

Annual Report 2001

Upper South Platte Watershed Protection and Restoration Project

A Healthy Forest For A Healthy Watershed

A Letter From Dave Hessel, Steering Committee Chair

The Buffalo Creek fire, which burned nearly 12,000 acres in the South Platte Watershed and resulted in the loss of homes and essential forest cover on highly erosive soils, was an important element in the beginning of the Upper South Platte Watershed Protection and Restoration Project. This fire provided a wake-up call: Thirteen-intense rain events followed the fire, causing flooding, and transporting large amounts of sediment and fire debris downstream to Strontia Springs Reservoir—an important water storage facility for the Denver metropolitan area. The Denver Water Department spent millions of dollars cleaning debris from the reservoir and will spend millions more in dredging operations to remove the sediment that has filled the reservoir since the fire.

The project was proposed in the fall of 1998, and had immediate support from a variety of partners, including Colorado State Forester, Jim Hubbard, and Lyle Laverty, Regional Forester for the United States Forest Service at the time. It was designed to offer a collaborative and innovative partnership approach to improving forest health on a landscape level.

The stakes are high,
but our resolve is firm:
We will work to heal the
Upper South Platte Watershed.

In the spring of 1999, the project was selected by the National Office of the USFS as one of the first National Large-Scale Watershed Restoration Partnership Projects. The National Office chose this project because it provided a highly visible watershed that is critical to the metro Denver area's water supply, it had recently experienced a devastating fire, and the Rocky Mountain Research Station had been conducting research on fire ecology within the watershed, thereby providing a strong scientific base for the project.

Over the last three years, we've made great strides. We have completed a landscape assessment, an environmental assessment, and a business plan. Restoration, fuel reduction, and resource work, which has taken place on Denver Water lands, as well as on other private lands, demonstrate the effectiveness of the efforts that are already underway. The project has a strong monitoring component built in, and we began our monitoring efforts in earnest this summer. We have done educational outreach through community events, and by bringing area students out to the field.

Since its inception, the project has received a lot of attention as a National Watershed Project. We've had many tours, numerous public meetings, and high interest from resource managers. The media has taken notice: We've had significant newspaper coverage; a segment on the syndicated radio program *Earth and Sky*; and television coverage from area news channels and an ESPN program.

We're fortunate to have a dedicated coalition of partners who are interested in working together to restore our forest's health, improve habitat and water quality, and reduce the risk of catastrophic fire. An excellent planning and implementation team has been put together by the USFS under Fred Patten's leadership. The work that's already underway on Denver Water properties under the direction of Chuck Dennis has helped demonstrate what restoration is all about.

This report provides information on the current status of the project, and reflects how this project has progressed. I hope you will find it interesting and informative. The progress of this partnership is something I am proud of. The stakes are high, but our resolve is strong: We will work to heal the Upper South Platte Watershed.





The Upper South Platte Watershed is located in the foothills of the Colorado Rocky Mountains, and is critical to the state, providing 75% of Colorado's citizens with water that comes from, or is transmitted through, this river drainage. Most of the watershed is located within the Pike National Forest, southwest of the metro Denver area.

The greater, Upper South Platte Watershed covers approximately 1.7 million acres, and has 41 major sub-watersheds within it. During the short-term, three of these sub-watersheds—Waterton-Deckers, Horse Creek, and Buffalo Creek—will be the focal areas for vegetation treatment. These sub-watersheds cover about 140,000 acres of public and private lands, and were ranked as top priority areas for restoration management based on their high risk of fire and soil erosion. They are located in Jefferson and Douglas Counties. In the future, the project may expand to include work in the 640,000 acres of montane forest within the greater watershed.

The South Platte drainage is a major recreation area in Colorado, highly regarded for its "Gold-Medal" trout fishery, its wildlife habitat, and its trails. It is home to many species, including several Threatened and Endangered Species.

Water quality issues have become a major concern in recent years, with the drainage listed as a "high-priority watershed in need of restoration" in The Colorado Unified Watershed Assessment.

