



Chatfield

Watershed Authority

2010 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.



2010 Chatfield Summit



To Our Readers from the Chatfield Watershed Authority Co-Chairs....

Thank you for your interest in the water quality activities and programs of the Chatfield Watershed Authority. This Chatfield Watershed Authority 2010 Annual Report presents highlights of water quality conditions and Authority efforts in the last year. The Authority's greatest success in 2010 was born out of the Chatfield Summit, held in June at the Denver Botanic Gardens at Chatfield. A broad spectrum of Chatfield Watershed stakeholders and Authority members brought camaraderie, interest and enthusiasm to a community celebration and work session on behalf of the watershed. This day-long meeting provided an opportunity for a wide variety of interested parties to share concerns, consider problems, and identify solutions that will provide guidance for the Authority's mission into the future. Through an open dialogue, the challenges and opportunities of protecting and improving nonpoint source water quality were explored. Topics included:

- Watershed planning,
- Stream restoration,
- Managing impacts from septic systems along the US-85 corridor,
- Controlling agricultural runoff, and
- Chatfield Reallocation mitigation projects.

Water quality in Chatfield reservoir met total phosphorus and chlorophyll-a water quality standards in 2010, through the month of August. In September, unusually high water quality measurements for these constituents were triggered by a combination of nonpoint source phosphorous loads and an early and sudden reservoir "fall mixing" induced by winds and seasonal changes in temperature gradients in the reservoir. As a result, phosphorus and chlorophyll-a water quality standards were in excess of defined growing season water quality standards. This phenomenon was also experienced in other neighboring front-range watershed reservoirs, including Bear Creek and Cherry Creek Reservoirs.

Our challenge and focus for 2011 will be to generate additional funds to implement important nonpoint source projects, especially in the Plum Creek Basin, where the primary source of phosphorus loading occurs. Continued protection of water quality in the Chatfield Basin is vital to the Authority and to the citizens of Colorado.

The Authority believes that the development and adoption of a Chatfield Watershed Plan, to commence in 2011, will establish the foundation by which creative thinking and effective collaboration with watershed partners will improve water quality and efficiently utilize limited funding resources. Our watershed plan will be an ambitious undertaking. We invite you to participate in and support our efforts in the achievement of watershed health.

Sincerely,

Kevin Urie
Co-Chair



Larry Moore
Co-Chair





The *2010 Chatfield Report* is the annual water quality summary status report presented by the Chatfield Watershed Authority to communicate the health 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
- Larry Moore, Roxborough Water & Sanitation District

Technical Review Committee, Chairman:

- David Van Dellen, Town of Castle Rock

Financial Officers:

- Ronda Sandquist, Squire Sanders & Dempsey, LLC
- Bob Deeds, City of Littleton
- Kevin Urie, Denver Water
- Larry Moore, Roxborough Water & Sanitation District

Treasurer:

- Lissa Oelkers, Plum Creek Wastewater Authority

Reservoir Regulatory Compliance 3

Monitoring Activities 7

Compliance with TMAL 8

Wastewater Treatment Plants 9

Regulated Stormwater Sources 11

2010 Chatfield Summit and Celebration of the Watershed 13

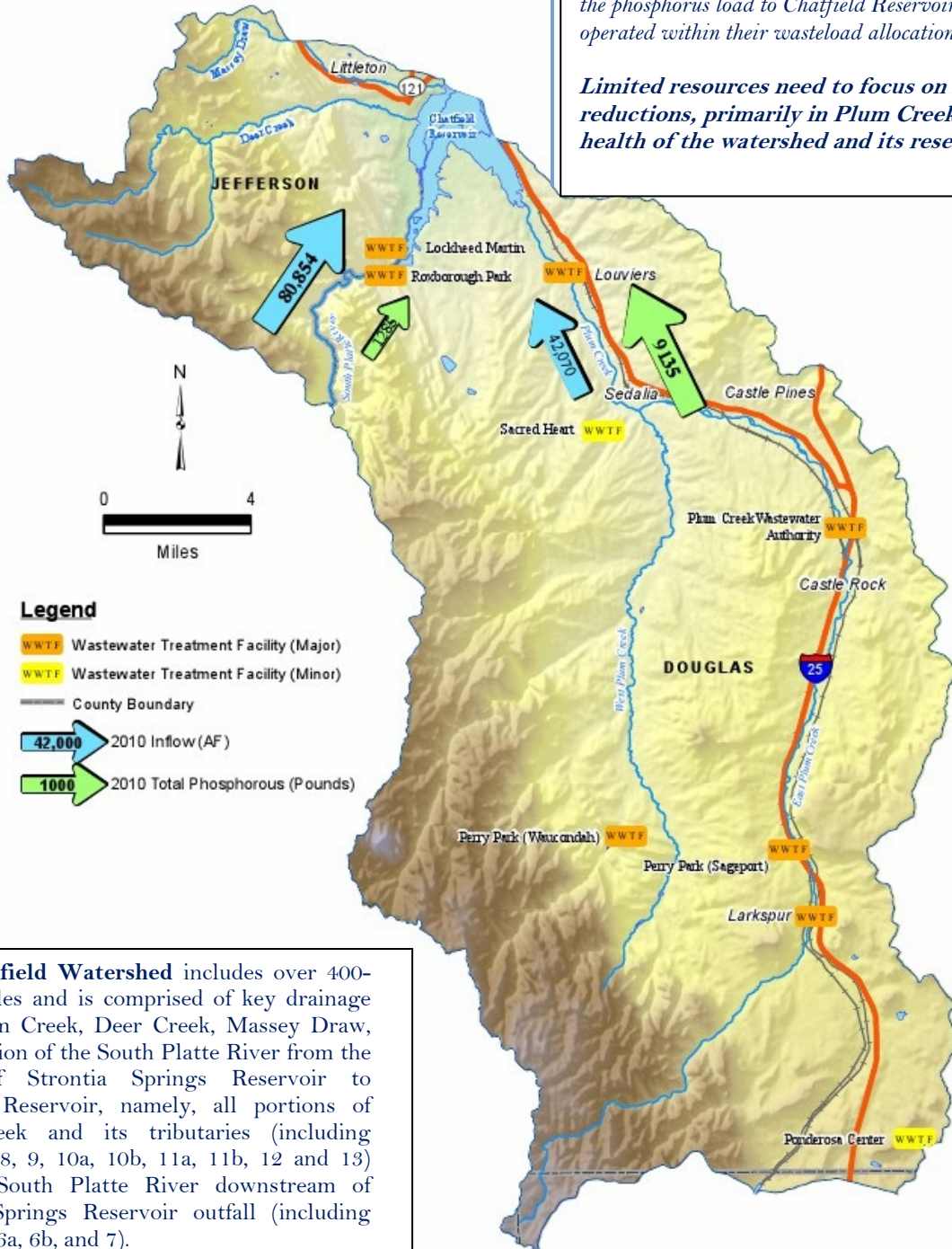
Recommendations for Improving Water Quality 15

Priority Projects

Where Do You Focus Limited Resources to Reduce Pollutant Loading to Chatfield Reservoir?

