



We Protect The Water You Enjoy

Chatfield

Watershed Authority

2015 Annual Report

The Chatfield Watershed Authority promotes protection of water quality in the Chatfield Watershed for drinking water supplies, recreation, fisheries, and other beneficial uses.





A note from the Chatfield Watershed Authority Chairmen Kevin Urie and Tim Grotheer

Dear Chatfield Watershed Stakeholders,

We are proud to present the 2015 Chatfield Annual Report, summarizing the water quality and watershed health of Chatfield Reservoir and its watershed. 2015 proved to be one of the wettest years in recent history, resulting in US Army Corps of Engineers (Corps of Engineers) Chatfield Reservoir operations at flood control stages. With the expertise of the Corps of Engineers, diligent releases from Chatfield Reservoir controlled downstream flooding and kept the public safe. Prolonged inflows and high snowmelt runoff exceeded the historic flood pool record from 1980, measuring 5447.9 feet. The Chatfield State Park swim beach and boat ramps were closed through July 2015 due to the flooding, but we are pleased to report that even with the significant runoff, three times the median, the chlorophyll-a and total phosphorus concentrations were below water quality standards established in Control Regulation #73. Our report provides more water quality specifics, along with these other noteworthy 2015 highlights that supported progress towards development of the revised TMAL:

-  **Adoption of the Chatfield Watershed Plan.** Through this collaborative watershed planning process, we have built partnerships, characterized water quality, identified potential nonpoint sources, and developed an implementation plan to guide our progress.
-  **Chatfield Watershed Model Development.** Chatfield Watershed Model tools will strengthen our understanding of total phosphorus fate and transport mechanisms, potential phosphorus sources, and phosphorus inputs to the Reservoir. The watershed modeling effort is well underway, with hydrologic calibration and validation phases nearing completion.
-  **Plum Creek Monitoring to Support Modeling and Nonpoint Source Identification.** In the Plum Creek basin, watershed monitoring continues through voluntary sampling efforts by the Plum Creek Water Reclamation Authority (PCWRA).
-  **Collaborations with the Chatfield Reallocation via the Chatfield Reservoir Mitigation Company (CRMC).** The Authority has memorialized partnerships with the sponsors of the Chatfield Reallocation Project and the newly formed CRMC, regarding data collection to support water quality goals in the Reservoir. This data will facilitate upcoming Chatfield Reservoir modeling efforts and TMAL development.
-  **Outreach and education to Colorado Foundation for Water Education participants on Chatfield Reservoir water quality/quantity issues.** A fun and educational bike tour to support Chatfield outreach efforts.
-  **Strengthening the Governmental Structure of our Organization.** While grant funding and strategic partnerships are important to support water quality improvements and Watershed Plan implementation, it has been widely recognized that a restructuring of the Authority Board to include elected officials will promote the needed political support for collaborative water quality efforts. An amended and restated IGA is being formulated, along with new bylaws and governance structure. This restructuring will provide the political and fiscal decision-making to support water quality goals and long-term funding strategies.

Our water resources are becoming more and more precious each year. So, protection of water quality in Chatfield Reservoir for drinking water supplies, recreation, fisheries, and agricultural uses is crucial to ensure their continued use into the future. Thank you for your continued support in the Chatfield Reservoir and its watershed.

Sincerely,

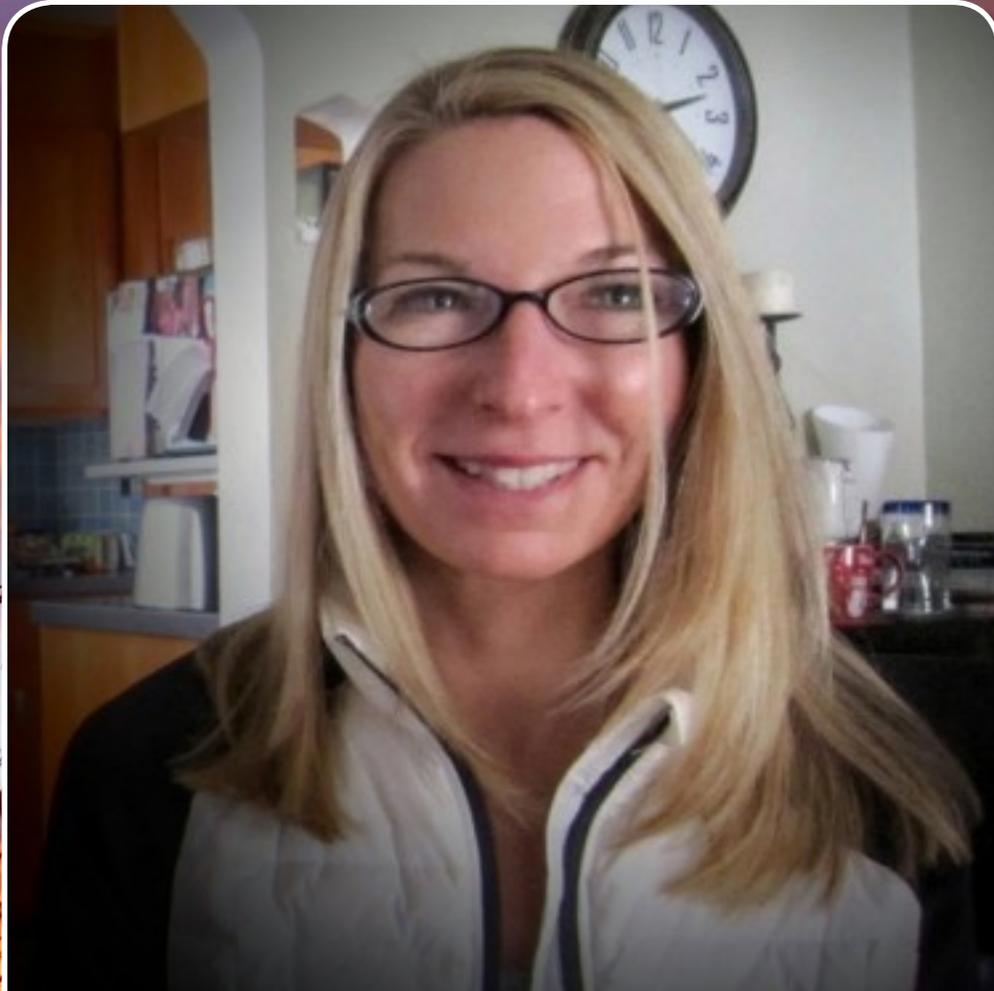
Chatfield Watershed Authority

Kevin Urie
Co-Chair



Tim Grotheer
Co-Chair





**In Memory of
MARTHA J. HAHN**

1974 – 2015

**Dedicated to the Engineering and Science of Water
Reclamation, Treatment, and Sanitation**



The *2015 Chatfield Report* is the annual water quality summary and status report presented by the Chatfield Watershed Authority to communicate the water quality of Chatfield Reservoir and its watershed, highlighting information required by the Colorado Water Quality Control Commission in Control Regulation #73.

Chatfield Watershed Authority

www.chatfieldwatershedauthority.org

Authority Board Co-Chairs:

Kevin Urie, Denver Water
 Tim Grotheer, Centennial Water & Sanitation District

Technical Review Committee Co-Chairs:

David Van Dellen, Town of Castle Rock
 Jim Dederick, Douglas County

Financial Officers:

Ronda Sandquist, Brownstein Hyatt Farber Schreck
 Bob Deeds, City of Littleton
 Kevin Urie, Denver Water

Larry Moore, Roxborough Water & Sanitation District

Accountant: Ted Snailum, TWS Financial

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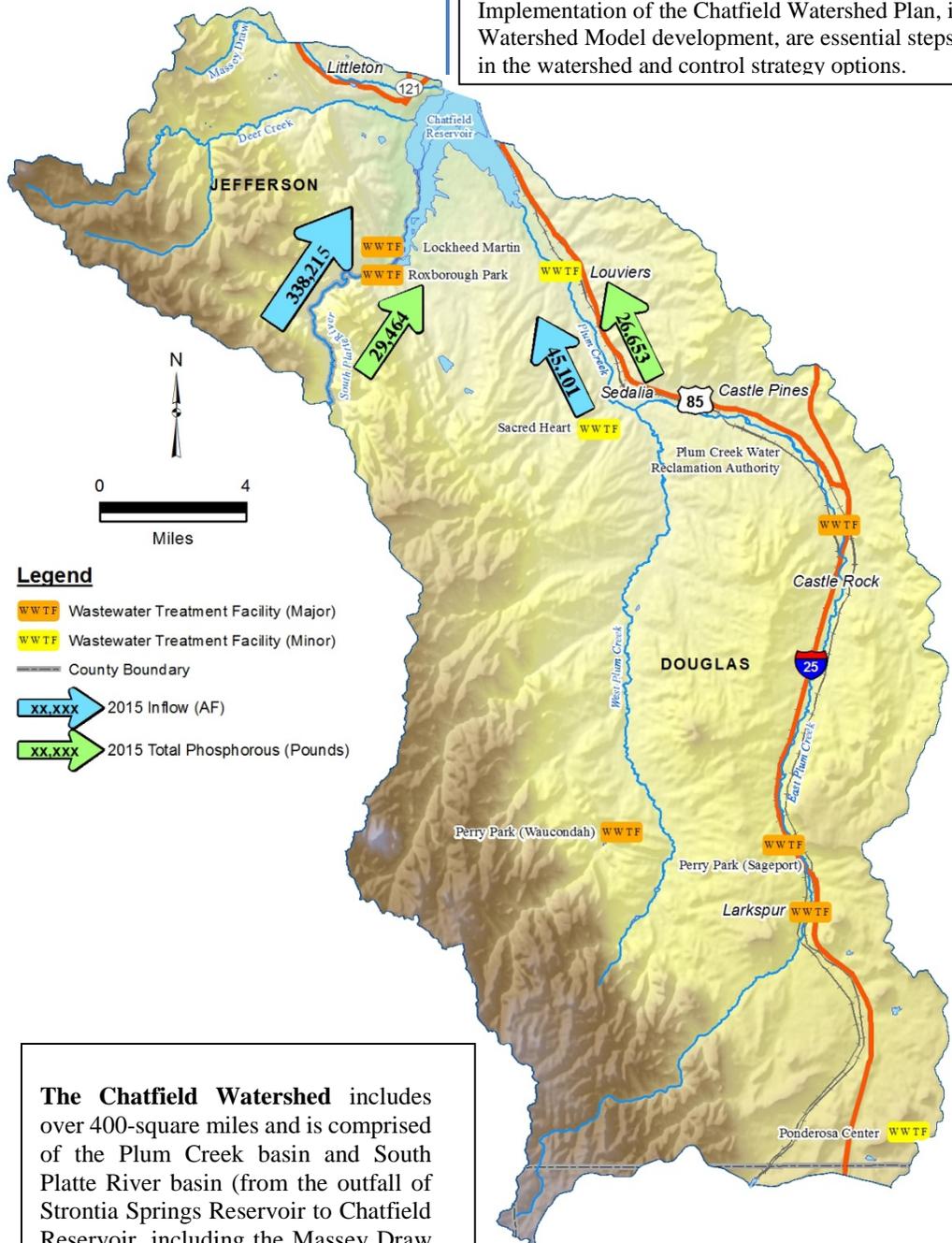
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2015 was a very wet year with high inflows from the South Platte River and Plum Creek exceeding 3,300 cubic feet per second (cfs). Prolonged inflows and high snowmelt runoff exceeded the historic flood pool record in 1980, measuring 5447.9 feet. Diligent reservoir operations by the U.S. Army Corps of Engineers provided downstream flood control and public safety.

