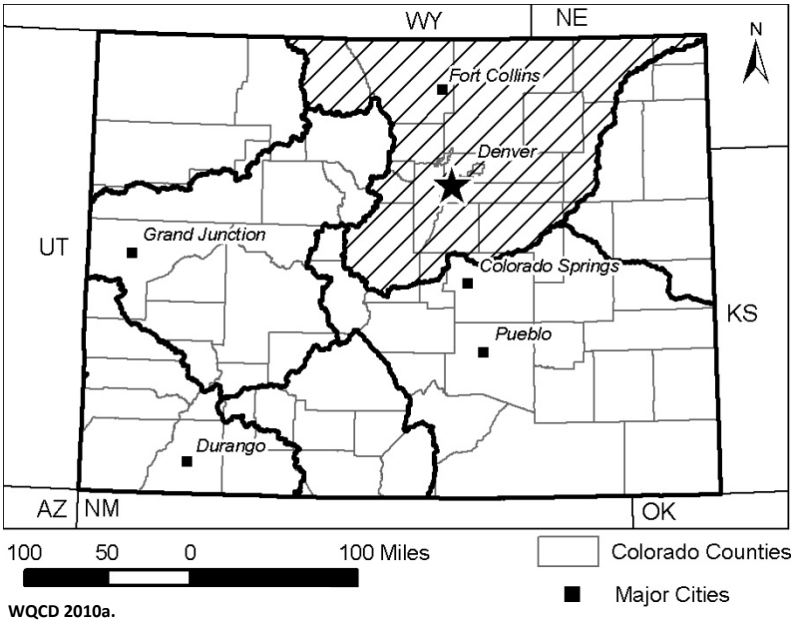
Chapter 11
Platte River Basin Plan
(Regulation Nos. 33 and 38)

Exhibit 11-1. Platte River Basin Physical Location



WQCD 2010a.

Exhibit 11-2. Platte River Basin Summary Statistics

Ecoregions (Level IV):[1]	18. Wyoming Basin (f) 21. Southern Rockies (a-j) 25. High Plains (b-d, l) 26. Southwestern Tablelands (e, i-j)	**Surface Area:**[2] **Stream Length:**[3]	20,306 square miles 22,907 miles
Threatened and Endangered Species (federal and state):[2]	Threatened: 14 Endangered: 12 State Species of Concern: 21	**Major Land Cover:**[2]	Grassland and Planted/Cultivated
Counties:	Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, El Paso (portion), Elbert (portion), Gilpin, Jefferson, Larimer, Lincoln (portion), Logan (portion), Morgan, Sedgwick (portion), Teller (portion), Washington (portion), Weld	**No. of Assessed Lakes/Reservoirs:**[4, 5] **Corresponding Acres:**	71 95,588.49
Population:[6]	3,476,903	**No. of Groundwater Aquifers:**[2]	13
Major Population Centers:[2]	Denver, Boulder, Aurora, and Lakewood	**Approximate No. of Publicly Owned Treatment Works:**[7]	348
Water Quality Planning Regions (in total or in part):[8]	1, 2, 3, 4, 5, and 12	**Known Primary Water Quality Stressors:**[4]	Ammonia, arsenic, cadmium, chlorophyll-a, copper, dissolved oxygen, *Escherichia coli*, iron, lead, manganese, mercury, pH, phosphorus, sediment, selenium, sulfide, temperature, and zinc

[1] See appendix B for a description of key ecoregional characteristics.
[2] CWCB 2004 (North Platte Basin plus 66% of the South Platte Basin).
[3] WQCD 2002a.
[4] WQCC 2010c; WQCD 2010a.
[5] The number of lakes/reservoirs and the corresponding acres only include the lakes that have been assessed by Water Quality Control Division and do not reflect all of the lakes/reservoirs present in the basin.
[6] CWCB 2010.
[7] USEPA 2010a, 2010d; WQCD 2010b.
[8] See exhibit 2-2 in chapter 2 for the names of the Water Quality Planning Regions and counties covered.

This basin chapter and the SWQMP as a whole are primarily water quality documents. They are based on readily available, peer reviewed water quality information, particularly the 2010 Integrated Water Quality Monitoring and Assessment Report (2010 Integrated Report or Clean Water Act (CWA) section 305(b) report).[1] *Both the Water Quality Control Commission (WQCC) and the Water Quality Control Division (WQCD) are aware of many other water quality data sources. Organizations and other parties with water quality data are encouraged to get involved in "calls for data" for the biennially completed CWA section 305(b) reports. The data sources that are used in forthcoming CWA section 305(b) reports will subsequently be used in future iterations of the SWQMP. Other key water quality regulations and policies used in the chapter are tabulated in Appendix A.*

11.1 System Description

11.1.1 Location and Physical Setting

The Platte River Basin encompasses approximately 20,306 square miles and includes drainages for the North Platte River and the South Platte River covering the northeastern part of Colorado. The North Platte River drains the area bounded on the west by the Park Mountain Range and on the south by the Rabbit Ears Mountain Range. The Front Range divides the North Platte River and the South Platte River drainages. The South Platte River originates southwest of Denver and flows through the Denver metropolitan area and into the high plains region of Colorado. Tributaries to the North Platte River include the Laramie River and Sand Creek. Tributaries to the South Platte River include the North, Middle, and South Forks of the South Platte River, Bear Creek, Clear Creek, St. Vrain Creek, Big Thompson River, and Cache La Poudre River (CWCB 2004).

Elevations in the Platte River Basin range from 14,000 feet in the headwater regions to approximately 3,400 feet in the high plains region (CWCB 2006a, 2006b). A map of the basin showing the North and South Platte Rivers and their major tributaries is provided as exhibit 11-3 (at end of chapter).

11.1.2 Ecology

The boundaries of the Platte River Basin fall within four distinct level III ecoregions (Chapman et al. 2006). Approximately 53% of the basin falls within the High Plains Ecoregion, 37% falls within the Southern Rockies Ecoregion, 10% falls within the Southwestern Tablelands, and 0.5% falls within the Wyoming Basin Ecoregion (exhibit 11-4 at end of chapter). Key characteristics of these and the more specific level IV ecoregions, such as physical characteristics, elevation, land cover, climate, geology, and soil types, are provided in appendix B.

The Platte River Basin contains several endangered and threatened species and several species of state concern, as summarized in exhibit 11-5 (at end of chapter). There are 12 federally and/or

[1] The Integrated Reports are prepared by the WQCD on a biennial basis and are approved by the WQCC as Regulation No. 93: *Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List*, 5 CCR 1002-93 (WQCC 2010c; WQCD 2010a).

state-listed endangered species (four fish, four bird, three mammalian, and one plant species) and 14 federally and/or state-listed threatened species (three fish, five bird, three mammalian, and three plant species). Finally, Colorado has 21 species of concern in the Platte River Basin (two fish, three amphibian, two reptile, one gastropod, one bivalve, eight birds, and four mammalian species) (CDOW 2010; CWCB 2004).

Exhibit 11-6 (at end of chapter) shows the locations of environmental and recreational uses (i.e., nonconsumptive uses) in the Platte River Basin.[2] The use categories include environmental focus areas, environmental and recreational focus areas, and recreational focus areas (CWCB 2009). The nonconsumptive uses shown are only meant to provide information on environmental and recreational uses in the basin and not to dictate future actions or impact any water rights (CWCB 2009).

The Colorado Division of Wildlife (CDOW) has designated the following areas in the Platte River Basin as gold medal fisheries and, thus, areas of high recreational value (CWCB 2004): North Platte River from Routt National Forest to the Colorado-Wyoming border, North Delaney Butte Lake, South Fork from Highway 285 to Antero Reservoir, Middle Fork from Highway 9 to the confluence of the Middle and South Forks and the South Platte River, Middle and South Forks to Elevenmile Reservoir (including Spinney Mountain Reservoir), and Chessman Reservoir Dam to the North Fork (CWCB 2004).

11.1.3 Climate

Because large portions of the Platte River Basin are relatively flat, particularly in the eastern portion, daily and seasonal air temperatures are extremely variable. The plains portion of the basin receives low amounts of precipitation, ranging from 7 to 17 inches annually, while the mountains in the western portion of the basin can receive over 30 inches of precipitation annually. The foothills between the mountains and the plains receive 17 to 21 inches of precipitation annually. Exhibit 11-7 (at end of chapter) shows a contour (isohyetal) plot of the average annual precipitation throughout the basin (CWCB 2004).

11.1.4 Land Ownership and Land Cover/Use

Sixty-two percent of the land in the Platte River Basin is privately owned. Thirty percent of the land is federally owned, and the remaining 8% is owned by the state of Colorado. Exhibit 11-8 at end of chapter provides a map of land ownership by basin.

Land cover in the Platte River Basin is shown in exhibit 11-9 (at end of chapter) and summarized in exhibit 11-10. Grassland and planted/cultivated land are the predominant land cover types in the basin, covering approximately 47% and 29% of the basin, respectively. Forests are the predominant feature in the northwestern portion of the basin (CWCB 2004).

[2] In 2005, the Colorado legislature established the Water for the 21st Century Act, which established an Interbasin Compact Process that provides a permanent forum for broad-based water discussions in the state. The law created two new structures: the Interbasin Compact Committee (IBCC) and the Basin Roundtables. As part of the IBCC, the Basin Roundtables are required to complete basin-wide needs assessments; an assessment of consumptive water needs and an assessment of nonconsumptive water needs. In 2009, the Colorado Water Conservation Board released a draft report entitled, *Nonconsumptive Needs Assessment Focus Mapping.* The focus mapping described in the report is part of the Basin Roundtables' assessment of nonconsumptive water needs.

Exhibit 11-10. Platte River Basin[1] Land Cover Data

Land Cover	Basin-wide		Statewide	
	Area (sq. miles)	Percent of Total	Area (sq. miles)	Percent of Total
Grassland	9,568	47.1%	41,051	23.3%
Forest	3,160	15.6%	29,577	10.7%
Shrubland	1,053	5.2%	16,883	6.2%
Planted/cultivated	5,849	28.8%	13,737	42.6%
Barren	82	0.4%	1,219	6.7%
Developed	390	1.9%	923	42.2%
Open water	187	0.9%	590	31.7%
Wetland	15	0.1%	80	18.6%
TOTAL	**20,304**		**104,067**	

[1]Source: CWCB 2004. The CWCB Platte River boundaries are different from the SWQMP boundaries. Land cover for the SWQMP Platte River Basin is equivalent to 100% of the CWCB North Platte Basin and 66% of the CWCB South Platte River Basin.

11.1.5 Demographic and Socioeconomic Conditions

Population growth has exploded in the urban areas of the Platte River Basin over the past several years, primarily in Boulder, Fort Collins, Longmont, and Greeley. The population of the Platte River Basin is projected to increase by about 71% between 2009 and 2050 under medium economic growth assumptions, from 3.5 to 5.9 million. Population will remain relatively flat in Teller, Morgan, Gilpin, Clear Creek, and Larimer counties during the same period (CWCB 2010). Exhibit 11-11 (at end of chapter) shows the population projections for the Platte River Basin.

The Platte River Basin has the largest employment of all basins with over 1.3 million jobs in 2007 and over 2.2 million expected jobs by 2050. As shown in exhibit 11-12, the resident service sector had the greatest number of jobs in 2007 and is anticipated to continue having the most jobs by 2050 as compared to other sectors. The household basic sector will provide the highest number of jobs in 2050; they are expected grow at the fastest rate of any sector between 2007 and 2050 (CWCB 2010).

Exhibit 11-12. Platte River Basin 2050 Employment Projections,[1] Medium-Growth Scenario

Sector	2007	2050
Agribusiness Jobs	69,303	88,015
% of Total Jobs	3.4%	2.6%
Total % Growth	NA	27.0%
Mining Jobs	15,345	18,216
% of Total Jobs	0.7%	0.5%
Total % Growth	NA	18.7%
Manufacturing Jobs	74,057	100,292
% of Total Jobs	3.6%	2.9%
Total % Growth	NA	35.4%
Government Jobs	122,523	147,699
% of Total Jobs	5.9%	4.3%
Total % Growth	NA	20.6%
Regional/National Service Jobs	380,299	687,348

Sector	2007	2050
% of Total Jobs	18.4%	20.2%
Total % Growth	NA	80.7%
Tourism Jobs	97,813	178,498
% of Total Jobs	4.7%	5.2%
Total % Growth	NA	82.4%
Household Basic Jobs	159,165	436,505
% of Total Jobs	7.7%	12.8%
Total % Growth	NA	174.1%
Total Basic Jobs	919,420	1,656,578
% of Total Jobs	44.6%	48.6%
Total % Growth	NA	80.2%
Resident Service Jobs	1,144,837	1,749,829
% of Total Jobs	55.5%	51.4%
Total % Growth	NA	52.9%
Total Jobs	2,063,466	3,406,407
% of Total Jobs	100%	100%
Total % Growth	NA	65.1%

[1] The CWCB Platte River Basin boundaries are different from the SWQMP Platte River Basin boundaries. Employment data for the SWQMP Platte River Basin was estimated by summing the CWCB North Platte River Basin projections and 66% of the CWCB South Platte River Basin projections. The remaining 34% of the CWCB South Platte River Basin projections is assigned to the SWQMP Republican River Basin employment projections.

Source: CWCB 2010.

