



# STATE OF THE WATERSHED

Annual Newsletter of the Big Dry Creek Watershed Association

December 2018

Volume 20

## Big Dry Creek 2017 Water Quality and Biological Monitoring Review

A key focus of the Big Dry Creek Watershed Association (BDCWA) is annual assessment of water quality conditions in Big Dry Creek. In the spring of each year, BDCWA uploads the results of the instream water quality monitoring program into a long-term water quality database and compares the results to applicable water quality standards for Big Dry Creek. Findings are documented in an annual water quality report that is presented and discussed at the March BDCWA public meeting and then posted to the BDCWA website.

Biennially, biological monitoring is also conducted at a subset of the water quality monitoring sites. The most recent round of biological monitoring, which was conducted by Aquatics Associates, occurred during October 2018.

This brief article highlights some of the key findings of the 2017 water

quality analysis and biological monitoring program, based on analysis of the data completed during 2018.

In 2017, water quality samples were collected and analyzed for a variety of constituents. Metals were monitored on a quarterly basis, with the exception of iron, which was monitored monthly. All other constituents were monitored on a monthly basis. BDCWA communities also fund operation of the U.S. Geological Survey (USGS) gauging station at Westminster behind Front Range Community College.

Key findings and recommendations regarding Big Dry Creek water quality and aquatic life conditions based on analysis of the 2017 data set include:

- ◆ Water quality in Big Dry Creek attained currently applicable stream standards, with the exception of *E. coli* for the entire stream and iron

*(Continued on page 2)*

### Inside this issue:

<i>Big Dry Creek 2017 Water Quality and Biological Monitoring Review</i>	1
<i>Farewell to Long-time BDCWA Leaders</i>	3
<i>Urban Drainage and Flood Control District's Flood Alert System</i>	3
<i>Watershed Plan Update</i>	4
<i>Big Dry Creek Biological Monitoring</i>	5
<i>Thornton Open Space Pilot Project</i>	6
<i>Barr Lake and Milton Reservoir Water Quality Model Updates</i>	6
<i>Broomfield's Microbial Source Tracking Special Study</i>	7
<i>What is the Big Dry Creek Watershed Association?</i>	8

All Watershed Association general membership meetings are open to the public.

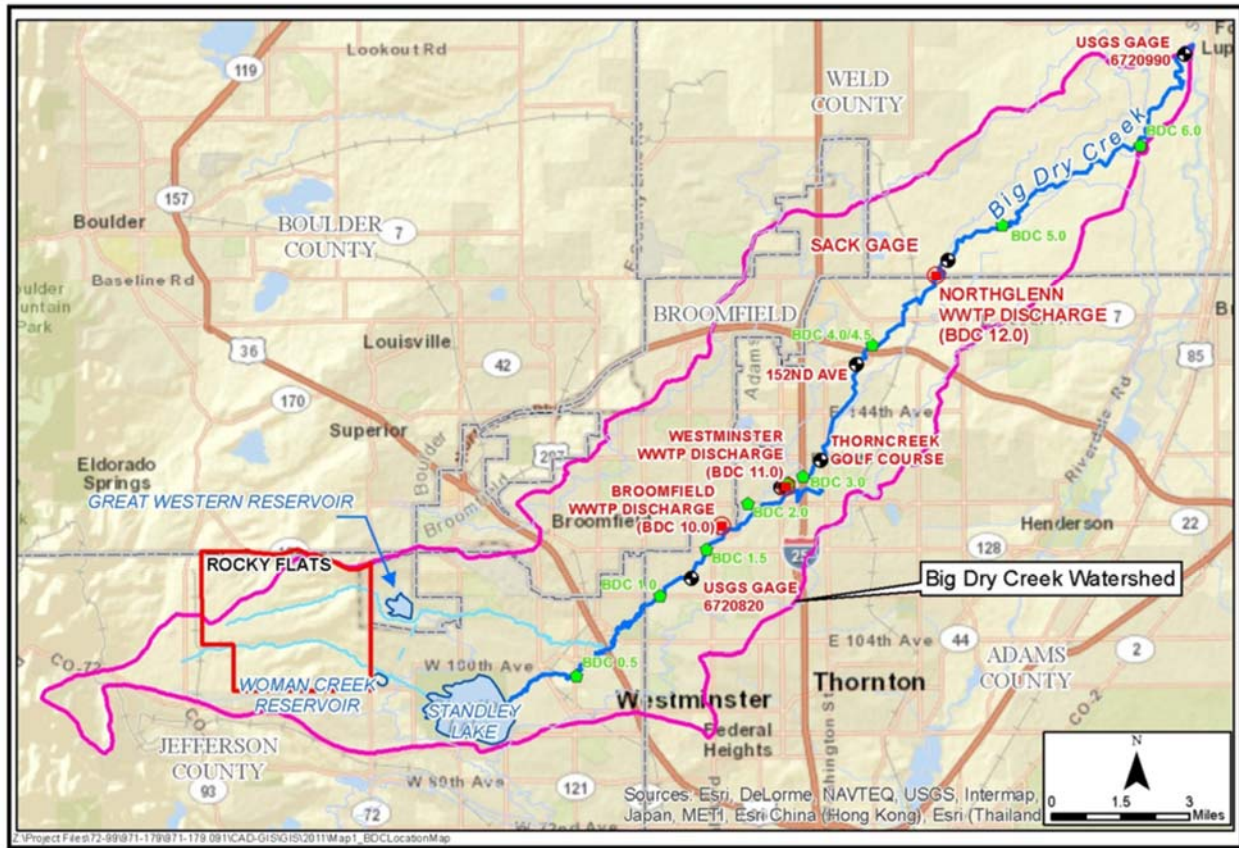
Meetings are generally held on a quarterly basis in March, June, September and December.

