BEAR CREEK FLOOD

The Bear Creek Watershed Association protects and restores water and environmental quality within the Bear Creek Watershed from the effects of land use.

Clear Creek County
Jefferson County
City of Lakewood
Town of Morrison
Aspen Park Metropolitan District
Brook Forest Inn
Conifer Sanitation Association
Conifer Metropolitan District
Denver Water Department
Evergreen Metropolitan District
Forrest Hills Metropolitan District
Genesee Sanitation & Water District
Geneva Glen
Jefferson County School District
Kittredge Water & Sanitation District
Tiny Town Foundation, Inc.
West Jefferson County Metropolitan District
Evergreen Trout Unlimited
U.S. Army Corps of Engineers

In September 2013, the reservoir became a major flood control structure that prevented unimaginable downstream damage. The rains began in earnest on September 9, 2013 in the upper watershed and the resultant great Bear Creek flood has altered streams and reservoirs throughout the watershed.

The U.S. Army Corps of Engineers shut the outflow gates on Bear Creek Reservoir on September 13, 2013. The pool rose from 1,817 acre-feet to over 15,000 acre-feet (5 trillion gallons) on September 22, 2013. The surface area was about 500 acres or 70% of surface acre capacity. Bear Creek within Bear Creek Park ran at about 40 cubic feet per second on September 1, 2013, which was about 20 cfs over expected conditions (caused by an earlier single heavy rainfall event). By September 11 Bear Creek was up to 400 cfs and soon after the gaging station in the park washed away. Bear Creek peak stage (UDFCD) was 3,200 cfs in Morrison. Highest September flows in 113-year record. Flows in Evergreen

this significant flood event. In Bear Creek Reservoir the estimated September inflow was about 31,000 ac-ft. The peak flood chemistry showed a Total Phosphorus load in excess of 14,000 pounds, a Total Nitrogen load of 82,000 pounds and the Total Suspended Sediment load was about 1.7 million pounds. Bed-load exceeded a million tons. In comparison the entire Total Phosphorus load in 2012 was 3,298 pounds. More Total Phosphorus was loaded into the reservoir in September than measured from 2007-2012. The reservoir also received a high organic matter load, as seen in the photo. This organic load will decay over the next few years and influence reservoir chemistry.

A similar massive nutrient loading occurred in Evergreen Lake. Evergreen Lake received about 20,650 ac-ft of runoff. The peak flood chemistry showed a Total Phosphorus load in excess of 1,650 pounds, a Total Nitrogen load of 22,550 pounds and the Suspended Sediment load was about 900 tons (750 cubic-yards) with an estimated bedload of about 13,500 tons (11,200 cubic-yards). It is very likely that Evergreen Lake will need dredging to reduce this massive sediment load.

2013 Reservoir Estimated Pounds			
	August	September	October	2013
Total Nitrogen	2,433	45,514	2,548	94,110
Nitrate/Nitrite as N, dissolved	775	28,555	1,588	51,020
Nitrogen, ammonia	391	4,128	439	
Total Phosphorus	172	13,050	26	14,387
Total Dissolved Phosphorus	231	2,528	335	
Residue, Non-Filterable (TSS)	69,737	1,331,703	315,271	2,103,351

above Evergreen lake exceeded 1,300 cfs. Bear Creek jumped its channel in many locations and caused flood damage throughout the urban corridor.

The stream morphology is altered and habitats are changed at most monitoring sites. The flood damage has affected the water quality program. After the September 2013 flood event, the Association started a water quality evaluation to document short-term and long-term changes to water quality caused by

The monitoring of watershed nutrients beginning near Mt. Evans. From a water quality perspective, the watershed showed remarkable resilience. Although Bear Creek Reservoir returned to normal pool by the end of October, the water quality in the reservoir may be altered for years to come.

This storm event has provided valuable insight into big-event nutrient loading. The Bear Creek Watershed Association is applying an adaptive management process to adjust monitoring, strategies and options, and redefine restoration projects throughout the watershed.

www.bearcreekwatershed.org
Established 1981