Reservoir inflows were over 3 times greater than the median inflow of 100,860 acre-feet. As anticipated, the higher inflows from the South Platte and Plum Creek resulted in higher total phosphorus (TP) loading to the Reservoir, approximately 57,000 pounds; nonetheless, the Reservoir was in compliance with TP and chlorophyll-a water quality standards.

Regardless of hydrology, the Authority's water quality focus remains steadfast on reduction of nonpoint sources of TP in the watershed and Chatfield Reservoir. Implementation of the Chatfield Watershed Plan, including progress in Chatfield Reservoir Model development, are essential steps in understanding TP dynamics in the watershed and control strategy options.



The Chatfield Watershed includes over 400-square miles and is comprised of the Plum Creek basin and South Platte River basin (from the outfall of Strontia Springs Reservoir to Chatfield Reservoir, including the Massey Draw and Deer Creek sub-basins).

Reservoir Regulatory Compliance

In 2015, Chatfield Reservoir was in compliance with the growing season averages regulated for chlorophyll-*a* (chl-*a*) and total phosphorus (TP) (Control Regulation #73, Water Quality Control Commission (WQCC), 5-CCR-1002-73).

Chlorophyll-*a*

The chlorophyll-*a* (chl-*a*) growing season (July through September) average was 7.2 µg/L, below the standard of 10 µg/L, with an assessment threshold of 11.2 µg/L, 1 in 5 year allowable exceedance frequency. Observed 2015 chl-*a* concentrations in Chatfield Reservoir are depicted in Figure 1. The chl-*a* concentrations observed are a function of nutrient availability from reservoir inputs and internal loading, and other conventional reservoir parameters like dissolved oxygen, temperature, and pH. During the past five years (2011-2015), the chl-*a* growing season average concentration has not

exceeded the 11.2 µg/L water quality assessment threshold (Figure 2).

Chl-*a* is composed of many types of algae. In 2015, blue-green phytoplankton, also known as Cyanophyta or cyanobacteria, (species *Anabaena*, *Ankistrodesmus*, and *Aphanocapsa*) concentrations ranged from 30 to 65,000 algal cells/mL, with highest concentrations occurring in August (Figure 3). These algal species typically correspond with elevated chl-*a* measurements. Specific species of Cyanobacteria convert nitrogen gas to biologically available forms of nitrogen, serving as an additional source of nitrogen to the reservoir system. Cyanobacteria were the predominant algae observed in April, late July and August (Figure 4).

Total Phosphorus

The total phosphorus (TP) growing season average was 20.5 µg/L, below the standard of 30 µg/L, with an assessment threshold of 35 µg/L, 1 in 5 year allowable exceedance frequency. The TP concentrations observed in 2015 in Chatfield Reservoir are shown in Figure 5.

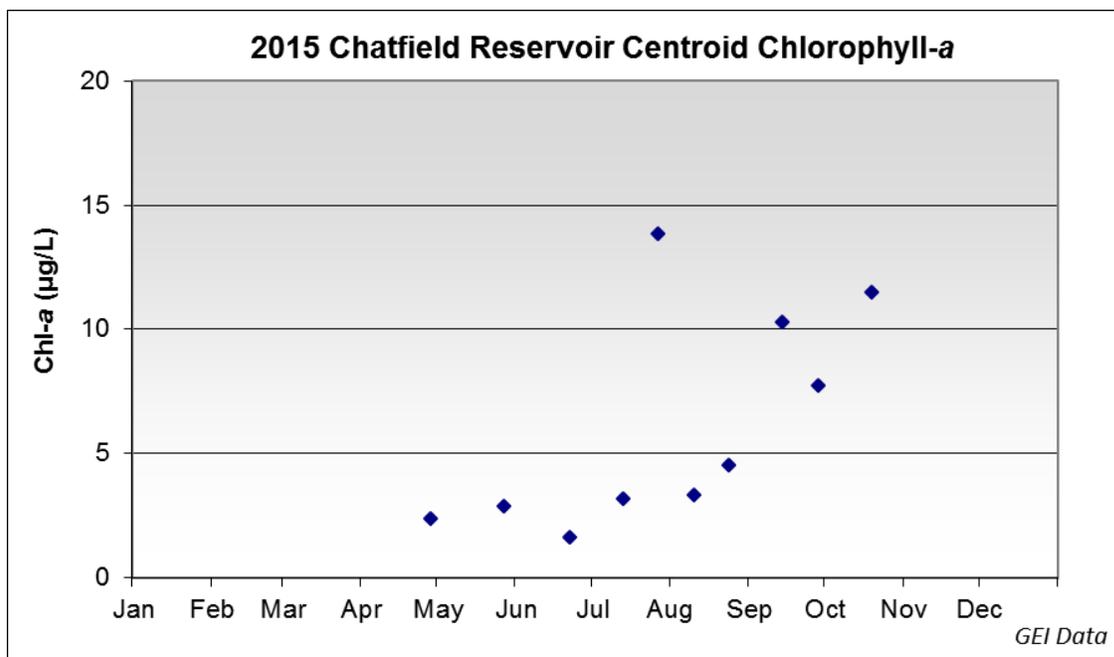


Figure 1 Observed 2015 Chlorophyll-*a* Concentrations in Chatfield Reservoir – The growing season average (July – September) was 7.2 µg/L, below the 10 µg/L standard.

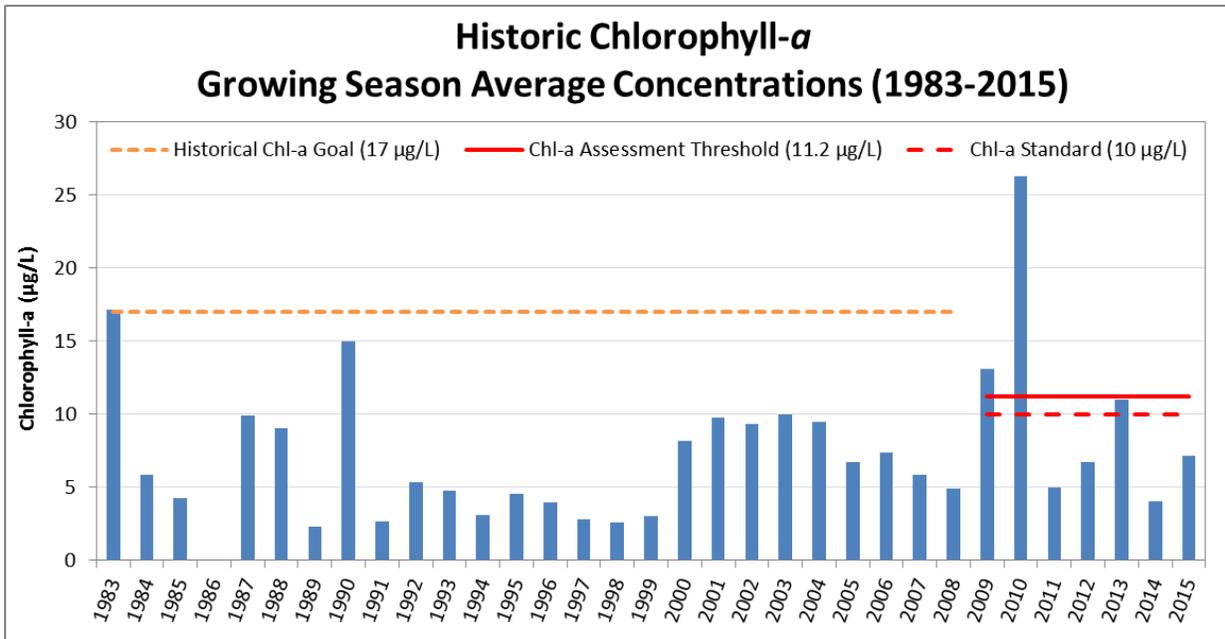


Figure 2 Historical Chl-a Growing Season Compliance 1983 to 2015 at Chatfield Reservoir

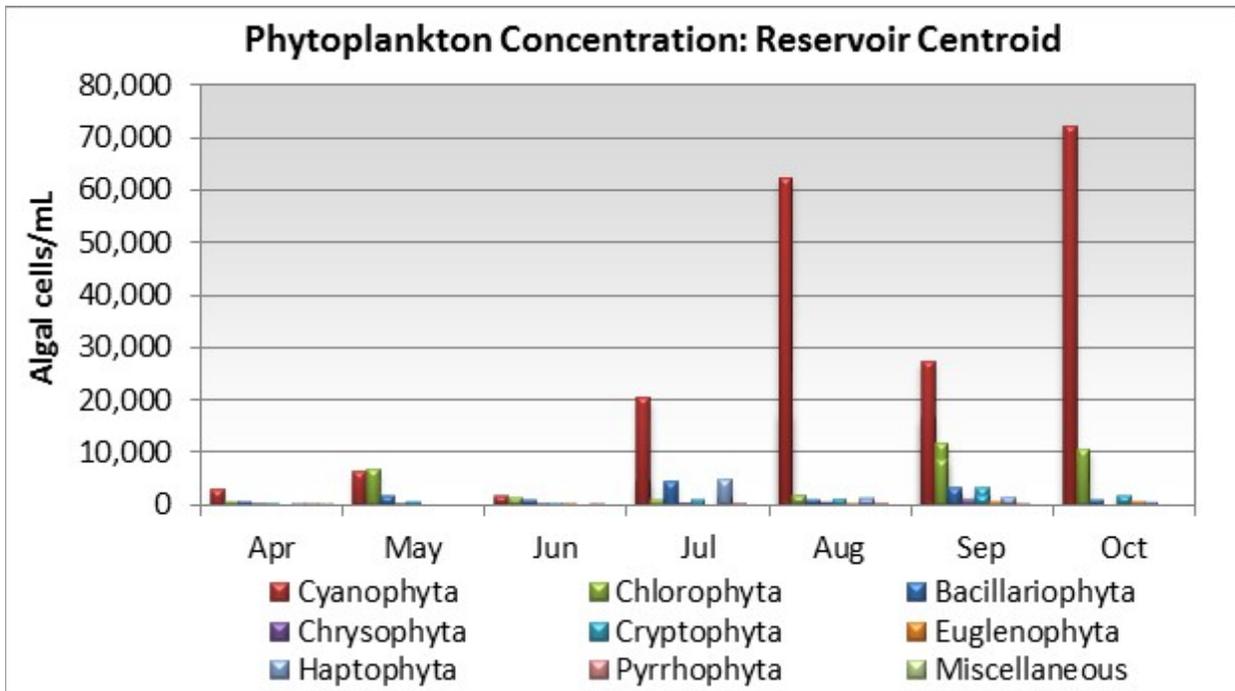


Figure 3 2015 Phytoplankton Monthly Summary - Phytoplankton samples were taken in the Reservoir during 10 sampling events from April through October 2015. Cyanophyta, or blue-green algae, is shown to peak in October at 72,000 algal cells/mL.

