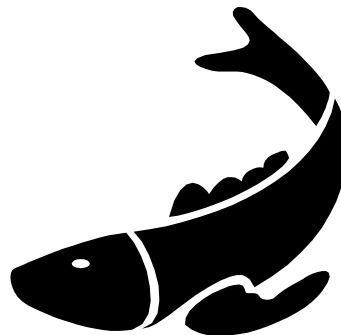
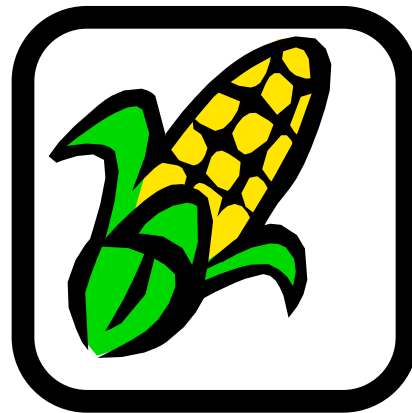


# Status of Water Quality in Colorado - 2006

The Update to the 2002 and 2004 305(b) Reports



Prepared by the  
Water Quality Control Division  
April 2006



Colorado Department  
of Public Health  
and Environment

## Executive Summary - 2006 305(b) Update

The following document, Status of Water Quality in Colorado - 2006 (The Update to the 2002 and 2004 305(b) Reports) fulfills Clean Water Act Section 305(b)(1) which requires all states to assess and report on the quality of waters within their State. This report fulfills Colorado's obligation under the Clean Water Act, and covers the 2004-2005 two-year period.

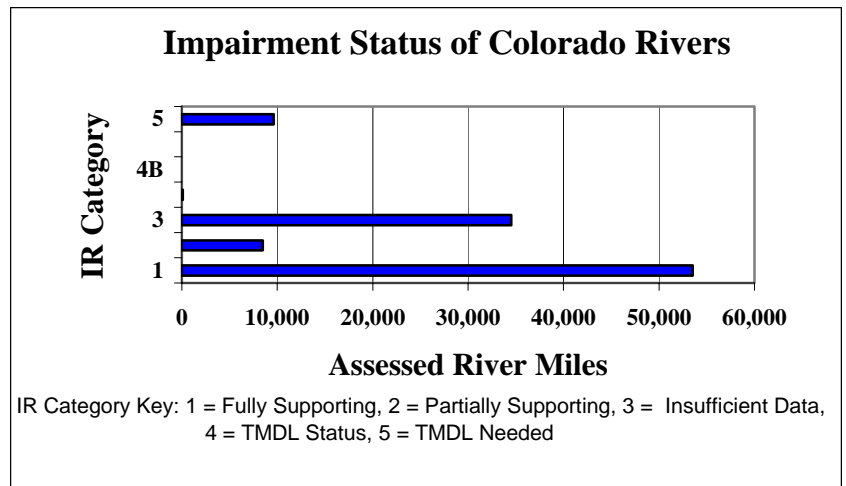
This update provides the State's assessments of water quality that were conducted during the past five years. Specifically, it compares the classified uses of all surface waters within the State to the corresponding standards in order to assess the degree to which waters are in attainment of those standards. Additionally, it also reports the extent to which these waters provide protection for the propagation of aquatic life ("fishable") and primary contact recreation ("swimmable") in and on the water. This update also includes a summary of ground water quality assessments that were conducted during the 2004 and 2005 time frame.

Beginning with the 2004 305(b) report, Colorado has elected to submit updates to the comprehensive 2002 submittal. These updates provide a more concise summary of the water quality assessments that have been conducted over the intervening two years. A number of the water pollution programs in Colorado report on their progress through a number of other venues. Therefore, this update references a number of other reports in an effort to conserve limited resources, yet still provide the interested reader with the resources to gain a thorough understanding of the status of water quality in Colorado.

### Assessment Efforts during 2004 and 2005

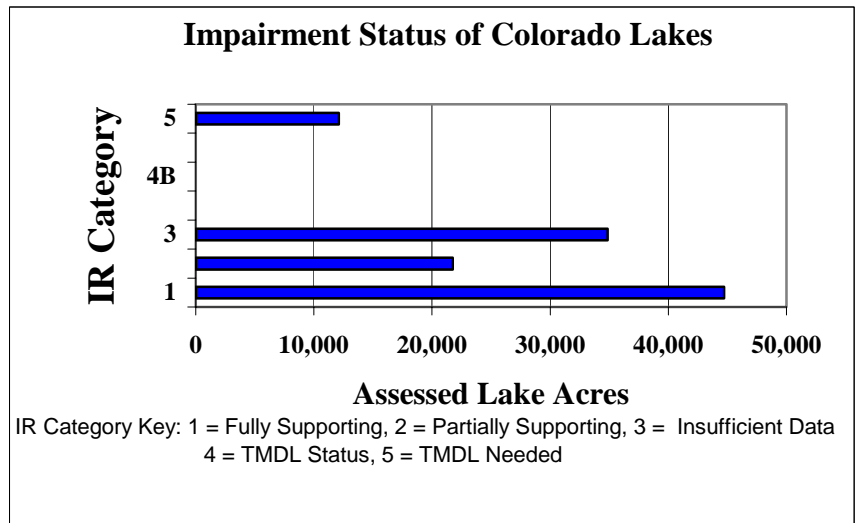
In 2005, Colorado began a long-term effort to migrate all their water quality standards, and associated information, to a computerized Geographic Information System (GIS). In late 2005, the first stage of this migration was completed, and entailed digitally mapping all the stream and lake segments of the State. During this process a number of issues were discovered regarding the segment sizes, and therefore the number of river miles and lake acres reported in this document will differ from previously reported values.

Surface water quality assessments over the past two years have focused on the rulemaking hearing for the South Platte Basin (Regulation No. 38), which was held in July of 2004. Other water quality assessments were also conducted during the preparation of the 2006 303(d) List as well as those associated with Colorado Discharge Permit System (CDPS) permits. For the



current assessment cycle, over 53,000 miles of Colorado Rivers were supporting all classified uses. Approximately, 8,500 miles were supporting at least one classified use, but approximately 9,600 miles were found to be impaired and require a TMDL.

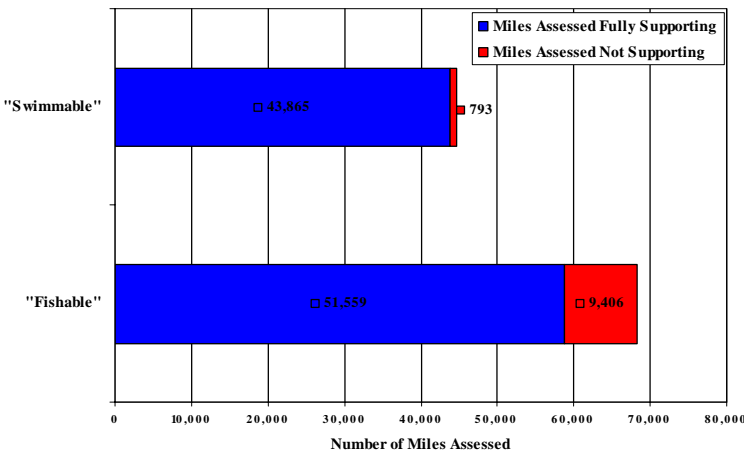
For Colorado lakes, approximately 45,000 acres were found to fully support all classified uses. An additional 22,000 acres were supporting at least one designated use. A total of approximately 12,000 lake acres were found to be impaired and require a TMDL. For both rivers and lakes, approximately 95% of the assessed waterbodies were in attainment of least one of the classified uses.



### Surface Water Quality and Use Support

Surface water quality standards have been established to be protective of all uses.

Waterbodies may be assigned any of the four following categories of use classifications:

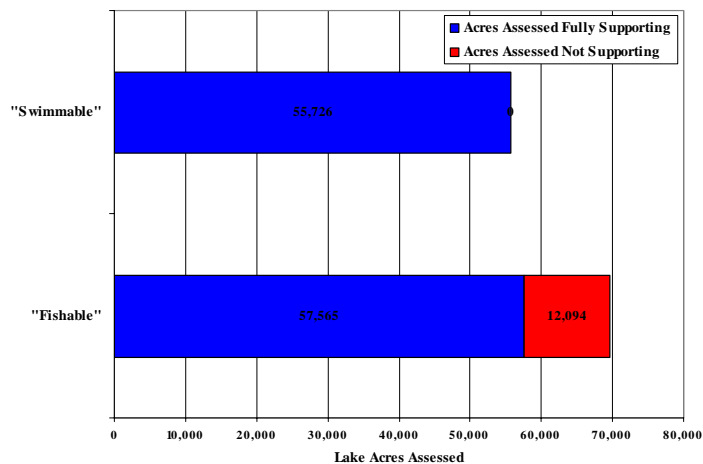


aquatic life, recreation, water supply, or agriculture. One goal of the Clean Water Act (CWA) is that all waters of the state are classified and fully supporting "fishable" and "swimmable" use classifications.

For rivers approximately 44,000 miles met the "swimmable" goal, and over 51,000 miles met the

"fishable" goal. Of the river miles assessed, about 9,500 miles did not meet the "fishable" goal, but only 790 miles did not meet the "swimmable" goal.

For lakes a total of 57,500 acres met the "fishable" goal, with 56,000 acres meeting the



“swimmable” goal. Approximately 12,000 lake acres failed to achieve the “fishable” goal, but all lakes assessed during this assessment cycle met the “swimmable” goal.

### **Miles/Acres Impaired - 303(d) List**

Stream segments that are not fully supporting their designated uses are defined as impaired and placed on the state 303(d) List of Impaired Waters. The 2006 303(d) List is being submitted to EPA in April, 2006. Efforts to integrate the 305(b) Report and the 303(d) List are reflected in the Designated Use Support Tables in Appendix B and Appendix C. The suspected causes and sources of the impairment have also been identified. For impaired waters, the leading cause of impairment is metals and more specifically selenium in rivers and mercury in lakes. The major source or contributor of these pollutants in Colorado is still unknown in most cases. Where the source of metals has been identified it is mostly resource extraction.

### **Water Quality Control Programs**

This Report discusses only recent aspects of the State’s water quality programs. For a more complete description of these programs, readers are referred to two other documents. First, the Colorado Water Quality Management and Drinking Water Protection Handbook (Handbook) explains the basis and goals of the various Water Quality Control Division (WQCD) programs. The Annual Reports to the Water Quality Control Commission (WQCC) for both 2004 and 2005 discusses the Division's activities over the last two years. These reports can be accessed through the Division's Website at: <http://www.cdphe.state.co.us/wq/wqhom.asp>. The direct links to these documents as well as other useful water quality documents for the State of Colorado are found in Section A of this Report.

Programs that are briefly discussed in this Update include the Nonpoint Source (NPS) Program, Colorado's Wastewater and Drinking Water Financial Assistance Program (FAP) and the Total Maximum Daily Load (TMDL) Program.

A goal of Colorado's NPS Program is to restore those waters which do not fully support all designated uses as a result of nonpoint source pollution. A table detailing the projects funded through the CWA Section 319 Grants Programs for the last two years is included in this Update. In the past two years, over \$3.5 million dollars have been awarded through this grant program.

Another funding mechanism managed by the Division’s FAP Program is the State Revolving Funds. This program provides low-interest loans to wastewater plants, drinking water systems as well as nonpoint source projects. On the wastewater side, thirteen Revolving Fund Loans have been executed during 2004 and 2005. Individual projects funded by these loans, as well as the NPS program, are described in section B2 of this report.

The TMDL Program identifies water quality limited segments for listing on the State's 303(d) List, prioritizes these waterbodies, and develops pollutant load allocations for the various contributing sources. The WQCD submitted 42 TMDLs prior to June 2004.



Twenty-three additional TMDLs are currently scheduled to be completed by June of 2006.

The Clean Lakes Program assesses the water quality of Colorado's lake. During the past two years the Program assessed the trophic status, through the use of chlorophyll, of approximately 30 lakes. Additionally, fish tissue was sampled from twenty-three lakes, with a total surface area of over 32,500 acres, resulting in four new fish advisories being issued.

The Agricultural Chemicals and Groundwater Protection Program conducted ground water quality monitoring during the past biennium. Groundwater quality monitoring was conducted within the South Platte and Arkansas River Basins. This program specifically analyzes for pesticides and other agriculturally related compounds in groundwater.



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The Appendices are included on Compact Disk at the end of the report.

