

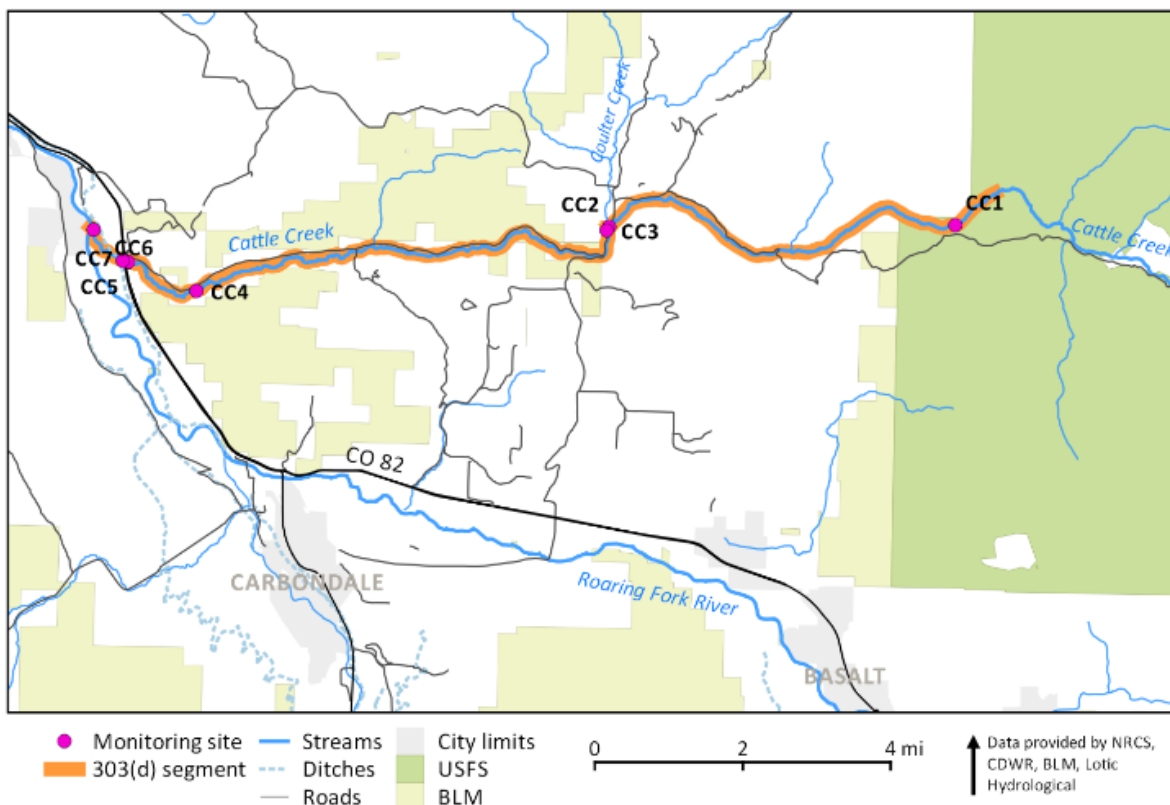


Cattle Creek 2015 Stream Health Evaluation

Background:

In 2015, Roaring Fork Conservancy (RFC), with funding from Garfield County, embarked on an extensive study to better understand water quality impairment(s) on Cattle Creek. Based on previous macroinvertebrate data, a 14.5-mile segment of Cattle Creek, from Bowers Gulch to the confluence with the Roaring Fork River was listed on Colorado's 303(d) list. Based on previous data, Cattle Creek exhibits high water quality near the headwaters and impaired water quality in the lower reach. With this information, RFC worked with property owners to gain access to strategic areas in and along Cattle Creek to understand what is happening in between these two sites. Through the summer and fall of 2015, RFC collected and assessed chemical and biological water quality data based on Colorado State Standards at seven sites along Cattle Creek to provide insight into the source of any water quality impairment(s).

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:

- Sampling revealed increased levels of nutrients, bacteria, and total dissolved solids in downstream sites. The likely source is agricultural land uses, although impacts may be exacerbated by poor near-stream land management practices including removal or destruction of riparian buffer zones.

- Phosphorus levels increased in a downstream direction, with the state standards exceeded at 2 of the 3 most downstream sites. The timing of high levels of total phosphorus primarily suggests livestock and natural/soil impacts.
- Nitrate concentrations increased substantially in a downstream direction. The timing of nitrate levels show a correlation with septic tank density although more data is required for verification.
- Levels of E. coli exceeded state recreation standards at all sites in July. During other sampling events, levels increased and remained consistently high at all sites below Coulter Creek (CC3). The spatial pattern of E.coli results suggests that grazing activities and streamside land management are likely the primary contributors.

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

MACROINVERTEBRATES:

- Macroinvertebrate sampling indicates increased levels of stress and disturbance at downstream sites relative to upstream sites.
- With a few exceptions, upstream and middle sites attain state standards while the most downstream sites indicate impaired conditions.
- Despite low overall levels of development in the watershed, the location and impacts of the agricultural and residential activities create a clear signal of aquatic life stress in Cattle Creek. These stressors seem to be varied along the creek, with agricultural land use in the upper reaches and residential and commercial development in the lower reaches all playing a role in the steady downstream degradation of stream health.

LAND USE:

- Land use analysis identifies gradients of land use change that correlate with water quality findings. The upper reaches of the Cattle Creek watershed are largely undeveloped and forested, supporting excellent water quality. 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 have led to riparian alteration or degradation which in turn impacts water quality.

FLOWS:

- Water withdrawals in the middle and upper watershed remove significant streamflow to irrigate lands in Missouri Heights. This may exacerbate water quality issues due to the reduced dilution for existing stressors such as agriculture and streamside development.

Next Steps

- Monitoring work in 2015 identified potential issues with nutrients and bacteria in Cattle Creek. Continued chemistry and macroinvertebrate monitoring will add depth, reliability, and increased statistical power to the dataset. Exploration of additional factors such as flow stress and fish communities may also shed additional light on stream impairments.
- RFC plans to continue monitoring in 2016. Results from 2015 were used to inform and modify the 2016 plan to increase informative results, as well as resource and cost efficiency.
- 2016 Monitoring Plan
 - Quarterly Water Quality monitoring at 5 of the 7 original sites along Cattle Creek.
 - Additional nutrients included in the sampling regime (Ammonia & Total Inorganic Nitrogen).
 - Macroinvertebrate sampling in the fall at all 7 original sites with an emphasis on addressing the state 303(d) listing.

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.