



SOUTH PLATTE BASELINE STUDY

October, 2018



This report has been prepared by Carol Ekarius, Executive Director of the Coalition for the Upper South Platte (CUSP).

CUSP wishes to thank the South Platte Enhancement Board (southplatte.org) for funding this project.

Special thanks for the project team goes to:

**Pete Gallagher, Fin-up Habitat Consultants;
Greg Policky, Policky Aquatics;
Dave Winters, Retired USFS;
Denny Bohon, Retired USFS;
Gary Dowler, Retired CPW.**

This team collected all the field data... lugging equipment to hard to get to spots, fighting high water, and documenting the state of the river in 2016-2018.

The recommendations appearing in this report are those of CUSP, and do not represent the U.S. Forest Service, South Platte Enhancement Board, or the project team members, individually or collectively.

EXECUTIVE SUMMARY

In 1968, Congress adopted the Wild & Scenic River Act (WSRA), to balance river development with river protection. In the WSRA, Congress declared:

“...certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing conditions, and ... shall be protected for the benefit and enjoyment of present and future generations.”

By the early 1990s, the United States Forest Service (USFS) concluded that the South Platte River was suitable for designation as a Wild & Scenic River. However, this designation would create new challenges for future development and management of the river to supply water to the Colorado Front range. The South Platte River supplies water for well over half of Colorado’s citizens, and with populations on the rise and economic development requiring flexibility on the river’s future use, “an alternative that aggressively sought to protect river values through local means, and to not be dependent on Congressional action under the Wild and Scenic Rivers Act, was put forth by representatives of local governments and local environmental groups.” The USFS agreed, stating in the final Decision Notice (approved in 2004), “Recognizing that the overriding concern of the [Wild & Scenic] study (aka, the draft Legislative Environmental Impact Statement, or DLEIS) was to find ways to protect the river values that had been identified, the Forest Service concluded it was appropriate to provide for development of such an alternative. Rather than postpone release of the DLEIS pending development of the alternative, the Forest Service elected to include it in the DLEIS, albeit as a concept rather than as a fully-developed alternative.”¹

The plan, ultimately dubbed the South Platte Protection Plan, was initiated as a locally supported alternative that recognizes that the river not only has key environmental values, but also serves as a key water supply for the Colorado Front Range, and provides recreation that local communities depend on for their economic survival. Under the final Decision Notice, the South Platte Protection Plan was accepted as the preferred alternative to Wild and Scenic designation, that would still protect the “outstandingly remarkable values,” or ORVs. There were numerous components to the South Platte Protection Plan, but two included the creation of a \$1,000,000 endowment fund to help implement the Plan, with the creation of the South Platte Enhancement Board (SPEB) as the organization to oversee the dispersal of funding, and calling out the Coalition for the Upper South Platte (CUSP), the local nonprofit watershed group, which would serve as the primary partner for implementing protection efforts.

¹Record of Decision, Wild and Scenic River Study of the South Platte River and North Fork of the South Platte River USDA Forest Service Pike and San Isabel National Forests, Cimarron and Comanche National Grasslands (PSICC) Douglas, Jefferson, Park and Teller, Counties, Colorado .

About the Segments

The South Platte Protection Plan defined a number of river “segments” within the Plan’s areas of concern, which include the Mainstem of the South Platte from the bottom of Elevenmile Dam to the confluence with the North Fork, and the North Fork from Insmont to the confluence with the Mainstem. These segments were defined based on their primary, shared characteristics relating to the “outstandingly remarkable values,” or ORVs, as they are often referred to. Again, the ORVs are those values described in the WSRA, such as wildlife, fisheries, or recreational, to name a few.

Segment Area Descriptions

The following are the segment descriptions as defined in the South Platte Protection Plan.

Segment A – The 8.7 mile section of the South Platte River from Elevenmile Dam (downstream from the fence on Denver Water’s special use area) to Lake George.

Segment B – The 7.7 mile reach from Lake George, CO to the mouth of Beaver Creek, at the border of U.S. Forest Service lands and Sportsman’s Paradise private lands.

Segment C – The 10.4 mile segment from the north end of the private lands near Beaver Creek to the high water line of Cheesman Reservoir (upstream of the stream gage).

Segment D – The 3.1-mile segment of the South Platte River from below Cheesman Dam downstream to the upstream boundary of the Wigwam Club property.

Segment E – The 19.5-mile segment of the South Platte River from the upstream boundary of the Wigwam Club property downstream to the high water line of Strontia Springs Reservoir.

Segment H – North Fork from Insmont (~2.5 miles southeast of Bailey along the North Fork) to its confluence with the South Platte Mainstem.

Segments are each established based on the outstandingly remarkable values (or ORVs) that the U.S. Forest Service originally defined when working on the draft Legislative Environmental Impact Statement (DLEIS).

Segment A: Classification—Recreational; ORV’s—Scenic, recreational, geological, fisheries.

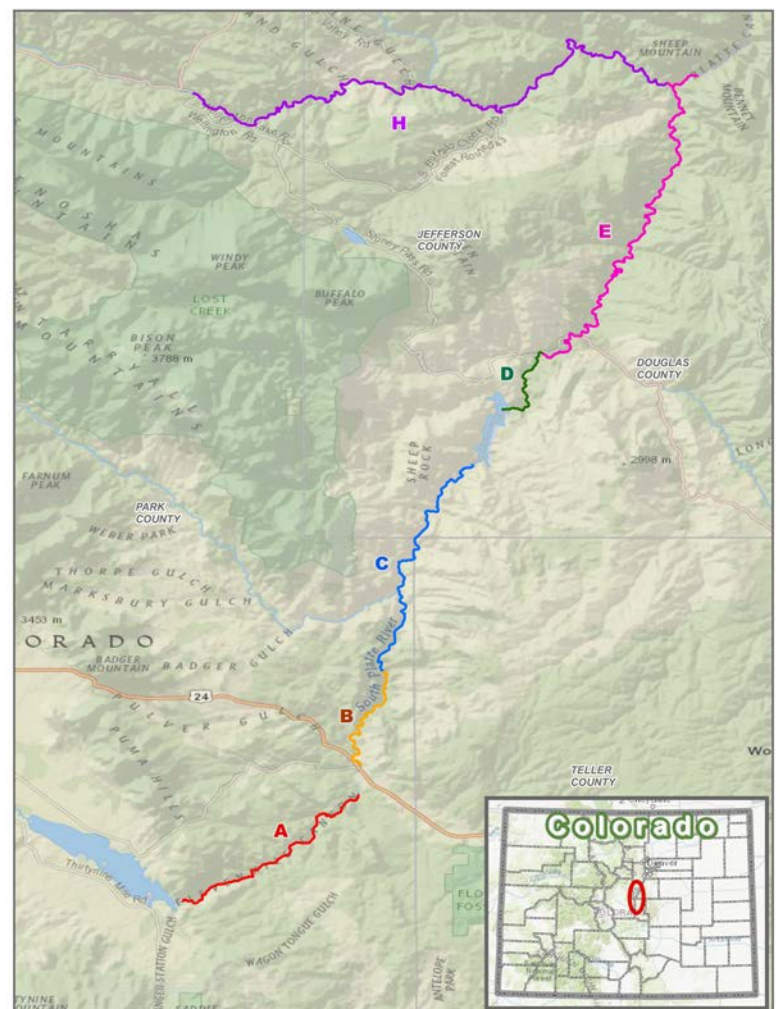
Segment B: Classification—Recreational; ORV’s—Fisheries.

Segment C: Classification—Wild & Scenic; ORV’s—Scenic, geological, fisheries, wildlife.

Segment D: Classification—Wild; ORV’s—Recreational, fisheries, wildlife.

Segment E: Classification—Recreational; ORV’s—Recreational, fisheries, wildlife.

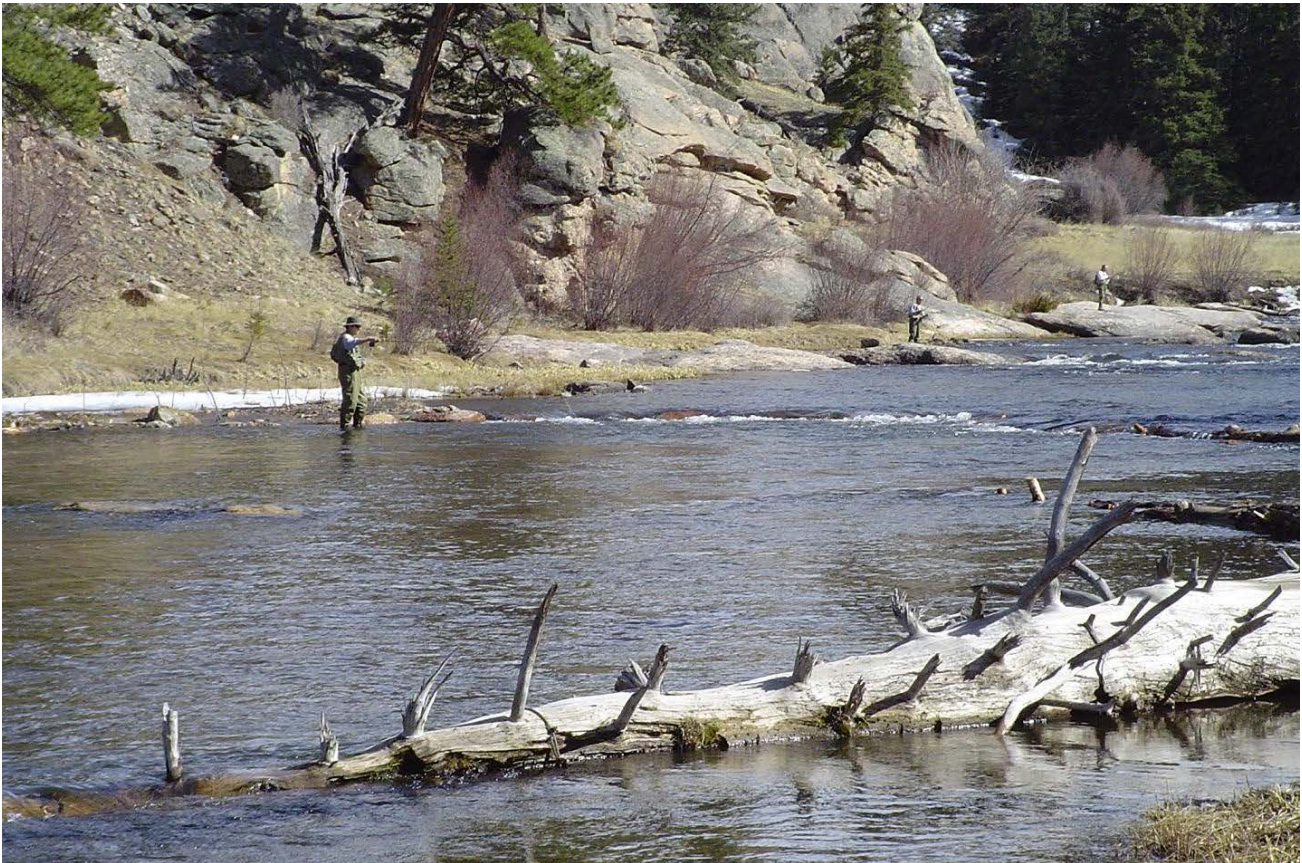
Segment H: Classification—Recreational & Scenic; ORV’s—Recreational, wildlife, cultural.



The Baseline Study

Although there have been numerous monitoring efforts along the different stream segments over the years, there has not been a comprehensive and inclusive monitoring program that incorporates historical data, and establishes a baseline condition for the eligible areas. Beginning in 2015, CUSP and the SPEB Board partnered to create such a baseline study that provides understanding of current conditions of the resource values. This effort helps SPEB, CUSP, and other local stakeholders meet the intent of the plan. Both organizations can better prioritize restoration and conservation opportunities and projects for future implementation. This extensive monitoring project will provide the foundation for developing and implementing projects that maintain and enhance resource values to ensure adequate protection of the stream corridor. A watershed-scale understanding of current conditions, and integration of monitoring data, will help support cooperative and coordinated management of resource values.

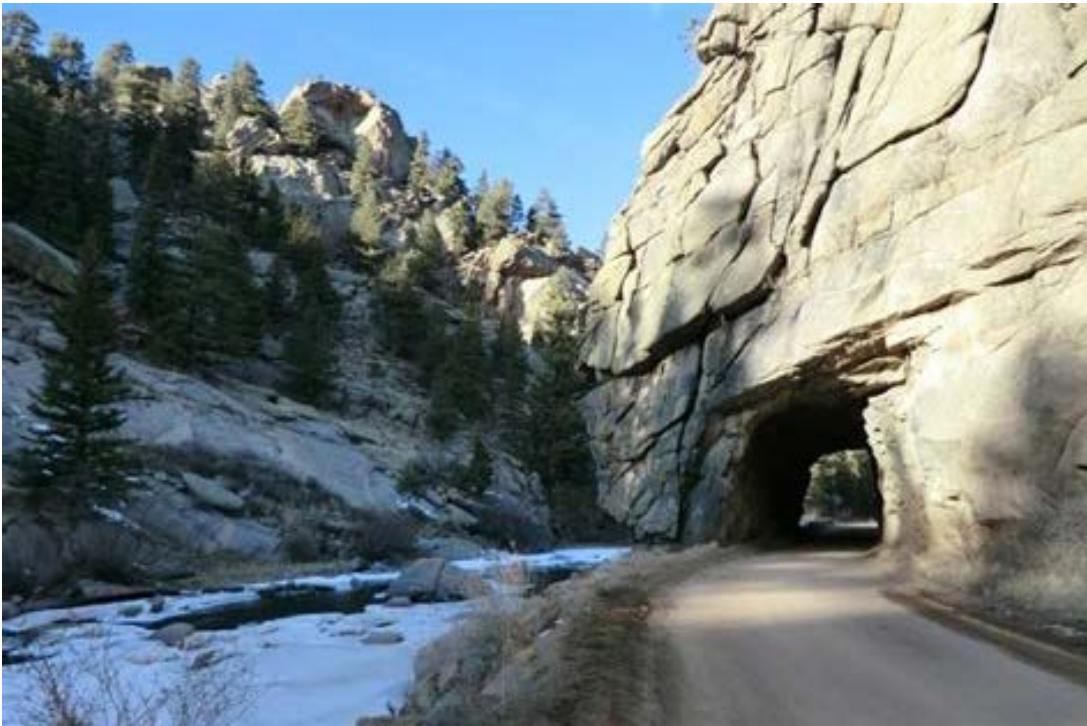
The study included extensive field monitoring, including producing over 1200 photo points, bank stability data, and a complete survey of most reaches, including longitudinal profile and cross-sections, and habitat analysis, as well as gathering historic information.



Fishermen in Elevenmile Canyon

REACH SCALE PROTOCOL

The riverine and riparian portion of the assessment included establishment of permanent georeferenced photo points, surveys of geomorphic form and condition, and assessment of aquatic habitat features in the study watershed. Data was collected using GNSS¹ based survey equipment and physical observation. All data was georeferenced, and available for query in ArcMap GIS platforms. Data was collected at two “scales, including the broad-scale “Reach level”, and a finer Meso-Habitat Unit level”. Each scale, and associated attributes, is described below.



Reach Scale Data:

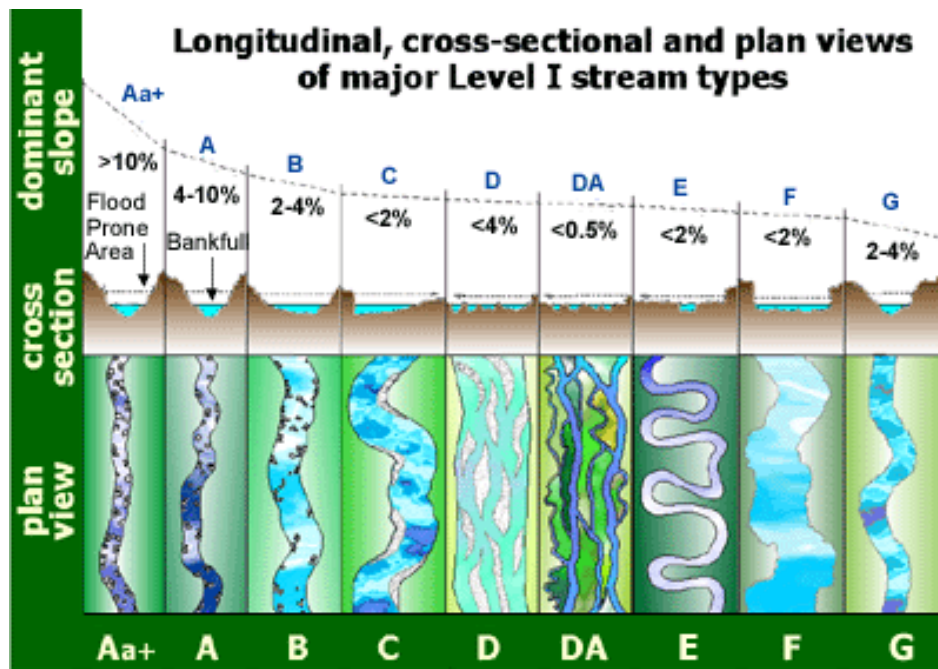
Photo-points were established throughout all of the project reaches in the watershed. Additional data collection was prioritized based on the geomorphic characteristics of each reach. Adjustable and depositional reaches, typically exhibiting Rosgen C and B channel forms (see image below), were the highest priority for complete geomorphic and aquatic habitat survey, as they are the most likely to exhibit significant change over time due to both natural and anthropogenic disturbances. Many of the reaches in the study watershed are bedrock-controlled segments of river, which effectively transport sediment to depositional reaches downstream. These reaches, typically exhibiting Rosgen A channel forms, were a lower priority for complete geomorphic and aquatic habitat survey. Several of these lower priority reaches proved to be impossible to survey longitudinal profile and other geomorphic characteristics due to topography that limited the ability to collect RTK data from satellites, depth of the channel limiting wading, and other safety factors. Full geomorphic and aquatic habitat surveys were completed along at least one representative reach for each channel type in each Wild & Scenic River Segment.

1. Global Navigation Satellite Systems. Specific equipment being used is a survey grade 2014 Topcon HyperV Base & Rover Kit with L1 & L2 upgrades, utilizing both the U.S. GPS and Russian GLONASS satellite constellations.