- Appendix A - Colorado's Decision Tree to EPA Integrated Reporting ("IR") Categories
- Appendix B – Summary of Designated Uses and Attainment for Colorado Rivers
- Appendix C – Summary of Designated Uses and Attainment for Colorado Lakes
- Appendix D – 2006 303(d) List and Monitoring and Evaluation List





## A. Introduction

Section 305(b)(1) of the Clean Water Act (CWA) requires that each state submit a biennial report to the United States Congress through the United States Environmental Protection Agency (EPA). The 305(b) Report is required to include the following:

- an assessment of water quality of the State,
- an analysis of the extent to which the waters of the State provide protection for the propagation of aquatic life and recreation in and on the water,
- a report of the water pollution control programs;
- a description of the nonpoint source pollution control programs, ground water and drinking water programs.

This 305(b) report is intended to comprehensively summarize the quality of State waters during 2004 and 2005. This characterization of water quality is the result of the ongoing assessment of all readily available data collected from governmental, municipal, and private entities working throughout Colorado. These assessments are instrumental in the identification of pollution sources that are producing an impairment of State waters. Ultimately, identification of the causes of impairments is utilized in the formulation of the appropriate response strategies.

Beginning in 2004, the State of Colorado has elected to fulfill this reporting requirement by submitting comprehensive updates to earlier 305(b) reports. Additionally, other reports, regulations, and policies pertaining to Colorado water quality issues are utilized as reference material to these 305(b) updates. Consequently, the updates rely heavily on a vast array of background material that address the in-depth details of the current status of water quality in Colorado. These materials, along with available web links, are summarized in Table 1.

<b>Table 1: Documents Pertaining to Water Quality in Colorado</b>		
<b>Document Name</b>	<b>Website Address</b>	<b>Major Topics</b>
<u>Status of Water Quality in Colorado - 2004: The 2004 Update to the 2002 Section 305(b) Report</u>	<a href="http://www.cdphe.state.co.us/op/wqc/c/waterstatus2004/305(b).pdf">http://www.cdphe.state.co.us/op/wqc/c/waterstatus2004/305(b).pdf</a>	- Assessed Segments - Designated Use Support of Assessed Miles
2006 Section 303(d) Listing Methodology	<a href="http://www.cdphe.state.co.us/op/wqc/c/SpecialTopics/303(d)/ListMethFinal.pdf">http://www.cdphe.state.co.us/op/wqc/c/SpecialTopics/303(d)/ListMethFinal.pdf</a>	- 303(d) Listing Methodology
2006 Section 303(d) List Water-Quality-Limited Segments Requiring TMDLs	<a href="http://10.1.0.61/op/wqcc/OtherRegs/93-94_2006/200693EXHIBIT1.pdf">http://10.1.0.61/op/wqcc/OtherRegs/93-94_2006/200693EXHIBIT1.pdf</a>	- 2006 303(d) list
2006 303(d) and Monitoring and Evaluation lists	<a href="http://10.1.0.61/op/wqcc/OtherRegs/93-94_2006/200693EXHIBIT2.pdf">http://10.1.0.61/op/wqcc/OtherRegs/93-94_2006/200693EXHIBIT2.pdf</a>	- 2006 M&E list



<b>Table 1: Documents Pertaining to Water Quality in Colorado</b>		
<b>Document Name</b>	<b>Website Address</b>	<b>Major Topics</b>
Annual Report to the Water Quality Control Commission Fiscal Year 2004-05, Oct. 1, 2005	<a href="http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0405.pdf">http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0405.pdf</a>	- Colorado WQCD's activities and accomplishments in the various major areas of water quality management.
Annual Report to the Water Quality Control Commission Fiscal Year 2003-04, Oct. 1, 2004	<a href="http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0304.pdf">http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0304.pdf</a>	- Colorado WQCD's activities and accomplishments in the various major areas of water quality management.
Annual Reports of the Agricultural Chemicals and Ground Water Protection Program	<a href="http://www.ag.state.co.us/CSD/GroundWater/annualreports.html">http://www.ag.state.co.us/CSD/GroundWater/annualreports.html</a>	- Annual Reports describing results of Ground Water Monitoring and Program Activities
2002 Section 305(b) Report: Status of Water Quality in Colorado	<a href="http://www.cdphe.state.co.us/op/wqc/waterstatus2002/305(b)tableofcontents.html">http://www.cdphe.state.co.us/op/wqc/waterstatus2002/305(b)tableofcontents.html</a>	<ul style="list-style-type: none"> <li>- Background Info of Water Quality Programs</li> <li>- Watershed Overviews</li> <li>- WQCD Monitoring Program</li> <li>- WQCD Assessment Methodology</li> <li>- Surface Water Quality Assessments</li> <li>- WQCD Groundwater Program</li> <li>- WQCD Public Water Supply</li> </ul>
Annual Report to the Water Quality Control Commission, Fiscal Year 2001-2002, October 1, 2002	<a href="http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0102.pdf">http://www.cdphe.state.co.us/op/wqc/WQCD_reports/wqccannrep0102.pdf</a>	- Same features as the 2003 Annual Report as listed above.
<u>Colorado Water Quality Management and Drinking Water Protection Handbook, A Continuing Planning Process</u> (Handbook), Commission Policy #98-2, Updated: October 15, 2002.	<a href="http://www.cdphe.state.co.us/op/wqc/GeneralInfo/StatutesRegsPolicies/Policies/cppfinal2002.pdf">http://www.cdphe.state.co.us/op/wqc/GeneralInfo/StatutesRegsPolicies/Policies/cppfinal2002.pdf</a>	- Concise, readable summary of the water quality management and drinking water protection system in Colorado, and the roles of the major participants in that system.

During 2005, Colorado began a process of systematically converting all of the State's stream segments to a GIS-based database system. This effort involved digitally mapping over 680 surface water body segments within the State and then comparing those maps to their corresponding segment descriptions. During this process errors and inconsistencies were discovered where segment lengths either had gaps or overlapped. These problems were found in every basin of the State, and in December of 2005 a rulemaking hearing was conducted to rectify these errors and omissions. As a result of this process the total stream lengths for every basin within the State have changed from previously reported values. Additionally, the correct river mile results of this GIS effort have not yet been updated in the Assessment Database (ADB). In 2006, Colorado will begin working on updating the ADB with the current, corrected stream segment lengths.



## B1. Colorado Atlas

This section provides a statewide overview of Colorado’s surface water and a summary of the status of water quality. Assessment information about individual basins is provided in Section C. The individual segment assessments are listed in Appendix B: Designated Use Support Summary.





Within Colorado’s borders can be found over 95,000 river miles and more than 250,000 lake acres. The majority of Colorado’s rivers originate in the pristine high alpine environment of the Rocky Mountains and flow downstream through the high desert, or high plains, regions before leaving the state. There are seven major river basins in Colorado: the Arkansas, Rio Grande, San Juan, Colorado, Green, Platte and Republican. The largest of these basins on a national level is the Colorado River Basin, which has its headwaters in Rocky Mountain National Park, flows from Colorado through Utah and the Grand Canyon in Arizona, and ultimately completes its journey at the Gulf of California. The following table summarizes statistics on Colorado’s waters.

<b>Table 2: Colorado Atlas</b>		
<b>State Population<sup>1</sup>:</b> 4,601,403		
<b>State Surface Area:</b> 104,042 Square Miles		
<b>Number of Major River Basins:</b> 7		
<b>River Basin</b>	<b>Surface Area (sq. mi.)</b>	<b>Stream Length (mi.)</b>
Arkansas	28,258	22,095
Rio Grande	9,859	10,072
San Juan	7,540	5,773
Colorado	18,160	19,340
Green	10,499	13,448
Platte	20,897	18,959
Republican	8,829	5,846
<b>Total Number of River Miles<sup>2</sup>:</b> 95,533		
<b>Estimated Acreage of Lakes/Reservoirs/Ponds<sup>2</sup>:</b> 252,261		
<b>Acreage of Freshwater Wetlands:</b> unknown		
Notes:		
1 U.S. Bureau of the Census, 2004 Population Estimates Program (PEP)		
2 Estimated from NHD, 1:100,000 GIS coverage		

### Summary of Classified Uses

The State of Colorado has adopted four different categories of classified waterbody uses: aquatic life, water supply, recreation and agriculture. Table 3, Summary of Classified Uses, breaks down the number of stream miles and lake acres in the state that have been assigned each of these classified uses. Many segments support multiple uses.



<b>Table 3: Summary of Classified Uses</b> <i>(estimates of river miles and lake acres)</i>			
	<b>Classified Use</b>	<b>River Miles</b>	<b>Lake Acres</b>
	Aquatic Life Cold 1	<i>40,196</i>	<i>60,169</i>
	Aquatic Life Warm 1	<i>1,661</i>	<i>46,173</i>
	Aquatic Life Cold 2	<i>8,889</i>	<i>1,065</i>
	Aquatic Life Warm 2	<i>53,505</i>	<i>6,023</i>
	Recreation Primary Contact (Recreation Class E and P)	<i>62,663</i>	<i>110,980</i>
	Recreation Secondary Contact (Recreation Class U and N)	<i>43,603</i>	<i>2,449</i>
	Water Supply	<i>45,654</i>	<i>78,678</i>
	Agriculture	<i>106,238</i>	<i>113,429</i>

**Summary of Degree of Use Support**

Colorado’s water quality is assessed periodically in conjunction with the triennial review of water quality standards, the development of discharge permits, 303(d) Lists, and Total Maximum Daily Loads (TMDLs), and the completion of special studies. The following table summarizes the number of assessed stream miles and lake acres that do or do not fully support “all” their assigned classified uses.

<b>Table 4: Surface Water Quality Summary for Degree of Use Support<sup>1</sup></b>		
<b><i>Degree of Support</i></b>	<b><i>Percentage of Assessed River Miles</i></b>	<b><i>Percentage of Assessed Lake Acres</i></b>
Supporting at Least One Use	<b><i>95.6%</i></b>	<b><i>95.2%</i></b>
Not Supporting at Least One Use	<b><i>4.4%</i></b>	<b><i>4.8%</i></b>
Total Miles or Acres Assessed <sup>2</sup>	<b><i>236,855</i></b>	<b><i>253,537</i></b>
Note: 1) Total assessed miles and acres include assessments conducted in the last five years. 2) Total miles or acres assessed includes multiple classified uses for the same segment, and therefore does not reflect the physical miles or acres present in Colorado.		



**Summary of Waterbodies Meeting EPA Fishable/Swimmable Criteria**

The CWA at Section 101(a)(2) requires that all waters be suitable for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water unless it is demonstrated that the use is not attainable. This provision of the CWA is often referred to as EPA’s “fishable/swimmable” goal. The following table summarizes the number of assessed stream miles and lake acres that have been assessed which do or do not support their aquatic life and recreation classified uses.

<b>Table 5: Summary of Assessed Water Bodies in Attainment of the Fishable/Swimmable Criteria</b>		
	<i>Fishable</i>	<i>Swimmable</i>
<b>River Miles</b>		
Miles Assessed	68,242	44,658
Miles Assessed and Fully Supporting	58,836	43,865
Miles Assessed and Not Fully Supporting	9,406	793
<b>Lake Acres</b>		
Acres assessed	69,659	55,726
Acres assessed and fully supporting	57,565	55,726
Acres assessed and not fully supporting	12,094	0
Note: Total assessed miles and acres include assessments conducted in the last five years.		

**B2. Water Pollution Control Programs**

This Section provides an overview of the Water Quality Control Division’s (WQCD’s or the Division’s) water quality assessment and pollution control programs and directs the reader to other documents where more information can be found.

**The Water Quality Control Division**

The WQCD is the agency responsible for maintaining, restoring and improving the quality of Colorado’s waters and ensuring that safe drinking water is provided to the public from public water systems. The WQCD is organized into two sections: The Watershed Section and the Water Quality Protection Section. The Watershed Section consists of three units: Monitoring, Assessment, and Outreach & Assistance. The Water Quality Protection Section is also divided into three units: Permits, Technical Services, and Compliance Monitoring & Data Management. In addition, the Administrative Unit operates under the WQCD’s Director’s Office.

**Water Quality Monitoring, Assessment and Reporting**

A discussion of the Division’s water quality monitoring assessment and reporting can be found in Chapter IV of *Colorado Water Quality Management and Drinking Water Protection Handbook (Handbook)*. Division activities in the last two years are



summarized in the Annual Reports to the Water Quality Control Commission (WQCC or Commission).