The watershed is in an urban/forest interface, and has been identified as a "Red Zone", or area that is susceptible to catastrophic fire.

According to research performed by Dr. Merrill Kaufmann and his team at the USFS Rocky Mountain Research Station, "The current forested landscape condition does not reflect the historic disturbance regime, and is not sustainable. Wildfire historically

came through these areas on a thirty to fifty year cycle. These fires created a patchy crown structure, with many small to moderate openings."

For years, fire has been suppressed, and logging and grazing practices have had real impacts on the ground. The result: Fires escape, becoming catastrophic events. The Buffalo Creek (1996) and and Hi Meadow (2000) fires brought this fact home to resource managers, public

officials, and homeowners in the area.

The General Accounting Office notes, "Uncontrollable wildfires should be seen as a failure of land management and public policy, not as an unpredictable act of nature. The size, intensity, destructiveness and cost of wildfires are no accident. It is an outcome of our attitudes and priorities. The fire situation will become worse, rather than better unless there are changes in land management priorities at all levels."

We recognize the need to change land management strategies in the watershed, and we're taking action to make things better!

"The current forested landscape condition does not reflect the historic disturbance regime and is not sustainable."

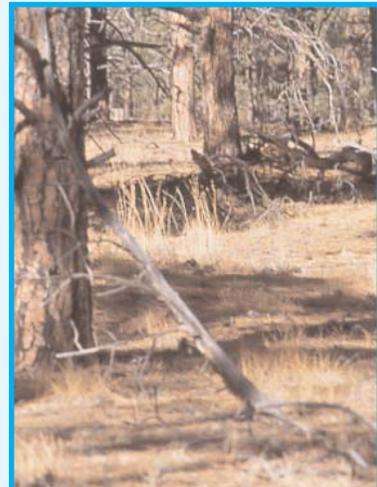
Dr. Merrill Kaufmann
Research Ecologist

Our Goals

- Reduce the risk of catastrophic fire to protect human life, property, ecological health, and water quality.
- Improve water quality and reduce sediment sources.
- Integrate research, management, and monitoring.
- Create a healthy and sustainable forest.



After the Buffalo Creek fire, almost 12,000 acres of the watershed burned. This area was reseeded with grass, but USFS silviculturalist, Jim Thinnes, estimates that for the forest to naturally regenerate would take several hundred years!



A healthy opening at Trumbull with grass returning between the trees after thinning operations are complete.



Volunteers from the Rampart Range Motorcycle Management Committee help repair damage and restore trails in Dutch Fred Gulch, a popular motorized trail area.



The Primary Partners

United States Forest Service (USFS)
Denver Water Department (Denver Water)
Colorado State Forest Service (CSFS)
Upper South Platte Watershed Protection Association (USPWPA)
United States Natural Resources Conservation Service (NRCS)
United States Geological Survey (USGS)
United States Environmental Protection Agency (EPA)

Partnership Overview

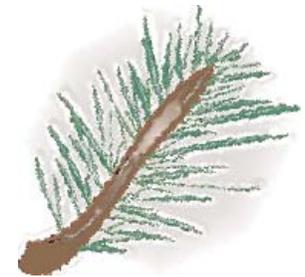
The project has seven primary partners. Each partner comes to the project with a slightly different mission, and brings slightly different expertise. Our individual missions and expertise dictate how each of us are involved in the project.

The United States is the largest landowner in the watershed, and the USFS is the lead agency—managing approximately 500,000 acres in the Pike National Forest within the project area. The USFS has responsibility to manage national forest lands on a sustainable basis while also being fiscally responsible. Other federal agencies share an interest in protecting the watershed as well: USGS is responsible for monitoring water quality nationally, EPA is responsible for overall environmental health nationally, and NRCS helps private and public landowners—in this case, with restoration projects following the Buffalo Creek and Hi Meadow fires.