All reaches along the South Platte River that had received previous aquatic habitat surveys in 1980's and 1990's received a complete geomorphic and aquatic habitat survey between 2015 and 2017 under this project. Additionally, all reaches where habitat restoration projects have been conducted since 1990, with the notable exception of Reach 12 (through the private Wigwam Club), received complete geomorphic and aquatic habitat surveys during the 2015 – 2017 study. The map on the next page shows the status of all project reaches as of January 2018.

Reach Delineation:

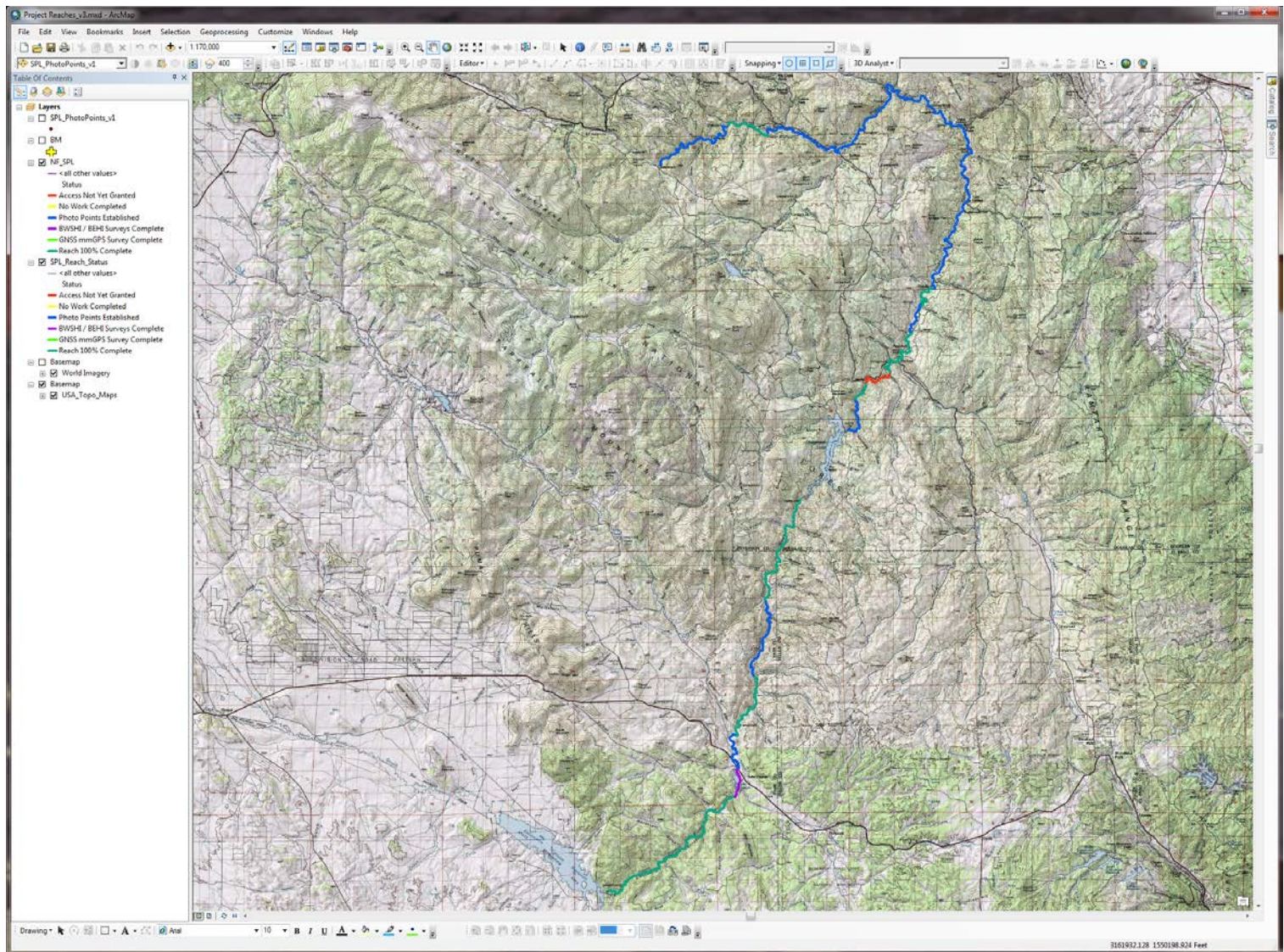
River reaches in the study area were delineated based on geomorphic form, stream order, and flow regime; and to a lesser extent, on administrative and/or political boundaries. We utilized the US Forest Service reach delineations developed by the Pike National Forest in 1992 for continuity, and to compare historic data to current conditions. Reaches were numbered consecutively from 4 - 31, beginning at the confluence with the North Fork of the South Platte River and extending upstream to Elevenmile Dam. Some of these reaches are very large, and were further divided into sub-reach segments determined by channel morphology or other factors. The following data was collected at the Reach level scale.



Reach Scale Channel Morphology Features

- Rosgen Classification (Level I&II): Valley Type & Channel Type. (Image above.)
- Photo Points (SPL_PhotoPoints_v1.shp): 1,205 photo points were established at locations that allow for unrestricted views, both upstream and downstream, of the river and associated floodplain. Photo points were georeferenced, and included date, time, & bearing direction (in degrees). Photo-point collection occurred during the summer season in order to assess riparian condition. Photos were taken using a Nikon 1 (12MP) camera equipped with a wide-angle lens, polarizing filter, and GPS attachment.
- Reach Longitudinal Profile (MAGNET Tools): Longitudinal profiles include a survey of the elevation of the channel bed along the thalweg, water surface at the time of survey, bank full elevation (based on physical bank characteristics) & top of bank features.

- Islands, Bars, and Secondary Channels (SPL_ALL_ISLAND_POLYGONS.shp): Islands and mid channel bars were mapped using the GNSS. Secondary channels were surveyed for dimension, pattern and profile.
- Channel Cross-Section (MAGNET Tools). Channel cross sections were selected based on local characteristics, and included the active channel, water surface elevation, bank full elevation, top of bank (if any), and extended to encompass the flood-prone width of the channel at minimum.
- Actively Eroding River Banks (SPL_ALL_ERODE_POLYLINES.shp). All actively eroding banks on either side of the river were mapped. Location, length, bank height, bank slope, and near bank stress data was utilized in conjunction with bank measurements in the longitudinal profile and meso-habitat unit bank condition data to estimate bank erosion hazard index (BEHI) value.



Reach Scale Structural Features

- Diversion Points (SPL_ALL_STR_POINTS.shp).
- Diversion Structures (SPL_ALL_STR_POLYLINES.shp).
- Rip-Rap River Banks and other bank hardening features (SPL_ALL_STR_POLYLINES.shp).
- Aquatic & Riparian Habitat Improvements.
 - Channel Realignment & Reconstruction (SPL_ALL_STR_POLYLINES.shp).
 - Pool / Point Bar Construction (SPL_ALL_STR_POLYLINES.shp).

- Multi-threaded channel closures (SPL_ALL_STR_POLYLINES.shp).
- Backwater Pool & YOY Habitat Features (SPL_ALL_STR_POLYLINES.shp).
- Boulder Cross Vanes (SPL_ALL_STR_POLYLINES.shp).
- 2X Log Cross Vanes (SPL_ALL_STR_POLYLINES.shp).
- Boulder J-Hook Vanes (SPL_ALL_STR_POLYLINES.shp).
- Log/Boulder J-Hook Vanes (SPL_ALL_STR_POLYLINES.shp).
- Boulder Vanes (SPL_ALL_STR_POLYLINES.shp).
- Log/Boulder Vanes (SPL_ALL_STR_POLYLINES.shp).
- Habitat Trees (SPL_ALL_STR_POLYLINES.shp).
- Boulder Clusters (SPL_ALL_STR_POINTS.shp).
- Bank Full Benching (SPL_ALL_STR_POLYLINES.shp).
- Log and Boulder Sills (SPL_ALL_STR_POLYLINES.shp).
- Toe Wood River Bank Restoration (SPL_ALL_STR_POLYLINES.shp).
- “Lunker” Habitat Structures (SPL_ALL_STR_POLYLINES.shp).

Meso-Habitat Unit Level:

The meso-habitat unit (MHU) scale delineates the channel reach by habitat type. The USDA Forest Service Basin Wide Stream Survey habitat mapping protocol developed by the Pike National Forest (D.S. Winters, et al., 1997) was utilized for habitat mapping of river reaches in the study area. The basic habitat forms under the Winters protocol are Pool, Riffle, and Glide. These are further defined into 15 distinct types, based on channel and habitat morphology. Up to twenty-three different attributes were collected for each meso-habitat unit type, and are described in detail below. Many of these attributes were physically measured using the GNSS. Others were derived from other GNSS data or collected on BWSHI database field forms and linked to the GIS utilizing the Habitat Unit ID.

Habitat Unit Type Descriptions

- Unique Key ID (OBJCODE): Each meso-habitat unit was given a unique unit ID, consisting of a combination of the River branch, Reach number, and meso-habitat unit ID.
- Reach ID (REACH): Each Reach was given a unique Reach name consisting of a combination of the River branch and Reach number.
- HU ID (OBJNAME): Within each study reach, each meso-habitat unit was given a unique ID. This ID defines the meso-habitat unit as a pool, riffle, or glide, and is numbered consecutively from the downstream boundary of the reach to the upstream boundary. The ID sequence is typically as follows – R1, P1, R2, R3, P2, G1, R4, etc.
- MHU Habitat Unit Type (TYPE): Integer value with a range from 1 -15, describing channel unit type. Type 1 indicates a Glide. Type 2-7 indicate Pools. Type 8-15 indicate Riffles. See Winters Protocol for full definition of all Channel Unit Types.
- MHU Structural Association (SA): Identifies the principle habitat forming feature of the meso-habitat. Structural associations may include multiple features that contribute to habitat form. See Winters, 1997.

Habitat Unit Physical Measurements

- MHU Wetted Perimeter (AREA): Post processed poly feature derived from the Reach scale longitudinal profile water surface line feature. Measurement is in square feet.
- MHU Length (LENGTH): Post processed data field derived from the Reach scale longitudinal profile channel thalweg line feature. Measurement is in linear feet.
- MHU Average Width (WIDTH): Post processed data field derived from the Reach scale longitudinal pro-

file. Measurement is in linear feet. $WIDTH = AREA/LENGTH$

- MHU Residual Pool Depth (RPD_DEPTH): Only measured in pool habitats. RPD is an indicator of over-winter capacity and sediment deposition. Measurement is in tenths of feet. Post processed data field derived from the Reach scale longitudinal profile. $RPD = MAX_DEPTH - DownstreamThalweg\ DepthMAX$.
- MHU Average Depth (A_DEPTH): Only measured in Pool habitats. Minimum of 9 pool depth points collected with GNSS in the field. Post processed data field derived from the Reach scale longitudinal profile water surface line feature and the collected pool points. Measurement is in tenths of feet.
- MHU Maximum Depth (MAX_DEPTH): Only measured in Pool habitats. Collected with GNSS in the field. Measurement is in tenths of feet.

Habitat Unit Cover Measurements

Locations where fish prefer to rest, hide and feed are called cover. Cover can create areas of reduced velocities providing critical resting and feeding stations for fish. The amount of cover available in a stream can influence the production of a number of fish and invertebrate species. The quantity of suitable cover has typically been found to be the single greatest limiting factor to successful fish propagation on the small head-water streams. Additionally, available suitable cover may be significantly impacted by existing and proposed land management practices and disturbances within the aquatic ecosystem. The categories of cover used in this inventory are described below:

- MHU In-Channel Object Cover (CVR2): > 1 ft depth, velocity shelter exhibiting 0.5ft/sec or less. Measurement is in square feet, with a minimum 1 ft² area.
- MHU Overhead Object Cover (CVR3): > 0.5 ft depth, no velocity shelter, flow < 0.5ft/sec. Measurement is in square feet, with a minimum 1 ft² area.
- MHU Combination Object Cover (CVR4): Exhibits the characteristics of both in-channel and overhead cover – undercut banks. 1 ft depth, velocity shelter exhibiting 0.5ft/sec or less. Measurement is in square feet, with a minimum 1 ft² area.
- MHU Pool Depth Cover (CVR5): Indicator of over-wintering capacity of the MHU. 1.5 ft depth or greater, velocity 0.5ft/sec or less. Measurement is in square feet, with a minimum 1 ft² area.

Stream Bank Stability Measurements

Bank stability describes the vegetated state and the stability of the stream banks. The conditions of stream banks are a very good indicator of possible impacts in the watershed. Deposition of sediment from upstream activities can result in unstable bank conditions, as can activities along the adjacent stream banks themselves (e.g. mass waste slopes). Cattle grazing, adjacent road activities and catastrophic events (e.g. high spring runoff and flash flooding) appear to be the most common factors which cause of bank instability in the streams we have observed. To determine the stability of each bank, we observe each bank independent of the other and utilize the coding system described as follows:

- 1 – Greater than 50% of the MHU bank is vegetated and stable.
- 2 – Greater than 50% of the MHU bank is vegetated but unstable.
- 3 – Greater than 50% of the MHU bank is unvegetated but stable.
- 4 – Greater than 50% of the MHU bank is unvegetated and unstable.

Examples of a Type 3 bank would be a bank dominated by bedrock and large boulders. An example of a Type 4 bank would be a large mass-wasting slope of decomposed gravel. Bank stability of left and right banks are evaluated separately for each MHU. Left and right banks are determined looking upstream.

In addition to bank stability, the composition of stream bank rock is evaluated to provide an estimate of bank

armoring. Values are from 2 – 8, with Type 2 being bedrock or boulders less than 3ft along the medial axis and Type 8 consisting of particles of sand less than 1/4” in diameter. As with bank stability measurements, left and right banks are evaluated separately for each MHU. In the database, the individual fields for bank stability and bank rock content are as follows:

- MHU Bank Stability Left (BSL).
- MHU Bank Stability Right (BSR).
- MHU Bank Rock Content Left (BRL).
- MHU Bank Rock Content Right (BRR).

Other MHU Attributes

- Large Wood (LOD). Large organic or woody debris influences a number of important factors in the stream system. Large pieces of wood and fallen trees which are found in the stream can significantly shape the stream channel, provide an energy base (nutrients) to the stream, and influence the composition of fish species and the quantity of fish. The primary effects of logs or trees on stream channels are related to changes in streamflow patterns. Pools are formed by the stream scouring around and under logs. Gravel and sediment are stored behind these objects and undercut banks can be created by water being deflected against a stable bank. All of the attributes contribute to a variety of habitat types that can be used by trout and the organisms they feed on. Large wood is defined in the Winters Protocol as any wood that exceeds 3 feet in length and is at least 4 inches in diameter. Both naturally accumulated and placed large wood in the active river channel are quantified.
- Notes/Comments (COMMENT).
- Wild & Scenic River Segment (Wild_Scenic_Segment)
- o Location of the meso-habitat unit in the designated segment under the Wild & Scenic River EIS.

Symbology Used in the Following Chapters

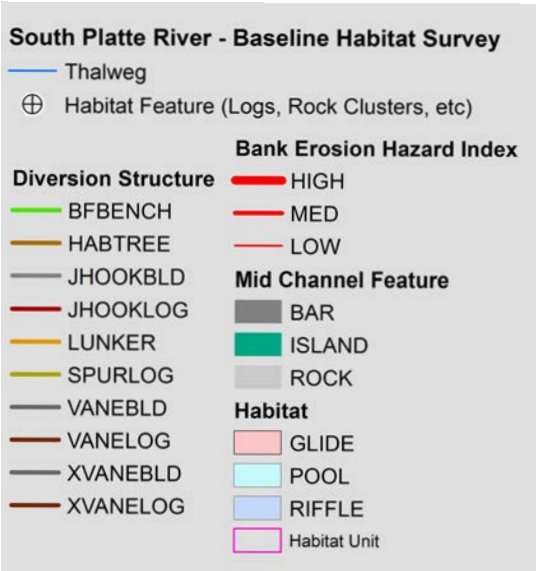


We believe the reach currently meets the threshold of suitability, and has no significant impact to the outstandingly remarkable values of the reach.



We believe the reach may still meet the threshold of suitability, but there are impacts that currently do, or could potentially reduce the quality of the outstandingly remarkable values to the point to negating suitability. If banks have greater than 20% Type 4 instability we have flagged it as being of concern. Areas that have significant and unmanaged motorized recreation in the river have been noted as being of concern.

Survey cartographic legend used in maps on pages that follow on maps in segment chapters tat follow.

