

Water

KEY PERFORMANCE MEASURES

- *Flow rates in rivers and streams*
- *Macroinvertebrate populations in rivers and streams*
- *Water availability (*)*
- *Acre feet of treated water produced (*)*

Desired Outcome: *The Aspen community has a sufficient supply of safe, clean water to satisfy a full range of municipal and other purposes while maintaining healthy streams and rivers. Resources such as the Roaring Fork River and its tributaries are essential to the vitality of the Aspen area, providing high-quality water for a variety of purposes. Because of its heavy dependence on this limited resource, it is important for the City to have minimal negative impacts on water quality and quantity. Only if Aspen has a sufficient supply of clean water for drinking and recreation, will residents and visitors be able to continue enjoying the life and natural amenities for which the area is known. Aspen takes responsibility for and minimizes pollutants entering waterways through storm water and waste water pollution prevention.*

Learn more about [Water](#) as a key environmental sustainability theme for the community.

() Measures under development*

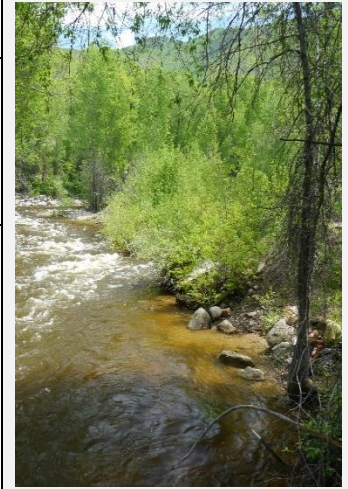
Flow rates in rivers and streams

What is it? Why is it important?

Aspen’s waterways are healthiest when flow rates are above minimum tolerable levels, experience peak run off, fluctuate with the seasons.¹ To protect water ways from reaching dangerously low levels, Colorado has designated **instream flows (INF)** which no part of the river should fall. INF levels should be considered a bare minimum at which a river can maintain health for a short period. **The INF for the Roaring Fork River (RF) is 32 cubic feet/second (cfs) and 13.3 cfs for Castle Creek (CC).**²

What does the data/trend say?

Figure 1 compares the annual 7-day minimum stream flows of the RF and CC with their respective INF. In the 2013-2016 water years (Oct-Sep), **CC flow rates did not drop below the INF.** The closest minimum flow was 18 cfs in 2013, still 4.7 cfs above the INF. CC water is diverted for use by the City of Aspen and other local water users. In contrast, the **RF INF was violated every year from 2006-2015**, varying from 9 cfs below (2006-2009) to 16.7 cfs below in 2014.³ The majority of diversion from the RF goes through the Twin Lakes Tunnel to the Arkansas River Basin.⁴ The City of Aspen also uses water from the RF, but curtails use when INF is not satisfied. The City is also currently drafting a River Management Plan for the RF. Figure 2 shows the annual 7-day maximum flows of the RF and CC. Dramatic variation in RF data corresponds to yearly precipitation, both in the Roaring Fork Valley and elsewhere in Colorado. When water supplies are abundant on the Front Range, trans-mountain diversions can be shut down, as was the case in 2015. In contrast, 2012 was an extreme drought year in Colorado.



The Roaring Fork River

Figure 1. Minimum Annual Stream Flows and Committed Instream Flows: Roaring Fork River and Castle Creek

