

7. Water Quality Characterization

Surface water and groundwater quality problems in the South Platte watersheds are due to historic water diversion, agricultural practices, mining activities in Park County, and unique geological formations containing natural heavy metals (i.e., iron, copper, manganese, zinc) and radium-rich minerals. Drinking-water source protection programs and TMDL studies largely affect water quality planning issues within this area.

7.1. Standards and Classification

Classifications and Numeric Standards for South Platte River Basin, Regulation #38, last updated in 2019, identifies the surface water segments and corresponding standards for the South Platte and Upper South Platte Watersheds. The stream segments within Regulation #38 are Upper South Platte Segments 1a, 1b, 2a, 2b, 2c, 3, 4, 5a, and 5b. Most of the proposed changes to these segments were updates based on changes adopted in the basic standards and revisions to the segment descriptions to separate lakes from the streams.

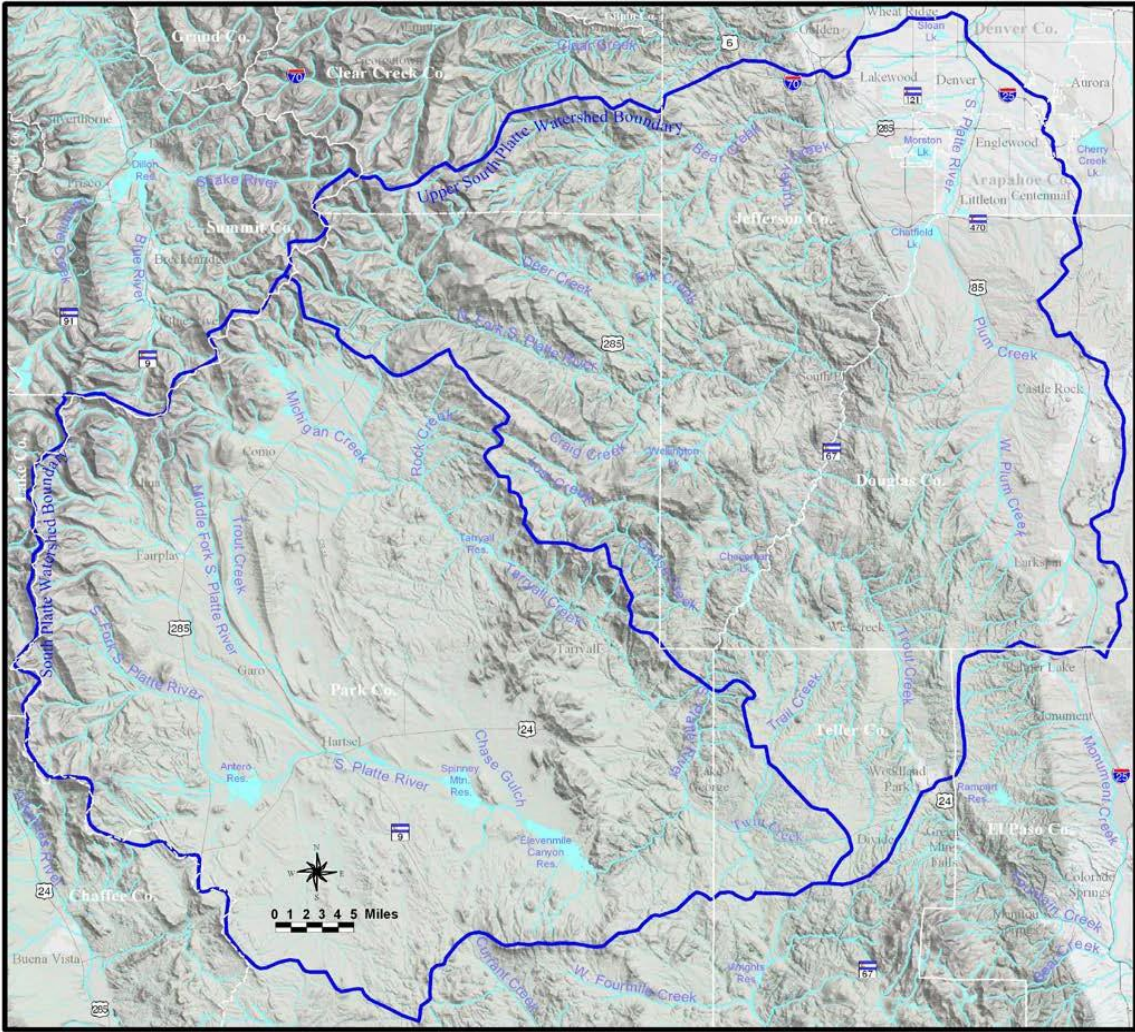
Issues that might affect the South Platte Basin as part of the next rulemaking hearing in 2020 are:

- More restrictive ammonia standards;
- More restrictive chloride standards;
- Revision of total recoverable arsenic standards;
- Temperature standards; and
- Nutrient standards.

7.2. Surface Water

Several municipalities depend on Park and Teller counties for their water supply. Residents in Teller and Park counties primarily depend on groundwater and not surface water as the primary component to the total water supply. Woodland Park and Alma, along with the smaller communities of Grant, Camp Alexander, Camp Santa Maria, Insmont, Glen Isle Lodge, Mooredale, Shawnee, and Eastbrook are the only entities that utilize surface water as a component of the total water supply. The cities of Denver, Aurora, and Colorado Springs also depend extensively on this for surface water. As growth continues along the Front Range, the evaluation of water supply alternatives in Park County will probably increase.

7.3. Figure: South Platte and Upper South Platte Stream Locations



7.4. Approved TMDLs

Table 3 in Appendix C is a list of TMDLs that are approved or are in progress in the PPACG portion of the Upper South Platte/South Platte Watersheds. Hyperlinks to the segment reports are included within the table, and all reports are listed at

<https://www.colorado.gov/pacific/cdphe/tmdl-south-platte-river-basin>

7.5. Water-Quality-Impaired Stream Segments

Most of the segments identified on the 2018 303(d) List and the Monitoring and Evaluation List are due to historic mining activities and sediment. While several segments have impairments for constituents that would not normally be associated with historic mining activities, primarily E. coli, other impairments (particularly those of metals such as arsenic, iron, and lead) are likely from historic mining operations or naturally occurring. Similarly, selenium is a water quality concern in many parts of the state and has been found to be naturally occurring.

7.6. Water Quality Analysis

There has been very little surface water quality data collected in Park County by the USGS or other agencies since the last update of the 208 Plan in 2010. The focus has been on the South Platte River in the Denver area and downstream from Denver. Groundwater quality data has been collected in Park County and is discussed in the groundwater quality section.

Results of the water quality assessment conducted as part of the previous 2010 208 Plan update indicate water quality is good except for localized problem areas that are primarily a result of historic mining activities and improper grazing activities. These problems were described in the Surface Water Stream Section. This water quality analysis will primarily examine the issues of most concern in Park County: nutrients; fires and post fire flooding; physical properties; and metals and other trace elements.

7.7. Nutrients

Stream segments are currently being evaluated for the potential development of stream standards for total phosphorous and total nitrogen. The CDPHE (2009) is analyzing discrete samples from several stream segments for total phosphorous and total nitrogen concentrations in preparation of determining nutrient standards.

Nitrogen and orthophosphate are the primary nutrient concerns in Park County. Elevated

nutrient levels which can degrade aquatic habitat, accelerate algae growth, and are toxic to fish (in the form of unionized ammonia) may be caused by sources such as wastewater discharges, seepage from septic systems, and fertilizers. Nitrate concentrations are typically higher in urban and built-up areas than in rangeland and forested areas. Nitrite was not detected and most unionized ammonia concentrations were less than the state chronic standard of 0.02 mg/l; all nitrate concentrations were less than the in-stream standard of 10 mg/l (USGS, 2001).

7.8. Fires and Post-Fire Flooding

Water quality impacts from forest fires include flooding, erosion, and an increase in the amount of bedload and suspended sediment that is transported. The amount of runoff and erosion rates depend on the intensity of the storms and the effectiveness of the rehabilitation practices taking place. The Forest Service is monitoring the implementation of the treatment processes that have taken place.

