Chatfield
Watershed Authority
2013 Annual Report

We Protect The Water You Enjoy

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

May 2014

www.chatfieldwatershedauthority.org

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

Dear Chatfield Watershed Stakeholders,

We are proud to present the 2013 Chatfield Annual Report. We are pleased to report that considerable progress was made on our focused effort for the year…stakeholder outreach and development of the Chatfield Watershed Plan!

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. In 2013, the growing season average concentration for chlorophyll-a and total phosphorus were compliant with the assessment thresholds under Control Regulation #73. The swim beach water quality was also below the State required E. coli standard protective of human health and remained open every day during the 2013 recreational season.

Even though the unprecedented September 2013 storm events brought record-breaking precipitation to the region, this was another dry year in the Chatfield watershed, with annual inflow of 56,642 acre-feet, well below the median of 100,860 acre-feet. During the last two years we have measured some of the lowest year to year inflows to Chatfield Reservoir since the 2002 drought.

Some noteworthy highlights in 2013 included the following:

- **Development of the Chatfield Watershed Plan is well underway with plan completion anticipated mid-2014.** In 2013, we conducted nine public stakeholder meetings, receiving input from communities, state and federal agencies, landowners, local governments, environmental organizations, and special districts about watershed issues and opportunities for improvement. Through this collaborative process, we have built partnerships, characterized water quality issues in the watershed and identified potential nonpoint source projects and developed an implementation plan. Nonpoint sources in the watershed include leachate from aged septic systems, degraded streambanks, and runoff from overgrazed agricultural lands and wildfire burn areas.
- **A conversation has begun on funding strategies to support the projects, studies and monitoring programs identified in the Chatfield Watershed Plan.** While grant funding and strategic partnerships are important to support Watershed Plan efforts, it is widely recognized that a larger, long-term funding source is needed. Therefore, it is prudent to start a conversation about other funding strategies to bolster funding resources for water quality improvements. A strategic evaluation of funding is recommended for the Chatfield Watershed, as without a greater revenue base it will be extremely challenging to secure sufficient grant funding and partnerships for a host of anticipated capital improvement water quality projects needed in the Chatfield Watershed.
- **The Authority continues collaborative efforts with the Chatfield Reallocation Water Providers on data collection, modeling and water quality improvement projects.** There is ongoing coordination with water quality aspects of the proposed Chatfield Reallocation water storage project. The 2013 release of the Final Feasibility Report and Environmental Impact Statement (FR/EIS) was followed by a 30-day public comment period. A Record of Decision is anticipated in 2014. While the Authority acknowledges certain risks and uncertainties associated with the Chatfield Reallocation as it relates to water quality and the phosphorus TMAL, the mitigation efforts proposed will also leverage common goals with the Chatfield Watershed Plan and TMAL development. Ongoing Authority coordination with the Chatfield Reallocation Water Providers will continue to focus on common priority efforts relative to water quality protection of the Chatfield Reservoir through data collection, reservoir modeling, stream restoration and wetlands creation.

Thank you for your continued support in the Chatfield Reservoir and its watershed.

Sincerely,

Chatfield Watershed Authority

Kevin Urie
Co-Chair

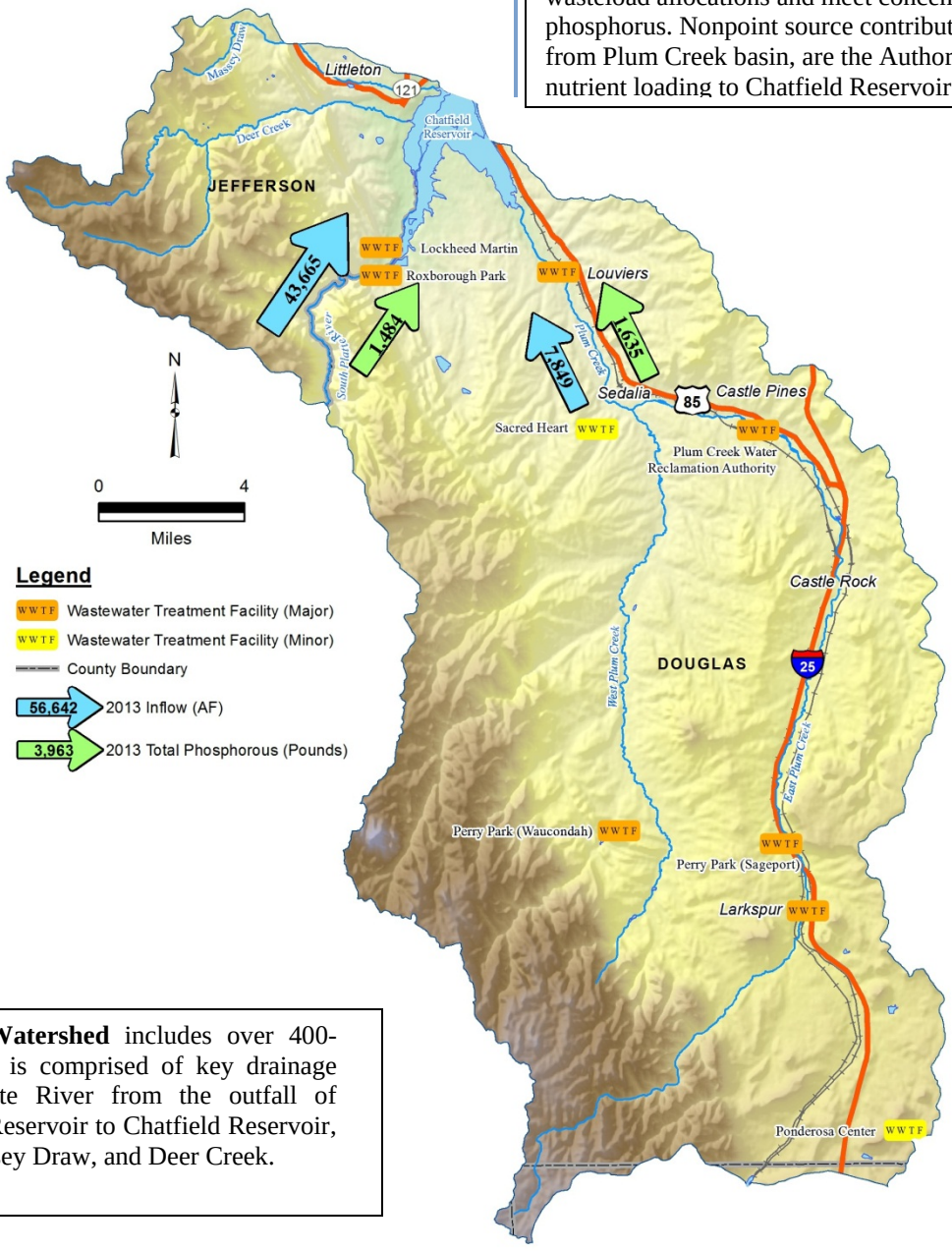
Tim Grotheer
Co-Chair

The ***2013 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.

Where Should Limited Resources be Focused to Reduce Phosphorus Loading to Chatfield Reservoir?

We need to focus on nonpoint source total phosphorus (TP) reductions, primarily in Plum Creek, to maintain the water quality of the watershed and the Reservoir.

In 2013, the South Platte River contributed 77% of the inflow and 37% of the TP loading to the Chatfield Reservoir. Comparatively, Plum Creek, which drains the majority of land within the watershed, contributed only 14% of the inflow and 41% TP contribution. Point sources, such as wastewater treatment plants (WWTPs), continue to operate well below their phosphorus wasteload allocations and meet concentration limits for phosphorus. Nonpoint source contributions of TP, predominately from Plum Creek basin, are the Authority's focus to reduce the nutrient loading to Chatfield Reservoir.



The Chatfield Watershed includes over 400-square miles and is comprised of key drainage areas South Platte River from the outfall of Strontia Springs Reservoir to Chatfield Reservoir, Plum Creek, Massey Draw, and Deer Creek.

Sources of data: ESRI, CDOT, CDSS, DRCOG, USGS, Authority

Reservoir Regulatory Compliance

In 2009, the Colorado Water Quality Control Commission (WQCC) revised the water quality standards for Chatfield Reservoir as follows:

- Chlorophyll-*a* (chl-*a*) standard of 10 µg/L, with an assessment threshold of 11.2 µg/L, 1 in 5 year allowable exceedance frequency.

- Total phosphorus (TP) standard of 30 µg/L, with an assessment threshold of 35 µg/L, 1 in 5 year allowable exceedance frequency.

These water quality standards are applicable to the growing season (July through September) concentration averages. The WQCC recognized the variability in water quality, setting assessment thresholds as the marker for determining long-term compliance.

The 2013 growing season observed concentrations for chl-*a* and TP are illustrated in Figure 1 and Figure 2, respectively.

"Our water resources are precious, so how we protect water quality in Chatfield Reservoir for drinking water supplies, fisheries, recreational and agricultural purposes is critical to our future."

~Kevin Urie, Co-Chair of the Chatfield Watershed Authority

The growing season average concentration for chl-*a* was 11 µg/L (Figure 1). This is above the 10 µg/L water quality standard for chl-*a*, but below the assessment threshold of 11.2 µg/L. The growing season average concentration for TP was 24.5µg/L (Figure 2). This is below the TP water quality standard of 30 µg/L and the 35 µg/L assessment threshold.

