



STATE OF THE WATERSHED

Newsletter of the Big Dry Creek Watershed Association
Fall 2000 Volume 3

Big Dry Creek Water Quality Good in 1999

Since 1988, the cities of Broomfield, Northglenn, and Westminster have been conducting a voluntary combined water quality monitoring program on Big Dry Creek. The current monitoring program includes eight locations. The cities also helped to fund operation of the U.S. Geological Survey gauging stations at Westminster behind Front Range Community College and near Fort Lupton. Parameters monitored include flow, nutrients, metals, fecal coliform, total suspended solids (TSS) and other water quality indicators. Samples are collected and analyzed on a monthly basis, and the results are reviewed for quality assurance and entered into the Watershed Association's database. The data collected during 1999 resulted in 3,860 measurements being added into the database.

During 2000, the water quality data collected during 1999 were compared to existing stream standards on Big Dry Creek and analyzed to determine whether the main stem of Big Dry Creek was attaining Colorado Water Quality Control Commission (CWQCC) stream standards. The CWQCC determines whether a stream segment is supporting its designated uses by reviewing a combination of water chemistry, physical and biological information. A stream segment is considered to "fully support"

designated uses if the 85th percentile data point (or the 50th percentile value for total recoverable metals) is below the applicable chronic stream standard and there are no exceedances of the acute water quality standard. Results of physical and biological assessments should also indicate that the use is not impaired.

Data for the main stem of Big Dry Creek were available for all parameters with stream standards with the exception of chlorine, sulfide and boron. Standards for metals with table value standards were calculated based on a hardness value of 250 mg/L, which was determined based on site-specific data. Key findings include:

1. Overall, water quality was good in Big Dry Creek during 1999 with stream standards attained for the following constituents: dissolved oxygen, pH, fecal coliform, unionized ammonia, nitrite, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc. Cyanide, total iron and dissolved selenium were three constituents of potential concern during 1999.
2. Cyanide concentrations exceeded the stream standard of 0.005 mg/L on December 9, 1999 at five monitoring locations. No trend with regard to upstream to downstream location was evident. Based on follow-up data exploration, laboratory error is

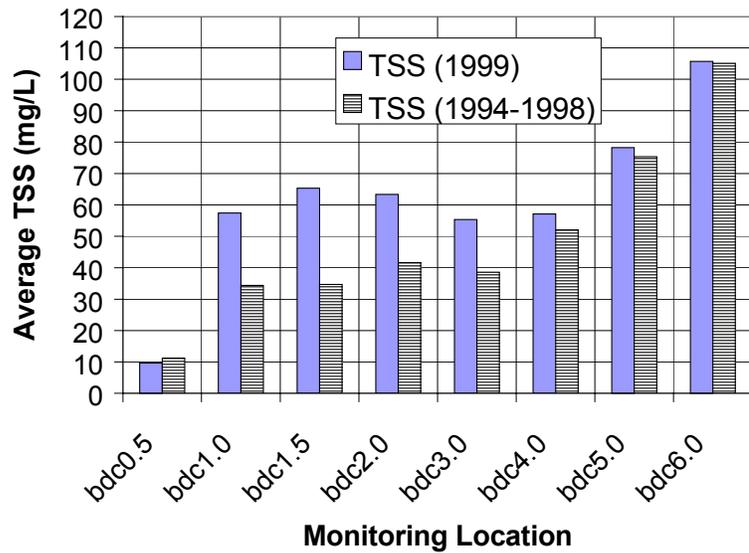
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suspected. During 1994-1998, the cyanide standard was exceeded on only one day.