11.1.6 Water Withdrawals

Water quantity and quality issues are intertwined, particularly in arid western states where water can be scarce (CFWE 2003). Water quantity issues tend to be more contentious than quality issues. Water rights are protected under Colorado's constitution and several state statutes, including the Colorado Water Quality Control Act. Colorado water law establishes water use rights for a variety of purposes including farming, drinking, manufacturing, recreation, protection of the environment, and all of the use categories listed in exhibit 11-13 below (CFWE 2003). Public and private entities involved in watershed protection in Colorado have grown to appreciate that the two worlds of water quality and quantity are inexplicably linked and are working together more frequently to combat water quality/quantity problems.

In 2005, the U.S. Geological Survey (USGS), in cooperation with the Colorado Water Conservation Board (CWCB), estimated total surface water and groundwater use in the Platte River Basin to be approximately 3,179.97 million gallons per day (Mgal/d). Use was estimated for the following categories: irrigation for crops, irrigation for golf courses, public supply, domestic, industrial, livestock, mining, and thermoelectric.[3] Exhibit 11-13 shows the total water withdrawals in the basin and the state as a whole for these categories. The predominant uses of water in the basin were for agriculture at 2,522.12 Mgal/d (79%), followed by public supply at 538.17 Mgal/d (17%), and industrial at 57.20 Mgal/d (2%).

[3] The term "public supply" refers to "community water systems" as that term is defined under the federal Safe Drinking Water Act. Community water systems (CWSs) are any water system that serves drinking water to at least 25 people for at least 60 days of the calendar year or has at least 15 service connections. In addition to providing water to domestic customers, CWSs also deliver water to commercial, industrial, and thermoelectric power users. The term "domestic" refers to the portion of the population not served by a "public supply" (USGS 2010).

Exhibit 11-13. Platte River Basin Total Water Withdrawals[1] in Colorado, 2005

Use Category	Withdrawals by Use Category		
	Withdrawals (Mgal/d) *(Percent of Total Basin Withdrawals)*	Total Withdrawals All of Colorado (Mgal/d)	Withdrawals in Platte River Basin as Percent of Total Withdrawals in State
Agriculture (crop irrigation & livestock)	2,522.12 (79.31%)	12,354.91	20.41%
Irrigation (golf course)	20.46 (0.64%)	40.64	50.34%
Public Supply[2]	538.17 (16.92%)	864.17	62.28%
Domestic[3]	13.77 (0.43%)	34.43	40.01%
Industrial	57.20 (1.80%)	142.44	40.16
Mining	2.80 (0.09%)	21.42	13.07%
Thermoelectric	25.44 (0.80%)	123.21	20.6%
Totals	**3,178.50** *(or 3,564.76 thousand acre-feet per year)*	**13,581.22** *(or 15,224.55 thousand acre-feet per year)*	**23.41%**

[1] The CWCB Platte River Basin boundaries are different from the SWQMP Platte River Basin boundaries. Water withdrawal data for the SWQMP Platte River Basin was estimated by summing the CWCB North Platte River Basin data and 66% of the CWCB South Platte River Basin data. The remaining 34% of the CWCB South Platte River Basin data is assigned to the SWQMP Republican River Basin water withdrawals.

[2] The term "public supply" is water supplied by a publicly or privately owned water system for public distribution, sometimes also known as a "municipal-supply system" or "community water system" (CWS). Any water system that serves drinking water to at least 25 people for at least 60 days of the calendar year or has at least 15 service connections is considered a public supply system. In addition to providing water to domestic customers, CWSs also deliver water to commercial, industrial, and thermoelectric power users (USGS 2010).

[3] The term "domestic" refers to water used for household purposes, such as washing clothes, cleaning dishes, drinking, food preparation, bathing, flushing toilets, and watering lawns and gardens that are not served by public-supply systems (USGS 2010).

Source: USGS 2010.

The CWCB recently completed a projection of municipal and industrial (M&I) surface water use needs to the year 2050 for the state.[4] The projections will provide relevant parties in the state with a basis for discussing and addressing the state's future M&I water needs. In that report, the CWCB estimated M&I water demand in the Platte River Basin to be at 630,507 acre-feet per year (AFY) (563 Mgal/day) in 2008 and at 1,092,011 AFY (974 Mgal/day) for 2050 under medium economic growth assumptions. The water demands are projected to be 987,011 AFY

[4] In 2003, the Colorado General Assembly authorized the CWCB to implement the Statewide Water Supply Initiative (SWSI), an 18-month basin-by-basin investigation of the state's existing and future water needs. As part of that effort, the CWCB assembled water users (farmers, ranchers, municipalities, industrial users, recreationalists, and environmentalists) to plan for the future. That effort resulted in the completion of the *Statewide Water Supply Initiative* Phase I Report in November 2004 and a Phase II report in November 2007. Both reports focus on all water uses, not just M&I. Since that time, the CWCB has undertaken another investigation to project M&I surface water use needs to the year 2050 for the state. The result of that investigation is reported in the document *State of Colorado 2050 Municipal and Industrial Water Use Projections*, dated July 2010. The report is part of the Basin Roundtables' assessment of consumptive water needs in the state as required by the Water for the 21st Century Act, which was passed by the Colorado legislature in 2005.

(880 Mgal/day), under medium economic growth assumptions, if passive conservation is employed[5] (CWCB 2010).

M&I water needs in the Platte River Basin are expected to be nearly 0.7 times higher than 2008 levels by the year 2050. The counties with the highest forecasted M&I water demands are Jackson, Larimer, and Weld (CWCB 2010).

Water needs for self-supplied industrial (SSI) uses in the Platte River Basin are all from large industries, snow-making industries, and thermoelectric facilities in Larimer, Boulder, Adams, Denver, Clear Creek, Jefferson, Morgan, and Weld counties. Large industry demands are expected to hold steady at 59,000 AFY from 2008 to 2050 under medium economic growth assumptions for Jefferson, Morgan, and Weld counties. Snow-making industry water demands are expected to hold steady at 320 AFY from 2008 to 2050 under medium economic growth assumptions for Boulder and Clear Creek counties. Thermoelectric water demands are expected to increase from 33,400 AFY in 2008 to 59,400 AFY in 2050 (CWCB 2010)[6].

11.1.7 Hydrography and Hydrology

11.1.7.1 Surface Geology

The mountains of the Platte River Basin consist of Precambrian-age metamorphic and igneous rocks with some intrusions of granitic igneous rocks. Mesozoic- and Paleozoic-age sedimentary rock layers are present throughout the basin. Sedimentary rock layers range from flat-lying to steeply dipping folded and faulted structures. These sedimentary rock layers come into contact with the Precambrian age rock layers at a fault running north-south just west of Denver (CWCB 2004). It should also be noted that soils derived from the various shallow geologies and deposited materials are a prime consideration in water quality planning.[7]

11.1.7.2 Surface Water

The Platte River Basin includes both the North Platte River and the South Platte River. The North Platte River drains the north-central part of Colorado and has the Laramie River and Sand Creek as major tributaries. The South Platte River drains a larger portion of Colorado than the North Platte River, draining much of the northeast portion of the state, including the Denver metropolitan area and large portions of the high plains. The North Platte River has numerous tributaries, including the North Fork of the South Platte River, Middle Fork of the South Platte River, South Fork of the South Platte River, Bear Creek, Clear Creek, Boulder Creek, St. Vrain

[5] Passive conservation accounts for retrofits of existing housing and commercial construction with high-efficiency toilets, clothes washers, dishwashers, etc. as implementation of the baseline efficiency standards established under the 1992 National Energy Policy Act take place (CWCB 2010).

[6] Actual surface water and groundwater withdrawals listed in exhibit 11-13 differ from the current and projected M&I surface water use and SSI water needs. Source information is different for water withdrawal data and M&I and SSI data and should therefore not be directly compared.

[7] Soil variations occur on a local and regional scale and should be taken into consideration when addressing water quality problems. Information on soil conditions can be found through the Natural Resources Conservation Service (NRCS) Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. The website can be used to access soil maps and soil descriptions, interpretations, and characteristics. The information can be used at a relatively broad scale as well as on a site-specific basis.

Creek, Big Thompson River, and Cache la Poudre River. The Front Range separates the North Platte River drainage from the South Platte River drainage (CWCB 2004, 2006a, 2006b).

To monitor stream flow, numerous USGS stream flow gauges are maintained in the Platte River Basin. Exhibit 11-14 summarizes the mean annual stream flow, period of record, and drainage area for seven drainages, all of which CWCB recently selected to summarize historic flows in the basin across a broad spatial scale. As indicated in the exhibit, mean annual flows are highest in the South Platte River at Kersey and at South Julesburg. The locations of the selected gauges are shown in exhibit 11-15 (at end of chapter). Also shown in the latter exhibit are major surface water diversions and segments with decreased instream flow.

Exhibit 11-14. Platte River Basin Summary of Selected USGS Stream Gauges

Site Name	USGS Site Number	Mean Annual Stream Flow (AFY)	Mean Annual Stream Flow (cfs)[1]	Period of Record (years)	Drainage (square miles)
Laramie River near Glendevey	06657500	52,312	72	1904-1982	101
Sand Creek at Colorado-Wyoming State Line	06659580	7,518	10	1968-2002	29
North Platte River near Northgate	06620000	310,389	429	1915-2002	1,431
Poudre	06752000	270,981	374	1881-2002	1,056
South Platte at South Platte	06707500	289,740	400	1896-2002	2,579
South Platte at Kersey	06754000	651,466	900	1901-2002	9,598
South Platte at South Julesburg	06764000	395,314	546	1902-2002	23,193

[1] cfs = cubic feet per second.
Source: CWCB 2004.

In addition, it should be noted that mountain snowpack can have significant impacts and can cause variations in surface water quality and quantity on an annual basis. The Natural Resources Conservation Service (NRCS) Snow Survey Program provides mountain snowpack data and streamflow forecasts for the western United States. Common applications of snow survey data include water supply management, flood control, climate modeling, recreation, and conservation planning. Additional information on the NRCS snow survey program can be found at http://www.co.nrcs.usda.gov/snow/.

11.1.7.3 Groundwater

Groundwater in the Platte River Basin is predominately located within three aquifers: (1) Alluvial, (2) Bedrock, and (3) Designated Basins. Exhibit 11-16 (at end of chapter) shows these three aquifers. Also shown in the exhibit is the location of wells with a permitted or decreed yield of 500 gallons per minute (gpm) or higher (CGS 2003).

Approximately 880,000 AFY of groundwater is used for irrigation purposes, while 10,000 AFY is used to meet municipal, domestic, livestock, industrial, and commercial purposes. The saturated alluvial deposits might contain as much as 8.3 million acre-feet in storage and are hydrologically connected to the South Platte River. Groundwater withdrawals can affect flows farther downstream in the lower portions of the South Platte River. The largest number of wells

is in the alluvial aquifer. Saturated alluvial thickness ranges from 20 feet near Denver to more than 200 feet near Julesburg (CWCB 2004).

11.2 Water Quality Classifications and Standards

In general, water quality classifications and standards information is presented on a basin scale with some additional detail provided for sub-basins.

11.2.1 Sub-Basin Boundaries

As discussed in chapter 3, "Current Statewide Water Quality," Colorado's seven major drainage basins have been sub-divided into sub-basins as a means to present data at somewhat smaller scales throughout this document. The sub-basins are aggregations of the various stream segments on which the WQCD provides assessment data in its biennial *Integrated Water Quality Monitoring and Assessment Report*. For purposes of this report, the Platte River Basin has been sub-divided into four sub-basins.[8] These include the following:

- **North Platte:** The North Platte River Sub-basin is composed of segments of the North Platte River mainstem and tributaries from the headwaters to the Colorado/Wyoming border, as shown in exhibit 11-17 at end of chapter.
- **Upper South Platte:** The Upper South Platte River Sub-basin is composed of segments of the South Platte River mainstem and tributaries from the headwaters to Chatfield Reservoir, as shown in exhibit 11-18 at end of chapter. The Upper South Platte River Sub-basin is a large sub-basin that includes the metropolitan areas of Boulder and Denver. The tributary drainage areas of the South Platte River included within the sub-basin, are quite large and include Cherry Creek, Bear Creek, Clear Creek, Big Dry Creek, Boulder Creek, and St. Vrain Creek.
- **Middle South Platte:** The Middle South Platte River Sub-basin is composed of segments of the South Platte River from Big Dry Creek to the Weld/Morgan county line, as shown in exhibit 11-19 at end of chapter. The tributary drainage areas of the South Platte River included within this sub-basin include Big Thompson River, Cache La Poudre River, and Laramie River.
- **Lower South Platte:** The Lower South Platte River Sub-basin is composed of segments of the Lower South Platte River mainstem and tributaries from the Weld/Morgan county line to the Colorado/Nebraska border, as shown in exhibit 11-20 at end of chapter.

11.2.2 Surface Water

11.2.2.1 Use Classifications

The Platte River Basin contains a total of 218 stream segments covering approximately 18,590 stream miles (exhibit 11-17 through 11-20 at end of chapter). The WQCC has specified the classified uses for each of these segments in Regulation No. 33: *Classifications and Numeric*

[8] The WQCD identifies different sub-basins in its biennial Integrated Water Quality Reports than those provided in this document. The SWQMP aggregates water quality segments into larger sub-basins than those in the Integrated Reports simply because the resources available for this first iteration of the SWQMP did not allow for analyzing the data at finer scales.