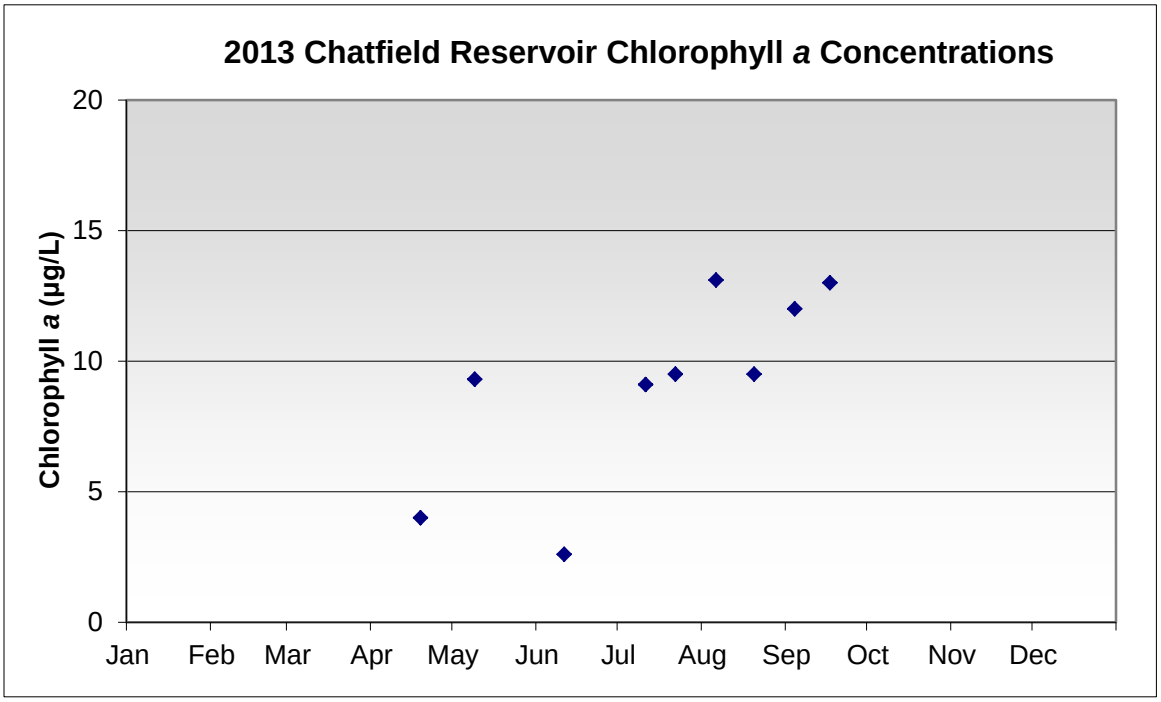


Figure 1 Observed 2013 Chlorophyll-*a* Concentrations in Chatfield Reservoir – The growing season average (July – September) was 11.0 µg/L.

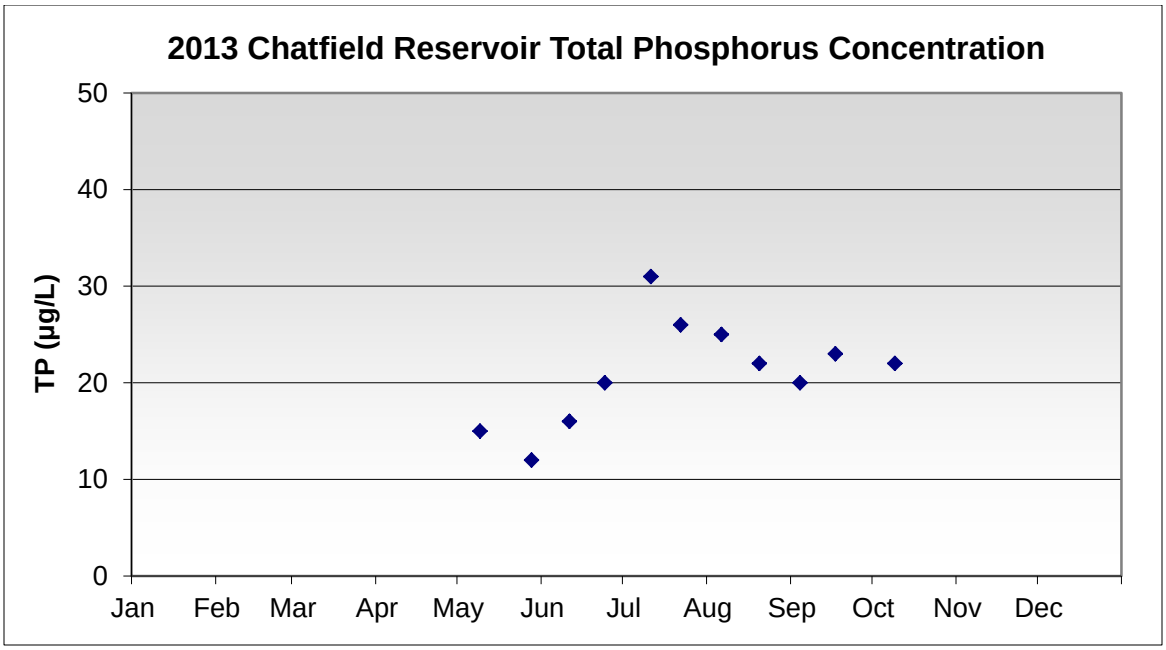


Figure 2 Observed 2013 TP Concentrations in Chatfield Reservoir – The growing season average (July – September) was 24.5 µg/L.

Elevated chl-*a* concentrations observed in September were likely in response to the higher TP observed in the earlier summer months (i.e. July), internal loading, among other factors. Blue-green algae (cyanobacteria species, Anabaena, Ankistrodesmus, and Aphanocapsa) reached counts between 100 and 400 per mL in July through early September. Anabaena concentrations peaked in mid-September reaching over 1,500 counts per milliliter. These algal species typically serve as good indicators of elevated chl-a measurements and are potentially a reference to the higher chl-*a* observations in September. In addition to elevated TP concentrations in the top, mixed layer of the Reservoir, increased internal TP loading was observed in late July through August, as shown in Figure 3. In July and August, TP concentrations were elevated at depths of 14 meters, measuring above 100 µg/L. In September, after reservoir mixing, the TP concentration at 14 meters reduced to approximately 60 µg/L

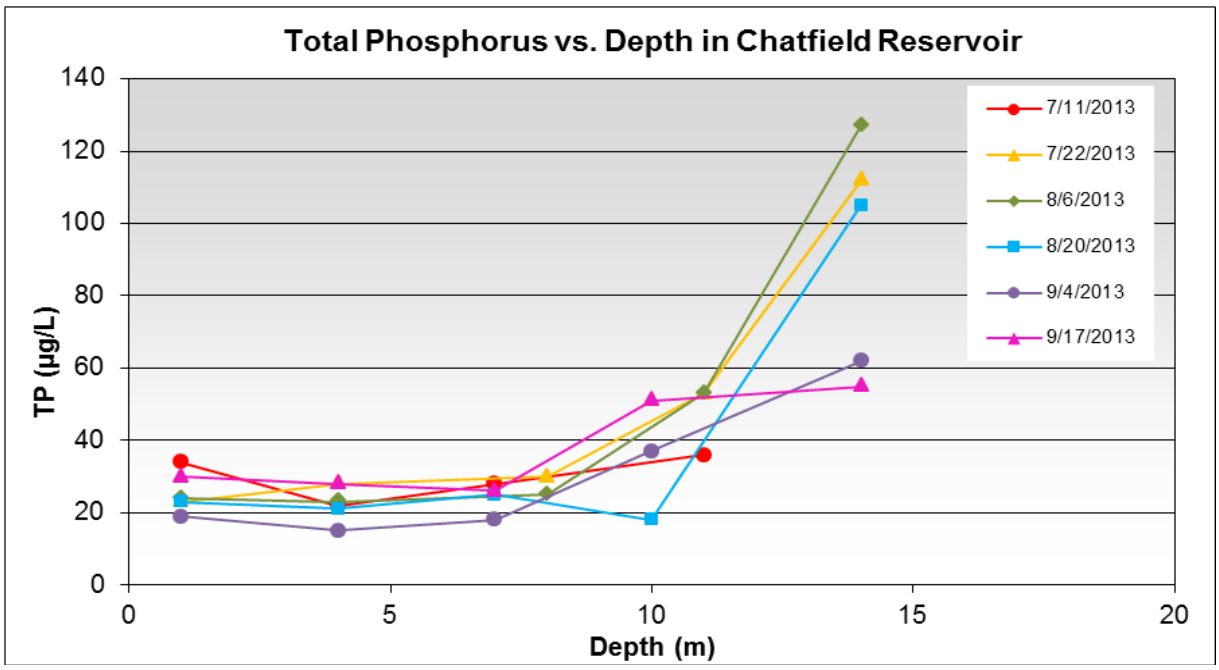


Figure 3 Total Phosphorus Water Column Depth Profile – Higher TP concentrations observed at depths of 14 meters indicate presence of internal phosphorus loading.

A historic review of compliance is illustrated in Figure 4 and Figure 5 for growing season average chl-*a* and TP concentrations, respectively. As shown in Figure 4, the chl-*a* growing season average concentration exceeded the 10 µg/L water quality standard in 2009, 2010, and 2013. In 2013, the chl-*a* growing season average of 11.0 µg/L was below the 11.2 µg/L assessment threshold. The assessment threshold was exceeded twice in the last five years; in 2009 and 2010. As for TP, the growing season averages have consistently complied with the regulatory requirements since the water quality standard was changed in 2009. These disparate results highlight the complex relationship between chl-*a* and phosphorus.

