



STATE OF THE WATERSHED

Annual Newsletter of the Big Dry Creek Watershed Association

BIG DRY CREEK December 2015

Volume 17

Big Dry Creek 2014 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 is conducted by Aquatics Associates, also occurred during 2014.

This brief article highlights some of the key findings of the 2014 water quality analysis and biological monitoring program, based on analysis of the data completed during 2015.

In 2014, water quality samples were collected and analyzed for a variety of constituents. Metals were monitored on a quarterly basis. 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 2014 data set include:

(Continued on page 2)

Inside this issue:

<i>Big Dry Creek 2014 Water Quality and Biological Monitoring</i>	1
<i>BDCWA Participates in CSU Research on Nutrient Loading Associated with Channel Erosion</i>	4
<i>Broomfield WWRF Nutrient Enhancement Project Construction Ahead of Schedule</i>	5
<i>Elk Herd Spotted in Big Dry Creek Watershed</i>	6
<i>Water Quality Regulatory Updates</i>	6
<i>Westminster Awarded GOCO Grant</i>	6
<i>South Platte River Segment 15 E. coli TMDL</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, May, September and December.

For More Information on the Next Watershed Meeting, contact

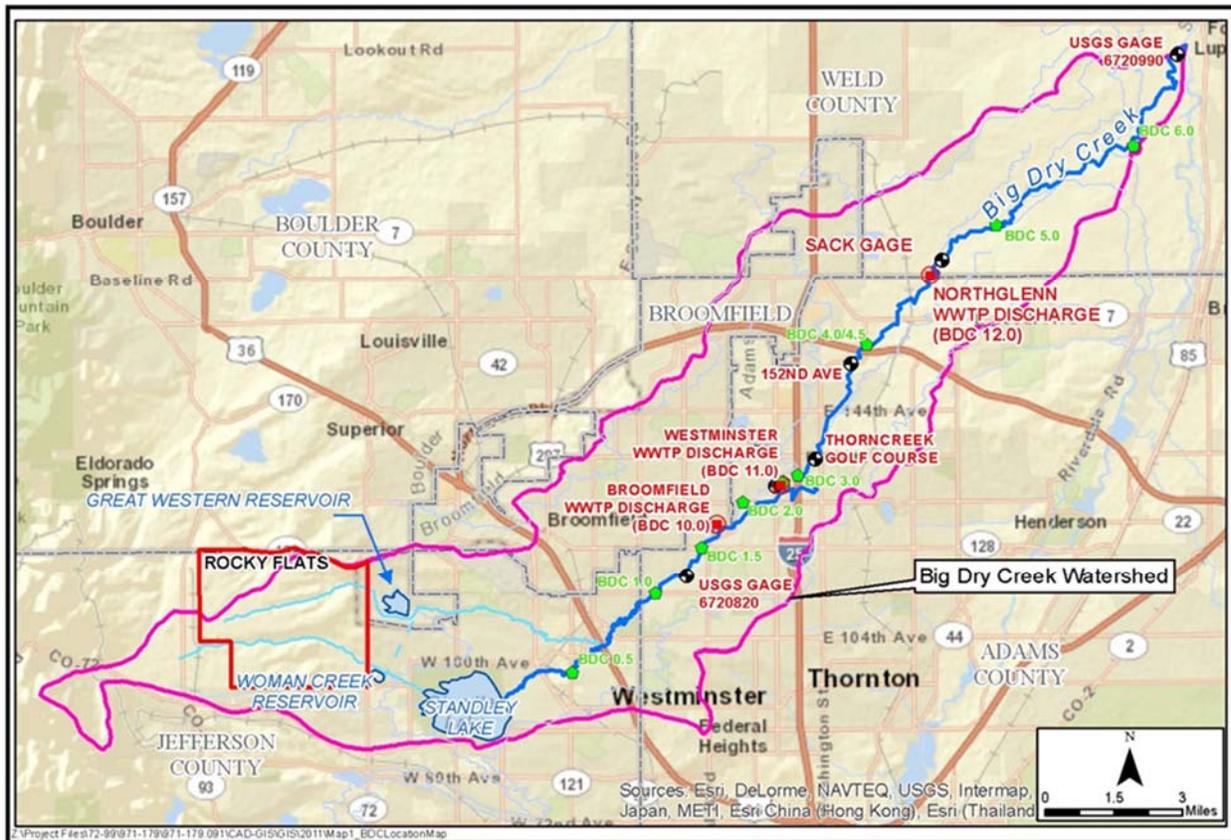
Jane Clary: 303-480-1700 or visit our website:

www.bigdrycreek.org

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



In 2014, fish populations in Big Dry Creek continued to be healthy and abundant with typical year-to-year and site-to-site variability. —Tami Schneck, Aquatics Associates



(Big Dry Creek 2014 Water Quality Review, Continued from page 1)

1. Water quality in Big Dry Creek attained stream standards for assigned stream standards, with the exception of *E. coli*. A total maximum daily load (TMDL) for *E. coli* is anticipated to be completed in 2016. BDCWA is working cooperatively with the CWQCD to ensure that the most complete and scientifically sound data set and assumptions are used in this process.
2. Big Dry Creek did not meet the *E. coli* standard during 2014, based on assessment procedures that determine attainment on a bimonthly interval. *E. coli* exceeded the stream standard during all bimonthly intervals except March-April and at one location for November-December. When considering the last five-year period for the overall stream segment, the standard is attained during March-April, but exceeded during the remaining months, including during the recreation season (May-October).
3. For the most recent 5-year analysis period (2010-2014), Big Dry Creek attained its site-specific selenium standard for both the irrigation and non-irrigation seasons. The CWQCD has adopted a statistical procedure for assessing site-specific standards that is expected to reduce cycling on and off of the 303 (d) List. Big Dry Creek was listed as impaired for selenium on the 2012 303(d) List, but is no longer listed on the draft 2016 303(d) List for selenium.
4. Big Dry Creek does not attain the interim warm water instream nitrogen and phosphorus "values" adopted by the Colorado Water Quality Control Commission (CWQCC) in 2012. Although these values would not be expected to be adopted as stream standards for the main stem of Big Dry Creek prior to 2022, addressing nutrient sources on Big Dry Creek is an increasing area of focus for BDCWA for both point and non-point sources of nutrients.