Standards for the Upper Colorado River Basin and North Platte (Planning Region 12) (5 CCR 1002-33) and Regulation No. 38: *Classifications and Numeric Standards for the South Platte River Basin, Laramie River Basin, Republican River Basin, and Smoky Hill River Basin* (5 CCR 1002-38) (WQCC 2010a, 2010b). These uses are summarized in exhibits 11-21 through 11-25 (at end of chapter). The exhibits show that the WQCC has classified most of the segments in the Platte River Basin with the uses of agriculture (99%) and recreation (87%). These classified uses are followed by water supply (76%), aquatic life cold water 1 (43%), aquatic life warm 2 (34%), aquatic life cold 2 (12%), aquatic life warm 1 (11%), not suitable for recreation (10%), potential for recreation (3%), and undetermined recreation (3%). The stream miles associated with these uses are shown in exhibit 11-26.

Exhibit 11-26. Number of Streams and Stream Miles by Classified Use

Classified Uses	Number of Streams	Stream Miles	Percent of Total Stream Miles (n=18,589.70 miles)
Agriculture	216	18,585.65	99.9%
Existing Recreational Uses[1]	189	12,515.02	67%
Aquatic Life Warm 2	74	10,513.53	57%
Water Supply	165	9,231.21	50%
Aquatic Life Cold 1	94	7,208.66	39%
Not Suitable for Recreation[1]	22	5,588.21	30%
Aquatic Life Cold 2	27	700.70	4%
Aquatic Life Warm 1	23	166.81	1%
Potential Recreational Uses[1]	6	161.71	1%
Undetermined Recreational Uses[1]	6	38.30	0.2%
Total Streams	**218**	**18,589.70**	--

[1] Some segments in this basin have different recreational uses depending on the time of year (existing, not suitable, potential, and undetermined). This exhibit reflects all of the classified uses for all segments in the basin even if some are only applicable at certain times of the year.

Sources: WQCC 2010a, 2010c.

In its latest assessment cycle, the WQCD presented information for a total of 71 lakes in the Platte River Basin, covering 95,588.49 acres. [9] Exhibit 11-27 shows the classified uses for each of these lakes/reservoirs and the corresponding lake acres.

[9] Lakes are presented in WQCC's surface water quality classifications and standards regulations in several ways. A lake may be present alone as its own segment, as a combination of several lakes grouped into a segment, or as part of a segment that includes streams, lakes, and wetlands. The WQCD presented only those lakes/reservoirs it assessed during its latest monitoring cycle in appendix B of the 2010 Integrated Report. The entire universe of lakes/reservoirs in the state is not explicitly denoted in the WQCC regulations, nor are the lakes/reservoirs fully denoted in WQCD's biennial Integrated Reports. Each biennial cycle, the WQCD assesses and presents information for only a subset of lakes/reservoirs in the state.

Exhibit 11-27. Number of Lakes/Reservoirs and Corresponding Acres by Classified Use

Classified Uses	Number of Lakes	Lake Acres	Percent of Total Lake Acres (n=95,420.19 acres)
Agriculture	71	95,588.49	100%
Existing Recreational Uses[1]	65	89,971.79	94%
Water Supply	60	77,337.00	81%
Aquatic Life Warm 2	22	40,404.56	42%
Aquatic Life Cold 1	30	27,384.36	29%
Aquatic Life Warm 1	13	26,621.47	28%
Undetermined Recreational Uses[1]	3	4,416.40	5%
Aquatic Life Cold 2	6	1,178.10	1%
Potential Recreational Uses[1]	1	874.10	1%
Not Suitable for Recreation[1]	2	326.20	0.3%
Total Lakes:	**71**	**95,588.49**	--

[1] Some segments in this basin have different recreational uses depending on the time of year (existing, not suitable, potential, and undetermined). This exhibit reflects all of the classified uses for all segments in the basin even if some are only applicable at certain times of the year.

Sources: WQCC 2010a, 2010c.

11.2.2.2 Designations

As further shown in exhibits 11-21 through 11-25 (at end of chapter), the WQCC has designated a total of 18 waterbody segments as *Outstanding Waters*. The WQCC has designated a total of 49 waterbody segments as *Use Protected*. The meaning of these two designations is provided in section 2.2.3.1 of chapter 2, "Water Quality Planning and Management in Colorado."

11.2.2.3 Standards

Numeric standards for the Platte River Basin are provided in the "Stream Classifications and Water Quality Standards" tables attached to Regulation Nos. 33 and 38. Because new standards are often developed and existing standards are periodically revised, the standards are not summarized here. Readers should consult the actual regulations for specific details; they are available at http://www.cdphe.state.co.us/regulations/wqccregs.

11.2.3 Lakes

11.2.3.1 Trophic Status

From July 2007 to July 2009 the WQCD monitored a total of 50 lakes and reservoirs across the state to evaluate their trophic status and to assess whether they were attaining their respective water quality standards. Of the 50 lakes/reservoirs assessed, 18 are in the Platte River Basin (three in the North Platte, six in the Upper South Platte, five in the Middle South Platte, and four in the Lower South Platte). In addition, during the period from 1995 to 2006, the WQCD monitored other sets of lakes/reservoirs across the state to assess their trophic status and determine whether water quality standards were being met. Of the total lakes/reservoirs assessed during the period, six are in the Platte River Basin (three in the Upper South Platte and three in the Middle South Platte). (See exhibits 11-28 through 11-31.)

The *trophic state* is a means of classifying lakes based on their 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 disk depth, and in-lake epilimnetic total phosphorus concentration. WQCD broadly defines the various *trophic states* for the purposes of its analyses as follows:

- **Oligotrophic.** Lakes with few available nutrients and a low level of biological productivity. They are characterized by clear water, and they often support cold-water fish species.
- **Mesotrophic.** Lakes with moderate nutrient levels and biological productivity between oligotrophic and eutrophic. These lakes usually support warm-water fish species.
- **Eutrophic.** Lakes with high nutrient levels and a high level of productivity. These lakes typically support only warm-water fish species.
- **Hypereutrophic.** Lakes in an advanced eutrophic state.

Exhibit 11-28. North Platte River Sub-Basin, Trophic Status of Lakes and Reservoirs as Measured by WQCD during the Period 2007 to 2008

Lake	Lake John	North Delaney Lake	North Lake
Segment ID No.	COUCNP04	COUCNP04	COUCNP04
Elevation (feet)	8,050	8,050	8,893
Surface Acres	612	565	130
Chlorophyll *a* (µg/L)	2.77	1.17	1.84
Chlorophyll Trophic Status Index[1]	41	32	37
Secchi Depth (meters)	4.57	4.37	--
Estimated Trophic Status	Mesotrophic	Oligotrophic	Oligotrophic
Year Monitored	2007	2007	2008

[1] Chlorophyll Trophic Status Index (TSI) quantifies the relationship between lake clarity measured in terms of Secchi disk transparency and algal biomass measured in terms of chlorophyll a. Lakes with the following TSI values are estimated to have the following trophic status: TSI 0-40, Oligotrophic; TSI 41-50, Mesotrophic; TSI 51-70, Eutrophic; and TSI greater than 70, Hypereutrophic.

Sources: WQCD 20002a, 2008a, and 2010a.

Exhibit 11-29. Upper South Platte River Sub-Basin, Trophic Status of Lakes and Reservoirs as Measured by WQCD during the Period 2000 to 2008

Lake	11-Mile	Antero	Spinney	Tarryall	Union	Wellington #4	Bear Creek Reservoir	Cherry Creek Reservoir	Standley Lake
Segment ID No.	COSPUS01a	COSPUS01a	COSPUS01a	COSPUS02	COSPSV06	COSPUS04	COSPBE01c	COSPCH02	COSPBD02
Elevation (feet)	8,597	8,940	8,686	8,860	4,956	5,228	5,600	5,550	5,500
Surface Acres	3,405	5,000	2,520	886	743	100	109	900	1,230
Chlorophyll *a* (µg/L)	4.72	2.37	1.81	1.81	5.37	1.08	14.6	25	2.8
Chlorophyll Trophic Status Index[1]	46	39	36	36	47	31	57	62	41
Secchi Depth (meters)	6.27	4.70	5.47	5.47	1.27	1.75	2.3	0.96	2.85
Estimated Trophic Status	Mesotrophic	Oligotrophic	Oligotrophic	Oligotrophic	Mesotrophic	Oligotrophic	Eutrophic	Eutrophic	Mesotrophic
Year Monitored	2007	2007	2007	2007	2007	2008	2000	2000	2000

[1] Chlorophyll TSI quantifies the relationship between lake clarity measured in terms of Secchi disk transparency and algal biomass measured in terms of chlorophyll a. Lakes with the following TSI values are estimated to have the following trophic status: TSI 0-40, Oligotrophic; TSI 41-50, Mesotrophic; TSI 51-70, Eutrophic; and TSI greater than 70, Hypereutrophic.

Sources: WQCD 20002a, 2008a, and 2010a.

Exhibit 11-30. Middle South Platte River Sub-Basin, Trophic Status of Lakes and Reservoirs as Measured by WQCD during the Period 1995 to 2008

Lake	Boedecker Reservoir	Carter Lake	Douglas	Lon Hagler Reservoir	Lonetree Reservoir	Barr Lake	Horseshoe Lake	Loveland Lake
Segment ID No.	COSPBT14	COSPBT11	COSPCP13a	COSPBT14	COSPBT14	COSPMS04	COSPBT12	COSPBT12
Elevation (feet)	5,062	5,760	5,204	5,125	5,131	--	--	--
Surface Acres	308	1,140	565	100	502	--	--	--
Chlorophyll *a* (µg/L)	1.99	2.14	6.08	4.30	5.03	--	15.1	5.8
Chlorophyll Trophic Status Index	37	38	48	45	46	--	57	48
Secchi Depth (meters)	0.85	2.57	0.95	1.68	2.27	--	0.8	2.4
Estimated Trophic Status	Oligotrophic	Oligotrophic	Mesotrophic	Mesotrophic	Mesotrophic	Hypereutrophic	Eutrophic	Mesotrophic
Year Monitored	2008	2007	2008	2008	2007	1995-1998	1999	1999

[1] Chlorophyll TSI quantifies the relationship between lake clarity measured in terms of Secchi disk transparency and algal biomass measured in terms of chlorophyll a. Lakes with the following TSI values are estimated to have the following trophic status: TSI 0-40, Oligotrophic; TSI 41-50, Mesotrophic; TSI 51-70, Eutrophic; and TSI greater than 70, Hypereutrophic.

Sources: WQCD 20002a, 2008a, and 2010a.

Exhibit 11-31. Lower South Platte River Sub-Basin, Trophic Status of Lakes and Reservoirs as Measured by WQCD during the Period 2007 to 2008

Lake	Jackson Reservoir	Jumbo	North Sterling Reservoir	Prewitt Reservoir
Segment ID No.	COSPLS03	COSPLS03	COSPLS03	COSPLS03
Elevation (feet)	4,440	3,704	4,065	4,088
Surface Acres	2,600	1,703	2,880	900
Chlorophyll *a* (µg/L)	26.67	3.66	77.80	14.50
Chlorophyll Trophic Status Index	63	43	73	57
Secchi Depth (meters)	0.70	3.53	0.52	0.40
Estimated Trophic Status	Eutrophic	Mesotrophic	Hypereutrphic	Eutrophic
Year Monitored	2007	2007	2007-2008	2008

[1] Chlorophyll TSI quantifies the relationship between lake clarity measured in terms of Secchi disk transparency and algal biomass measured in terms of chlorophyll a. Lakes with the following TSI values are estimated to have the following trophic status: TSI 0-40, Oligotrophic; TSI 41-50, Mesotrophic; TSI 51-70, Eutrophic; and TSI greater than 70, Hypereutrophic.

Sources: WQCD 20002a, 2008a, and 2010a.

As shown in exhibits 11-28 through 11-31, eight of the assessed lakes and reservoirs in the Platte River Basin were identified as oligotrophic, nine were identified as mesotrophic, five were identified as eutrophic, and two were noted as hypereutrophic.

11.2.3.2 Fish Tissue Studies

As part of its overall monitoring efforts, the WQCD also investigates fish tissues for the presence of contaminants that can be harmful to humans if ingested. The WQCD uses the monitoring data to issue fish consumption advisories (FCAs) to the public as warranted. During the period July 2007 to July 2009, WQCD evaluated fish tissues from more than 112 waterbodies. Of this number, 10 were assessed in the Platte River Basin for mercury, selenium, and arsenic. No FCAs were issued for any of the 10 lakes included in this assessment effort. Exhibit 11-32 lists the lakes/reservoirs and fish species evaluated in the Platte River Basin.

Exhibit 11-32. Platte River Basin Lakes and Reservoirs Assessed for Mercury, Selenium, and Arsenic During the Period 2007 to 2009

Lake (Segment ID No.)	Species Tested
Barker Reservoir (COSPBO14)	Brown trout and rainbow trout
Boedecker Reservoir (COSPBT14)	Striped bass and walleye
Boulder Reservoir (COSPSV07)	Black crappie, channel catfish, smallmouth bass, and walleye
Cherry Creek Reservoir (COSPCH02)	Walleye
Douglas Reservoir (COSPCP13a)	Wiper and walleye

Lake (Segment ID No.)	Species Tested
Johnstown Reservoir (COSPBT13)	Walleye
Lake Loveland (COSPBT13)	Smallmouth bass, yellow perch, and walleye
Lon Hagler (COSPBT14)	Channel catfish, largemouth bass, northern pike, walleye, and striped bass
Prewitt Reservoir (COSPLS03)	Wiper and walleye
Wellington #4 Reservoir (COSPUS04)	Northern pike, walleye, and wiper

Sources: WQCC 2010c; WQCD 2010a.