The Division conducts monitoring at a limited number of reservoirs and lakes around the state to determine their trophic status, develop TMDLs, and support changes to standards and classifications during triennial reviews. Resources for lake monitoring are limited, as funds for such monitoring originate from the overall surface water-monitoring program. The Division assesses the water quality of lakes and reservoirs by reviewing available data and comparing this data to the standards adopted for each waterbody. In addition, the trophic status of lakes and reservoirs is determined using the Carlson Trophic State Index. These water quality assessments are found in the basin rationale for standards review. A more detailed description of the lake and reservoir monitoring activities in 2004-2005 is found in section C3.9 of this report.

**Water Quality Standards**

Water quality standards are dependent on the classified uses and are the regulatory basis for limits placed on discharges to waterbodies. A discussion of the water quality standards program can be found in Chapter IV of the Handbook. The surface water standards review schedule is presented in Table 6 below.

<b>Table 6: Surface Water Standards Review Schedule</b>			
River Basins (and Regulation Number)	Issues Scoping Informational Hearing	Issues Formulation Informational Hearing	Rulemaking Hearing
San Juan, Dolores & Gunnison (#34 & #35)	October 2004	November 2005	June 2006
Arkansas & Rio Grande (#32 & #36)	October 2005	November 2006	June 2007
Colorado Basin (#33 & #37)	October 2006	November 2007	June 2008
South Platte (#38)	October 2007	November 2008	June 2009
Basic Standards (#31)	October 2008	November 2009	June 2010

The Commission reviewed Regulation No. 38 in July 2004 and made several revisions to the regulation. The Commission updated temporary modifications of standards on 32 segments, and removed temporary modifications from 5 segments. The Commission added a Water Supply designated use to 6 segments. Site-specific standards were adopted for South Mosquito Creek and Mosquito Creek, as well as three streams located near Denver International Airport. Finally, the Commission also adopted site-specific water effects ratios for copper using the biotic ligand model on 7 segments.

In June 2005, Colorado revised the Basic Standards for Surface Water (Reg # 31) as per the normal regulation triennial review schedule. During this hearing the WQCC adopted several changes including:



- Changes regarding the implementation of temporary modifications, and also added a schedule to review all temporary modifications every two years.
- Revised some specific antidegradation rules, including some changes to the baseline year for determining appropriate ambient water quality, and how use protection is integrated with certain use classifications.
- Revised all of the recreation use classifications to more accurately reflect the various recreation activities that occur in Colorado waters.
- Adopted EPA's 1999 total ammonia criteria, as well as scheduling a statewide implementation hearing for March 2007 (as opposed to a basin-by-basin implementation according to the schedule presented in table 6).
- Adopted new or revised standards for aluminium, antimony, arsenic, cadmium, uranium, and zinc.

The more detailed description of the State's water quality standards review activities over the last two years can be found in the Division's Annual Reports to the WQCC (q.v. Table 1).

### **Point Source Control Programs**

The Permits Unit of the Water Quality Control Division protects public health and the environment through issuance of discharge permits and other control mechanisms, as provided by the Colorado Water Quality Control Act. The permits program is multi-faceted and covers industrial, domestic and animal feeding operation wastewater discharges to surface waters and ground water, as well as stormwater discharges. The industrial pretreatment program<sup>1</sup>, biosolids program<sup>1</sup> and reuse programs are also operated within the Permits Unit. Permits are designed to limit the amount of pollutants entering streams, lakes and groundwater so as to protect the beneficial uses of the receiving water. Control mechanisms for discharges to privately owned treatment works and land application of biosolids are written to protect public health and the environment. A discussion of the point source control program can be found in Chapter VI of the Handbook. The Division's permitting activities, including the backlog reduction efforts of the last two years, are summarized in the Annual Reports to the WQCC.

### **Nonpoint Source Program**

The goal of the Nonpoint Source Program is to restore water bodies impaired by nonpoint sources of pollution and to prevent future impairments. One means of accomplishing this goal is through the implementation of projects funded under the Clean Water Act Section 319 Grant Program. Federal guidelines direct grant money to Clean Water Act 303(d) listed segments that are significantly impacted by nonpoint sources and to specific action items identified in the "Colorado Nonpoint Source Management Program" document.

The management program was updated in 2005. The updated management program was approved by the Commission in August 2005, and a copy can be found at

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<sup>1</sup> EPA can delegate the authority to administer these programs to a state. Colorado has not sought delegation for these two programs.



<http://www.cdphe.state.co.us/wq/nps/2005MgtProg.html>. Annual activities in the Nonpoint Source Program are described in the Division's Annual Reports. Table 7 lists the projects funded by Section 319 in 2004 and 2005.

<b>Table 7: Nonpoint Source Projects Funded by Section 319 in 2004 and 2005</b>					
<b>Title</b>	<b>Sponsor</b>	<b>Year</b>	<b>NPS Grant Funding</b>	<b>General Project Type</b>	<b>Project Category</b>
Assessing Irrigation Induced Se and Fe	Colorado State University	2004	\$186,895	Monitoring/Characterization	Agriculture
Big Thompson Watershed Management Plan	Big Thompson Watershed Forum	2004	\$25,000	Assessment/Watershed Planning	Cross-cutting categories
Cherry Creek Reservoir TMAL Actions	Cherry Creek Basin Water Quality Authority	2004	\$144,000	Monitoring/Characterization - TMDL related	Urban
Cherry Creek State Park Wetlands	Cherry Creek Basin Water Quality Authority	2004	\$95,700	Restoration	Urban
Coal Creek Watershed Planning Project	Town of Crested Butte	2004	\$25,000	Assessment/Watershed Planning	Mining
Drip Irrigation. . . Arkansas River Basin	East Otero Conservation District	2004	\$49,900	Demonstration	Agriculture
Grand Valley Selenium Assessment	Mesa County	2004	\$97,200	Monitoring/Characterization - TMDL related	Cross-cutting categories
Henson Creek Synoptic Sampling	Hinsdale County	2004	\$97,542	Monitoring/Characterization - TMDL related	Cross-cutting categories
I-70 Snow Slide Structural BMP	Town of Dillon	2004	\$151,200	Restoration	Urban
Interstate I-70/Vail Pass Sediment Control	Eagle River W&S District	2004	\$150,000	Restoration	Urban
NPS Education Outreach - Middle and High School	Colorado Foundation for Agriculture	2004	\$79,350	Information/Education	Cross-cutting categories
NPS Newsletter Continuation	League of Women Voters	2004	\$18,960	Information/Education	Cross-cutting categories
NPS Outreach Coordination Continuation	Colorado State University	2004	\$216,280	Information/Education	Cross-cutting categories
Owl Mountain/North Platte Project	Colorado Wildlife Heritage Foundation	2004	\$146,000	Restoration	Agriculture





**Table 7: Nonpoint Source Projects Funded by Section 319 in 2004 and 2005**

<b>Title</b>	<b>Sponsor</b>	<b>Year</b>	<b>NPS Grant Funding</b>	<b>General Project Type</b>	<b>Project Category</b>
Post Remediation Assessment	Animas River Stakeholders	2004	\$74,308	Best Management Practices Effectiveness Monitoring	Mining
Priority Mine Site Waste Removal	Animas River Stakeholders	2004	\$163,500	Restoration	Mining
Providing Technical Guidance (Beef Producers)	Colorado Cattlemen's Association	2004	\$93,600	Information/Education	Agriculture
Rio Grande Riparian Stabilization	Rio Grande Headwaters Restoration Project	2004	\$150,000	Assessment/Watershed Planning	Cross-cutting categories
Stollsteimer Creek Watershed Plan	San Juan Conservation District	2004	\$20,000	Assessment/Watershed Planning	Cross-cutting categories
Upper Clear Creek Watershed Plan	Upper Clear Creek Watershed Assn.	2004	\$25,000	Assessment/Watershed Planning	Mining
Willow Creek Watershed Plan	Willow Creek Reclamation Committee	2004	\$25,000	Assessment/Watershed Planning	Mining
Water Conservation/ Wise Water Use Education Program to Reduce Selenium and Salt Loading in Western Colorado	Gunnison Basin / Grand Valley Water Forum	2005	\$7,875	Information - Education	Cross-cutting categories
Barr-Milton Reservoir Watershed Plan	South Platte Coalition for Urban River Evaluation	2005	\$301,900	Assessment/Watershed Planning	Cross-cutting categories
Rio Grande Watershed Restoration Strategic Plan	Rio Grande Headwaters Restoration Project and San Luis Valley Water Conservancy District	2005	\$25,000	Assessment/Watershed Planning	Cross-cutting categories
Reclamation of the Amethyst Waste Dump	San Luis Valley RC&D for the Willow Creek Reclamation Committee	2005	\$140,162	Restoration	Mining



<b>Table 7: Nonpoint Source Projects Funded by Section 319 in 2004 and 2005</b>					
<b>Title</b>	<b>Sponsor</b>	<b>Year</b>	<b>NPS Grant Funding</b>	<b>General Project Type</b>	<b>Project Category</b>
Pilot Test for Nelson Tunnel Dewatering	San Luis Valley RC&D for the Willow Creek Reclamation Committee	2005	\$57,561	Monitoring/Characterization	Mining
City of Aspen Stormwater Water Quality Enhancement Project	City of Aspen	2005	\$150,000	Restoration	Urban
Anglo Saxon/Porcupine Mine Assessment and Characterization	Anglo Saxon Properties, Limited	2005	\$12,360	Monitoring/Characterization	Mining
NPS Statewide Outreach	Colorado Foundation for Agriculture	2005	\$155,000	Information - Education	Cross-cutting categories
Coordinated TMDL Development in the Snake River Watershed	NW Colorado Council of Governments	2005	\$40,500	Monitoring/Characterization - TMDL related	Mining
Statewide Land Use Decision Maker Education Program Continuation	League of Women of Colorado Education Fund	2005	\$127,350	Information - Education	Urban
"Keep it Clean" Neighborhood Water Stewardship Program	Watershed Approach to Stream Health (WASH) Project	2005	\$25,000	Information - Education	Urban
Colorado Animal Feeding Operation Program continuation	Colorado Livestock Association	2005	\$134,388	Restoration - dispersed, not watershed related	Agriculture
Culebra Watershed Plan	Colorado Acequia Association	2005	\$25,000	Assessment/Watershed Planning	Cross-cutting categories
Assessment of Metal Contamination and Toxicity (Lefthand Creek)	Lefthand Watershed Oversight Group	2005	\$49,950	Monitoring/Characterization	Cross-cutting categories
Coal Creek Watershed Water Quality Monitoring Project	Town of Crested Butte	2005	\$44,760	Monitoring/Characterization - TMDL related	Mining



<b>Table 7: Nonpoint Source Projects Funded by Section 319 in 2004 and 2005</b>					
<b>Title</b>	<b>Sponsor</b>	<b>Year</b>	<b>NPS Grant Funding</b>	<b>General Project Type</b>	<b>Project Category</b>
Coyote Gulch Restoration	City of Lakewood	2005	\$200,000	Restoration	Urban

**Water Pollution Control Revolving Fund Financial Assistance**

In 2004-2005 the Colorado Water Pollution Control Revolving Fund (WPCRF) Program in the Water Quality Control Division Outreach and Assistance Unit assisted with the planning and financing of 13 water quality projects throughout the state (Table 8). These projects have improved water quality and restored and protected beneficial uses in the referenced segments (see Figure 1) by reducing pollutant loadings through wastewater treatment facility upgrades, consolidation with larger wastewater treatment systems, and nonpoint source water pollution treatment. Many of the projects will benefit the water quality in impaired stream segments. The total amount funding in the form of low interest loans was over \$120 million.

