

BCWA PINNACLE

Clear Creek County
Jefferson County
City of Lakewood
Town of Morrison
Aspen Park Metropolitan District
Conifer Sanitation Association
Conifer Metropolitan District
Denver Water Department
Evergreen Metropolitan District
Forrest Hills Metropolitan District
Genesee Water & Sanitation District
Jefferson County School District
Kittredge Sanitation & Water District
West Jefferson County Metro District
Tiny Town
U.S. Army Corps of Engineers

Volume 13

July 2017



2017 National Concrete Canoe Races Held at Evergreen Lake

The American Society of Civil Engineers held the 30th annual ASCE National Concrete Canoe Competition on Evergreen Lake, June 19, 2017. This event represents a legacy of engineering excellence, creativity and student ingenuity from some of the premier academic civil engineering programs in America, Canada and China.

Student teams must design, test and built a functional concrete canoe; and then race these craft through local, regional and this national competition. In 2017, 205 teams competed in 18 conference competitions to qualify for 20 national spots.

These highly engineered

concrete canoes have hulls less than 3/8 inch thick, weighting from a mere 125 pounds to a robust 390 pounds, canoes had to be between 19 to 21 feet, they are built to be unsinkable, and hold up to four co-ed racers. Each canoe had a unique theme (e.g., Wright Brothers, Formula Racing, Titanic's Lifeboats, Kwan, Mountain Mama, Game of Thrones, and a classic Frank Lloyd Wright inspired stained glass design), and then included a hidden design element depicting the theme.

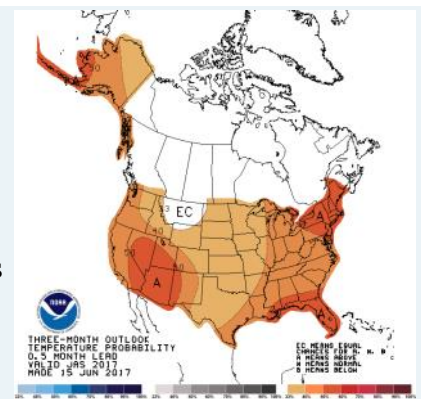
There were 5 different race events: men's and women's endurance, and men's, women's and co-ed sprint races.

The Evergreen Metro District and the Evergreen Park & Recreation District assisted the Colorado School of Mines with race course set-up and used their pontoon boat as a judge platform. The course was noted as the best designed in the race history. Many of the racers came from near sea level and the higher elevation of Evergreen Lake caught many by surprise. This highly competitive event show-cased some of our best new Engineers.



The hydrology of a watershed like Bear Creek can be very complex under expected conditions. The BCWA has available over 100-years of stream flow records. A clear long-term trend of declining flows, shifting weather patterns and earlier spring runoff is evident in the data record. This changing hydrology has a profound influence on water quality within the watershed. The Association also has a 25-year water quality data record. In the past decade, the Bear Creek Watershed has experienced both extreme drought and flood events. These emerging extreme trends don't appear to be predictable. Water providers in the watershed are developing source water protection plans to better preserve and protect future water supplies, which could decline drastically. Reliable predictions by multiple sources show Western snowpack will continue to decline over the next 50 years. Measured weather and climate data has shown

that between the 1980s and 2000s, there was a 10 to 20 percent loss in the annual maximum amount of water contained in snowpack in the western states. Multiple models predict that climate change could cause as much as an additional 60 percent decline in snowpack over the next 30 years. It's been really warm over the last few years and this is not normal. The U.S. is enduring a stretch of abnormally warm weather unsurpassed in the record books, and it shows no immediate sign of ending. The latest one-, two-, three-, four- and five year periods—ending in March—rank as the warmest in 122 years of record-keeping for the Lower 48 states, according to data from the National Oceanic and Atmospheric Administration. In November 2016, the nation was nearly snow-free in the middle of the month for the first time on record. Colorado will see average annual temperatures increase by 2.5°F, with summers warming by 5°F and winters by 3°F by 2050. Warmer temperatures mean changes in evaporation and soil moisture, reducing snowmelt runoff in each of Colorado's river basins.



