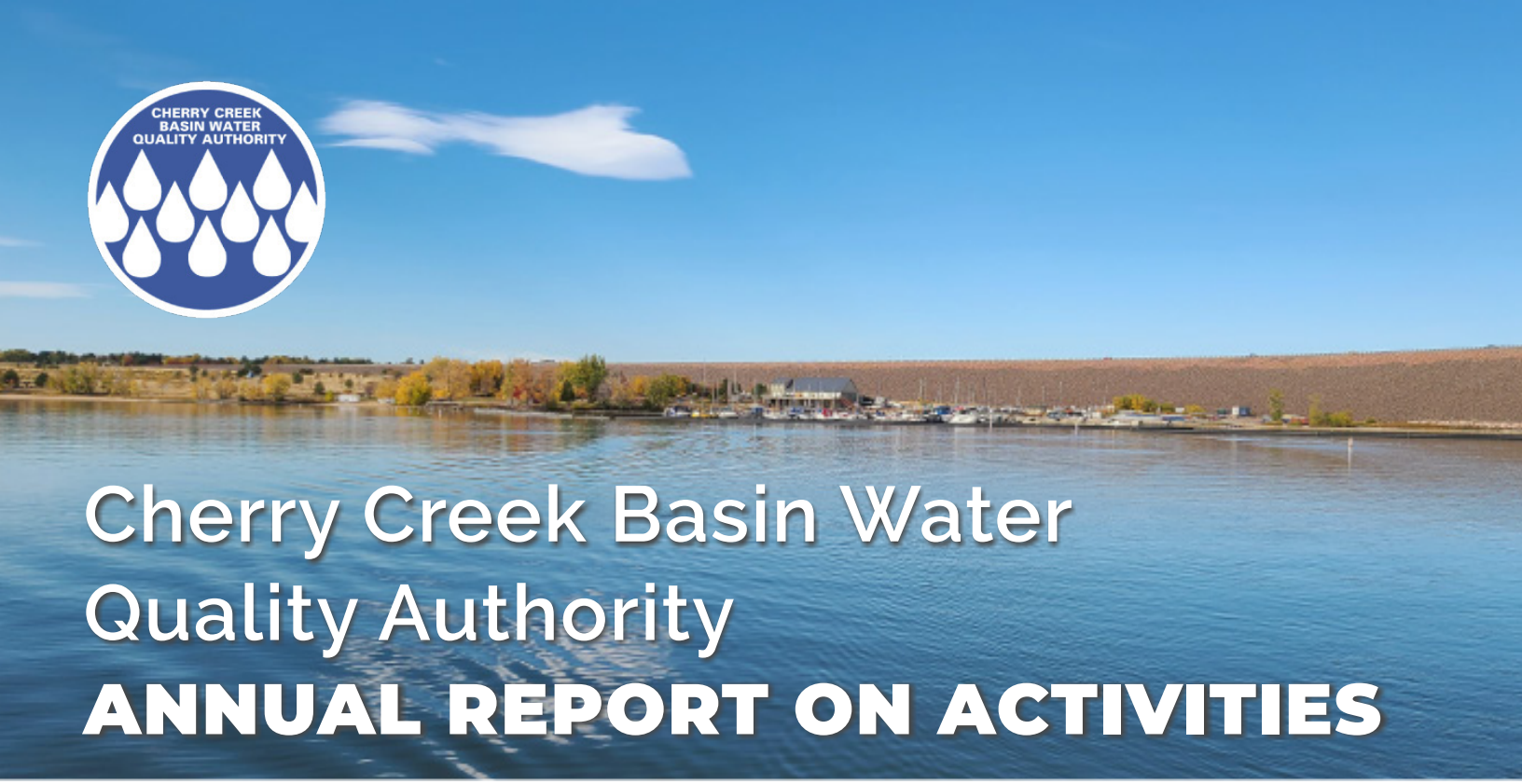


Cherry Creek Basin Water Quality Authority

ANNUAL REPORT ON ACTIVITIES

2023 EXECUTIVE SUMMARY

This is an interactive document.
Click on **bold green text** to get to the referenced material on the CCBWQA interactive website.