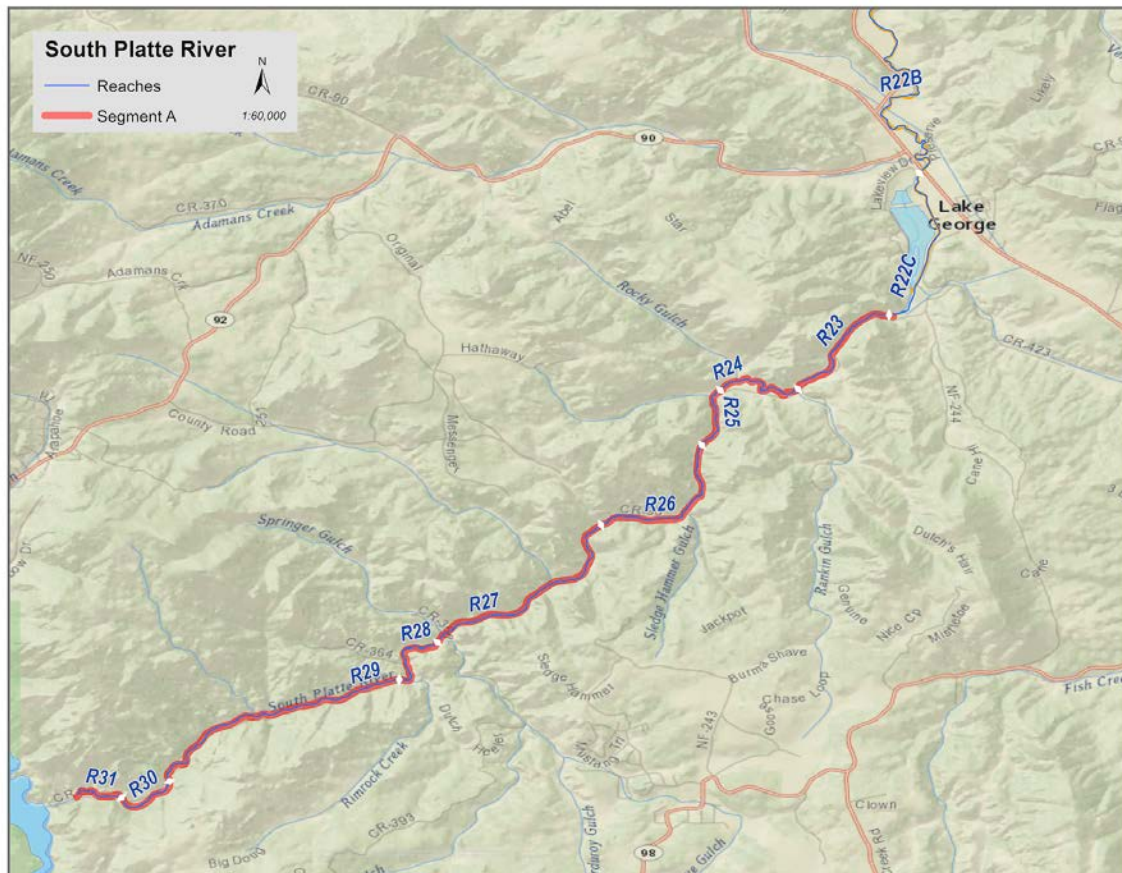
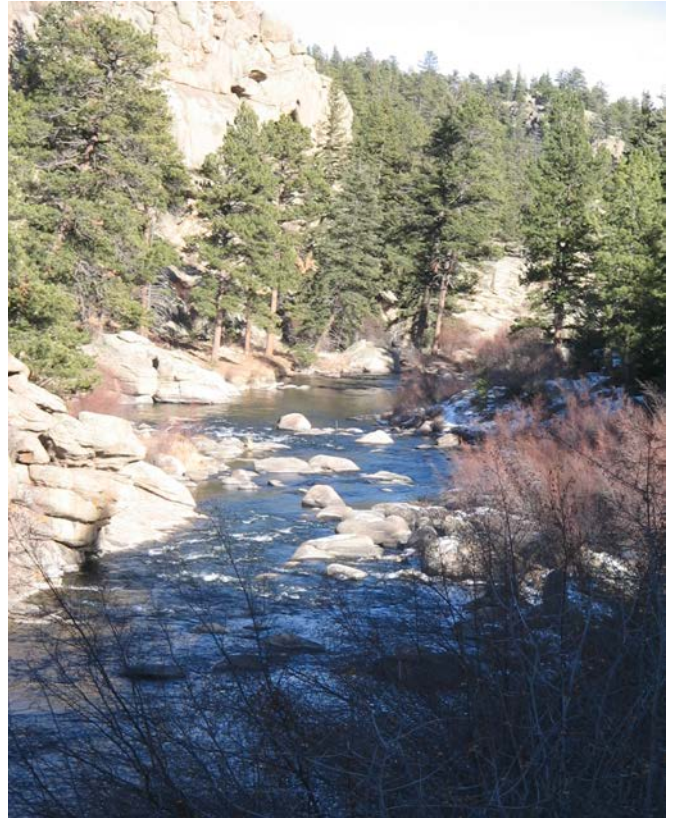


SEGMENT A

Segment A is the uppermost reach of the area included in the South Platte Protection Plan. It runs for 8.7 miles from Elevenmile Dam (downstream from the fence on Denver Water's special use area) to Lake George, and includes Reaches 31 through 23. Its outstandingly remarkable values include scenic, recreational, geological, fisheries.

As seen in the photo on the next page, the Canyon is a geologic gem of the Upper South Platte Watershed, with beautiful rock outcroppings in various areas along its run. These rock outcroppings are also a recreational asset, used by mountain climbers (including the U.S. Army and Airforce for training purposes).

Although climbers enjoy the Canyon, the largest recreational pursuit is fishing, with thousands of fishermen frequenting the Canyon on a busy weekend. Other visitors enjoy hiking, birdwatching, picnicing, and camping. The U.S. Forest Serv-





There is a reason that the Elevenmile segment is considered an important recreational site in the Upper South Platte: this lunger is being weighed and measured during fish shocking at the IFIM site (instream flow incremental methodology site) in the Canyon.

ice estimates that over 350,000 visitors recreate in the Canyon each year. This visitation does have some negative implications for recreators enjoyment, and for environmental values, ranging from issues with adequate and safe parking, to excess sediment and aquatic nuisance species (New Zealand Mud Snail).

As such, the South Park Ranger District, which oversees the Canyon, is working on a travel management plan that will address some of the traffic issues. CUSP, in partnership with the South Park Ranger District and organizations like Trout Unlimited, has performed river restoration through the Canyon (the Trees for Trout project, circa 2004). The river restoration has shown improvement in stream bank vegetation, width-depth ratios, and habitat. The area has also benefitted significantly from the Denver Water/Aurora Water voluntary flow management program, which ramps flows to reduce washing of redds (fish eggs) and challenges to “young of the year” fish.

There appears to be nutrient issues in the canyon, as there is still excessive algae growth. Pit toilets have been replaced, but that has not corrected the issue. The source of nutrients is unknown. CUSP has made a recommendation to the U.S. Forest Service Rocky Mountain Research Station that they conduct a study to determine the cause.

Reaches 31 and 30

Reach 31 is closest to Elevenmile Dam, beginning at the edge of the Denver Water property line below the dam. These reaches have seen significant improvement in vegetation over former periods, but still has some degradation of banks, and the parking area adjacent to 31 continues to contribute excess sediment to the river.



RECOMMENDATION: We recommend that the upper parking area receive additional maintenance. We also recommend additional monitoring to try to determine the source of nutrients that are causing algae in the Canyon.



	Current Cycle				Former Cycle			
	Reach 31							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1205.92	1010.68	59.49	2276.09	754.00	854.00	541.00	2149.00
AVG WIDTH HABITAT (ft.)	63.67	53.62	62.31	59.87	72.75	62.58	55.80	63.71
RESIDUAL DEPTH (ft.)	1.54	0.00	0.00	1.54	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	1.64	0.00	0.00	1.64	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	75.00	81.25			8.33	66.67		
TYPE 2 > 50%veg./degrading	25.00	18.75			75.00	16.67		
TYPE 3 < 50%veg./no sign of stress	0.00	0.00			8.33	0.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			8.33	16.67		
	Current Cycle				Former Cycle			
	Reach 30							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	785.00	1433.46	511.46	2729.92	239.00	729.00	1188.00	2156.00
AVG WIDTH HABITAT (ft.)	62.34	62.95	59.59	61.63	63.00	62.20	65.20	63.47
RESIDUAL DEPTH (ft.)	1.22	0.00	0.00	1.22	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	1.74	0.00	0.00	1.74	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	62.50	87.50			41.67	100.00		
TYPE 2 > 50%veg./degrading	12.50	6.25			58.33	0.00		
TYPE 3 < 50%veg./no sign of stress	25.00	6.25			0.00	0.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	0.00		

Reach 29

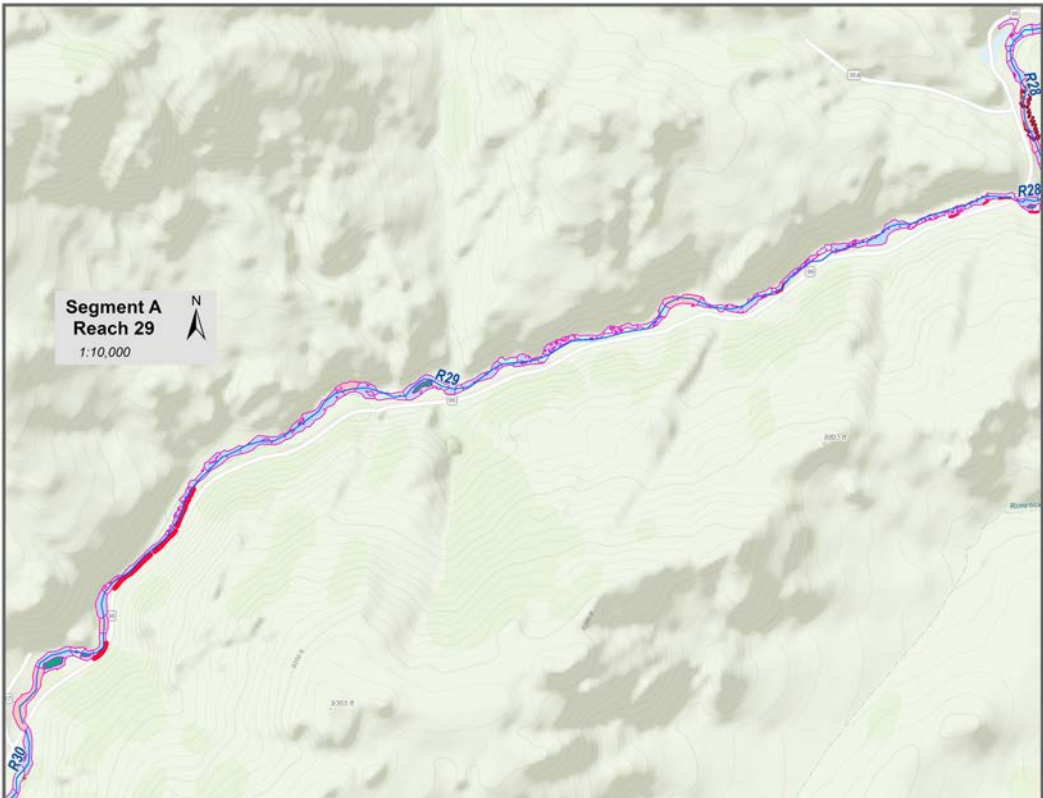
Reach 29 has several areas of highly eroding bank, driven primarily by proximity to the road, parking, and fishermen climbing up and down the banks to enter the river.



	Current Cycle				Former Cycle			
	Reach 29							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	3386.41	6840.14	1419.08	11645.63	3107.00	5908.70	1620.00	10635.70
AVG WIDTH HABITAT (ft.)	45.57	67.78	75.76	63.04	54.79	63.56	71.17	63.17
RESIDUAL DEPTH (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	0.00	0.00	0.00	0.00				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	66.07	51.79			47.62	46.03		
TYPE 2 > 50%veg./degrading	12.50	0.00			20.63	7.94		
TYPE 3 < 50%veg./no sign of stress	14.29	48.21			17.46	46.03		
TYPE 4 < 50%veg./degrading	7.14	0.00			14.29	0.00		



RECOMMENDATION: We recommend that in the future the partners install rock stair points to help stabilize the banks, and that the U.S. Forest Service remove parking areas adjacent to the river in this reach.



Reach 28

Reach 28 also has several areas of eroding banks, again driven by the road and parking, but it is generally in decent shape. This reach is home to the IFIM site (instream flow incremental methodology), and one of the first river restoration projects in the basin.

	Current Cycle				Former Cycle			
	Reach 28							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1581.57	1723.88	488.84	3794.29	814.00	1614.00	968.00	3396.00
AVG WIDTH HABITAT (ft.)	60.65	66.13	76.15	67.64	55.25	57.56	76.90	63.24
RESIDUAL DEPTH (ft.)	1.83	0.00	0.00	1.83	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.03	0.00	0.00	2.03	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	72.41	89.66			75.00	65.00		
TYPE 2 > 50%veg./degrading	3.45	6.90			5.00	20.00		
TYPE 3 < 50%veg./no sign of stress	24.14	3.45			20.00	10.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	5.00		



RECOMMENDATION: Address bank instability and road issues.

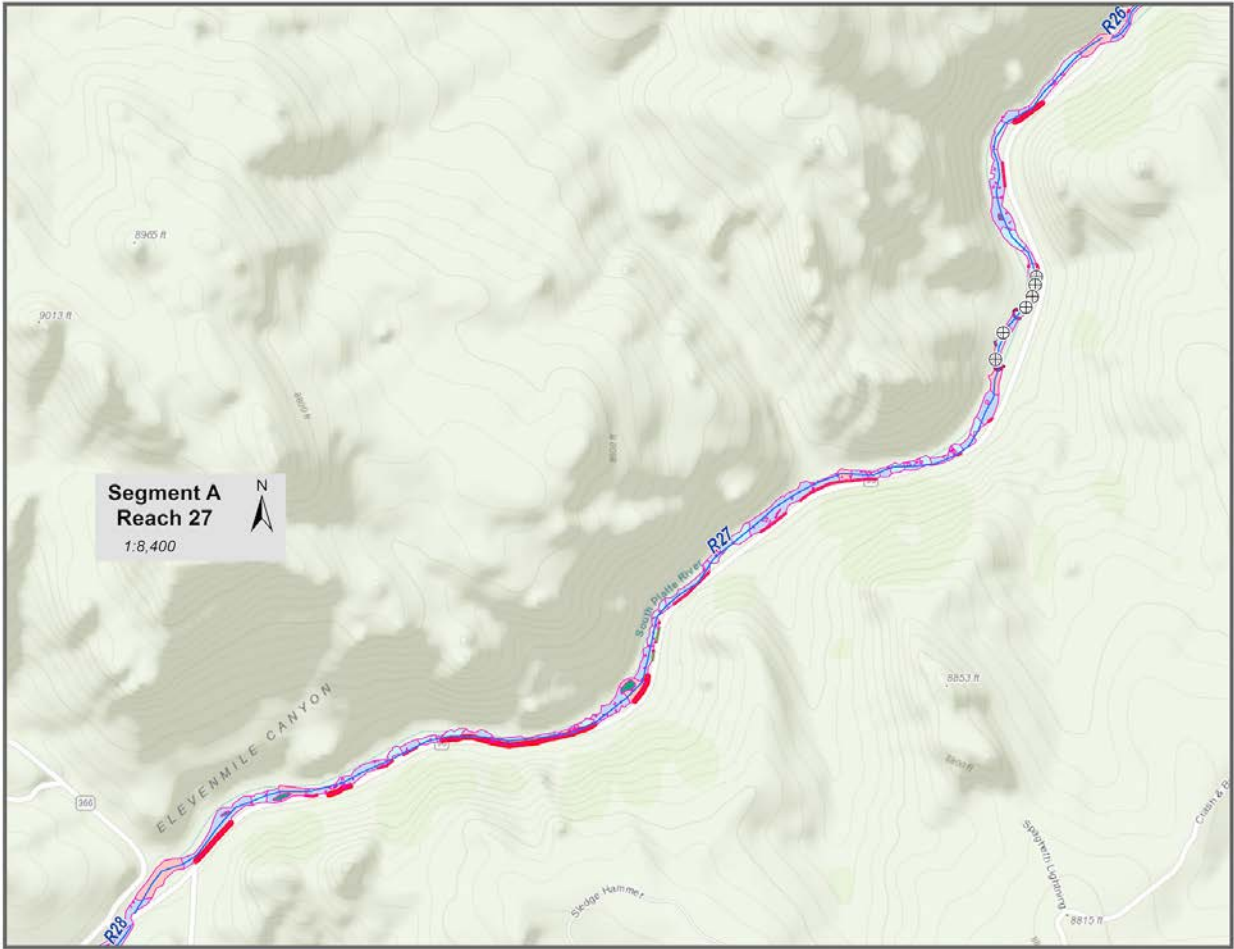
Reach 27

Although much of this reach is constrained by bedrock and rock walls right to the waters edge, this reach still has significant bank instability, and has actually gotten worse in areas as far as vegetation and bank stability goes since the last data was taken (1993 for this reach). Again, the road and fishermen access drives the instability.

	Current Cycle				Former Cycle			
	Reach 27							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	2981.33	5540.40	1151.11	9672.84	2343.00	5389.00	2024.00	9756.00
AVG WIDTH HABITAT (ft.)	48.17	51.71	63.03	54.30	49.32	46.32	49.29	48.31
RESIDUAL DEPTH (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	50.00	72.22			41.67	64.58		
TYPE 2 > 50%veg./degrading	24.07	0.00			43.75	4.17		
TYPE 3 < 50%veg./no sign of stress	3.70	27.78			4.17	31.25		
TYPE 4 < 50%veg./degrading	22.22	0.00			10.42	0.00		



RECOMMENDATION: Address bank instability and road issues.



Reach 26

Excess algae is readily seen in the photo below. During water quality sampling in hot weather in the Canyon, we have had some hits for nitrates that exceed water quality standards. We still don't have a clear understanding of what is causing the nutrients or the excessive algae growth. The banks are continuing to degrade along the roadside.



	Current Cycle				Former Cycle			
	Reach 26							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	2451.30	4026.46	1156.66	7634.42	1216.00	2647.00	2968.00	6831.00
AVG WIDTH HABITAT (ft.)	53.33	51.57	64.51	56.47	41.75	47.66	55.41	48.27
RESIDUAL DEPTH (ft.)	1.85	0.00	0.00	1.85	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.53	0.00	0.00	2.53	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	84.91	49.06			73.68	55.26		
TYPE 2 > 50%veg./degrading	0.00	49.06			10.53	42.11		
TYPE 3 < 50%veg./no sign of stress	15.09	1.89			15.79	2.63		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	0.00		



RECOMMENDATION: Address bank instability and road issues. Develop a monitoring program to understand what is driving nutrients and aglae.

Reaches 24 & 25

As with other reaches in the canyon, areas of erosion are primarily tied to the road. That said, the reach has seen significant improvement in vegetation and bank stability since the prior sampling cycle. Note the “Trees for Trout” structures in the photo at right.