3. Dissolved selenium concentrations exceeded the stream standard of 0.005 mg/L at most monitoring locations on December 9, 1999, as well as at two locations on September 9, 1999. The highest selenium concentration, which was roughly twice the standard, was measured at the upstream-most monitoring location, bdc0.5. No trend with regard to upstream to downstream location was identified. During 1994-1998, dissolved selenium data were not available.
4. Fecal coliform concentrations met stream standards in 90 percent of the samples collected during 1999, which is comparable to findings during 1994-1998. The 85th percentile value for 1999 met the stream standard of 2000/100 mL, and geometric mean concentrations at each station were well below the stream standard.
5. Nitrite concentrations exceeded stream standards on two days at bdc2.0. The 85th percentile value did not exceed the stream standard. These two exceedances appear to be related to elevated nitrite in Broomfield's wastewater treatment plant discharge on those two days.
6. Iron concentrations exceeded stream standards in 56 percent of the samples, relatively consistent with findings during 1994-1998 when the iron standard was exceeded in 62 percent of the samples. The 50th percentile value during 1999 exceeded the stream standard, as was the case during 1994-1998. Iron concentrations are typically higher during the summer and fall, when flows in the creek are higher. Elevated iron concentrations are expected to be related to natural sources.

Average TSS in Big Dry Creek



7. TSS concentrations during 1999 were comparable to those during 1994-1998, with roughly 10 mg/L at the upstream-most station and 105 mg/L at the downstream-most station. However, in the central portion of the watershed where development is occurring, TSS concentrations were roughly double the previous five-year average, although still relatively low at around 60 mg/L.
8. Average flow conditions during 1999 at the Fort Lupton gauge were comparable to flows measured between 1992-1998. Average flows at the Westminster gauge were comparable to those during 1998. The 1998 and 1999 flows are somewhat higher than those measured in previous years dating back to 1988.
9. No exceedances for acute or chronic unionized ammonia standards occurred during 1999. Some exceedances of the acute standard had occurred during 1994-1998.
10. No exceedances occurred for lead and zinc during 1999. Lead and zinc exceeded standards on several occasions during 1994-1998.

Big Dry Creek Aquatic Community Assessments Continue

In addition to the ongoing water quality monitoring program, the Watershed Association completed benthic macroinvertebrate sampling in October 1999 and March 2000 and fish sampling in October 1999. These activities were conducted using methods consistent with EPA's protocols and the previous biological monitoring conducted from the fall of 1997 through the spring of 1999. Aquatics Associates completed the analysis of the 1998 biological data and provided a written report. Hallie Mahan of the City of Broomfield presented the findings of the study at the March Watershed Association meeting. Key findings included:

1. The 1998 monitoring included spring and fall macroinvertebrate samples and fall fish samples.
2. Findings were comparable to the 1997 findings for fish and macroinvertebrates, as well as fish data collected in 1992-93 by the Division of Wildlife.
3. For analysis of the data, two different reference stations were used to assess the health of the biological community. Site bdc1.5 was used in addition to bdc0.5 because it better represents reference conditions for a plains stream type and is more appropriate for use in comparing the downstream monitoring locations.
4. Thirteen species of fish were present. Fish species distribution was consistent with the two different stream types present on the main stem of Big Dry Creek. Species present at the upper stations were typical of transitional foothills-plains streams, while

the species present at the lower stations were typical for plains streams. Macroinvertebrate distribution was similar, with more sensitive species upstream and more tolerant species downstream.

5. Johnny darter distribution was consistent with past samples.
6. An assessment of impairment using EPA's Rapid Bioassessment Protocol III methods indicated that most sites showed only slight impairment, with a few sites showing moderate impairment. The number of sites showing moderate impairment decreased when using bdc1.5 as the reference station.
7. Site bdc6.0 was noted to have poorer habitat quality than some of the other sampling locations due to channelization and lack of overhanging vegetation.
8. Site bdc1.0 was noted to have experienced increased sedimentation, which appeared to have adversely impacted the benthic macroinvertebrate community.

Our Mission:

"Developing a sound scientific understanding of water quality, flow, aquatic life and habitat conditions in the Big Dry Creek watershed for the purposes of 1) environmentally responsible decision-making with regard to land and stream uses and 2) identifying measures to improve and protect stream conditions."