CHERRY CREEK WATERSHED AT A GLANCE

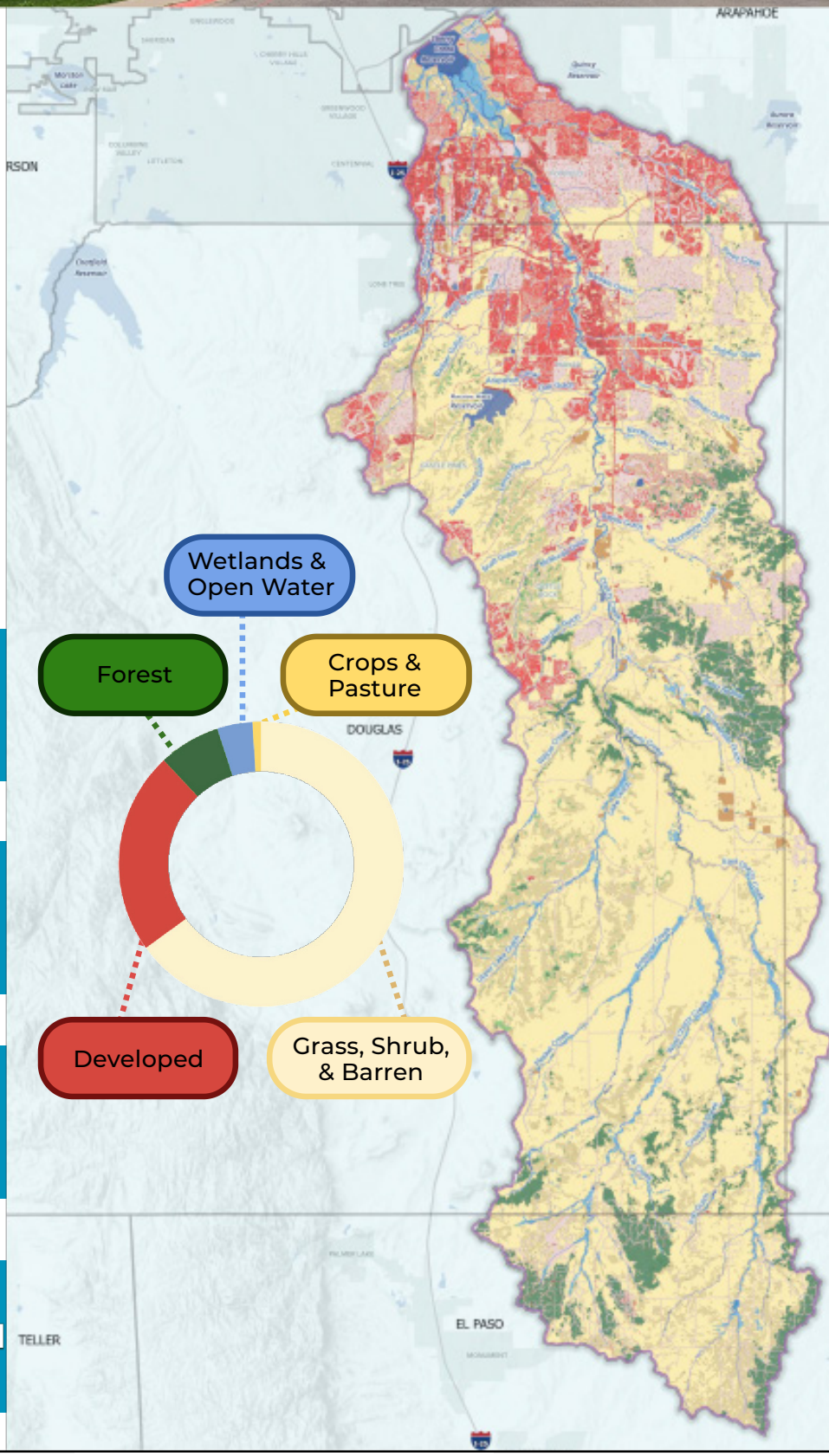
CONTENTS

POPULATION QUADRUPLED From 1990-2020

386 SQUARE MILES Over 2.5x the size of Denver County

SPANS 4 COUNTIES 75% Douglas County

75% OF RESERVOIR INFLOWS Cherry Creek & Cottonwood Creek



2023 ACTIVITIES

The Cherry Creek Basin Water Quality Authority worked with its partners to preserve and protect water quality in Cherry Creek Reservoir

LEADERSHIP FROM ACROSS THE BASIN

BOARD OF DIRECTORS

17 members represented by Counties, Municipalities, Special Districts and Governor Appointees

STREAM RECLAMATION

OVER $2.3 MILLION

Invested into pollution abatement projects in the watershed in 2023 alone.

