as fully supporting its overall uses and meeting all criteria. The Authority is currently monitoring Big Blue Creek as part of its intensive systematic program. It is a tributary of Lake Meredith, and like many of the creeks in the area, the dry conditions have caused it to become an intermittent stream, flowing mainly after rainfall events when the water table is higher.



**Reach 3** represents the Rita Blanca Creek watershed upstream to the Texas-New Mexico state line encompassing Hartley and Dallam Counties. The three subwatersheds contained in this reach include approximately 3,600 square miles, of which an estimated 1,500 square miles are contributing drainage.

Dalhart is the largest city in **Reach 3** with a population of 7,200. There are five other small towns which include Texline and Channing. The economy of the reach is basically agribusiness, oil and gas production and hunting. Rainfall averages from 16 inches to a little over 17 inches annually.

Within the reach are 16 concentrated animal feeding operation permits, one active permitted solid waste disposal site, and more than 350 ground water wells that use water from the Ogallala and Dockum Aquifers in **Reach 3**.

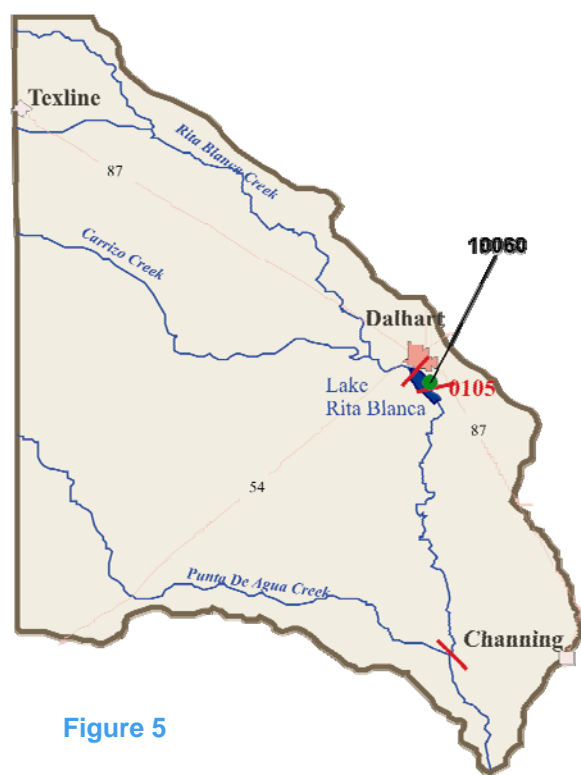


Figure 5

There are many farms and ranches that produce cattle, wheat, oats, corn, sorghum, hay, barley, alfalfa, and soybeans. As described in the preceding reaches, only a small portion is irrigated. The soils range from sandy alluvial soils to dark, reddish clay loams that extend over flat plains to broken rocky ravines, where the plains break into the Canadian River Valley.

The only segment located in **Reach 3** is **Segment 0105 – Rita Blanca Lake**.

During the reference period of September 1, 2006 through August 31, 2007, the TCEQ conducted four monitoring events and collected about 100 parameters from one water quality monitoring station on Rita Blanca Lake. **Figure 5** illustrates the monitoring coverage of **Reach 3**, where the monitoring station is designated by a five digit numeric code.

Rita Blanca Lake is unique in that it is the only segment in the Canadian and Red River Basins to be classified as a **non-contact recreation** water body. Even with this categorization, Rita Blanca Lake is

listed on the **2006 Texas 303(d) List** as not supporting the general use due to pH. It is also listed as having concerns for chlorophyll a, orthophosphorus and total phosphorus. However, Rita Blanca Lake was removed from the **2006 Texas 303(d) List** for meeting its general use for elevated total dissolved solids. The only significant inflow Rita Blanca Lake receives is treated effluent from the City of Dalhart's wastewater treatment plant, as well as occasional rainfall. Without a steady inflow, Rita Blanca Lake has become a shallow, marshy wetland.