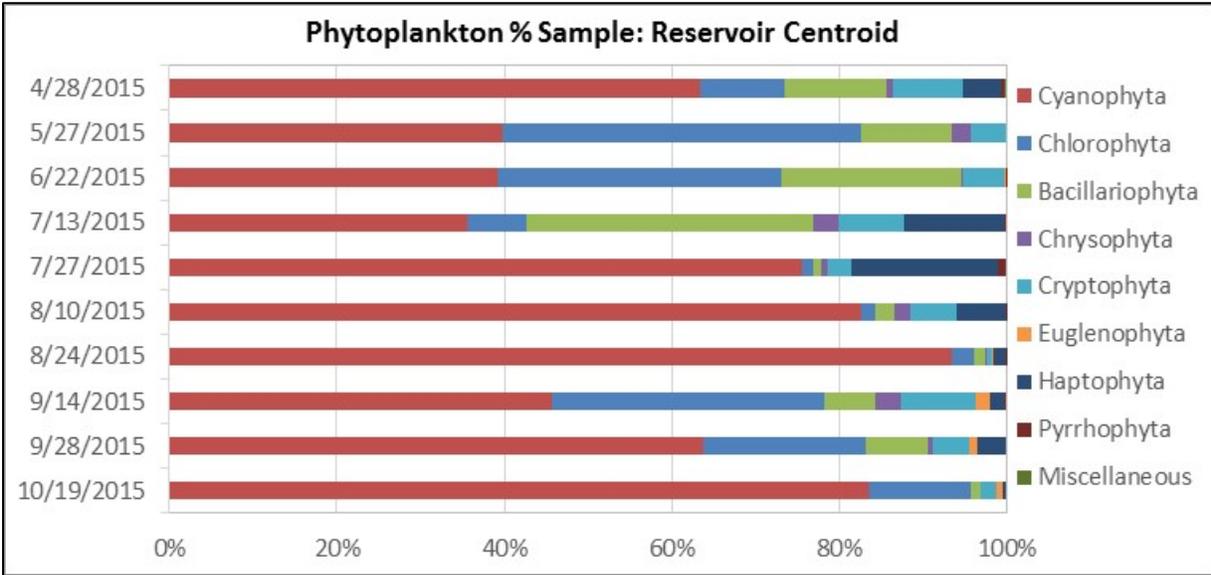


Figure 4 – 2015 Phytoplankton Speciation Variability – Cyanophyta (cyanobacteria) were the predominant algae observed in April, late July through October.

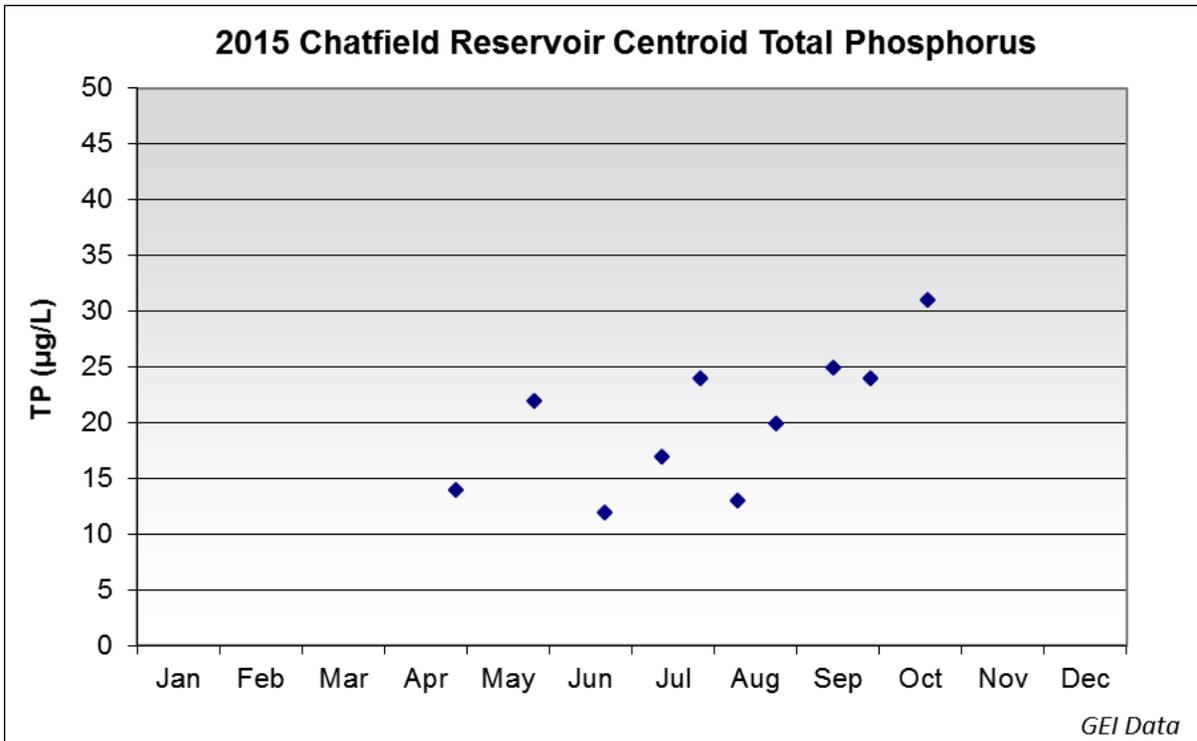


Figure 5 Observed 2015 TP Concentrations in Chatfield Reservoir – The growing season average (July – September) was 20.5 µg/L, below the standard of 30 µg/L.

Figure 6 depicts the variability of TP concentrations at various depths in the Reservoir between May and October of 2015. TP concentrations in the top 1 meter ranged between 18-31 $\mu\text{g/L}$. In the early summer months (May through July) TP concentrations observed at depths beyond 10 meters did not exceed 30 $\mu\text{g/L}$. In August through October TP concentrations observed at depths beyond 10 meters exceeded 30 $\mu\text{g/L}$, reaching 67 $\mu\text{g/L}$ in one observed event. As summer turns into fall, increased TP concentrations are observed in the lower depths of the Reservoir indicating presence of internal phosphorus loading. A historic review of TP compliance from 1983 to 2015 is illustrated in Figure 7. The TP growing season average has remained below the water quality assessment threshold of 35 $\mu\text{g/L}$ since the standard changed in 2009.

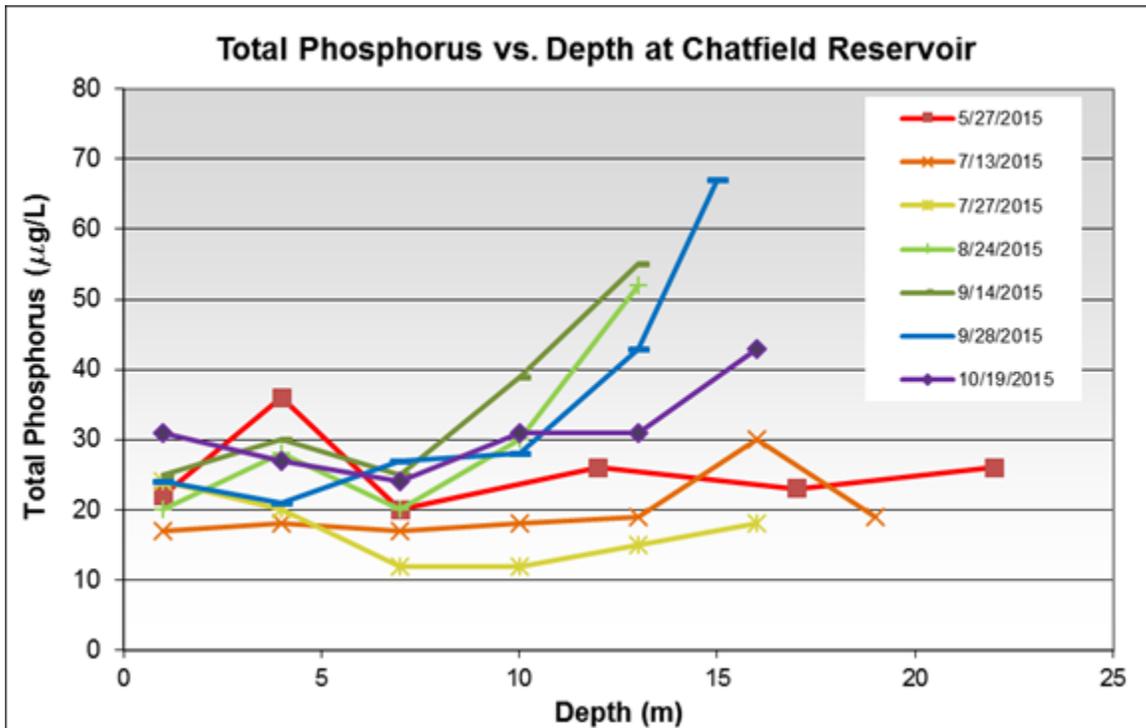


Figure 6 Total Phosphorus Water Column Depth Profile – Generally during late summer months, higher TP concentrations observed at depths of 10-17 meters indicate presence of internal phosphorus loading.

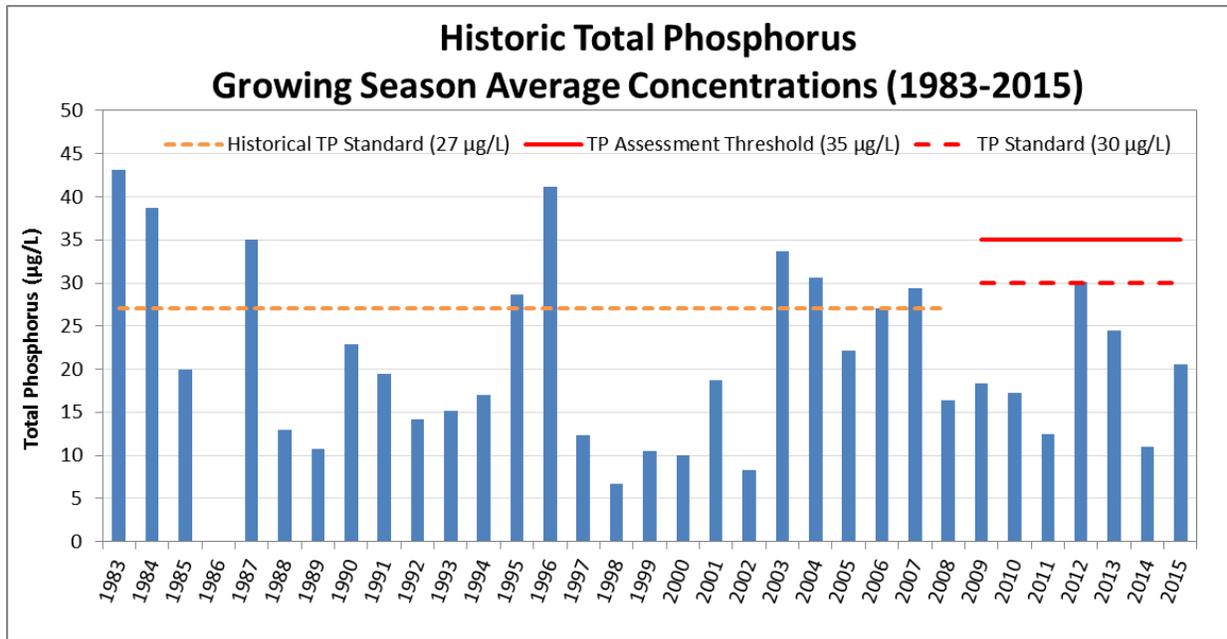


Figure 7 Historical Review of TP Growing Season Compliance 1983 to 2015

Compliance with the TMAL

The phosphorus Total Maximum Annual Load (TMAL) of 19,600 pounds/year at a median flow of 100,860 acre-feet/year was revised by the WQCC in 2009 to reflect a statewide probabilistic model describing the linkage between watershed TP loads and in-lake TP concentrations. The WQCC acknowledged that progress towards development of revised phosphorus allocations to meet the TMAL of 19,600 pounds was contingent on suitable funding to support data and modeling needed to re-partition loads between the South Platte River and Plum Creek, reallocating loads within each basin, and revising wasteload allocations, as appropriate. Therefore, until these tasks are completed to provide a scientific basis for development of revised allocations, the original point and nonpoint source allocations totaling 59,000 pounds/year remain applicable (WQCC, 2009).

