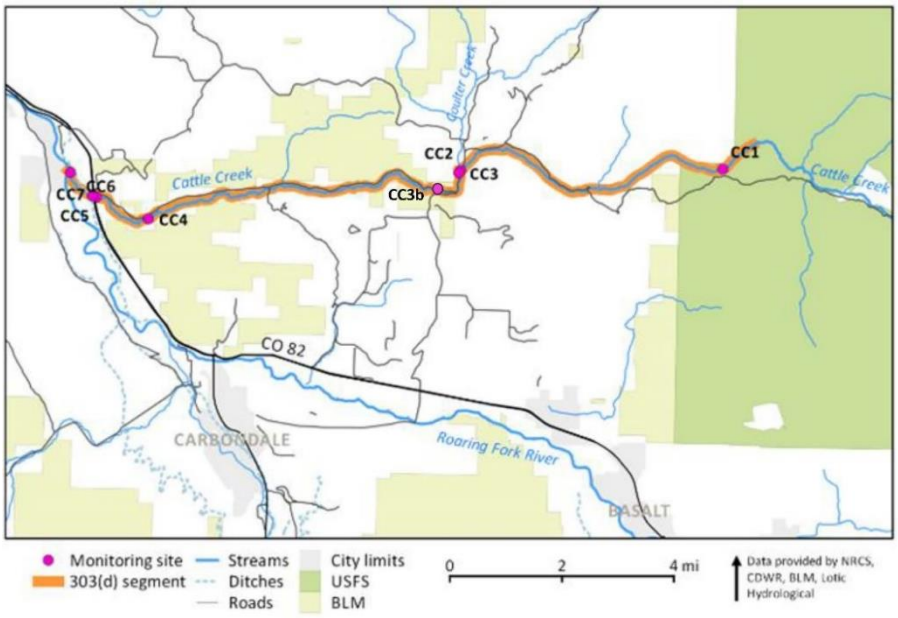
Cattle Creek Stream Health Evaluation Summary - 2018

Background:

In 2015, Roaring Fork Conservancy (RFC), with funding from Garfield County, embarked on an extensive study to better understand water quality impairments on Cattle Creek. Based on macroinvertebrate data, a 14.5-mile segment of Cattle Creek, from Bowers Gulch (near CC1) to the confluence with the Roaring Fork River (CC7) was placed on Colorado's 303(d) list for impaired waters.* Study goals included addressing the 303(d) listing and understanding the transition from high water quality near the headwaters to impaired water quality in the lower reach. In 2015, RFC collected and assessed chemical and biological data, conducted a land use analysis, and published results in the Cattle Creek 2015 Stream Health Evaluation.



Based on the 2015 findings, RFC has continued monitoring from 2016 through 2018 with funding from Garfield and Eagle Counties. All monitoring is strategically designed to complement and enhance the original data and provide additional information attuned to state standards. Results from the three-year study have informed RFC's initiative to address Cattle Creek's 303(d) listing, and provided a broader understanding of overall creek health and potential impacts to aquatic life.

**The Clean Water Act is the primary federal law governing water quality in the United States. Section 303(d) asserts each state is required to monitor waterways and document those which do not meet water quality standards. States must then prioritize impaired waters and develop remediation plans to improve water quality.*

Overview:

WATER CHEMISTRY:

- The conditions present in the 2018 drought year, with minimal snowpack and precipitation, low stream flows, hot temperatures, and the Lake Christine Fire in the upper Cattle Creek Watershed, can impact water chemistry, highlighting the importance of collecting both baseline and targeted water quality data.


Site CC5

- Basic water quality constituents, Dissolved Oxygen, pH and temperature, did not exceed state standards in 2018 and were minimally influenced by low flows.
- Similar to previous years, Specific Conductance, Total Dissolved Solids, and Salinity exhibited noteworthy downstream increases. These parameters were significantly above the study average at downstream sites in 2018, likely impacted by low flow conditions.
- In both 2017 and 2018, phosphorus levels were generally elevated at the mid-stream site (CC3b) compared to up and downstream sites, and exceeded the state standard during peak flows. A peak in phosphorus levels during spring runoff suggests livestock and natural/soil impacts.