In 2010, over 63% of the flow volume to Chatfield Reservoir, or 80,854 AF, was derived from the South Platte basin; however of the 11,117 pounds of phosphorus entering the reservoir, 82% of the phosphorus loads, or 9,135 pounds, came from the Plum Creek basin. Wastewater treatment plants (WWTPs), less than 20% of the phosphorus load to Chatfield Reservoir, have historically operated within their wasteload allocations.

Limited resources need to focus on nonpoint source reductions, primarily in Plum Creek, to maintain the health of the watershed and its reservoir.



The Chatfield Watershed includes over 400-square miles and is comprised of key drainage areas Plum Creek, Deer Creek, Massey Draw, and a portion of the South Platte River from the outfall of Strontia Springs Reservoir to Chatfield Reservoir, namely, all portions of Plum Creek and its tributaries (including segments 8, 9, 10a, 10b, 11a, 11b, 12 and 13) and the South Platte River downstream of Strontia Springs Reservoir outfall (including segments 6a, 6b, and 7).

Reservoir Regulatory Compliance with Water Quality Standards

New water quality standards for Chatfield Reservoir were adopted by the Water Quality Control Commission, becoming effective on June 30, 2010.

- Chlorophyll-a (Chl-a) standard of 10-µg/L with an assessment threshold of 11.2-µg/L
- Total phosphorus (TP) standard of 30-µg/L, with an assessment threshold of 35-µg/L

These water quality standards are during the growing season (July through September), and include a one-in-five year exceedance frequency.

Chlorophyll-a Concentration During the 2010 Growing Season

During 2010, the new Chl-a standard was exceeded with a growing season average of

“Complex ecological interactions and processes governing nutrients likely led to chlorophyll-a exceedances and potentially to a TP exceedance in the reservoir in 2010”.

“... is summer mean and late summer maximum total phosphorus in Chatfield Reservoir related more to inflow concentration or internal loading and climate factors?... Additional TP data, collected in the reservoir at 3- m depth intervals, at a MDL of 2-µg/L, is critical to answer questions regarding the magnitude of internal TP loading.”

Dr. Harry Gibbons, Limnologist

26.3-µg/L (Figure 1). Figure 2 provides a historical perspective of the Chl-a growing season average. Over the 28 year period of record, the reservoir has met the new Chl-a standard 85 % of the time.

Figure 1. Monthly 2010 Chlorophyll-a Concentration in Chatfield Reservoir

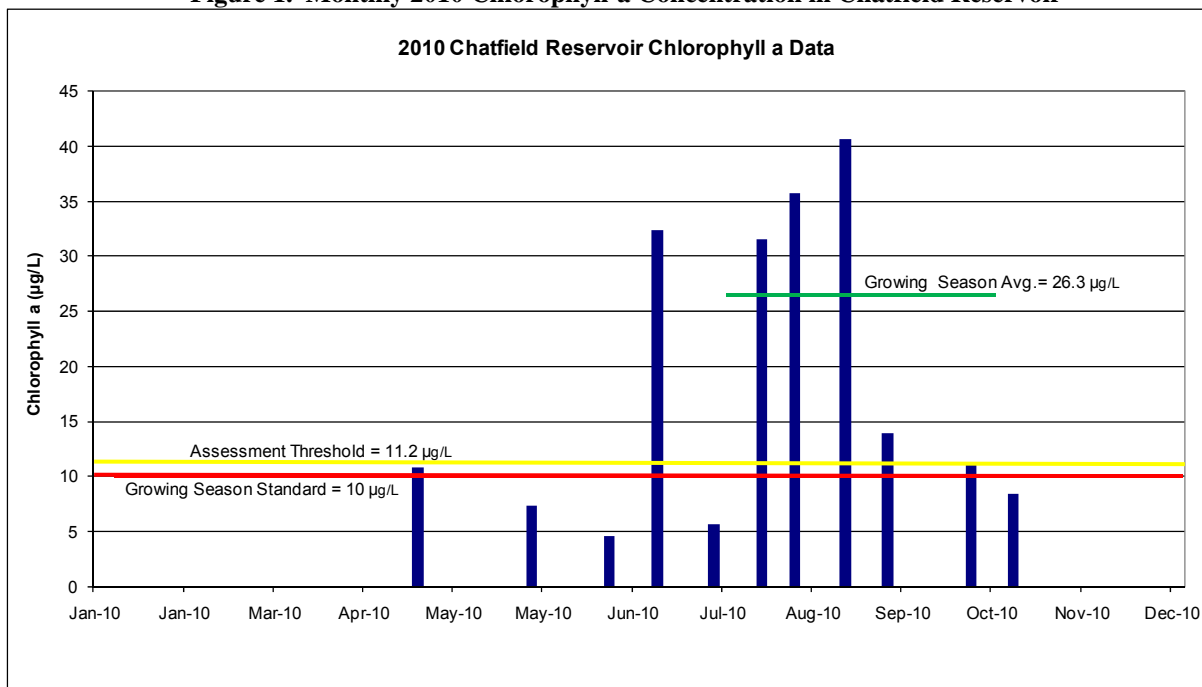
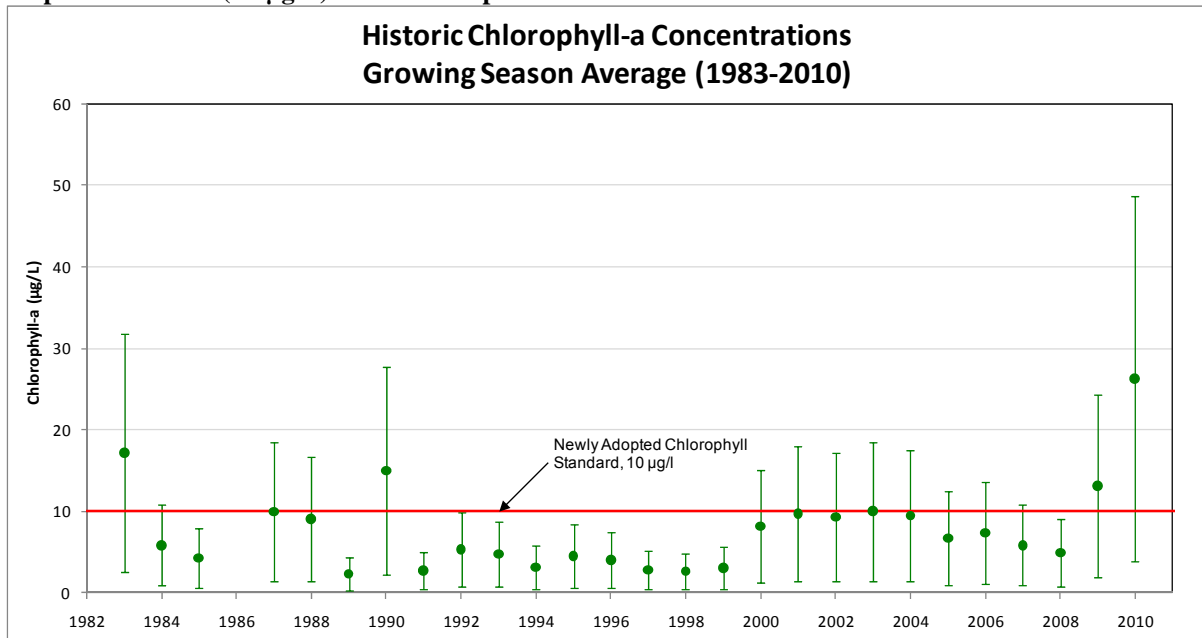