	Current Cycle				Former Cycle			
	Reach 25							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1041.34	2043.54	0.00	3084.88	867.00	1381.00	739.00	2987.00
AVG WIDTH HABITAT (ft.)	49.36	57.20	0.00	35.52	46.75	45.05	53.10	48.30
RESIDUAL DEPTH (ft.)	2.81	0.00	0.00	2.81	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.69	0.00	0.00	2.69	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	76.19	61.90			45.45	45.45		
TYPE 2 > 50%veg./degrading	14.29	9.52			27.27	9.09		
TYPE 3 < 50%veg./no sign of stress	4.76	28.57			9.09	40.91		
TYPE 4 < 50%veg./degrading	4.76	0.00			18.18	4.55		
	Current Cycle				Former Cycle			
	Reach 24							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	973.39	1870.50	1102.19	3946.08	252.00	892.00	1906.00	3050.00
AVG WIDTH HABITAT (ft.)	48.43	56.02	56.33	53.59	45.00	47.50	48.40	46.97
RESIDUAL DEPTH (ft.)	1.02	0.00	0.00	1.02	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.22	0.00	0.00	2.22	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	95.00	100.00			58.33	91.67		
TYPE 2 > 50%veg./degrading	0.00	0.00			41.67	8.33		
TYPE 3 < 50%veg./no sign of stress	5.00	0.00			0.00	0.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	0.00		



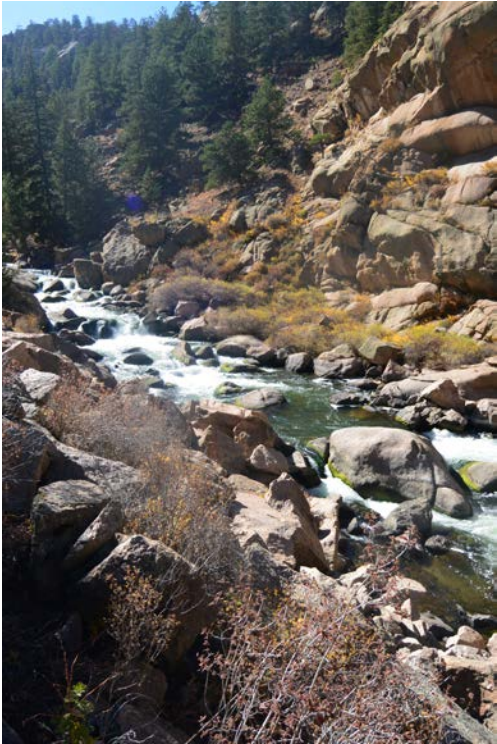
RECOMMENDATION: Address bank instability and road issues. Develop a monitoring program to understand what is driving nutrients and algae.



Reach 23

Reach 23 extends to the former Colorado Springs Utilities diversion dam, located at the mouth of the Canyon. The partners (USFS, CUSP, SPEB, Trout Unlimited, and Colorado Springs Utilities) are beginning a planning process to remove the dam, which is an aquatic species passage barrier, and has changed to the sediment transport and geomorphology of the river.

As with other areas of the Canyon, degraded areas are primarily associated with the road.



	Current Cycle				Former Cycle			
	Reach 23							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1494.68	3464.98	1015.34	5975.00	861.00	2979.00	1722.00	5562.00
AVG WIDTH HABITAT (ft.)	53.87	49.17	66.34	56.46	50.80	48.50	51.81	50.37
RESIDUAL DEPTH (ft.)	2.11	0.00	0.00	2.11	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.16	0.00	0.00	2.16	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	75.00	81.25			45.83	66.67		
TYPE 2 > 50%veg./degrading	15.63	0.00			45.83	8.33		
TYPE 3 < 50%veg./no sign of stress	6.25	18.75			0.00	25.00		
TYPE 4 < 50%veg./degrading	3.13	0.00			8.33	0.00		



RECOMMENDATION: Address bank instability and road issues. Continue efforts to remove the diversion dam.



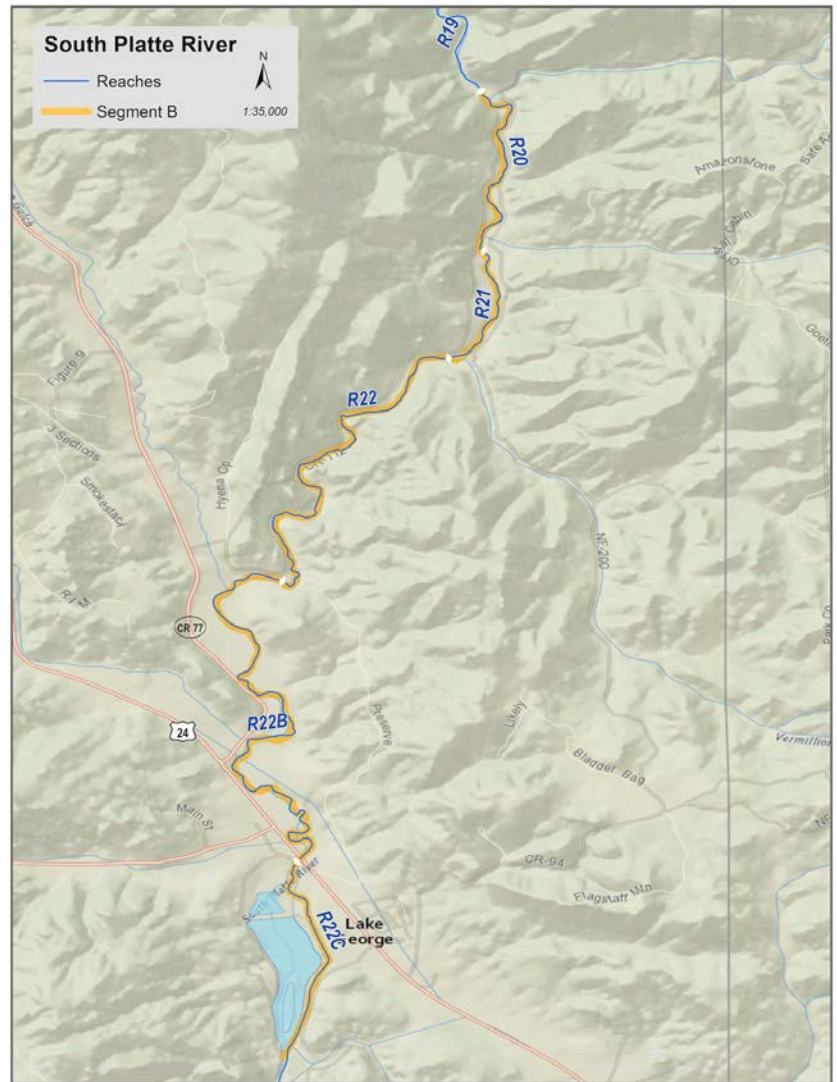
SEGMENT B

Segment B, which is approximately 7.5 miles long, runs from the mouth of Elevenmile Canyon, through Lake George, Happy Meadows, and Sportsmen's Paradise (at the confluence of Beaver Creek and the South Platte). It includes reaches 22 through 20. Fisheries is the listed value, however other forms of recreation, such as tubing, kayaking, swimming, and hiking, are more popular today at Happy Meadows than they were in the past. In part this attributed to the fact that it is still a fee-free area along the river.

Reach 22 is broken into three portions, A, B, and C due to ownership and our ability to access the stream. Reach 22B represents a large portion of the river that runs through Lake George that is under private ownership, and for which we did not receive permission from the current owner of this stretch to collect data; however the property is expected to change hands in 2019 and the expected new owner has reached out and will not only grant permission for monitoring, but he is also interested in river restoration.

Reach 22C, which is mainly in private hands, Happy Meadows (22A) and the Sportsmen's Paradise reaches (21 and 20) have all had river restoration projects completed in the last decade. These reaches also had direct impacts from the 2002 Hayman fire, which burned in the drainages to the east of the river in this area.

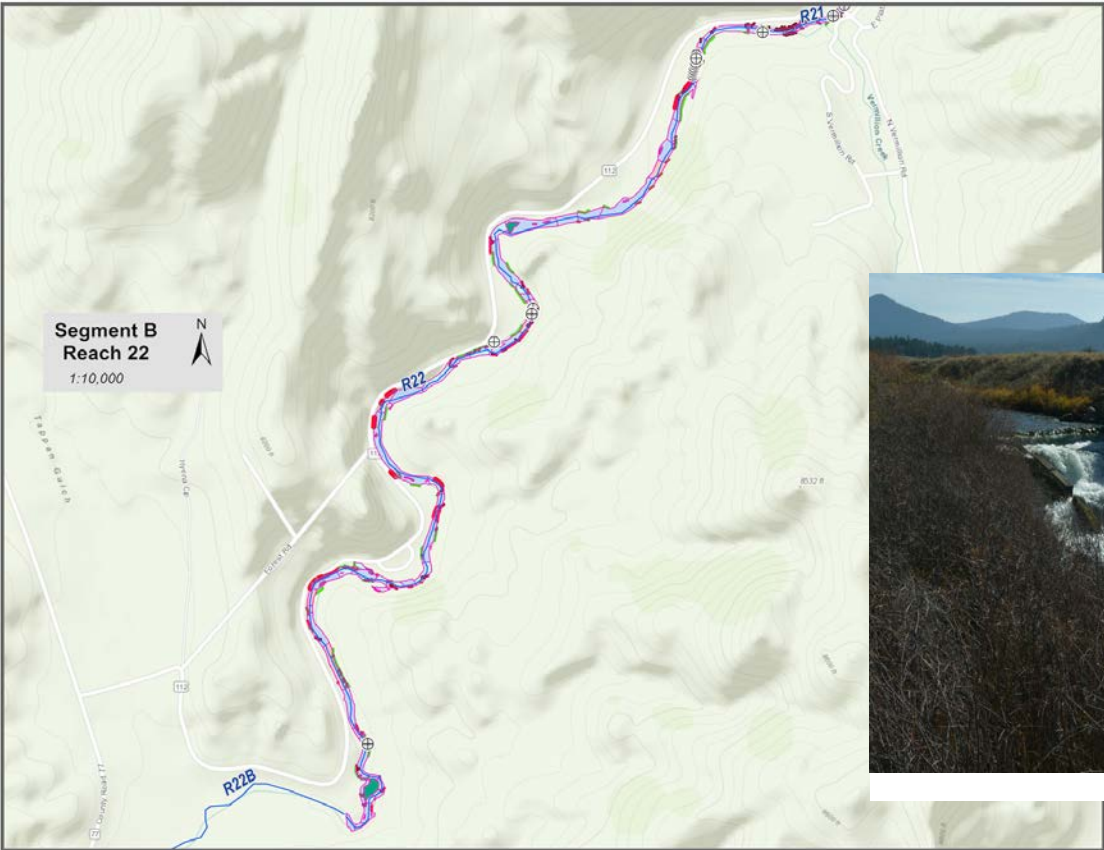
Looking downstream of the diversion dam, located at the uppermost point of segment B.



Reach 22

Reach 22 is partly on federal land, and partly on private. There is a second diversion below the Colorado Springs Utilities diversion, on 22c, which diverts water into Lake George (a private lake), and a third diversion on 22b that diverts water for irrigation of the fields.

We know that 22B has significant portions of eroding banks from roadside observations, and that the diversion on this section has created overwidening and headcutting. Along 22A, the portion that runs through Happy Meadows, there are still small areas of eroding bank, again, a direct impact from adjacent gravel roads, and there is still some sediment making it to the river from the Hayman scar, though this is highly reduced at this time. Overall, however, 22C, the segment through Happy Meadows, is in much better overall condition then when the last data was taken in 2009, immediately following the Happy Meadows restoration project. That said, there are significant social trails that continue to add sediment as well.



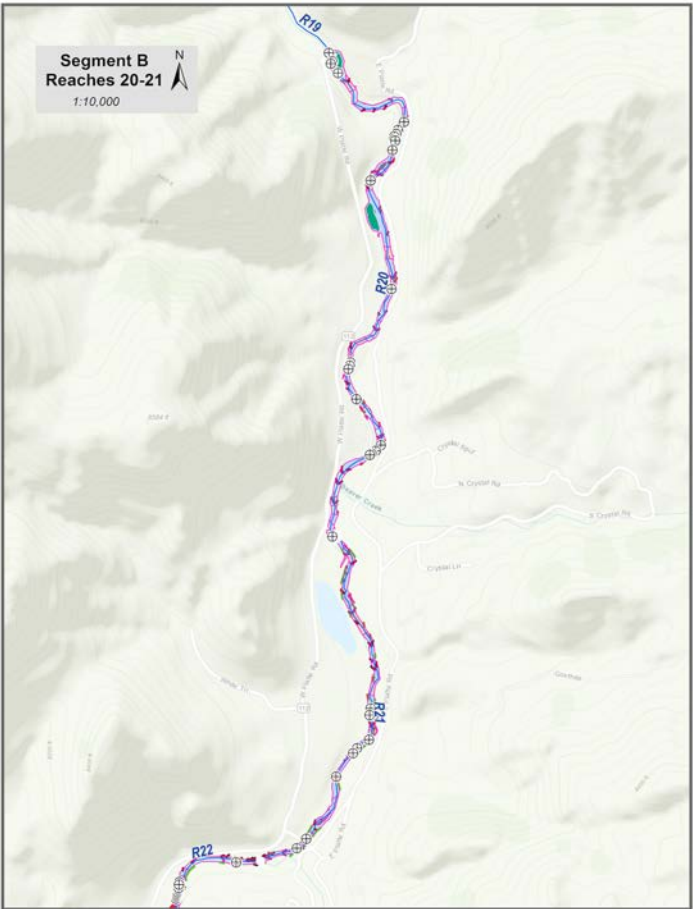
	Current Cycle				Former Cycle			
	Reach 22							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	3258.19	7149.78	1249.43	11657.40	2608.00	5606.00	2894.00	11108.00
AVG WIDTH HABITAT (ft.)	47.34	58.76	48.63	51.57	55.89	61.19	68.20	61.76
RESIDUAL DEPTH (ft.)	1.58	0.00	0.00	1.58	2.02	0.00	0.00	2.02
AVERAGE DEPTH (ft.)	1.88	0.00	0.00	1.88	2.05	0.00	0.00	2.05
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	77.36	84.91			84.00	72.00		
TYPE 2 > 50%veg./degrading	18.87	15.09			16.00	28.00		
TYPE 3 < 50%veg./no sign of stress	1.89	0.00			0.00	0.00		
TYPE 4 < 50%veg./degrading	1.89	0.00			0.00	0.00		



RECOMMENDATION: Reduce the number of social trails along the river, and move parking and camping away from the banks.

Reaches 21 & 20

Reaches 21 and 20 are in the private inholding, Sportsmans Paradise. CUSP partnered with the community in 2012 to remove a dam and redevelop the diversion, and to perform river restoration in conjunction with the Happy Meadows restoration project. Bank stability and habitat have substantially improved in these reaches, and the new diversion allows fish passage between Cheesman and the diversion dam at the mouth of Elevenmile Canyon.



RECOMMENDATION: Continue relationship with the Association to maintain the value of the investment.

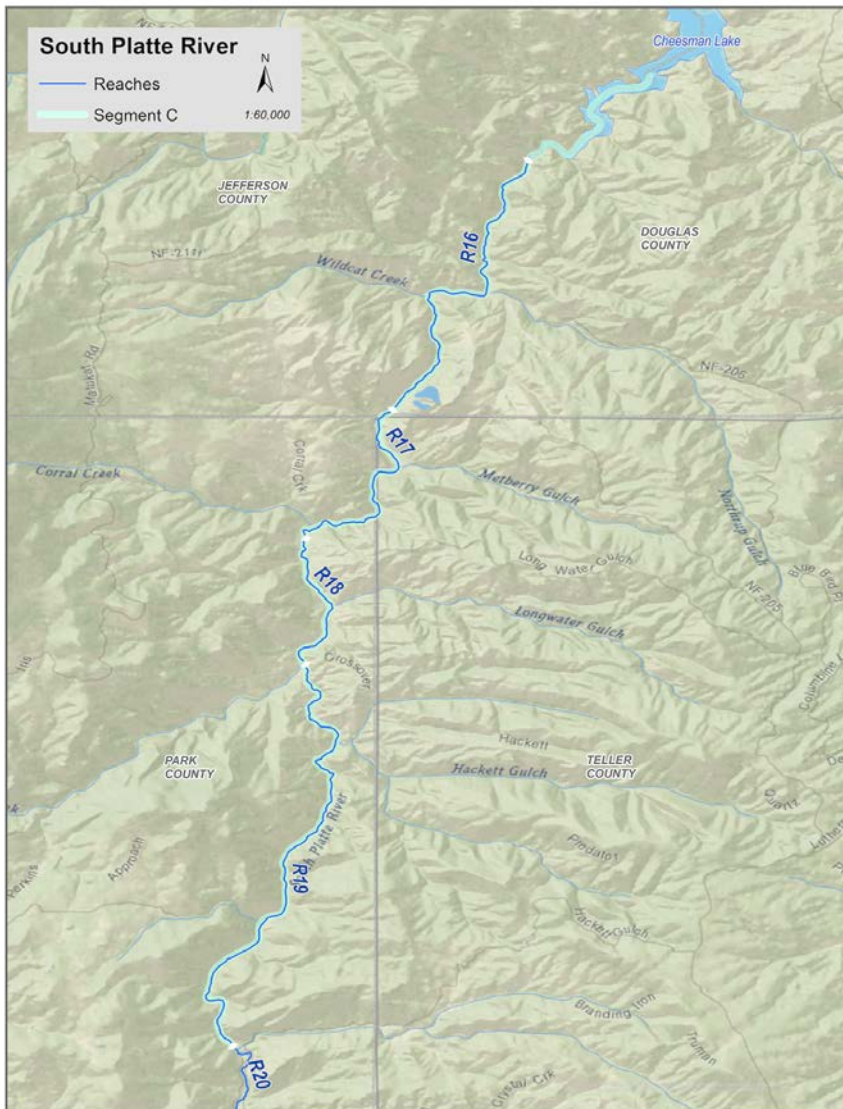
	Current Cycle				Former Cycle			
	Reach 21							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1172.72	2127.11	801.45	4101.28	917.00	1851.00	887.00	3655.00
AVG WIDTH HABITAT (ft.)	36.04	53.59	52.36	47.33	70.00	70.00	70.00	70.00
RESIDUAL DEPTH (ft.)	1.16	0.00	0.00	1.16	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	1.96	0.00	0.00	1.96	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	96.00	92.00			92.59	81.48		
TYPE 2 > 50%veg./degrading	4.00	8.00			7.41	14.81		
TYPE 3 < 50%veg./no sign of stress	0.00	0.00			0.00	0.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	0.00		
	Current Cycle				Former Cycle			
	Reach 20							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1480.19	3456.53	918.79	5855.51	1992.00	2661.00	1181.00	5834.00
AVG WIDTH HABITAT (ft.)	50.97	61.62	53.37	55.32	70.00	70.00	70.00	70.00
RESIDUAL DEPTH (ft.)	2.38	0.00	0.00	2.38	0.00	0.00	0.00	0.00
AVERAGE DEPTH (ft.)	2.20	0.00	0.00	2.20	0.00	0.00	0.00	0.00
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	100.00	97.14			88.37	95.35		
TYPE 2 > 50%veg./degrading	0.00	0.00			9.30	4.65		
TYPE 3 < 50%veg./no sign of stress	0.00	2.86			0.00	0.00		
TYPE 4 < 50%veg./degrading	0.00	0.00			2.33	0.00		



SEGMENT C

Segment C runs for 10.4 *extremely rugged* miles from the confluence Beaver Creek to Cheesman Reservoir. The values identified for this segment are scenic, geological, fisheries, wildlife, and includes reaches 16 through 19.