EXTENSIVE MONITORING PROGRAM

OVER 2,700

Water quality samples analyzed

PUBLIC EDUCATION & OUTREACH

OVER 100 ATTENDEES

At the Annual Cherry Creek Watershed Conference

ADVANCED WASTEWATER TREATMENT

6 WASTEWATER TREATMENT PLANTS

below nutrient effluent permitting limits

SPECIAL STUDIES & MODELING EFFORTS

350,000+ LBS OF MATERIAL REMOVED

Wetland Harvesting Pilot Study reduced nutrients from reaching the Reservoir

POLLUTANT REDUCTION FACILITY OPERATION & MAINTENANCE

171 DAYS

Operating the Reservoir Destratification System (RDS)

STORMWATER MANAGEMENT

10 MS4 PERMITEES

Implemented stormwater control measures and innovative programs

HOW IS THE RESERVOIR?

BENEFICIAL USES

Cherry Creek State Park has a record number of visitors every year, and the Reservoir continues to provide space where people enjoy recreating and connecting.

In 2023 the Reservoir effectively fulfilled its flood control function, storing water from major storm events and protecting downstream communities.

>1.5 MILLION VISITORS
to Cherry Creek Park in 2023

Colorado Parks and Wildlife biologists reported that the **walleye fishery is doing well.**

Paul Winkle helped collect some of the ~45 million eggs supplied to state hatchery programs.

RESERVOIR WATER QUALITY

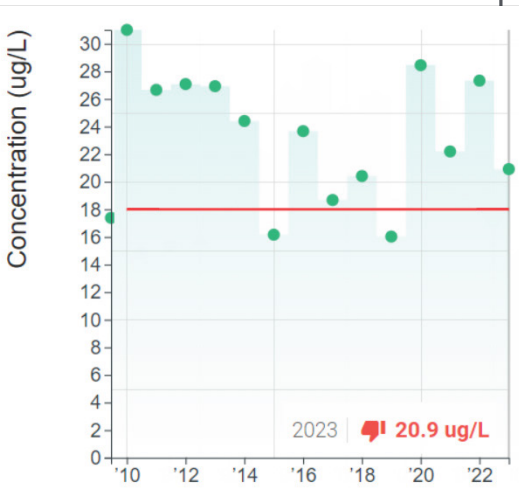
Seasonal phosphorus concentrations in the Reservoir were much higher than they have been relative to the average over the past 20 years, likely due to large storm events that occurred in May and June.

Despite on-going efforts to reduce nutrient loading to the Reservoir, the Reservoir did not attain its chlorophyll-a standard of 18 ug/L during 2023. **The average chlorophyll-a concentration was 20.9 ug/L** for the growing season of July through September.

The Reservoir has exceeded the standard for four of the past five years; however, the average chlorophyll-a concentrations were the lowest they've been in the last four years. One undesirable blue-green algae bloom occured in late July and was responsible for closure to human contact due to the detection of toxins. The toxin was only detected for a few days and the bloom dissipated in ~two weeks.

CHERRY CREEK RESERVOIR MET AQUATIC LIFE STANDARDS
for temperature, pH, & dissolved oxygen

Seasonal average chlorophyll-a concentrations.

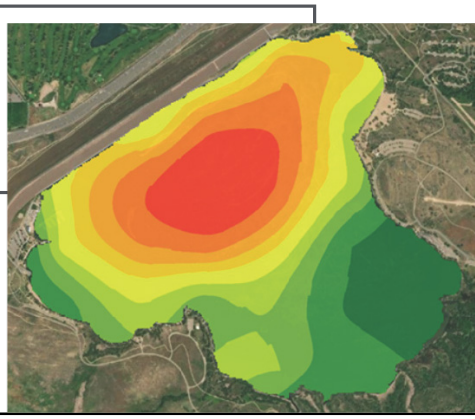


RESERVOIR DYNAMICS

Some of the factors affecting conditions in the Reservoir are challenging or impossible to control and result in year-to-year variations in water quality and environmental conditions. Some of these factors include weather conditions such as **temperature, wind, and precipitation patterns.**

Other factors include background sources of phosphorus **loading from the watershed** and **alluvial groundwater** and the release of stored nutrients from **Reservoir sediments** (internal loading). CCBWQA operates a Reservoir Destratification System from April through October to help mitigate some of these influences.