Figure 2. Historical Perspective of Chl-a Growing Season Compliance 1983 to 2010
 Points on plot depict Chl-a average concentration during the July to September compliance period. The error bars represent 95% confidence intervals around the mean. The solid red line represents the new standard adopted June 2010 (10- $\mu\text{g/L}$) used for compliance evaluation.



Total Phosphorus Concentration During the 2010 Growing Season

The 2010 TP growing season average is in question due to an outlier measurement in September 2010 (Figure 3). As shown, during the early growing season months of July and August, the TP concentration measurements in the reservoir were generally below the TP standard. However an unusually high TP reading of 1,100- $\mu\text{g/L}$ measured in September confounded the TP growing season standard results. The 1,100- $\mu\text{g/L}$ spike in September was deemed an outlier because levels this high are not measured in reservoir waterbodies, nor is it within the average Chl:TP ratio observed in world lakes (0.35) or the average Chl:TP ratio of Chatfield Reservoir (0.28). Therefore, the September outlier was rejected and not retained in the data analysis. However, two approaches, both consistent with *ASTM Standards for*

Outlying Observations (November 2008), were considered in analyzing the TP growing season standard.

1. Calculating the growing season average with the remaining five data points. Using this approach the TP growing season average would be calculated at 17.8- $\mu\text{g/L}$.
2. Estimating the 2010 TP growing season average using a Chl:TP relationship measured in Chatfield Reservoir during the growing season from 2003 – 2008 of 0.28 (Table 1). Using this relationship the 2010 TP data is omitted, however the average 2010 growing season Chl-a concentration observed in the reservoir of 26.3- $\mu\text{g/L}$ (Figure 1) is utilized. Using this approach, the estimated TP growing season average would have a calculated value of 93.9- $\mu\text{g/L}$.

Figure 3. Monthly 2010 TP Concentration in Chatfield Reservoir

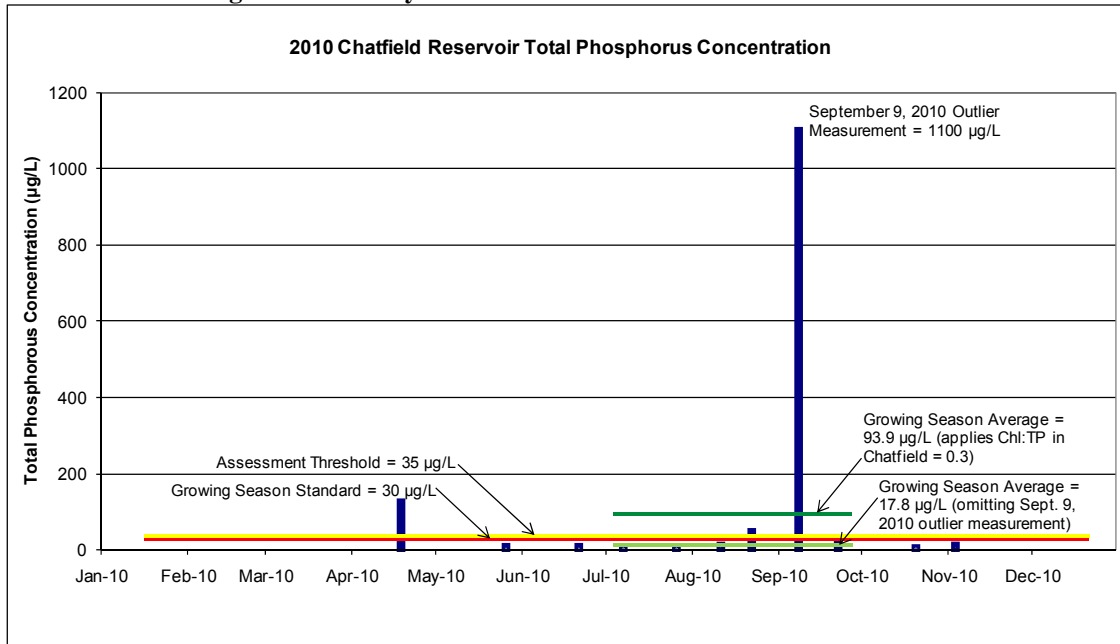


Table 1. Growing Season Average Metrics (2003 – 2008)

