



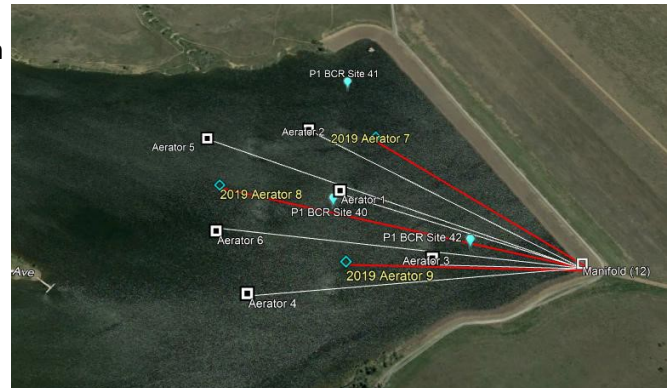
BEAR CREEK RESERVOIR

Fact Sheet 62 BCR Aeration System Operation July 2019

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

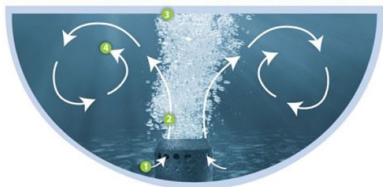
Clear Creek County
Jefferson County
City of Lakewood
Town of Morrison
Aspen Park Metropolitan District
Conifer Sanitation Association
Conifer Metropolitan District
Denver Water Department
Evergreen Metropolitan District
Forrest Hills Metropolitan District
Genesee Sanitation & Water District
Geneva Glen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

An in-reservoir aeration system is a long-term *smart management practice* to protect and enhance the Bear Creek Reservoir fishery (BCWA Policy 8 BCR Aeration). There are 9 fine bubble Quad Duraplate Diffusers (see picture lower left) strategically placed on the reservoir bottom (average depth 32 feet) in the eastern end of the reservoir (BCWA Fact Sheet 47 New 2014 BCR Aeration System and Fact Sheet 63 2014 BCR Aeration System Evaluation). The 36 diffuser perforated membrane discs are supplied compressed air through weighted lines by a 15



horsepower variable compressor. The aeration system operates continuously from April to October. The BCWA and Lakewood measure oxygen concentrations at three full profile stations 12 times during the operational season.

A fine bubble membrane disc (produces 1 to 1.5 micro-meter bubbles) has high aeration efficiency at low airflow rates (mass oxygen transfer per unit power per unit time). The oxygen transfer efficiency (OTE) is about 12 pounds of oxygen / (horsepower * hour). Smaller bubbles take more time to reach the surface and they maximize surface area contact. The increased number of seconds each bubble spends in the water, allows more time to transfer oxygen to the water.



Example of laminar flow in reservoir

The aeration system does reduce reservoir stratification. As the bubbles rise from the diffusers, they cause an outward and upward laminar current. The oxygen transfer shows a measurable increase about 5-8 feet (about 2m) off the bottom with maximum transfer in the upper 6-8 feet (2m) of the water column. The BCWA has measured this outward flow to be from 100-250 feet from each diffuser unit, depending on surface wind directions and speed. Under windy conditions, each diffuser unit can generate laminar current with increased oxygen about 450 feet from the diffuser unit. The reservoir at normal pool is about 110 surface acres. The current aeration system influences oxygen concentrations in about 40 surface acres. Monitoring data indicates the aeration system can increase upper water column oxygen by about 1-1.5 mg/l. There is a lag period from 30-50 days for the aeration system to raise and maintain the oxygen concentrations consistently above the 6 mg/l standard in the eastern end of the reservoir. The current operational practice is to start the aeration system before the reservoir dissolved oxygen concentrations begin to sag.



Top view, fine bubble Quad Duraplate Diffuser