Internal loading from sediments can impact nutrient concentrations in the Reservoir.



HOW IS THE WATERSHED?

>170% OF AVERAGE **ANNUAL** PRECIPITATION

<3% TOTAL PHOSPHORORUS LOAD TO THE RESERVOIR FROM **WASTEWATER TREATMENT PLANTS**

POLLUTANT REDUCTION FACILITIES ON COTTONWOOD CREEK EFFECTIVELY REDUCING **PHOSPHORUS AND SUSPENDED** SOLIDS DURING STORM FLOWS.

The watershed has **experienced significant growth** since Control Regulation 72 was implemented.

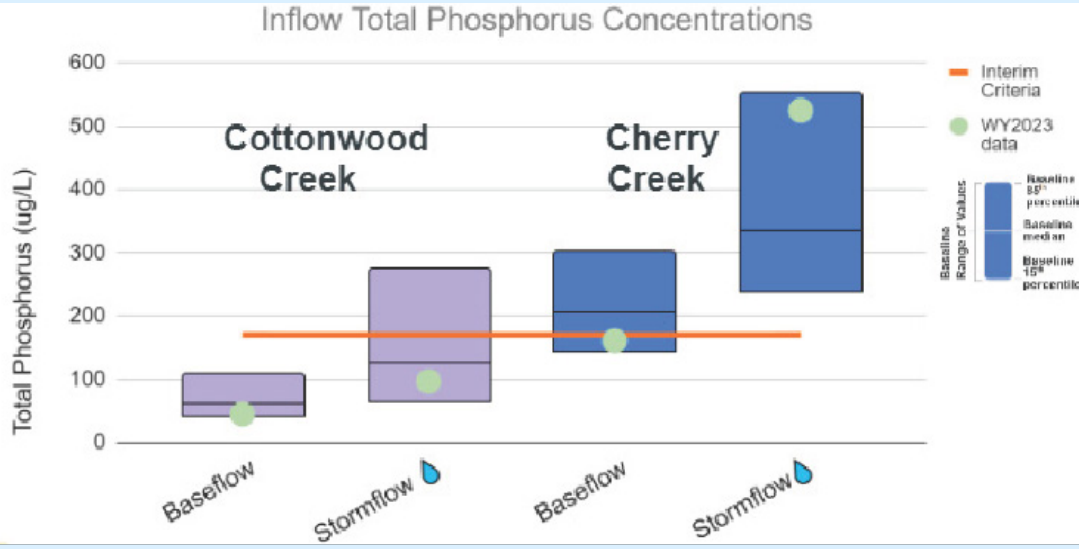
Over 6 inches of rain fell in just 48 hours, washing out Lakeview Drive.

2023 WATERSHED WATER QUALITY

CCBWQA monitors **phosphorus and nitrogen concentrations in Cherry Creek and Cottonwood Creek** since they are the two main inflows to the Reservoir.

Key findings from 2023 include

- Median total phosphorus concentrations in baseflows of both Cherry Creek and Cottonwood Creek were lower than long-term medians. However, the median phosphorus concentrations in Cherry Creek were much higher than the historical median during the storms sampled in WY 2023.
- Significant erosion occurred in response to major storm events, contributing to higher phosphorus concentrations in the creeks.
- Baseline phosphorus concentrations in Cottonwood Creek were ~ 70% lower than concentrations in Cherry Creek.
- Total nitrogen concentrations in both Cherry Creek and Cottonwood Creek were higher than the long-term historical median.
- Median nitrogen concentrations in Cherry Creek were 50% lower than concentrations in Cottonwood Creek in base flows but only 7% less during storms.
- Conductivity in the watershed is increasing in both streams and groundwater.
- Median nutrient concentrations were lower downstream of the stream reclamation project on McMurdo Gulch.



Inflow phosphorous concentrations

WHAT DID WE DO TO PRESERVE WATER QUALITY?

CCBWQA and its partners continue to implement pollutant reduction facilities, stormwater control measures, construct stream reclamation projects and conduct several special projects and studies to reduce nutrient loading throughout the watershed

STREAM RESTORATION

Happy Canyon Creek upstream of I-25

Approximately 3,000 linear feet of stream reclamation was implemented from February through November 2023. The project promoted floodplain connection by raising the incised channel and included engineered bed and bank protection. Project partners included Douglas County, Mile High Flood District, and the City of Lone Tree.