The WQCD chose to test for the presence of mercury, selenium, and arsenic in fish tissue because of the harmful human health effects that may occur if these parameters are ingested. In particular, mercury adversely affects wildlife and humans, especially children and women of childbearing age. It is also the leading cause of impairment in the nation's estuaries and lakes. Mercury was cited in nearly 80% of FCAs reported by the states in the 2000 National Listing of Fish and Wildlife Advisories. Although arsenic generally bio-accumulates in fish in its less toxic organic form, human exposure is still harmful. The U.S. Department of Health and Human Services (DHHS) has determined that arsenic is a known carcinogen, and human exposure can occur by ingesting water, soil, or air contaminated by the substance. Selenium is an essential dietary element that prevents damage to tissues by oxygen. When consumed in amounts higher than the recommended daily allowance, however, it is toxic to both humans and animals, and excessive ingestion or exposure should be minimized (WQCD 2005).

Any waterbody that is issued an FCA is listed on the state's CWA section 303(d) list of impaired waters with aquatic life impairment. TMDLs must be completed for all impairments. Between 1993 and 2010, the WQCD issued an FCA for mercury for six waterbodies during 2006 and 2007 in the Platte River Basin (exhibit 11-33).

Exhibit 11-33. Platte River Basin Lakes and Reservoirs in Which a Fish Consumption Advisory (FCA) Has Been Issued

Lake (Segment ID No.)	Pollutant	Species Tested	Year FCA Issued
Berkeley Lake (COSPUS17a)	Mercury	Largemouth bass	2006
Boyd Lake (COSPBT12)	Mercury	Walleye	2007
Carter Lake (COSPBT11)	Mercury	Walleye	2007
Horsetooth Reservoir (COSPCP14)	Mercury	White bass, wiper, and walleye	2007
Horseshoe Lake (COSPBT12)	Mercury	Smallmouth bass and sauger	2007
Rocky Mountain Lake (COSPUS17a)	Mercury	Largemouth bass	2006

Sources: WQCC 2010c; WQCD 2006a, 2006b, 2007a, 2007b, 2007c, 2007d, 2010a.

11.2.4 Wetlands

A map of Platte River Basin wetlands is included as exhibit 11-34 (at end of chapter). The wetlands are those included in the U.S. Fish and Wildlife Service's (USFWS's) National Wetlands Inventory, the database the USFWS uses to periodically report to Congress on the status and trends of the nation's wetlands. Colorado's Natural Heritage Program and other entities are involved in more fully identifying and characterizing Colorado's wetlands. This information will be added when completed to future iterations of the SWQMP.

At the state level, the Platte River Basin lies within an area supported by CDOW's North Park Focus Area Committee and South Platte Focus Area Committee.[10] The CDOW has identified numerous wetland types within the Platte River Sub-Basin, including beaver ponds, natural kettle ponds, lakes, marshes, irrigated meadows, and riparian wetlands. These wetlands types are generally distinguished by water table, vegetation and soil types (North Park Wetlands Focus Area Committee 2002, South Platte Wetland Focus Area Committee 2002).

Both the North Park and the South Platte Focus Area Committees have identified important wetland areas within their respective areas of interest. Important wetlands include those that the committees believe have educational and recreational value and that serve as migratory and wintering habitat for waterfowl. Exhibit 11-35 provides a list of the important wetland areas identified by the committees, as well as their descriptions of each.

Exhibit 11-35. Wetlands of Importance to CDOW North Park and South Platte Focus Area Committees

Wetland Area	Focus Area Committee	Description
Centennial Valley Ranch State Wildlife Area (SWA)	South Platte	The Centennial Valley Ranch covers 1,953 acres of wetlands and riparian areas adjacent to the South Platte River. Meadows and saltgrass pastures have been irrigated on the south side of the river, providing habitat for wintering migratory waterfowl.
Brush Prairie Ponds SWA	South Platte	A water delivery system has been put in place in the Brush Prairie Ponds SWA area, helping to restore native cover on abandoned farmlands. The application of recharge water is timed to provide wetland habitat for migratory waterfowl during the fall and spring migration.
Elliott SWA	South Platte	The Elliot SWA includes a total of 120 acres of constructed shallow-flooded seasonal wetlands. Flooding is controlled to emulate spring and fall wetland habitats for migrating waterfowl.
Tamarack SWA	South Platte	The Tamarack SWA covers 10,500 acres and 15 miles of the South Platte River. A total of 50 acres of seasonal wetlands have been constructed in three wetland sites to benefit numerous wildlife species, including the plains minnow, suckermouth minnow, brassy minnow, plains topminnow, and long-billed curlew.
Red Lion SWA	South Platte	The Red Lion SWA has 17 acres of permanent or semi-permanent wetlands, plus an additional 80 acres of seasonal wetlands. The lacusterine wetland habitat supports numerous species such as the long-billed curlew, northern leopard frog, and the common garter snake.

[10] CDOW created the Wetlands Wildlife Conservation Program (WWCP) to focus on preserving, restoring, enhancing, and creating wetlands throughout the state. This program focuses on (1) protecting the role of wetlands in Colorado as important feeding, breeding, migratory, and brooding habitat for water birds, and (2) providing recreational uses, such as hunting, fishing, and bird watching, through wetlands (CDOW 2008). The CDOW has created 11 focus area committees under the WWCP. The committees provide a mechanism through which conservationists can share information on local wetlands, discuss wetland needs, and generate ideas for wetland protection and restoration projects.

Wetland Area	Focus Area Committee	Description
DT Ranch Conservation Easement	South Platte	The DT Ranch Conservation Easement includes riparian areas and pastures along the south side of the South Platte River. Several shallow-water flood fields and wet soil management units constitute the wetlands in this easement. Mallard ducks and Canada geese use this habitat extensively, particularly during inclement weather.
Arapaho National Wildlife Refuge	North Park	The Arapaho National Wildlife Refuge includes irrigated meadows, sagebrush uplands, wetlands, and riparian willow and stream habitats. The meadows and wetlands provide important vegetation, nesting, and foraging habitat for waterfowl, shorebirds, and sage grouse.
Boettcher and Big Creek Lakes	North Park	The Boettcher lakes comprise five natural kettle ponds providing nesting habitat for ducks and shorebirds. Big Creek lakes are composed of rainwater and snowmelt water. Both Boettcher and Big Creek lakes are often occupied by a variety of birds.
North Park Colorado State Wildlife Areas (SWA)	North Park	The Colorado SWAs in the North Park Focus Area have all been grouped together. They include Lake John SWA, Richard SWA, Delaney Butte Lakes SWA, Manville SWA, Irvine SWA, Verner SWA, Brownlee SWA, Cowdrey SWA, Walden Reservoir SWA, Murphy SWA, Owl Mountain SWA, and Seymour Lake SWA. All of these areas provide important waterfowl habitat and vegetation. Public recreational uses such as fishing and hunting have become increasingly important in these areas.
Hebron Waterfowl Area	North Park	The Hebron Waterfowl Area covers 2,720 acres, including the 160-acre Eighteen Island Reservoir. Mallards, pintails, green-winged teal, blue-winged teal, Canada geese, American avocets, willets, and black-crown herons are all found in the Hebron Waterfowl Area and Eighteen Island Reservoir.
MacFarlane Reservoir	North Park	MacFarlane Reservoir is an important molting area for ducks and geese and also provides nesting habitat for white pelicans.
Pole Mountain Reservoir	North Park	Pole Mountain Reservoir is an important nesting and brood rearing habitat for waterfowl, but it is also an important site for waterfowl molting and resting. In addition, Pole Mountain Reservoir provides important habitat for aquatic invertebrates.

Sources: North Park Wetlands Focus Area Committee 2002; South Platte Wetland Focus Area Committee 2002.

11.2.5 Groundwater

11.2.5.1 Interim Narrative Standard

The Interim Narrative Standard in section 41.5(C)(6)(b)(i) of Regulation No. 41: *The Basic Standards for Groundwater* (5 CCR 1002-41) (WQCC 2009) is applicable to all groundwater for which the WQCC has not already assigned standards, with the exception of those groundwaters where the total dissolved solids (TDS) are equal to or exceed 10,000 milligrams per liter (mg/L). The Interim Narrative Standard is independent of and in addition to the statewide groundwater standards for radioactive materials and organic pollutants.

Until such time as use classifications and numeric standards are adopted for groundwater on a site-specific basis, the following standards apply for each parameter at whichever of the following levels is the least restrictive:

- Existing ambient quality as of January 31, 1994, or
- That quality which meets the most stringent criteria set forth in Tables 1 through 4 of Regulation No. 41: *The Basic Standards for Groundwater*.

The four tables from Regulation No. 41: *The Basic Standards for Groundwater* can be viewed

online at http://www.cdphe.state.co.us/regulations/wqccregs for the following classified uses: Table 1: Domestic Water Supply - Human Health Standards; Table 2: Domestic Water Supply - Drinking Water Standards; Table 3: Agricultural Standards; and Table 4: Total Dissolved Solids Water Quality Standards.

11.2.5.2 Site-Specific Classifications and Standards

The WQCC has established 23 site-specific groundwater classifications for the Platte River Basin, as summarized in exhibit 11-36. Exhibits 11-37 through 11-59 [11](at end of chapter) illustrate the classified areas. These exhibits are cross-referenced in exhibit 11-36.

Exhibit 11-36. Site-Specific Groundwater Classifications and Standards in the Platte River Basin

Site	Specified Area[1,2]	Classifications for Confined and Unconfined Groundwater	Are Groundwater Quality Standards in Tables 1–4 Applicable? [3]
North Platte River Sub-Basin			
Oil and Gas Fields of East-Central Jackson County	See exhibit 11-37	Limited Use and Quality	No
Oil and Gas Field of West-Central Jackson County	See exhibit 11-37a	Limited Use and Quality	No
Upper South Platte River Sub-Basin			
Rocky Flats Area, Jefferson and Boulder Counties	See exhibit 11-38	Surface Water Protection Site-Specific Radionuclide Standards	Applicable standards include: 31.11(2) (statewide surface water radioactive materials standards), section 31.11(3) (statewide surface water interim organic pollutant standards), and the site-specific surface water quality standards for segments 4a, 4b, and 5 of Big Dry Creek (in section 38.6 of the South Platte Basin Classifications and Standards)
Federal Heights Water District Wellfield, Adams County	See exhibit 11-39	Domestic Use Quality and Agricultural Use Quality	Yes
City of Glendale and Cherry Creek Valley Water and Sanitation District Groundwater Classification Area, Arapahoe County	See exhibit 11-40	Domestic Use Quality and Agricultural Use Quality	Yes
City of Brighton Wellfield, Adams County	See exhibit 11-41	Domestic Use Quality and Agricultural Use Quality	
Denver Southeast Suburban Water & Sanitation District Wellfield, Douglas County	See exhibit 11-42	Domestic Use Quality and Agricultural Use Quality	Yes
Upper Cherry Creek Basin and Denver Basin Alluvial Aquifers and Tributaries, and Portions of El Paso, Douglas and Arapahoe Counties	See exhibit 11-43	Domestic Use Quality and Agricultural Use Quality	Yes
Town of Castle Rock Wellfield, Douglas County	See exhibit 11-44	Domestic Use Quality and Agricultural Use Quality	Yes
Willows, and Centennial Groundwater Classification Area, Arapahoe and Douglas Counties	See exhibit 11-45	Domestic Use Quality and Agricultural Use Quality	Yes
East Cherry Creek Valley Water and Sanitation District, Arapahoe County	See exhibit 11-46	Domestic Use Quality and Agricultural Use Quality	Yes
Middle South Platte River Sub-Basin			
Northern Colorado Water Association Wellfield, Larimer County	See exhibit 11-47	Domestic Use Quality and Agricultural Use Quality	Yes

[11] Maps displayed in these exhibits are pulled directly from Regulation No. 42: *Site-Specific Water Quality Classification and Standards for Ground Water* (WQCC 2006).

Site	Specified Area[1,2]	Classifications for Confined and Unconfined Groundwater	Are Groundwater Quality Standards in Tables 1–4 Applicable? [3]
Town of Bennett Wellfield, Adams County	See exhibit 11-48	Domestic Use Quality and Agricultural Use Quality	Yes
City of Fort Lupton Wellfield, Weld County	See exhibit 11-49	Domestic Use Quality and Agricultural Use Quality	Yes
Oil and Gas Fields of Eastern Larimer County	See exhibit 11-50	Limited Use and Quality	No
Oil and Gas Fields of Weld County	See exhibit 11-50a,b, and c	Limited Use and Quality	No
Oil and Gas Fields of Adams, Arapahoe, Morgan, Washington, and Weld Counties	See exhibits 11-51, 11-52, and 11-53	Limited Use and Quality	No
Lower South Platte River Sub-Basin			
Morgan County Quality Water District Wellfield, Morgan County	See exhibit 11-54	Domestic Use Quality and Agricultural Use Quality	Yes
City of Fort Morgan Wellfield, Morgan County	See exhibit 11-55	Domestic Use Quality and Agricultural Use Quality	Yes
Morgan County Quality Water District, (San Arroyo Creek Basin), Morgan County	See exhibit 11-56	Domestic Use Quality and Agricultural Use Quality	Yes
Colorado Oil and Gas Fields of Logan, Northern Washington, and Northeastern Morgan Counties	See exhibit 11-57	Limited Use and Quality	No
City of Brush Wellfield, Morgan County	See exhibit 11-58	Domestic Use Quality and Agricultural Use Quality	Yes
City of Sterling Wellfield, Logan County	See exhibit 11-59	Domestic Use Quality and Agricultural Use Quality	Yes

[1] Specified areas pertain to confined and unconfined groundwaters within the saturated zones.