The Texas Parks and Wildlife Department has designated Rita Blanca Lake as a high quality water fowl habitat since it is located in the flyway of migratory waterfowl. Because of the large numbers of waterfowl that utilize the lake as a stopover in their annual migration, their waste deposition places an unusually heavy organic load on Rita Blanca Lake. This is most likely the cause of the elevated chlorophyll a, phosphorus (both ortho and total) levels, which in turn is a major factor affecting the pH levels. The Authority's review of the data agrees with these assessments. Additionally, a review of the recent data by the Authority revealed that ammonia levels also exceeded the criteria set for this segment.





**Reach 4** includes Palo Duro Creek from the northern Texas-Oklahoma state line upstream to its headwaters including portions of Coldwater Creek, Frisco Creek, and Lower Beaver River. It contains three sub-watersheds with 6,500 square miles of which 3,500 are contributing drainage in Texas.

Major cities located in **Reach 4** include Dumas, Spearman, Cactus, Stratford, Sunray, and Gruver. Rainfall averages from 19 to 20 inches annually. The area contains many farms and ranches that produce cattle, wheat, oats, corn, sorghum, hay, barley, alfalfa, and soybeans. Soils range from sandy alluvial to dark, red-dish clay loams that extend over flat plains to broken rocky valleys.

There are nine permitted municipal and industrial dischargers, four active permitted solid waste disposal sites, about 45 concentrated animal feeding operations, and one superfund site. In addition, **Reach 4** includes more than 1,450 ground water wells that utilize water from the Ogallala and Dockum Aquifers.

The only segment located in **Reach 4** is **Segment 0199A – Palo Duro Reservoir**.

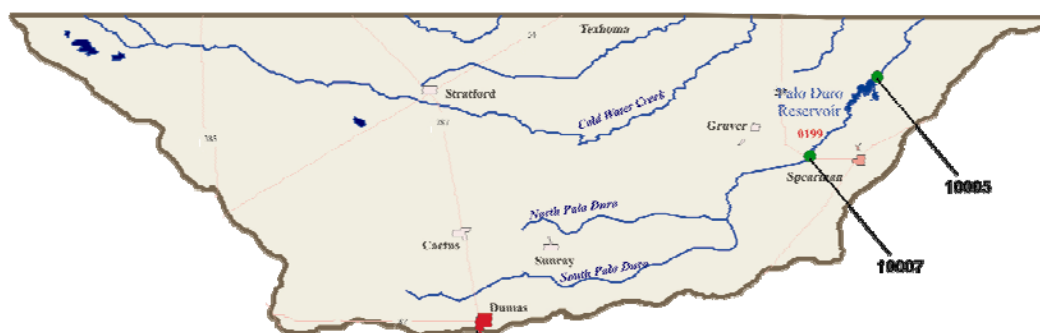


Figure 6

Palo Duro Reservoir has a total storage capacity of 60,900 ac/ft, with a drainage area of about 614 square miles. Total surface acres are 2,413 with an approximate shore line of 48 miles. The continuing dry conditions, combined with the naturally arid nature of this region, has slowed the filling of Palo Duro Reservoir. The heavy rainfall of this past spring and early summer brought the lake level up slightly. However, within a few months, the lake had dropped back to the level where it was prior to the floods.

During the reference period of September 1, 2006 through August 31, 2007, the TCEQ conducted two monitoring events and collected approximately 50 water quality parameters from one water quality monitoring station on Palo Duro Reservoir. In addition, the USGS monitored continuous flow from one monitoring station. Refer to **Figure 6** for surface water monitoring coverage of **Reach 4**, where each monitoring station is designated by a five digit numeric code.