For More Information on the Next Watershed Meeting, contact Jane Clary: 303-480-1700 or visit our website: [www.bigdrycreek.org](http://www.bigdrycreek.org)

The Big Dry Creek Watershed Association is a 501(c)(3) corporation.



Big Dry Creek in Weld County in fall 2017.



(Big Dry Creek 2017 Water Quality Review, Continued from page 1)

for the reach below Weld County Road 8 (bdc6.0).

- ◆ *E. coli* concentrations are elevated at multiple instream locations, with the highest concentrations present at bdc3.0 at I-25 and at bdc6.0 in the lower agricultural area. *E. coli* concentrations in the WWTP discharges are very low and meet stream standards.
- ◆ Big Dry Creek below Weld County Road 8 is listed as impaired on the 2016 303(d) List for elevated total recoverable iron concentrations, which are expected to be due to streambank and soil erosion in the lower watershed.
- ◆ For the most recent five-year analysis period (2013-2017), Big Dry Creek attained its site-specific selenium standard. In 2016, the stream was removed from the 303(d) List of impaired waters.
- ◆ Big Dry Creek does not attain the warm water instream nitrogen and phosphorus "interim values" below WWTP discharges (from the Broomfield WWTP to the South

Platte River). Although these values are not expected to be adopted as stream standards on the main stem of Big Dry Creek below WWTP discharges prior to 2027, addressing nutrient sources on Big Dry Creek is already an increasing area of focus for BDCWA. Phosphorus concentrations and loads to Big Dry Creek have decreased over time as a result of WWTP upgrades at the Broomfield and Westminster WWTPs, along with reuse programs that continue to be implemented at these WWTPs.

- ◆ Big Dry Creek does not show impairment of aquatic life uses, based on calculation of Multi-metric Index (MMI) scores in accordance with the Commission's Aquatic Life Use Attainment Policy 10-1. Scores were calculated at six biological monitoring locations for fall monitoring conducted during 2008, 2010, 2012, 2014 and 2016. MMI scores vary substantially, both temporally and spatially.

For a copy of the 2017 Annual Report, please visit <http://www.bigdrycreek.org/>.

## Farewell to Long-time BDCWA Leaders

During 2018, BDCWA said goodbye to two long-term BDCWA volunteers: Mary Fabisiak and Craig Hoffman.

Mary served as the Water Quality Administrator at the City of Westminster, as well as two terms on the Colorado Water Quality Control Commission. Prior to her more than 15 years of service for the City of Westminster, Mary worked for the City of Northglenn for 6 years. Mary served as part of BDCWA's leadership for almost 20 years and was also involved with the Standley Lake Watershed Group. Mary retired in April 2018 and is already missed by BDCWA!