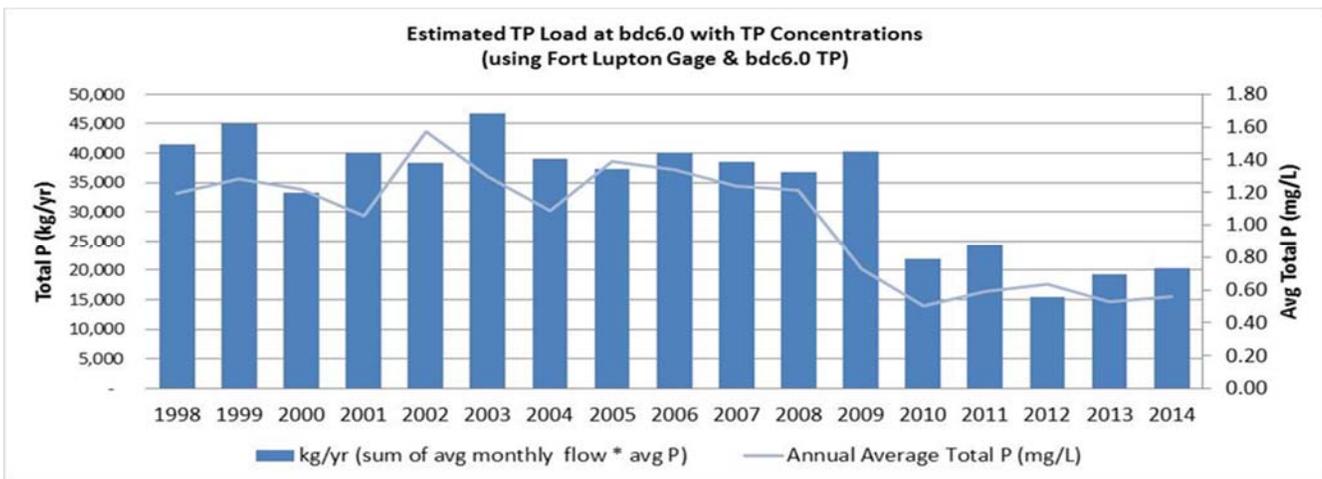
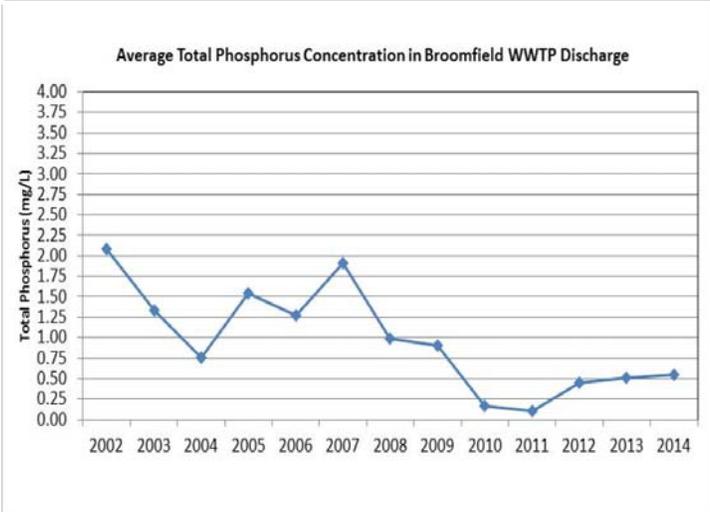
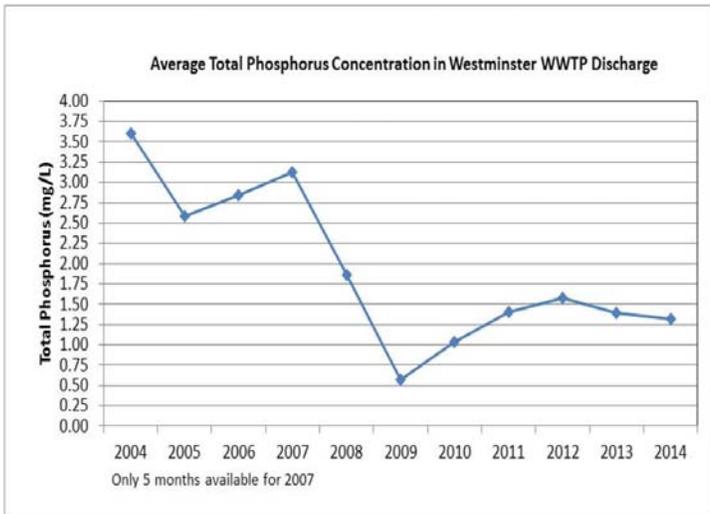
(Continued on page 3)

(Continued from page 2)

5. Phosphorus concentrations and loads to Big Dry Creek have decreased due to enhanced treatment processes at the Broomfield and Westminster WWTPs (see graphs), along with reuse programs that continue to be implemented at these WWTPs.
6. Big Dry Creek currently attains aquatic life uses, based on calculation of multi-metric index (MMI) scores in accordance with CWQCC's Aquatic Life Use Attainment Policy 10-1. Scores were calculated at six biological monitoring locations for fall monitoring conducted during 2008, 2010, 2012, and 2014. MMI scores vary substantially, both temporally and spatially.
7. Overall, the 2014 benthic macroinvertebrate community in Big Dry Creek remained relatively healthy, especially at bdc0.5, 1.0 and 2.0 where increases in mayflies were noted compared to earlier study years. The most interesting result during 2014 was a large increase in mayflies collected at site bdc2.0, which has historically been nearly void of mayflies, due mainly to poor habitat conditions (soft anaerobic sediments and shifting sand substrates). The September 2013 flood helped scour out the accumulated soft sediments to a firm bottom which may have improved habitat conditions at this location.

8. In 2014, fish populations in Big Dry Creek continued to be healthy and abundant with typical year-to-year and site-to-site variability.

For a complete copy of the 2014 Annual Report, please visit <http://www.bigdrycreek.org/>.



