

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

The BCWA has established specific water quality monitoring sites to better characterize specific tributary drainages with elevated total phosphorus and total nitrogen loading (Yankee Creek, Cub Creek, Troublesome Gulch, and Mt Vernon Creek), and is developing improved management strategies for these tributary areas (*BCWA Policy 15 Non-point Source Strategies and BMPs*). The BCWA also integrates planning efforts with other agencies to help resolve several identified pollute loading problems (*BCWA Policy 29 BCWA Integration with Other Planning Efforts*).

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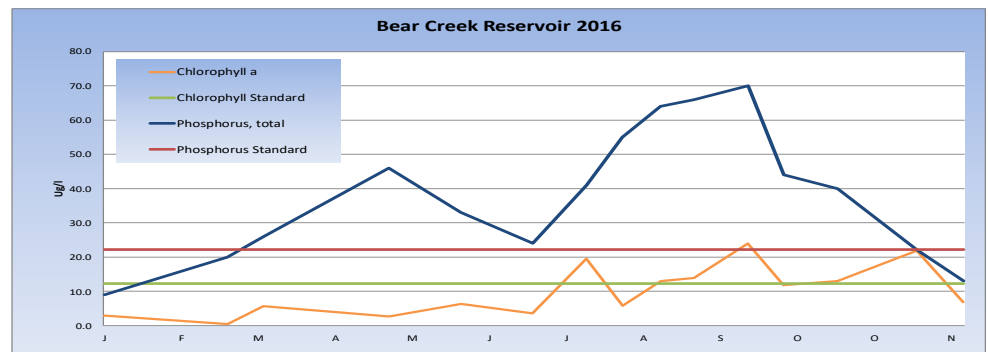


2016 Nutrient Loading in Bear Creek Reservoir

The Association monitors watershed nutrients by major stream segments beginning near Mt. Evans (segment 7) and extending downstream to Bear Creek Reservoir. 2016 was a typical nutrient loading year with 79% of the total phosphorus load and 60% of the total nitrogen load occurring in the April-May spring runoff period. The nutrient load comes from the urbanized corridor of segment 1a (above Evergreen Lake to

the Clear Creek County Line), and segment 1e, which is the mainstem of Bear Creek from Evergreen Lake to the Harri-man Ditch Diversion, Morrison. About 30 pounds of total phosphorus passed through Evergreen Lake (7 month sampling period), with an additional 250 pounds coming from the Cub Creek drainage. The majority of the total phosphorus loading occurred between Evergreen to Morrison with

about 4,357 nonpoint source phosphorus and 1,025 wastewater treatment plant point source phosphorus load. The 5,660 total phosphorus pounds loaded in the reservoir coupled with previous internal loading contributed to a standard exceedance for total phosphorus (22.2 ug/l) and triggered several large algal blooms that caused a chlorophyll standard exceedance (12.2 ug/l).



PGO29- BCWA Surface Water Monitoring Program and Sample Analyses Plan Version 2017.01

The Bear Creek Watershed Association maintains five types of water quality and other monitoring efforts to characterize water and environmental quality within the Bear Creek Watershed:

- P1- Routine water quality monitoring at Bear Creek Reservoir (multiple vertical stations), Turkey Creek inflow to reservoir, Bear Creek inflow to reservoir, reservoir discharge into lower Bear Creek, and the lower edge of the watershed near Wadsworth. The P1 sites are long-term reference monitoring sites consistent with the intent of the monitoring program outlined in the Bear Creek Reservoir Control Regulation #74.
- P2- Supplemental sampling of tributaries, problem areas, restoration or other project specific sites (e.g., Coyote Gulch in cooperation with the City of Lakewood). These types of monitoring efforts can be either of limited duration, or long-term on a site-specific basis, and generally these programs monitor for specific parameters of interest to the project.
- P3- Watershed surface water monitoring along Bear Creek and Turkey Creek drainages for site-specific characterizations (e.g., temperature trends, nutrient loading, flow studies). These are interim and long-term monitoring sites for watershed characterizations. Watershed monitoring stations include both long-term reference sites where multi-year data is desirable, and target sites that may provide only a couple years of data. The nutrient monitoring is on a watershed basis that begins near Summit Lake and extends through Bear Creek Reservoir.
- P4- Supplemental environmental characterizations of Bear Creek watershed including, but not limited to macroinvertebrates, flow analysis, habitat characterizations, fishery evaluations, system productivity, or other environmental factors that potentially affect fisheries or watershed health.
- P5- Wastewater treatment facility nutrient sampling consistent with Regulation #85.