Year	Growing Season Avg TP (µg/L)	Growing Season Avg. Chl-a (µg/L)	Growing Season Avg. Chl-a:TP Ratio	Growing Season Avg TN:TP
2003	33.7	10.0	0.30	12.8
2004	30.7	9.5	0.31	18.1
2005	22.2	6.7	0.30	26.8
2006	27.0	7.4	0.27	19.3
2007	30.7	5.9	0.19	28.5
2008	16.3	4.9	0.30	22.4
Average	26.8	7.4	0.28	21.3

Historically, the reservoir has met the TP standard 73% of the time. (Figure 4). Regardless of these compliance metrics, the Authority, concerned with the Reservoir’s 2010 Chl-a exceedance and TP growing season concentration range of 17.8 µg/L- 93.9-µg/L, retained limnologist Dr. Harry Gibbons to study the data and evaluate the causes and conditions.

While investigations are still underway, Gibbons, suggests a number of factors likely contributed to the 2010 growing season concentrations of TP and Chl-a, including:

- **Climate**

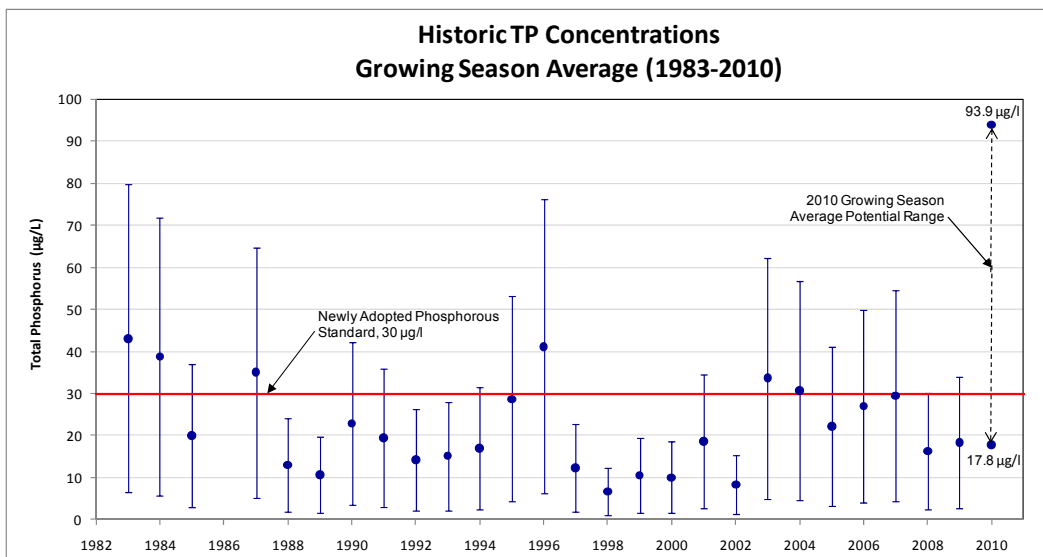
A lack of rainfall, coupled with windy conditions and complex ecological interactions and processes governing nutrients were likely contributing factors

that ultimately led to the late summer de-stratification of the reservoir and episodic TP and Chl-a concentration.

The fact that blooms occur only during some years indicates some control by climatic conditions affecting lake hydrography (stability of thermal stratification) and/or biotic vertical migration of phosphorus by phytoplankton. That is, high wind, stormy weather may hasten de-stratification or sun intensity may enable metalimnetic/hypolimnetic phytoplankton growth. Such conditions, if preceded by low wind, resulting in strong stratification that produces an anoxic period, could combine to create a large TP spike throughout the water column.

Figure 4. Historical Perspective of TP Growing Season Compliance 1983 to 2010.

Points on plot depict TP concentration during the July to September compliance period. The error bars represent the 95% confidence intervals around the mean. The solid red line represents the new standard adopted June 2010 (30- $\mu\text{g/L}$) used for compliance evaluation.



- **Dissolved Oxygen.** A chlorophyll and TP concentration maximum have occurred in the late summer and early fall the past few years. While the ecological drivers that led to this increase in TP and Chl-a are not completely understood, the data reveals the role dissolved oxygen plays at depth when minimum dissolved oxygen concentrations of 1 mg/L at 11 meters may cause a release of TP from the deep sediments on the reservoir floor.
- **Internal Loading.** Algal blooms during the mid to late summer period can be caused largely by internal loading of P that occurs when sediment phosphorus is liberated under anoxic conditions in the deep sediments of the reservoir floor.
- **External Loading.** Inflow TP concentrations (external loading), more elevated from the Plum Creek watershed, increase phosphorus in Chatfield Reservoir, and my load sediment in the Reservoir contributing to future internal loads.

As other reservoirs in the front-range Denver area (i.e. Cherry Creek Lake and Bear Creek Lake) experienced similar high water quality measurements in early September 2010, we believe the late summer de-stratification and internal TP loading were likely key factors in the higher TP concentrations in Chatfield Reservoir.

Continued Studies. New evaluations will help us better understand the cause(s) for chlorophyll and phosphorus peaks in Chatfield Reservoir. Past data provide clues to determine potential relationships that contribute to these events and future data will address the question “is summer mean and late summer maximum TP related more to inflow concentration from the watershed or internal loading and climate factors?” In order to quantify the magnitude and dynamics related to internal loading and better characterize water quality in Chatfield Reservoir, Dr. Gibbons recommends additional TP data collection in the reservoir in 2011, measurements at 3-m depth intervals to the bottom 0.5-m of the reservoir during the growing season, analyzed to a method detection limit (MDL) of 2- $\mu\text{g/L}$.

Monitoring Program

The monitoring parameters for the Reservoir and its inflows continued to characterize water quality and determine regulatory compliance. The constituents (Table 2) are monitored monthly, with the exception of twice monthly reservoir sampling during the July through September growing season. 2010 water quality data is made available on the Authority's website, www.chatfieldwatershedauthority.org. Surface water samples are collected at four locations as depicted in Figure 3.