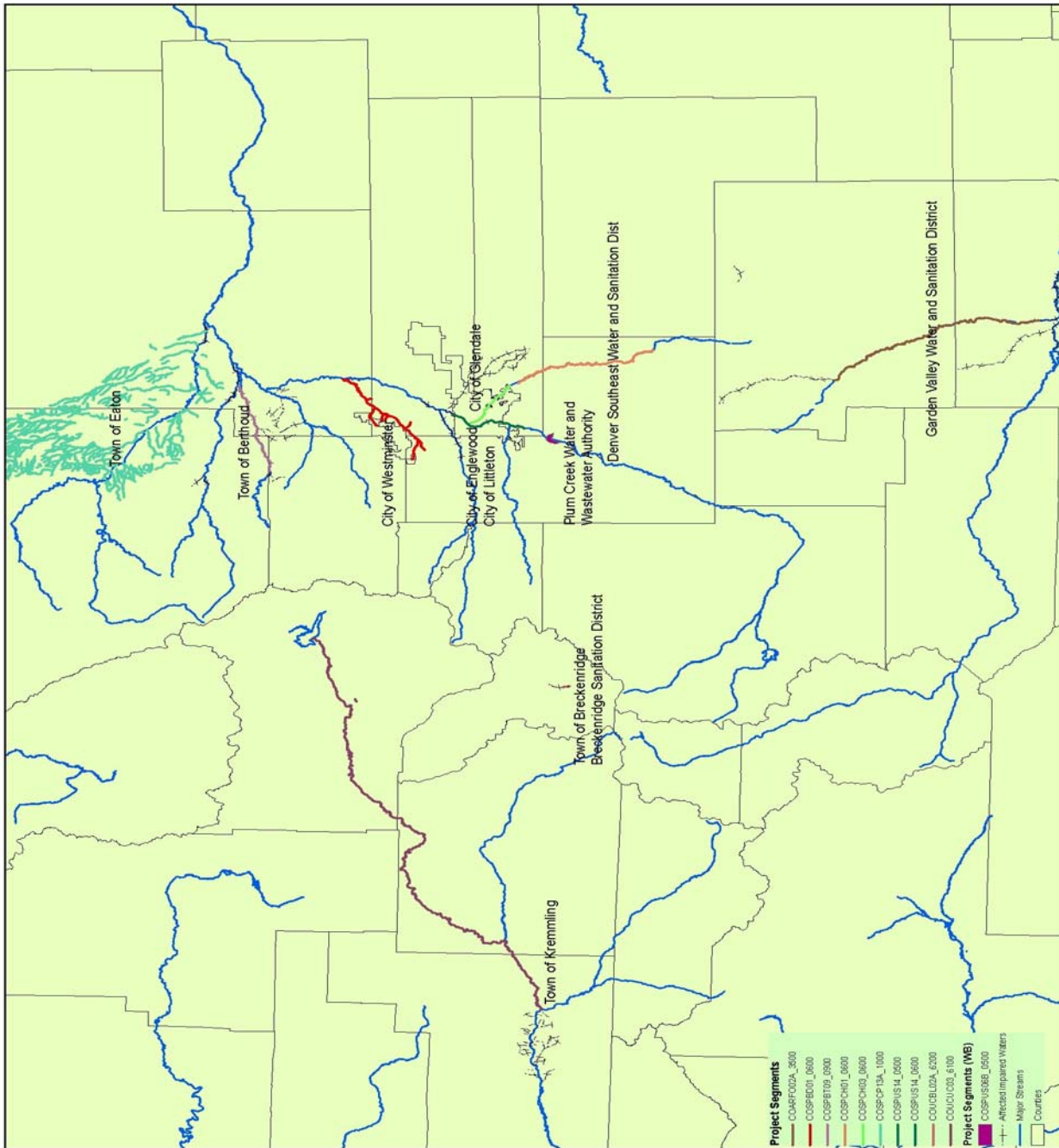
<b>Table 8: WPCRF Projects in 2004-2005</b>		
<b>Project</b>	<b>Loan Amount</b>	<b>Project Description</b>
Garden Valley Water and Sanitation District	\$300,000	Consolidation with Colorado Springs Utilities
Town of Berthoud	\$2,385,000	Wastewater Treatment Plant Improvements and Expansion
City of Englewood	\$29,564,275	Wastewater Treatment Plant Improvements and Expansion
City of Littleton	\$29,677,780	Wastewater Treatment Plant Improvements and Expansion
Town of Breckenridge	\$4,320,000	Watershed Protection and Treatment of Abandoned Mine Discharges
Breckenridge Sanitation District	\$8,000,000	Pumpback of Wastewater Discharge for Stream Improvements
Denver Southeast Water and Sanitation District	\$4,800,000	Wastewater Treatment Plant Improvements and Expansion
Town of Eaton	\$4,824,431	Wastewater Treatment Plant Improvements and Expansion
Plum Creek Wastewater Authority	\$1,510,000	Biosolids Handling
Roxborough Park Metro District	\$9,600,000	Consolidation with Littleton/Englewood Wastewater Treatment Facility
City of Westminster	\$15,440,000	Wastewater Treatment Plant Improvements and Expansion



<b>Table 8: WPCRF Projects in 2004-2005</b>		
<b>Project</b>	<b>Loan Amount</b>	<b>Project Description</b>
City of Glendale	\$10,000,000	Consolidation with Denver Metro Wastewater Reclamation District
Town of Kremmling	\$950,000	Wastewater Treatment Plant Improvements

Based on an annual survey of local governments across the state, the identified wastewater, stormwater, and nonpoint source needs over the next 3-5 years total approximately \$1.3 billion. The 2005 Clean Water Needs survey conducted for EPA every 5 years identified \$2.4 billion in infrastructure improvements. Wastewater discharge permit requirements, aging infrastructure, and population growth are all factors in creating wastewater infrastructure needs. Through 2005 the WPCRF Program has been able to fund all projects ready to proceed although dwindling federal capitalization grants may limit total assistance and increase prioritization of projects in the future.





**Figure 1: WPCRF Funded Projects for 2004-2005**



**Total Maximum Daily Load Program**

The maximum pollutant load that a waterbody can assimilate and still attain standards is called the “Total Maximum Daily Load”. The TMDL program is responsible for identification of surface water bodies that are impaired and the development of the load allocations to address the impairment. The Handbook describes the Division’s program in Chapter V. Annual activities are described in the Division’s Annual Reports. Colorado’s 2004 Listing Methodology, Section 303(d) List (List of Impaired Waters Still Requiring TMDLs) and Monitoring and Evaluation List are included as Appendix D.

The State of Colorado, the Colorado Environmental Coalition and Biodiversity Legal Foundation, EPA, and other parties entered into a Settlement Agreement on August 24, 1999 concerning the pace of TMDL development. That settlement includes a schedule for the development of TMDLs for segments and pollutants included on the 1998 303(d) list. See Table 9.

<b>Table 9: TMDL Completion Schedule for 1998 Section 303(d) List</b>					
<i>Biennium</i>	<i>End Date</i>	<i>TMDLs to be Completed per Settlement Agreement</i>			<i>TMDLs Completed</i>
		<i>Number</i>	<i>Percent of Total</i>	<i>Cumulative Percentage</i>	
1st	6/30/00	30	15	15	33
2nd	6/30/02	50	25	40	66
3rd	6/30/04	40	20	60	42
4th	6/30/06	40	20	80	23*
5th	6/30/08	38	20	100	

\*Projected as of 12/1/05

There were 42 TMDLs completed during the third biennium (see Table 10, page II-29 of the 2002 305(b) Report and Table 10, page 11 of the 2004 303(b) Report for TMDLs completed during the first two bienniums).

<b>Table 10: TMDLs completed as of June 30, 2004 (3<sup>rd</sup> biennium)</b>			
<i>WBID</i>	<i>Segment Description</i>	<i>Portion</i>	<i>Parameter(s)</i>
COARLA01	Arkansas River, Fountain Creek to stateline	all	Fe, SO <sub>4</sub>
COARUA01b	E. Fork Arkansas River above Birdseye Gulch	all	Pb, Mn, Zn
COARUA09	Iowa Gulch, Paddock Ditch to Arkansas River	all	Zn



<b>Table 10: TMDLs completed as of June 30, 2004 (3<sup>rd</sup> biennium)</b>			
<i>WBID</i>	<i>Segment Description</i>	<i>Portion</i>	<i>Parameter(s)</i>
CORGAL03a	Alamosa River, Alum Creek to Wightman Fork	all	pH, Fe, Mn
CORGAL03b	Alamosa River, Wightman Fork to Fern Creek	all	Fe
CORGAL05	Wightman Fork, source to S30, T37W, R4E	all	Fe, Zn
CORGAL08	Terrace Reservoir	all	pH, Mn, Zn
CORGAL09	Alamosa River, Terrace Reservoir to Highway 15	all	pH, Fe, Mn, Zn
CORGAL10	Alamosa River, below Highway 15	all	Cu, Fe, Mn
CORGCB09a	Kerber Creek above Brewery Creek and tributaries except segment 8	all	Cu, Mn, Zn
COSJDO04	McPhee Reservoir	all	Hg
COSJLP08	Narraquinnepp Reservoir	all	Hg
COSPBO09	Boulder Creek, South Boulder Creek to Coal Creek	all	NH <sub>3</sub> , Aquatic Life*
COSPBO10	Boulder Creek, Coal Creek to St. Vrain Creek	all	NH <sub>3</sub> , Aquatic Life*
COSPSV03	St. Vrain Creek, Hygiene Road to South Platte River	all	NH <sub>3</sub> , Aquatic Life*
COSPUS14	South Platte River, Bowles Avenue to Burlington Ditch	all	NO <sub>3</sub>
COUCBL06	Snake River and tributaries, source to Dillon Reservoir	all	Mn
COUCBL07	Peru Creek, source to Snake River	all	Mn
COUCBL11	French Gulch, 1.5 miles below Lincoln to Blue River	all	pH, Cd, Zn
COUCEA05	Eagle River, Belden to Gore Creek	all	Cd, Mn
COUCEA07	Cross Creek	all	Mn
COUCEA09	Eagle River, Gore Creek to Colorado River	all	Mn
COUCRF09	Coal Creek, source to Crystal River	all	Fe

Table 11 lists those TMDLs that are currently scheduled to be completed by June 30, 2006, in accordance with the settlement agreement.



<b>Table 11: TMDLs Projected for Completion as of June 30, 2006</b>			
<b><i>WBID</i></b>	<b><i>Segment Description</i></b>	<b><i>Portion</i></b>	<b><i>Parameters</i></b>
COGULG02	Gunnison River	all	Se
COGUUN04	Uncompahgre River, Highway 550 to Gunnison River	all	Se
CORGAL03a	Alamosa River, Alum Creek to Wightman Fork	all	Al, Cu
CORGAL03b	Alamosa River, Wightman Fork to Fern Creek	all	pH, Al, Cu
CORGAL08	Terrace Reservoir	all	Cu
CORGAL09	Alamosa River, Terrace Reservoir to Highway 15	all	Cu
COSJDO05	Silver Creek	all	Cd, Zn
COSJSJ03	Lower Rio Blanco River	all	sediment
COSPCL13	North Fork Clear Creek	all	Cd, Cu, Mn, Zn, Aq life
COSPUS03	Trout Creek & tributaries on NF land	all	sediment
COSPUS15	South Platte River, Burlington Ditch to Big Dry Creek	all	Cd
COUCBL02	Blue River below French Gulch	all	Cd, Zn

### **C3. Use Support Summary by Basin**

Colorado periodically evaluates the quality of its surface water to determine the degree to which it is suitable for its assigned designated uses. The designated uses in Colorado include four categories: aquatic life, recreation, water supply and agriculture use. Assessments of Colorado's streams, reservoirs, and lakes are conducted to identify chemical, physical, and biological attainment or impairment. The Division identifies the causes and sources of pollutants in water bodies and uses the state's water quality control programs (such as the Colorado Discharge Permits System (CDPS), and the TMDL program) to improve water quality where impairment are found to exist.

The following table, Table 12: Degree of Support for Colorado Rivers shows the degree of use support in Colorado Rivers.





<b>Table 12: Degree of Support for Colorado Rivers (miles)</b>			
<b>Use</b>	<b>Size Assessed</b>	<b>Size Assessed and Fully Supporting</b>	<b>Size Assessed and Not Supporting</b>
Aquatic Life Cold 1	33,637	31,620	2,017
Aquatic Life Warm 1	1,300	746	554
Aquatic Life Cold 2	6,396	5,645	751
Aquatic Life Warm 2	26,910	20,824	6,086
Primary Contact (Recreation, Class E and P)	44,658	43,865	793
Secondary Contact (Recreation, Class U and N)	19,630	19,405	224
Drinking Water Supply	40,037	39,990	47
Agriculture	64,288	64,210	78
Note: Total assessed miles and acres include assessments conducted in the last five years.			

The following table, Table 13: Degree of Support for Colorado Lakes, shows the degree of use support in Colorado Lakes.