Due to the ruggedness of the terrain, several segments had no previous data, and segment 19 had no data other than photo points collected during this sampling cycle for the safety of our crew (Pete Gallagher, former Pike National Forest fisheries biologist and owner of Fin-Up Habitat Consultants; Dave Winters, former Regional Fisheries Biologist for the US Forest Service; Denny Bohon, former Biologist, Pike National Forest; and Greg Policky, former Colorado Parks and Wildlife Aquatic Biologist). Much of the segment is steep and narrow, with extremely rocky A or B channel configurations (as seen in the photo below).



These segments were directly impacted by the Hayman Fire, and are still showing impacts from the fire.



Reach 19

As discussed above, this reach was too dangerous to sample when the crew went in, on two different occasions.

We have concerns with the continued OHV use on the Hackett Gulch area, which is officially closed to OHV traffic, but is being utilized in spite of the closure. Photos show sediment and mid-channel islands forming due to crossing.

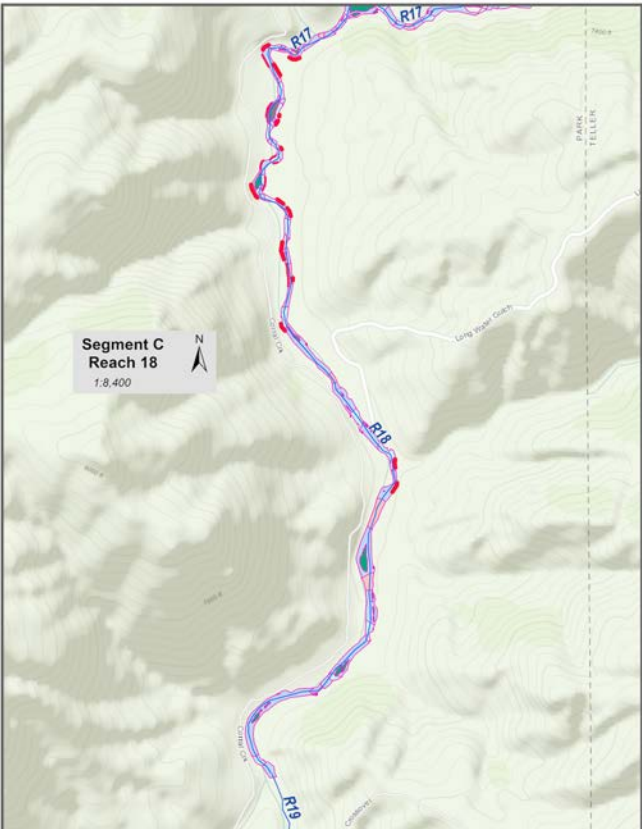



RECOMMENDATION: Enforce and harden closure, or develop a plan to manage recreation.

Reach 18

Between the closed-but-being-accessed by OHV’s portion of Corral Creek Road, and the after effects of the Hayman Fire, this reach has significant erosion and bank areas of bank instability, particularly where vehicles are entering the river.

	Current Cycle				Former Cycle			
	Reach 18							
TOTAL HABITAT (ft.)	2097.04	5181.42	869.40	8147.86				
AVG WIDTH HABITAT (ft.)	45.28	51.06	47.62	47.98				
RESIDUAL DEPTH (ft.)	2.71	0.00	0.00	2.71				
AVERAGE DEPTH (ft.)	2.44	0.00	0.00	2.44				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	70.45	63.64						
TYPE 2 > 50%veg./degrading	15.91	27.27						
TYPE 3 < 50%veg./no sign of stress	2.27	0.00						
TYPE 4 < 50%veg./degrading	11.36	9.09						



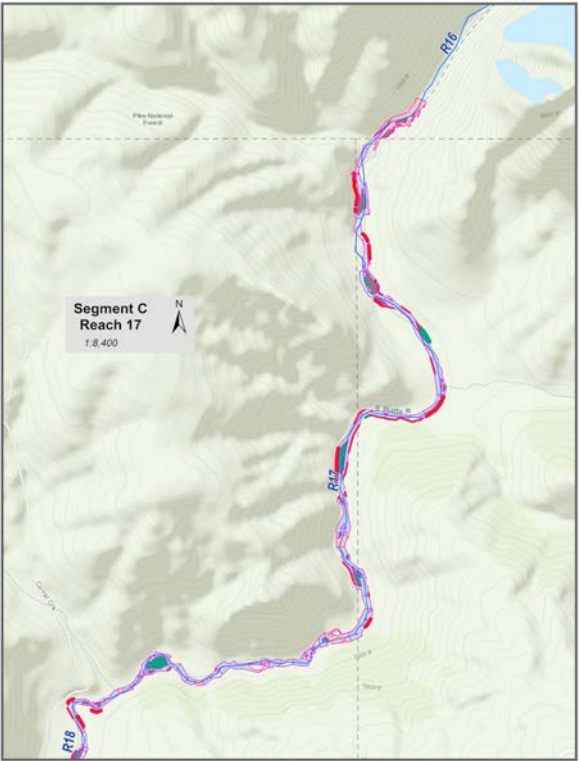


RECOMMENDATION: Enforce and harden closure, or develop a plan to manage recreation.

Reach 17

Although much of the reach is impossible to access, and the remainder has reduced motorized use, so there has been improvement since the last monitoring of this reach.

	Current Cycle				Former Cycle			
	Reach 17							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	2711.64	6776.55	1466.34	10954.53	3979.00	4782.50	1638.00	10399.50
AVG WIDTH HABITAT (ft.)	45.04	53.68	57.33	52.02	50.35	61.10	77.34	62.93
RESIDUAL DEPTH (ft.)	3.03	0.00	0.00	3.03	3.06	0.00	0.00	3.06
AVERAGE DEPTH (ft.)	2.37	0.00	0.00	2.37	2.73	1.56	1.78	2.73
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	51.85	61.11			65.59	66.67		
TYPE 2 > 50%veg./degrading	27.78	25.93			4.30	7.53		
TYPE 3 < 50%veg./no sign of stress	20.37	12.96			30.11	23.66		
TYPE 4 < 50%veg./degrading	0.00	0.00			0.00	2.15		



RECOMMENDATION: Enforce and harden closure, or develop a plan to manage recreation.

Reach 16

Reach 16 benefits from no available motorized access. This stretch of river is in excellent condition.

	Current Cycle				Former Cycle			
	Reach 16							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1287.29	4772.63	3661.34	9721.26				
AVG WIDTH HABITAT (ft.)	45.11	54.21	76.98	58.77				
RESIDUAL DEPTH (ft.)	0.00	0.00	0.00	0.00				
AVERAGE DEPTH (ft.)	0.00	0.00	0.00	0.00				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	44.44	44.44						
TYPE 2 > 50%veg./degrading	0.00	0.00						
TYPE 3 < 50%veg./no sign of stress	55.56	55.56						
TYPE 4 < 50%veg./degrading	0.00	0.00						



RECOMMENDATION: No recommendation at this time.

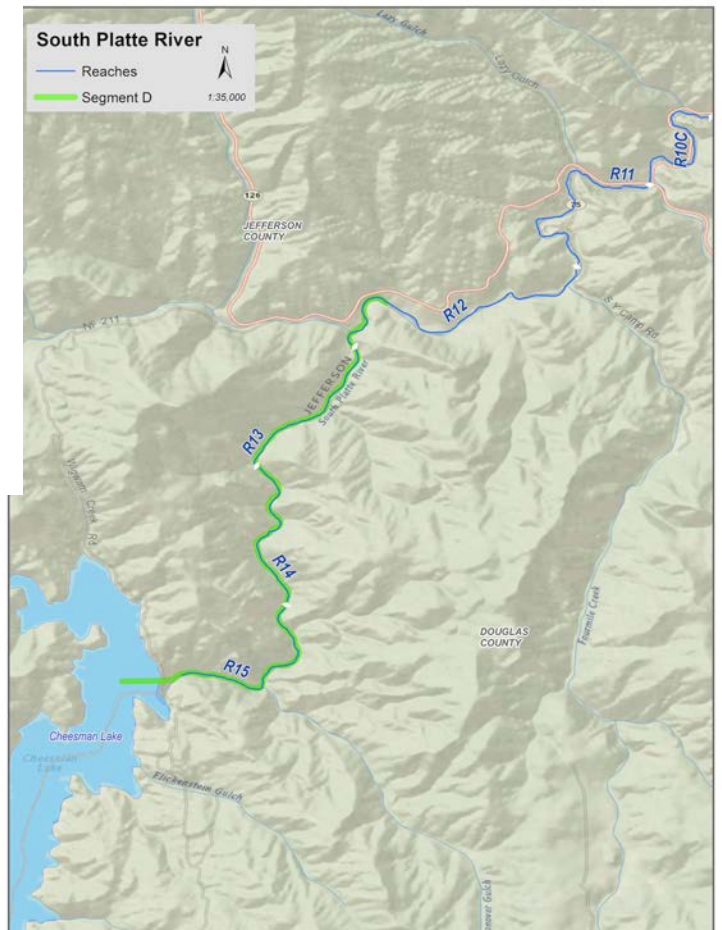


SEGMENT D

Segment D is the shortest segment, at a mere 3.1 miles, running from the mouth of Cheesman Reservoir to the upstream boundary of the Wigwam Club, and includes reaches 13 through 15. The segment's values are recreational, fisheries, and wildlife. For crew safety, data was not collected in Reaches 15 or 14 due to the steep, rocky channels, as seen in the photo below.

These reaches are accessed at parking areas on Denver Water's Cheesman property and on Hwy 126, and there is rough trails paralleling the river. It is a favorite area for serious fishermen.

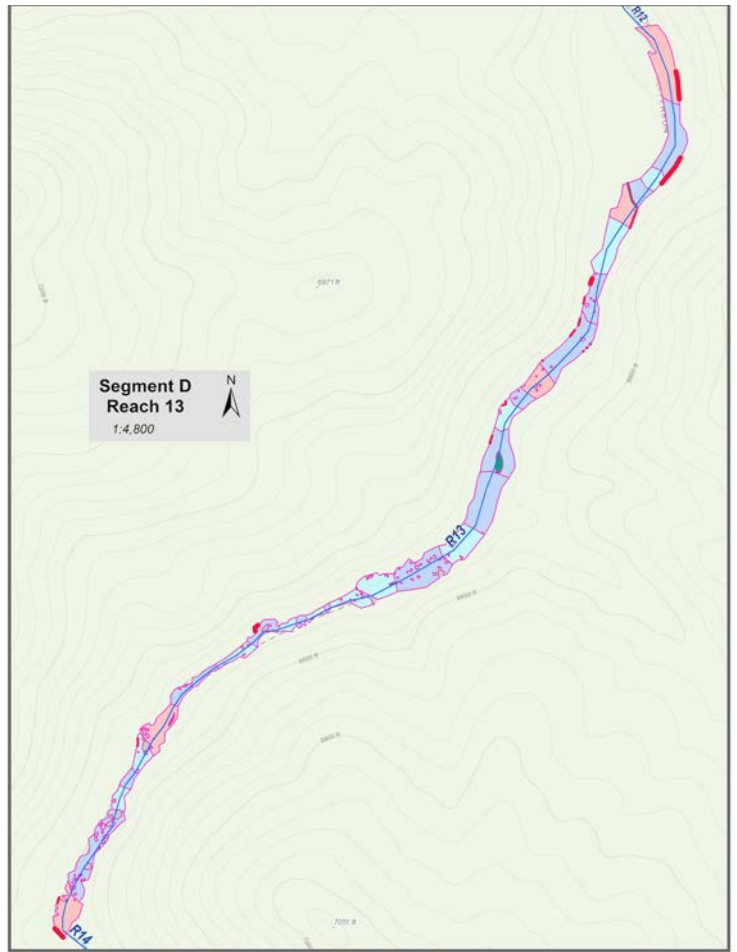
Generally speaking, due to the ruggedness and rockiness, this area is in a good condition, however there are social trails that contribute excess sediment to the river.



Reach 13

Reach 13 is generally in good shape, but does need consistent trail maintenance and reducing social trails, as well as working to increase vegetation on slopes above the river..

	Current Cycle				Former Cycle			
	Reach 13							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1619.43	2735.46	977.00	5331.89				
AVG WIDTH HABITAT (ft.)	58.83	65.37	88.72	70.97				
RESIDUAL DEPTH (ft.)	5.95	0.00	0.00	5.95				
AVERAGE DEPTH (ft.)	5.34	0.00	0.00	5.34				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	35.48	54.84						
TYPE 2 > 50%veg./degrading	12.90	3.23						
TYPE 3 < 50%veg./no sign of stress	48.39	41.94						
TYPE 4 < 50%veg./degrading	3.23	0.00						



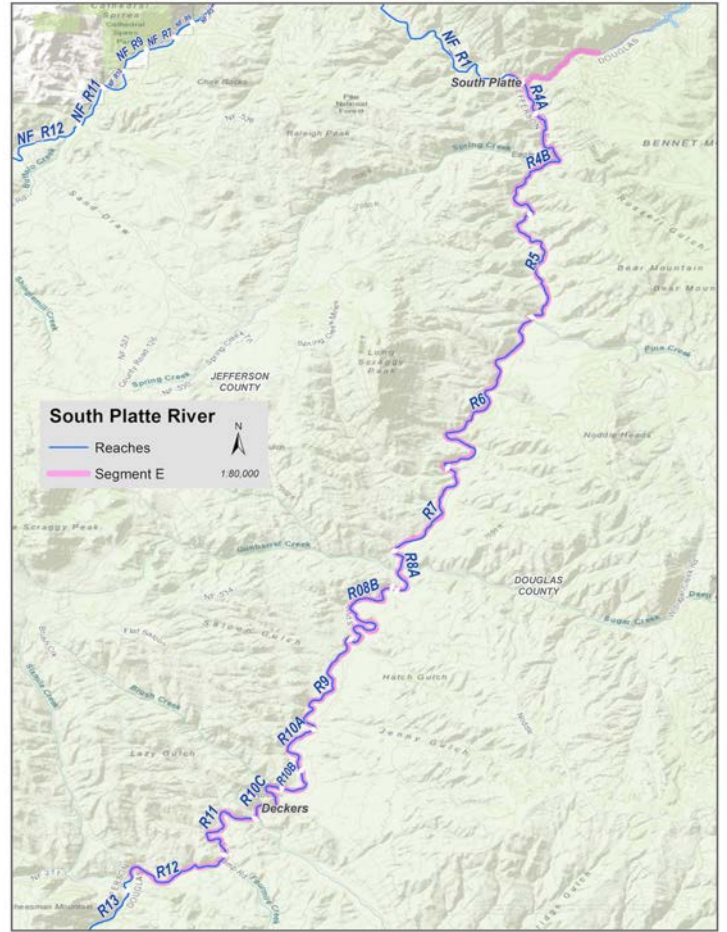
RECOMMENDATION: Increase trail maintenance. (Denver Water has already increased funding for more trail maintenance starting in 2019.)

SEGMENT E

At 19.5 miles, Segment E is the longest segment along the river. Its values include: Recreational, fisheries, wildlife and includes reaches 4 through 12.

There are several reaches along this segment that are private, including Reach 12, which runs through the Wig Wam Club, and Reach 9, which runs through Swayback Ranch, and Reaches 4-7, which are generally bed-rock controlled, and include substantial intermixed areas of private land. Denver Water owns significant land along this Segment.

Segment E is readily accessible with Highway 67 and the Y-Camp Road running adjacent to it, so it is heavily used by fishermen, sightseers, and tubers and kayakers. Because of the high level of usage, many reaches have excessive social trail development, and trash and weeds are a problem. The Segment was highly impacted by the Hayman and other fires.



The South Platte at Deckers.

Reach 11

Reach 11 runs from the lower boundary of the Wig-Wam Club to Deckers. It has several areas of highly eroding bank due to the adjacent gravel road and fisherman access. CUSP, with SPEB and Trout Unlimited Funding has begun installing rock stairs for access.

New Zealand Mudsnails were found in the river near Lone Rock Campground in 2017.



RECOMMENDATION: Continue stair installation. Work with road crews to reduce erosion from the road.

	Current Cycle				Former Cycle			
	Reach 11							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1760.43	3754.14	1934.95	7449.52	2232.00	3166.00	1868.00	7266.00
AVG WIDTH HABITAT (ft.)	51.03	67.68	75.34	64.68	50.28	67.60	77.98	65.29
RESIDUAL DEPTH (ft.)	2.67	0.00	0.00	2.67	1.99	0.00	0.00	1.99
AVERAGE DEPTH (ft.)	2.88	0.00	0.00	2.88	2.26	0.98	1.22	2.26
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	54.17	70.83			43.10	87.93		
TYPE 2 > 50%veg./degrading	29.17	10.42			8.62	1.72		
TYPE 3 < 50%veg./no sign of stress	16.67	18.75			15.52	8.62		
TYPE 4 < 50%veg./degrading	0.00	0.00			32.76	1.72		

Reach 10

No data was collected prior to our project on Reach 10, which runs from Deckers to the upper boundary with Swayback Ranch. As with other areas in this segment, social trails are causing bank erosion. 10B has been impacted by drainage from the Hayman fire.