2015 Flows

Hydrology in the Chatfield watershed was one of the wettest in recent history. Inflows were retained in Chatfield Reservoir in the flood control pool to reduce downstream flood impacts, resulting in closure of the swim beach and boat ramps along with other reduced recreational opportunities at the State Park through July 2015 (Photos 1 and 2). Significant rainfall occurred across the Chatfield Watershed totaling about 27.17 inches of rainfall observed in Highlands



Photo 1 - Picnic facilities at flood stage elevation 5447.9 feet.

Ranch, CO (National Climatic Data Center (NCDC). The heaviest precipitation occurred during the months of April through July with 56% of the annual rainfall (15.33 inches). Heavy rainfall and snowmelt runoff observed during



Photo 2 - High water levels in June 2015 near boat inspection facilities at Chatfield Reservoir.

these spring months corresponded to the high flows observed (Figure 8), over three times what was measured in 2014. Inflows are measured at USGS monitored stations at Plum Creek at Titan Road and South Platte River at Waterton Road (Colorado Division of Water Resources Gage). Inflows totaled 389,215 AF (Figure 9), over three times the median inflow into the Chatfield Reservoir (100,860 AF). The South Platte River contributed the majority of the inflow, 338,215 AF (87%). Plum Creek contributed approximately 12% of the inflow, or 45,101 AF. Other inflows included direct precipitation on the Reservoir (27.2 inches) and alluvial flows (2,684

AF). Flows from Deer Creek and Massey Draw are not gaged and have limited flow related to Plum Creek and the South Platte River. Because of these limitations, combined with the Authority’s limited financial resources, these drainages were not measured.

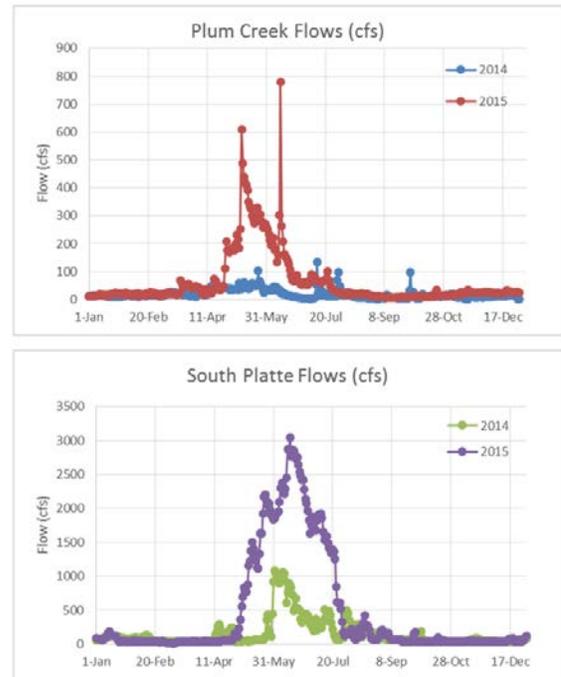


Figure 8 - Comparison of 2015 and 2014 Hydrology in Chatfield Watershed- Plum Creek and South Platte River inflows to Chatfield Reservoir resulted in flood control storage through July 2015.

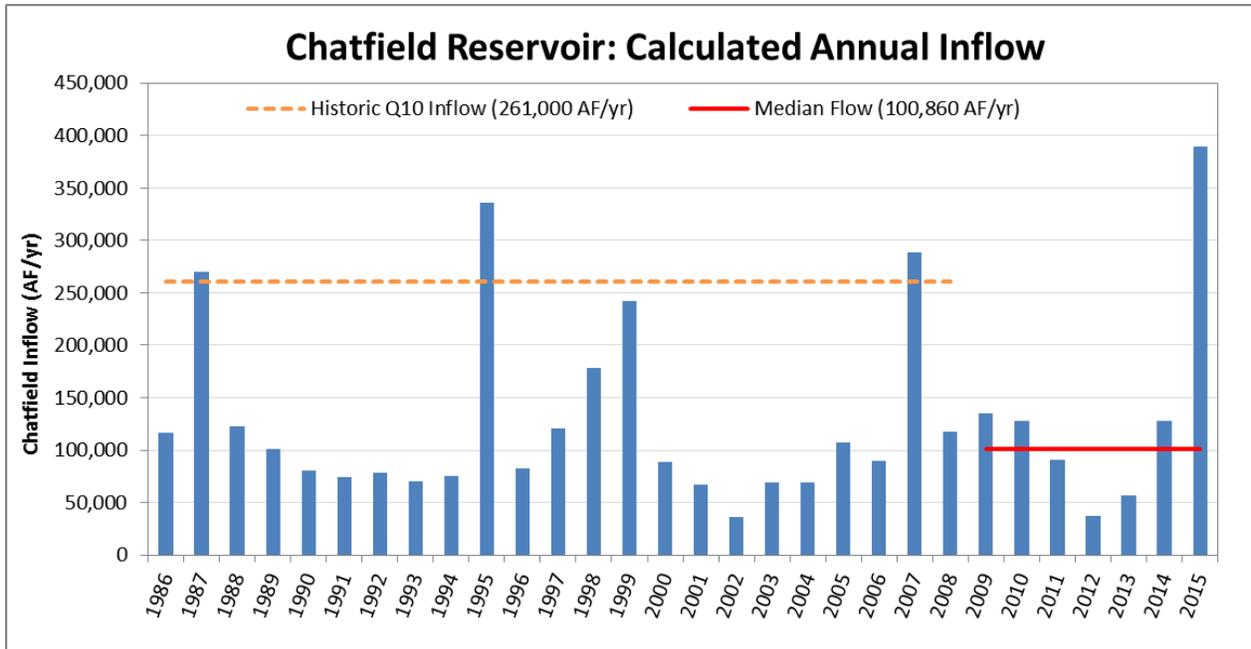


Figure 9– Chatfield Reservoir Calculated Annual Inflow (1986 – 2015)

2015 TP Concentrations – Instream and Reservoir

Observed monthly TP concentrations of South Platte and Plum Creek inflows, Chatfield Reservoir outflow and Chatfield Reservoir are depicted in Figure 10. Plum Creek TP concentrations were highest for all months of the year in comparison to measurements observed elsewhere in the watershed. These average monthly TP concentrations for all sites are slightly higher than those in 2014.

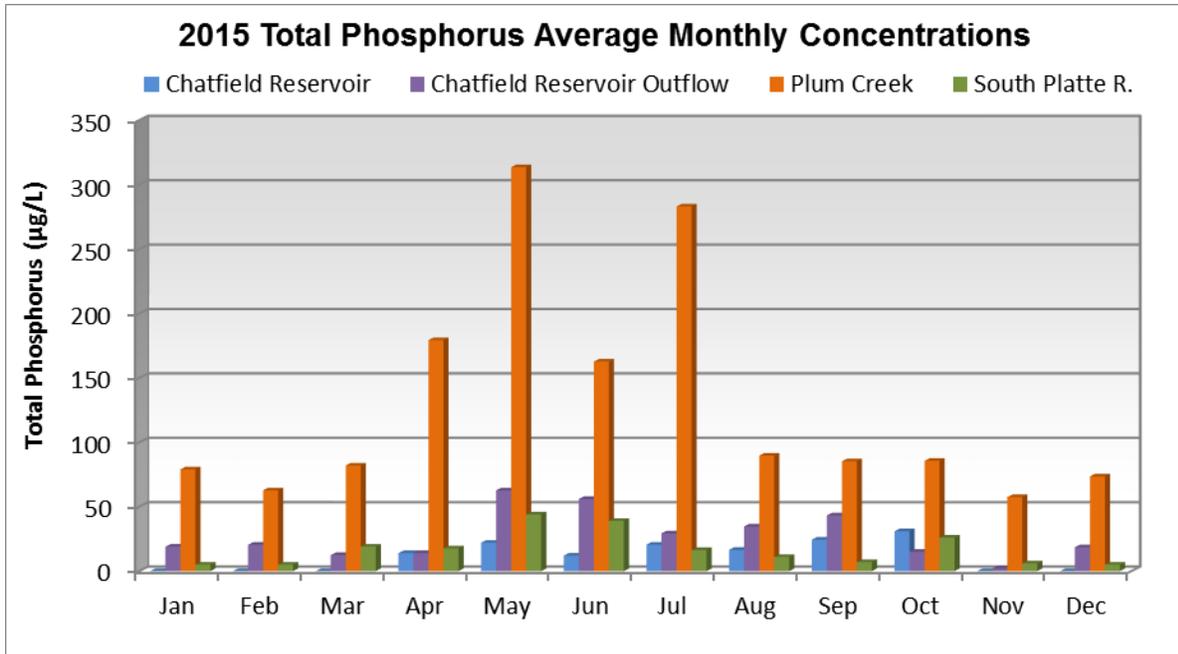


Figure 10 – Average Monthly TP Concentrations in the Chatfield Watershed and Chatfield Reservoir

Calculated TP Load

The high inflows observed in 2015 contribute to the higher annual TP load calculated for 2015 (Figure 11). The 2015 annual TP load to the Reservoir totaled 57,247 pounds, exceeding the

TMAL of 19,600 pounds, however, below the 59,000 pounds that remains in effect until repartitioning of TP loads has occurred (WQCC, 2009). In 2007, similarly high inflows of approximately 289,000 AF resulted in a TP annual load of approximately 56,000 lbs.