[2] Maps displayed in these exhibits are pulled directly from Regulation No. 42: *Site-Specific Water Quality Classification and Standards for Ground Water* (WQCC 2006).

[3] The groundwater quality standards included in tables 1 to 4 of Regulation No. 41: *The Basic Standards for Groundwater* are assigned to all confined and unconfined groundwater in the specified area.

Source: WQCC 2006.

11.2.5.3 Groundwater Quality

Groundwater use by the counties encompassing the Platte River Basin varies from less than 1% in Grand and Mesa counties to a maximum of 9% in Summit County (CGS 2003). Surface water is more commonly used for domestic water supplies.[12] Because of the shallow well depths and water levels, alluvial groundwater is readily developed in rural areas for agricultural and domestic purposes (CGS 2003). The aquifers located within the Platte River Basin are shown on exhibit 11-16 (at end of chapter), and they include the following:

- **Alluvial Aquifers**
  - Alluvial Aquifers (including South Platte and North Platte River systems)
  - Designated Groundwater Basins (including the Upper Crow Creek, Camp Creek, Northern High Plains, Lost Creek, and Kiowa-Bijou aquifers)
- **Sedimentary Rock Aquifers**
  - Denver Basin (including Dawson, Denver, Arapahoe, and Laramie formations and the Fox Hills Sandstone)
  - Dakota-Cheyenne

[12] The Colorado Geological Survey does not define their use of the term "domestic water supply." It is taken to refer to public and private supplies that are regulated under the Safe Drinking Water Act. Groundwater used for "domestic purposes" is taken to mean private wells.

- **Mountainous Region Aquifers**
  - South Park Basin
    - North Park Basin
    - Precambrian Crystalline and Tertiary Igneous Rock Aquifers

Alluvial Aquifers

In the mountains, west of the Dakota hogback (which is along the eastern limit of the Front Range), alluvial deposits tend to be thin and discontinuous and serve as a water resource on a very local basis. The mountain streams often flow directly on a bedrock surface. The alluvial aquifers, where they are present, are valley fill deposits consisting of poorly sorted sand and gravel with silt and clay and a high percentage of boulders and cobbles (CGS 2003). See the exhibit at end of chapter 3 for a map showing the distribution of alluvial deposits in Colorado.

The Colorado Geological Survey (CGS) reports that water quality is relatively good in the South Platte alluvium upgradient of the Denver Metropolitan area. The alluvial groundwater quality is generally similar to the surface water quality; the groundwater is recharged annually by mountain snowmelt. The alluvial groundwater flows in the same direction as the surface water and is in direct communication with surface water (CGS 2003).

The reach of the South Platte River that begins southwest of the Denver Metropolitan area and continues downstream to the state line is underlain by valley fill sediment, forming the alluvial aquifer. This alluvial aquifer is composed primarily of poorly sorted gravel, sand, and clay. The saturated alluvium increases from 20 feet near Denver to over 200 feet at Julesburg; the thickest section runs along the center of the historic river channel. The alluvial aquifer is estimated to contain as much as 8.3 million acre-feet in storage and is hydraulically connected to the river. In the lower South Platte River alluvium, there are approximately 10,880 permitted wells with yields ranging in capacity from one to 3,000 gallons per minute (gpm). The average yield is 430 gpm; however, 50% of the wells have a yield of 30 gpm or less, which is biased by domestic wells. Large-capacity irrigation wells can actually depress the water table in the alluvial aquifer, so that water flows from the river into the alluvial aquifer (CGS 2003).

Water quality in the South Platte River Basin is adversely affected as both surface water and groundwater flow from urban areas into agricultural areas. In the Front Range area, the alluvial groundwater is classified as calcium bicarbonate water. Farther downstream it becomes calcium sulfate water (CGS 2003).

North Park has a network of alluvial groundwater systems that are associated with the main rivers and tributaries in the basin. These aquifers are typically composed of unconsolidated Quaternary-age alluvial deposits associated with major rivers throughout the state. As noted above, the North Platte River and its principal tributaries drain North Park. In the upper North Platte River Sub-basin, the alluvial aquifers tend to be thin, shallow, and discontinuous, with streams often flowing on bedrock surfaces. The alluvial groundwater quality is generally similar to the surface water quality, which is generally good (CGS 2003).

Designated Groundwater Basins

Designated basins are areas in which the use of groundwater is assumed not to impact the major

surface water basin to which the designated basin would otherwise be tributary. Designated groundwater basins are usually considered non-tributary, or at least not adjacent to major streams and rivers. Designated basins are areas within the eastern plains with very little surface water where users rely primarily on groundwater as their source of water supply.

The designated groundwater basins include the Upper Crow Creek, Camp Creek, Northern High Plains, Lost Creek, and Kiowa-Bijou aquifers. The Colorado Ground Water Commission (CGWC) has established eight designated groundwater basins, five of which are in the South Platte River Sub-basin.

The CGS reports that water quality in the designated basins is generally quite good relative to sedimentary bedrock groundwater systems. This designated groundwater is used extensively for both domestic and agricultural purposes (CGS 2003).

Denver Basin

The Denver Basin underlies a 6,700 square mile area that includes the Denver Metropolitan area, extending north almost to Greeley, east nearly to Limon, and south beyond the Palmer Divide near Colorado Springs. The area of outcrop-subcrop of the Laramie-Fox Hills aquifer generally defines the basin. The depth to the top of the aquifer ranges from zero, where it outcrops along the Front Range on the western edge of the Denver Basin, to greater than 9,000 feet in the center of the Denver Basin. There are four statutorily recognized aquifers within the Denver Basin, which in descending order are Dawson, Denver, Arapahoe, and Laramie-Fox-Hills (CGS 2003). See the exhibit at end of chapter 3 for map showing the Colorado's major sedimentary rock aquifers and aquifer systems.

The Denver Basin aquifers exhibit large differences in transmissivity, or the ability of the aquifer to transmit water. The highest average transmissivities are measured in the Arapahoe aquifer and the lowest in the Denver aquifer. The best producing wells in the Denver Basin may yield more than 500 gpm, although 300 gpm yields are more common (CGS 2003).

The CGS indicates that water quality in the Denver Basin aquifer system is generally good, meeting state and federal drinking water standards with few exceptions. Dissolved solids concentrations range from less than 100 mg/L in the Dawson aquifer to nearly 2,000 mg/L in the Laramie-Fox Hills aquifer (CGS 2003). Water in the Dawson aquifer is a calcium bicarbonate type, with low sulfate concentrations, and it is moderately hard. Water in the Arapahoe aquifer is also of good quality, particularly in the central portion of the aquifer, and has much higher dissolved solids concentration (up to 2,000 mg/L) along the northern and eastern margins. The Arapahoe aquifer is classified as a sodium bicarbonate type. The Laramie-Fox Hills aquifer is also classified as a sodium bicarbonate type with sodium sulfate dominating on the northern and eastern margins. In some areas the high sodium absorption ratio of the water produced from the aquifer makes this water unusable for irrigation purposes (CGS 2003).

Dakota-Cheyenne

As depicted in exhibit 11-16 (at end of chapter) the Dakota-Cheyenne group is an assemblage of water-yielding sandstones, shales, and mudstones that were typically deposited in deltaic environments along an ancient seaway that covered much of Colorado during the Cretaceous

Period (CGS 2003). These formations contain coal, oil, and gas resources, particularly in the portion of the South Platte Basin along the Front Range and farther east. The Dakota-Cheyenne formations nearly encircle the Denver Basin formations on the north, east, and south. See the exhibit at end of chapter 3 for map showing the Colorado's major sedimentary rock aquifers and aquifer systems.

CGS reports that water quality within the Dakota-Cheyenne is generally good, but TDS concentrations range from 250 to 25,000 mg/L. The aquifer area in northeastern Colorado has TDS concentrations greater than 2,000 mg/L. The complex stratigraphy in the northern portion of the aquifer produces highly variable water chemistry (CGS 2003).

South Park Basin

South Park is a north-south trending, elongated intermontane basin in Central Colorado. The basin is approximately 45 miles long and 20 miles wide, encompassing 893 square miles. Mountains surround the basin on the north (Continental Divide), east (Tarryall Mountains), and west (Mosquito Range) (CGS 2003). See Exhibit 3-18 at end of chapter 3 for map showing the location and extent of Colorado's crystalline, volcanic, valley-fill, and intermontane park aquifers.

Most of the sedimentary formations in South Park are potential aquifers, at least for domestic use. The water-bearing formations in the South Park Basin are divided into an upper South Park aquifer and a lower South Park aquifer. The saturated thickness of the upper aquifer ranges from 50 to 2,000 feet. Well yields are generally less than 10 gpm. Water yields from the lower aquifer range from 5 to 10 gpm. The estimated saturated thickness of the lower aquifer ranges from 50 to 3,000 feet (CGS 2003).

Most of the wells in South Park are used for private domestic purposes. As result, there is little public information about groundwater quality. CGS found that water samples from wells in the area between Jefferson and Hartsel, Colorado, had a median TDS concentration of 257 mg/L (CGS 2003).

North Park Basin

North Park is part of a large intermontane basin, which is also a separate and distinct groundwater basin. It is part of a synclinal structural basin that encompasses both North Park in Jackson County and Middle Park in Grand County. In the central portions of North Park, more than 8,000 feet of Tertiary (Cenozoic) sedimentary rocks overlie the Cretaceous (Mesozoic) Pierre Shale, which is greater than 6,000 feet thick (CGS 2003). See Exhibit 3-18 at end of chapter 3 for map showing the location and extent of Colorado's crystalline, volcanic, valley-fill, and intermontane park aquifers.

Groundwater in the North Platte Sub-basin is mainly associated with poorly consolidated or unconsolidated sediments that were deposited during Tertiary time. Sands and gravels were deposited near the margins of the uplifting mountains that now surround North Park. Silts and clays were deposited in lakes and swamps near the center of the basin (CGS 2003). Exhibit 11-16 shows the location of the significant aquifers in the North Park Basin separated into two groups: alluvial (valley-fill alluvium) and bedrock (North Park and Coalmont). The valley-fill

alluvium is composed of sand, gravel, clay, and silt and is 80 feet thick in some areas. The North Park Formation is a 2,000-foot layer of calcareous sandstone with interbedded layers of siltstone, clay, and volcanic ash. Well yields from this aquifer are typically less than 50 gpm (CGS 2003).

The Coalmont Formation is a 6,000 to 9,000 foot layer of sandstone, shale, conglomerate, and coal beds. It is the primary aquifer in the North Park Basin. Well yields are generally less than 10 gpm (CGS 2003). Exhibit 11-16 also shows the location of wells with permitted or decreed capacities greater than or equal to 500 gpm. In the North Platte Basin there is only one such well located to the west of South Delaney Lake. Groundwater recharge and discharge are assumed to be equal because there has been no substantial change in the volume of storage in the North Park Basin. The volume of water withdrawn each year is very small compared to the total volume of groundwater storage (CGS 2003).

The water in the Coalmont Formation is generally a sodium bicarbonate type with a median TDS concentration of 400 mg/L. However, the TDS concentrations in 30 samples collected by the USGS ranged from 200 to 3,000 mg/L. Groundwater quality has been influenced by coal beds and coal mining in the area near the town of Coalmont (southwestern portion of the basin). Elevated concentrations of sulfate, iron, and manganese have been measured there, and the median TDS concentration is 700 mg/L with considerable hardness. In the area east of Walden, groundwater is very hard with TDS concentrations ranging from 400 to 7,000 mg/L (CGS 2003).

Crystalline Rock Aquifers

Crystalline rocks are exposed at the surface throughout the mountainous portion of the Platte River Basin in Colorado. Since crystalline rocks have no porosity, water is stored in fractures within the rocks. Consequently, water storage is low in these types of aquifers. Nonetheless, these rock types supply most of the domestic needs in the mountains of Colorado (CGS 2003). See the exhibit at end of chapter 3 for map showing the location and extent of Colorado's crystalline, volcanic, valley-fill, and intermontane park aquifers.

The CGS reports that water quality is generally very good in aquifers associated with fractured Precambrian crystalline rocks unless there has been extensive mineralization, in which case acidic or metallic waters can be found (CGS 2003). Water cannot dissolve large amounts of contaminants from hard crystalline rocks unless the fractures have been filled previously with highly mineralized geothermal fluids. This, in fact, has occurred in many of the mountainous areas of the Platte River Basin. Extensive mining for precious metals has occurred in Colorado's Mineral Belt, which extends northeast to southwest from the Front Range, near Boulder, to the San Juan Mountains. There was a tremendous amount of mining in the Platte River Basin in such areas as Ward, Central City, Idaho Springs, Georgetown/Silver Plume, Breckenridge, Alma, and Fairplay. There was also a brief but intense flurry of silver mining in North Park near Teller City, a ghost town south of Gould in Jackson County, Colorado.

CGS indicates that water quality in shallow Precambrian crystalline rock aquifers is generally very good, except in areas of mineralization where acidic or metallic waters can be found. However, deep water in crystalline rock aquifers may contain significant TDS concentrations (CGS 2003). Individual wells and septic systems are common in the mountains of the Platte River Basin, where bacterial contamination is a concern. Radon can also be a concern in wells

completed in Precambrian rocks. This is because of the presence of uranium and radium, which decay into radon. Radon concentrations in the Conifer area were measured at 100 to 166,000 picocuries per liter (pCi/L) (CGS 2003).