Palo Duro Reservoir was first listed on the *2000 Texas 303(d) List* for not supporting its aquatic life use due to depressed dissolved oxygen. In the 2002 assessment of Palo Duro Reservoir there were an insufficient number of 24-hour dissolved oxygen values available for proper analysis for the Aquatic Life Use Assessment. The TCEQ has also noted Palo Duro Reservoir as having nutrient enrichment concerns. The Authority's review of the recent data revealed elevated chlorophyll *a*, orthophosphorus and total phosphorus levels. Palo Duro Reservoir will remain on the *2006 Texas 303(d) List* until a sufficient number of 24-hour dissolved oxygen measurements are available to demonstrate its support of the aquatic life use criteria. Like Rita Blanca Lake, Palo Duro Reservoir is also in a major flyway for migratory waterfowl. The Authority speculates that the heavy organic load from the waterfowl is causing the elevated nutrient and algal growth concerns.



**Reach 5** comprises the Wolf, Mammoth and Kiowa Creek watersheds from the Texas-Oklahoma state line upstream to the headwaters of each. It encompasses the upper eastern section of the Panhandle in Lipscomb and Ochiltree Counties. The largest city in **Reach 5** is Perryton, which has a population of 7,800. Other towns include Booker, Higgins, Follett, and Darrouzett. The total population of the reach is approximately 11,000. Economics of the area are based on agribusiness, oil and gas production, and hunting. Farms and ranches in this reach produce cattle, wheat, oats, corn, sorghum, hay, and barley. There are two permitted municipal and industrial dischargers, three active permitted solid waste disposal sites, 17 concentrated animal feeding operations, and one superfund site. In addition, more than 375 ground water wells within the reach utilize water from the Ogallala Aquifer.

**Segment 0104 – Wolf Creek**, is the only named segment located in **Reach 5**. Wolf Creek is naturally spring-fed and flows year round. Local ranchers utilize Wolf Creek as a valuable watering source for their livestock. Consequently, run-off from rainfall events have caused the bacterial levels to rise sharply and then return to normal levels during drier periods.

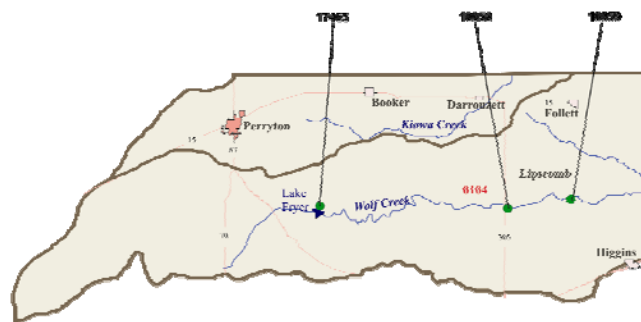


Figure 7

During the reference period of September 1, 2006 through August 31, 2007, the Authority conducted eight monitoring events and collected approximately 240 water quality parameters from two monitoring stations. The TCEQ conducted four monitoring events and collected about 100 water quality parameters from one water quality monitoring station at Lake Fryer. In addition, the USGS continuously monitored flow at one monitoring station in this reach. Refer to **Figure 7** for an illustration of the monitoring coverage for **Reach 5**, where each monitoring station is designated by a five digit numeric code.

The middle portion of Wolf Creek, Plum Creek to Lake Fryer Dam, is listed on the **2006 Texas 303(d) List** for bacteria. Although this area has received much needed rainfall, there has not been enough to significantly end the dry conditions that have plagued the area for many years. Wolf Creek is currently meeting all of its water body use criteria. The precipitation received over the past year in the Texas Panhandle was greatly needed for farmers and ranchers alike, but even more so in **Reach 5** as some dry land fields have not produced a crop in years. Continued rain and snow fall are needed to keep soil moisture levels high enough to sustain crops through to maturity.



Wolf Creek at 1454



Wolf Creek at 305

The upstream section of Wolf Creek located in Ochiltree County includes Lake Fryer, a small water body used for recreational purposes. The TCEQ began monitoring on Lake Fryer in 2002, and as such, the amount of quality assured data have increased. Therefore, the TCEQ was able to assess and evaluate its water quality. According to the Authority's review of the data, the water quality in Lake Fryer is relatively good with the exception of finding elevated chlorophyll a levels. The Authority agrees with the TCEQ that this site needs additional data and monitoring.