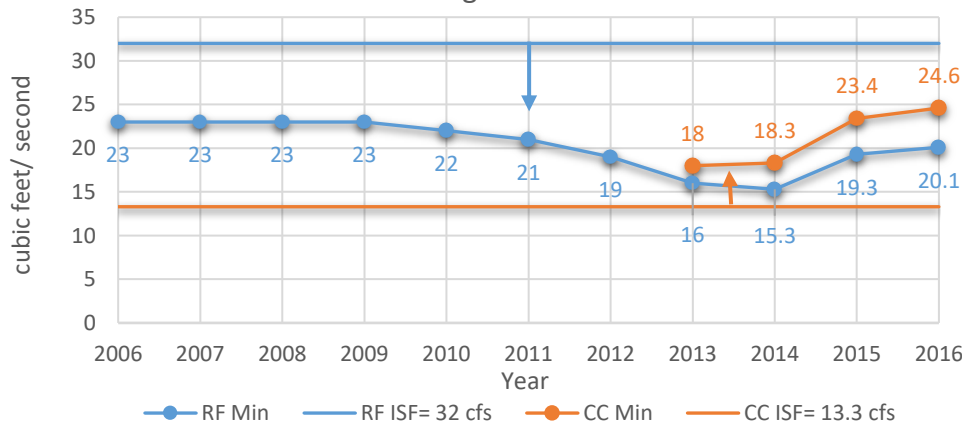
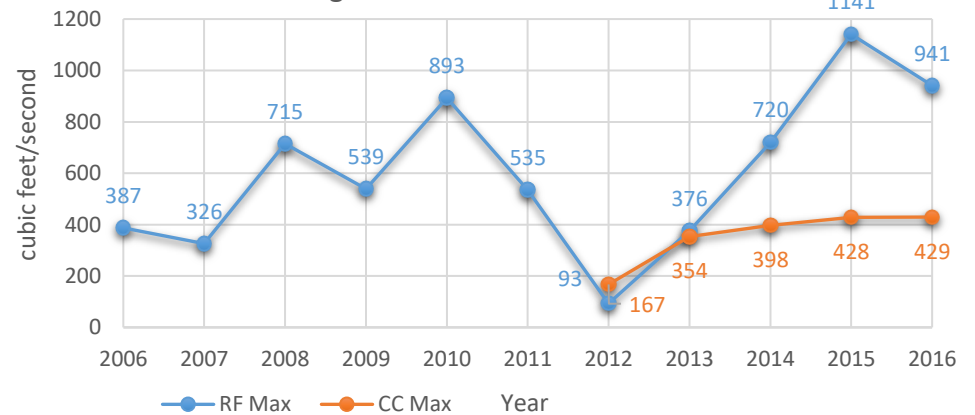


Figure 2. Maximum Annual Stream Flows: Roaring Fork River and Castle Creek



Targets

Aspen’s target is that minimum flows will not fall below instream flow commitments. **Between 2013 and 2016, Castle Creek met this target. In every year between 2006 and 2016, the Roaring Fork has failed to meet the instream flow during its annual 7-day low.**

Data Sourcing and Considerations

Year-round USGS stream flow data on Castle Creek began in spring, 2012. Accordingly, maximum flow data is available (run-off is in late spring), but minimum flow (occurs in winter) was first available in 2013.

Sources: [1] "Instream Flow Program." Colorado Water Conservation Board. Colorado Department of Natural Resources, Web. <http://cwcb.state.co.us/environment/instream-flow-program/Pages/main.aspx>. [2] City of Aspen Water Department [3][4][Figure data] "USGS Water Data for Colorado." National Water Information System. Web. <http://waterdata.usgs.gov/co/nwis/>. [Photo] Babbie, Sheila. 2016.

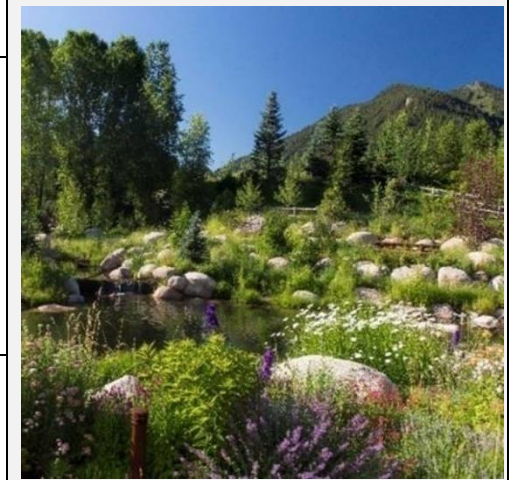
Macroinvertebrate populations in rivers and streams

What is it? Why is it important?