7.9. Physical Properties

Based on the 2018 update of the 208 Plan, no segments were impaired in subwatersheds for dissolved oxygen, thus indicating that dissolved oxygen concentrations were at acceptable levels. Similarly, no segments were impaired in subwatersheds for pH, indicating that pH concentrations were at acceptable levels.

7.10. Phosphorous Loading

Phosphorous loads in the South Platte River Basin are extremely important due to the limits placed on the Chatfield Reservoir from the South Platte River Basin.

7.11. Metals and Other Trace Elements

Based on data available during the 2010 update, some segments were impaired for dissolved selenium, total arsenic, dissolved manganese and total and dissolved iron. A summary of all 2018 303(d) listings in the Fountain Creek Watershed for water quality impairments and the monitoring and evaluation list can be found in Section 17.1.3. Metals such as aluminum, barium, iron, and manganese are abundant in the types of igneous and sedimentary rocks found in Park County.

Total iron and dissolved manganese were found to be the highest in areas where abandoned mines were present. In 2010, the Coalition for the Upper South Platte conducted a Mine Assessment Project. The assessment included fifty water quality samples on seventy-three sites. For example, at Hall Valley, primary metals were found exceeding state standards

including aluminum, cadmium, copper, manganese, lead and zinc. More information and field data can be found at <http://cusp.ws/wp-content/uploads/2014/10/CUSPmineReport2010Comp.pdf>

7.12. Suspended Sediment

In 2015, CUSP conducted a Roads to Rivers assessment of Eleven Mile Canyon, Happy Meadows, and Sportsmen's Paradise Roads which evaluates the road conditions, drainage systems, sediment concerns, traffic use, environmental conditions, and recreation management in the upper South Platte River corridor near Lake George, Colorado. Sources of suspended sediment was found from the road within Eleven Mile Canyon as the primary source, with an annual sediment yield of approximately 3.5 tons for the entire 8.7-mile length of Eleven Mile Canyon road. More information and field data can be found at <http://cusp.ws/wp-content/uploads/2016/02/2015.09.30%20Roads%20To%20Rivers%20Assessment%20-%20Eleven%20Mile%20-%20Happy%20Meadows%20-%20Sportsmens%20-%20Final.pdf>

7.13. Groundwater

7.13.1. Overview

Many streams and lakes in Colorado are sustained during dry periods by inflow from groundwater. During wetter periods, aquifers may be recharged from water in the same streams and lakes. It is this connection between surface water and groundwater that forms the understanding of the impacts one source might have on the other. There is increasing reliance on groundwater, especially during recent drought periods, for purposes where surface water is used, thus requiring more monitoring and control emphasis to now be directed toward its preservation. In many areas such as Bailey, residents have to drill deeper wells and are noticing water levels in the wells are much lower due to the decrease in aquifer recharge from below-average precipitation levels. This can also lead to increased concentrations of groundwater contamination because of less dilution. The specific water quality impacts due to the drought on residents who rely on groundwater wells still needs to be assessed.

Park and Teller counties share similar geologic characteristics and problems and rely heavily on groundwater as a source of drinking water for residents in both the incorporated and unincorporated areas. Alma and Woodland Park are two major cities/towns that utilize a surface water collection system and groundwater pumping to meet their drinking water needs. This is of particular concern since an increase in population in both Park and Teller counties will cause an increase in the amount of groundwater withdrawals.

7.13.2. Groundwater Monitoring

Park County is seeing an increased demand on water resources, as well as increased groundwater contamination due to the forecasted upward trend in population. The Phase I monitoring effort was completed by a cooperative effort between USGS, Park County, and Center of Colorado Water Conservation District. This effort indicated:

- Limited groundwater-quality data suggests groundwater contamination may be occurring in some aquifers and may be associated with population growth and increased on-site wastewater systems; and
- Broad-scale geographic and seasonal distribution of current groundwater quantity and quality are not available.

The Park County Strategic Master Plan (RPI Consulting, 2016) stipulates a need to protect the existing groundwater resources.