Craig Hoffman is retiring from the City and County of Broomfield after working in the Environmental Lab for 14 years. Craig has conducted water quality monitoring on Big Dry Creek for 13 years and has been a wealth of knowledge on stream conditions in Big Dry Creek. BDCWA will miss his active participation in the Association and appreciates his service. Although we know Craig will enjoy his retirement on the western slope, we hope he will keep his waders handy and come back for biological sampling on Big Dry Creek in 2020!



BDCWA wishes Mary and Craig many happy days in their retirement and thanks them for their service.

## Urban Drainage and Flood Control District's Flood Alert System

UDFCD works with local governments to ensure the safety of their citizens by providing local officials with early notifications of heavy rain and flood threats in partnership with NOAA's National Weather Service. Local officials act on these notifications according to their respective emergency plans and warn people in affected high risk areas when a flooding threat becomes more likely. The public can also access real-time rainfall, streamflow, and weather information from UDFCD's ALERT System. ALERT data can also be retrieved for past events.

The gauge was installed in conjunction with a stream restoration project on Big Dry Creek sponsored by Thornton and UDFCD.

In 2018, UDFCD began operating a new ALERT stream gauge on Big Dry Creek near the I-25 and the Thorncreek Golf Course. To access data, go to <https://udfcd.onerain.com/home.php>.