Dove Creek Phase 1 (Otero Avenue to Chambers Rd)

In 2023, Phase 1 of the Dove Creek stream restoration project began. The project included step pool structures for grade control, bank protection and grading to create overbanks providing a wider stream corridor that stabilizes the stream and reduces erosion potential. The Southeast Metro Stormwater Authority (SEMSWA) is the project lead.

SPECIAL PROJECTS & STUDIES

Wetlands Harvesting Project

In 2023, CCBWQA completed year three of a six-year pilot project to cut and dispose of wetland vegetation to reduce phosphorus and nitrogen from being carried to Cherry Creek Reservoir after the plants decay. Vegetation rebounds within the year.

Stormwater Best Management Practice (BMP) Effectiveness Study

CCBWQA continued a study to synthesize the most current information on the expected effectiveness of stormwater BMPs (also known as stormwater control measures). This study will be completed in 2024.

Wetland plants harvested in 2023 removed nutrients from the watershed.

Receiving Pervious Area Study

CCBWQA is partnering with SEMSWA and the Mile High Flood District to develop a more quantitative understanding of volume reduction benefits of receiving pervious areas such as grass buffers, grass swales and other landscape areas. Reducing runoff volumes through green infrastructure can reduce pollutant loads and channel erosion.

OUR PLANS FOR 2024

CCBWQA will continue its routine activities along with some new activities in 2024. Highlights include:

Continue the extensive **long-term monitoring program** that includes weather and stream flow, water quality in the watershed and Reservoir, pollutant reduction facility performance and phytoplanton and zooplankton dynamics in the Reservoir.

Invest over $3.9 million in stream reclamation projects in the watershed. These include projects on Cherry Creek, McMurdo Gulch, Happy Canyon, Lone Tree Creek, Dove Creek, Piney Creek and the Reservoir shoreline.

Use long-term Reservoir data and the **Reservoir model** to develop appropriate **site-specific nutrient standards** for the Reservoir, and link selected modeling scenarios from the **watershed model** to the Reservoir model to help prioritize future nutrient-reduction strategies.

Continue the **wetland harvesting pilot project** for the Pollutant Reduction Facility on Cottonwood Creek and evaluate potential benefits through water quality analysis.

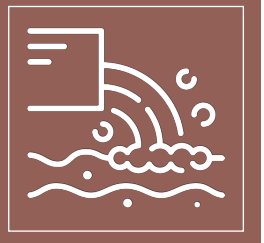
Continue a major update to the 2012 Watershed Plan, including joint TAC and Board workshops and subcommittee participation. The updated Watershed Plan includes a significant effort to integrate **geospatial data** from multiple partners into **CCBWQA's Data Portal.**

Continue to host the **Cherry Creek Stewardship Partners** annual watershed conference in the fall of 2024.

Operate the Reservoir Destratification System from April through October.

Communicate and share information and data with sister watersheds on the front range, including **Bear Creek, Chatfield, and Barr-Milton.**

Complete extension of a **drainage master plan** on Lone Tree Creek, Windmill Creek and Cottonwood Creek from the Park boundary to the Reservoir, collaborating with SEMSWA and Mile High Flood District.



Work with the USACE to evaluate if there is a water quality benefit of change of storage and release timing in the Reservoir.

LEARN MORE

LEARN MORE ABOUT THE PROGRAM

- CCBWQA WY 2023 Annual Report on Activities
- WY 2023 Monitoring Program Annual Report
- CCBWQA Data Portal
- Cherry Creek Basin Water Quality Authority Website
- Cherry Creek Stewardship Partners
- Cherry Creek State Park
- CCBWQA Interactive Map

THANK YOU TO OUR PARTNERS

MS4s

City of Lone Tree
City of Castle Pines
Southeast Metro Stormwater Authority
Arapahoe County
Town of Castle Rock, Colorado
Parker, Colorado
Greenwood Village, Colorado
Douglas County, Colorado
Aurora
CDOT

WWTFs

Pinery Water & Wastewater District — Quality Water for Life
Plum Creek Water Reclamation Authority
Meridian Service Metropolitan District
ACWWA — Arapahoe County Water and Wastewater Authority
Stonegate Village Metropolitan District
ParkerWater & Sanitation District — Sustaining Life For Our Community