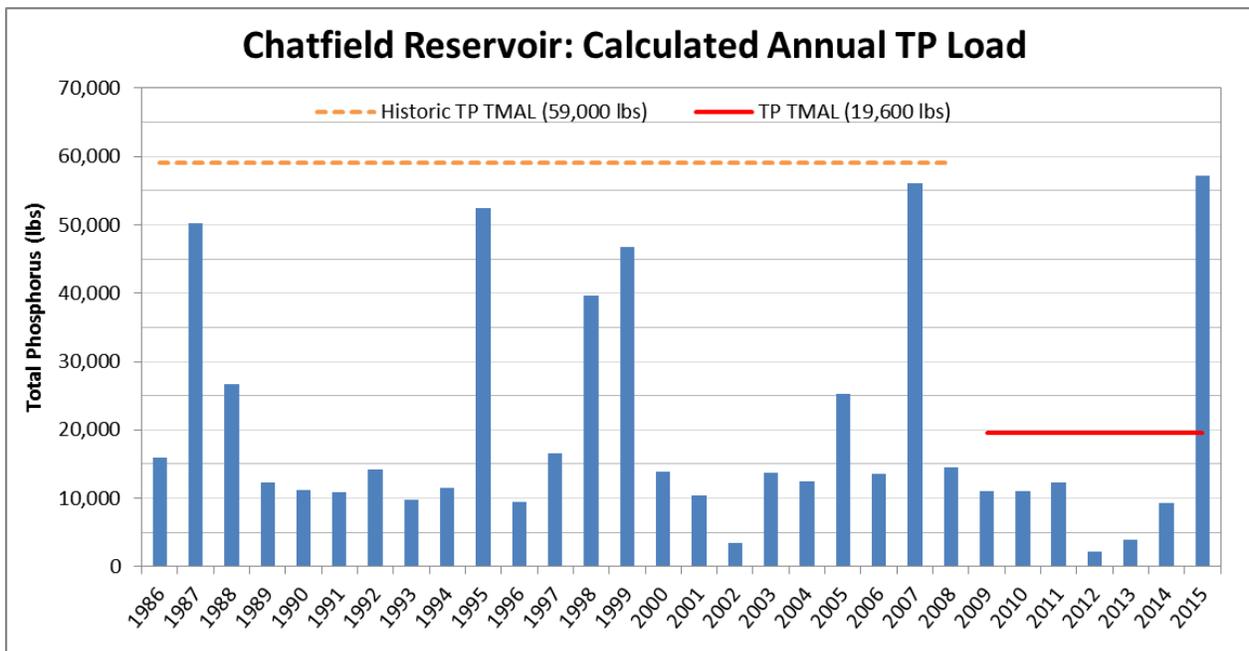


Figure 11 Calculated TP Load to Chatfield Reservoir (1986 – 2015) – 2015 TP loads were below the 59,000 pound TMAL which remains in effect until modeling is completed and loads and wasteloads are reallocated.

Despite the magnitude of TP loading into the Reservoir in 2015, the relative TP loading from sources is typical compared to historic TP inputs. This year, TP loading from Plum Creek was 26,653 pounds, or 47% of total input, compared to 29,464 pounds from the South Platte River, or

51% of total input. Direct precipitation on Chatfield Reservoir and alluvial inflows and other direct flow sources contributed approximately 1,000 pounds, or 2% of total input. A comparison of the inflow and TP load contributions is presented in Figure 12.

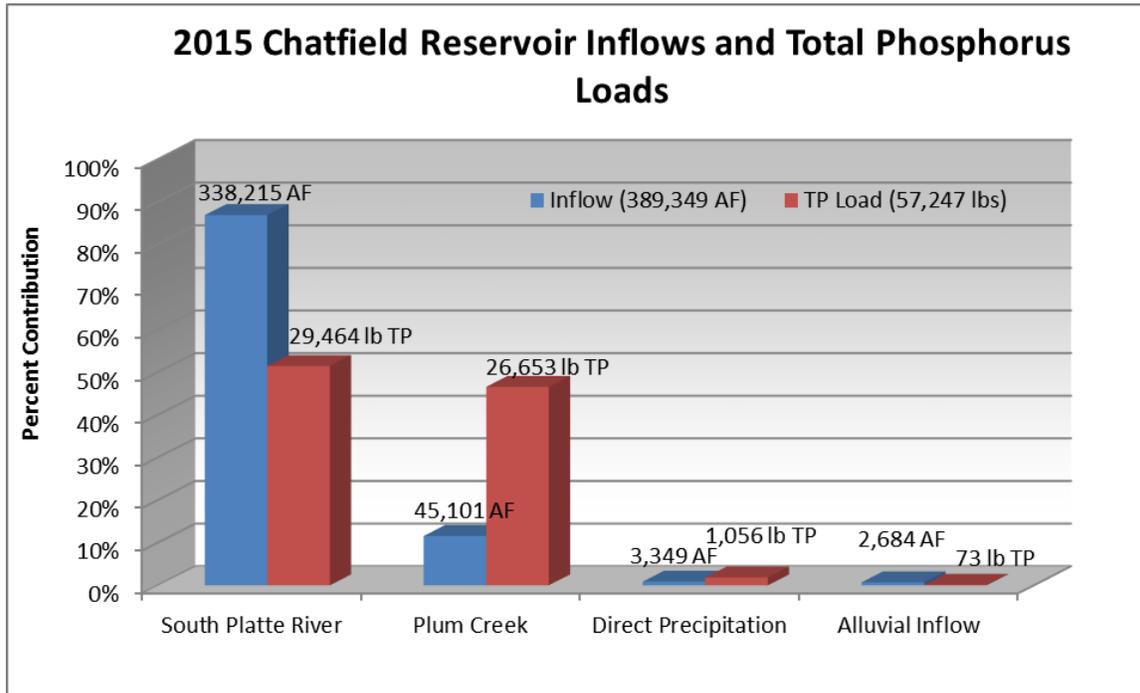


Figure 12 2015 Comparison of Chatfield Reservoir Inflows and TP Loads

Reservoir Monitoring Program

The Authority maintains a monitoring program to characterize Reservoir water quality and determine regulatory compliance. Surface water samples are collected by Denver Water and GEI Consultants, Inc. at four locations as shown in Figure 13. These locations include:

- South Platte River at Waterton Road,
- Plum Creek at Titan Road,
- South Platte River below Chatfield, and
- Chatfield Reservoir (centroid, South Platte arm and Plum Creek arm).

The constituents (Table 1) are monitored monthly when ice has melted off the Reservoir. During the growing season (July through September), Reservoir sampling is conducted twice monthly. To better understand reservoir dynamics, the Authority collects water column measurements, including the epilimnion and hypolimnion layers, at various depth intervals. All water quality data are available on the Authority's website, located at www.chatfieldwatershedauthority.org.

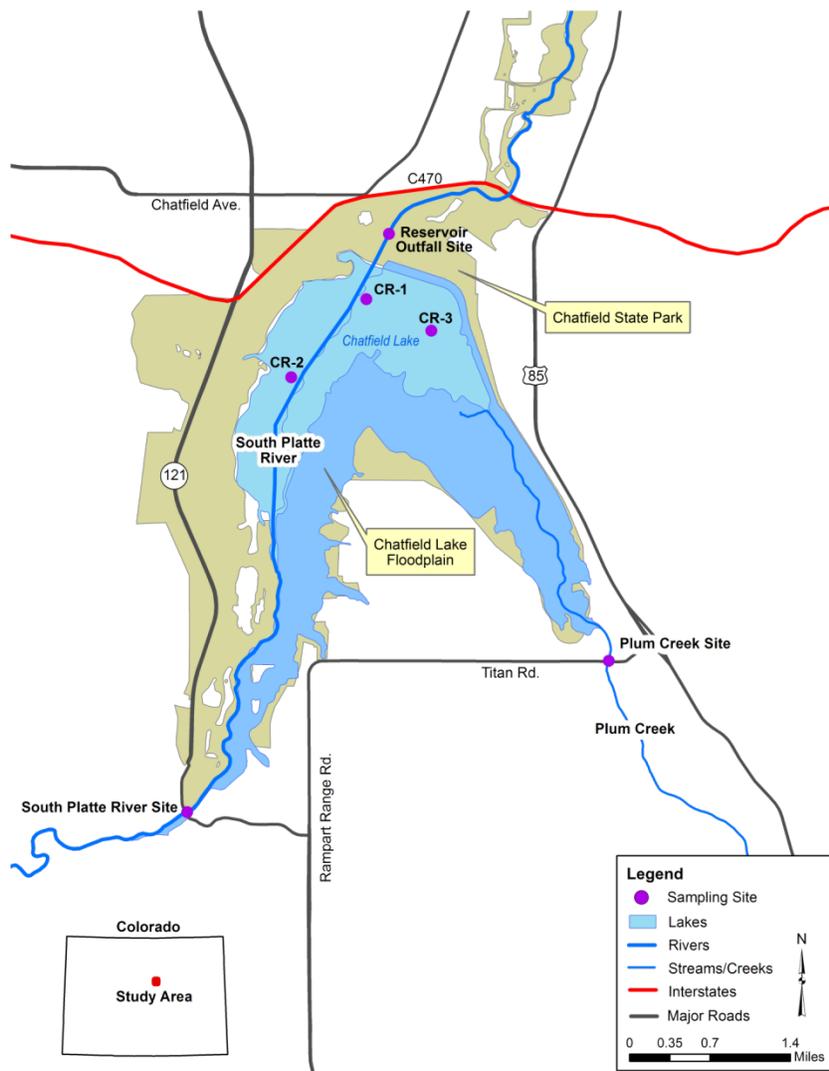


Figure 13 Chatfield Reservoir Monitoring Locations

Table 1 Chatfield Reservoir Water Quality Monitoring Parameters

Field Parameters	Nutrients	Biological	Wet Chemistry
Temperature, degrees C	Chl- <i>a</i> , µg/L	<i>E. coli</i> (number/mL)	Alkalinity, mg/L
pH (s.u.)	TP, µg/L	Phytoplankton (# of organisms/ml)	Total Suspended Solids (TSS), mg/L
Specific Conductance, µS/cm	Ortho Phosphorus (Ortho-P), µg/L		Dissolved metals
Dissolved Oxygen (DO), mg/L	Nitrite + Nitrate-nitrogen, mg/L		
Secchi Depth, meters	Ammonia Nitrogen, mg/L		
Instantaneous Flow (Rivers and Creeks), cubic feet per second (cfs)	Total Nitrogen, mg/L		

Plum Creek Watershed Monitoring Program

In 2015, the Authority continued the watershed monitoring efforts at locations illustrated in Figure 14. In the Plum Creek basin, watershed monitoring continues through voluntary sampling efforts by the Plum Creek Water Reclamation Authority (PCWRA). The Plum Creek monthly analyte list is provided in Table 2.

The objective of Plum Creek monitoring program is to better characterize water quality in Plum Creek and identify potential nonpoint source pollutant sources. A variety of potential nonpoint sources have been identified in the Chatfield Watershed, including stormwater runoff from historic urbanized and rural areas, leachate from unmaintained septic systems, agricultural activities, including runoff from overgrazed agricultural lands, runoff from wildfire burn areas, runoff from impervious areas, and erosion from degraded streambanks (Chatfield Watershed Plan, May 2015). Further data collection is needed, contingent on available resources, to identify and quantify phosphorus sources in the Plum Creek watershed.