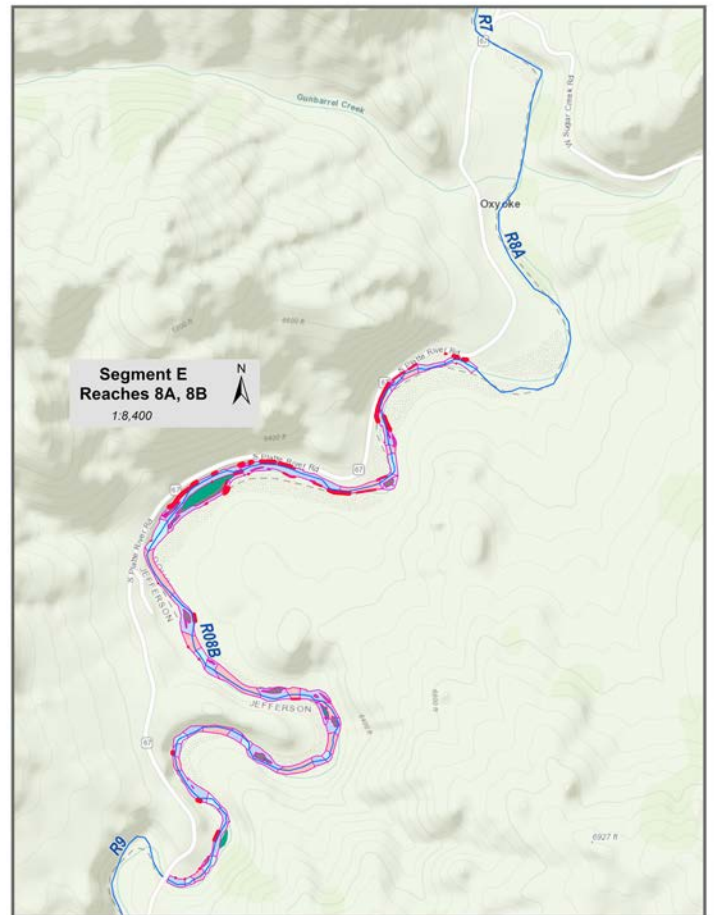
	Current Cycle				Former Cycle			
	Reach 10							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	3118.05	8322.51	2555.34	13995.90				
AVG WIDTH HABITAT (ft.)	54.51	62.34	66.75	61.20				
RESIDUAL DEPTH (ft.)	1.90	0.00	0.00	1.90				
AVERAGE DEPTH (ft.)	2.27	0.00	0.00	2.27				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	77.61	79.10						
TYPE 2 > 50%veg./degrading	19.40	17.91						
TYPE 3 < 50%veg./no sign of stress	2.99	2.99						
TYPE 4 < 50%veg./degrading	0.00	0.00						



RECOMMENDATION: Work on reducing socail trails, and continue installing fisherman stairs.

Reach 8

Reach 8 runs from the bottom of Swayback to private lands at Oxyoke. The road is the primary contributor to sedimentation, followed by social trails and access points.



	Current Cycle				Former Cycle			
	Reach 8							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	2108.26	5877.10	2698.32	10683.68	1130.00	2151.00	666.00	3947.00
AVG WIDTH HABITAT (ft.)	49.96	61.27	66.05	59.09	72.83	70.92	55.50	66.42
RESIDUAL DEPTH (ft.)	1.88	0.00	0.00	1.88	1.92	0.00	0.00	1.92
AVERAGE DEPTH (ft.)	1.92	0.00	0.00	1.92	2.23	0.83	1.37	1.48
% Veg & Bank Stability	LEFT BANK	RIGHT BANK			LEFT BANK	RIGHT BANK		
TYPE 1 > 50%veg./no sign of stress	80.43	73.91			100.00	37.50		
TYPE 2 > 50%veg./degrading	10.87	17.39			37.50	6.25		
TYPE 3 < 50%veg./no sign of stress	8.70	6.52			0.00	0.00		
TYPE 4 < 50%veg./degrading	0.00	2.17			0.00	56.25		



RECOMMENDATION: Work on reducing social trails, and continue installing fisherman stairs. Work with CDOT to improve road maintenance.

SEGMENT H

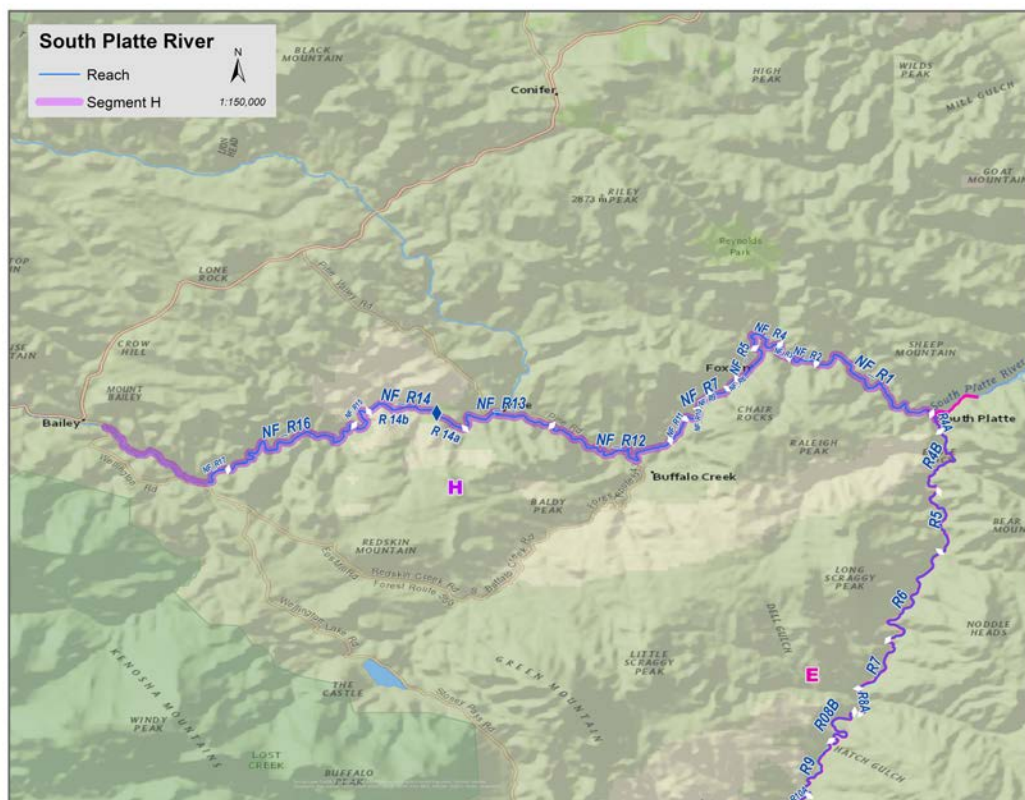
Segment H covers the North Fork of the South Platte from Insmont to the confluence with the mainstem. The ORVs for this segment include Recreational, Wildlife, and Cultural.

This segment has significantly more private land along it than Segments along the mainstem, and a large portion of the public lands is bedrock hardened reaches that do not tend to change with flows. For these reasons, our team investigated representative reaches on 14.

Segment H has been impacted by the Buffalo Creek and Hi Meadow fires (1996 and 2000 respectively). Buffalo Creek, in particular, resulted in thirteen 100+ year flood events in the first year and a half after the fire, and deposited hundreds of thousands of tons of sediment in the river. Roads also cause significant impacts along this segment, as several miles remain unpaved between Foxton Road and the South Platte Confluence, and the paved portions of Foxton Road contains little vegetation between road's edge and river.



Glenisle, circa 1920

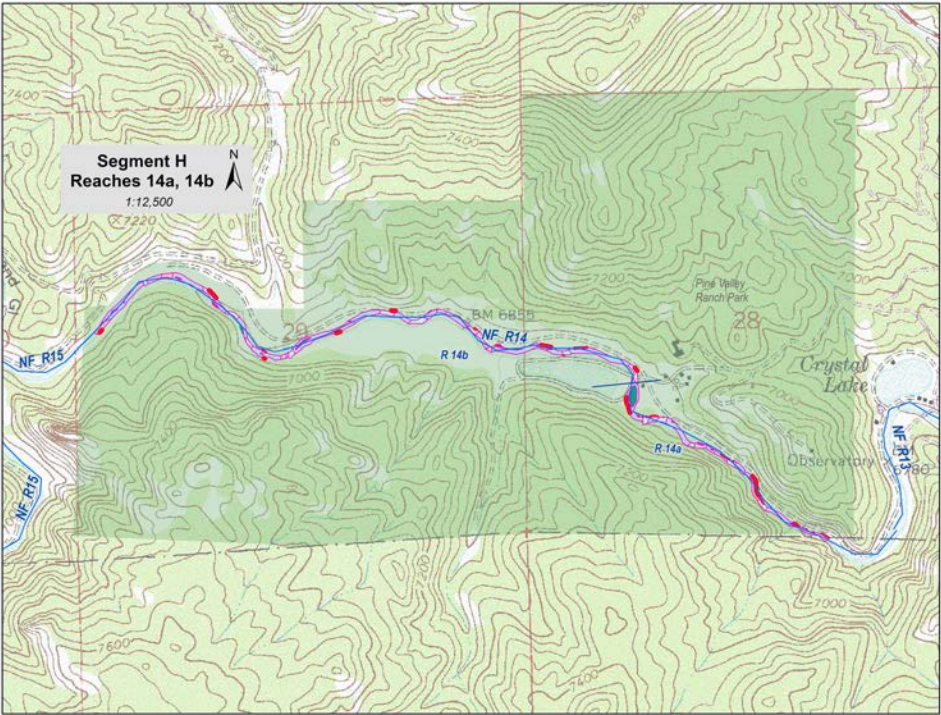


Reach 14

Reach 14 is representative of much of the North Fork. Data was collected in two series, 14a, and 14 b. As seen in the photo below, much of the North Fork is a constrained in narrow and rocky channels, which helps the river to remain stable.



	Current Cycle				Former Cycle			
	Reach 14a							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	655.09	2121.27	0.00	2776.36				
AVG WIDTH HABITAT (ft.)	52.26	44.33	0.00	32.20				
RESIDUAL DEPTH (ft.)	2.34	0.00	0.00	2.34				
AVERAGE DEPTH (ft.)	2.72	0.00	0.00	2.72				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	58.82	29.41						
TYPE 2 > 50%veg./degrading	0.00	41.18						
TYPE 3 < 50%veg./no sign of stress	35.29	0.00						
TYPE 4 < 50%veg./degrading	0.00	23.53						
	Current Cycle				Former Cycle			
	Reach 14b							
	POOL	RIFFLE	GLIDE	TOTAL	POOL	RIFFLE	GLIDE	TOTAL
TOTAL HABITAT (ft.)	1559.65	5290.71	955.60	7805.96				
AVG WIDTH HABITAT (ft.)	43.44	53.34	50.42	49.06				
RESIDUAL DEPTH (ft.)	1.16	0.00	0.00	1.16				
AVERAGE DEPTH (ft.)	2.02	0.00	0.00	2.02				
% Veg & Bank Stability	LEFT BANK	RIGHT BANK						
TYPE 1 > 50%veg./no sign of stress	93.94	81.82						
TYPE 2 > 50%veg./degrading	0.00	12.12						
TYPE 3 < 50%veg./no sign of stress	6.06	0.00						
TYPE 4 < 50%veg./degrading	0.00	6.06						



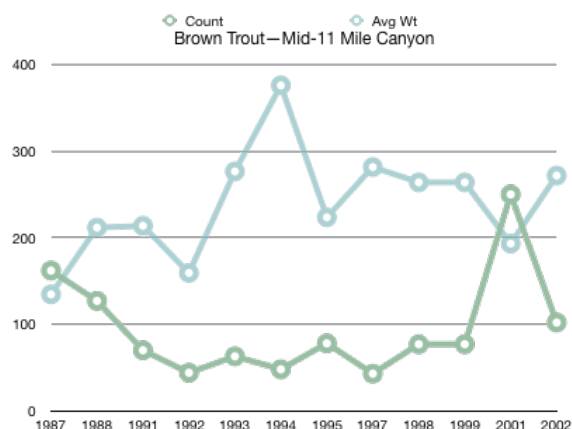
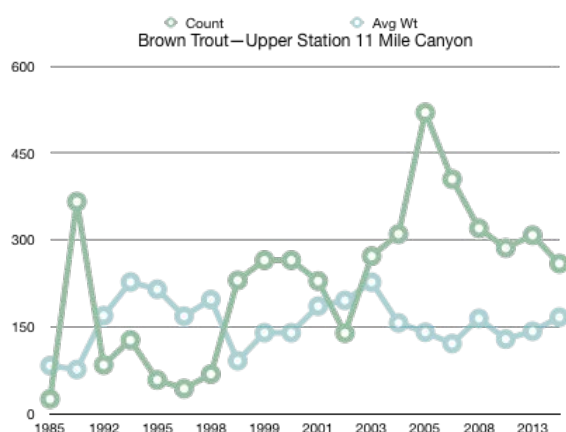
RECOMMENDATION: No recommendation at this time.

OTHER DATA

Through the course of this project, we have acquired other data that can provide a record of where the river is at this time, including fishery data from CPW, and water quality data from various public sources.

Generally speaking, the system is in worse condition than when Wild & Scenic consideration started, due to the various wildfires in the basin since the start of the process; however, the trend has been improving as the ecosystem comes back from the fires.

The data in both of these categories is a rich source of information. For example, we can look at a specific species in a specific location. Note on the charts below that weights of brown trout are higher lower in the Elevenmile Canyon than just below the dam, though the number of brown trout is higher closer to the dam.



Both sets of data files are massive, containing thousands of records, so at this point, they are not shared in more detail in this report, but if report users have specific questions on fishery and water quality data, please contact Carol Ekarius at CUSP (719-748-0033).

LITERATURE REVIEW

As an initial step in developing the Baseline Study CUSP staff performed a literature review. The following reports and papers were pertinent to the segments. Literature has been categorized by the OHV it covers.

All reports and papers described below are available from CUSP upon request. Most are stored in an electronic drive online. The segment designations are noted after the title and source information

Overall

“Two Forks Metropolitan Denver Water Supply Environmental Impact Statement,” US Army Corps of Engineers — 1988 (Segments A, B, C, D, E, & H)

The environmental impact statement (EIS) dealt with the Two Forks Dam and Reservoir proposal, a water supply project proposed by the Denver Board of Water Commissioners and the Metropolitan Water Providers to help meet the water supply needs of the Denver metropolitan area. The EIS was finished in March 1988 and recommended construction of a dam on the South Platte River, approximately 1 mile downstream from its confluence with the North Fork. The proposed reservoir would have a surface area of about 7,300 acres and would provide a storage capacity of 1,100,000 acre-feet. After several years of meetings and review, the US environmental Protection Agency (EPA) issued a Recommendation Determination in 1990 to prohibit construction of the Two Forks Dam and reservoir pursuant to section 404(c) of the Clean Water Act (EPA, 1990).

Eight suburban water districts appealed EPA’s decision. On June 5th, 1996, US District Judge Richard Matsch dismissed the appeal. The judge ruled that EPA had not “acted capriciously and arbitrarily” in blocking construction of the dam because of its impact on the environment. The judge also ruled that the eight suburban water districts did not have legal standing to proceed with the case without support of the Denver Water Board. The forest services’ interpretation of section 5(d)(1) of the WSRA that a Wild and Scenic Rivers assessment would have to occur prior to any decision that would allow construction of a containment structure.

“Wild and Scenic River Study Report and Final Environmental Impact Statement, North Fork of the South Platte and the South Platte Rivers,” Pike National Forest — 1997 (Segments A, B, C, D, E, & H)

The study area was reviewed as part of the Wild and Scenic River Study Report and the Draft Environmental Impact Statement (DEIS) for the North Fork of the South Platte and the South Platte River, followed by the Supplemental Draft Legislative Environmental Impact Statement (DLEIS), released in March 2000. In 2004, the Final Environmental Impact Statement (FEIS) was released, outlining the Preferred Alternative (USDA Forest Service, 2004b). The result of this study determined that the study area would be sufficiently managed under a federal, state, and local government partnership, as outlined in the South Platte Protection Plan (South Platte Protection Plan)(SPEB, 2001). At this time, the 1984 Forest Plan was amended to include these

portions of the South Platte River as “eligible” for Wild and Scenic status, which affords protection from activities that could diminish the character of the river (USDA Forest Service, 2004a).

“Record of Decision: Wild and Scenic River Study Report and Final Environmental Impact Statement: North Fork of the South Platte and the South Platte Rivers” Pike National Forest — 2004 (Segments A, B, C, D, E, & H)

The purpose of the Wild and Scenic River study is to provide a basis for Congress to determine whether to add two rivers in Colorado into the National Wild and Scenic Rivers System. This document includes the eligibility and suitability studies for 99.5 miles of river, including the North Fork of the South Platte River and segments of the South Platte River; it combines material presented in the Draft Legislative Environmental Impact Statement (DLEIS), released in April 1997, and the Supplemental Draft Legislative Environmental Impact Statement (SDLEIS), released in March 2000. The Forest Service states in this document that it intends to protect the outstandingly remarkable values (ORVs), free-flow and water quality of eligible segments of the South Platte River through the cooperative process described in Alternative A2 with Forest Service legal authorities added as described in Alternative A3. The river’s ORV’s, free-flow, and water quality are to be managed under a Federal/State/local government partnership as outlined in the South Platte Protection Plan (Appendix A). As one of the stipulations of the South Platte Protection Plan, the South Platte Enhancement Board (SPEB), which is responsible for enactment of the South Platte Protection Plan, funds grant projects aimed at maintaining and/or enhancing the Outstandingly Remarkable Values (ORVs) within identified stream segments of the South Platte River. In addition, the Stream Flow Management Plan, a provision of the South Platte Protection Plan, has been implemented daily since 2006 by Denver Water, Aurora Water, and Colorado Parks & Wildlife to manage dam flow release operations, including water releases within the South Platte, to benefit the ORVs (SPEB, 2014).

Wildlife



“Biological Evaluation for Upper South Platte Watershed Protection and Restoration Project Environmental Assessment” prepared by Brad Piehl - Foster Wheeler Environmental — 1999 (Segments E & H)

This document contains an evaluation of potential effects of the Forest Service alternatives on sensitive species identified in the Upper South Platte Watershed Landscape Assessment. This list includes 22 plants, 8

mammals, 3 amphibians and 12 birds which are known from, or which could occur within the Upper South Platte Project Area. The principal objective of this Biological Evaluation (BE) is to ensure that a proposed action does not contribute to loss of viability of any native or desired non-native plant or animal species.