BDCWA Participates in CSU Research on Nutrient Loading Associated with Channel Erosion

Project Background

Big Dry Creek has a history of channel instability and incision, which is a concern recognized in both the urban and agricultural areas of Big Dry Creek. In 2015, Colorado State University researchers Dr. Brian Bledsoe, P.E., and Rod Lammers reached out to BDCWA and the Urban Drainage and Flood Control District to assess interest in participating in a study oriented towards characterizing the relationship between channel erosion and nutrient loading. Sediment bound phosphorus and decreased riparian denitrification may be a source of measurable nutrient loading. Given Colorado's recently adopted nutrient regulations, nutrient trading among point and non-point sources of pollutants may be an effective strategy for reducing overall nutrient loading in watersheds.

Project Goals and Approach

This project, part of the EPA-funded Center for Comprehensive, Optimal, and Effective Abatement of Nutrients (CLEAN), is focused on quantifying channel degradation as a source of nutrients and developing tools that can be used to assess the magnitude of this source and how it might change in the future. Big Dry Creek is one of the study watersheds selected for this analysis. Early efforts will consist of quantifying nutrient inputs for channel erosion using historical and field data. Next, a tool will be developed to estimate loading rates and predict how these will change over time. Finally, researchers will model ecological engineering approaches, including bank bioengineering and floodplain reconnection, to assess their expected effectiveness in reducing nutrient loading from channel degradation.

Specific Tasks

Research includes both field and modeling tasks. Field data collection will include bank soil sampling and phosphorus content characterization, riparian groundwater level and nitrate concentration monitoring, and channel surveying. Non-field tasks will include historic aerial photo analysis, LIDAR/GIS analysis, and bank stability modeling.

Project Progress

As of September 2015, Rod Lammers has visited over 20 sites along Big Dry Creek and taken measurements of bank geometry and channel slope. In addition, bank soil samples have been collected and will be analyzed for P content and texture (i.e. sand/silt/clay content). These data will be used to model bank erosion in Big Dry Creek. Aerial photo analysis has also been completed to estimate historic rates of bank erosion (1995-2012) which will be used for comparison/validation of the bank erosion modeling results. Next steps will focus on the modeling effort.

Project Sponsors

This project is being completed with funding from the U.S. EPA through the CLEAN Center, BDCWA, UDFCD, the City of Westminster, the City and County of Broomfield, and Adams County. For more information on the CLEAN Center, see: <https://erams.com/clean/>.



Broomfield Wastewater Reclamation Facility Nutrient Enhancement Project Construction Is Ahead of Schedule

On October 24, 2014, The City and County of Broomfield Council approved a construction agreement for improvements to the Wastewater Reclamation Facility (WWRF) with Moltz Construction.

In 2011 prior to the final adoption of Regulation 85, Broomfield staff evaluated several operational adjustments to determine whether the existing WWRF could meet the proposed nutrient limitations being considered in the rulemaking and stakeholder process.

Based on water quality monitoring results gathered during this evaluation, it was determined that Broomfield's current treatment processes would not be able to consistently meet the proposed discharge limits without significant modifications.

Improvements include:

- 1. Blower & Aeration Control Upgrades.** The turbo blowers are currently being installed and will start up December 15, 2015. With magnetic bearings designed for minimal energy loss and no mechanical wear, the blowers are projected to reduce energy costs by 30% and provide better regulated and controlled flow rates to enhance nutrient removal.
- 2. Centrate Return Pump System Modifications.** The new centrate return pump system came on-line in September 2015. The original pumping equipment pumped large volumes of centrate in a short period of time, resulting in a significant ammonia load being reintroduced to the treatment processes over a short period of time. The upgrade included changing out the centrifugal pumps for progressive cavity pumps with variable frequency drive controls. The pump rate can now be controlled throughout the day allowing for a more stable feed rate.



New turbo blowers (manufactured by Sulzer-ABS).

- 3. Primary Effluent Treatment Bypass Line.** The idea behind the primary effluent bypass line is to take a percent of the primary effluent and directly feed the flow to the denitrification treatment process and bypass the Bio-P treatment. It was determined that the Bio-P treatment was utilizing a significant portion of the carbon thereby reducing the available carbon to the denitrification organisms, reducing treatment effectiveness. The bypass lines are completed and testing will begin during the first quarter of 2016.