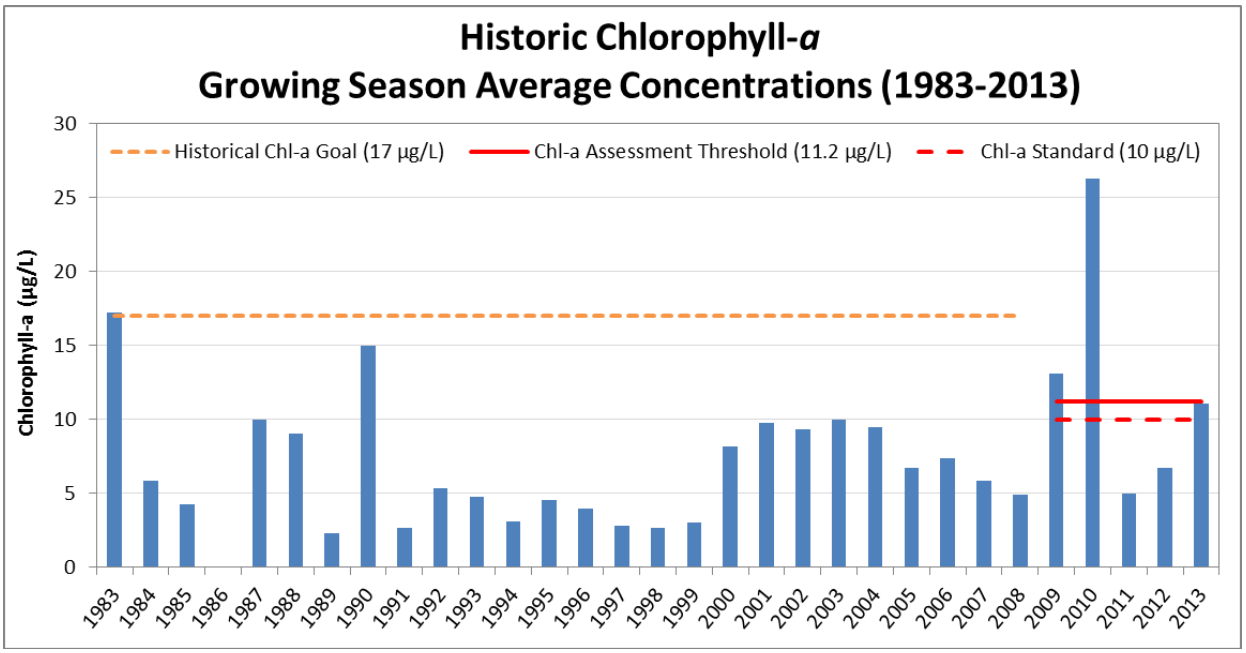


Figure 4 Historical Perspective of Chl-*a* Growing Season Compliance 1983 to 2013

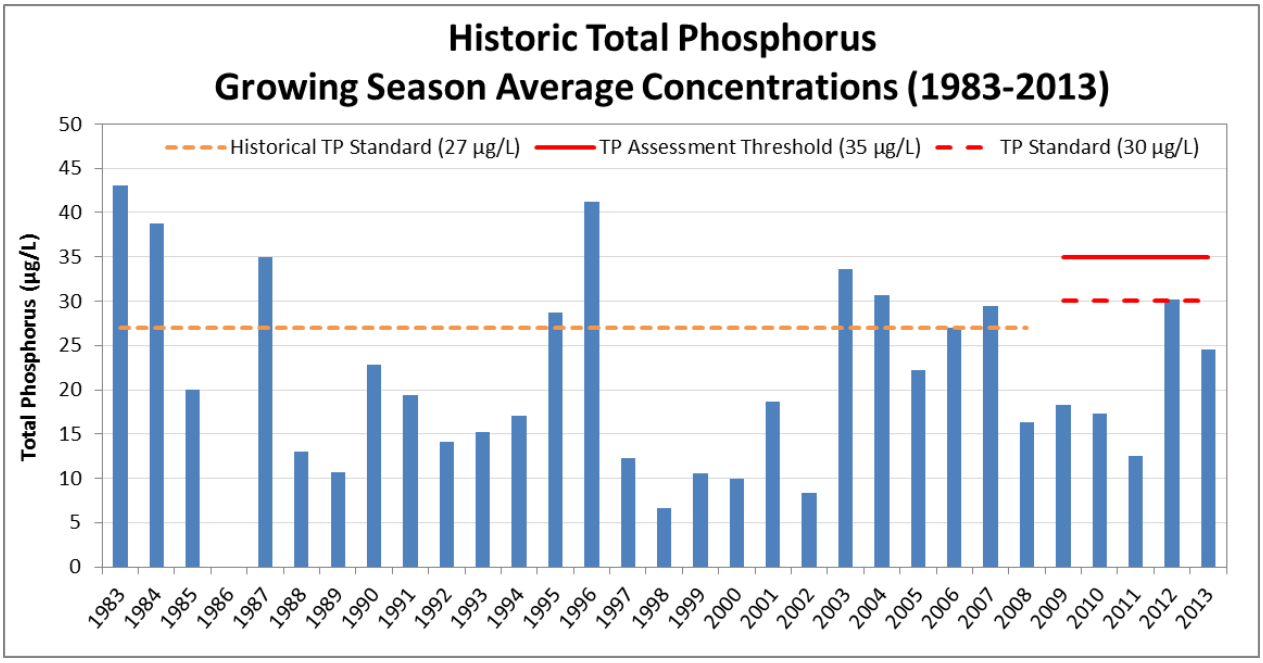


Figure 5 Historical Perspective of TP Growing Season Compliance 1983 to 2013

Compliance with the TMAL

The annual TP load is calculated from inflows, outflows and TP inputs and outputs to the Reservoir. 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 scientific basis for development of revised allocations, the original point and nonpoint source allocations totaling 59,000 pounds/year remain applicable (WQCC, 2009).

In 2013, the Authority's progress on the revised phosphorus allocations to meet the new TMAL was limited due to inadequate funding. Nonetheless, additional data collection in Plum Creek and the start of collaborative discussions on modeling and additional data collection efforts with Chatfield Reallocation Water Providers will support the reallocation of loads in the coming years.

2013 Flows

In 2013, the estimated inflow to Chatfield Reservoir totaled 56,642 AF (Figure 6), representing another dry year, similar to 2012, with about half of the median inflow into the Chatfield Reservoir (100,860 AF). The South Platte River contributed the majority of the inflow, 43,665 AF (77%). Plum Creek contributed 14% of the inflow, or 7,849 AF, to the Reservoir. Inflows are based on USGS monitored flow measurements from Plum Creek at Titan Road and South Platte River at Waterton Road (Colorado Division of Water Resources Gage). Other inflows include direct precipitation on the Reservoir (19.83 inches) and alluvial flows (2,684 AF). Flows from Deer Creek and Massey Draw have limited flow related to Plum Creek and the South Platte River, therefore they are not measured.

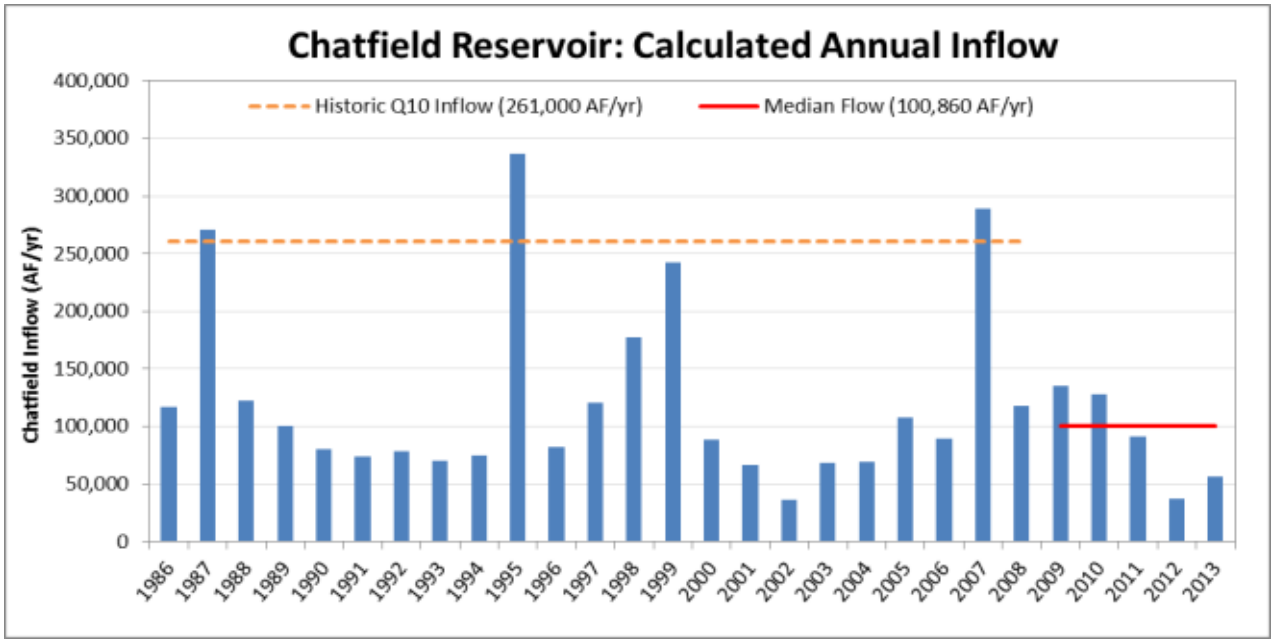


Figure 6 Historical Inflows to Chatfield Reservoir (1986 – 2013).

2013 TP Concentrations

Observed monthly TP concentrations of inflows and outflow are depicted in Figure 7. Plum Creek TP concentration was highest for all months of the year in comparison to measurements observed elsewhere in the watershed (Figure 7).