“Wild Connections Conservation Plan for the Pike and San Isabel National Forests,” Wild Connections, 2006 (Segments A, B, C, D, E, & H)

In 2006, the Upper Arkansas and South Platte Project (UASPP) released area-specific management recommendations for the South Platte Canyons Complex as part of the Wild Connections Conservation Plan for the Pike and San Isabel National Forests (UASPP, 2006). The recommendations identified Elevenmile Canyon as an active management area for wildlife habitat.

“Survey of Critical Biological Resources, Jefferson County, Colorado 2010-2011” prepared by John Sovell, Pam Smith, Denise Culver, Susan Panjabi and Joe Stevens, Colorado Natural Heritage Program, 2011 (Segments D, E, & H)

“In 2010, Jefferson County contracted with Colorado State University and the Colorado Natural Heritage Program (CNHP) to survey for critical biological resources in Jefferson County with funding provided by Jefferson County Open Space. A wetland and riparian survey was conducted concurrently with funding provided by the U.S. Environmental Protection Agency, Region 8 Wetland Program Development Grant. The purpose of this project was to provide scientific data on biological resources for land managers, planners, and the citizens of Jefferson County for conducting proactive landscape planning. This document is intended to be a tool for managing lands that support rare, imperiled and/or sensitive plants, animals, and significant plant habitats. The goal of the project was to systematically identify the locations of rare species and significant habitats. Additionally, the original paper-based National Wetland Inventory maps were digitized in accordance with the U.S. Fish and Wildlife Wetland Inventory protocol to provide an additional data resource for Jefferson County.”

Ongoing, CPW Species Data (Segments A, B, C, D, E, & H)

“This is a public-facing GIS resource for the Colorado Parks and Wildlife. The general public can quickly access basic information, interactive maps, and links to similar websites; while Conservation Planners, biologists, and mapping professionals have ready access to much more detailed information, and digital (GIS) map layers for planning and analysis purposes.”



Pronghorn

“South Park Pronghorn Herd Management Plan – Data Analysis Unit PH-30; Game Management Units 49, 50, 57, 58, 500, 501, 511, 581” Colorado Parks and Wildlife – June 2011” (Segments A, B, C, D)

Management Unit 501 is bordered on the north and east by all segments of the South Platte River identified in the South Platte Protection Plan. “The South Platte pronghorn herd (PH-30) has the distinction as being

the highest elevation herd within the state of Colorado. This herd is likely at the extent of the pronghorn's habitat range, occupying a high elevation (9,000-10,000 feet) grassland steppe ecosystem. It is a relatively small herd that has maintained around 1,000 animals in recent years, but has seen numbers as low as 300 in the early 1970s. This herd experiences periodic low recruitment rates and it is not uncommon to see pre-hunt fawn:doe ratios below 20:100. Game damage issues in the past kept harvest high and the overall population well below 1,000 in the late 1980s and early 1990s. Extended periods of drought and severe winters appear to be limiting factors for this herd more recently.

Game damage has been a concern historically, but there have been few complaints in recent years. Based on public input gathered through meetings and a survey, the public is generally satisfied with current management although there is a desire for a slight increase in population and a buck to doe ratio above 25:100. Recent years have seen an increase in archery hunter numbers and the proportion of buck harvest going to archery hunters. In 2009 and 2010, 35% and 37% of the buck harvest was attributed to archery hunters.

Archery hunting licenses in South Park units have been unlimited and could be purchased over-the-counter; however it has required 6-8 preference points to draw limited rifle buck licenses. In 2010, the Colorado Parks & Wildlife Commission (CPW) approved the recommendation to remove game management units (GMUs) 49, 50, 57, 58, 500, 501, and 581 from the statewide archery hunt and create limited archery hunts starting in the 2011-2012 hunting season."

Elk and Mule Deer

"Kenosha Pass Elk Management Plan – Data Analysis Unit E-18; Game Management Units 50, 500, 501"

Jack Vayhinger, Terrestrial Biologist - Colorado Division of Wildlife 2007 (Segments A, B)

"This Data Analysis Unit (DAU) has been managed as a quality hunting area since 1958 with limited bull and cow licenses. The population estimate peaked around 1996 at approximately 3,500 and as a result of aggressive cow harvest, has declined to the current estimate of 2,400. As part of the management regime to reduce the population, antlerless harvest has exceeded bull harvest for all but one of the last seventeen years. Snow conditions before and during the hunting seasons create significant fluctuation in annual harvest levels. Support for continuation of quality hunting opportunities and the resultant limitation of numbers of antlered hunters is strong in this DAU (81%)



Changes in land use and conversion of rangeland to residential subdivision have negatively impacted the carrying capacity of the area as well as impacting hunter access and harvest success. While there is adequate forage in most years for a larger population (4,500) than currently exists in the DAU (2,400) based on a habitat assessment model developed for Colorado's Habitat Partnership program, localized conflicts with agricultural producers still occur. There is relatively little hay production in this DAU and no game claims have been paid, but complaints of forage competition and fence damage have increased in the last two years."

"Elk Management Plan Data Analysis Unit E-23 Elevenmile Herd" Jamin Grigg, Wildlife Biologist, Colorado Parks and Wildlife 2012 (Segments A, B)

"Elk Data Analysis Unit (DAU) E-23 (Elevenmile Herd) is located west of Colorado Springs and includes Game Management Units (GMUs) 59, 511, 512, 581, and 591. The E-23 herd is managed as an unlimited opportunity over-the-counter (OTC) DAU, with a 4-point antler restriction on bull licenses. Licenses are unlimited during the archery, 2nd rifle, and 3rd rifle seasons, but limited during muzzleloader, 1st rifle, and 4th rifle seasons to allow Colorado Parks and Wildlife (CPW) discretion in managing hunting pressure, bull:cow ratios, and population size.

The previous population objective for the E-23 herd was 1,200 animals, with a bull:cow ratio objective of 23:100. However, recent refinements to population modeling techniques have increased the estimated number of elk existing in the E-23 herd, and thus it is prudent to adjust the population objective accordingly. Recent bull:100 cow ratios have been relatively stable at approximately 20:100 post-hunt, with a relatively stable population trend of approximately 3,000 – 3,500 elk. Current numbers of elk and sex ratios within the DAU seem to be reasonable and CPW recommends a population objective and expected post-hunt sex ratio that is consistent with the current stable population and ratio estimates.

"Colorado Elk Harvest Estimates" CPW, Annual, (Segments A, B, C, D, E, & H)

Each year, CPW contracts a third-party vendor to conduct the Big Game Harvest Survey. Email/online and live operator telephone based questionnaires collect general harvest and participation information for all seasons and manners of take at a Data Analysis Unit (DAU) level. Each DAU represents a geographic area that a specific herd will utilize throughout the year and consists of one or more Game Management Units (GMU). GMUs are used to control hunter distribution in each DAU, which is accomplished through the use of established hunts and license setting. By collecting and analyzing hunter survey responses at the DAU level, CPW can increase precision in reporting and analysis."

"Bailey Deer Herd Management Plan, Data Analysis Unit D-17" CPW 2006 (Segment H)

"D-17 is made up of GMUs 39, 391, 46, 461, and 51. It covers the area west of Denver to the continental divide, between I-70 and Highway 285, and south of Denver to the southern border of Douglas County. The diverse habitat in this area ranges from alpine tundra to prairie grasslands. Half of the land in D-17 is privately owned. State and Federal public lands, which are mostly national forests, account for 43%, and the remaining 7% is open space land that is managed by city and county governments or by non-governmental organizations. The post-hunt population in D-17, based on the current model, is 8,012 deer. The population has increased over the past two decades but population growth has slowed in recent years. The current post-hunt population objective of 10,500 deer was established several years ago. Since that time, habitat has been altered and chronic wasting disease has been detected in this DAU".

Pawnee Montane Skipper

“Pawnee Montane Skipper Butterfly Recovery Plan” Bettina Proctor, US Fish & Wildlife Service — 1998 (Segment H)

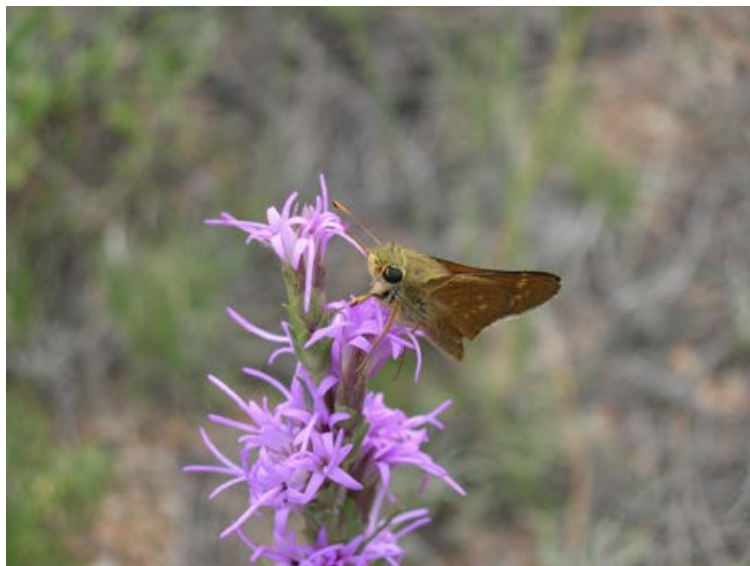
Current Status: The Pawnee montane skipper (*Hesperia leonardus montana*) is listed as threatened. The only known population occurs on the Pikes Peak Granite Formation in the South Platte River drainage system in Colorado. Estimated total known habitat is 37.9 square miles and is owned and/or administered by the Denver Water Department, the US Forest Service, Jefferson County, and private individuals.

Reason for Listing: The skipper’s narrow habitat preference combined with limited availability of this preferred habitat results in the skipper being restricted to only one area. Habitat loss likely has occurred over the last 120 years of fire suppression. Encroachment of conifers and subsequent loss of grasses and *Liatris* reduce the quality and quantity of skipper habitat. Past habitat loss or degradation also probably occurred when Cheesman Reservoir was constructed and when communities within the skipper’s range were developed. Another adverse impact on skipper habitat has been increases use by off-road vehicles. More recreation cabins, homes in the Pine Valley Ranch and new roads have added to the impacts.”

“Pawnee Montane Skipper Post-fire Habitat Assessment Survey – September 2006” John Sovell, Colorado Natural Heritage Program & Colorado State University — 2006 (Segment E)

“The Hayman and Schoonover forest fires burned across a large fraction of the historical habitat of the Pawnee montane skipper butterfly (*Hesperia leonardus montana*) during the summer of 2002 in Jefferson and Douglas counties, Colorado. These fires burned approximately 40% of the Pawnee montane skipper’s known habitat from southeast of Cheesman Reservoir, north around both sides of the reservoir, continuing north along the west side of the South Platte river to Oxyoke, and south of Deckers along Horse Creek for approximately six miles. The US Forest Service (USFS), the US Fish & Wildlife Service (USFWS), and Denver Water funded a post-fire habitat monitoring study within the range of this listed Threatened species to make an initial estimate of the post-fire habitat effects and to detect presence of skippers. The multi-agency team conducted the sampling in mid-September 2002. This sampling was developed into a longer-term monitoring effort in 2003 and was expanded to include the Buffalo Creek (1996) and Hi-Meadow (2000) fire areas.

The purpose of this monitoring effort is to document Pawnee montane skipper habitat conditions in both burned and unburned skipper habitat, on the Hayman and Schoonover fire areas and assess changes in skipper abundance in response to changes in habitat conditions.



Pawnee Montane Skipper, Credit: Magnus Manske, U.S. Fish & Wildlife Service

This is the first year of the five years of monitoring that the number of Pawnee montane skippers counted at unburned and low severity burn plots has declined. Pawnee montane skippers have clearly still not begun to reoccupy the highly burned areas of the Hayman Fire. The reasons for this may relate to the need for a healthy forest overstory, which may be essential for butterfly survival and reproduction.”

“Pawnee Montane Skipper Post-fire Habitat Assessment Survey – August/September 2009” John Sovell, Colorado Natural Heritage Program & Warner College of natural Resources — 2009 (Segment E&H)

“This project was established to implement a monitoring program to document PMS habitat condition and trends of population abundance, in both burned and unburned PMS habitat, on the Hayman and Schoonover fire areas in 2002 and subsequent years. Precipitation in the project area in 2009 was above or at the 100-year mean for four of the six months during the March to August growing season. In July, rainfall surpassed the 100-year mean by nearly three inches. The increased rainfall resulted in blooming gayfeather.

Current monitoring still indicates that the Hayman Fire and the mosaic of varying burn severity it has created across the landscape of suitable PMS habitat, has influenced the abundance of PMS within the project area.

Over nine years of monitoring, counts of PMS have consistently been highest at the unburned transects and lowest at the moderate-to-high severity burn transects; with counts at the low severity burn transects falling between the two. For the last three years monitoring has documented moderate numbers of PMS at moderate-to-high severity burn transects, and since monitoring began in 2002, PMS counts at moderate-to-high severity burn transects have increased by over 1000 percent. PMS have clearly begun to reoccupy the high severity burned areas of the Hayman Fire, but how persistent the populations are is unknown.”

“Pawnee Montane Skipper Post-fire Habitat Assessment” John Sovell, Colorado Natural Heritage Program & Warner College of Natural Resources, Colorado State University — 2012 (Segment E&H)

“The Pawnee montane skipper (PMS) butterfly, *Hesperia leonardus montana*, is listed as threatened by the US Fish & Wildlife Service under the Endangered Species Act. There are three populations of the PMS distinguished in the butterfly’s Recovery Plan that occupy approximately 25,044 acres of ponderosa pine forests between 6,000 and 8,000 feet in the South Platte River Valley. Between 1996 and 2002, four separate fires burned approximately 48.4 percent (12,026 acres) of the habitat: the Buffalo Creek, High Meadow, Schoonover, and Hayman Fires. The US Forest Service burn severity maps for these four fires show that over 65% of the burned habitat for the Cheesman, Mainstem South Platte, and North Fork populations of the PMS experienced moderate-to high intensity fire.

Monitoring continues to indicate that the Hayman Fire has influenced the abundance of PMS. Areas of moderate-to-high burn severity still represent marginal habitat for PMS even in 2012, 11 years after the Hayman fire. Over 10 years of monitoring, counts of PMS have consistently been highest at the unburned transects and lowest at the moderate-to high severity burn transects with counts at the low severity burn transects falling between the two.

An important finding of the 2012 monitoring effort is that the skipper population, both the *Hesperia* skipper sample and the sample of PMS, declined in unison with declines in dotted gayfeather densities, which are reacting to the extensive two-year drought in the region.”

“Trout Creek Pawnee Montane Skipper (*Hesperia leonardis montana*) Survey 2014” John Sovell, Colorado Natural Heritage Program, Colorado State University — 2014 (Segment E&H)

“The 2014 survey once again documented the occurrence of Pawnee montane skipper on both Trout Creek transects. Skippers decreased in 2014 compared to 2012. However, there were no statistically significant differences in the number of total, Common branded or Pawnee montane skippers observed between the two transects in 2014 versus either 2010 or 2012.”

Prebles Jumping Mouse



Credit: Karen Laubenstein, U.S. Fish and Wildlife Service

Presence or Absence of Preble's Meadow Jumping Mouse at Pine Valley Ranch, Jefferson County, Colorado, 2000 (Segment E)

“A presence or absence survey for the Preble’s meadow jumping mouse (*Zapus hudsonius preblei*) was conducted at Pine Valley Ranch Open Space on the North Fork of the South Platte River, Jefferson County, from 24-28 August 2000. This small mammal was listed as threatened by the U.S. Fish and Wildlife Service (USFWS) under provisions of the Endangered Species Act in May 1998. Pine Valley Ranch Park is owned and managed by Jefferson County. Denver Water has a diversion dam in the North Fork that needs to be replaced. The new diversion dam will be in the same area as the old dam, and construction action may affect potential Preble’s habitat, the dam would be replaced in 2001.”

“Presence or Absence Survey of Preble’s Meadow Jumping Mouse at Trumbull, Douglas County, Colorado 2002 (Segment E)

“A Preble’s meadow jumping mouse presence/absence live-trapping survey was conducted from 1-4 June 2002, on an ephemeral drainage that enters the South Platte River near Trumbull, Douglas County, Colorado. This small drainage was located within a much larger matrix of dense ponderosa pine forest. Water was flowing in the drainage during the survey and the narrow riparian area had a tree overstory with a heavy shrub/graminoids understory.”

“Preble’s Meadow Jumping Mouse” produced by Colorado Parks and Wildlife (Segment E&H)

“Species Description-Identification-Preble’s meadow jumping mice grow to approximately nine inches in length, including their five and a half-inch tails. They are mostly nocturnal and hibernate in upland areas for eight months of the year, making them difficult to observe.”

Peregrine Falcon

“Peregrine Falcon Biology and Management in Colorado 1973- 2001” prepared by Gerald R. Craig and James H. Enderson, Colorado Division of Wildlife 2004 (Segment H)

“Peregrine falcons breed throughout the Colorado Plateau and Southern Rocky Mountain ecological provinces of Colorado (Fig. 2). However, nesting does not occur on the eastern plains. Prairie falcons (*Falco mexicanus*) nest widely there and to a limited extent in the mountains as well. Peregrine nest in cliffs (n = 133) were distributed from 4,560 ft (1,390 m) to 10,800 ft (3,292 m) (Fig. 3). Seven nesting sites occurred above 10,000 ft (3,048 m) ranging from 10,100 ft (3,078 m) to 10,800 ft (3,292 m). Thus suitable nest situations apparently exist throughout all elevations in the western half of the state.”



Credit:U.S. FWS

Fisheries

Invasives

Known Positive Waters for Aquatic Nuisance Species in Colorado- CPW, January 2014 (Segments All)

New Zealand mudsnail, *Potamopyrgus antipodarum*- Pike NF- South Platte River below Elevenmile Dam;
Eurasian watermilfoil, *Myriophyllum spicatum*- South Platte River

Fish & Habitat Studies

“Stream Fisheries Investigations Federal Aid Study F-51” by R.B. Nehring and R.M. Anderson, 1984 (Segments D, E, H)

“This project began in 1973 as the "Upper Gunnison River Investigations." In 1975, the title was changed to "Stream Fishery Investigations" (F-51-R). At the time the project included Job 1, "Taylor River Flow Investigations" and Job 2, "Influence of Artificial Stream Flow Alterations on Trout Populations," included portions of the South Platte.”

