Nutrient Reduction Case Study

Dixie Drain Phosphorus Removal Facility

Boise, Idaho

The City of Boise, Idaho has two municipal wastewater treatment plants or "water renewal facilities (WRFs)," that discharge to the Lower Boise River. The Lower Boise River is impaired for nutrients (nitrogen and phosphorus) and has a total maximum daily load (TMDL) to address pollutant inputs into the river.

Dixie Drain, a manmade waterway, is located approximately 40 miles downstream of Boise's WRFs and was identified as the largest tributary source of phosphorus to the river during the irrigation season. This early 20th century irrigation conveyance returns water diverted for agriculture back into the Lower Boise River; however, it also delivers large amounts of sediment, nutrients, and other pollutants.

To meet the pollutant reductions identified in the TMDL, the City of Boise's National Pollution Discharge Elimination System (NPDES) permits were revised, adding stringent phosphorus limits. While upgrades to the city's WRFs would attain some benefit, removing phosphorous inputs from the Dixie Drain would offer far greater environmental benefits to the watershed. Utilizing an innovative approach to achieving nutrient load reductions in the Lower Boise River, the construction and operation of the Dixie Drain Phosphorus Removal Facility was included in the city's NPDES permit. The removal facility, located approximately 40 miles downstream of the WRFs, allows Boise to optimize phosphorus removal near the mouths of the Lower Boise Snake Rivers, offsetting the need for more costly removal technologies at the two WRFs operated further upstream by the city.

The Dixie Drain Phosphorus Removal Facility became operational in July 2016. Water from the drain travels by gravity flow into the removal facility and through a treatment basin where flocculants bind with phosphorus, forming floc that settles at the bottom of the basin. The treated water returns to the river. The floc is then dredged and removed. The city's NPDES permits require removal of a minimum of 25 pounds of phosphorus per day during the May through September growing season. Running at full capacity during the growing season, the facility can treat up to 130 million gallons per day and remove more than 140 pounds of phosphorus on a daily basis.

The project illustrates a successful offset that treats nonpoint source nutrient pollution, providing better environmental outcomes than would be achieved by NPDES limits alone. Additional benefits include sediment level reduction, improved fish and aquatic life habitat, and improved river aesthetics.

Additional Information

City of Boise, ID Project Details:
https://www.cityofboise.org/departments/public-works/dixie-drain/