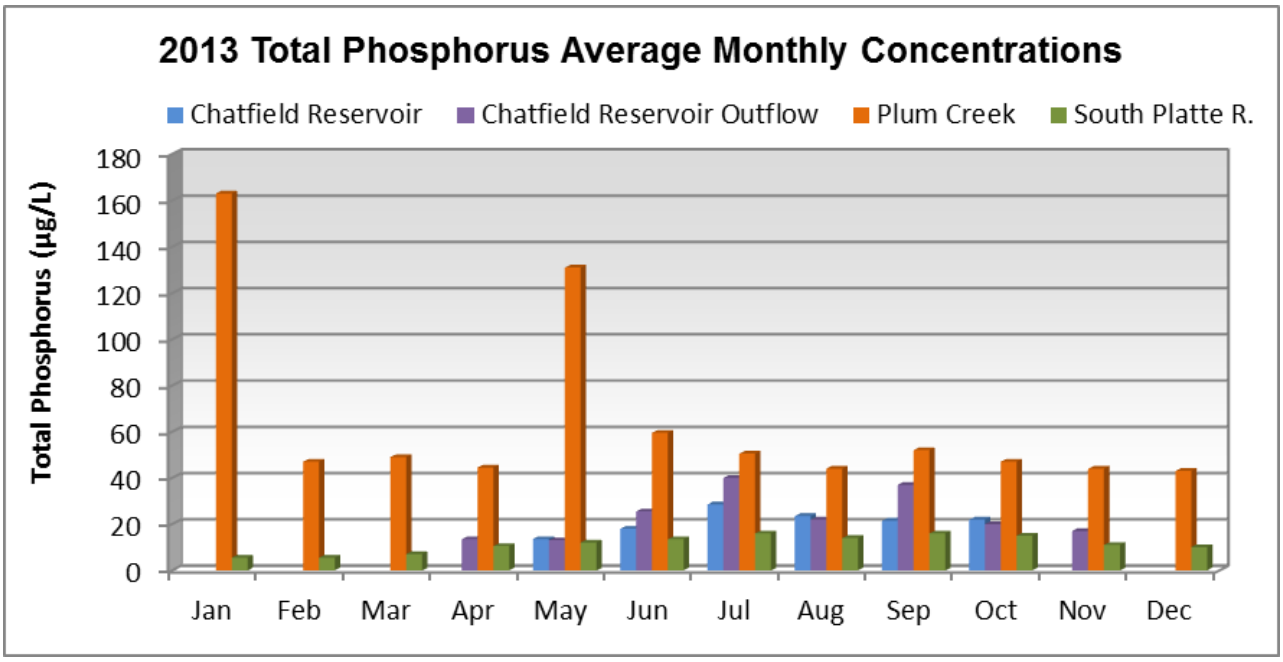


Figure 7 2013 Comparison of Average Monthly TP Concentrations

Calculated TP Load

The 2013 calculated TP load to the Reservoir was 3,963 pounds (Figure 8), below the TMAL of 19,600 pounds. The 2013 calculated TP load was the third lowest annual load since 1986.

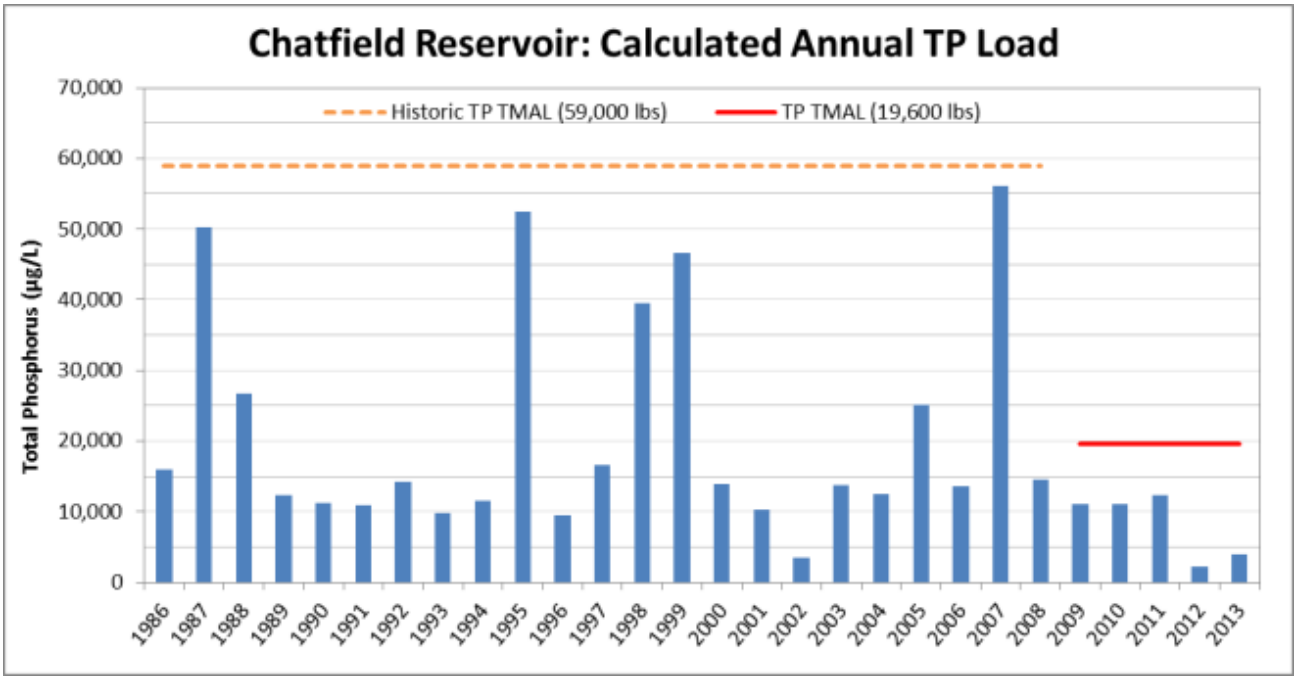


Figure 8 Calculated TP Load to Chatfield Reservoir

TP loadings from the South Platte River and Plum Creek were 1,484 lbs (37%) and 1,635 lbs (41%), respectively. Phosphorus loads were calculated based on monthly TP data collected at each inflow sampling location on the South Platte and Plum Creek.

A comparison of the inflow and TP load contributions from sources are presented in Figure 9. Plum Creek contributed slightly more TP loading to the Reservoir, even though the flow from the South Platte was approximately six times greater than that of Plum Creek.

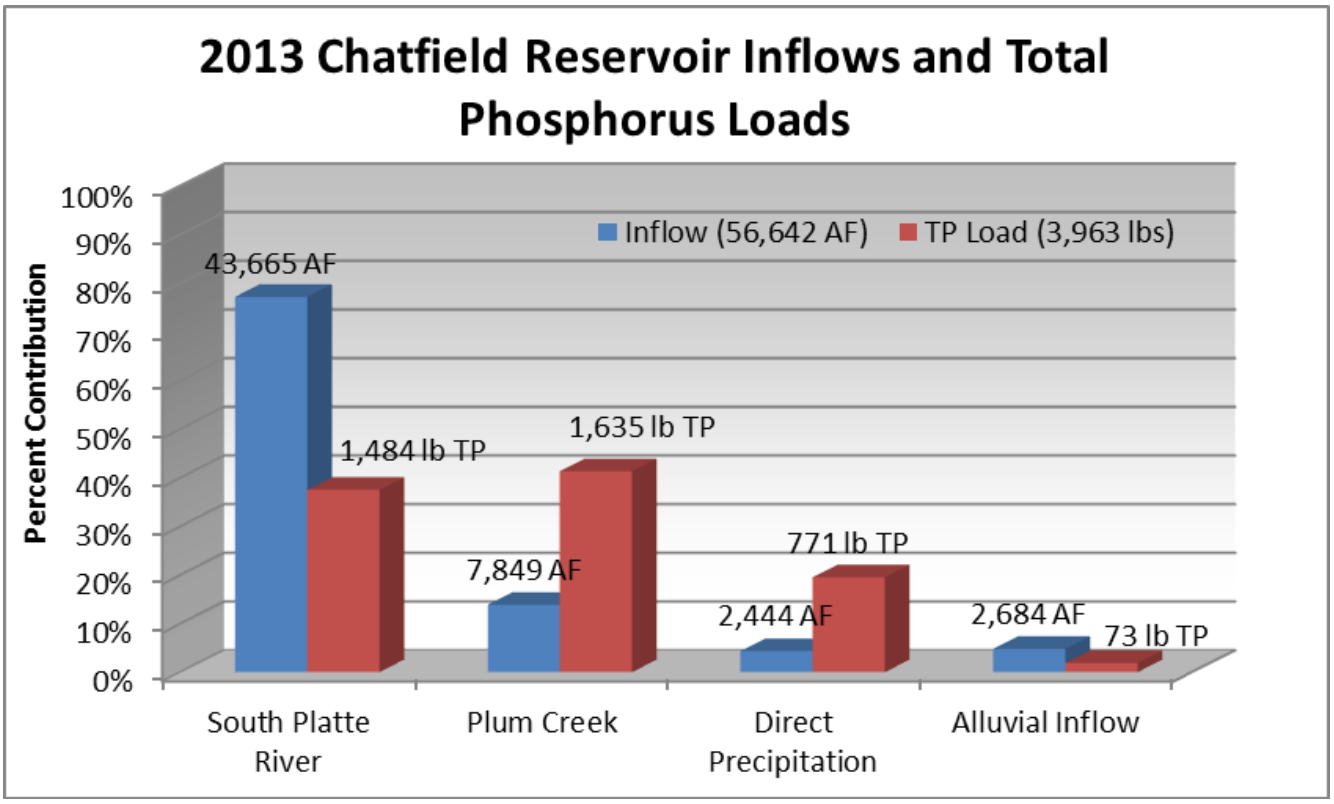


Figure 9 2013 Comparison of Chatfield Reservoir Inflows and TP Loads

Reservoir Monitoring Program

The Authority maintains a monitoring program to characterize Reservoir water quality and determine regulatory compliance. Surface water samples are collected at four locations as shown in Figure 10. These locations include:

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

The constituents (Table 1) are monitored monthly. During the growing season, Reservoir sampling is conducted twice monthly. To better understand reservoir dynamics, the Authority collects water column measurements, including the epiliminion and hypoliminion layers, at 3 meter depth intervals. All water quality data are available on the Authority's website, located at www.chatfieldwatershedauthority.org.