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

Figure 3. Chatfield Watershed Sampling Sites

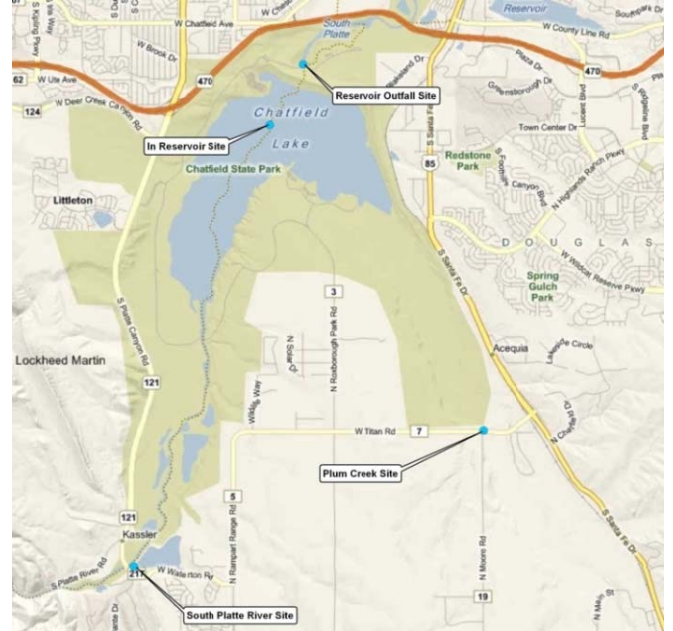


Table 2. Chatfield Water Quality Monitoring Parameters

Field Parameters	Nutrients	Wet Chemistry
Temperature, degrees C*	Chlorophyll-a, µg/L	Alkalinity, mg/L
pH (s.u.)	Total Phosphorus, mg/L	Total Suspended Solids, mg/L
Specific Conductance, µS/cm	Ortho Phosphorus, mg/L	
Dissolved Oxygen, mg/L*	Nitrite + Nitrate-nitrogen, mg/L	
Secchi Depth, meters	Ammonia Nitrogen, mg/L	
Instantaneous Flow (Rivers and Creeks), cfs	Total Nitrogen, mg/L	
	Phytoplankton (# of organisms/ml)	

* Chatfield Reservoir measurements include depth profile measurements in addition to epilimnion.

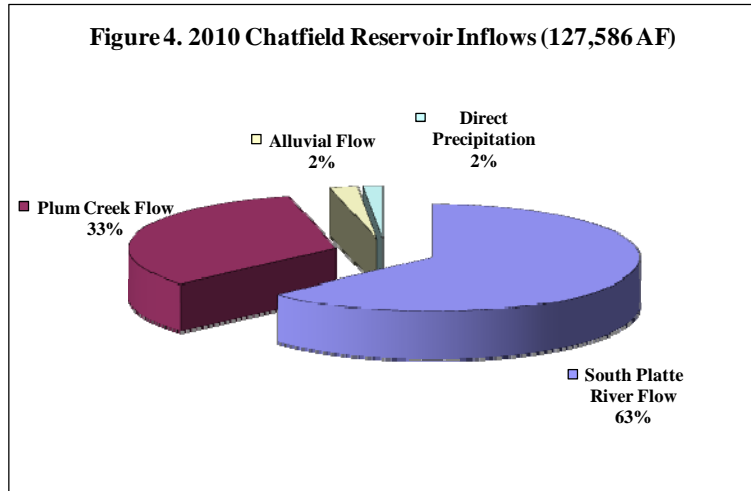


Compliance with the TMAL

In 2010, the TP load to the reservoir from all inflow sources, including alluvial flow and precipitation, was calculated at 11,117 pounds. This is well below the 19,600 pounds TP established under the new TMAL in Control Regulation #73.

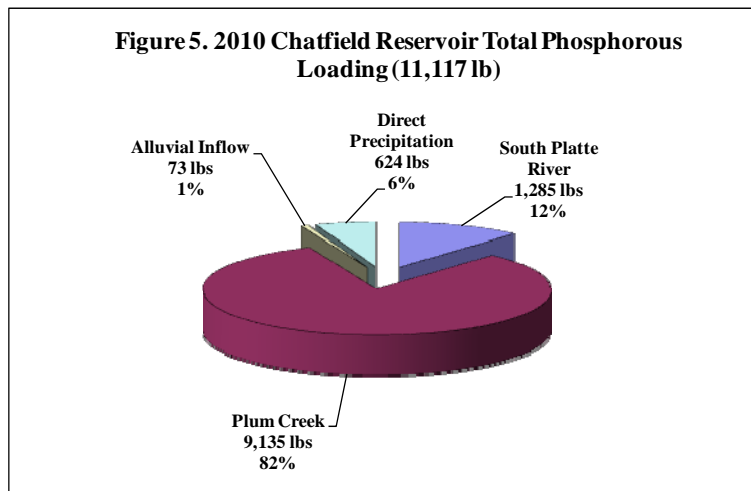
2010 TP Loading

In 2010, inflows to Chatfield Reservoir totaled 127,586 acre-feet (AF) and exceeded the median inflow of 100,860 AF. The South Platte River contributed the majority of the inflow, or 63%. Plum Creek contributed approximately 33% of the inflow to the reservoir. Other unmeasured inflows to the reservoir are estimated to be less than 4% of the total inflow and include Deer Creek, Massey Draw, direct surface runoff, direct precipitation, and alluvial inflow (Figure 4).



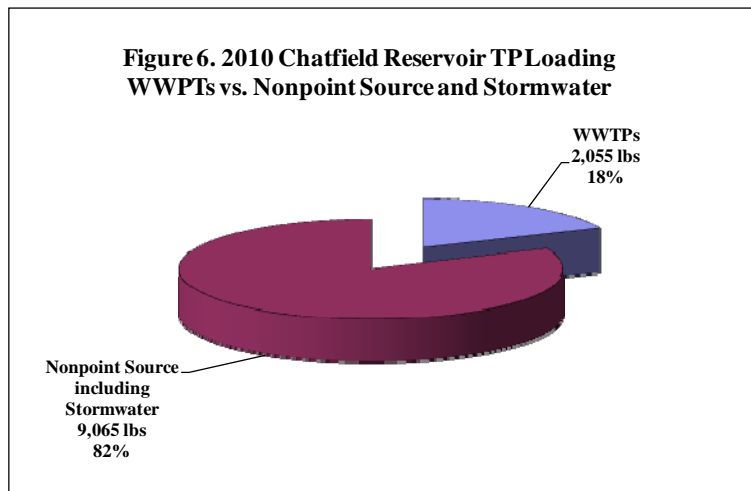
2010 Reservoir Inflow

In 2010, of the 11,117 pounds TP load, Plum Creek contributed an estimated 82% (9,135 pounds) of the TP load to the reservoir. The South Platte River contributed 12% of the TP load, or 1,285 pounds (Figure 5).