BIG DRY CREEK AT THORN CREEK GOLF COURSE

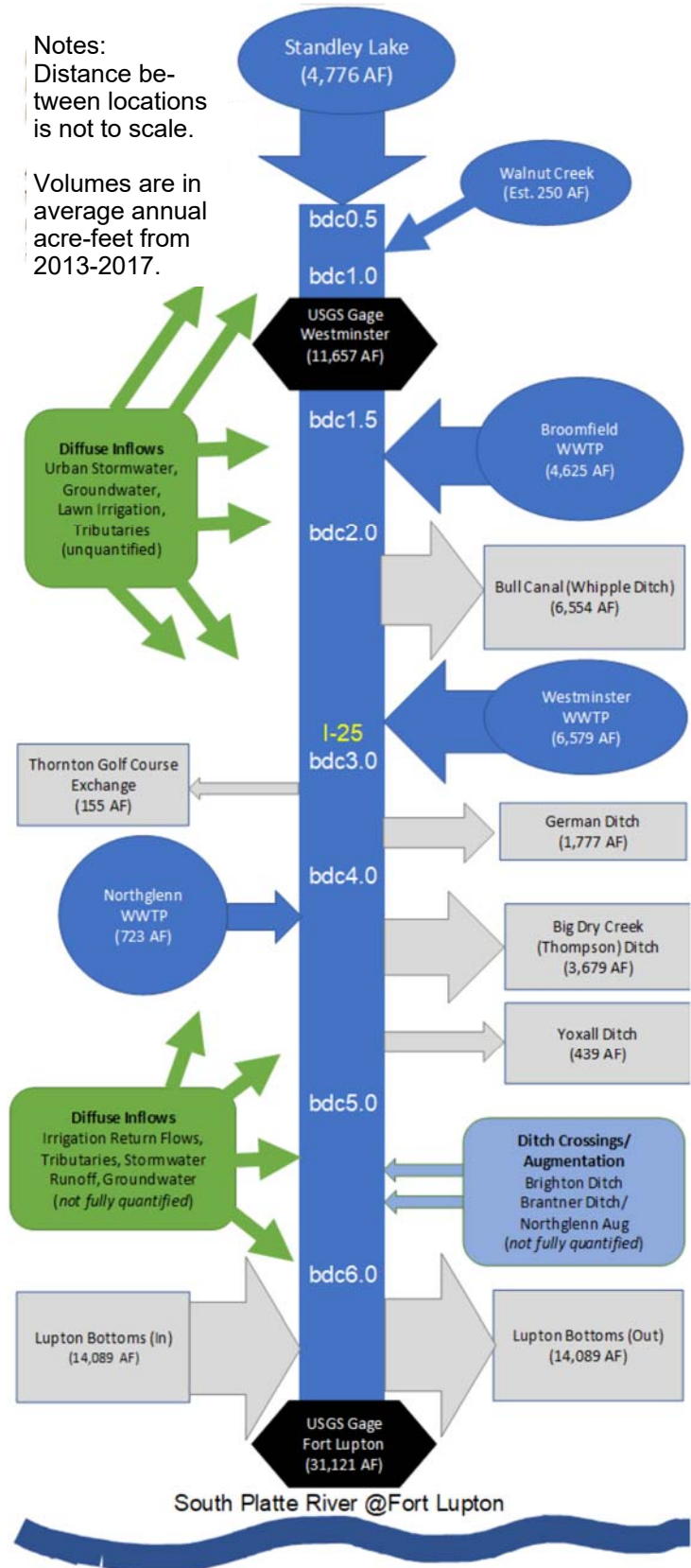
## Watershed Plan Update

In 2018, BDCWA began working on a significant update to the Big Dry Creek Watershed Plan, which was originally completed in 2001. Although interim updates have been completed and current activities of BDCWA are documented in annual reports, the 2018 update represents a significant revision to the plan.

Some of the areas being updated in the plan include:

- ***E. coli* Total Maximum Daily Load (TMDL):** In 2016, the Water Quality Control Division finalized a TMDL for *E. coli* on Big Dry Creek. The Plan will be expanded to include implementation planning to better characterize and control sources of *E. coli* and promote public education efforts related to pet waste, in conjunction with local stormwater programs.
- **Reuse Programs and WWTP Upgrades:** Since completion of the original watershed plan, both Broomfield and Westminster have implemented significant reclaimed water programs and treatment plant upgrades that are now characterized in the plan. Stream hydrology is influenced by WWTP discharges, as well as releases from Standley Lake and ditch diversions (see figure).
- **Drainage Planning and Stream Geomorphology:** Over the last few years, BDCWA, Colorado State University, Urban Drainage and Flood Control District and local governments have completed significant studies of channel conditions in Big Dry Creek, conducted drainage master plans, and implemented channel improvements. Special studies of the relationship between erosion and streambank phosphorus have also been completed.
- **Nutrient Management:** WWTPs in the watershed have completed plant improvements to reduce nutrient loading to the stream, with more upgrades planned in the future to comply with Colorado's Nutrient Management Control Regulation 85.

The Watershed Plan update will be completed in mid-2019, with the new plan available on the BDCWA website.



Major hydrologic influences on Big Dry Creek shown relative to long-term instream monitoring locations.

## Big Dry Creek Biological Monitoring

BDCWA conducts a biennial macroinvertebrate and fish monitoring program during the month of October in even years. Analysis for the 2016 sampling event is now available and 2018 sampling was completed in October.

For benthic macroinvertebrate monitoring, several types of evaluation are completed, including calculation of the invertebrate community index (ICI) and Colorado’s multi-metric index (MMI), along with other metrics. For purposes of evaluating compliance with Colorado’s Aquatic Life Use Attainment Policy 10-1, MMI scores are the primary focus. The figure below provides a summary of MMI results for macroinvertebrate data collected in the fall of 2008, 2010, 2012, 2014 and 2016 for the aquatic monitoring program on Big Dry Creek.

All samples for the five years met or were better than the impairment threshold (MMI score of 22), and over the five sampling years, no consistent upward or downward trends were noted. All 2016 MMI values met use attainment (MMIs >37 threshold for Class 2 streams) except for bdc5.0. All sites except bdc5.0 were also High Scoring Waters (MMI >44 for Biotype 3).