The 2015 Plum Creek water quality observations included the following:

- *E. coli* measurements are higher and have less variability at EPC-11.1 (E. Plum Creek above confluence with Plum Creek) compared to other sites in Plum Creek watershed. Although variability is evident at all sites, central tendency of observed *E. coli* remains below the water quality standard of 126 organisms/100 mL (Figure 15). In 2015, the Authority commenced a molecular source tracking monitoring program to help understand potential sources of *E. coli* (human,

horses, cattle, beaver, etc.) Results are inconclusive at this initial stage, however, data collection will continue in 2016 and findings will be summarized at that time.

- TP concentration generally increased from upstream to downstream along E. Plum Creek (Figure 16). No significant spatial trends were found in W. Plum Creek or Plum Creek. TP concentrations have historically been observed to be relatively high at the E. Plum Creek above Plum Creek confluence, compared to other sites in Plum Creek watershed. In 2015, average TP observed at this site was 220.5 µg/L, the highest compared to all other sites.
- For many sites, average TSS concentration (an indicator of sediment and high precipitation events) were greater in 2015 compared to 2014. The highest average TSS concentration observed in 2015 was at E. Plum Creek above the confluence with Plum Creek (134 mg/L) (Figure 17).
- The relationship between TP and TSS is complex. Some of the highest TSS and TP data collected in the watershed are coincidental with the highest precipitation events in the basin (i.e., on May 20, 2015 and July 8, 2015, had the highest observed precipitation observed on those sampling dates of 0.13 inches and 0.12 inches of rainfall, respectively). Based on review of the hydrologic data, these extreme events result in data that are not considered outliers. The TP vs TSS relationship, along with identification of potential nonpoint sources of TP, will be further evaluated as monitoring in Plum Creek basin continues.

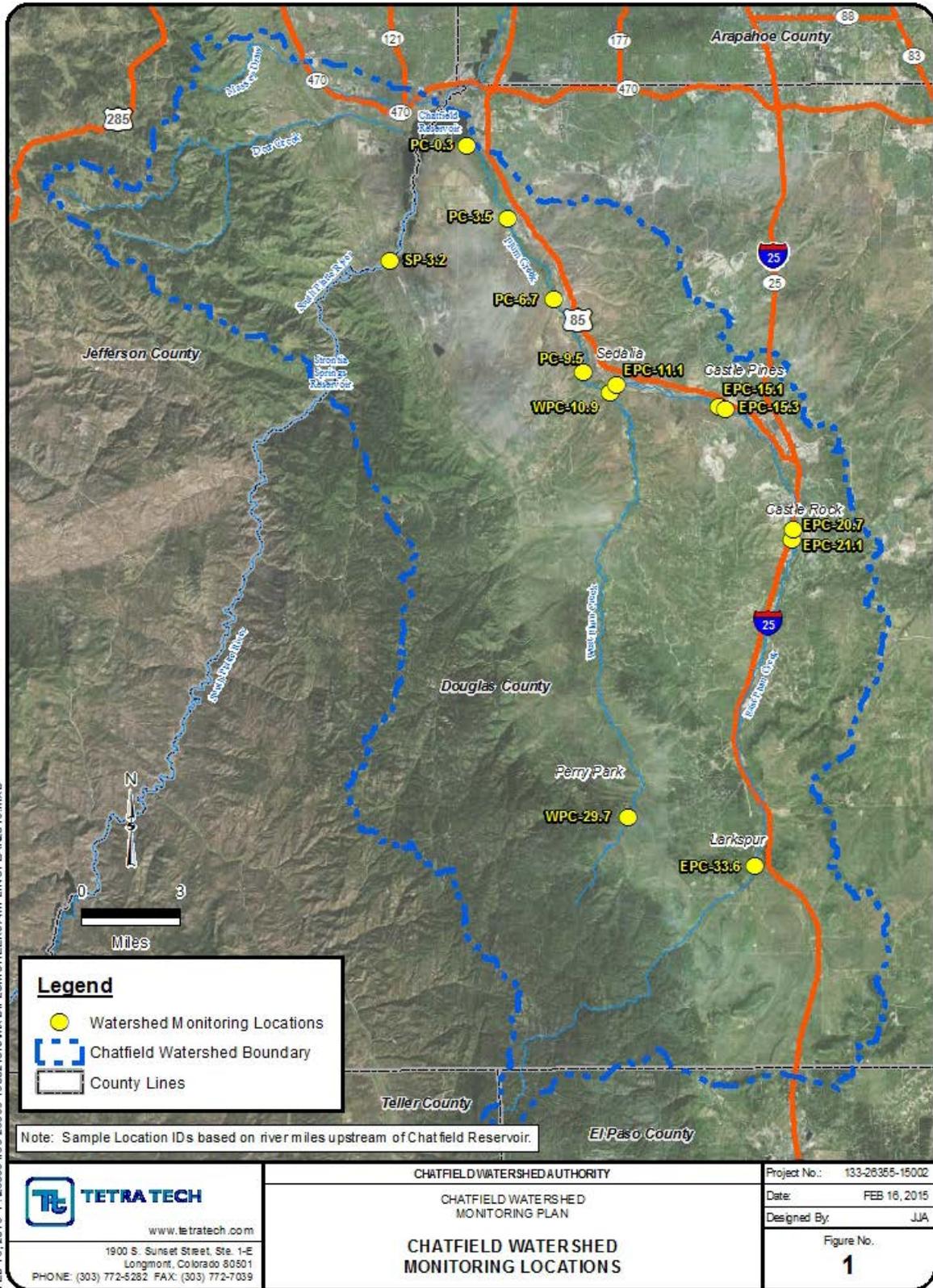


Figure 14 2015 Chatfield Watershed Monitoring Locations – Watershed sampling sites are located along Plum Creek (PC), East Plum Creek (EPC), West Plum Creek (WPC), and the South Platte River (SP).

Table 2 Plum Creek Basin Analyte List

Field Parameters	Nutrients	Biological	Wet Chemistry
Temperature, degrees C	Total Phosphorus, µg/L	<i>E. coli</i> (number/mL)	Alkalinity, mg/L
pH (s.u.)	Ortho Phosphorus, µg/L		Total Suspended Solids, mg/L
Specific Conductance, µS/cm	Nitrite + Nitrate-nitrogen, mg/L		
Dissolved Oxygen, mg/L	Ammonia Nitrogen, mg/L		
Instantaneous Flow, cfs	Total Nitrogen, mg/L		