11.3 Surface Water Quality Stressors and Sources

This section of the Platte River Basin Plan summarizes data provided in the 2010 Integrated Report developed by the WQCD and approved by the WQCC. It is important to note that the data on water quality impairments and pollutant sources, as well as segments listed for further monitoring and evaluation, are based on information that is available to the WQCD today. Moreover, the data are limited to those parameters for which assessments are performed.

11.3.1 Impairments

As shown in exhibit 11-60 (at end of chapter), the 2010 Integrated Report identifies 65 impairments in stream segments in the Platte River Basin. The impaired segments represent 30% of the total 218 segments in the basin and 70% of total stream miles in the basin. Selenium and *Escherichia coli* (or *E. coli*) are the cause of impairments in 19 segments each, while cadmium is the cause in 15 segments and copper is the cause in 14 segments. Additional pollutants causing impairments include zinc, arsenic, pH, temperature, lead, organic sediment, dissolved oxygen, iron, mercury, ammonia, and manganese. Further information on the impaired stream segments is provided in exhibits 11-61 to 11-64 (at end of chapter).

The 2010 Integrated Report identified 13 lake and reservoir segments as impaired (exhibit 11-65 at end of chapter). These 13 segments represent 18% of the total assessed lakes and 11% of total assessed lake acres, or 10,210 acres. Dissolved oxygen is the cause of the impairments in eight segments, while mercury is the cause in four and ammonia is the cause in three segments. Additional pollutants causing impairments include arsenic, pH, chlorophyll a, copper, *E. coli*, phosphorus, and dissolved oxygen For further information on the lake segment impairments, see exhibits 11-66 to 11-67 (at end of chapter).

A map showing all impaired waterbody segments (streams and lakes/reservoirs combined) is provided as exhibit 11-68 (at end of chapter).

11.3.2 Segments Listed for Further Monitoring and Evaluation

During each monitoring cycle, the WQCD typically identifies parameters with elevated concentrations in some segments within a basin. The sample results or other factors are such that the WQCD is unable to make a determination as to whether the beneficial uses of the segments in question are being attained. These segments are subsequently placed on the state's Monitoring and Evaluation (M&E) List for further monitoring and evaluation. In its latest monitoring cycle, the WQCD identified 53 of the 218 (24%) segments in the Platte River Basin with elevated concentrations of one parameter or more. The Upper South Platte River Sub-basin has the greatest number of segments on the M&E List (34 of 53, or 64%). It is followed by the Middle South Platte Sub-basin with 14 segments (26%), the North Platte River Sub-basin with three (6%), and the Lower South Platte Sub-basin with two (4%). Basin-wide, dissolved oxygen is most often identified as the parameter requiring further monitoring (21 segments), followed by pH (10 segments) and cadmium (9 segments). These parameters are followed by total

recoverable iron, *E. coli*, aquatic life use, lead, arsenic, selenium, sediment, zinc, temperature, dissolved iron, mercury, ammonia, manganese, and sulfide. See exhibits 11-69 to 11-73 (at end of chapter) for details.

11.3.3 Known Sources of Stressors

Exhibit 11-74 provides a synopsis of the identified sources of stressors to the Platte River Basin based on parameters causing impairments per the 2010 Integrated Report. The information is presented for each sub-basin and for the basin as a whole. Note that similar but even more detailed information is provided in exhibits 11-61 to 11-64 and 11-65 to 11-67 (at end of chapter). The Platte River Basin has a total of 78 impaired waterbody segments that require development of a TMDL. Selenium and *E.coli* account for the greatest number of impaired segments with 19 each, followed by copper with 16, cadmium with 14, and dissolved oxygen with 10 segments.

Exhibit 11-74. Platte River Basin, Summary of Stressors for Impaired Waterbodies[1]

Sub-Basin	Number of Impaired Segments	Impairment	Number of Affected Segments	Source of Pollutants	Number of Affected Segments	Number of Affected Segments by TMDL Priority Development Status		
						Low	Med	High
North Platte River Sub-Basin								
North Platte	2	Iron	1	Unknown	1	0	1	0
		Dissolved oxygen	1	Unknown	1	0	1	0
		Subtotal	**2**	**Total No. TMDLs**	**2**	**0**	**2**	**0**
Upper South Platte River Sub-Basin								
Mainstem and tributaries	15	Cadmium	5[3]	Not Assessed[2]	3	0	0	3
				Unknown	2	0	0	2
				Groundwater	1	0	0	1
		Zinc	2	Not Assessed	2	0	0	2
		Arsenic	2	Not Assessed	2	0	0	2
				Unknown	2	1	0	1
		Iron	1	Not Assessed	1	0	0	1
		Mercury	2	Not Assessed	1	0	0	1
				Unknown	1	0	0	1
		pH	1	Mining	1	0	0	1
		Copper	1	Not Assessed	1	0	0	1
		Ammonia	1	Not Assessed	1	0	1	0
		E. coli	4[3]	Groundwater	1	0	0	1
				Unknown	2	0	0	2
				Not Assessed	3	0	0	3
		Selenium	2[4]	Unknown	2	2	0	0
				Not Assessed	1	1	0	0
		Dissolved oxygen	5	Unknown	1	1	0	0
				Not Assessed	4	2	2	0
		Subtotal	**26**	**Total No. TMDLs**	**32**	**7**	**3**	**22**
Cherry Creek	2	*E. coli*	1	Not Assessed	1	0	0	1
		Selenium	2	Not Assessed	2	2	0	0
		Subtotal	**3**	**Total No. TMDLs**	**3**	**2**	**0**	**1**
Bear Creek	3	*E. coli*	2	Unknown	2	1	0	1

Sub-Basin	Number of Impaired Segments	Impairment	Number of Affected Segments	Source of Pollutants	Number of Affected Segments	Number of Affected Segments by TMDL Priority Development Status		
						Low	Med	High
		Chlorophyll-a	1	Unknown	1	0	1	0
		Phosphorus	1	Unknown	1	0	1	0
		Subtotal	**4**	**Total No. TMDLs**	**4**	**1**	**2**	**1**
Clear Creek	14	Cadmium	6[5]	Mining	5	0	1	4
				Unknown	2	0	0	2
		Zinc	2	Mining	2	0	1	1
		pH	1	Unknown	1	0	0	1
		Copper	3	Mining	2	0	1	1
				Not Assessed	1	0	0	1
		E. coli	2	Unknown	2	0	0	2
		Lead	1	Not Assessed	1	0	0	1
		Aquatic life use	2	Unknown	2	2	0	0
		Organic sediment	2	Unknown	2	2	0	0
		Dissolved oxygen (temperature)	1	Not Assessed	1	0	0	1
		Subtotal	**20**	**Total No. TMDLs**	**21**	**4**	**3**	**14**
Big Dry Creek	1	*E. coli*	1	Unknown	1	0	0	1
		Selenium	1	Unknown	1	1	0	0
		Subtotal	**2**	**Total No. TMDLs**	**2**	**1**	**0**	**1**
Boulder Creek	5	Cadmium	1	Mining	1	0	0	1
		E. coli	3	Unknown	3	0	0	3
		Selenium	1	Unknown	1	0	1	0
		Subtotal	**5**	**Total No. TMDLs**	**5**	**0**	**1**	**4**
St. Vrain Creek	7	Zinc	2	Not Assessed	1	0	0	1
				Mining	1	0	1	0
		Arsenic	1	Mining	1	0	0	1
		pH	1	Mining	1	0	1	0
		Copper	4	Mining	3	0	2	1
				Unknown	1	0	0	1
		E. coli	1	Unknown	1	0	0	1
		Selenium	1	Unknown	1	1	0	0
		Lead	1	Mining	1	0	1	0
		Temperature	1	Unknown	1	0	0	1
		Subtotal	**12**	**Total No. TMDLs**	**12**	**1**	**5**	**6**
Middle South Platte River								
Mainstem and tributaries	4	*E. coli*	1	Not Assessed	1	0	0	1
		Selenium	1	Not Assessed	1	1	0	0
		pH	3	Unknown	1	1	0	0
				Not Assessed	2	0	2	0
		Ammonia	3	Unknown	1	1	0	0
				Not Assessed	2	1	1	0
		Dissolved oxygen	2	Not Assessed	2	1	1	0
		Subtotal	**10**	**Total No. TMDLs**	**10**	**5**	**4**	**1**
Big Thompson River	15	*E. coli*	1	Unknown	1	0	0	1

Sub-Basin	Number of Impaired Segments	Impairment	Number of Affected Segments	Source of Pollutants	Number of Affected Segments	Number of Affected Segments by TMDL Priority Development Status		
						Low	Med	High
		Selenium	5	Unknown	4	3	1	0
				Not Assessed	1	0	1	0
		Copper	7	Unknown	2	0	1	1
				Not Assessed	5	0	2	3
		pH	1	Unknown	1	0	0	1
		Cadmium	1	Unknown	1	0	0	1
		Zinc	1	Unknown	1	0	0	1
		Temperature	2	Unknown	1	0	0	1
				Not Assessed	1	0	0	1
		Dissolved oxygen	1	Not Assessed	1	0	0	1
		Aquatic life use	1	Unknown	1	0	1	0
		Mercury	2	Unknown	2	0	0	2
		Subtotal	**22**	**Total No. TMDLs**	**22**	**3**	**6**	**13**
Cache La Poudre	8	*E. coli*	2[4]	Unknown	2	0	0	2
				Not Assessed	1	0	0	1
		Selenium	4[4]	Unknown	3	3	0	0
				Not Assessed	2	2	0	0
		Copper	1	Unknown	1	0	1	0
		Cadmium	1	Not Assessed	1	0	1	0
		Temperature	1	Unknown	1	0	1	0
		Lead	1	Not Assessed	1	0	1	0
		Dissolved oxygen	1	Not Assessed	1	0	1	0
		Mercury	1	Unknown	1	0	0	1
		Subtotal	**12**	**Total No. TMDLs**	**14**	**5**	**5**	**4**
Lower South Platte River Sub-Basin								
Lower South Platte	2	Selenium	2	Not Assessed	2	0	1	1
		Manganese	1	Not Assessed	1	0	1	0
		E. coli	1	Not Assessed	1	0	0	1
		Subtotal	**4**	**Total No. TMDLs**	**4**	**0**	**2**	**2**
Basin-wide Totals								
Platte River Basin	**78**	*E. coli*	19	Groundwater	1	0	0	1
				Unknown	14	1	0	13
				Not Assessed	7	0	0	7
		Selenium	19	Unknown	12	10	2	0
				Not Assessed	9	6	2	1
		Copper	16	Not Assessed	7	0	2	5
				Mining	5	0	3	2
				Unknown	4	0	2	2
		Cadmium	14	Not Assessed	4	0	1	3
				Unknown	5	0	0	5
				Groundwater	1	0	0	1
				Mining	6	0	1	5
		Dissolved oxygen	10	Unknown	2	1	1	0
				Not Assessed	8	3	4	1
		pH	7	Mining	2	0	1	1

Sub-Basin	Number of Impaired Segments	Impairment	Number of Affected Segments	Source of Pollutants	Number of Affected Segments	Number of Affected Segments by TMDL Priority Development Status		
						Low	Med	High
				Unknown	3	1	0	2
				Not Assessed	2	0	2	0
		Zinc	7	Not Assessed	3	0	0	3
				Mining	3	0	2	1
				Unknown	1	0	0	1
		Mercury	5	Not Assessed	1	0	0	1
				Unknown	4	0	0	4
		Ammonia	4	Not Assessed	3	1	2	0
				Unknown	1	1	0	0
		Temperature	4	Unknown	3	0	1	2
				Not Assessed	1	0	0	1
		Arsenic	3	Not Assessed	2	0	0	2
				Unknown	2	1	0	1
				Mining	1	0	0	1
		Lead	3	Not Assessed	2	0	1	1
				Mining	1	0	1	0
		Aquatic life use	3	Unknown	3	2	1	0
		Iron	2	Unknown	1	0	1	0
				Not Assessed	1	0	0	1
		Organic sediment	2	Unknown	2	2	0	0
		Chlorophyll-a	1	Unknown	1	0	1	0
		Phosphorus	1	Unknown	1	0	1	0
		Dissolved oxygen (temperature)	1	Not Assessed	1	0	0	1
		Manganese	1	Not Assessed	1	0	1	0
		Total[6]	**122**	**Total No. TMDLs[6]**	**131**	**29**	**33**	**69**

[1] The term "waterbodies" is used because the regulations identify some segments as containing streams, lakes, wetlands, or some combination thereof. In other instances, the regulations identify some segments as "lake-only." In this exhibit, all relevant segments are shown.
[2] "Not Assessed" indicates that if a single designated use is not assessed within the segment, then the whole segment is entered into the EPA Assessment Database as not assessed.
[3] For one segment the source of the pollutant is listed as groundwater and unknown.
[4] For one segment the source of the pollutant is listed as unknown and not applicable.
[5] For one segment the source of the pollutant is listed as mining and unknown.
[6] The total number of affected segments and the total number of TMDLs do not match because several segments have more than one source of pollutants. These situations are footnoted individually in this table.
Sources: WQCC 2010c; WQCD 2010a, appendices A to D.