7.13.3. Oil and Gas Exploration and Production

Recently it was estimated there might be one trillion cubic feet of natural gas in South Park. The exploration process within the Apache Creek Sandstone, Niobrara Formation, and Dakota Sandstone are at depths ranging from 7,610 to 10,400 feet. The major issues are associated with the production process where hydraulic fracturing is required. The potential impacts associated with the development of several hundred production wells are the fracturing chemical concentrations which are correlated with degradation of groundwater quality. Any releases of natural gas into the groundwater zones may cause impacts to groundwater as well.

Any production activities should be thoroughly scrutinized for their effects to groundwater and surface water associated with drilling and site development issues, such as but not limited to, stormwater, chemical storage, and hazardous chemical use.

Currently, Park County has a set of oil and gas regulations to help address related groundwater quality issues.

7.13.4. Water Quality

To assess groundwater quality, data was collected by the USGS (2001) from 180 wells, and additional data was collected on nitrate levels by the Park County Department of Health and Environment (PCDHE) and the U.S. Forest Service in 2016. Most of the wells were sampled

for physical properties (water temperature, dissolved oxygen, pH, specific conductance), major ions, nutrients, and trace elements, and bacteria. The report can be found at:

<http://parkco.us/631/Groundwater-Quality-Compilation-Study>

There are no site-specific water quality classifications and standards for groundwater within the Upper South Platte Watershed according to Regulation No. 42 (CDPHE-WQCC, 2002).

The highlights from this report are summarized below.

- About 90% of all chloride concentrations in groundwater were at least one order of magnitude lower than the U.S. EPA drinking water standard of 250 mg/l, and no concentrations exceeded the standard.
- In eight of 144 wells, sulfate concentrations were higher than the drinking water standard of 250 mg/l. This occurred primarily in wells completed in sedimentary and volcanic rock aquifers.
- Fluoride was detected at every well in concentrations ranging from 0.1 to 5.6 mg/l. About 10% of the wells exceeded the U.S. EPA drinking water standard of 4.0 mg/l. Nearly all of the wells that exceeded 2 mg/l were located in crystalline rock aquifers (composed of Pikes Peak Granite). These rock formations are primarily found on the eastern edge of central Park County, north of Bailey.

7.13.5. Nutrients

Most nitrate concentrations in groundwater were less than federal drinking water standards of 10 mg/l. Numerous wells in Harris Park and Shawnee were also found to have high dissolved-nitrate levels, a possible indication of septic contamination.

7.13.6. Radon & Uranium

Studies show there are naturally occurring high levels of radon in the groundwater. Currently there is no federally enforced drinking water standards for radon. "Proposed regulations, however, do suggest a maximum contaminant level of 300 picocuries per liter (pCi/L) and an alternative maximum contaminant level of 4,000 pCi/L contingent on other mitigating remedial activities to reduce radon levels in indoor air. Radon concentrations in about 91 percent of groundwater samples were greater than or equal to 300 pCi/L, and about 25 percent had

radon concentrations greater than or equal to 4,000 pCi/L” (USGS Scientific Investigations Report 2007-5220). A median radon concentration of 4,200 pCi/l for samples from 16 wells located east of Fairplay was higher than the national average concentration of 350 pCi/l. In Woodland Park, combined radium 226 and 228 are the primary problems.

Large deposits of uranium are located in South Park, and great concern was expressed over uranium mining in South Park and potential water quality impacts. One of the major problems with uranium mining is the tailings contain uranium decay products. Water from the tailings, especially if left in large ponds or impoundments, can leach heavy metals into the groundwater. Any activities involving the mining of radioactive material in Park County should be thoroughly scrutinized for their effects on groundwater before mining is conducted. Currently, there is no uranium mining taking place.

7.13.7. Metals

Park County has evaluated the drinking water supply and quality impairment in the town of Hartsel. Hartsel is located in a mineral-rich area. It is not yet known exactly what contaminants are involved, although heavy metals (high iron) concentrations are documented. As a result, some residents have installed in-house treatment systems. These were provided by the City of Aurora in direct response to groundwater diversions by Aurora. Also, the water table is dropping in the area, decreasing the availability and quality of the water and causing residents to have to drill deeper, sometimes as deep as 500 feet.