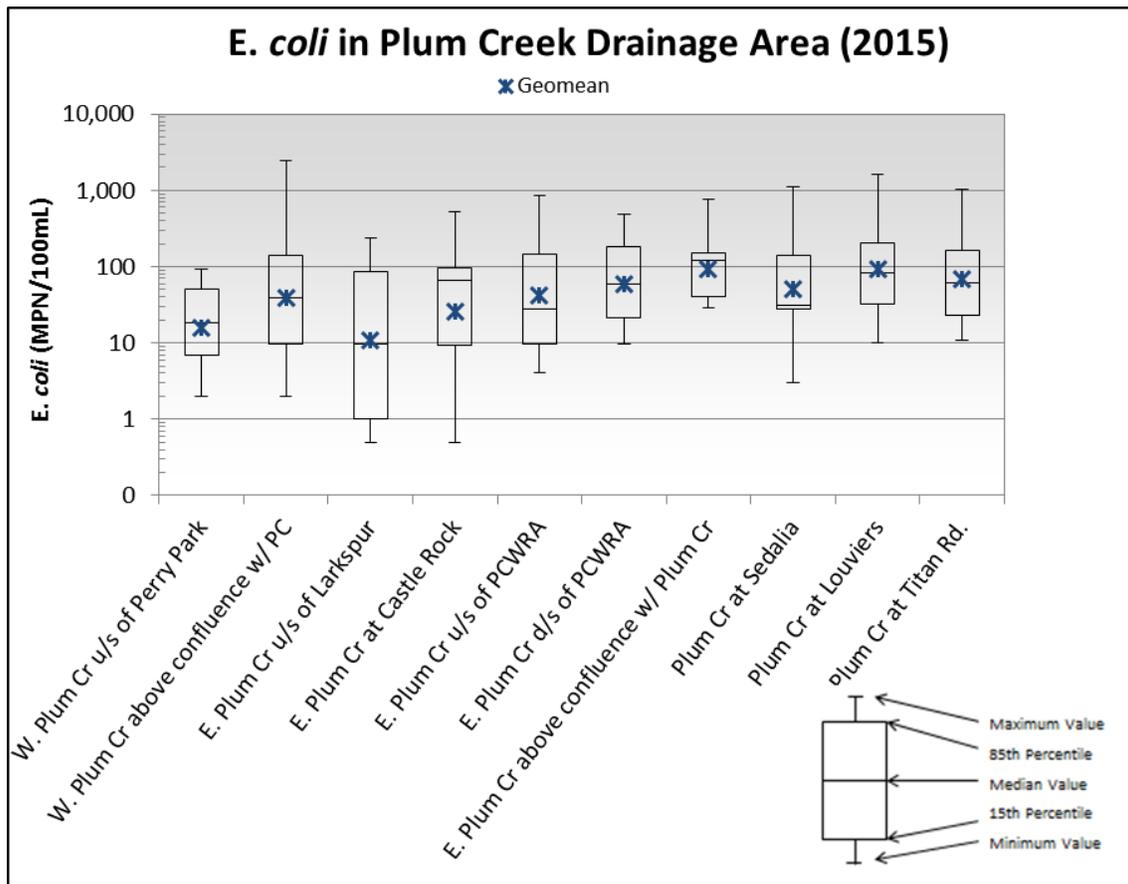


Figure 15 2015 *E. coli* in the Plum Creek Basin

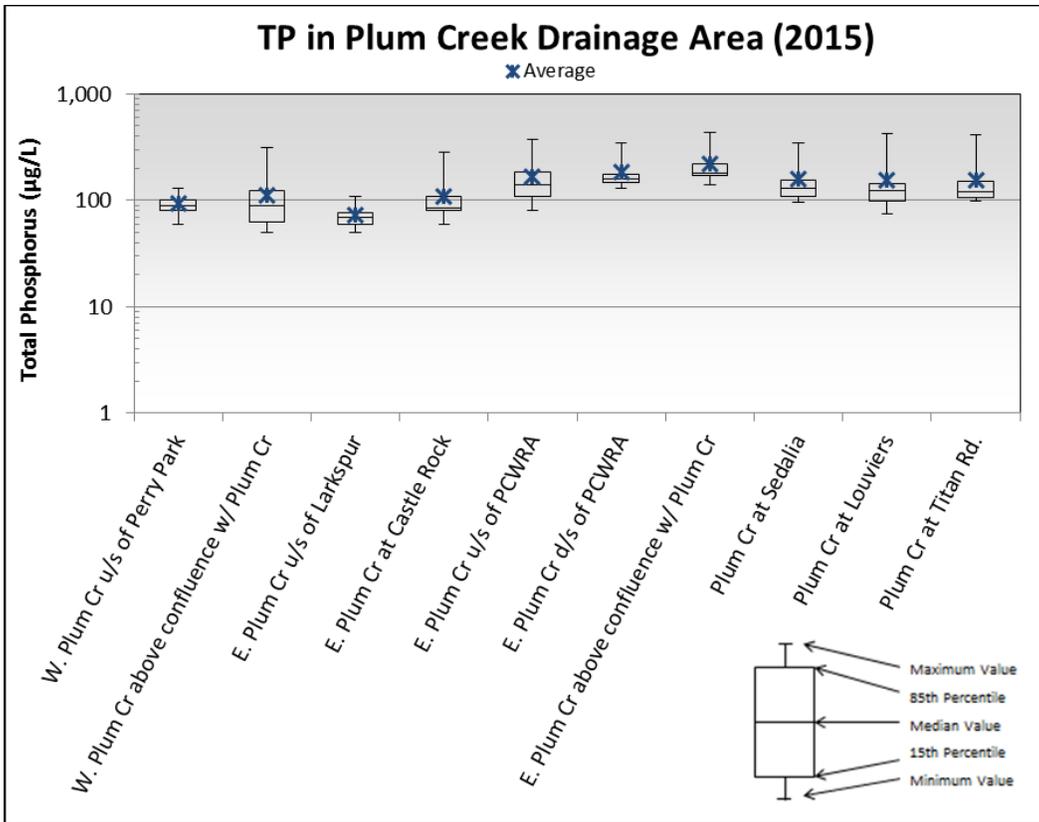


Figure 16 2015 TP Variability in the Plum Creek Basin

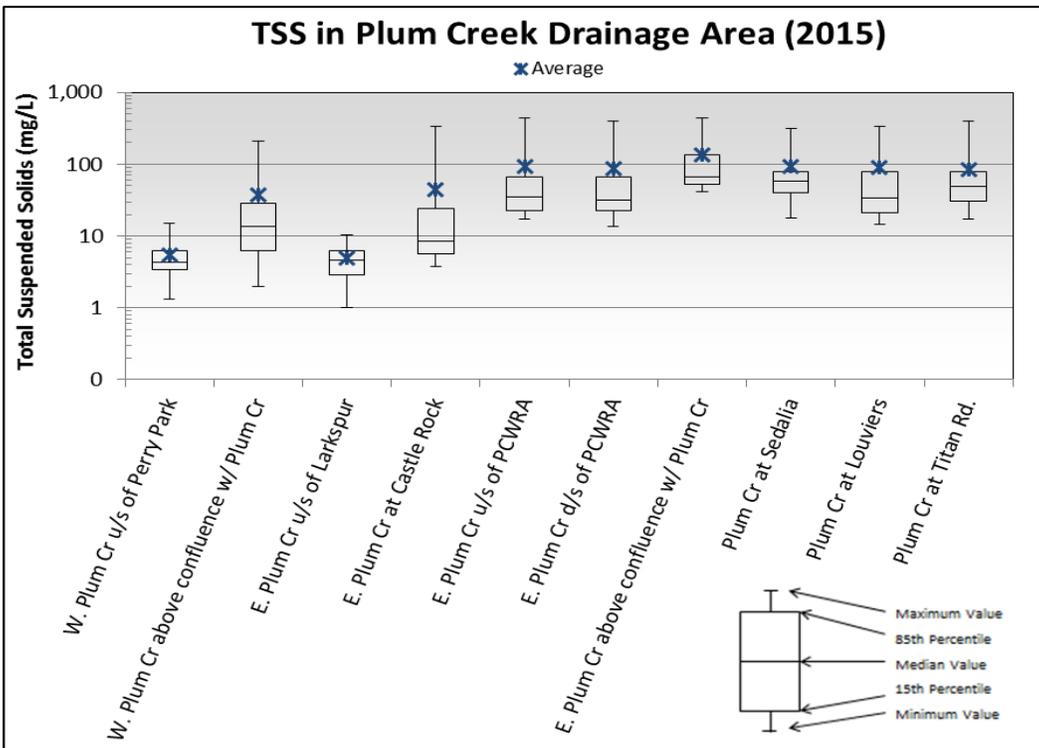


Figure 17 2015 TSS Concentrations in the Plum Creek Basin

Wastewater Treatment Plants

Table 3 summarizes the thirteen wastewater treatment plants (WWTPs) in the Chatfield watershed and their respective TP wasteload allocations. In 2015, reported TP discharges from WWTPs were approximately 2,416 pounds or 32% of the allowable wasteload allocation of 7,533 pounds.

Wastewater providers treat effluent to meet stringent water quality requirements pursuant to Control Regulation #73. Their monitoring and reporting of effluent discharges demonstrates compliance with their individual permits and the state regulations. During 2015, the discharges maintained their record of compliance, with every discharger in the Chatfield Watershed complying with their TP concentration limits and TP wasteload allocation (Table 3).



Table 3 2015 Phosphorus Wasteloads from WWTPs in the Chatfield Watershed

Allocation Sources	TP Wasteload Allocation (pounds)	2015 TP Loading from WWTPs* (pounds)
Plum Creek Water Reclamation Authority	4,256	2,253.0
Perry Park Water and Sanitation District: Waucondah	365	73.2
Perry Park Water and Sanitation District: Sageport	73	38.2
Lockheed Martin Space Systems Company	1,005	31.2
Town of Larkspur	231	11.7
Centennial Law Enforcement Foundation	30 ⁵	8.1
Centennial Water and Sanitation District	20	0.0
Ponderosa Center	75 ³	0.1 ⁷
Louviers Water and Sanitation District	122	0.0
Roxborough/Dominion Water and Sanitation District	1,218	No discharge ¹
Jackson Creek Metropolitan District	50 ⁴	No discharge ¹
Sacred Heart Retreat	15 ²	0.6 ⁷
South Santa Fe Metro District	21 ⁶	No discharge ¹
Reserve Emergency Pool	52	Not Used
Total Phosphorus Wasteload	7,533	2,416.1

Notes:

*TP loading from WWTPs is from the WWTP point of discharge; the TP load discharged from WWTPs does not equate to the TP load delivered to Reservoir due to assimilation of TP and geochemical fate and transport processes in the watershed.

1. No discharge of wastewater effluent in the Chatfield watershed.
2. Temporary five-year phosphorus allocation of 15 pounds for inclusion in discharge permit; allocation obtained from Roxborough Water and Sanitation District.
3. Ponderosa Center water quality credits are subject to completing a trade project pursuant to the Authority Trading Program.
4. Jackson Creek Metropolitan District received point source allocations through trades pursuant to the Authority Trading Program. Jackson Creek has a transfer agreement of 50 pounds with Roxborough Water and Sanitation District.
5. Centennial Law Enforcement Foundation water quality credits awarded pursuant to Authority's Trading Program.
6. South Santa Fe Metropolitan District received a point source allocation of 21 pounds through trade pursuant to the Authority Trading Program.
7. Estimate.

Recommendations on Clean Water Plan Amendments, New or Proposed Expansion of WWTPs, and Lift Stations

As the 208 Management Agency, the Authority reviews Clean Water Plan (CWP) Amendments, Site Applications, and Engineering Reports for new or proposed facilities to effectively manage waste treatment works and related facilities serving Chatfield Basin in conformance with the

water quality management plan and regulatory requirements.

In early September 2015, Dominion Water and Sanitation District (Dominion) requested Authority approval of its revision/amendment to the Site Approval for Dominion's Titan Lift Station to reflect that water from the lift station could also be treated at the Roxborough Wastewater Treatment Plant or the Littleton/Englewood Wastewater Treatment Plant. Authority approval was provided to CDPHE on September 22, 2015.

Regulated Stormwater Sources

Colorado’s stormwater permit program requires control of stormwater runoff in all Phase I and Phase II Municipal Separate Storm Sewer Systems (MS4) entities. These requirements are separate and distinct from the Chatfield Control Regulations, but complement the TMAL’s purpose. Through the efforts of the MS4’s, rate payers have spent significant funds to address water quality through implementing projects to mitigate impacts from urban stormwater runoff.

Authority members with Phase I and II MS4 permits in the Chatfield Basin include:

- Jefferson County
- Town of Castle Rock
- City of Littleton
- Castle Pines Metropolitan District
- City of Castle Pines
- Colorado Department of Transportation

Figure 18 depicts MS4 boundaries within the Chatfield Watershed. Currently, none of Douglas County’s MS4 Permit Boundary is within the Chatfield Watershed, as their boundary presently includes the Cherry Creek Basin portion of unincorporated Douglas County and Highlands Ranch. However, the anticipated renewal of CDPS MS4 permits will result in updated MS4 boundaries in Chatfield Watershed.

MS4 permits require the permittee to develop programs that meet six minimum control measures:

- Public education and outreach on stormwater impacts
- Public participation and involvement
- Detection and elimination of illicit connections and discharges
- Construction site stormwater runoff control
- Post-construction stormwater management in development and redevelopment
- Pollution prevention/good housekeeping for municipal operations

MS4 permits require implementation of best management practices (BMPs) to reduce pollutants discharged to the “maximum extent practicable.” A summary of 2015 MS4 permit inspection and



enforcement metrics and education and outreach activities are provided in Table 4.

Castle Rock’s annual “Spring Up the Creek” public outreach event continues to bring volunteers together to create awareness of water quality and stream health. In 2015 approximately 173 volunteers participated in the event (Figure 19). The theme for this year’s event was “Leave Only Footprints” (Figure 20). The results are always astonishing, with more than 112 bags of trash and 65 bags of recyclables collected to cleanup East Plum Creek. Sponsored in part by Douglas County and the Chatfield Watershed Authority, the event solicited the help from community volunteers to clean up debris along East Plum Creek, Sellars Gulch, and tributaries to the Meadows.