## PUBLIC PARTICIPATION AND OUTREACH

One very successful component of the Clean Rivers Program is public participation. This enables the general public to broaden their awareness of water quality conditions, share knowledge and expertise of many, and cooperatively pursue avenues to rectify problems. The reflection of service with an emphasis on good science is fundamental to the Authority's purpose.

A Stakeholder, as defined by the CRP, is any individual or entity that has a vested interest in the basin's waters, and includes the general public, institutions, government, industry, fee payers, and other interested parties. Stakeholder involvement in helping determine the direction of each basin's CRP activities is crucial and will be accomplished through the Steering Committee process, and other public participation, outreach, and education activities.



### Who Are Our Stakeholders?

Our Stakeholders include all individuals or organizations with an interest in the Canadian River Basin that have one or more of these attributes:

- ◆ They are significant contributors of pollutant loadings or otherwise significantly impact water quality.
- ◆ They are significantly affected by water quality problems.
- ◆ They are directly affected by project outcomes or decisions.
- ◆ They may be required to undertake control measures because of statutory or regulatory requirements.
- ◆ They have statutory or regulatory responsibilities closely linked to water quality—for example, flood control.
- ◆ They can help develop or implement actions to remedy water quality problems.
- ◆ They live in the watershed or use the water resource.

### Basin Steering Committee

As stated in the TAC rules, Basin Planning Agencies must develop a public participation process to include a Basin Steering Committee that provides for meaningful input and comments by private citizens and organizations in the local watersheds. As one of the most important components of the CRP, the active participation of a strong CRP Steering Committee is also one of the best opportunities for expanding stakeholder participation.

Originally conceived as a grass-roots project, the Clean Rivers Program established a format for the citizens of Texas to participate in effective state-wide watershed planning activities. Each Clean Rivers Program partner agencies developed a steering committee which set priorities within its own individual basin. These committees bring together the diverse and unique interests within each basin, which include representatives from the public, municipal, county, state, and federal government, industry, business, agriculture, environmental, education, civic organizations, and others.





## Basin Steering Committee

(continued)

As one of the most successful components of the Clean Rivers Program within the Canadian River Basin, the Steering Committee has guided this program through the years. The committee provides valuable assistance and guidance concerning water quality issues.

The Steering Committee and Basin Advisory Committee are one and the same. When originally formed, the Steering Committee was created to meet when it was not been possible for the entire Basin Advisory Committee to meet. However, through the years, the two committees have evolved into one, which serves its purpose very well.

Basin Advisory Committee Meetings are held at least once per year and are designed to be open, friendly, casual, and informative. In addition, they provide in-depth technical information regarding quality assurance, work plans, monitoring schedules, reports, and more. Committee members are encouraged to participate, ask questions and voice their ideas and opinions., not only at the meetings, but throughout the year, as they feel necessary.

## Volunteer Environmental Monitoring

The Texas Rivers Project, developed over 17 years ago, provided an opportunity for area students from junior high through high school to actively collect and analyze samples from their own unique monitoring sites. More than 12 schools have participated in the program since it was initiated. However, due to budget restrictions and time restraints, educators are not able to participate in the Texas Rivers Project as they have done in the past. The Authority is currently exploring ways to revitalize the program.

## Earth Day

The Authority is always proud to be associated with local Earth Day celebrations. However this year, the Authority was not able to be a part of the local Earth Day celebrations due to previous commitments. In previous years the Authority has partnered with the River Bend Nature Center, an environmental educational center located in Wichita Falls to provide hands-on environmental programs to children and adults. In previous events the Authority's Environmental Services Division staff provided presentations on water quality and conservation to the students. Teachers were also provided with environmental educational materials for their students.