Figure 10 The Authority Conducts Monitoring at Four Sampling Locations to Determine Regulatory Compliance

Table 1 Chatfield Reservoir Water Quality Monitoring Parameters

Field Parameters	Nutrients	Biological	Wet Chemistry
Temperature, degrees C	Chl-*a*, µg/L	e. Coli (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 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 2013, the Authority continued the watershed monitoring efforts in the Plum Creek basin through voluntary sampling efforts by the Plum Creek Water Reclamation Authority (PCWRA) and the Town of Castle Rock. Ten stations, illustrated in Figure 11, are sampled monthly. The Plum Creek 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, runoff from overgrazed agricultural lands, runoff from wildfire burn areas, and erosion from degraded streambanks. Further data collection is needed, contingent on available resources, to identify and quantify phosphorus sources in the Plum Creek watershed.

The 2013 Plum Creek water quality observations included the following:

- *E. coli* measurements were higher at PC-9.5 (Plum Creek at Sedalia) but below the water quality standard of 126 organisms/100 mL (Figure 12), assessed as the geometric mean.
- Similar to the data trend for *E.coli*, average TP concentration generally increased from upstream to downstream, with the highest concentration at Plum Creek at Sedalia (172 µg/L). TP concentration decreased slightly to 106-µg/L just upstream of the Reservoir, at Plum Creek at Titan Road. (Figure 13).
- Average TSS concentrations (an indicator of sediment) were highest at Plum Creek at Sedalia (97 mg/L), downstream of where the East and West fork of Plum Creek enter the mainstem Plum Creek (Figure 14).
- Variable correlation (R^2) was calculated between TSS and TP along various reaches of Plum Creek drainage (Table 3). Stronger correlations at the confluence of East Plum Creek near the confluence with Plum Creek (EPC-11.1), with $R^2 = 0.81$, and downstream at Plum Creek at Sedalia (PC-9.5), $R^2 = 0.97$, may reflect the effects of eroded streambanks which are known to be present in these areas with soils naturally higher in phosphorus. The TP vs TSS relationship will be further evaluated as monitoring in Plum Creek basin continues.

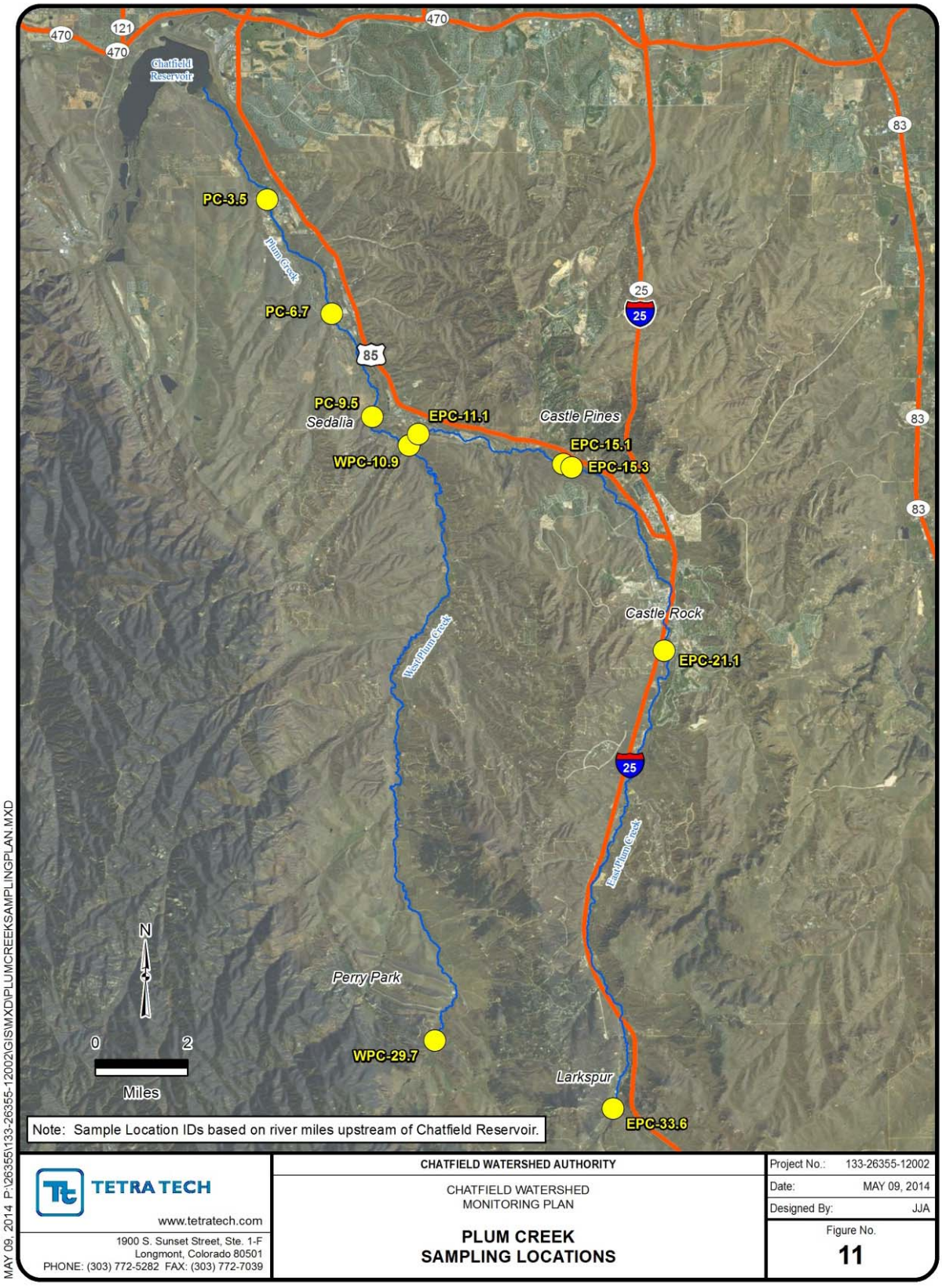


Figure 11 2013 Plum Creek Monitoring Locations

Table 2 Plum Creek Analyte List

Field Parameters	Nutrients	Biological	Wet Chemistry
Temperature, degrees C*	Total Phosphorus, µg/L	e. Coli (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		