www.bearcreekwatershed.org

Bear Creek Watershed Association
Russell Clayshulte, Manager
1529 South Telluride St.
Aurora, CO 80017-4333
Phone: 303-751-7144
E-mail: rclayshulte@earthlink.net



The BCWA 2016 annual report and data summary report are available on the website. The BCWA watershed plan is maintained on the website in an electronic form with ongoing updates and insertions.

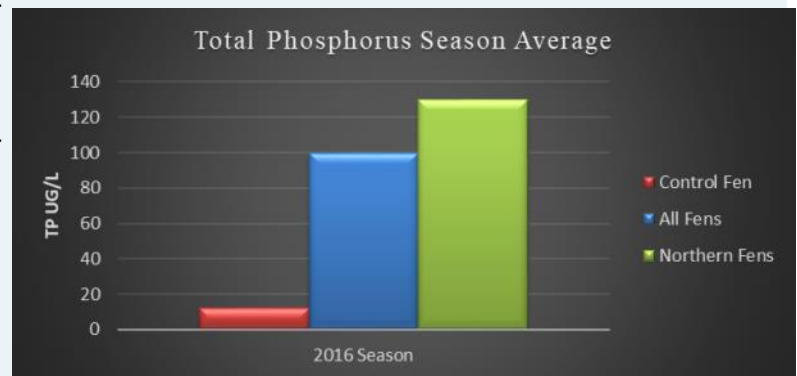
Fen Complex Study Summit Lake

A type of tributary wetland in the watershed is called a fen. In the Mt. Evans portion of the watershed, these wetland fens are an important and unique wetland type. They are ancient ecosystems 8,000 to 12,000 years old. They “provide important headwater quality functions,” including carbon storage, water storage, wildlife habitat, and biodiversity. Fens are peat-forming wetlands that receive nutrients from sources other than precipitation: usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement (*BCWA Fact Sheet 49 Wetlands, Fens and WQ BCW*). The preliminary data strongly suggests the chemistry and nutrient dynamics in the fen complex are more complicated than predicted.

As such, the Association began a five-year special study to establish the background or expected nutrient conditions for the fen complex. The Association summa-

rized evidence in the Regulation #38 Rulemaking Hearing for South Platte Basin Standards that suggests fen wetlands have background phosphorus levels that exceed Table Value Standards (TVS) even though streams in the same segment do not have elevated phosphorus levels (*Fact Sheet 53 BCR 2015 Regulation 38 Update*). It is not yet known what background level would be appropriate or if it varies among these fens.

In 2016, the Association established a control fen located on the south side of Bear Creek. This site has no visible human impact. All the fens on the north side of Bear Creek have varying degrees of anthropogenic degradation (*BCWA TM 2016.02 UBCW Summary*).



A special study of Cub Creek from 2012-2016 shows this tributary discharges from 250 to 3,040 pounds of total phosphorus per monitoring season into Bear Creek downstream of Evergreen Lake. The seasonal average total phosphorus load in upstream waters is 304 pounds with the downstream average substantially increasing to 1,378 pounds. While there are other types of nonpoint source nutrient sources within the Cub Creek corridor, on-site wastewater treatment systems (OWTS) are the most likely source for the excess total phosphorus loading along Cub Creek. This nutrient loading has also been seen on other tributaries within the watershed that have OWTS (e.g., Kerr/ Swede Gulch, *TM 2015.03 Kerr Swede 2015 Complete* and Yankee Creek, *BCWA WQSD02 Upper Bear*) or at special monitoring sites located downstream of a OWTS cluster (Troublesome, *BCWA WQSD01 Troublesome*). This is a major nutrient contributing tributary in the middle of the watershed.