<b>Table 13: Degree of Support for Colorado Lakes (acres)</b>			
<b>Use</b>	<b>Size Assessed</b>	<b>Size Assessed and Fully Supporting</b>	<b>Size Assessed and Not Supporting</b>
Aquatic Life Cold 1	45,899	39,646	6,253
Aquatic Life Warm 1	19,003	17,779	1,224
Aquatic Life Cold 2	142	0	142
Aquatic Life Warm 2	4,616	140	4,476
Fish Consumption	32,669	25,813	6,856
Primary Contact (Recreation, Class E and P)	55,726	55,726	0
Secondary Contact (Recreation, Class U and N)	2,449	2,449	0
Drinking Water Supply	55,550	55,550	0
Agriculture	70,153	70,153	0
Note: Total assessed miles and acres include assessments conducted in the last five years.			

**Causes and Sources Affecting Water Bodies that are not Supporting Classified Uses**

In Colorado, when a narrative or numeric standard is exceeded, the associated use is determined to be in non-attainment, and the cause and source affecting the water body is determined. The cause is the pollutant that contributes to the non-attainment. For example, if the aquatic life standard for zinc is exceeded, then the aquatic life use would be in non-attainment and the cause would be zinc. The source is the activity or facility



that contributes the pollutant. An example of a source is resource extraction if metal exceedances are found in a historic mining district.

The following tables summarize the causes and sources contributing to non-attainment of uses for Colorado’s assessed waters. Those causes and sources yet to be determined are identified as “unknown.”

<b>Table 14: Summary of Causes Affecting Water Bodies Not Fully Supporting Classified Uses</b>		
<b>Cause Category</b>	<b>Colorado Rivers Miles Affected</b>	<b>Colorado Lakes Acres Affected</b>
<b>Unknown Biological Stressor</b>	<b>26</b>	<b>916</b>
<b>Priority organics</b>	<b>0</b>	<b>0</b>
<b>Metals</b>		
<b>Aluminum</b>	<b>36</b>	<b>0</b>
<b>Arsenic</b>	<b>0</b>	<b>22</b>
<b>Cadmium</b>	<b>150</b>	<b>0</b>
<b>Copper</b>	<b>278</b>	<b>142</b>
<b>Iron (trec)</b>	<b>304</b>	<b>530</b>
<b>Lead</b>	<b>101</b>	<b>0</b>
<b>Manganese</b>	<b>36</b>	<b>0</b>
<b>Mercury</b>	<b>0</b>	<b>5819</b>
<b>Selenium</b>	<b>6055</b>	<b>286</b>
<b>Silver</b>	<b>12</b>	<b>0</b>
<b>Zinc</b>	<b>656</b>	<b>0</b>
<b>Nutrients</b>	<b>0</b>	<b>916</b>
<b>Nitrate</b>	<b>0</b>	<b>0</b>
<b>Unionized Ammonia</b>	<b>42</b>	<b>530</b>
<b>pH</b>	<b>65</b>	<b>0</b>
<b>Siltation</b>	<b>52</b>	<b>0</b>
<b>BOD, organic sediment load</b>	<b>12</b>	<b>0</b>
<b>Dissolved oxygen saturation</b>	<b>10</b>	<b>1006</b>
<b>Thermal Impacts</b>	<b>437</b>	<b>0</b>
<b>Pathogens - fecal coliform</b>	<b>278</b>	<b>0</b>
<b>Pathogens - e. coli</b>	<b>582</b>	<b>0</b>
Notes: “Cause” means the pollutants and other stressors that contribute to the non-attainment of classified uses in a water body.  Sum of the acres or miles affected does not equal the total non-attained acres or miles since non-attainment may have more than one cause.		



<b>Table 15: Summary of Sources Affecting Water Bodies Not Fully Supporting Classified Uses</b>		
<b>Source Category</b>	<b>Colorado Rivers (Miles Affected)</b>	<b>Colorado Lakes (Acres Affected)</b>
<b>Contaminated Groundwater</b>	<b>0</b>	<b>78.4</b>
<b>Highway/Road/Bridge Runoff (Non-construction Related)</b>	<b>17</b>	<b>0</b>
<b>Acid Rock Drainage</b>	<b>572</b>	<b>142</b>
<b>Sources Unknown</b>	<b>6,854</b>	<b>8,049</b>
Notes:		
“Source” means the activities, facilities, or conditions that contribute pollutants or stressors.		
Sum of the acres or miles affected does not equal the total non-attained acres or miles since non-attainment may have more than one cause.		

### C3.1 Designated Use Tables

This section gives an explanation for the Designated Use Support Table included in Appendix B and Appendix C of this Report. These assessments are individually listed in this table according to stream segments. The following table provides an explanation of the Water Body Identification (WBID) System used in Colorado. The basins are separated by Regulation Numbers. The Designated Use Table lists the assessments according to this system.

<b>Table 16: The Key to Colorado's WBIDs</b>			
<b>Regulation Number</b>	<b>Letters 1-2 = Colorado</b>	<b>Letters 3-4 = Major River Basin</b>	<b>Letters 5-6 = Minor River Basin</b>
<b>#32</b>	<b>CO</b>	AR Arkansas Basin	UA Upper Arkansas River Basin MA Middle Arkansas River Basin FO Fountain Creek Basin LA Lower Arkansas River Basin CI Cimarron River Basin
<b>#33</b>	<b>CO</b>	UC Upper Colorado and North Platte Basin	UC Upper Colorado River Basin BL Blue River Basin EA Eagle River Basin RF Roaring Fork River Basin NP North Platte River Basin YA Yampa River Basin
<b>#34</b>	<b>CO</b>	SJ San Juan River and Dolores River Basins	SJ San Juan River Basin PI Piedra River Basin PN Los Pinos River Basin AF Animas and Florida Rivers Basin LP La Plata River, Mancos River, McElmo Creek and San Juan DO (Upper) Dolores River Basin



<b>Table 16: The Key to Colorado's WBIDs</b>			
<b>Regulation Number</b>	<b>Letters 1-2 = Colorado</b>	<b>Letters 3-4 = Major River Basin</b>	<b>Letters 5-6 = Minor River Basin</b>
#35	CO	GU Gunnison and Lower Dolores River Basins	UG Upper Gunnison River Basin NF North Fork of the Gunnison River Basin UN Uncompahgre River Basin LG Lower Gunnison River Basin SM San Miguel River Basin LD Lower Dolores River Basin
#36	CO	RG Rio Grande Basin	RG Rio Grande River Basin AL Alamosa River/La Jara Creek/Conejos Creek Basin CB Closed Basin/San Luis Valley Basin
#37	CO	LC Lower Colorado Basin	LY Lower Yampa/Green River Basin WH White River Basin LC Lower Colorado river Basin
#38	CO	SP South Platte Basin	US Upper South Platte River Basin CC Cherry Creek BE Bear Creek Basin CL Clear Creek Basin BD Big Dry Creek Basin BO Boulder Creek Basin SV St Vrain Creek Basin MS Middle South Platte River Basin BT Big Thompson River Basin CP Cache La Poudre River Basin LA Laramie River Basin LS Lower South Platte River Basin RE Republican River Basin

Appendices B and C tabulate, for each segment, the designated uses as well the corresponding attainment status for each use, the date of the most current assessment, identified sources and impairments, and the corresponding segment size. The methodology used in Colorado for assigning these categories system is explained in the following table as well as detailed in the schematic in Appendix A.

<b>Table 17: Comparison of EPA IR Categories to Colorado 303(d) Listings</b>		
<b>EPA IR Category</b>	<b>EPA Description</b>	<b>Colorado Description</b>
1	All designated uses are supported, no use is threatened.	Fully Supporting for all uses. All uses have been assessed and all uses are fully supporting the designated uses.
2	Available data and/or information indicate that some, but not all of the designated uses are supported.	Some uses have been assessed and all uses assessed are fully supporting the designated uses. Other uses have not been assessed.



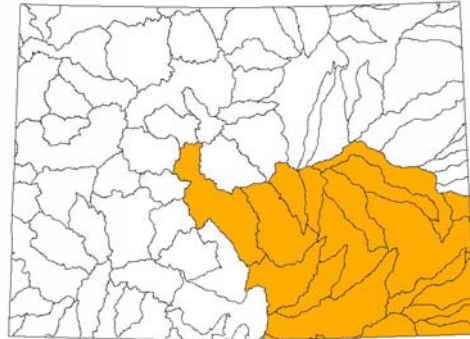
<b>Table 17: Comparison of EPA IR Categories to Colorado 303(d) Listings</b>		
<b>EPA IR Category</b>	<b>EPA Description</b>	<b>Colorado Description</b>
3	There is insufficient available data and/or information to make a use support determination.	Not Assessed for any uses. Placed on Colorado's Monitoring and Evaluation List (M&E) because impairment is suspected
4a	A TMDL to address a specific segment/pollutant combination has been approved or established by EPA.	TMDL completed. May be supporting or not assessed and waiting for future monitoring to determine use support.
4b	A use impairment caused by a pollutant is being addressed by the State through other pollution control requirements.	Water is impaired but a TMDL is not needed because other mechanisms are expected to result in the attainment of Water Quality Standards in a reasonable period of time. (e.g. CERCLA Sites)
4c	A use is impaired, but the impairment is not caused by a pollutant.	Impairment is caused by pollution. Placed on Colorado's Monitoring and Evaluation List (M&E)
5	Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed.	Placed on Colorado's 303(d) List. No TMDL has been completed.

In Colorado, the majority of the assessed surface water bodies fall into IR Categories 1, 2, and 3. Colorado has elected to place segments where not all uses have been assessed in IR Category 2. In some cases, a complete assessment of all uses cannot be completed due to the lack of data, but the data that is available indicates that at least some of the uses that were assessed are fully supporting. An example would be instances where an aquatic life assessment has been completed, but analytical results to assess water supply uses was not available. Colorado places segments that lack topical and conclusive evidence regarding attainment of standards on the M&E list, which is equivalent to IR Category 3. Also included in IR category 3 are those water bodies that were not assessed during the current 305(b) assessment cycle. Segments for which and EPA approved TMDL has been completed are placed in IR Category 4a. In some cases, segments that previously were classified as IR category 4a, have been re-assessed and placed in Category 1, as they are now are in attainment of all classified uses. Colorado currently does not have any surface water bodies classified as IR Categories 4b or 4c. Regulation #93, Colorado's section 303(d) list of impaired waters tabulates all those segments the require a TMDL, (Appendix D) tabulates all those water bodies that are classified as IR Category 5.



**C3.2 Arkansas River Basin**

The Arkansas River Basin is the largest basin in Colorado (28,286 square miles), based on drainage area. Major tributaries within the basin include: Fountain Creek, Huerfano River, and the Purgatoire. The headwaters originate near Leadville, and then run through the southeastern part of Colorado, where it leaves the State near the town of Holly. The major population centers in the Arkansas River Basin are Leadville, Colorado Springs, Pueblo, Las Animas and Lamar. The sub-basins include: Upper Arkansas River, Middle Arkansas River, Fountain Creek, Lower Arkansas River and the Cimarron River.



**Surface Water Quality Assessment:**

The water quality in the Arkansas River Basin was comprehensively assessed in 2001-2002 in preparation for the review of water quality standards for the 2002 Rulemaking Hearing in Pueblo, Colorado. The Division operates routine water quality stations in the Arkansas Basin, but additional Division stations were monitored in preparation for the 2002 hearing. Data from USGS, CDOW, and private locations throughout the basin were also assessed. The USGS operates a Hydrologic Benchmark Station on Halfmoon Creek (#07083000), near the headwaters of the Arkansas River. Additional assessments were completed for the 2006 303(d) List in 2005.

**Assessment Results:**

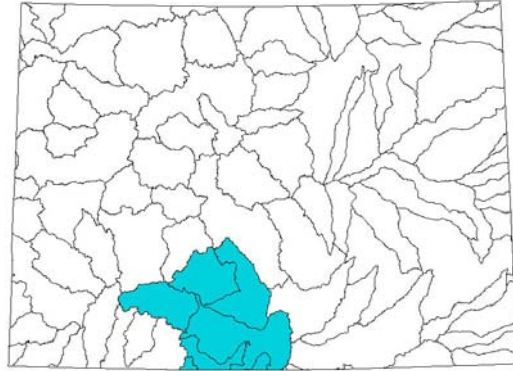
For the Arkansas River Basin 33% of the river miles and 34% of the lake acres are fully supporting all classified uses. For lakes another 38% of acres are supporting at least some of the classified uses. The individual use support for the Arkansas Basin waterbodies is summarized in the following table (Table 18).