Boy Scouts and EPA Volunteers Focus on Big Dry Creek for Earth Day

A Westminster Boy Scout troop led by Reed Hodgkin joined Gary Kleeman and other EPA volunteers to lend a hand to improve conditions along Big Dry Creek on Earth Day. Trash collection and willow planting were completed in the vicinity of 112th Avenue at several locations by about 25 scouts and EPA volunteers. The Watershed Association appreciates and encourages these efforts.

Contacts for Managed Water Releases to Big Dry Creek

Flows in Big Dry Creek vary significantly based on a combination of naturally occurring and managed flows in the basin. The list below identifies individuals who may be contacted with regard to controlled releases or discharges to Big Dry Creek.

Discharge Source	Contact	Average Annual Release (AF/YR)	Comment
Standley Lake	City of Westminster, Kelly Dinatale, 303-430-2400	9,220	Usually occurs May-October. Majority of flow diverted at Bull Canal.
Woman Creek Reservoir	City of Westminster, Bob Krugmeier, 303-430-2400	120	Discharges at rate of roughly 5-20 cfs.
Walnut Creek/ Rocky Flats Ponds	RMRS, Leslie Dunstan, 303-966-2002; U.S. Department of Energy, John Stover, 303-966 9735	200	Most discharges in April and May.
Broomfield Water Reclamation Facility	City of Broomfield, Ken Rutt, 303-464-5638	4,930	Planned 2000-3,200 AF/YR reduction due to reuse program. Daily flows currently average roughly 4.4 mgd.
Big Dry Creek Reclamation Facility	City of Westminster, Ray Glasmann, 303-452-8010	6,440	Planned 1,500-3,000 AF/YR reduction due to reuse program. Daily flows currently average roughly 5.5-6.0 mgd.
Northglenn Wastewater Treatment Facility	City of Northglenn, Rich Elliott, 303-450-4044	90	Rarely discharges to Big Dry Creek. When discharging, rate is typically 5 cfs.
Water Diversions	Contact	Average Annual Diversion (AF/YR)	Comment
Multiple Locations	Bob Stahl, District 2 Water Commissioner, 303-857-0742	13,800	Multiple diversions by water rights owners.

USDOE Provides Grant Funding to Support Watershed Association During FY2001

The U.S. Department of Energy (USDOE) Rocky Flats Field Office has been a key supporter of the Watershed Association since its inception. Thanks to the efforts of John Stover and John Rampe of USDOE, grant funding has been awarded to help continue the efforts of the association during FY2001. Efforts funded under the grant include:

- ❑ Macroinvertebrate sampling on Big Dry Creek and Walnut Creek during the fall of 2000.
- ❑ Fall fish sampling on Big Dry Creek and Walnut Creek.
- ❑ Habitat assessments at biological monitoring locations on Big Dry Creek and Walnut Creek.

- Continued baseline watershed coordination services such as meetings and database maintenance.

In addition to these activities funded under the grant, the cities of Broomfield, Northglenn and Westminster will continue to fund the monthly in-stream monitoring on Big Dry Creek.

Other valuable support by USDOE during FY2000 has included a helicopter fly-over of the creek to support of the field survey, donation of automated flow monitoring and water quality sampling equipment, videography services and provision of an intern for supporting research on historic aquatic life in Big Dry Creek.

Erosion, Sedimentation and Other Nonpoint Sources of Pollution Evaluated

Under the 319 grant awarded to the Watershed Association during FY2000, an assessment of the stream channel and erosion/sedimentation influences in the watershed was conducted. Based on field surveys and evaluation of available data, conclusions included:

1. The Big Dry Creek channel is remarkably stable considering the influences of activities such as wastewater discharges, irrigation return flows and runoff associated with urban development.
2. The main stem of Big Dry Creek is not experiencing excessive sedimentation and erosion; however, localized areas of erosion exist where improvements can be made. At the macro level, 80 percent of the stream banks are well vegetated, with total annual sediment loads being lower than what would be expected in comparable streams in this region. At the micro level, where erosion is occurring, there are measures that the Watershed Association and other parties can take to help reduce erosion.
3. The estimated annual sediment load for the key erosion-prone areas along Big Dry Creek, excluding construction sites, is 917 cubic yards per year, which translates to approximately 21 mg/L of TSS. Implementation of measures to reduce erosion in these areas would result in a 10 to 20 percent reduction in the sediment load in the creek. Better implementation of erosion and sediment controls at construction sites in the watershed would be expected to provide additional reduction of the sediment load. Construction sites with good erosion and sediment controls in place are reported to reduce sediment loading at such sites by roughly 73 percent, according to EPA's Report to Congress on the Phase I Stormwater Regulation.
4. The high iron concentrations in Big Dry Creek are expected to be of natural origin associated primarily with soils in the watershed. Groundwater contributions to the stream may also be a source of iron. Anthropogenic sources of iron were not observed or identified in this study.
5. It is vital that the Watershed Association be proactive in encouraging local governments within the watershed to enforce stormwater quantity and quality controls at new developments both during and following construction. A high priority and relatively low cost activity for the Watershed Association is to facilitate distribution of educational materials on nonpoint source and stormwater issues to both urban and agricultural residents. Under the existing 319 grant, some of these materials can easily be prepared and distributed. This type of activity is also consistent with the Phase II stormwater regulation, which will affect the municipalities and counties in the watershed.
6. The agricultural areas along Big Dry Creek are an asset to the watershed for many reasons (e.g., wildlife corridor, stormwater attenuation); however, in a few locations, the stream channel is experiencing degradation due to cattle trampling the stream banks. Water quality data for both TSS and nutrients indicate some impacts in

the agricultural area; however, it should also be noted that stream standards are generally attained in the agricultural area. The Watershed Association should respectfully work with landowners in these areas to identify economically viable alternatives that will reduce impacts to the stream. One key activity is to work with the Natural Resources Conservation Service (NRCS) to alert local landowners of grant funding that is available for such activities. The Watershed Association should share data with the NRCS that will increase the possibility of grant funding through the Environmental Quality Incentive Program (EQIP) and other programs.

7. Occupants of the Big Dry Creek basin should continue to expect increased flows in Big Dry Creek resulting from development. Although requirements for stormwater detention are in place in the developing upstream areas that should help to control peak stormwater flows, increased runoff volumes will occur. Bank stabilization measures, repairs to roads and culverts, and improvements to ditch diversion structures should be constructed to be stable during the relevant design storm event. It should also be noted that base flows in the creek may experience a periodic decrease of roughly 3,500 acre-feet/year over the next few years and roughly 6,200 acre-feet/year in the future due to wastewater reuse plans being implemented in Westminster and Broomfield.
8. The highest priority “on-the-ground” bank stabilization measures for Big Dry Creek include the 112th Avenue to 120th Avenue reach in the Westminster area, control of cattle access to the stream in the agricultural areas and an eroding field near Colorado Boulevard. Additionally, the bank in the vicinity of the Washington Street bridge is eroding in a manner that has the potential to damage the bridge, even though the sediment loading is minor relative to the overall watershed.

9. Riparian zone stewardship will be important to the future of Big Dry Creek to avoid losing this important amenity as urban development continues in the basin.

Meetings and Participation During FY2000

The Watershed Association held seven meetings during FY2000 with average attendance of roughly 20 individuals with over 40 different individuals attending various meetings over the year. Over 100 individuals have expressed interest in the Association over the last three years. Key topics of watershed meetings during the past year include:

- ❑ September 1999: status reports for various on-going efforts in the watershed and initial findings of 319 stream survey work
- ❑ October 1999: planning meeting for 319 activities and further discussion of stream survey work
- ❑ January 2000: “Stormwater Monitoring Principles and Relationship of Rocky Flats Monitoring Activities to Big Dry Creek Watershed” by Greg Wetherbee, Wright Water Engineers (WWE); “Updates on the South Platte TMDL Activities”—Bob Fiehweg, RMRS; and “Regulatory Changes Relevant to Big Dry Creek”—Dick Parachini, Colorado Department of Public Health and the Environment
- ❑ February 2000: “Findings of Big Dry Creek Stream Survey Report” by Lynn Schaper and Jane Clary, WWE
- ❑ March 2000: “Results of Big Dry Creek Biological Monitoring Activities” and “Future Monitoring Program for Big Dry Creek” by Hallie Mahan, City of Broomfield
- ❑ June 2000: “Stream Stabilization Principles and Approaches for Big Dry Creek” by Dr. Brian Bledsoe and Dr. Chester Watson, Colorado State University Civil Engineering Department and “Update on Water Quality