2010 TP Loading WWTPs vs. Nonpoint Source and Stormwater

The majority of TP load to the reservoir was from nonpoint sources and stormwater, contributing 82%, or 9,065 pounds of the TP load. WWTP's contributed 18% of the load to the reservoir, or 2,052 pounds (Figure 6).



Wastewater Treatment Plants

Table 3 summarizes the twelve wastewater treatment plants (WWTPs) in the Chatfield watershed, nine which are located and discharge to the Plum Creek sub-watershed. Two WWTPs discharge to the South Platte River. Lockheed Martin discharges to the South Platte alluvium upstream of the Chatfield Reservoir and also to Littleton/ Englewood WWTP located downstream of the reservoir. Roxborough Water and Sanitation no longer discharges to Chatfield watershed; all of its wastewater is conveyed to Littleton/ Englewood WWTP.

In 2010, recorded TP discharges from WWTPs were 2,055 pounds or about 27% of the allowable total discharge poundage. Wasteload allocations for Sacred Heart and the Centennial Law Enforcement Training Center were received pursuant to the Authority Trading Guidelines.




Compliance with Permits

WWTPs monitor their effluent discharges for compliance with their individual permits and compliance with Regulation #73. Every discharger in the Chatfield Watershed with a TP allocation fully complied with their TP concentration limits and TP wasteload allocation in 2010. The Authority remains concerned with Bell Mountain Ranch Metropolitan District, located south of Castle Rock, who treats Denver basin aquifer groundwater from the Arapahoe formation for drinking water supply purposes and discharges backwash from the water treatment plant into a tributary to East Plum Creek. The discharge amount permitted is 28,000 gallons per day but there is presently no phosphorus allocation for the discharge. Historic data indicate elevated phosphorus concentrations of the discharge and Bell Mountain does not have a wasteload allocation or phosphorus credits. Bell Mountain Ranch has been advised by the Authority to secure a wasteload allocation through the Trading Guidelines or modify water treatment processes to eliminate TP in the discharge.

Site Location Approval and Wastewater Plan Amendments

Site application approval was granted for an upgraded lift Station in Ken Caryl Ranch Water and Sanitation District. Wet well design was in accordance with emergency response plan guidance implemented by the Authority.

Table 3. Wastewater Treatment Facilities in Chatfield Watershed

	Phosphorus Point Source Allocations	Wasteload Allocation (Pounds Per Year)	2010 Point Source Total Pounds
	Plum Creek Wastewater Authority		4,256
Perry Park Water and Sanitation District: Waucondah		365	93.6
Perry Park Water and Sanitation District: Sageport		73	39.9
Lockheed Martin Space Systems Company		1,005	18.3
Town of Larkspur		231	7.9
Centennial Law Enforcement Foundation		30 ⁵	5.6
Ponderosa Center		75 ³	1.7
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 for Point Sources		7,533	2,055

Notes:

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 Guidelines.
4. Jackson Creek Metropolitan District received point source allocations through trades pursuant to the Authority Trading Guidelines. Jackson Creek has a transfer agreement of 50 pounds with Roxborough Water and Sanitation District.
5. Centennial Law Enforcement Foundation water quality credits are subject to completing a trade project pursuant to the Authority Trading Guidelines.
6. South Santa Fe Metropolitan District received a point source allocation of 21 pounds through trade pursuant to the Authority Trading Guidelines.



South Platte River inflow to Chatfield Reservoir.

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. Phase I and II MS4s in the Chatfield Basin include:

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

MS4 permits are based on requirements to develop programs that meet six minimum control measures, and many of these programs involve the implementation of best management practices in order to reduce pollutants discharged to the maximum extent practicable. The six minimum control measures Phase II permittees are required to meet include:

- 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

Water Quality Review of Land Use Applications

The Authority is a referral agency for land use applications for Douglas, Jefferson and Castle Rock and as such, provides review and comments on potential water quality impacts associated with proposed applications prior to construction. In 2010 the Authority reviewed land use applications from referral agencies providing a water quality review of applications

and review comments. Formal comments were prepared for projects from Sterling Ranch, Grace Presbyterian Church, Ken Caryl Ranch Water and Sanitation District, and the Colorado Department of Transportation. Table 4 on the following page summarizes information about the 2010 Phase II MS4 activities in the Chatfield watershed.



The largest contributor of phosphorus loading to the Chatfield Reservoir is nonpoint sources and stormwater. In 2010, nonpoint sources contributed 82% of the total phosphorus load.

Controlling nonpoint sources and stormwater is critical to preserving water quality.

Table 4. Summary of 2010 MS4 Programs for Inspections and Enforcement Actions

Land Use Agency	Permit Inspection Actions			Permit Enforcement Actions		
	Illicit Discharges	Construction	Post Construction	Illicit Discharges	Construction	Post Construction
Douglas County	N/A	1080 ¹	37 ²	23	545 ¹	0
Jefferson County	5	2014	11	5	39	0
Town of Castle Rock	156 Outfall 8 Hotline	1034 GESC 1144 DESC	110	9	941	23
Castle Pines Metropolitan District	0	0	2	0	0	0
City of Littleton	2	0	3	2	0	0

¹Number is approximate

²Total Inspections (includes Chatfield and Cherry Creek basins).