The overall project completion at the end of October was 89% with only 69% of the contract's allowable construction days used. Moltz Construction has continued to provide outstanding construction services in both how they approach the job and implementing the construction plan. Staff is excited and looking forward to our treatment process enhancements.

Article contributed by the City and County of Broomfield.

Elk Herd Spotted in Big Dry Creek Watershed

Bob Fiehweg, one of the original co-founders of BDCWA in the mid-1990s, reports that elk are becoming a more common sight in the western portions of the Big Dry Creek watershed. This herd could be seen from Highway 93 just west of Rocky Flats. Several herds have taken up residence on Rocky Flats National Wildlife Refuge and can occasionally be spotted from along the north and west sides. Earlier this fall, the sounds of elk bugling could be heard echoing in the Woman Creek drainage. No need to go to Rocky Mountain National Park - we can see this great fall nature spectacle in our own back yard. For more information on wildlife at Rocky Flats, see: http://www.fws.gov/refuge/rocky_flats/.



A herd of elk just west of Rocky Flats in the upper reaches of Woman Creek.

Water Quality Regulatory Updates for Big Dry Creek

During June 2015, BDCWA participated in the Regulation 38 Hearing, which is conducted triennially by the Water Quality Control Commission to review and update stream standards in the South Platte and Republican River basins. Several minor changes to the main stem were adopted, primary for consistency with agricultural use designations. These changes included a 100 mg/L standard for nitrate, chronic molybdenum standard of 150 ug/L and a chronic chromium-3 standard of 100 ug/L. Additionally, nutrient criteria for total phosphorus and chlorophyll-a were adopted for Segment 1; however, these standards only apply to tributaries to Big Dry Creek rather than the main stem. BDCWA also participated in the early stages of the

2016 303(d) List and worked with Division staff to quickly resolve concerns about a proposed iron impairment designation for the main stem of Big Dry Creek. A limited portion of Big Dry Creek will be listed as impaired for total recoverable iron below Weld County Road 8, based on data collected by Metro Wastewater. Metro conducts an independent monitoring program in the lower portion of Big Dry Creek. BDCWA data for the remainder of the segment demonstrated attainment of the iron standard.

The 2012 selenium impairment listing for Big Dry Creek was removed based on data demonstrating attainment of the standard.

Westminster Awarded Grant from Great Outdoors Colorado

Great Outdoors Colorado (GOCO) recently awarded the City of Westminster Parks, Recreation and Libraries (PRL) Department a \$75,000 grant as part of their \$25 million statewide Inspire Initiative.

The purpose of the initiative is to inspire Coloradans to appreciate and care for our great outdoors by providing funds for the creation or expansion of parks and natural habitats and to improve access to existing parks and trails. PRL plans to focus its coalition efforts on the area between Sheridan and Lowell Boulevards and 72nd and 52nd Avenues. The GOCO grant supports Governor John Hick-

enlooper's Colorado the Beautiful initiative by identifying and filling critical gaps in connectivity for trails and outdoor spaces, and creating improved access for every Coloradan to get outside.

GOCO invests a portion of Colorado Lottery proceeds to help preserve and enhance the state's parks, trails, wildlife, rivers and open spaces. Created when voters approved a Constitutional Amendment in 1992, GOCO has since funded more than 4,500 projects in urban and rural areas in all 64 counties without any tax dollar support.

South Platte River Segment 15 *E. coli* TMDL

Segment 15 of the South Platte River spans 26 miles and is described as the mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek. This segment was identified as impaired for *E. coli* on the 303(d) List for Colorado in 2002. During 2015, South Platte CURE moved forward with development of a “third party” Total Maximum Daily Load (TMDL). The draft TMDL was posted for public notice in November 2015.

The TMDL was developed using the Load Duration Curve methodology to ensure TMDL targets comply with the *E. coli* 126 CFU/100 mL standard during fluctuating flow conditions. A duration curve is a cumulative frequency graph that represents the percentage of time during which the value of a given parameter is equaled or exceeded. Load duration curves are developed from flow duration curves and can illustrate existing water quality conditions (as represented by loads calculated from monitoring data), how these conditions compare to desired targets, and the portion of the water body flow regime represented by these existing loads. Load duration curves were used to determine the load reductions required to meet the target maximum concentrations for *E. coli*.