Trends in Big Dry Creek” by Jane Clary, WVE

Materials Distribution for Big Dry Creek Watershed” by Jane Clary, WVE

- August 2000: “Results of Rocky Flats Actinide Migration Study” by Greg Wetherbee, WVE and “Educational

Meetings of the Association are open to the public. Contact Jane Clary at 303-480-1700 or clary@wrightwater.com for future meetings.

Thanks for Your Involvement!

We would like to thank the following organizations and individuals for their participation in the Big Dry Creek Watershed Association during 1999/2000. These individuals and organizations have participated by providing input at Watershed Association meetings, providing in-kind services, presenting information to the Watershed Association or by simply bringing their issues to the table for discussion. We look forward to another year of growth and progress!

Steering Committee:

Hallie Mahan, City of Broomfield
Mary Fabisiak, City of Northglenn
David Carter, City of Westminster
Robert Fiehweg, Rocky Mountain Remediation Services, LLC
John Stover, U.S. Department of Energy Rocky Flats Field Office

Watershed Coordinator:

Jane Clary, Wright Water Engineers, Inc.

Monitoring Team:

Kelly Cline, City of Northglenn
Sarah Reed, City of Broomfield
Tami Schneck, Aquatics Associates

We Appreciate the Involvement of the Following Organizations/Individuals:

Adams County CSU Extension Office
Aquatics Associates
Barbara and Don Rosenbrock, landowners
Barry Marrs, farmer
Big Dry Creek Ditch Company
Brighton Ditch Company
City of Arvada
City of Broomfield
City of Northglenn
City of Thornton
City of Westminster

Colorado Department of Health and Environment Water Quality Control Division
Denver Regional Council of Governments
Dr. Brian Bledsoe, Colorado State University
Dr. Chester Watson, Colorado State University
Dwight Kimsey, citizen
Greystone Consultants
Jefferson County
Kaiser Hill Company, LLC
Matt Studzinski, citizen
Natural Resources Conservation Service, Brighton Office
Natural Resources Conservation Service, Metro Field Office
North Front Range Water Quality Planning Association
Robert Stahl, District 2 Water Commissioner
Rocky Mountain Remediation Services, LLC
South Platte CURE
TDS Consulting, Inc.
U.S. Department of Energy Rocky Flats Field Office
Urban Drainage & Flood Control District
U.S. Environmental Protection Agency, Region VIII
Vranesh and Raisch
Weld County
Weld County CSU Coop. Ext. Office
Wright Water Engineers, Inc.

Who Are We?

The Big Dry Creek Watershed Association is a voluntary association 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 includes the Cities of Broomfield, Northglenn and Westminster and Rocky Flats Environmental Technology Site (Rocky Flats), founded the Watershed Association in 1997. These four entities discharge wastewater into Big Dry Creek and 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 Association is open to those interested in cooperatively working towards understanding

and prioritizing efforts to improve basin conditions.

Activities of the Association during the last three years have been funded through the USEPA's 319 (as administered by the CDPHE) and Regional Geographic Initiative grant programs in combination with contributions from the cities of Broomfield, Northglenn and Westminster and the Rocky Flats Environmental Technology Site (USDOE and RMRS).

For More Information

For more information on the Big Dry Creek Watershed Association, please contact Jane Clary, Watershed Coordinator, at Wright Water Engineers, Inc., 303-480-1700 or clary@wrightwater.com. The Big Dry Creek Watershed Association web page, which is hosted by the City of Broomfield, can be accessed at: www.ci.broomfield.co.us/broomfield/wastewater/bigdrycreek.shtml.



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