www.bearcreekwatershed.org

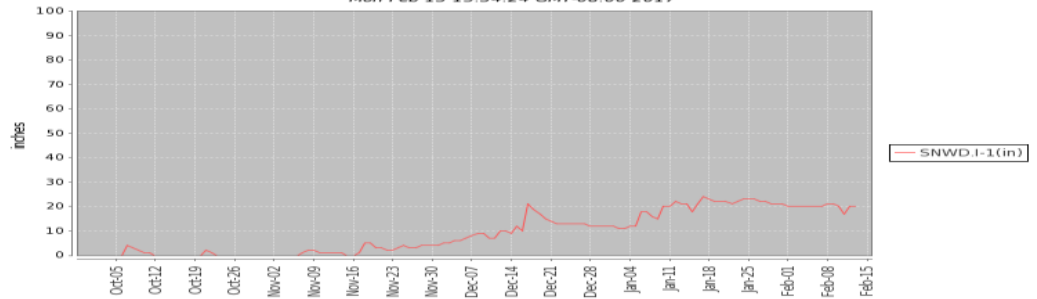
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The Association has 35-years of active service to the watershed in Clear Creek, Jefferson and Park Counties. The Association has 32-years of data and studies to support watershed science. During this time, the Association has removed or immobilized about 375 tons of phosphorus in the watershed. The 86 volunteer-years of effort by Association membership has helped waters in the watershed meet standards and classified uses as designated by the Colorado Water Quality Control Commission.

According to NOAA, the atmosphere/ocean system is demonstrating that it's returned to ENSO-neutral conditions, putting an end to the not-so-great La Niña of 2016/17. Most computer models agree that neutral sea surface temperatures will continue for the next few months, and forecasters estimate an approximately 60% chance of neutral conditions lasting through the spring. After that, it gets a bit more complicated. Some of the computer models are calling for a return of El Niño conditions by the second half of 2017.

Typical summer visitation at Mt. Evans. There were about 270,000 visitors that drove into the Mt. Evans Wilderness in 2016. This large visitation rate can affect the sensitive tundra environment and has caused measurable water quality degradation.

Station (936) WATERYEAR=2017 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
Mon Feb 13 15:34:24 GMT-08:00 2017



2017 Runoff Expectations for Bear Creek Watershed

Based on the water content of the snow pack at the Echo Lake SNOTEL station, the watershed in February is about 100% of average. The current expectation for 2017 is a normal runoff year with the peak runoff coming in the April-May runoff period. The Association climate modeling predictions as supported by the 10-year temperature data record, shows a shift to earlier runoff periods (2-3 weeks) compared to the long-term runoff record measured at Morrison and warmer conditions by about 2-3 degrees. The warming trend is causing early ice-off reservoirs like

Evergreen and Bear Creek Reservoir (Bear Creek Reservoir shorelines are melted and complete ice-off is expected in late February). The Missouri Basin River Forecast Center shows the Bear Creek drainage 2017 spring runoff prediction at 50-69% of the modeled historic average, while the upper Platte could be about 79% of average. The National Oceanic Atmospheric Administration (NOAA) is predicting a warmer than normal spring period for this region with average precipitation. This prediction is consistent with current local weather conditions and predictions.

Estimated Bear Creek Reservoir Inflow (Acre-Ft/Year)