<b>Table 18: Impairment Summary for the Arkansas River Basin</b>		
<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	7,974	12,992
2 - Some Uses Supporting	1,494	14,331
3 - Insufficient Data, Placed on the M&E list	12,591	10,242
4a - TMDL Completed and Approved	0	0
4b - Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	2,231	175



**C3.3 Rio Grande Basin**

The Rio Grande Basin is located in south-central Colorado, and covers 7,500 square miles. The basin ranges from above 14,000 feet above sea level in the Sangre de Cristo Mountains to 7,400 feet above sea level where the Rio Grande crosses the Colorado/New Mexico border. The principal tributaries of the Rio Grande are the Alamosa and the Conejos River.



**Surface Water Quality Assessment:**

The water quality in the Rio Grande Basin was comprehensively assessed in 2001-2002 in preparation for the review of water quality standards for the 2002 Rulemaking Hearing in Pueblo, Colorado. The Division operates routine water quality stations in the Rio Grande Basin, but additional Division stations were monitored in preparation for the 2002 hearing. Data from USGS, CDOW, and private locations throughout the basin were also assessed.

**Assessment Results:**

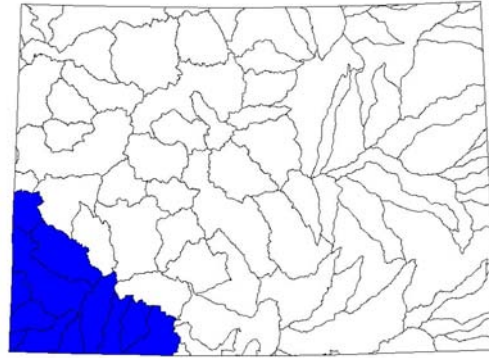
For the Rio Grande Basin 72% of the river miles are fully supporting all classified uses, with an additional 2% supporting at least one of the classified uses. For lakes within the Rio Grande Basin, 17% of the lake acres are fully supporting all classified uses. The individual use support for the Rio Grande Basin is summarized in the following table (Table 19).

<b>Table 19: Impairment Summary for the Rio Grande Basin.</b>		
<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	4,983	947
2 - Some Uses Supporting	119	0
3 - Insufficient Data, Placed on the M&E list	1,622	3,219
4a – TMDL Completed and Approved	0	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	151	1,347



**C3.4 San Juan River Basin**

The San Juan and Dolores Rivers in southwestern Colorado are both tributary to the Colorado River. The principal tributaries of the San Juan River are the Animas, Florida, La Plata, Los Pinos, Mancos, and Piedra Rivers. The main tributary of the Dolores River is the San Miguel River. The San Juan River and tributaries pass through the Ute Mountain Indian Reservation and the Southern Ute Indian Reservation before exiting the state. The major population areas are Cortez, Durango, and Pagosa Springs.



**Surface Water Quality Assessment:**

The water quality in the San Juan River Basin was comprehensively assessed in 2004-2005 in preparation for the triennial review of water quality standards scheduled for a July, 2006 Rulemaking Hearing. Water quality standards for the waters in the San Juan and Dolores Basin are contained in two regulations: Regulation No. 34, San Juan and Upper Dolores and Regulation No. 35, Gunnison and Lower Dolores.

**Assessment Results:**

For the San Juan River Basin, 51% of the river miles are fully supporting all classified uses. An additional 8% of the river miles are supporting at least one classified use. The individual use support for the San Juan Basin is summarized in the following table.

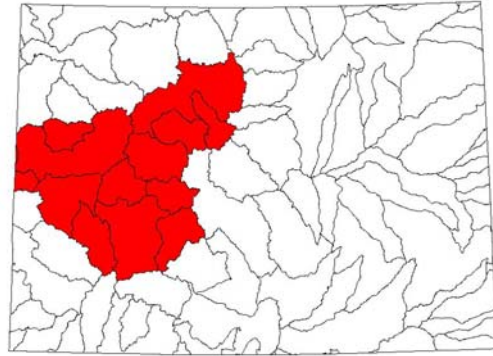
Table 20: Impairment Summary for the San Juan River Basin.		
EPA IR Category	River Miles	Lake Acres
1 - Fully Supporting	3,581	0
2 - Some Uses Supporting	586	0
3 - Insufficient Data, Placed on the M&E list	2,774	3,037
4a – TMDL Completed and Approved	86	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	72	5,048





**C3.5 Colorado River Basin**

The Colorado River Basin is the second largest basin in Colorado (18,140 square miles). The quantity of flows through the basin is greater than the combined flows of all the other basins in the state. Major tributaries to the Colorado River include: the Blue, Eagle, Roaring Fork, and Gunnison Rivers. The major population centers in this basin are: Grand Junction, Gunnison, Montrose, Aspen, Delta, and Vail.



**Surface Water Quality Assessment:**

Water quality standards for the Colorado River Basin have been reviewed at various times as the segments are included in three regulations: Regulation No. 33 (North Platte and Upper Colorado River Basins) was reviewed in July 2003, Regulation No. 35 (Gunnison and Lower Dolores River Basins) was reviewed in 2001, and Regulation No. 37 (Lower Colorado River Basin) was reviewed in 2001 and 2003. The Division operates routine water quality stations in the Colorado River Basin, but additional Division stations were monitored in preparation for the various hearings. Data from USGS, CDOW, and private locations throughout the basin were also assessed.

**Assessment Results:**

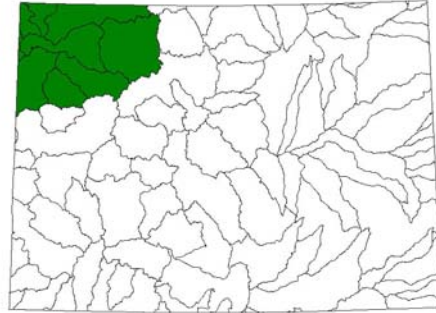
For the Colorado River basin 68% of the river miles and 67% of the lake acres are fully supporting all uses. An additional 12% of the river miles, and 20% of the lake acres, are supporting some of the classified uses. The individual use support for the Colorado Basin is summarized in the following table (Table 21).

<b>Table 21: Impairment Summary for the Colorado River Basin.</b>		
<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	16,988	18,130
2 - Some Uses Supporting	3,005	5,395
3 - Insufficient Data, Placed on the M&E list	1,194	2,875
4a – TMDL Completed and Approved	9	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	3,808	762



**C3.6 Green River Basin**

The Green River Basin is comprised of the Yampa and the White River Basins, the principal Colorado tributaries to the Green River. The Yampa and the White Rivers are among the least developed rivers in Colorado. They originate in the high alpine forests of the Flat Tops Wilderness Area. This basin is sparsely populated and the largest city is Craig, Colorado.



**Surface Water Quality Assessment:**

The Green River Basin was assessed in 2002 and 2003 for the July 2003 rulemaking hearing for Regulation No. 37, Lower Colorado River. The Division operates routine water quality stations in this basin, but additional Division stations were monitored in preparation for this hearing. Data from USGS, CDOW, and private locations throughout the basin were also assessed.

**Assessment Results:**

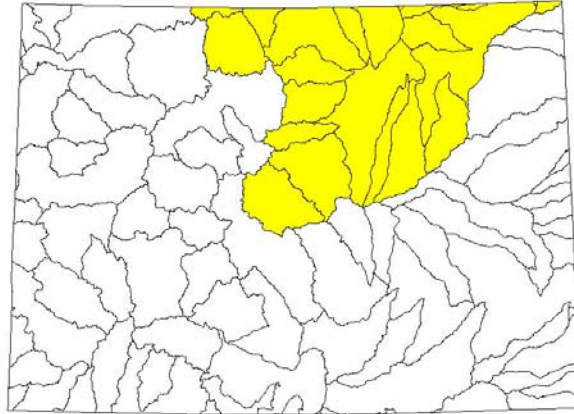
The Green River Basin has 52% of the river miles, and 59% of the lake acres fully supporting all designated uses. Additionally, 2% of the river miles, and 27% of the lake acres are supporting at some of the classified uses. The individual use support for the Green Basin is summarized in the following table (Table 22).

<b>Table 22: Impairment Summary for the Green River Basin.</b>		
<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	7,478	1,743
2 - Some Uses Supporting	334	780
3 - Insufficient Data, Placed on the M&E list	6,280	410
4a – TMDL Completed and Approved	0	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	208	0



**C3.7 Platte River Basin**

The Platte River Basin covers approximately 21,000 square miles in northeastern Colorado. The North and South Platte Rivers join in Nebraska to form the Platte River. The South Platte River has the largest population of any river basin in Colorado with almost 3 million people, or almost 70% of the state’s population. The major tributaries of the South Platte are Bear Creek, Cherry Creek, Clear Creek, Boulder Creek, St. Vrain River, Big Thompson River and the Cache La Poudre River.



**Surface Water Quality Assessment:**

The Platte River Basin was assessed in 2003 and 2004 for the July 2004 rulemaking hearing for Regulation No. 38, South Platte River. The Division operates routine water quality stations in this basin, but additional Division stations were monitored in preparation for this hearing. Data from USGS, CDOW, and private locations throughout the basin were also assessed.

**Assessment Results:**

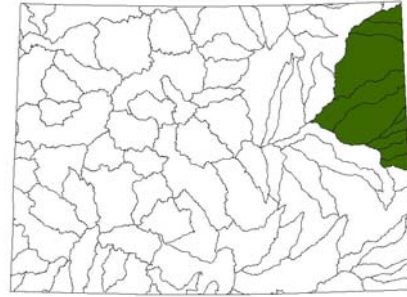
For the Platte River Basin 54% of the river miles are fully supporting, with an additional 13% supporting at least some of the uses. In terms of the percentage of river miles fully supporting, the South Platte River basin, with the largest population, is comparable to the Green River basin, one of the most sparsely populated basins in Colorado. For lakes within the Platte River Basin, 36% of the lake acres are fully supporting. Additionally, a further 4% of the lake acres are supporting at least some of the classified uses. The individual use support for the Platte Basin is summarized in the following table (Table 23).

<b>Table 23: Individual Use Summary for the Platte River Basin.</b>		
<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	12,439	10,911
2 - Some Uses Supporting	2,917	1,241
3 - Insufficient Data, Placed on the M&E list	4,580	13,252
4a – TMDL Completed and Approved	5	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	3,134	4,763



### C3.8 Republican River Basin

The Republican River Basin covers the northeast High Plains of Colorado. Yuma, Holyoke, and Burlington are the largest cities in this sparsely populated basin, where the population represents less than 1% of the State's population. The Republican is the only large river basin in the state that does not have headwaters in the mountains. The area depends primarily on groundwater from the Ogallala Aquifer for irrigating cropland and providing domestic water for farm communities. In 2004, the Republican River Water Conservation District was formed to respond to Colorado's requirements under the recently revised interstate compact.



#### **Surface Water Quality Assessment:**

The Republican River Basin was assessed in 2003 and 2004 for the July 2004 rulemaking hearing for Regulation No. 38, South Platte River. The Division operates routine water quality stations in this basin, but additional Division stations were monitored in preparation for this hearing. Data from USGS, CDOW, and private locations throughout the basin were also assessed.

#### **Assessment Results:**

For the Republican River Basin, 2% of the river miles are fully supporting, with an additional 1% supporting at least some of the designated uses. No lakes have been assessed in this basin. The individual use support for the Republican Basin is summarized in the following table (Table 24).

<b>EPA IR Category</b>	<b>River Miles</b>	<b>Lake Acres</b>
1 - Fully Supporting	95	0
2 - Some Uses Supporting	37	0
3 - Insufficient Data, Placed on the M&E list	5,486	1,831
4a – TMDL Completed and Approved	0	0
4b – Impaired no TMDL Necessary	0	0
4c - Impaired Naturally, Placed on the M&E list	0	0
5 - Impaired and TMDL Necessary	0	0



### **C3.9 Clean Lakes Program – Section 314**

Colorado has approximately 1,533 significant publicly owned lakes of greater than ten surface acres. The total surface acreage of these lakes has been estimated at 164,029. Significant publicly owned lakes are defined as those natural lakes, reservoirs, or ponds where the public has access to recreational activities, such as fishing and swimming, or where the beneficial uses, such as water supply, affect the public.

Section 314(a)(2) of the Clean Water Act requires states to report on the status of lake water quality as part of the 2006 305(b) report. Colorado conducted lake assessments under the Lake Water Quality Assessment assistance grant from EPA between 1989 to 1994. Since 1995, Colorado has not received separate funding for lake and reservoir monitoring.