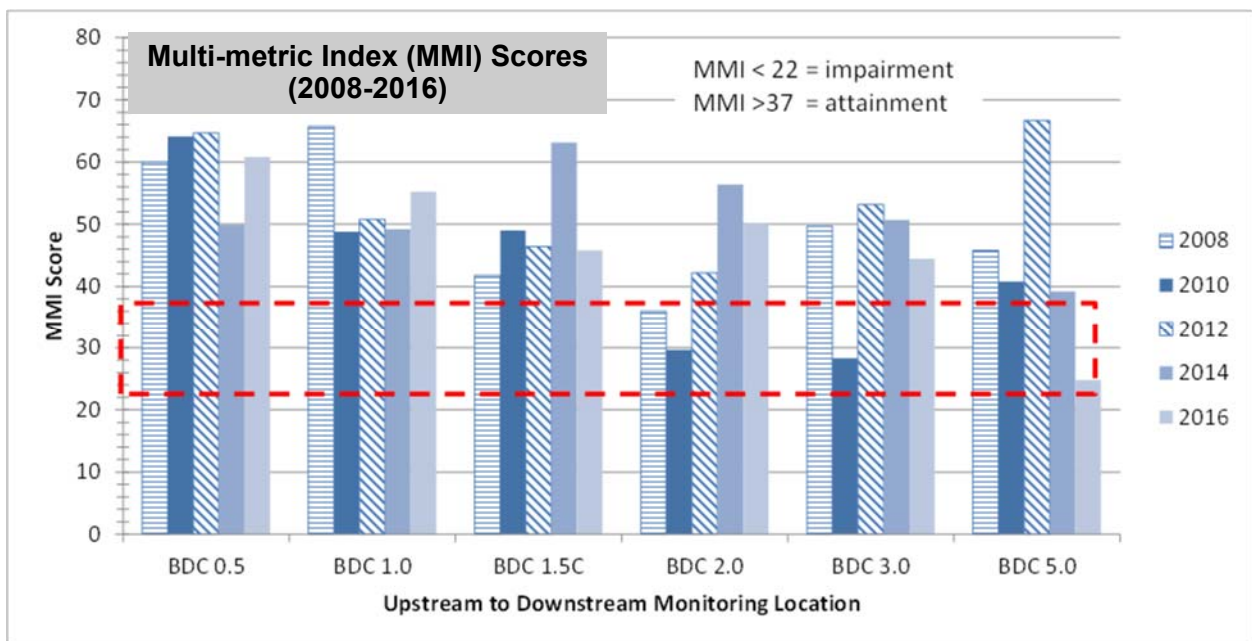
Although a detailed evaluation of the fish



*Aquatics Associates staff and volunteers count and measure fish collected from Big Dry Creek before returning them to the stream.*

sampling program is not included in this brief article, Tami Schneck of Aquatics Associates reports that fish populations in Big Dry Creek continued to be healthy and abundant with typical year-to-year and site-to-site variability based on the most recently available data from fish shocking in the fall of 2016.

Analysis of the 2018 fall sampling event will be presented to BDCWA later in 2019.



## Pilot Project in Thornton Open Space is Headed for Construction in 2019

Over the past six months, the city of Thornton has been working with consultants to develop a stream restoration pilot project on Big Dry Creek between East 152nd Avenue and the Northwest Parkway. This pilot project is an outgrowth of the city of Thornton's Big Dry Creek Recreation and Floodplain Restoration Master Plan that was completed in 2018. This project will address several areas of severe bank erosion along the creek and will help to protect a sanitary sewer mainline that runs near the creek through the corridor. The creek restoration will include a riffle/pool system that will promote a stable channel through a naturalized design approach. The city of Thornton is working through final permitting for a Nationwide Section 404 Permit and a Floodplain No-Rise Certification and expects that all necessary approvals will be obtained so that construction can start in early 2019. The city has partnered with the Urban Drainage and Flood Control District on this project, and UDFCD will oversee the construction of the creek improvements.

For more information contact Paula Schulte at [Paula.Schulte@cityofthornton.net](mailto:Paula.Schulte@cityofthornton.net).

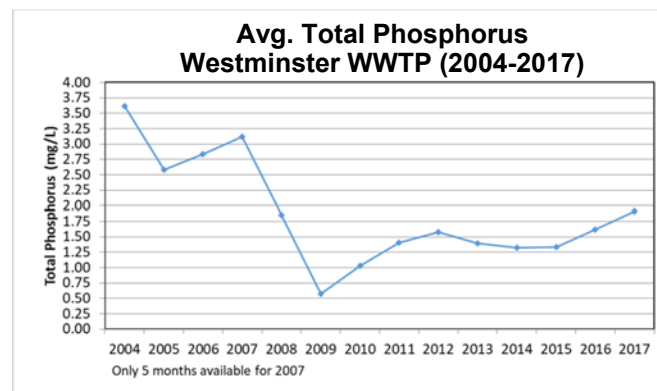
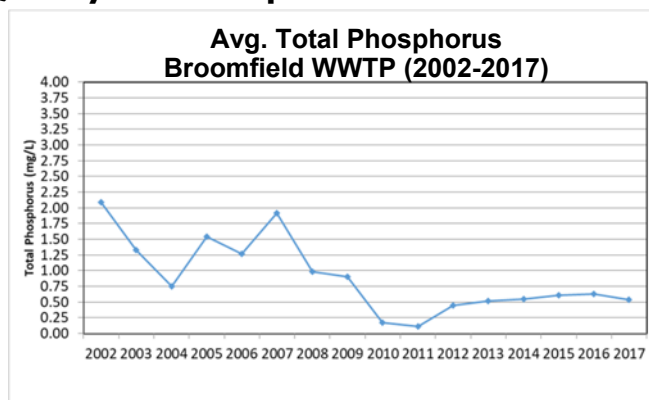