11.4 TMDLs as Water Protection Strategies

11.4.1 TMDL Basics

As noted previously in chapter 2, "Water Quality Management and Planning in Colorado," CWA section 303(d) requires states to periodically submit to EPA a list of waterbodies that are impaired, meaning that the segment is not meeting the standards for its assigned use classification. The list of impaired waterbodies is referred to as the CWA section 303(d) list. The WQCD prepares the list in conjunction with its biennial Integrated Reports. The WQCC

approves and adopts the list as Regulation No. 93: *Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List* (5 CCR 1002-93) (WQCC 2010c).

TMDLs must be developed for waterbodies on the CWA section 303(d) list. A TMDL is the maximum amount of a pollutant that a waterbody can receive and still maintain water quality standards. The TMDL is the sum of the waste load allocation (WLA), which is the load from point source discharges; the load allocation (LA), which is the load attributed to natural background and/or nonpoint sources; and a margin of safety (MOS).

TMDL Equation

TMDL = WLA + LA + MOS

An important aspect of the TMDL development process includes the identification of the sources of pollutants causing impairments in the waterbody. Both point sources and nonpoint sources are identified.

11.4.2 TMDLs Required to Be Developed

Exhibit 11-75 summarizes the number of TMDLs that must be developed based on the waterbodies (streams and lake-only segments) included on the 2010 CWA section 303(d) list, which is also encompassed in the 2010 Integrated Report. The first section of the exhibit shows that a total of 126 impairments occurred in 78 distinct waterbody segments for the basin as a whole. *E. coli*, selenium, copper, cadmium, and dissolved oxygen require the greatest number of TMDLs to be developed. Collectively, these parameters are to be the focus of 79 of the 126 (63%) TMDLs to be developed. Of the 79 TMDLs, WQCD has assigned a high priority to developing 43 (54%), a medium priority to 17 (22%), and a low priority to 19 (24%). The remaining TMDLs to be developed (47) are somewhat evenly distributed across 13 parameters. The WQCD has given a high priority to developing 23 of the 47 (49%), a medium priority to 16 (34%), and a low priority to eight (17%).

The sections that follow in exhibit 11-75 show the same information presented for the basin for each of the sub-basins. The Upper and Middle South Platte River Basins have the greatest number of impaired segments at 47 and 27, respectively. These numbers represent 26% and 15%, respectively, of the total 179 impaired segments in the basin. The Upper South Platte has the greatest number of affected stream segments of the two sub-basins (41 versus 20), yet the Middle South Platte has the greatest number of affected stream miles (1,641 versus 1,038 miles). While the Upper and Middle South Platte River Sub-basins have a similar number of affected lakes (six and seven, respectively), the acres affected are different. The affected acres in the Middle South Platte are substantially higher at 9,101 acres versus 1,109 in the Upper South Platte. A thorough review of exhibit 11-75 and exhibits 11-61 to 11-67 (at end of chapter) will provide readers with a better appreciation of nuances such as these.

Exhibit 11-75. Platte River Basin, Summary of Impairments, Affected Waterbody Segments, and TMDL Priority Development Status

	Total Number of Distinct Segments Impaired[1]	Affected Stream Segments		Affected Lake-Only Segments		Impairment	Number of Impaired Segments by Pollutant[1]	Number of Affected Segments and TMDL Priority Status by Pollutant		
		No. (n=196)	Miles (n=18,643)	No. (n=33)	Acres (n=49,006)			Low	Medium	High
Basin-wide	78	65	3,098	13	10,210	Ammonia	4	2	2	0
						Aquatic life use	3	2	1	0
						Arsenic	5	1	0	4
						Cadmium	14	0	2	12
						Chlorophyll-a	1	0	1	0
						Copper	16	0	6	10
						Dissolved oxygen	10	4	5	1
						Dissolved oxygen (temperature)	1	0	0	1
						E. coli	20	1	0	19
						Iron	2	0	1	1
						Lead	3	0	2	1
						Manganese	1	0	1	0
						Mercury	5	0	0	5
						Organic sediment	3	2	1	0
						pH	7	1	3	3
						Phosphorus	1	0	1	0
						Selenium	19	14	4	1
						Temperature	4	0	1	3
						Zinc	7	0	2	5
						Total No. TMDLs to Be Developed	**126**	**27**	**33**	**66**
Impaired Segments as Percent of Total Segments and Miles/Acres in Basin		**30%**	**17%**	**18%**	**11%**	**Affected Segments as Percent of TMDL Priority Status**		**21%**	**26%**	**52%**

	Total Number of Distinct Segments Impaired[1]	Affected Stream Segments		Affected Lake-Only Segments		Impairment	Number of Impaired Segments by Pollutant[1]	Number of Affected Segments and TMDL Priority Status by Pollutant		
		No. (n=12)	Miles (n=2,037)	No. (n=2)	Acres (n=5,337)			Low	Medium	High
North Platte River Sub-Basin	2	2	51.90	0	0	Iron	1	0	1	0
						Dissolved oxygen	1	0	1	0
						Total No. TMDLs to Be Developed	**2**	**0**	**2**	**0**
Impaired Segments as Percent of Total Segments and Miles/Acres in Sub-Basin		**17%**	**3%**	**0%**	**0%**	**Affected Segments as Percent of TMDL Priority Status**		0%	100%	0%

	Total Number of Distinct Segments Impaired[1]	Affected Stream Segments		Affected Lake-Only Segments		Impairment	Number of Impaired Segments by Pollutant[1]	Number of Affected Segments and TMDL Priority Status by Pollutant		
		No. *(n=142)*	Miles *(n=5,059)*	No. *(n=43)*	Acres *(n=31,507)*			Low	Medium	High
Upper South River Sub-Basin	47	41	1,038	6	1,109	*E. coli*	15	1	0	14
						Cadmium	12	0	1	11
						Copper	8	0	2	6
						Selenium	7	6	1	0
						Zinc	6	0	2	4
						Arsenic	5	1	0	4
						Dissolved oxygen	5	3	2	0
						Organic sediment	3	2	1	0
						pH	3	0	1	2
						Aquatic life use	2	2	0	0
						Lead	2	0	1	1
						Mercury	2	0	0	2
						Iron	1	0	0	1
						Ammonia	1	0	1	0
						Temperature	1	0	0	1
						Dissolved oxygen (temperature)	1	0	0	1
						Chlorophyll-a	1	0	1	0
						Phosphorus	1	0	1	0
						Total No. TMDLs to Be Developed	**76**	**15**	**14**	**47**
Impaired Segments as Percent of Total Segments and Miles/Acres in Sub-Basin		**29%**	**21%**	**14%**	**4%**	**Affected Segments as Percent of TMDL Priority Status**		**20%**	**18%**	**62%**

	Total Number of Distinct Segments Impaired[1]	Affected Stream Segments		Affected Lake-Only Segments		Impairment	Number of Impaired Segments by Pollutant[1]	Number of Affected Segments and TMDL Priority Status by Pollutant		
		No. *(n=58)*	Miles *(n=5,271)*	No. *(n=23)*	Acres *(n=38,458)*			Low	Medium	High
Middle South Platte River Sub-Basin	27	20	1,641	7	9,101	Selenium	10	8	2	0
						Copper	8	0	4	4
						E. coli	4	0	0	4
						Dissolved oxygen	4	1	2	1
						pH	4	1	2	1
						Temperature	3	0	1	2
						Ammonia	3	2	1	0
						Mercury	3	0	0	3
						Cadmium	2	0	1	1
						Aquatic life use	1	0	1	0
						Lead	1	0	1	0
						Zinc	1	0	0	1
						Total No. TMDLs to Be Developed	**44**	**12**	**15**	**17**
Impaired Segments as Percent of Total Segments and Miles/Acres in Sub-Basin		**34%**	**31%**	**30%**	**24%**	**Affected Segments as Percent of TMDL Priority Status**		**27%**	**34%**	**39%**

Lower South Platte River Sub-Basin	Total Number of Distinct Segments Impaired[1]	Affected Stream Segments		Affected Lake-Only Segments		Impairment	Number of Impaired Segments by Pollutant[1]	Number of Affected Segments and TMDL Priority Status by Pollutant		
		No. (n=6)	Miles (n=6,223)	No. (n=3)	Acres (n=20,287)			Low	Medium	High
	2	2	366.80	0	0	Selenium	2	0	1	1
						E. coli	1	0	0	1
						Manganese	1	0	1	0
						Total No. TMDLs to Be Developed	**4**	**0**	**2**	**2**
Impaired Segments as Percent of Total Segments and Miles/Acres in Sub-Basin		**33%**	**6%**	**0%**	**0%**	**Affected Segments as Percent of TMDL Priority Status**		**0%**	**50%**	**50%**

[1] When the total number of TMDLs to be developed is greater than the total number of distinct segments impaired, it typically means that one or more of the impaired individual segments is impaired by more than one pollutant. When the total number of TMDLs to be developed is less than the total number of distinct segments impaired, it typically means that one or more individual segments were identified as impaired in a previous CWA section 303(d) listing cycle. However, the segments showed in the latest monitoring cycle that they are not meeting the standard(s) for one or more assigned use classifications.

Sources: WQCC 2010c; WQCD 2010a, appendices A to D.

11.4.3 TMDLs Completed to Date

During any given assessment cycles segments are likely to be identified as impaired for which a TMDL has already been developed. This indicates that the TMDL has not yet been implemented or the benefits of TMDL implementation have yet to be realized. The previous exhibit identifies segments in these circumstances and the applicable pollutant(s), while also showing newly identified impaired segments.

To date, the WQCD has completed and had approved TMDLs for 23 waterbody segments in the Platte River Basin. Of this number, 22 segments are in the Upper South Platte Sub-basin and one is in the Middle South Platte Sub-basin (see exhibit 11-76 below).

Exhibit 11-76. Platte River Basin Completed and Approved TMDLs

Segment Data		Was use attained in the latest WQCD assessment?	Parameter
Segment	Description of Affected Segment Portion[1]		
North Platte River Sub-Basin			
Currently, no TMDLs have been completed and approved for segments in the North Platte River Sub-Basin.			
Upper South Platte River Sub-Basin			
COSPUS01a	South Platte River, source to North Fork South Platte River	No	Sediment
COSPUS02b	Mosquito Creek and South Mosquito Creek	No	Cadmium
		No	Lead
		No	Zinc
COSPUS02c	Mosquito Creek and South Mosquito Creek	No	Cadmium
		No	Iron
		No	Manganese
		No	Zinc
COSPUS03	Trout Creek and tributaries – Phase 1	No	Sediment[2]
COSPUS04	Hall Valley to Geneva Creek	No	Copper
		No	pH[2]
COSPUS05a	Geneva Creek, source to Scott Gomer Creek	No	Cadmium[2]

Segment Data		Was use attained in the latest WQCD assessment?	Parameter
Segment	Description of Affected Segment Portion[1]		
		No	Copper[2]
		Yes[3]	Manganese[2]
		No	Zinc[2]
COSPUS05b	Geneva Creek, Scott Gomer Creek to North Fork South Platte River	No	Cadmium[2]
		Yes[3]	Manganese[2]
		Yes[3]	Copper
		No	Zinc
COSPUS14	South Platte River, Bowles Ave. to Burlington Ditch	No	*E. coli*
		Yes[3]	Nitrate
COSPUS15	South Platte, Burlington Ditch to Big Dry Creek	Yes[3]	Dissolved oxygen
		No	Cadmium
		No	Cadmium[2,4]
COSPCL02	Clear Creek, Silver Plume to Argo Tunnel	No	Copper
		Yes[3]	Lead
		No	Zinc
COSPCL03a	South Clear Creek	No	Zinc
COSPCL03b	Leavenworth Creek	No	Lead
		No	Zinc
COSPCL06	Mad Creek	No	Zinc
COSPCL09a	Fall River	No	Copper
COSPCL09b	Trail Creek and tributaries	No	Cadmium
		No	Copper
		No	Lead
		No	Zinc
COSPCL11	Clear Creek, Argo Tunnel to Farmers Highline Canal	No	Cadmium
		No	Lead
		No	Zinc
COSPCL13b	North Fork Clear Creek	No	Cadmium
		No	Iron
		No	Manganese
		No	Zinc (aquatic life)
COSPBO04a	Gamble Gulch	No	Copper
		No	Zinc
		No	pH
		No	Cadmium[2]
		No	Zinc[2]
COSPBO09	Boulder Creek, South Boulder Creek to Coal Creek	No	Ammonia
COSPBO10	Boulder Creek, Coal Creek to St. Vrain	No	Ammonia
COSPSV03	St. Vrain Creek, Hygiene Road to South Platte River	No	Ammonia
COSPSV04	Little James Creek	No	pH
		Yes[3]	Cadmium
		Yes[3]	Iron
		No	Manganese
		No	Zinc
Middle South Platte River Sub-Basin			
COSPCP07	North Fork Cache la Poudre River, Hall Reservoir to Cache la Poudre River	Yes[3]	Sediment

Segment Data		Was use attained in the latest WQCD assessment?	Parameter
Segment	Description of Affected Segment Portion[1]		
Lower South Platte River Sub-Basin			
Currently, no TMDLs have been completed and approved for segments in the Lower South Platte River Sub-Basin.			

[1] Some segment descriptions may not precisely match the descriptions in Regulation Nos. 33 and 38. This is due to the TMDL being applicable to only a portion of a segment. The portion of the segment is then what is described.

[2] Public Notice Draft TMDL.

[3] Parameter is not listed in appendix A of the 2010 Integrated Report as a cause for the use not being attained in the segment.

[4] The description for this TMDL segment is South Platte River, Burlington Ditch to Clear Creek.

Sources: WQCC 2010c; WQCD 2002a, 2006c, 2008a, 2010a.