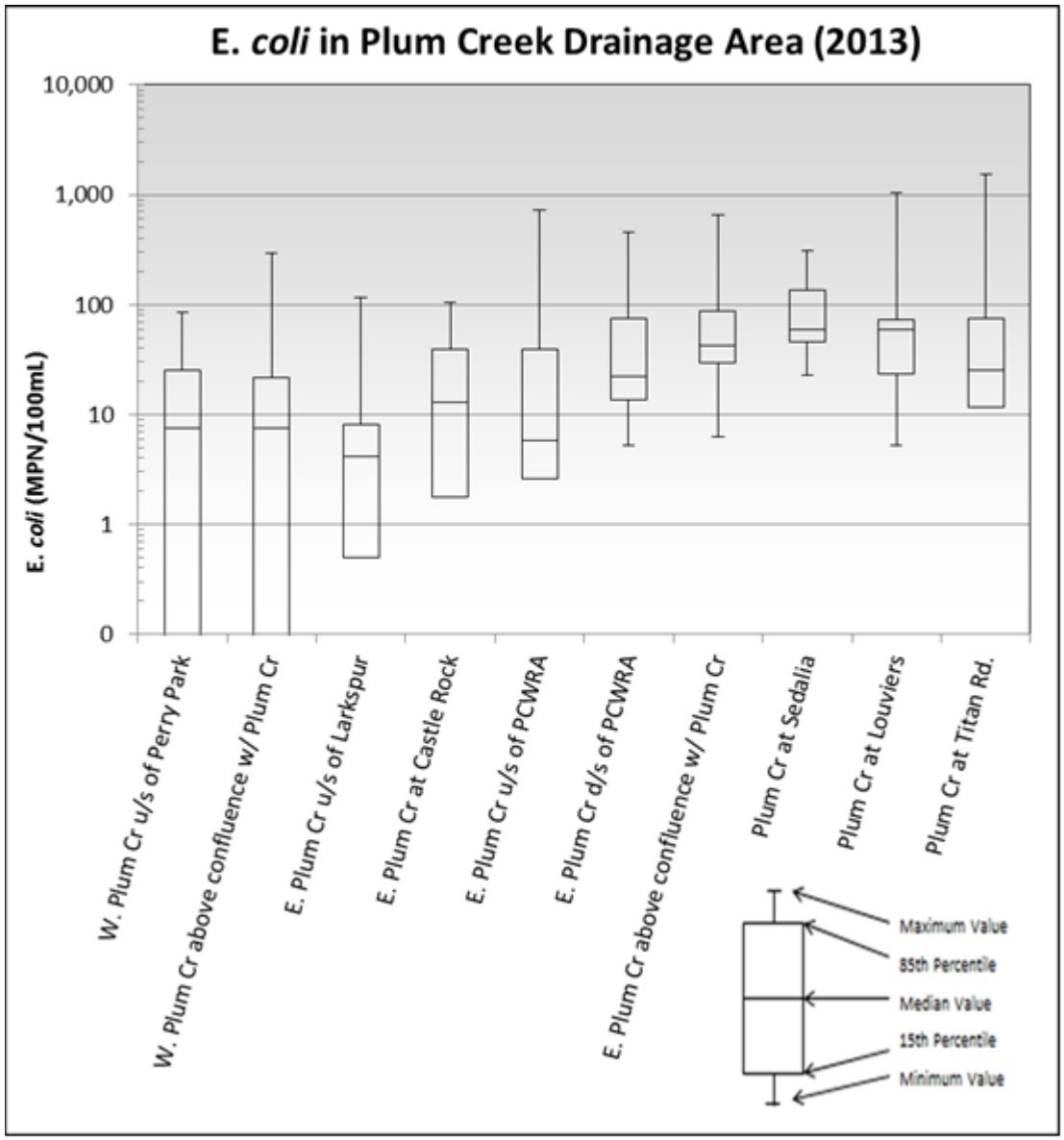


Figure 12 2013 *E. coli* in the Plum Creek Basin

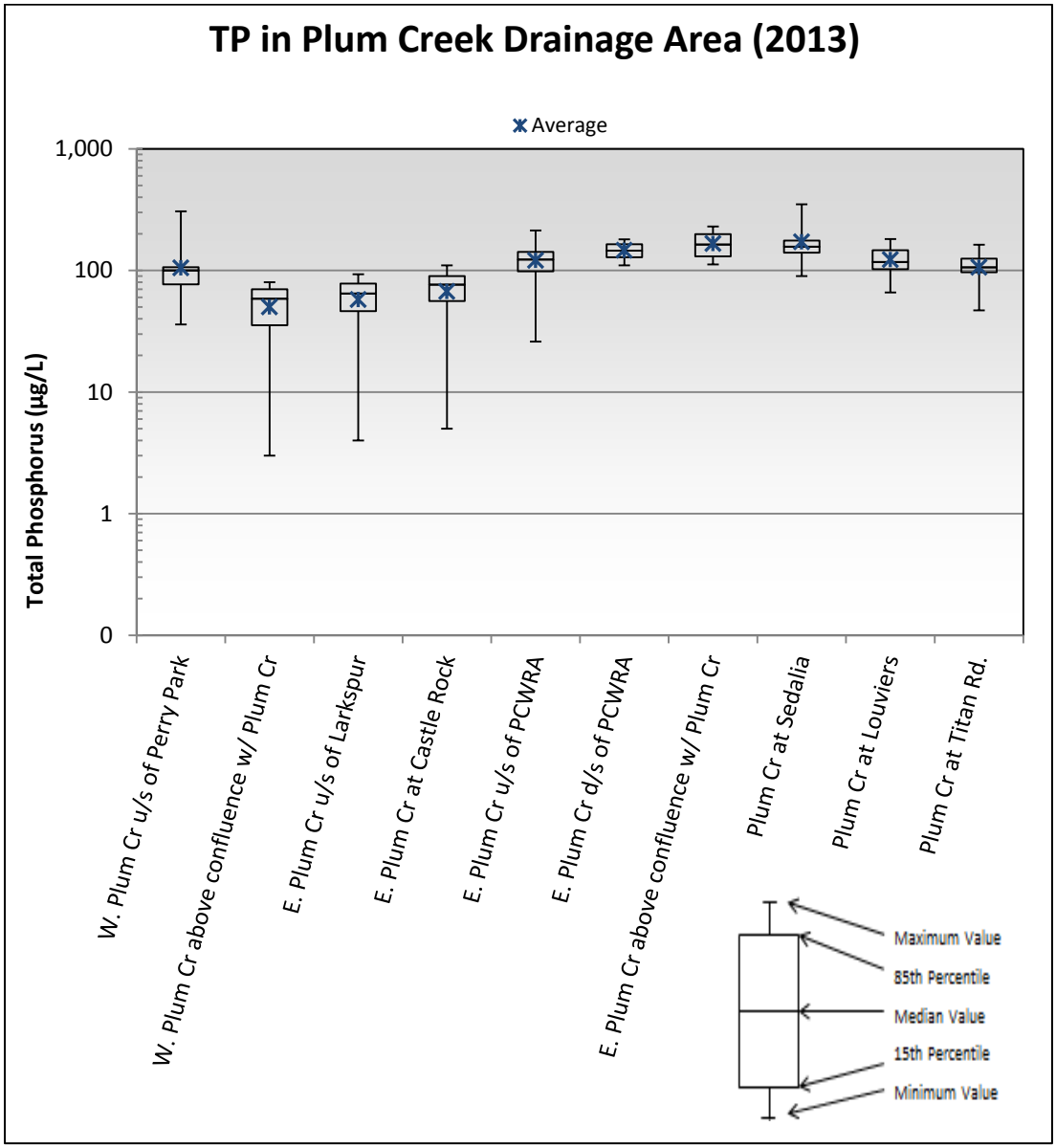


Figure 13 **2013 TP Variability in the Plum Creek Basin**

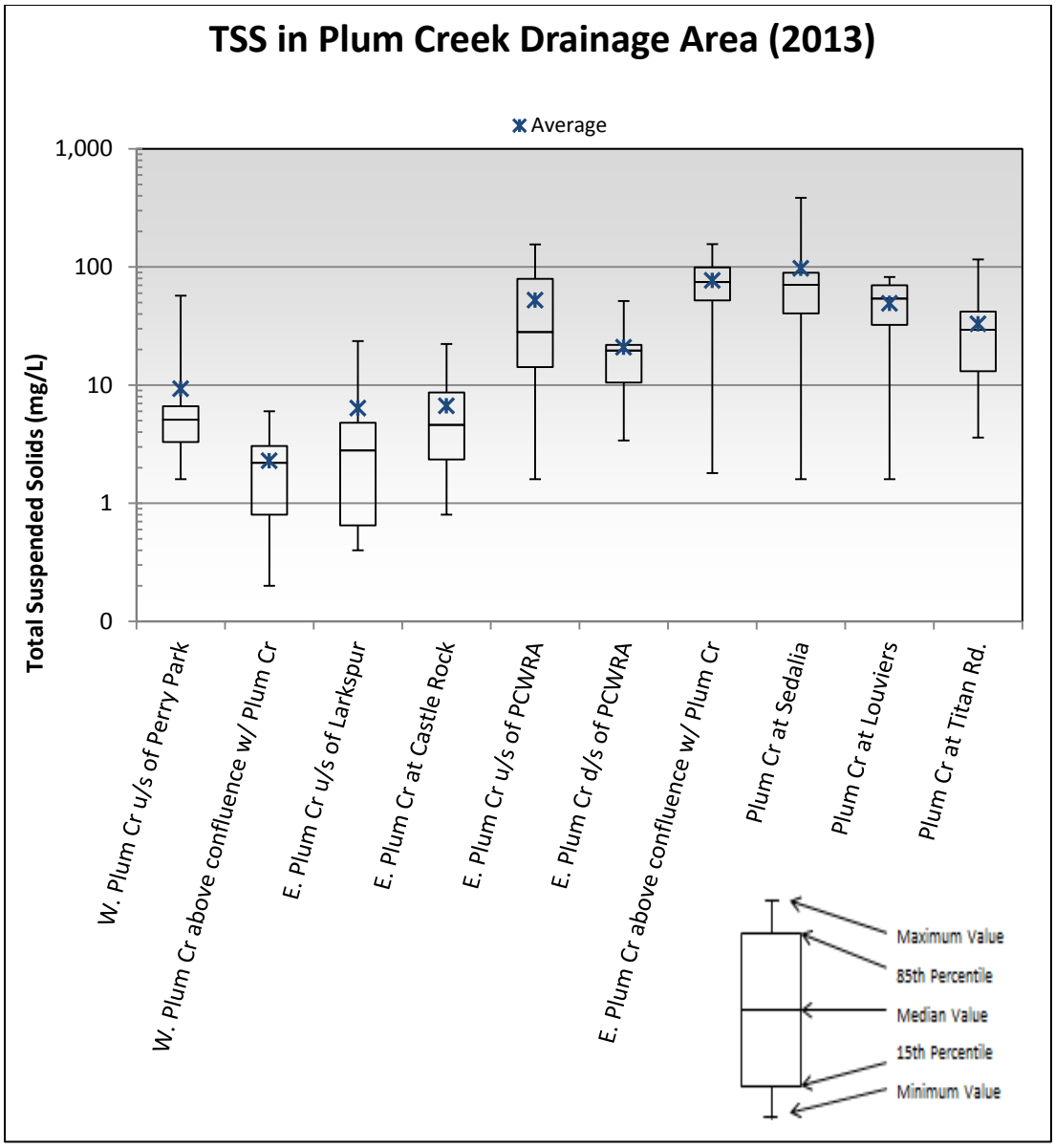


Figure 14 2013 TSS Concentrations in the Plum Creek Basin

Table 3 TP vs TSS Correlation Values (R^2) Along Reaches of Plum Creek (4/26/12-12/11/13)

East Plum Creek		West Plum Creek		Plum Creek	
Site	R^2	Site	R^2	Site	R^2
E. Plum u/s of Larkspur	0.00	W. Plum u/s of Perry Park	0.74	Plum Cr at Sedalia	0.97
E. Plum Cr at Castle Rock	0.02	W. Plum at confluence with Plum Cr	0.55	Plum Cr at Louviers	0.49
E. Plum u/s of PCWRA	0.34			Plum Cr at Titan Rd, u/s of Reservoir	0.44
E. Plum d/s of PCWRA	0.04				
E. Plum, confluence with Plum Cr	0.81				

Wastewater Treatment Plants

Table 4 summarizes the thirteen wastewater treatment plants (WWTPs) in the Chatfield watershed and their respective TP wasteload allocations. In 2013, reported TP discharges from WWTPs were 2,169 pounds or about 29% of the allowable wasteload allocation of 7,533 pounds.

WWTPs monitor their effluent discharges for compliance with their individual permits which include effluent limits established for the Chatfield Watershed in Regulation #73. During 2013, the discharges continued their record with every discharger in the Chatfield Watershed complying with their TP concentration limits and TP wasteload allocation in 2013.

Table 4 2013 Phosphorus Wasteloads from WWTPs in the Chatfield Watershed

Allocation Sources	TP Wasteload Allocation (pounds)	2013 TP Loading from WWTPs* (pounds)
Plum Creek Water Reclamation Authority	4,256	2,049.1
Perry Park Water and Sanitation District: Waucondah	365	68.6
Perry Park Water and Sanitation District: Sageport	73	25.3
Lockheed Martin Space Systems Company	1,005	16.9
Town of Larkspur	231	2.1
Centennial Law Enforcement Foundation	30[5]	6.1
Centennial Water and Sanitation District	20	0
Ponderosa Center	75[3]	0.1
Louviers Water and Sanitation District	122	0
Roxborough 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
South Santa Fe Metro District	21[6]	No discharge[1]
Reserve Emergency Pool	52	Not used
Total Phosphorus Wasteload	**7,533**	**2,168.8**

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.