## Education

Authority personnel also provide presentations to various organizations, clubs, and civic groups to spark interest and awareness in local natural resource issues. Additionally, the Authority provides information and articles that appear regularly in newspapers throughout the basin.

Members of the Environmental Services Division have assisted yearly in judging entries in the Red River Regional Science and Engineering Fair held at Midwestern State University. This annual event is held for students from Texas Region IX school districts who are in fifth grade through high school and covers entries in 18 categories, including environmental, chemistry and biology.

Another program sponsored by the Authority is the distribution of educational materials. The Major Rivers and Think Earth curricula are provided to all schools upon request. These two publications are favored by teachers and students alike. Last year water quality educational materials were mailed out to schools in the Red and Canadian River Basins.

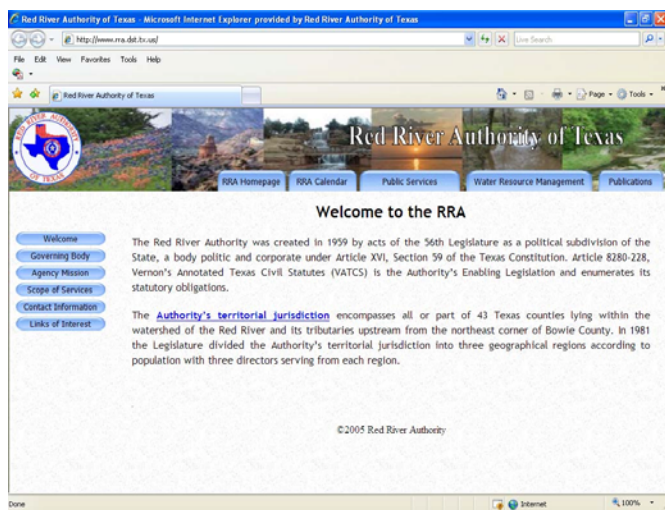
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*As an agency of the state, and in compliance with its mission, the Red River Authority of Texas provides financial assistance as much as possible to alleviate some of the budget shortfalls, and also contributes to the Clean Rivers Program by payment of fees assessed to fund TCEQ's water programs. The Authority supports itself through contractual agreements with governmental and non-governmental entities, limiting the additional funding required to adequately monitor the basin's many water resources. Nevertheless, the Authority will continue to work toward full attainment of the Clean Rivers Program goals.*



## RRA ON THE WEB

The Authority maintains an enthusiastic commitment to provide up-to-date scientifically correct information on the Authority's website at [www.rra.dst.tx.us](http://www.rra.dst.tx.us). The website provides information covering all aspects of Authority Operations as well as Clean Rivers Program Data.



One of the popular features found on the Authority's website is the **Public Information Repository**. Facts and data on almost any aspect of the Canadian River Basin and the Red River Authority are just a few clicks away. Additional information that is available includes: data inventories, digital mapping, general information, legislation, environmental sites, and historical weather data. The Authority also maintains an online publication library that includes reports and studies prepared by the Authority.

## Future Work in the Basin

The Authority continues to monitor sites, analyze the data collected, determine trends, and assist in the development of Best Management Practices to maintain and/or improve the water quality in the Canadian River Basin.

The Clean Rivers Program has not received an increase in program fees since its beginning in 1991. With rising costs for services, supplies, and the skyrocketing price of fuel, monetary restrictions have been implemented. This has forced Clean Rivers Program partner agencies to rethink and refocus, re-identify, and reduce sampling events and parameters collected. Since the number of monitoring sites and parameters needed to meet the Clean Rivers Program goals are far more than can actually be sampled, an increase of continuous monitoring stations should be implemented to provide a constant, reliable source of water quality data. In addition, it is the Authority's opinion that water bodies associated with the greatest risks of not attaining their water quality standards should receive the greatest attention.



Aerial Photo of Lake Meredith Courtesy of Canadian River Municipal Water Authority



**The Texas Clean Rivers Program**  
**Working Together for Clean Water and Sensible Decisions**