RFC Staff collecting samples at CC1

- Nitrate concentrations in 2018 increased in a downstream direction, similar to previous years. However, timing fluctuations differed, possibly due to low flows. Downstream site CC5 recorded the highest Nitrate result to date.
- Since 2016, Ammonia and Total Inorganic Nitrogen (TIN) have been included in the sampling regime. Ammonia consistently measures very low at all sites. TIN increases moving downstream, though no related exceedances of state standards have been documented.
- Levels of E. coli generally increased moving downstream, but were below study averages at all sites in 2018. Exceedances of state standards still occurred at the mid-stream site (CC3b), however no exceedances occurred at the downstream site (CC5) for the first time in the study, possibly indicating a connection with low flows. The pattern and timing of E.coli results continue to suggest that grazing activities and streamside land management are likely primary, but not sole, contributors.
- Monitoring results in 2018 reiterated Cattle Creek's potential nutrient and bacteria issues, along with revealing some new trends possibly tied to low flow and drought conditions.

Please note, these results do not justify legal designations of impairments.

MACROINVERTEBRATES:

- In 2017 RFC submitted 2016 Macroinvertebrate data to the Colorado Water Quality Control Division (WQCD) to address the current 303(d) impairment listing of the creek. Initial analysis by the WQCD unofficially indicates the data, along with a revised state metric, could lead to the de-listing of the creek.
- In 2018 the Glenwood Ditch Company installed a new diversion structure on lower Cattle Creek below site CC5. In the fall of 2018, RFC staff collected macroinvertebrate samples above and below the structure to assess potential impacts to aquatic insect communities. Results are pending.

LAND USE:

- Land use analysis (conducted in 2015) identifies land use changes that correlate with water quality and macroinvertebrate findings. The upper reaches of Cattle Creek are largely undeveloped and forested, supporting excellent water quality, however a portion of this area burned in the Lake Christine Fire. A gradient of increasing impacts matches land use in a downstream direction from agricultural activities to residential and commercial development. These varied uses along the stream corridor lead to water quality impacts, signals of aquatic life stress, and riparian alteration, all playing a role in the steady downstream degradation of stream health.

FLOWS:

- Flows were significantly impacted by 2018 drought conditions, with all sites measuring well below study averages during all sampling events. The middle site (CC3b) had a record low measurement and the upper site (CC1) measured less than half of average during spring runoff.
- Water withdrawals in the middle and upper watershed continue to remove significant streamflow to irrigate lands in Missouri Heights. Throughout the lower reach, streamflow remains at consistently low levels, which may exacerbate water quality issues due to the reduced dilution for existing stressors.


RFC staff measuring flow at CC1

LAKE CHRISTINE FIRE:

- In July 2018, the Lake Christine fire burned over 12,000 acres around Basalt Mountain. Some of the highest intensity burn areas were located in the Cattle Creek Headwaters. These areas had high soil burn severity which directly correlates with: flood risk, erosion rate, vegetative recovery rate, and downstream threats.
- Potential remains for debris and sediment flows from the burn area to impact Cattle Creek in the next 1-5 years. Impacts will be exacerbated in reaches where little water currently exists to flush sediments downstream.
- RFC is coordinating the Lake Christine Technical Advisory Group to support communication between active agencies and facilitate long term fire restoration planning and projects.

Action Items:

BLM PROPERTY:

- In 2018 RFC identified a water quality and riparian habitat concern on a Bureau of Land Management (BLM) property along Cattle Creek. After submitting a letter of concern to BLM proposing a site cleanup and protection from future degradation, the project was approved.
- RFC partnered with the BLM to host a 2-day cleanup event on the property, including staff from both entities, Garfield County and a crew from Rocky Mountain Youth Corps. In total over 400 yards of barbed wire and 2,260 pounds of trash and debris were removed from the riparian area along the creek.

Picking up thousands of bullet casings and shells near the creek

Next Steps:

Roaring Fork Conservancy will:

- Continue water quality monitoring in 2019. Pursue options for post-fire monitoring.
- Shepherd RFC-submitted data through the WQCD process to address the current 303(d) listing.
- Explore opportunities to address low flows on the creek, particularly a voluntary coordinated spring flushing flow.
- Host a public panel discussion with all affected jurisdictions detailing post-fire impacts, preparedness, and restoration projects.
- Address Colorado Department of Transportation proposed scour mitigation project at the Hwy 82 Cattle Creek bridge.
- Continue work with stakeholders to provide consultation and resources regarding riparian, septic, and other best management practices to improve stream health.

For more information, visit www.roaringfork.org
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Roaring Fork Conservancy: Inspiring *people to explore value and protect our watershed since 1996.*