The following is a summary of 2010 MS4 Education & Outreach Programs in the Watershed:



Douglas County

- Spring Up the Creek in conjunction with Castle Rock
- Various open space events

Jefferson County

- Interactive booths at public events
- Stormwater article in County's e-newsletter
- Household chemical waste drop off
- National Flood Insurance Program's Community Rating System

Town of Castle Rock

- Monthly Ads
- Spring Up the Creek
- Household Chemical Roundup

Castle Pines Metropolitan District

- Annual Creek clean up with Castle Rock and Douglas County
- International Storm Water Training Course for Operations Crew



City of Littleton

- Newspaper ads and articles
- Stormwater activity book for children
- Stormwater booth at public events



Watershed Outreach at the 2010 Chatfield Watershed Summit

Denver Botanic Gardens, Chatfield Area

A full day Watershed Summit, hosted at the Denver Botanic Gardens at Chatfield and Chatfield Reservoir, staged the celebration of watershed. Over 90 stakeholders attended the Summit that was funded in part by a Mini-Grant from the Colorado Water Quality Control Division, the Chatfield Watershed Authority, and a host of Summit sponsors. The morning included presentations from notable speakers on Chatfield topics including;

Jeff Shoemaker, The Greenway Foundation

Mr. Shoemaker discussed the recreational and water quality amenities along the South Platte River and the funding and grant mechanisms used to launch projects along the Greenway corridor.

Tom Browning, Colorado Water Conservation Board

Tom Browning, CWCB project manager for the Chatfield Reservoir Storage Reallocation Study, provided information on the Feasibility Report and an Environmental Impact Statement (FR/EIS) being conducted by the U.S. Army Corps of Engineers to increase the amount of water stored in Chatfield Reservoir. Tom described why the project is needed, citing CWCB's Statewide Water Supply Investigation (SWSI) findings that by 2030 an additional 90,000 acre-feet of water/year will be needed to meet water demand in the front range of Colorado.

Larry Vickerman, Denver Botanic Gardens at Chatfield

Larry Vickerman described the Botanic Gardens as a multiple use facility that integrates agriculture, horticulture and habitat preservation and conservation. Water quality and water conservation are top priorities for the gardens and are integrated in all aspects of the educational program. Larry also discussed the

water quality benefits associated with the stormwater detention facility from the adjacent development and the wetlands ecosystem along Deer Creek.



Derick Clemens, Natural Resources Conservation Service

Derick Clemens discussed NRCS practices that improve water quality, such as conservation tillage, irrigation water management, nutrient management, pesticide management, conservation buffers, rotational grazing, streambank protection, and water control structures. Derick described the various NRCS programs with funding available, and the Chatfield watershed NRCS contracts where funding have been obtained. Clemens described the restoration and sediment control efforts along West Creek and Horse Creek where NRCS partnered with Douglas County to provide over \$200,000 in improvements.

Don Kennedy, Denver Water

Don Kennedy highlighted the water quality impacts resulting from fires, such as the Buffalo Creek and Hayman fires. In the last 12 years there have been 7 fires of which four occurred in 2002. The Buffalo Creek fire (May 1996) destroyed nearly 12,000 acres in 4 ½ hours. During the 2" rain storm that occurred 60 days

after the fire, Spring Creek ran 10,000 cfs vs. its normal 1.5 cfs, causing significant sediment and debris to enter Strontia Springs Reservoir. He unveiled Denver Water's plans to remove sediment from Strontia Springs Reservoir to protect water quality and its water supply. The estimated cost of dredging project at the reservoir is over \$30 million.

Keynote Speaker, Barbara Biggs, Metro Wastewater Reclamation District and Colorado Water Conservation Board

Barbara articulated her insights and perspective on water issues in Colorado. She presented the group with a big picture view of water quality and water resources realities in the Chatfield and South Platte River watersheds, including its challenges, collaboration opportunities, and sustainability vision.



The afternoon included interactive breakout groups to discuss water quality improvements, suggested projects, and funding opportunities in the watershed. The selected breakout groups developed lists of priority projects or efforts they thought were most important to protect water quality in the Chatfield basin and funding mechanisms to support the following topics:

Chatfield Reallocation - Mitigation projects to improve water quality. This group discussed ideas that would improve water quality, including water conservation to reduce water uses and runoff, such as:

- Forestry management (looking upstream)
- A community-wide fire protection plan
- Stream enhancements and ecosystem restoration

- Pilot project for sprinkler system conservation
- Caldera – heating coil to save on heating water
- Dog park management
- Porous pavement for higher use areas to reduce erosion
- Education on water quality

Recreation and water quality amenities along the Plum Creek Corridor. This group discussed ideas such as:

- Developing a Watershed Plan that proposes a comprehensive analysis of the nine elements of a watershed plan.
- Geomorphologic study of Plum Creek, habitat analysis, and a sampling/monitoring program
- Local agency participation
- Recreational opportunities

Managing septic systems (ISDS) in the watershed. This group discussed:

- Quantifying phosphorus load contribution
- Statutory change to ISDS regulations
- Addressing ISDS problem by constructing sewer with funding from public/private partnerships, water quality testing, sewage reuse, etc.
- Funding – implementing an impact fee on ISDS to fund water quality projects

Promoting grazing and animal waste management in rural areas to preserve land and water quality. This group discussed:

- Holistic land management
- Implementing and education on BMPs

The afternoon completed the Summit with a memorial dedication for Paul Grundemann, former Chatfield Watershed Authority Board Member and Colorado Water Quality Leader, at the Chatfield Reservoir Marina, followed by an interactive boat tour on Chatfield Reservoir, hosted by **Paul Winkle, Colorado Division of Wildlife**, describing the prolific walleye fishery and fisheries management at Chatfield.

Recommendations for Improving Water Quality

The Chatfield Watershed management plan, combined with water quality enhancement projects, is slated to improve water quality in 2011. While funding obstacles presented challenges in 2010, the Authority has reached out to new members and old to secure participation and sought out grant funding and partnerships to support water quality goals in the Chatfield Watershed.

Board Membership Supports Water Quality Improvements

The Authority's primary income source is from annual dues of its members. In 2010, dues totaling \$140,040 financed implementing activities required in the Control Regulation, including water quality programs. We continue to rely significantly on membership dues and Board member in-kind support to help keep our programs going with limited financial resources (i.e. watershed monitoring program implemented by Denver Water and Town of Castle Rock serving as fiscal agent of grant applications).

In 2010 the Authority began an outreach campaign to solicit new members who benefit from the water quality services provided by the Chatfield Watershed Authority, namely; entities that rely on the Chatfield watershed for water supply purposes, or those entities that have a water or wastewater special district in the watershed. As a result, our recent new members include Aurora Water and Ken Caryl Ranch Masters Association.