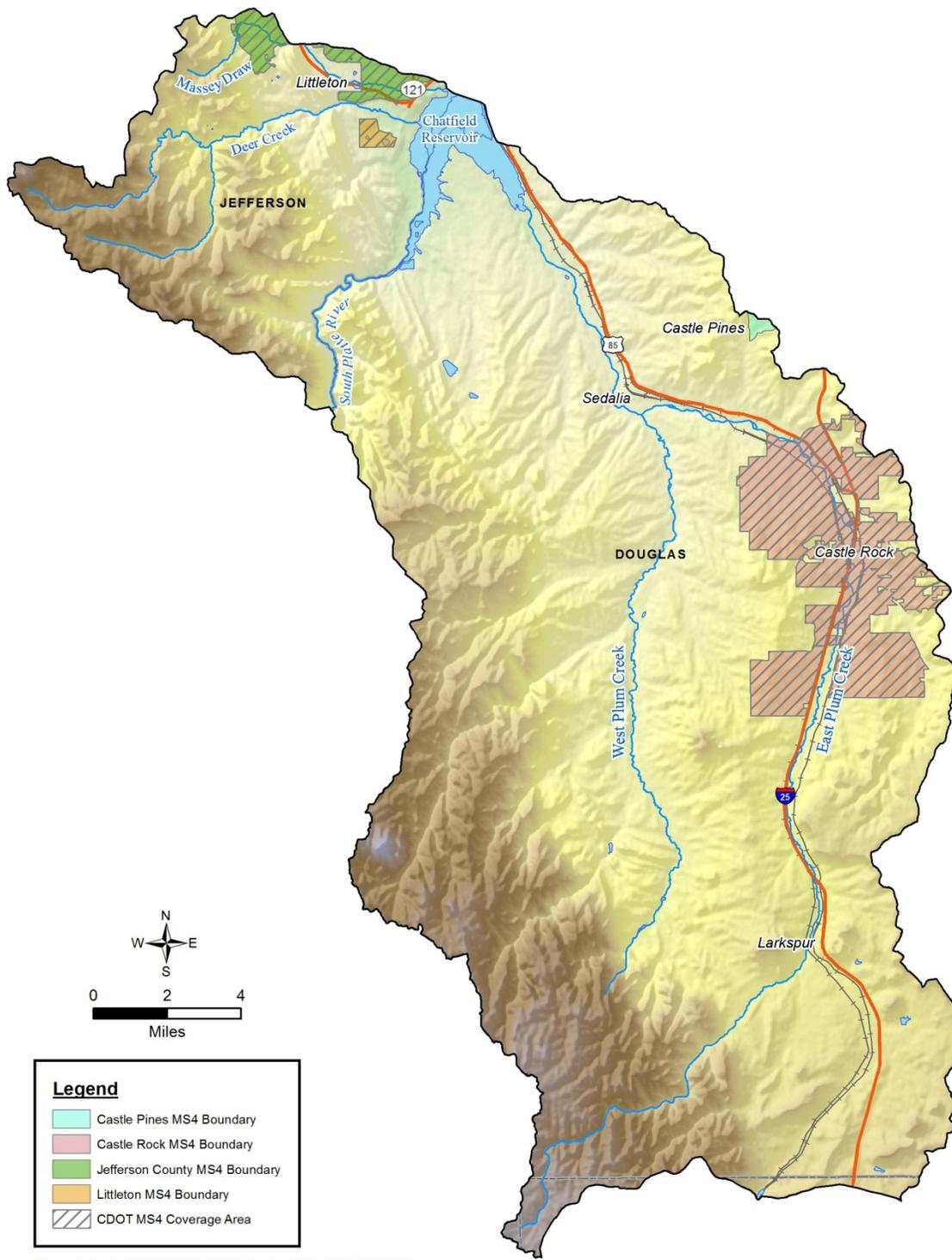


Figure 18 2015 MS4 Boundaries in the Chatfield Watershed



Figure 19 Volunteers at Castle Rock’s 12th Annual “Spring Up the Creek” – In only two hours, 173 volunteers picked up trash and recyclable materials from East Plum Creek, Sellars Gulch and tributary streams in the Meadows.



Figure 20 T-shirt design reminding everyone our creeks, rivers and lakes depend on you.

Table 4 Summary of 2015 MS4 Permit Activities

Land Use Agency	Permit Inspection Actions			Permit Enforcement Actions			Education and Outreach
	Illicit Discharges	Construction	Post Construction	Illicit Discharges	Construction	Post Construction	
Douglas County	8	3400	1	0	55	0	Participated/co-sponsored Spring Up the Creek; Presented to schools in basin.
Jefferson County	36	2768	14	12	28	0	Rooney Road Recycling Facility - in 2015 collected over 350,000 pounds of household hazardous waste; participated in a number of public events on MS4 and floodplain management programs.
Town of Castle Rock	0	3639	329	8	1200	0	Annual outreach in Plum Creek basin at Spring Up the Creek event.

Notes: Castle Pines Metro District inspection and enforcement action data incorporated in Douglas County reporting; City of Castle Pines MS4 boundary predominately in the Cherry Creek Basin; only a very small portion is located in the Chatfield Watershed.

Progress to Promote Water Quality Protection

While funding sources remain very limited, the Authority’s collaborative role seeks out partnerships to support our water quality goals now and in the future. In 2015, donations and in-kind services from Authority members have supported progress towards development of the revised TMAL in the following ways:

- Adopted the Chatfield Watershed Plan (May 2015).
- Began model development for the Chatfield Watershed.
- Monitored Plum Creek to support modeling and nonpoint source identification.
- Collaborated with Chatfield Reservoir Mitigation Company (CRMC) regarding data collection to support upcoming future reservoir modeling efforts.
- Conducted outreach and education on Chatfield Reservoir water quality and the Chatfield Reallocation to the Colorado Foundation for Water Education (CFWE) at its June 2015 South Platte bike tour.
- Drafted amended Intergovernmental Agreement (IGA) and bylaws to strengthen the governmental structure of our organization.

Chatfield Watershed Plan

In 2015, the Authority adopted the Watershed Plan. While data collection and modeling are a priority in understanding water quality processes in the Reservoir and Watershed and developing the new TMAL, there is still a need to holistically address nonpoint source water quality issues in Chatfield Reservoir and its Watershed to protect water quality now and in the future.

- Proactive measures are required to protect Chatfield Reservoir for its designated uses for the long term. High quality surface water is essential to sustain growth and development in the watershed.
- Nonpoint sources potentially impact water quality. Nonpoint sources in the watershed may include degraded streambank erosion, runoff over agricultural lands, seepage from unmaintained septic systems located in the floodplain, and wildfire burn areas.

The Watershed Plan prioritizes the additional monitoring, data collection, studies, and projects, contingent on funding, to address water quality concerns. The draft Watershed Plan provides a starting place to define water quality issues, solve potential nonpoint problems, with the goal of promoting water quality for high value water uses; drinking water supplies, recreation, aquatic life, and agriculture.

Watershed Modeling

Our additional data collection efforts in the watershed are providing the basis for developing Chatfield Watershed Model tools to strengthen our understanding of TP fate and transport mechanisms, potential phosphorus sources, and phosphorus inputs to the Reservoir. The HSPF watershed modeling effort is well underway, with hydrologic calibration and validation phases nearing completion (Figures 21 and 22) and water quality calibration underway. The model anticipated completion is in 2016.

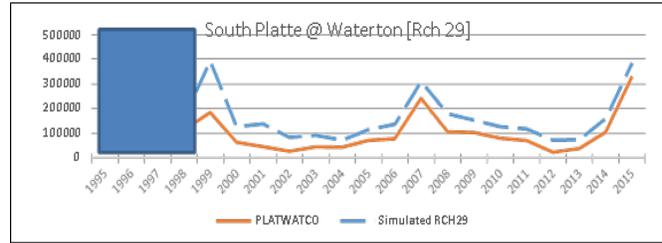


Figure 21 – Hydrologic calibration at South Platte River at Waterton is one example of the analytical rigor required to model the watershed.

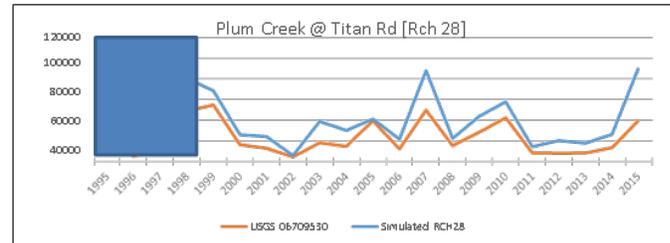


Figure 22 – Hydrologic calibration efforts along Plum Creek at Titan Road support modeling efforts.

Chatfield Reservoir Mitigation Company Collaborations

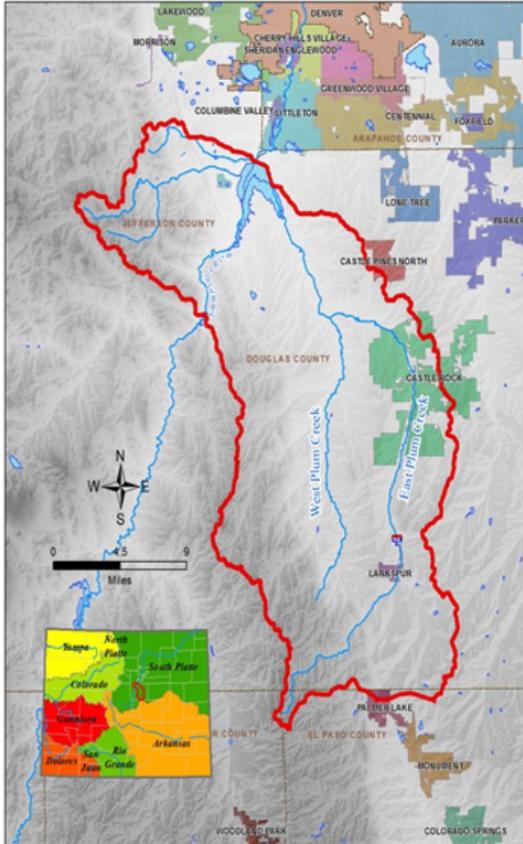
Collaborative discussions on data collection efforts with CRMC will also support the revised TMAL in the coming years. In 2015, the Authority memorialized its continued coordination with the CRMC through a Memorandum of Understanding (MOU) regarding reservoir monitoring and data collection to support joint water quality objectives in the Reservoir.

Chatfield Outreach & Education

The June 2015 Chatfield bike tour hosted by the CFWE was a big success. The Authority conveyed important information on Chatfield Reservoir and watershed water quality and the Chatfield Reallocation Project (Figure 23). This outreach activity coupled with the annual Spring Up the Creek event in Castle Rock remind stakeholders of the importance to promote water quality to protect beneficial uses.

PLANNING FOR INCREASED STORAGE & CHATFIELD WATERSHED HEALTH

Kevin Urie, Chatfield Watershed Authority



Chatfield Watershed and its Reservoir – The Reservoir is 15 miles southwest of Denver and spans Jefferson, Douglas and El Paso Counties. The Reservoir receives drainage from the South Platte River basin and Plum Creek Basin (321 square miles).

Chatfield Watershed and Reservoir Facts

- The Chatfield Reservoir and Dam were constructed in response to disastrous flooding in 1965.
- The beneficial uses of the Reservoir are drinking water, fisheries, recreation, and agriculture.
- Denver Water can use about 27,400 AF in Chatfield Reservoir, and uses its own water rights to fill and maintain water in the Reservoir
- The Chatfield Reallocation Project will add up to 20,600 AF more water in the Reservoir.
- The Chatfield Watershed Authority is coordinating with Reallocation on priority water quality efforts; Data collection, monitoring, modeling, and stream restoration.
- The recently adopted Chatfield Watershed Plan provides a roadmap with proactive measures necessary to protect future water quality conditions.
- Further data, studies and models will help us plan

The Chatfield Watershed Authority promotes protection of water quality in the Chatfield Watershed for drinking water supplies, recreation, fisheries, and other beneficial uses.



"We Protect the Water That You Enjoy"

www.chatfieldwatershedauthority.org

Figure 23 – CFWE Bike Tour Handout – Education and outreach to stakeholders on key Chatfield water quality/quantity issues.

Amended IGA and Governance Structure

While grant funding and strategic partnerships are important to support water quality improvements and Watershed Plan implementation, it has been widely recognized that a restructuring of the Authority Board to include elected officials will promote the needed

political support for collaborative water quality efforts. An amended and restated IGA is being formulated, along with new bylaws and governance structure. This restructuring will provide the political and fiscal decision-making to support water quality goals and long-term funding strategies. Anticipated completion in Spring 2016.



Chatfield Reservoir at Sunset *(Photograph by Thad Roan)*



We Protect The Water You Enjoy

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Bob Deeds, City of Littleton
David Van Dellen, Town of Castle Rock
Kevin Urie, Denver Water
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