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. Two Site Applications and one CWP Amendment were brought forth in 2013, requesting Authority review and approval.

1. Dominion Water and Sanitation District Clean Water Plan Amendment

Dominion Water and Sanitation District, in conjunction with Roxborough Water and Sanitation District, submitted a Clean Water Plan (CWP) Amendment on May 22, 2013. On June 26, 2013 the Authority submitted its recommendation for approval of the CWP amendment to the Colorado Department of Public Health and Environment, Water Quality Control Division (Division) specifically approving the following:

- An interim reclaimed water facility near Titan Road, which will provide reclaimed water for use.

The CWP remains unchanged in other regards. The Roxborough WWTP and the Roxborough/Dominion CWP service areas remain as previously approved in the 2006 joint CWP Amendment, and the Roxborough WWTP (main WWTP) will provide long-term wastewater service to these service areas.

2. Lagae North Lift Station Site Application

On June 24, 2013, MSK Consulting, LLC, on behalf of applicant R.I Management of Tulsa, Inc., submitted a Site Application for the Lagae North Lift Station. As proposed, the lift station will replace the Lagae Ranch Interim Lift Station, located in the Cherry Creek watershed, and convey wastewater to the PCWRA for treatment. The lift station capacity is 114,000 gallons per day and the applicant proposed Castle Pines North Metro District (CPNMD) to own and operate the lift station.

The Authority did not initially have adequate responses on fundamental issues regarding operation by CPNMD, the new sewer line proposed, and wastewater service by PCWRA. At its July 24, 2013 Authority Board meeting, the application was suspended until these key issues were addressed. The Board also raised concerns about the inadequate review and coordination between the Chatfield Basin Authority and Cherry Creek Basin Water Quality Authority, since the application spanned both watersheds and both agencies have 208 Management responsibilities.

Over the ensuing months, the outstanding issues were addressed to the satisfaction of the Authority and on November 21, 2013 the Authority recommended approval of Lagae North Lift Station to the Division.

3. Titan Water Reclamation Facility Site Application

Dominion Water and Sanitation District submitted a Site Application for the Titan Water Reclamation Facility on August 26, 2013. The hydraulic capacity of the proposed reclamation facility is 0.2 MGD. The selected alternative is a rotating biological contactor (RBC)/activated sludge system followed by tertiary filtration and UV disinfection. The water reclamation facility

is designed to meet the preliminary effluent limitations (PELs), including a phosphorus limit of 1.0 mg/L (30-day average). A 30-acre site will store approximately 110 acre-feet of reclaimed water during the non-irrigation season. The Authority's Technical Review Committee (TRC) reviewed the site application, engineering report and appendices in August 2013. Authority approval of the Site Application was provided to the Division on September 25, 2013.

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. 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 15 depicts current MS4 boundaries within the Chatfield Watershed. Currently, none of Douglas County's MS4 Permit Boundary is within the Chatfield Watershed, as the 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 2013 MS4 permit inspection and enforcement metrics and education and outreach activities are provided in Table 5.

"Our challenge and focus for the next decade will be on reducing nonpoint source pollutants and generating additional funds to implement important nonpoint projects in the Watershed.

Through collaboration and partnerships, the Authority will continue to promote water quality protection."

~ Tim Grotheer, Co-Chair of the Chatfield Watershed Authority

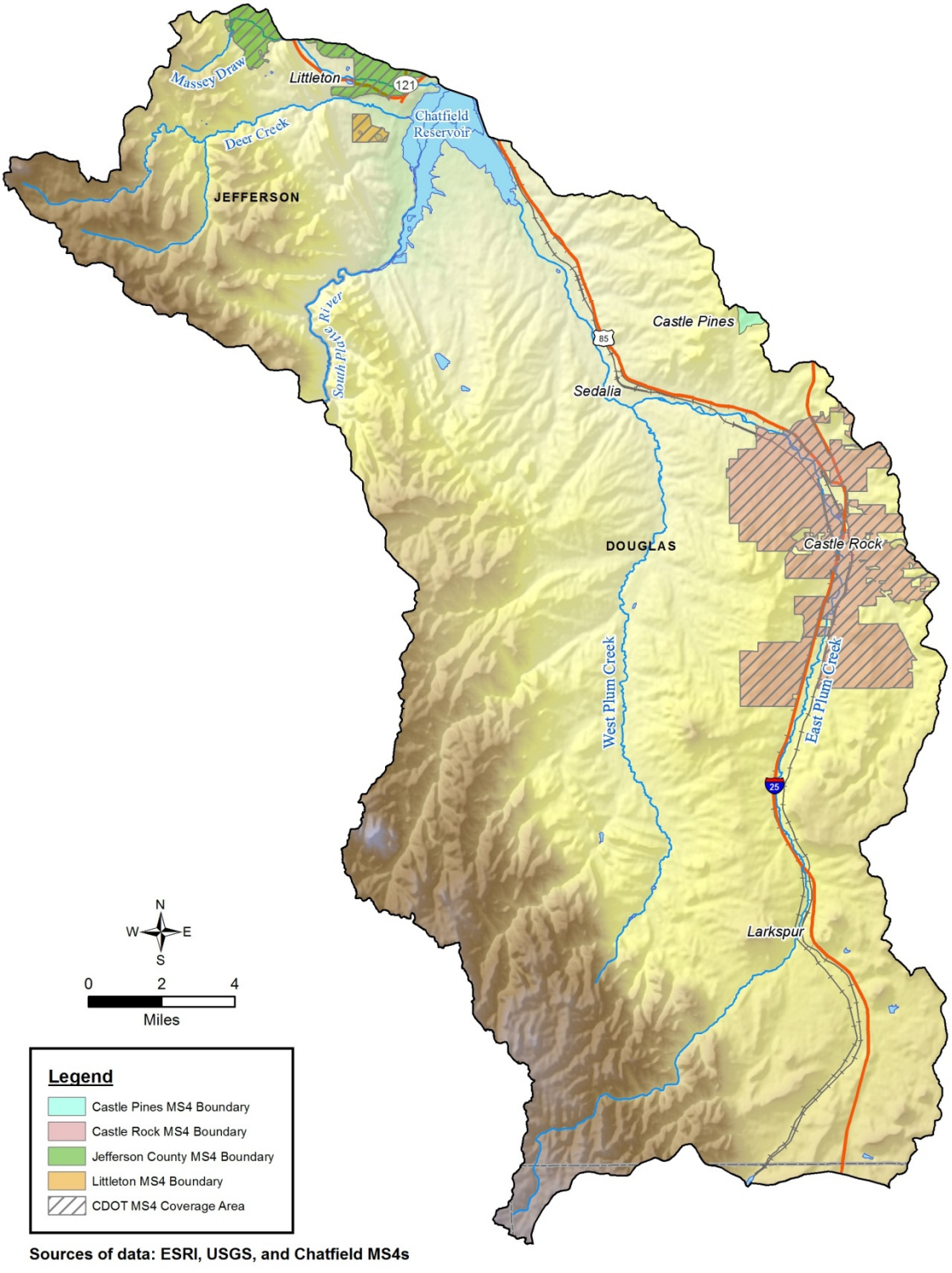


Figure 15 2013 MS4 Boundaries in the Chatfield Watershed

Table 5 Summary of 2013 MS4 Actions

Land Use Agency	Permit Inspection Actions			Permit Enforcement Actions			Education and Outreach
	Illicit Discharges	Construction	Post Construction	Illicit Discharges	Construction	Post Construction	
Douglas County	15	GESC – 753 DESC*-371	29	0	145 GESC-V 1-GESC-SW 72-DESC*-V 0-DESC*-SW	0	Participated/co-sponsored Spring Up the Creek; Presented to 3rd graders and elementary school in basin
Jefferson County	4	1871	38	4	190	0	Hazardous Materials Recycling Roundup; Public events to reach diverse audiences for MS4 and floodplain management programs
Town of Castle Rock	218	2585	214	11	834	1	10th Annual Spring Up the Creek (Fig 16)
Castle Pines Metropolitan District	NA**	NA**	NA**	NA**	NA**	NA**	Partner at Spring Up the Creek Clean Up Chemical Round up with Castle Rock and Douglas County
City of Castle Pines***	0	0	0	0	0	0	Chemical Roundup; Educational material through Douglas County CLEAR
City of Littleton	18	11	4	0	0	0	World Water Monitoring Day (Fig 17)

Abbreviations: DESC (Drainage, Erosion, and Sediment Control) program; GESC (Grading, Erosion and Sediment Control) program; SW (stop work order); V (violation)

* DESC numbers only reflect June through December 2013. This data was made available due to new permitting process.

** 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.

Figure 16 – Castle Rock's 10th Annual "Spring Up the Creek" - In only two hours, 226 volunteers picked up 160 bags of trash, 54 bags of recyclable materials and various pieces of debris, were removed from East Plum Creek, Sellars Gulch and tributary streams in the Meadows.

Figure 17 – World Water Monitoring Day in Littleton, CO (October 2013)

September 2013 Storm Highlights

(Excerpts from Town of Castle Rock, CO)

Total rainfall during the historic September 2013 rain storms varied in the Chatfield watershed. The highest daily streamflow measured at Plum Creek at Titan Road was on September 13, 2013, measuring 201 cfs. Areas around Castle Rock, near The Meadows, saw as much as 5 inches of rain, while rain in other areas measured less than 3 inches. Minor flooding of Sellars Gulch and East Plum Creek occurred. East Plum Creek typically flows at 10 to 15 cubic feet per second this time of year, but during the storm, the peak was 1,000 cubic feet per second.