“Aquatic Baseline Metropolitan Denver Water Supply Systemwide/Site-Specific Environmental Impact Statement” prepared by Chadwick and Associates 1986 (Segments All)

“The emphasis of this report is on fishery populations of project streams and reservoirs. Invertebrate and algal population data have been collected for some of the waters and have been incorporated into this report when available. Most of the biological information used has been collected by the Colorado Division of Wildlife (CDOW) and Denver Water Board (DWB) consultants, with scattered additional studies by various governmental agencies and consultants. This baseline information is being made available to be used to estimate the responses of aquatic life to habitat changes resulting from proposed site-specific projects and alternatives.

“Basin-Wide Stream Habitat Inventory 1991, A Cooperative Inventory conducted by USDA Forest Service Pike and San Isabel National Forests Cimarron & Comanche National Grasslands and the Colorado Division of Wildlife Southeastern Regional Office, Volume 1” prepared by, David S. Winters, Eddie N. Bennett and, J. Peter Gallagher, 1991 (Segments B, C, H)

“This report presents the results of a cooperative Colorado Division of Wildlife (CDOW) and US Forest

Service (USFS) fishery habitat inventory project for FY1993. These inventories were conducted to determine those areas in high priority streams where watershed conditions could be improved. In addition, this information will be valuable, for monitoring activities within the drainage, and in determining what kind of management strategies should be applied within the drainage, to improve the fishery. Lastly, this project was developed in order to meet the requirement of both agencies in terms of pre- and post-project monitoring.”



“Basin-Wide Stream Habitat Inventory 1993, A Cooperative inventory Conducted by USDA Forest Service Pike and San Isabel National Forests Cimarron and Comanche National Grasslands and the Colorado Division of Wildlife, Southeastern Regional Office, Volume 1” prepared by J. Peter Gallagher, David S. Winters, and Louanne McMartin 1993 (Segments A, B)

“Independently analyzed each stream inventoried this year. Each stream was sectioned into smaller reaches. By looking at each reach independent of all others, we expect to identify the factors specific to that reach. These factors may or a may not be consistent along other reaches analyzed, and by treating each independently, we can then compare similar reaches to understand the differences between them. Some reaches in a stream may show a number of impacts while others may show none, or totally different impacts. These differences are used to assess and understand the factors limiting fish habitat, and ultimately the fish population.”

“A Classification of the Riparian Vegetation of the South Platte and Republican River Basins, Colorado” by Gwen Kittel, Erika VanWie, and Mary Damm, Colorado Natural Heritage Program, 1998, (Segments All)

“In this report we present results from field surveys conducted in 1995 & 1996 in the South Platte River Basin. We collected vegetation and environmental data from just under 300 sites found along relatively

undisturbed stretches of rivers and streams. We classified these stands into alliances and plant associations based on their dominate plant species, similar species composition, and environmental setting. Three new plant associations are described from the main stem on the South Platte River, and several high quality foothill riparian areas were located in the upper parts of the watershed."



“Review and Analysis of Available Streamflow and Water-Quality Data for Park County, Colorado, 1962-98” by Robert A. Kimbrough, U.S, Geological Survey, 2001 ([Segments A, B, D, E, H](#))

“This report presents available data for surface- and ground-water resources in Park County for 1962-98. Specific objectives of this report are (1) to summarize historical data on streamflow and on the quality of surface-water and ground-water resources, (2) to analyze historical data and assess the broad-scale spatial and temporal variability in stream-flow and water quality, and (3) where possible, to identify, describe, and explain the primary natural and human factors that affect observed streamflow and water quality in Park County.”

“Bank Stabilization and Habitat Enhancement Summary” prepared by CUSP, 2002 ([Segment A, B](#))

Excel spreadsheet listing work done in Happy Meadows and Elevenmile Canyon between 1996-2001, both bank stabilization and glides are listed.

Total Maximum Daily Load Assessment Upper South Platte River, Segment 1A Sediment, CDPHE, 2002 ([Segments A, B, C](#))

“The South Platte River, segment COSPUS01A, from Elevenmile Dam to Cheesman Reservoir, is included on

the 1998 Colorado 303(d) list. This segment is identified in non-attainment of its assigned Class 1 Cold (water) aquatic life use designation due to deposition of excessive quantities of sediment. Water bodies which are included on the Colorado 303(d) list due to excessive sediment deposition do not attain their assigned aquatic life classification because of the impacts of sediment on fish and invertebrate reproduction and habitat. The goal of this TMDL is to reduce sediment loads to the stream and subsequent deposition to the substrate, and ultimately to improve habitat for aquatic populations.”

“Elevenmile Canyon Trees for Trout Accomplishments”, 2005 prepared by CUSP (Segment A)

Excel spread sheet listing structure counts by reach

“Trees for Trout Briefing Paper” prepared by Dana Butler, USFS, 2006 (Segment A, B)

“In June 2002, the Hayman Fire created approximately 4 million snags. The idea to utilize some of these snags to benefit trout populations and wetland enhancement began to form in 2003. The first trees were toppled in 2004 and placed in the South Platte River and Tarryall Creek. Similar projects done in the past have been shown to decrease erosion and sedimentation, increase riparian vegetation and improve the habitat for young of the year trout. Future plans were made to continue this same type of work on both private and public lands. When the Centennial Grant opportunity came about, the South Park Wetlands Focus Area Committee jumped at the opportunity to utilize these funds and complete work that would have otherwise taken them several years to complete.”

“Trees for Trout” PowerPoint prepared by CUSP (Segment A, B)

PowerPoint explaining the project and outcomes from the Trees for Trout project

“Happy Meadows Pebble Count”, 2006 CUSP (Segment B)

Scan of 2006 field notebook of pebble count for Happy Meadows

“T4T wideout video” 2009 CUSP (Segment A, B)

Video discussing the Hayman fire and the Trees for Trout project

“Environmental Assessment South Platte River Corridor Restoration Project at Happy Meadows South Park Ranger District Pike and San Isabel National Forests Cimarron and Comanche National Grasslands Park County, Colorado” 2009 (Segment B)

“The U.S. Forest Service proposes to stabilize eroding stream banks and increase deep pool and cover habitat for trout on more than 5,000 feet of river within a 2.0 mile section of the South Platte River. The Forest Service, in cooperation with Park County also proposes to repair and improve 2.4 miles of County Road (CR) 112 and associated parking pullouts and trailheads near the South Platte River. The project area is on the Pike National Forest 2.3 miles north of Lake George, Colorado (see Project Location map).”

“Aquatic Assessment and Habitat Enhancement Plan, The South Platte River, Lake George Company Park County – Colorado” prepared by J Peter Gallagher, Fin Up Habitat Consultants (Segment A, B)

“In October 2008, FIN-UP Habitat Consultants, Inc. was contracted by Barton Johnson, an owner of the Lake George Company, to conduct an assessment of a recently completed stream improvement project the South Platte River, where it runs through property belonging to the Lake George Company. The assessment included a survey of existing channel morphology, a condition assessment of previous structural work that had been attempted in the reach, and development of a restoration plan to improve habitat quality and complex-

ity in the reach. This document summarizes the results and our recommendations for future enhancement work and management of the stream and adjacent riparian corridor.”

”South Platte River Sportsman's Paradise and Happy Meadows Reaches 20,21,22 River Assessment and Restoration Plan” Coalition for the Upper South Platte, (Segment A, B)

“The South Platte River throughout the project reaches is limited by excess sediment from sources upstream, and from inputs from the adjacent county road (CR 112). This segment of the river was designated by the State of Colorado as impaired by sediment under Section 303(d) of the Federal Clean Water Act of 1972, and a total maximum daily load (TMDL) analysis was conducted between 1996 -2002. The channel is classified as Rosgen C throughout the project reaches, and is over-wide in many segments, exhibiting shallow depth, laminar flow, limited habitat complexity, and poor sediment transport. The downstream segment of Reach 22 is affected by a large low-head diversion structure on the Sportsman’s Paradise property that has dramatically over-widened the river. In 2002, the Hayman wildfire burned a large portion of the watershed on the eastern side of the project reaches, further increasing sediment input into the river.”



“South Platte River Restoration Project Hydrologic Analysis” Jeff Crane, 2009 (Segment B)

“The Coalition for the Upper South Platte in Lake George contracted with Crane Associates in Carbondale, CO to develop a hydrologic model of the design reach to determine the approximate rise or fall of water surface elevations in the project reach due to the construction of stream rehabilitation structures to verify the sediment transport goals of the design. The project reach begins at Latitude 39°00’33.35”N / Longitude -105°21’52.43”W and ends at Latitude 39°02’45.19”N / Longitude -105°20’52.14”W. The proposed restoration project is designed to improve sediment transport and aquatic habitat through the reach.”

“Elevenmile Canyon Nutrient Sampling Final Report” by Beth Nielsen, Coalition for the Upper South Platte, 2013 (Segment A)

“This report summarizes the results of nutrient sampling in the South Platte River in the Elevenmile Canyon Recreation Area (Elevenmile Canyon) that was conducted by the Coalition for the Upper South Platte (CUSP) in the summer of 2013. Algal blooms in the South Platte River along Elevenmile Canyon have increased over the years, and it is suspected sediment from erosion and/or the existence of old vault and pit toilets along

the river is adding nutrients to the river. An excess of algal growth in a river system can negatively impact plant and aquatic life. In 2012, CUSP applied for and was granted funding through the 2008-2011 Secure Rural Schools program managed by the USDA Forest Service's Resource Advisory Committee (RAC). This grant outlined multiple project objectives such as replacing two old vault toilets in the canyon, hosting volunteer projects to reduce sediment loading in the river and conducting further water monitoring in the South Platte River in Elevenmile Canyon. In the summer of 2013, CUSP sampled 19 locations along the South Platte River in Elevenmile Canyon at three separate times during the summer for nitrates/nitrogen and total phosphorous (sediment loading). These results will be used to design projects to improve water quality in this area."

"Benthic Results from South Platte River sampling Fall 2013" CUSP (Segment B)

Excel spreadsheet

"CPW fisheries data for the South Platte River" compiled by CUSP, 2015 (Segments All)

Compiled data in Excel spreadsheet showing information going back to 1973, where available, on sampling dates, stocking reports, and chemistry data.

"Fish Survey and Management Information" prepared by Jeff Spohn, Colorado Parks and Wildlife, (Segments All)

<http://cpw.state.co.us/thingstodo/Pages/FisherySurveySummaries.aspx> Fish data for several locations throughout the state, generally updated yearly.

Recreational



Kayaking the first rapid (class V) of Elevenmile Canyon; Creative Commons License—Alex Kerney

"Environmental Assessment for the Elevenmile Canyon Ecosystem Project" South Park Ranger District, USFS, 1995, (Segment B)

"This Environmental Assessment (EA) is a document disclosing the environmental consequences of the proposed Elevenmile Ecosystem Project (EEP). This is a proposal to enhance the quality of the recreation experience and use activities, and reduce resource damage in the Elevenmile Area as shown on the attached

map. This proposal includes erosion control, fisheries habitat improvement, work on campgrounds, picnic sites, trails, dispersed camping areas, fishing access sites, roads, parking, interpretation and information facilities. Implementation of this project is dependent on funding and participation by partners.”

“South Platte Basin River Conditions” prepared by Trouts Flyfishing, Ongoing **(Segments All)**

<https://troutsflyfishing.com/info/fishing-information/south-platte-basin/> Daily updates on river flow levels, weather conditions and access points for fishermen.

Cultural

(All Cultural are in Segment H)

North Fork Historic District

“National Register of Historic Places Inventory- Nomination Form” 1974

“The original appearance of the North Fork Historic District differs little from the appearance given today. The dominant human alteration of the landscape in the 1800s was the narrow gauge bed of the Denver, South Park, and the Pacific Railroad. Today the bed is largely replaced by a narrow, two lane gravel road. The visual impact is surprisingly similar to the earlier one, however, and thus the major alteration within the district has retained the area's historic character. Construction in the communities of the district has been largely dormant for several decades. Most of the original land uses are still followed with resort tourism still visually dominant. Ranching and lumbering have retained the hillside and river bottom look of the last century.”



*Glen Isle, between 1904-1915,
Photographer Charles Lillybridge,
Credit History Colorado Collection*

“Fires, Floods and Dams: The North Fork Historic District Struggles against the Odds” by Kris Christensen pg 24-26 from Historically Jeffco Issue 1998

“For a number of years, the towns along the North Fork National Register Historic District have been through a rough time. First a battle with the Denver Water Department against the Two Forks Dam that would have put the towns of Buffalo Creek, South Platte, Foxton and others under water, such as the Dillon reservoir now covers the original town site of Dillon. After the Buffalo Creek fires that burned acres of forest and dislocated many from their homes, the floods that came after the fire threatened to wash away what was left. Buffalo Creek survives today because of the tenacity of those who live there and have rebuilt their homes and have saved historic structures. The North Fork Historic District faces additional threats to its history. As one of the earliest districts in Colorado to be placed on the National Register of Historic Places, in September of 1974, it lacks the documentation that would be required should it be placed on the National Register today.”

“Forest Improvement Project at South Platte Hotel Helps Preserve and Protect Colorado History December 2004”

“Concern for the safety of recreation enthusiasts, and ecosystem and watershed protection prompted Denver Water to invest in a two-acre forest improvement project on the hotel grounds, which is covered by deciduous trees more common to urban areas. This endeavor is just one of many forest management activities being implemented through the Upper South Platte Watershed Protection and Restoration Project, an impor-

tant component of the Front Range Fuels Treatment Partnership. Consistent with the goals of the FRFTP to reduce wildland fire risks through sustained fuels treatment, the primary goals of the South Platte Hotel project were to reduce hazards to the public and create wildlife habitat along the South Platte River. However, this project was unique because it required the expertise of an arborist who possesses knowledge about urban trees. With that in mind, in August 2004, Denver Water, along with the Urban and Community Forestry Division of the Colorado State Forest Service (CSFS), the Colorado Division of Wildlife, and an arborist from The Natural Way, Inc., developed and implemented a forest improvement plan for the hotel grounds.”

“North Fork of the South Platte National Register Historic District Jefferson County, Colorado Survey Report” by Architecture 2000, PC and Ann W Bond, 2007

“For a number of years, the towns along the North Fork National Register Historic District have been through a rough time. First a battle with the Denver Water Department against the Two Forks Dam that would have put the towns of Buffalo Creek, South Platte, Foxton and others under water, much as the Dillon reservoir now covers the original town site of Dillon. After the Buffalo Creek fires that burned acres of forest and dislocated many from their homes, the floods that came after the fire threatened to wash away what was left. Buffalo Creek survives today because of the tenacity of those who live there and have rebuilt their homes and have saved historic structures. The North Fork Historic District faces additional threats to its history. As one of the earliest districts in Colorado to be placed on the National Register of Historic Places, in September of 1974, it lacks the documentation that would be required should it be placed on the National Register today.”

“National Register of Historic Places Continuation Sheet”, 2008

“Additional Documentation and Boundary Increase for NRIS #74000586 This additional documentation for the 1974 North Fork Historic District reiterates and clarifies the areas of significance, extends the period of significance, and expands the 1974 North Fork Historic District in six geographic locations.”

Estabrook Historic District

“National Register of Historic Places Inventory- Nomination Form”, 1980

“Located a few miles southeast of Bailey on the North Fork of the South Platte River, the Estabrook Historic district is one that consists of several stone and wood structures, ice houses, barns and related outbuildings, parts of the old roadbed of the Denver South Park & Pacific Railway, and one small railroad bridge reputed to be the only original bridge remaining from the line. These buildings and artifacts are situated entirely on privately-owned property almost entirely surrounded by the Pike National Forest. The land is generally flat or rolling, some open for grazing, some forested, but the boundaries are generally formed by high hills or high rock walls, particularly to the east. The dominant feature of the District is the North Fork of the South Platte River,



Estabrook Train Station, circa 1880s, credit Park County Archives

which runs from the northwest near Insmont Hill to the central part of the District where it joins with Craig Creek coming up from the south, and then flows easterly into narrow, high-walled Waterton Canyon on the long journey from the mountains to the high plains.”

Geological

“General Geology and Petrology of the Precambrian Crystalline Rocks, Park and Jefferson Counties, Colorado”, 1929 (Segments All)

“Attention was focused on the southern Tarryall region, Colorado, by the discovery of beryllium ore on the Badger Flats in 1955 and the subsequent exploitation of the ore at the Boomer mine. The region is also noteworthy because of an unusually complete and varied suite of Precambrian rocks which includes the three main Precambrian granitic units of the Front Range Boulder Creek(?), Silver Plume(?), and Pikes Peak. These rocks are in juxtaposition in the region; they clearly show crosscutting relations and differences in petrologic character related to the level of their emplacement. The granitic rocks were intruded into an older layered gneiss terrane corresponding lithologically to the Idaho Springs.

This report deals mainly with the general geology of the Precambrian rocks; as such it complements chapter A (Hawley, 1969) which described the beryllium deposits. The igneous rocks are especially stressed in this chapter; for example, an attempt is made to trace the evolution of the Pikes Peak granitic rocks from granodiorite through alkalic granite to the residual hydrothermal solutions which formed the beryllium deposits of the region.”

“Geology and Mineral Resources of Park County, Colorado” L. Alex Scarbrough, Jr. GIS data included, 2001, (Segment H)

“This report reviews the geology of Park County and is a comprehensive compilation of all known mineral deposits, including base- and precious-metal, uranium, coal, oil, and gas. The report will be useful to prospectors, exploration companies, government agencies (especially county planners), and interested citizens. Various base- and precious-metal deposits mined from Park County are described herein, and examples are given for each deposit type. Detailed information on individual mines, including location, host rock, mine type, tonnage, grade, and ore controls, has been compiled from the United States Geological Survey (USGS) Mineral Resources Data System (MRDS; McFaul and others, 2000) and is presented in two appendices. Descriptions of ore controls have been updated. Production statistics for both the county and individual districts and subdistricts have been compiled, but may be incomplete. Map plates include geologic and topographic maps at 1:100,000 scale, both show locations of all shafts and adits shown on topographic maps and in the MRDS data file.”