Aquatic life in Aspen’s rivers is an indicator of overall ecosystem health and pollution levels. Macroinvertebrate (insects living on river bottoms) populations are used to assess water quality due to their diversity, sensitivity, and response to stressors such as metals, nutrients and sediments. The Roaring Fork River between Difficult and Brush Creeks is on the State of Colorado’s 303d list for impaired waters (part of the Clean Water Act) because it does not meet aquatic life standards. Suspected stressors include: stormwater run-off, altered or degraded riparian habitat, and non-natural or decreased flows due to trans-mountain and other diversions. The City of Aspen has completed water quality improvement projects at three of the City’s major outfalls, including the Jennie Adair wetlands, Rio Grande Park and John Denver Sanctuary, and Prockter Open Space. These projects remove pollutants from stormwater runoff from more than one third of the City’s impervious areas.

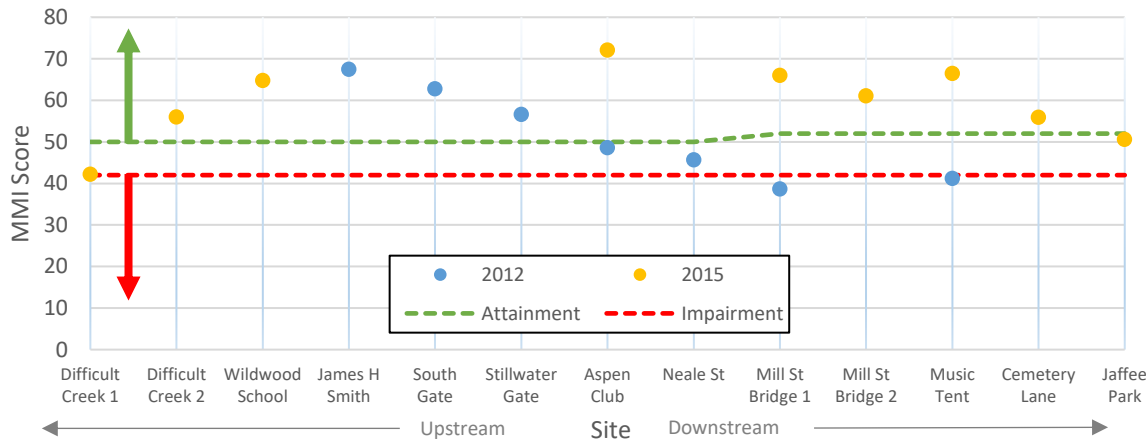
What does the data/trend say?

In Figure 1, 2012 data shows that the location of low and impaired sites correlates strongly with increasing watershed urbanization in and around the City of Aspen.² Interestingly, 2015 MMI scores were significantly higher, with no impairment scores, except for at Difficult Creek. This is likely because of a 2015 the Grizzly Reservoir release that is suspected to have flushed metal-enriched sediments into the river. The increased 2015 MMI scores near town may be due to improved stream health and could also be influenced by sampling method and time of year.³ Both 2012 and 2015 samples were taken in the fall, using similar methods.



John Denver Park, a stormwater filtration system.

Figure 1. MMI Scores on the Upper Roaring Fork River



Targets

Aspen’s target is to achieve healthy levels of aquatic life, such that the Roaring Fork River at Aspen is removed from Colorado’s 303d list for impaired waters. 2015 MMI indicate that Aspen is meeting its target, though future and continued evaluation is needed to establish whether these scores will persist as a trend.

Data Sourcing and Issues

One challenge with using macroinvertebrates as an indicator is that if a stream is highly polluted and then cleaned up, the extent and speed at which these populations will recover is not clearly established. For a more robust assessment, this report could consider including data related to pollution loads, riparian areas, and flow targets.

Sources: [1] Long, April. City of Aspen Stormwater Manager [2] S.K. Mason Environmental, LLC, and Timberline Aquatics, Inc. 2012 Upper Roaring Fork River Aquatic Life Use Assessment. [3] Timberline Aquatics, Inc. Results from Benthic Macroinvertebrate Study. 2015. [Photos] April Long.