## Barr Lake and Milton Reservoir Water Quality Model Updates

The Barr Lake and Milton Reservoir Watershed Association (BMW) is updating their watershed and in-lake models using water quality data from 2011-17. The models form the basis of the pH and dissolved oxygen TMDL BMW is working to implement. The primary purpose of the modeling work is to ensure that the models reflect what is happening in the environment. The models may also be used to explore water quality impacts for different management scenarios. BMW plans to have results to share in the near future.

The Barr-Milton TMDL focuses on phosphorus reduction. Big Dry Creek received a phosphorus load reduction target of 20% relative to its 2004 phosphorus load to Milton Reservoir. Big Dry Creek has met this objective through major reductions of phosphorus discharged from the Broomfield and Westminster wastewater treatment plants (see figures).

For more information on BMW activities and model updates, contact Amy Conklin, BMW Coordinator, at [amy.conklin@comcast.net](mailto:amy.conklin@comcast.net) or <http://www.barr-milton.org/>.



## Broomfield's Microbial Source Tracking Special Study

In response to the 2016 Total Maximum Daily Load (TMDL) for *E. coli* for Big Dry Creek, the City and County of Broomfield initiated a limited scope special study using microbial source tracking (MST). MST is a set of methods used to determine the hosts (various animals or human) that contribute fecal pollution to streams. Broomfield's study included collection of stream and dry-weather stormwater outfall samples for analysis at a commercial laboratory (Source Molecular) using methods for the detection and quantification of the fecal-associated human gene biomarkers by real-time quantitative Polymerase Chain Reaction (qPCR) DNA analytical technology. Tests were also completed to evaluate the presence of DNA markers for birds, dogs, and beavers.

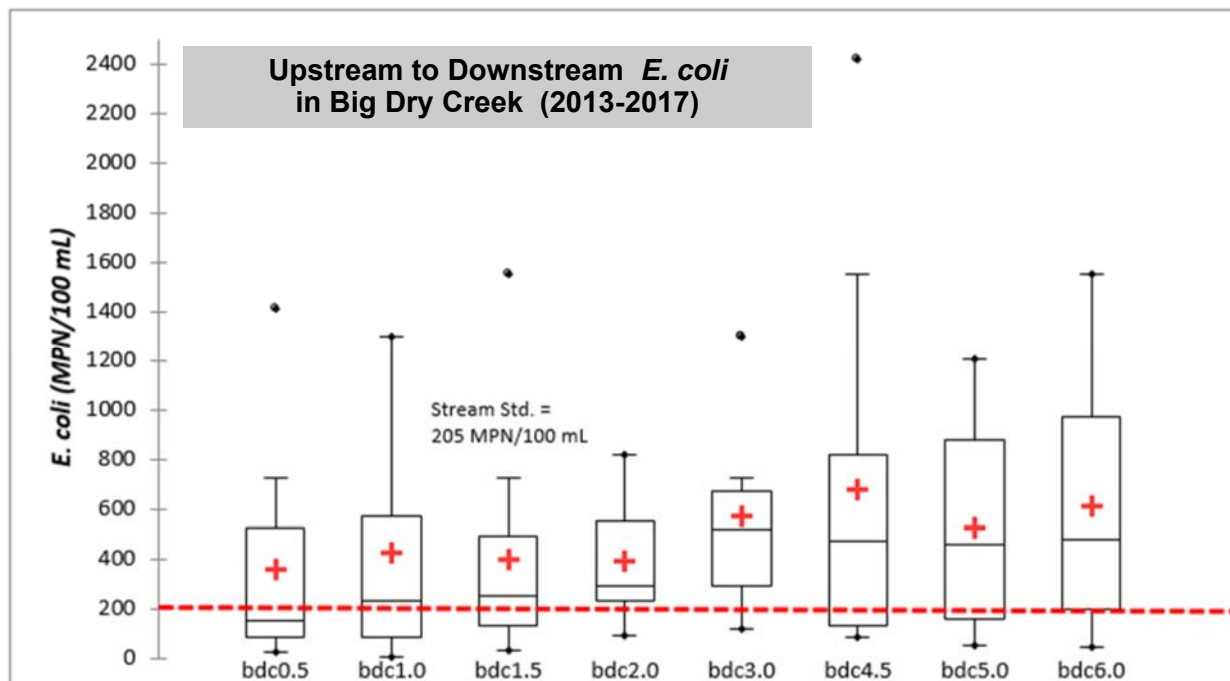
The study area was located in the vicinity of the Broomfield WWTP between bdc1.5 and bdc2.0 and included instream samples and dry weather samples at two of Broomfield's flowing stormwater outfalls. Other Broomfield stormwater outfalls in this area were dry. Findings from this exploratory special study suggest that a variety of sources may contribute to elevated *E. coli* instream in this reach. Additional observations from this limited study included:

- MST will not be useful for determining whether uncontrolled human sources of elevated *E.*

*coli* are present *instream* on Big Dry Creek below WWTPs or where reclaimed water is used for irrigation due to the presence of human DNA markers that can still be detected in treated (i.e., UV-disinfected) effluent. The WWTP sample showed high human DNA and very low *E. coli* in disinfected effluent.

- Broomfield storm outfall sample results do not show significant human source DNA markers or elevated *E. coli*.
- Dog, bird and beaver DNA were detected in all instream samples at all locations in the study reach. Dog sources may potentially include canines such as coyotes, as well as domestic dogs.
- Bird sources are identified at a "moderate" level upstream of the Broomfield WWTP.
- Future use of MST is recommended to focus on flowing MS4 outfalls that also have elevated *E. coli*. MST may be most useful during the non-irrigation season or in areas where reclaimed water is not being used for irrigation.

Overall, the study suggests that elevated fecal indicator bacteria in Big Dry Creek originate from a variety of sources. Additional study will be needed to further understand sources of elevated *E. coli* in Big Dry Creek.



## What is the Big Dry Creek Watershed Association?

The Big Dry Creek Watershed Association (BDCWA) is a non-profit corporation consisting of individuals and entities who dedicate time and resources to developing a sound scientific understanding of water quality, flow, aquatic life and habitat conditions in the Big Dry Creek watershed and act to improve these conditions.

The Big Dry Creek Partnership, which included the City and County of Broomfield, the Cities of Northglenn and Westminster, and Rocky Flats Environmental Technology Site (RFETS), founded the BDCWA in 1997. These entities have been heavily involved in monitoring stream conditions for many years. Since 1997, the Association has expanded to include representatives from other cities, counties, farmers, ditch companies, citizens and regulatory and resource agencies. The BDCWA is open to those interested in cooperatively working towards understanding and prioritizing efforts to improve basin conditions.

In 2004, the BDCWA formed a non-profit corporation with a Board of Directors currently consisting of representatives of the Cities of Westminster, Northglenn and Thornton, the City and County of Broomfield, Weld County and Adams County. Activities of the BDCWA during the last twenty years have been funded through the contributions from these entities, as well as the U.S. Department of Energy, the Woman Creek Reservoir Authority, the Colorado Water Conservation Board, the U.S. Environmental Protection Agency's 319 program (as administered by the Colorado Department of Public Health and Environment) and the Regional Geographic Initiative grant program.

For more information on the Big Dry Creek Watershed Association, please visit the BDCWA's website at [www.bigdrycreek.org](http://www.bigdrycreek.org) or contact Jane Clary, Watershed Coordinator, Wright Water Engineers, Inc., 303-480-1700 or [clary@wrightwater.com](mailto:clary@wrightwater.com).



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