Due to a variety of non-point sources of *E. coli*, locations of permitted point sources, influences on river flow from tributaries and diversions, and land use characteristics, Segment 15 was divided into three reaches for TMDL evaluation purposes: Reach 1 (from the Burlington Ditch diversion to 64th Avenue); Reach 2 (from 64th Avenue to 124th Avenue); and Reach 3 (from 124th Avenue to the confluence with Big Dry Creek). Allowable *E. coli* loads and wasteloads at varying flow conditions were developed at a representative assessment location in each of the three reaches. Analysis of the data generally showed declining *E. coli* concentrations from upstream to downstream, with the most elevated concentrations during the late summer months.

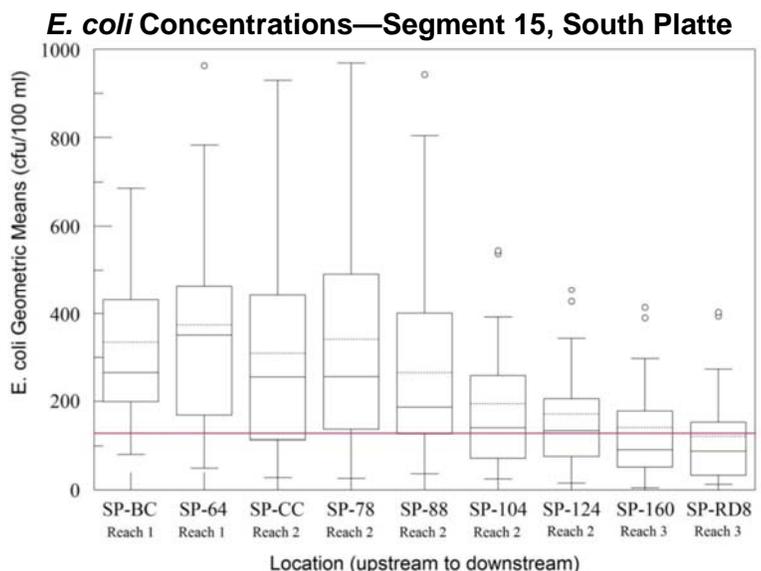
With regard to Big Dry Creek, the TMDL states: “*Big Dry Creek only impacts a small*

point of Segment 15 immediately at the confluence, but since the boundary is just below the confluence, it is still considered a contributor to Segment 15 of the South Platte River. However, Big Dry Creek is downstream of the Road 8 assessment point for Reach 3. Therefore it is not part of the load measured at Road 8. Big Dry Creek is more of a contributor to the segment downstream (COSPMS01) and will be considered in a TMDL for that segment.”

After the TMDL is adopted, recommended categories of implementation actions include: (1) education and outreach; (2) coordination with other watershed groups and entities in the urban South Platte Basin; (3) additional monitoring; (4) possible future microbial source tracking for source identification, and (5) possible future revision of the TMDL.

Progress toward achieving the underlying *E. coli* water quality target is expected to be an iterative process, similar to a staged implementation approach.

For more detailed information, see: Total Maximum Daily Load (TMDL) Assessment, Upper South Platte Segment 15 COSPUS15 Adams County and Weld County, Colorado November 2015, accessible at <https://www.colorado.gov>.



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 and Northglenn, the City and County of Broomfield, Weld County and Adams County. Activities of the BDCWA during the last fifteen years have been funded through the contributions from these entities, as well as the City of Thornton, 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 web page at www.bigdrycreek.org or contact Jane Clary, Watershed Coordinator, Wright Water Engineers, Inc., 303-480-1700 or clary@wrightwater.com.



Big Dry Creek Watershed Association
c/o Wright Water Engineers, Inc.
2490 W. 26th Ave., Suite 100A
Denver, CO 80211

Phone: 303-480-1700

Fax: 303-480-1020

www.bigdrycreek.org

Email: clary@wrightwater.com