However, the 2009 resignation of Lockheed Martin continues to be a watershed and fiscal hardship to the Authority. We appreciate the Commission's outreach to Lockheed Martin last year urging their return to the Chatfield Watershed Authority. We have also followed up with Lockheed Martin and to date we have not received a positive or negative response from the watershed's largest industry; in the meantime,

this entity receives benefits from the Authority without commensurate dues payments.

Chatfield Watershed Plan - Section 319 Grant

The Chatfield Watershed Authority, through its Board Member and fiscal agent the Town of Castle Rock, submitted a grant application for Section 319 funding to develop the "Chatfield Watershed Plan". We are proud to be a grant recipient and will begin this effort later in 2011, but foresee this plan as being a critical component to roadmap our path in pursuing watershed health.

The project goal is to develop the "Chatfield Watershed Plan" which provides a framework to protect water quality and riparian habitat in waters adversely affected or threatened by nonpoint source and stormwater pollution. This process is intended to take a long-term management approach that results in a living document to be reviewed and revised on a regular basis by the stakeholders of the watershed.

The watershed plan will be developed in accordance with US EPA's "Nine Elements of a Watershed Plan" that incorporates the following:

- Building partnerships
- Characterizing the watershed
- Identifying projects
- Developing an implementation program

The Chatfield Watershed Plan will provide a retrospective analysis of our current understanding of water-quality issues within the watershed, identify physical characteristics of the watershed, management strategies to reduce nonpoint source and stormwater loads, and an implementation program that encompasses interim milestones, education and outreach, evaluation and monitoring, and address the nine elements required for Clean Water Act Section

319 grant funding. Two key components of the watershed planning effort will be:

- Stakeholder involvement, fostered through public meetings that will be conducted to educate the public on watershed information, partnerships, and watershed priorities, and
- Addressing water quality issues in the watershed to meet water quality standards and targets.

Stream Restoration Along Equestrian Area in North Massey Draw - CWCB Stream Restoration Grant

In collaboration with our newest member, Ken Caryl Ranch Masters Association, the Authority was recently awarded a grant through the Colorado Water Conservation Board Stream Restoration Grant program for stream improvements along an upper reach of Massey Draw that flows directly into Chatfield Reservoir. The project objectives are;

- Improve water quality by stabilizing streambed and bank conditions and controlling runoff from manure laden pasture areas adjacent to the project site.
- Reduce sediment load to Chatfield Reservoir, and thereby increasing the storage capacity life of this popular front range reservoir used for flood control, water supply, fishery, and recreational purposes.
- Reduce flooding at the Ken-Caryl Ranch Equestrian Center.
- Mitigate unsafe conditions for open space visitors by reshaping unstable stream banks and highly degraded channel.

Special Projects and Studies Identified at the Chatfield Summit to Preserve Water Quality

Following the June 2010 Chatfield Summit, the Authority brainstormed and identified various studies and water quality enhancement projects to address water quality in the watershed. The “Priority Project List” on page 17 summarizes more immediate project needs. Additional funding

will help the Authority implement these projects to meet watershed and water quality goals.

Future Issues on the Horizon

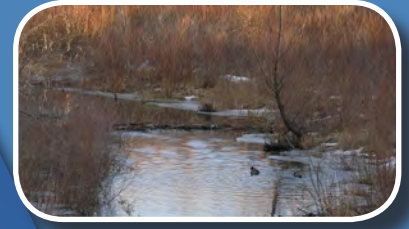
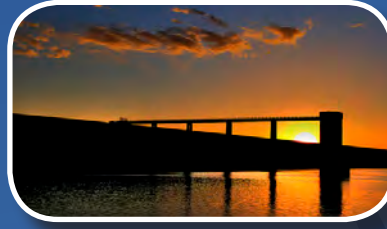
The overarching challenge for the Authority into the future will be to manage nonpoint source and stormwater impacts with funding constraints. The Authority is committed to implementing improvements in the basin targeted towards phosphorus reduction and watershed health. We believe some of our 2011 activities will support long term funding available for water quality projects.

Implementing Additional Nonpoint Source and Stormwater Control Strategies

With additional funding, or commitment on grant requests, the Authority can make great strides in targeting the most effective controls to reduce phosphorus. Projects like those summarized below will improve water quality and reduce sediment and phosphorus loading in the watershed and reservoir while providing a riparian habitat amenity.



List of Chatfield Watershed Priority Projects



1. Chatfield Watershed Plan

- Begin project Fall 2011, after Section 319 funding is contracted
- Build partnerships
- Characterize the watershed
- Identifying projects
- Develop an implementation program

2. North Massey Draw Stream Restoration at the Equestrian Center

- Kickoff and contract with CWCB
- Finalize design and secure permits
- Construct stream stabilization measures to reduce sediment and phosphorus loading from horse stables.
- Conduct monitoring to quantify nonpoint source improvement.

3. Plum Creek Water Quality Monitoring and Source Characterization

- Win Healthy River Funds Grant
- Implement monitoring
- Analyze data
- Identify sources and projects to control NPS loading

4. Implement shoreline erosion control management strategies around heavily accessed portions of reservoir; conduct demonstration of impervious pavement applications in conjunction with geo-grid textile products.

- Identify funding source(s)
- Stabilize disturbed access areas along shoreline with impervious pavement, vegetation and other engineered products.

5. Sediment control and streambank stabilization along East Plum Creek

- Secure funding source(s) in 2011/2012
- In coordination with Town of Castle Rock, implement stream restoration improvements along reaches of Plum Creek that are highly erosive and require streambank stabilization.

6. Livestock and stable management projects to control livestock wastes from entering waterbody

- In coordination with Douglas County and NRCS, implement pilot projects with agricultural users in the watershed.

7. West Plum Creek ecosystem improvements

- In coordination with Division of Wildlife, install drop structures to stabilize stream reaches and create pools that promote Johnny darter fisheries habitat and reduce sediment and nutrient load.

8. Convert ISDS along the US 85 corridor to conventional wastewater treatment.

- Identify funding sources for collection system, sewer conversion and wastewater improvements in the Town of Sedalia, South Santa Fe Commerce Center, Law Enforcement Training Center, and Titan Road Industrial Park.
- In coordination with Douglas County, consider development of ordinances regarding prohibition of ISDS in the floodplain.



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