Throughout Castle Rock, stormwater ponds, which are normally dry, filled up to 10-year volumes. Some ponds in The Meadows reached 100-year volumes. Small waterways in neighborhoods also ran at nearly full capacity. This is what these systems are designed to do. Ponds hold back flood waters and slowly release this to prevent downstream flooding. Stream channel improvements also slow the flow of water and prevent erosion that protects nearby roads and trails.

Castle Rock removed and disposed of approximately 2,000 cubic yards of sediment from detention ponds and minor drainageways following the September storm event.

Storms like these remind us why properly constructed and maintained stormwater infrastructure – like pipes, ponds and channel improvements – is so critical and highlight the importance of a well-managed stormwater program for protecting life, property and the environment.

2013 Regulated Stormwater Projects Mitigated Impacts from Urban Runoff

In 2013 the Town of Castle Rock constructed these stormwater improvement projects in the Chatfield watershed to mitigate impacts from urban runoff.

Plum Creek Stabilization Project
Town of Castle Rock

The East Plum Creek Stabilization Project at Plum Creek Parkway was a joint project with the Public Works Department to install a grade control structure following the Plum Creek Parkway interchange project. The improvements included steel sheet piling and a grouted boulder drop structure immediately down-stream of the Plum Creek Parkway bridge, as well as a grouted boulder wall under the bridge.

New grade control structure provides protection and enhancement to constructed wetlands along East Plum Creek

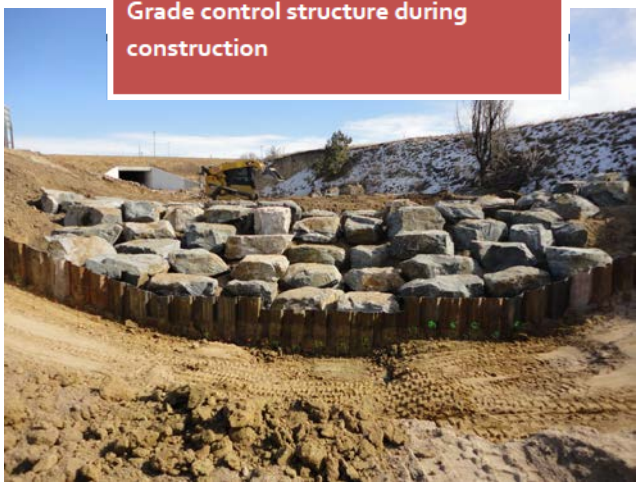
The project was required to protect the new bridge from scour and to enhance the surrounding wetlands and riparian mitigation site. The improvements prevent sediment transport and enhance wetlands which reduces phosphorus loading in the Watershed.

Construction began in January 2013 and was completed in May 2013. The construction cost for this project was approximately $250,000.

Completed project along East Plum Creek at Plum Creek Parkway

Hangman's Gulch Trail and Channel Improvements
Town of Castle Rock

The Hangman's Gulch Trail and Channel Improvement Project was jointly funded by the Town of Castle Rock Stormwater Enterprise Fund and the Parks and Recreation Department. This joint effort integrates the goals of both the Trails and Transportation Master Plan and the Storm Water Master Plan. The project includes six grouted drop structures and six concrete check structures along the channel to mitigate active down cutting of the creek bed and protect adjacent property, roadways, trails and utilities.



Grade control structure during construction

The project provides a water quality benefit in the Chatfield Watershed by minimizing stream bank erosion and enhancing riparian vegetation along the stream corridor.

The total construction cost was approximately $1.7 million including $700,000 for stream channel improvements with 1.3 miles of new trail that provides a connection from the East Plum Creek Trail to the Town's Recreation Center.

Grade control protects the railroad, trail and native habitat along Hangmans Gulch

Progress to Promote Water Quality Protection

In 2013, the Authority continued in its mission to "*promote protection of water quality in the Chatfield Watershed for drinking water supplies, recreation, fisheries, and other beneficial uses.*" Our extensive coordination with watershed stakeholders and partnerships with members focused on two areas;

1. **Chatfield Watershed Planning –** Stakeholder outreach and development of the Chatfield Watershed Plan.

2. **Collaboration with Chatfield Reallocation Water Providers –** Began coordination efforts on additional monitoring, data collection, and modeling.

> **"Looking ahead, our primary focus is to protect the water quality in the Chatfield Reservoir through on-going planning and implementation of water quality projects."**
>
> **~Kevin Urie, Co-Chair of the Chatfield Watershed Authority**

Chatfield Watershed Plan – Section 319 Grant

In 2013, the Authority conducted extensive outreach with stakeholders, through its watershed planning process. A facilitated stakeholder process was conducted to promote partnerships and develop a sustainable plan. Over the course of twelve months, nine public stakeholder meetings were conducted throughout the watershed. The meetings focused on:

- Outreach and educating stakeholders on the watershed,
- Recognizing watershed issues and concerns,
- Collecting information and data to characterize the watershed,
- Identifying and prioritizing potential implementation measures to improve water quality, and
- Identifying and prioritizing potential funding and technical resources to evaluate the feasibility and effectiveness of implementation measures.

To serve as a foundation of the Watershed Plan and direct future focus, a shared vision and mission were established by stakeholders:

Vision: "Protect waters of Chatfield Reservoir and throughout the Chatfield Watershed that support water supplies, aquatic life, recreation, and agriculture."

Mission: "Through stakeholder collaborative efforts, prioritize activities to maintain and measurably improve water quality in Chatfield Reservoir and the watershed for their designated uses."

Three key components of the watershed planning effort are:

1. Educating the public on watershed information, partnerships, and watershed priorities.
2. Addressing potential water quality issues in the watershed and next steps to resolve potential water quality concerns.
3. Addressing funding shortfalls by starting a conversation on funding strategies to support the projects, studies and monitoring programs under consideration in the Chatfield Watershed Plan. Grant funding and strategic partnerships are important to

support Watershed Plan efforts, however, it is widely recognized that a larger, long-term funding source is needed for capital improvement water quality projects in the Chatfield Watershed.

The Chatfield Watershed Plan is funded in part through a Section 319 grant from the Colorado Department of Public Health and Environment. The Watershed Plan is being developed in accordance with US EPA's "Nine Elements of a Watershed Plan". The Watershed Plan and identifying funding strategies to implement the water quality efforts in the Plan will continue to be a priority in 2014. Plan completion is anticipated mid-2014.

Modeling and Data Coordination with Chatfield Reallocation Water Providers

In 2013, the Authority began collaborating with the Chatfield Reallocation Water Providers about additional data collection and model development to support TMAL development and meeting potential reporting requirements of the Chatfield Reallocation water storage project.

The release of the Final Feasibility Report and Environmental Impact Statement (FR/EIS) was followed by a 30-day public comment period. A Record of Decision is anticipated in 2014.

As proposed, the reallocation of water storage in the Reservoir could increase the water level up to 12 feet during non-flood conditions. The water level fluctuations can increase in both magnitude and frequency. Water quality effects related to the increased water levels, water level fluctuations in the Reservoir and internal nutrient loading, are uncertain. Mitigation measures are proposed by the Water Providers to address potential water quality impacts, including:

- Wetlands creation along the South Platte River and Plum Creek,
- Stream restoration along Plum Creek,
- Shoreline stabilization,
- Reservoir operations plan,
- Data collection, monitoring, and modeling.

The Authority acknowledges certain risks and uncertainties associated with the Chatfield Reallocation as it relates to water quality and the phosphorus TMAL. However, the mitigation efforts proposed also provide opportunities to collaborate on water quality efforts that are a priority for the Authority, including data collection, modeling, stream restoration and wetlands creation. This collaborative dialogue will continue to be a priority in 2014.

CHATFIELD WATERSHED AUTHORITY
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We Protect The Water You Enjoy

Authority Members:

Patrick O'Connell, Jefferson County
Jim Dederick, Douglas County
Bob Deeds, City of Littleton
David Van Dellen, Town of Castle Rock
Kevin Urie, Denver Water
Matt Krimmer, Town of Larkspur
Larry Moore, Roxborough Water & Sanitation District
Diana Miller, Louviers Water & Sanitation District
Martha Hahn, Plum Creek Water Reclamation Authority
Father Ed Kinerk, Sacred Heart Retreat
Paul Dannels, Castle Pines Metro District
Tim Grotheer, Centennial Water & Sanitation District
Diana Miller, Perry Park Water & Sanitation District
Ronda Sandquist, Jackson Creek Metropolitan District
Doug Lohrey, Ponderosa Retreat & Conference Center
Bob Mattucci, South Santa Fe Metro District
Harold Smethills, Dominion Water & Sanitation District
Steve Miller, Centennial Law Enforcement Facility
Chris Pacetti, Ken Caryl Ranch Master Association
Sean Lieske, Aurora Water
Rick McLoud, Chatfield Reallocation Water Providers

Technical Review Committee Members:

David Van Dellen, Town of Castle Rock
Jim Dederick, Douglas County
Fred Bromberger, City of Littleton
Authority Board Members

Associate Members:

Warren Brown and Hope Dalton,
Tri-County Health Department
Tammy Allen and Joni Nuttle, Colorado Water Quality Control Division
Scott Roush, Keith Kahler, and Jay Skinner,
Colorado Parks and Wildlife
Chris Sturm, Colorado Water Conservation Board
Timothy Rose, United States Army Corps of Engineers
Carol Ekarius, Coalition for the Upper South Platte
Jeff Shoemaker, Greenway Foundation
Greg Kernohan, Ducks Unlimited
Brooke Fox, Colorado Agricultural Leadership Foundation
Derick Clemons, NRCS

Management:

Tetra Tech, Inc.
Julie Vlier, Manager

Website:

Hughes and Stuart Sustainable Marketing