#### **1. Monitoring Current Biennium**

During this biennium (2004-2005), the Division monitored 29 lakes and reservoirs. The lake and reservoir monitoring efforts provide data to evaluate the trophic status of Colorado lakes and reservoirs. The data also are used to assess attainment of water quality standards.

#### **2. Trophic State Assessment**

Trophic state is a classification of lakes based on the level of biological productivity (especially algae) and nutrient status. Commonly used indicators of nutrient status and productivity include the amount of algae as measured by chlorophyll-a, water transparency as measured by Secchi disc depth, and in-lake epilimnetic total phosphorous concentration. The trophic state is broadly defined as follows:

- Oligotrophic: lakes with few available nutrients and a low level of biological productivity
- Mesotrophic: lakes with nutrient levels and biological productivity between oligotrophic and eutrophic
- Eutrophic: lakes with high nutrient levels and a high level of productivity
- Hypereutrophic: lakes in an advanced eutrophic state

Trophic status, per se, is not an indicator of water quality problems. It is an index of water quality only to the extent that trophic condition limits the desired use of a lake (i.e., water supply or recreation). Generally, the effects of lake eutrophication are considered to be negative, especially if the eutrophication is accelerated by human activities. Negative effects include taste and odor problems for water supplies; reduction in water clarity, which is important for many recreational uses; and a reduction in the DO concentration in bottom waters to levels that are lethal to fish. Eutrophication often leads to increased fish production, but at the expense of desired species that inhabit cold deep areas, such as trout.



As part of the lake assessments, the Division also considers data collected by agencies other than the Division. Routine monitoring of publicly owned reservoirs is being, or has been performed, by the USGS, Army Corps of Engineers, Denver Water Board, and various other entities including cities, regional council of governments, and river basin associations.

The Division uses the Trophic State Index (TSI) equations developed by Carlson (1977) to estimate trophic state. Data for the epilimnion (upper-most layer in a stratified lake) collected during the open-water season was used to calculate the mean chlorophyll-a for each lake monitored by the Division during 2004 and 2005. The mean chlorophyll-a values were used to calculate the chlorophyll TSI for each lake. Each lake’s TSI was compared to the categories presented below (Table 25) to determine an overall trophic state (Olem and Flock, 1990).

<b>Table 25: Trophic State Index (TSI) vs. Trophic State</b>	
<b>TSI</b>	<b>Trophic State</b>
0-40	Oligotrophic
41-50	Mesotrophic
51-65	Eutrophic
>65	Hypereutrophic

Interpretation of TSIs for estimating the trophic status of reservoirs sometimes poses problems because of discrepancies among TSIs. For example, reservoirs tend to have large watersheds and are turbid due to suspended inorganic materials. This tends to elevate the TSIs for Secchi depth and total phosphorus when compared to chlorophyll a. Therefore, the Division evaluates eutrophication using chlorophyll a as the primary indicator. A summary of the lake assessments can be found in Table 26.

<b>Table 26: Trophic Status of Colorado Lakes presents the estimated trophic status of individual lakes monitored by the WQCD during the period 2003-2005.</b>							
<b>Lake</b>	<b>WBID</b>	<b>Elevation</b>	<b>Surface Acres<sup>1</sup></b>	<b>Chlorophyll a, µg/L</b>	<b>Chl-TSI</b>	<b>Estimated Trophic Status</b>	<b>Years monitored</b>
DeWeese Reservoir	COARUA15	7665	240	3.9	44	Mesotrophic	2005
Turquoise Lake	COARUA05	9869	1788	1.1	31	Oligotrophic	2005
Clear Creek Reservoir	COARUA05	8875	425	2.5	40	Oligotrophic	2005
Twin Lakes	COARUA10	9200	2277	1.2	33	Oligotrophic	2005
Brush Hollow Reservoir	COARUA24	5500	200	10.5	54	Eutrophic	2005



**Table 26: Trophic Status of Colorado Lakes presents the estimated trophic status of individual lakes monitored by the WQCD during the period 2003-2005.**

Lake	WBID	Elevation	Surface Acres <sup>1</sup>	Chlorophyll a, µg/L	Chl-TSI	Estimated Trophic Status	Years monitored
John Martin Reservoir	COARLA11	3851	3112	22.7	61	Eutrophic	2005
Nee Gronda Reservoir	COARLA10	3876	3490	8.2	51	Eutrophic	2005
Adobe Creek Reservoir	COARLA10	4128	4105	81	74	Hypereutrophic	2005
Lake Meredith	COARLA12	4100	5509	0.4	20	Oligotrophic	2005
Lake Henry	COARLA12	4312	1200	7.6	51	Eutrophic	2005
Trinidad Reservoir	COARLA05B	6172	2018	2.2	38	Oligotrophic	2005
Martin Lake	COARMA16	6410	206 <sup>2</sup>	8.1	51	Eutrophic	2005
Beaver Creek Reservoir	CORGRG05	8850	115	84.6	74	Hypereutrophic	2005
La Jara Reservoir	CORGAL11	9698	800	105.9	76	Hypereutrophic	2005
Sanchez Reservoir	CORGRG30	8272	675	6.8	49	Mesotrophic	2005
Smith Reservoir	CORGRG27	7721	674	74.6	73	Hypereutrophic	2005
Platoro Reservoir	CORGAL14	10034	700	15.6	58	Eutrophic	2005
Lake San Cristobal	COGUUG29	8995	330	0.8	28	Oligotrophic	2004-2005
Sweitzer Reservoir	COGUUN14	4950	126	3.4	43	Mesotrophic	2005
Ridgeway Reservoir	COGUUN03	6871	1030	1.3	33	Oligotrophic	2004-2005
McPhee Reservoir	COSJDO04	6924	4470	2.2	38	Oligotrophic	2004-2005
Narraguinnep Reservoir	COSJLP11	7050	578	1.1	32	Oligotrophic	2005
Vallecito Reservoir	COSJPN03	7665	2654	2.1	38	Oligotrophic	2004-2005
Lemon Reservoir	COSJAF12B	8148	622	3.1	42	Mesotrophic	2004-2005
Mancos Reservoir	COSJLP04	7825	220	2.1	38	Oligotrophic	2004-2005



**Table 26: Trophic Status of Colorado Lakes presents the estimated trophic status of individual lakes monitored by the WQCD during the period 2003-2005.**

Lake	WBID	Elevation	Surface Acres <sup>1</sup>	Chlorophyll a, µg/L	Chl-TSI	Estimated Trophic Status	Years monitored
Totten Reservoir	COSJLP11	6158	244 <sup>2</sup>	1.4	34	Oligotrophic	2004-2005
Puett Reservoir	COSJLP11	7261	134 <sup>2</sup>	4	44	Mesotrophic	2004-2005
Summit Reservoir	COSJDO04	7368	402	42.4	67	Hypereutrophic	2005
Carter Lake	COSPBT11	5760	1118	1.3	33	Oligotrophic	2004
1) Surface acres were estimated using the NHD 1:100,000 scale GIS coverage, and are therefore based on the mapped lake levels associated with this digitized coverage. 2) These WBIDs represent multiple lakes and reservoirs, and the reported surface acres were estimated for the individual waterbody listed in the table.							





## **D. Ground Water Monitoring and Assessment**

Ground water protection in Colorado is diverse, with a number of State agencies providing varying roles in providing ground water quality protection and assessment. A number of these agencies, referred to as “implementing agencies”, are charged with protecting ground water under separate Federal or State legislation. The various implementing agencies have developed program specific regulations, under their authority, to address ground water quality issues.

### *Ground Water Standards and Classifications*

In 2004, the Water Quality Control Commission (WQCC) conducted a triennial review hearing to address Colorado’s *Basic Standards for Groundwater* (Regulation 41). During the hearing the WQCC updated and revised a number of numeric ground water standards, including the manner in which standards are derived for certain Group C chemicals. The WQCC also adopted new standards for 21 additional organic chemicals that are classified as carcinogenic (Group A or B). The most controversial of these new standards was a numeric standard for 1,4-dioxane, which has been found in the ground water at several RCRA and CERCLA facilities in Colorado. The numeric standards for organic chemicals that were adopted for ground water were concurrently adopted for surface water. Additionally, for those organic chemicals that could bioaccumulate, corresponding standards for fish consumption were included for surface water.

During 2004 and 2005 the WQCC also adopted two additional site-specific ground water classifications, bringing the total for the State to 53. Both of the classifications involved oil field operations, and were initiated by the Colorado Oil and Gas Conservation Commission (COGCC), the implementing agency with jurisdiction of Underground Injection Control (UIC) Class II wells. The classifications integrate the OGCC’s rules and regulations regarding UIC Class II wells with those promulgated by the WQCC. These classifications are one example of Colorado’s efforts to coordinate the ground water quality protection efforts conducted by the various implementing agencies.

### *Ground Water Monitoring*

The *Agricultural Chemicals and Groundwater Protection Program* (Groundwater Program), a cooperative program between the Colorado Department of Agriculture (CDA), Colorado State University Cooperative Extension (CSUCE), and the Water Quality Control Division (WQCD), has been systematically monitoring for the presence of agricultural related chemicals in vulnerable aquifers throughout Colorado. The program utilizes a combination of regulations, education, and groundwater monitoring to assess and control potential ground water contamination that may result from improper use of agricultural chemicals. The Groundwater Program, which has been actively pursuing ground water protection since 1992, has developed a number of tools including:

- EPA approved Pesticide Management Plans (PMPs),



- Several chemical specific ground water sensitivity and vulnerability investigations,
- Numerous Best Management Practices (BMPs) and related educational material intended as pollution prevention measures.
- Rules and Regulations regarding mixing and loading operations and containment at commercial pesticide facilities.

Additionally, the Groundwater Program has actively monitored all the major aquifers in agricultural areas within the State. These aquifers include:

- South Platte alluvial aquifer
- San Luis Valley unconfined aquifer
- Lower Arkansas alluvial aquifer
- Denver Basin Aquifer System and alluvial deposits on the Front Range
- High Plains / Ogallala aquifer
- Colorado River and Uncompahgre River alluvial aquifers
- N. Platte alluvial and terrace formations in Jackson County
- Alluvial and fractured bedrock aquifers in Custer County.

During 2004 and 2005 the Groundwater Program continued annual sampling of the South Platte alluvial aquifer between Brighton and Greeley. The monitoring network for the South Platte alluvial aquifer includes dedicated monitoring wells as well as privately owned irrigation and domestic wells. Additionally, the Groundwater Program drilled and sampled 20 dedicated monitoring wells within the Arkansas River alluvial aquifer utilizing an EPA grant. For all the ground water monitoring, parameters that are sampled for include nitrates as well as 47 commonly used pesticides.

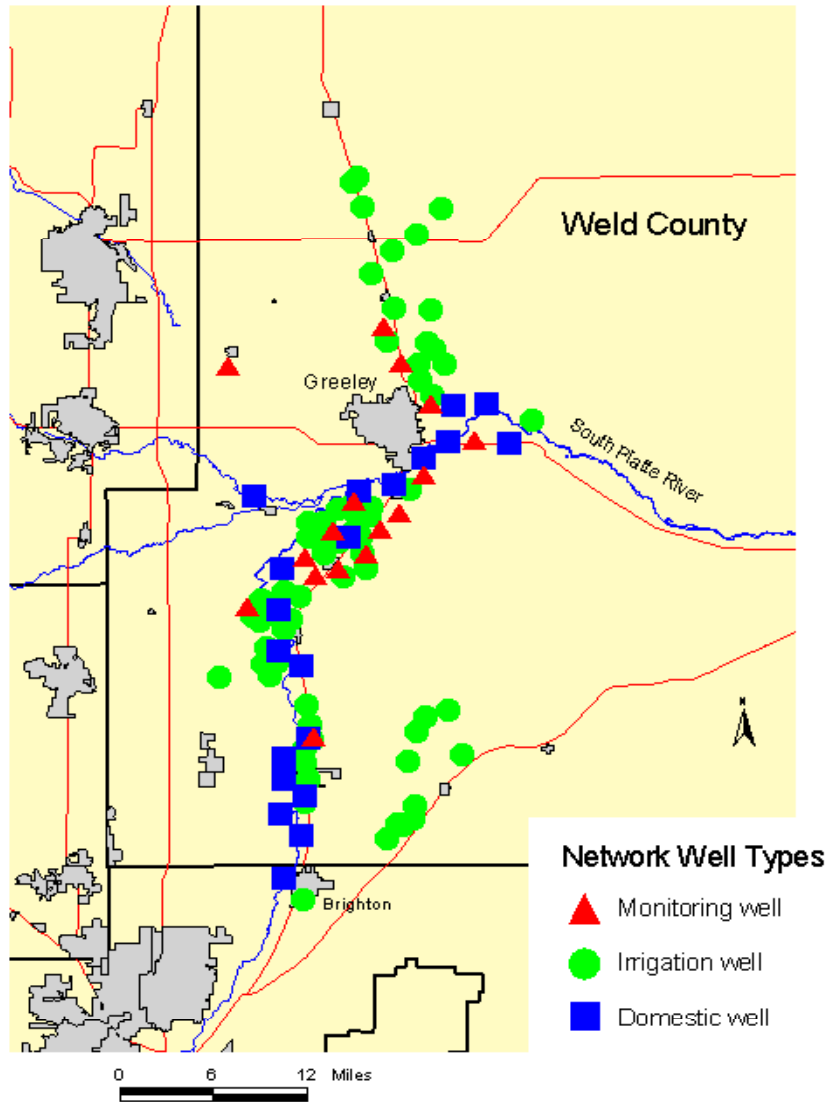
### **Fiscal Year 2003/2004 Groundwater Monitoring**

In 2003, the program completed the ninth year of a long term monitoring in the South Platte alluvial aquifer between Brighton to Greeley. The long-term monitoring network was established in 1995 and is a combination of three types of wells designed to sample the aquifer both laterally and vertically (Figure 2). The three well types include:

- 20 dedicated monitoring wells operated by the Central Colorado Water Conservancy District;
- 60 irrigation wells that were previously sampled in 1989, 1990, 1991, 1994; and
- 18 domestic wells first sampled in 1992.