11.4.4 TMDL Implementation Strategies

Exhibit 11-77 at end of chapter summarizes information in the TMDL reports completed to date.[13] Specifically, it summarizes current and potential future strategies identified in the TMDL reports. The discussion should not be considered to be complete or exhaustive in terms of strategies that could or should be undertaken in the basin. Moreover, WQCD recognizes that many other entities have undertaken or are planning activities that will contribute to improvements in water quality in the basin. Finally, WQCD appreciates that the development and implementation of strategies is best undertaken in partnership with local and other stakeholders in the watersheds and basins of issue. Readers interested in understanding the array of potential strategies that could be employed in a watershed should consult chapter 4 of this document, "*Strategies for Addressing Water Quality Problems*" and appendix E.

11.5 Planned Point Source Treatment Upgrades

As shown in exhibit 11-78, there are a total of 348 public and private point source dischargers in the Platte River Basin[14]. Of this number, one (0.2%) is in the North Platte, 226 (65%) are in the Upper South Platte, 93 (27%) are in the Middle South Platte, and 28 (8%) are in the Lower South Platte Sub-basins. The point source dischargers are located in 22 counties. The counties with the greatest number of point source dischargers are Weld with 56 (16%) and Jefferson with 41 (12%).

[13] Time and resource constraints prohibited a review of TMDLs beyond those available on WQCD's website at http://www.cdphe.state.co.us/wq/assessment/TMDL/TMDLs.html.

[14] Point source dischargers only include those reported in the Clean Watershed Needs Survey 2008 database (USEPA 2010a), the USEPA ECHO database accessed June 24, 2010 (USEPA 2010d), and the Water Pollution Control Revolving Fund annual Intended Use Plan (WQCD 2010b).

Exhibit 11-78. Platte River Basin Summary of Point Sources by County

Sub-Basin	Applicable Counties	Number of Point Sources by County
North Platte	Jackson	1
Total North Platte Sub-Basin *(as % of Total in Basin)*		**1** *(0.3%)*
Upper South Platte	Adams	24
	Arapahoe	29
	Boulder	30
	Broomfield	1
	Clear Creek	13
	Denver	32
	Douglas	20
	Gilpin	8
	Jefferson	41
	Larimer	3
	Las Animas	1
	Park	9
	Summit	1
	Teller	5
	Weld	9
Total Upper South Sub-Basin *(as % of Total in Basin)*		**226** *(65%)*
Middle South Platte	Adams	9
	Boulder	3
	Elbert	6
	Larimer	29
	Weld	46
Total Middle South Platte Sub-Basin *(as % of Total in Basin)*		**93** *(27%)*
Lower South Platte	Adams	1
	Arapahoe	2
	Elbert	4
	Logan	6
	Morgan	9
	Otero	1
	Sedgewick	3
	Washington	1
	Weld	1
Total Lower South Platte Sub-Basin *(as % of Total in Basin)*		**28** *(8%)*

Sub-Basin	Applicable Counties	Number of Point Sources by County
Basin-wide	Adams	34
	Arapahoe	31
	Boulder	33
	Broomfield	1
	Clear Creek	13
	Denver	32
	Douglas	20
	Elbert	10
	Gilpin	8
	Jackson	1
	Jefferson	41
	Larimer	32
	Las Animas	1
	Logan	6
	Morgan	9
	Otero	1
	Park	9
	Sedgewick	3
	Summit	1
	Teller	5
	Washington	1
	Weld	56
Total All Basins	**22**	**348**

Sources: USEPA 2010a, 2010d; WQCD 2010b.

Congress authorized the Clean Water State Revolving Fund (CWSRF; called the Water Pollution Control Revolving Fund, or WPCRF, in Colorado) when amending the CWA in 1987. The purpose of the CWSRF is to help provide financial assistance to governmental agencies for the construction of projects that are listed in the state's annual Intended Use Plans (IUPs). The Project Eligibility List included in the IUPs is made up of projects for construction of publicly owned treatment works and projects/activities eligible for assistance under CWA sections 319 and 320. The Colorado IUP Project Eligibility List is comprised of the following six categories: (1) Category 1 includes those projects that improve or benefit public health or that will remediate a public health hazard; (2) Category 2 includes those projects that enable an entity to achieve permit compliance; (3) Category 3 includes those projects that contribute to the prevention of a public health hazard, enable an entity to maintain permit compliance, or enables an entity to address a possible future effluent limit or emerging issue; (4) Category 4 includes those projects that implement a watershed/nonpoint source management plan; (5) Category 5 includes those projects that implement a source water protection plan; and (6) Category 6 includes those projects that sought funding only under the American Recovery and Reinvestment Act of 2009 and that were not already on the state's Project Eligibility List as of January 1, 2009.

For the purposes of the SWQMP, projects in categories 1 through 3 were labeled as wastewater treatment facility projects; projects in category 4 were labeled as nonpoint source projects or stormwater projects; and projects in category 5 were labeled as source water protection projects.

Finally, projects in category 6 were labeled as wastewater treatment facility, nonpoint source, stormwater, or source water protection depending on the nature of the project (WQCD 2010b).

A total of 163 planned treatment projects were identified for point source facilities in the Platte River Basin[15]. Exhibit 11-79 provides a summary of the project types and includes the number of projects, the estimated costs of the projects, and the population expected to benefit. Wastewater treatment facility projects lead the list in terms of the greatest number of scheduled projects (126 of 163, or 77%). Stormwater projects follow with a total of 23 (14%). Nonpoint source projects total 12 (7%), and source water protection projects total 2 (1%).

Exhibit 11-79. Platte River Basin Summary of Scheduled Point Source Improvements

Project Type	Sub-Basin	Number of Projects	Estimated Cost of Projects[1]	Population Expected to Benefit from Projects	Percent of Projects Reporting Population Data
Wastewater Treatment Facility	North Platte	1	$400,000	750	100%
	Upper South Platte	75	$852,735,629	4,306,013	99% (74 of 75)
	Middle South Platte	36	$268,824,482	415,755	100%
	Lower South Platte	14	$31,733,709	42,638	100%
Total Wastewater Treatment Facility Projects		**126**	**$1,153,693,820**	**4,765,156**	
Nonpoint Source	North Platte	0	0	0	--
	Upper South Platte	8	$19,675,000	491,095	100%
	Middle South Platte	3	$3,600,000	90,500	100%
	Lower South Platte	1	$250,000	975	100%
Total Nonpoint Source Projects		**12**	**$23,525,000**	**582,570**	
Stormwater	North Platte	0	0	0	--
	Upper South Platte	12	$22,195,667	248,371	100%
	Middle South Platte	9	$17,087,800	159,643	100%
	Lower South Platte	2	$52,410,000	17,471	100%
Total Stormwater Projects		**23**	**$91,693,467**	**425,485**	

[15] Projects identified include only those on the state's IUP. Therefore, the list is not likely inclusive of all projects that may be occurring in the basin.

Project Type	Sub-Basin	Number of Projects	Estimated Cost of Projects[1]	Population Expected to Benefit from Projects	Percent of Projects Reporting Population Data
Source Water Protection	North Platte	0	0	0	--
	Upper South Platte	2	$820,000	1,188	100%
	Middle South Platte	0	0	0	--
	Lower South Platte	0	0	0	--
Total Source Water Protection Projects		**2**	**$820,000**	**1,188**	
All Projects	North Platte	1	$400,000	750	
	Upper South Platte	97	$895,426	5,046,667	
	Middle South Platte	48	$289,512,282	665,898	
	Lower South Platte	17	$84,939,709	61,084	
Total All Projects		**163**	**$1,269,732,287**	**5,744,399**	

[1] Dollar amounts listed are those reported in WPCRF project applications only, as reported in the IUP. They likely are not inclusive of all projects that may be occurring in the basin.

Sources: USEPA 2010a, 2010d; WQCD 2010b.

The total estimated cost of the 163 projects in the Platte River Basin is approximately $1.3 billion. Wastewater treatment facility improvement projects constitute 91% of the total cost at approximately $1.2 billion. This is followed by stormwater projects at approximately $91.7 million (7%), nonpoint source projects at about $23.5 million, and source water protection projects at $820,000 (0.1%). Exhibits 11-80 through 11-83 (at end of chapter) provide additional details. In addition to project information, these exhibits also summarize NPDES permit information. It should be noted that funding gaps exist nationwide in the CWSRF for wastewater treatment projects.[16] Total funding has also not increased significantly under CWA section 319 in spite of nonpoint sources being the leading source of water pollution nationwide.

11.6 Nonpoint Source Management

Exhibit 11-84 (at end of chapter) summarizes CWA section 319 nonpoint source grant projects in the Platte River Basin for the past 5 years. A total of 17 CWA section 319 nonpoint source projects were identified. The principal aim of six of the projects was to develop watershed plans or conduct watershed assessments. The purpose of an additional four projects was best management practice (BMP) design/implementation, and the objective of another four projects was stream bank stabilization and restoration. Remaining projects were related to

[16] It is well recognized that the nation's infrastructure is aging and that the funds to replace this infrastructure are severely lacking. EPA recently completed its 2008 Report to Congress summarizing the results of its Clean Watersheds Needs Survey. The report presents a comprehensive analysis of capital investments necessary to meet the nation's wastewater and stormwater treatment and collection needs over the next 20 years. The report documents a total need of $299.1 billion as of January 1, 2008. This total includes capital needs for publicly owned wastewater treatment pipes and treatment facilities ($192.2 billion), combined sewer overflow correction ($63.6 billion), and stormwater management ($42.3 billion) (USEPA 2010b).

hydromodification and educational programs. Only 12 of the 17 grant projects reported budgets, and they totaled approximately $3.9 million. Approximately 38% of this amount ($1.5 million) was provided through section 319 grant funds. The remaining funds were from other sources and represent the grant recipients' cost-share agreement with WQCD.

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Map References

Exhibit 11-1. Platte River Basin Physical Location

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Exhibit 11-3. Platte River Basin and Major Tributaries (Base Map)

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Exhibit 11-4. Platte River Basin Level III Ecoregions

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Exhibit 11-6. Platte River Basin Nonconsumptive Needs Assessment

CWCB (Colorado Water Conservation Board). 2009a. *Nonconsumptive Needs Assessment Focus Mapping*. Colorado Department of Natural Resources, Colorado Water Conservation Board, Denver, Colorado.

Exhibit 11-7. Platte River Basin Precipitation

CWCB. 2004. *Statewide Water Supply Initiative*. Colorado Department of Natural Resources, Colorado Water Conservation Board, Denver, Colorado.

Exhibit 11-8. Platte River Basin Land Ownership

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Exhibit 11-9. Platte River Basin Land Cover

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Exhibit 11-15. Platte River Basin Key Diversions and Streamflow Gauges

CWCB. 2004. *Statewide Water Supply Initiative*. Colorado Department of Natural Resources, Colorado Water Conservation Board, Denver, Colorado.

Exhibit 11-16. Platte River Basin Wells and Aquifers

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Exhibit 11-17. North Platte River Sub-Basin Classified Waterbody Segments

WQCD. 2010a. CDPHE 2010 305(b) Basin Classifications. Shape\hucs\12digit\hydrologic_units\wbdhu12_a_co_Clip.shp. Acquired from Water Quality Control Division March 16, 2010.

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Exhibit 11-18. Upper South Platte River Sub-Basin Classified Waterbody Segments

WQCD. 2010a. CDPHE 2010 305(b) Basin Classifications. Shape\hucs\12digit\hydrologic_units\wbdhu12_a_co_Clip.shp. Acquired from Water Quality Control Division March 16, 2010.

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Exhibit 11-19. Middle South Platte River Sub-Basin Classified Waterbody Segments

WQCD. 2010a. CDPHE 2010 305(b) Basin Classifications. Shape\hucs\12digit\hydrologic_units\wbdhu12_a_co_Clip.shp. Acquired from Water Quality Control Division March 16, 2010.

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Exhibit 11-20. Lower South Platte River Sub-Basin Classified Waterbody Segments

WQCD. 2010a. CDPHE 2010 305(b) Basin Classifications. Shape\hucs\12digit\hydrologic_units\wbdhu12_a_co_Clip.shp. Acquired from Water Quality Control Division March 16, 2010.

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Exhibit 11-34. Platte River Basin Wetlands

USFWS (U.S. Fish and Wildlife Service). 2009. National Wetlands Inventory. <http://www.fws.gov/wetlands/data/DataDownload.html >. Accessed June 14, 2010.

Exhibit 11-68. Platte River Basin Impaired Waterbody Segments

USEPA. 2010. 2010 EPA-approved National Hydrography Database (NHD) Stream Segmentation co_2010_305b_draft_str_021410.shp and 2010 EPA-approved National Hydrography Database (NHD) Waterbody Segmentation co_2010_305b_draft_wb_021410.shp. Acquired from Water Quality Control Division on March 16, 2010.

WQCD. 2010a. CDPHE 2010 305(b) Basin Classifications. Shape\hucs\12digit\hydrologic_units\wbdhu12_a_co_Clip.shp. Acquired March 16, 2010.

WQCD. 2010b. CDPHE 2010 303(d) Listings By Regulation and Basin Shape\303D_LISTING\REG_33_EXPORT.shp, Shape\2010_303_ME\COUC\lakes\COUC_impaired_lakes.shp, Shape\2010_303_ME\COSP\COSP_impaired_str.shp, Shape\2010_303_ME\COSP\lakes\COSP_impaired_lakes.shp. Acquired from the Water Quality Control Division on March 16, 2010.