The monitoring and irrigation wells are sampled each year; the domestic wells every three years.





**Figure 2: Location and Well Type Comprising Weld County Long Term Monitoring Network**

During fiscal year 2003/2004, 69 wells in the long-term network were sampled. All wells were analyzed for nitrate-nitrite as nitrogen. The 19 monitoring wells were analyzed for the complete suite of 47 pesticides. The pesticide analysis for the 50 irrigation wells was an immuno assay screen for the triazine herbicides.

Nitrogen analysis indicated that 63% of the monitoring wells and 66% of the irrigation wells exceeded the nitrate drinking water standard of 10 mg/L. In the monitoring wells, nitrate levels varied over a broader range, with the highest median value. The monitoring wells sample the upper most zone (10 feet) of the aquifer. The irrigation wells recorded a narrower range in nitrate levels and a smaller median value. The differences are expected due to the different zones of the aquifer sampled by each well set, as the irrigation wells



sample the entire saturated zone. Table 27 below, lists the summary statistics for both sets of wells.

<b>Table 27: Summary Statistics for the Weld County Nitrate Monitoring FY 2003/2004</b>		
	<b>Monitoring wells</b>	<b>Irrigation wells</b>
Mean	25.2	19.4
Median	20.3	16.8
Standard Deviation	25.8	16.5
Minimum	2.4	< 0.01
Maximum	111	82
# Wells Sampled	19	50
Note: all values are Nitrate as N (mg/L), except # Wells Sampled		

Pesticide results for the monitoring well portion of the network revealed two pesticides, Atrazine and Metolachlor present in the Weld County monitoring well samples. The breakdown product of Atrazine, Deethyl Atrazine, was also detected. Atrazine was present in two wells and Deethyl Atrazine was also present in two of the wells. One well contained both triazine compounds. Metolachlor was detected in two other wells. Detection levels ranged from 0.58 for Metolachlor to 1.27 ug/L (ppb) for DEA. No pesticide was detected at a level that exceeds the applicable standard or health advisory.

The triazine herbicide screen used on the irrigation wells detects any pesticide in this family, which includes Atrazine, Simazine, Cyanazine, Deethyl Atrazine, Deisopropyl Atrazine, and Prometone. The results are calibrated in units of Atrazine equivalent but may be actually composed of one or more of the components. In 2003, triazine herbicides were detected in 76% of the irrigation wells, an increase from the 63% detected in 2002. Levels ranged from 0.06 ug/L to 0.61 ug/L (ppb).

**Fiscal Year 2004/2005 Groundwater Monitoring**

In 2004, the Program completed the tenth year of a long term monitoring in the South Platte alluvial aquifer between Brighton to Greeley. From June through August 2004, 82 wells in the long-term network were sampled. All wells were analyzed for nitrate-nitrite as nitrogen. The 19 monitoring wells were analyzed for 47 pesticides. The pesticide analysis for the 53 irrigation and 10 domestic wells was an immuno assay screen for the triazine herbicides.

Nitrogen analysis indicated that 58% of the monitoring wells, 70% of the irrigation wells and 40% of the domestic wells exceeded the nitrate drinking water standard of 10 mg/L. In the monitoring wells, nitrate levels varied over a broader range, with the highest median value. The monitoring wells sample the upper most zone (10 feet) of the aquifer. The irrigation and domestic wells recorded a narrower range in nitrate levels with a smaller median value for the domestic wells. The differences are expected due to the different zones of the aquifer sampled by the various types of wells. The irrigation wells



typically represent samples from the entire saturated zone, while the domestic wells samples are more typical of the lower portion of the aquifer. Table 28 below, lists the summary statistics for each set of wells.

<b>Table 28: Summary Statistics for the Weld County Nitrate Monitoring FY 2004/2005</b>			
	<b>Monitoring wells</b>	<b>Domestic wells</b>	<b>Irrigation wells</b>
Mean	20.0	11.7	15.9
Median	14.7	9.0	14.3
Standard Deviation	23.2	10.5	9.8
Minimum	3.6	1.6	0.05
Maximum	110	35.3	37.2
# Wells sampled	19	10	53
Note: all values are Nitrate as N (mg/L), except # Wells Sampled			

Pesticide results for the monitoring well samples indicated the presence of three pesticides; Atrazine, Metolachlor, and Clopyralid. The breakdown product of Atrazine, Deethyl Atrazine was also detected. Atrazine was present in three wells and Deethyl Atrazine was present in six of the wells. Three wells contained both triazine compounds. Metolachlor and Clopyralid were each detected in other wells. The total number of wells with pesticide detections was eight of the nineteen sampled (42%). Detection levels ranged from 0.16 for Atrazine to 1.96 ug/L (ppb) for DEA. No pesticide was detected at a level that exceeds the applicable standard or health advisory.

The triazine herbicide screen used on the irrigation wells detects any pesticide in the triazine family, including; Atrazine, Simazine, Cyanazine, Deethyl Atrazine, Deisopropyl Atrazine, and Prometone. The results are calibrated in units of Atrazine equivalent but may be actually composed of one or more of the above components. In 2004, triazine herbicides were detected in 92% of the irrigation wells and 80% of the domestic wells. Levels ranged from 0.06 ug/L to 0.86 ug/L (ppb) in the irrigation wells and from 0.06 ug/L to 0.18 ug/L in the domestic wells.

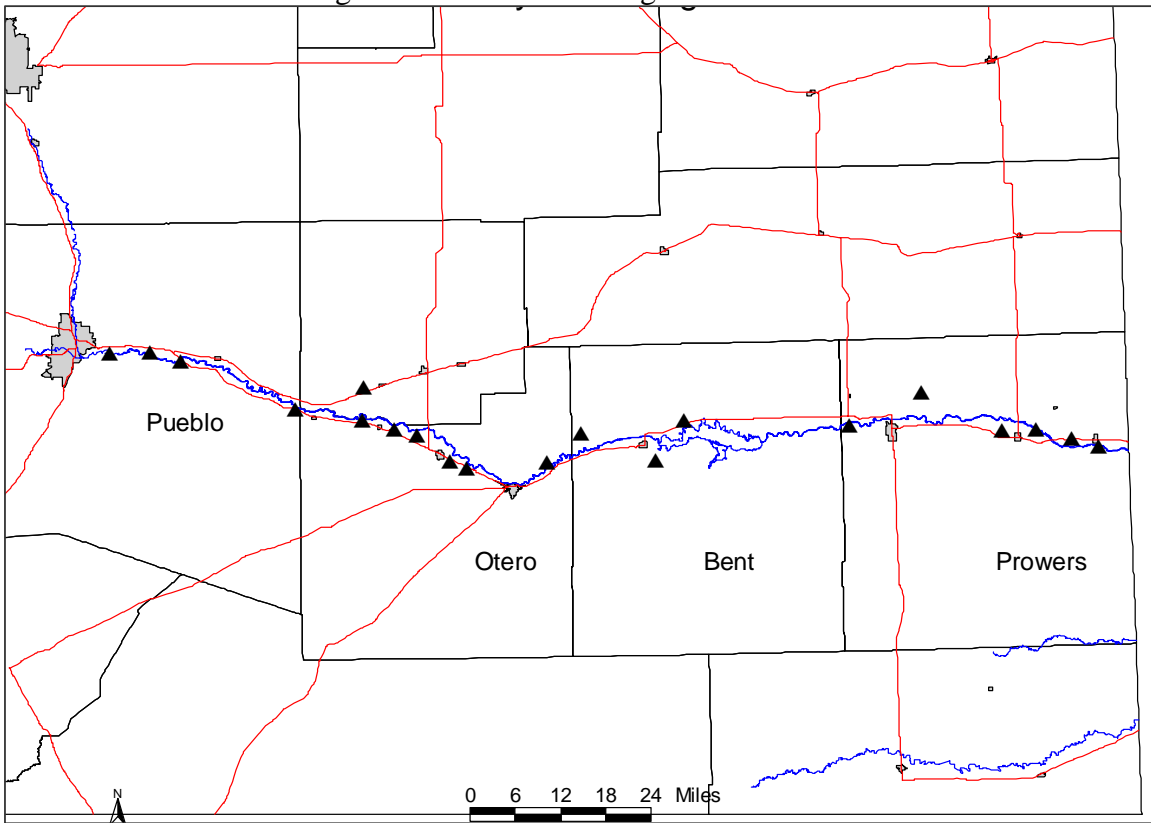
**Arkansas River Monitoring Well Network**

The analysis of existing monitoring data, agricultural chemical use, and aquifer sensitivity and vulnerability models developed by the Program lead to a priority ranking of areas of the state for monitoring. The Arkansas River alluvial aquifer was lacking in monitoring well coverage and ranks third as an area of concern. Therefore, this area was selected to receive a dedicated monitoring well network.

The specific monitoring well site selection criteria were similar to the criteria that have guided the monitoring program since its inception. To qualify, a location must have agricultural chemical use in significant quantities, depth to ground water generally less than 50 feet (both a vulnerability and drilling economics factor), a representative array of soil types, and a mixture of irrigated and non-irrigated land use.



In the spring of 2004, the Groundwater program drilled a total of 20 monitoring wells in the Arkansas River alluvial aquifer. These wells were located along the river from just east of the city of Pueblo to the town of Holly, near the Colorado and Kansas border. The locations of the monitoring wells are shown on Figure 3.



**Figure 3: Final Monitoring Well Locations with the Arkansas River Alluvial Aquifer.**

***Arkansas River Monitoring Well Network Sampling***

The Arkansas monitoring well network was first sampled in 2004, after installation and development of the new monitoring wells. Only one of the monitoring wells had reported a nitrogen analysis result that exceeded the nitrate drinking water standard of 10 mg/L. In fact, nitrate concentrations were below 5 mg/l in 13 of the 19 monitoring wells (68%) that were sampled, and thus the average concentration observed was 4.3 mg/l. Table 29, below, lists the summary statistics for Arkansas River Alluvium aquifer monitoring wells.



<b>Table 29: Summary Statistics for the Arkansas River Monitoring Wells FY 2004/2005</b>	
	<b>Monitoring wells</b>
Mean	4.3
Median	2.6
Standard Deviation	3.6
Minimum	<0.19
Maximum	13.6
# Wells sampled	19*
Note: all values are Nitrate as N (mg/L), except # Wells Sampled. * One monitoring well was damaged before sampling was conducted	

Pesticides analyses indicated only a single detection for each of the following pesticides; Atrazine, Desethyl Atrazine, Metalachlor, and 2,4-D. The concentrations for each of these compounds were below any standard or health advisory level, and the maximum concentration observed was 0.41µg/l of Desethyl Atrazine. In total over 765 analyses of individual pesticides were conducted, with approximately 0.5% of the samples indicating any presence of pesticides.