Denver Water’s customers count on high quality water at an affordable price; helping protect and restore the watershed helps them meet their customers needs. THE CSFS provides forest management advice and assistance on state-owned lands and to private land owners. Denver Water has contracted with CSFS to provide management assistance on their lands. USPWPA is a stakeholder group addressing watershed issues in the entire 1.7 million acre South Platte River drainage above Strontia Springs Reservoir, which includes the project area.

Other organizations support the project, including Jefferson County, Douglas County, Park County, Elk Creek Fire Protection District, Colorado Division of Wildlife, Fish and Wildlife Service, Trout Unlimited, Volunteers for Colorado Outdoors, the Colorado Mountain Club, the Rampart Range Motorcycle Management Committee, and the Middle Eastern Regional Coop. We encourage and welcome other interested parties to participate in the project.

The partners and supporting organizations share a desire to protect the water quality and ecological health of the watershed, and realize that catastrophic fire is one of the most serious threats to the watershed.



Partner Objectives

The partners have identified the following short-term goals:

- 1.) Use adaptive management to treat and restore approximately 20,000 acres of high-risk forest to sustainable condition,
- 2.) Treat at least 250 acres for noxious weeds annually,
- 3.) Stabilize 2 miles of stream bank,
- 4.) Improve Pawnee montane skipper habitat on 4,000 acres,
- 5.) Obliterate and reclaim 25 miles of road, and monitor and mitigate OHV (off-highway vehicle) use, and
- 6.) Assist 100 private landowners in area in developing “defensible spaces” annually.

Doctoring a Forest

Theresa Springer

Photos by Ken Woodard

Excerpted from the Upper South Platte Watershed Protection Association's *Watershed Watch* Newsletter

I was standing between two, woodland worlds. On my left was an open forest with grasses and flowers growing, with deer tracks and other evidence of wildlife making their home here. It gave me the feeling that life is good, that things are content and healthy. On my right was a forest comprised of spindly trees, gasping for space; most of the grassy understory had long since abandoned the area. This side invoked feelings of confinement, like the begging eyes of an animal enclosed in a cage.

I was at the Trumbull restoration demonstration site. Chuck Dennis, who works for the Colorado State Forest Service, was waiting for my reaction. "Wow", was my first response.

Chuck just smiled a knowing smile: "Not what you think about, when you think about logging, is it?" he seemed to ask, though he never opened his mouth.

Seeing the forest for the trees

A forest isn't just trees. It includes: shrubs, grasses, flowers, insects and wildlife. Chuck emphasized the basic concept that there are different kinds of forests. A rain forest is different from an evergreen forest. A lodge pole pine forest is different than a ponderosa pine forest. A ponderosa pine forest along the Front Range is different than one in the Four Corners area. Each kind requires different management practices.

A healthy Colorado Front Range ponderosa pine forest has scattered trees with openings that range from one or two acres, up to 150 acres. Crown closure is less than 30% of the total forest. Clumps of aspen and Douglas fir grow on the north facing slopes and along steep drainages. The forest has a very diverse and abundant wildlife population. The woods are open, and rich with forageable plants and wildflowers

Seeing the whole picture—the forest and the trees—is Chuck's first job. His second job is doctoring an unhealthy forest so that it is vibrant again, and

vibrant is what I was looking at, but how did Chuck do this? How did he turn the dark gloom of an unhealthy forest like the one on my right, into a luxurious habitat, like the one on my left?

The Upper South Platte Restoration Project

Chuck, with his ever-present smile, told me that the work was part of the Upper South Platte Restoration Project (the project). The project is a partnership between the U.S. Forest Service (USFS), Colorado State Forest Service (CSFS), Denver Water Board, and the Upper South Platte Watershed Protection Association.

The partners first did extensive research at Denver Water's Cheesman Reservoir site. The goal of the research was to determine what a healthy forest was like when the first Euro-Americans came to Colorado. Cheesman was an excellent site for the research, because it hasn't changed much in the last 150 years. It allowed the partners to document what the pre-settlement forest looked like.

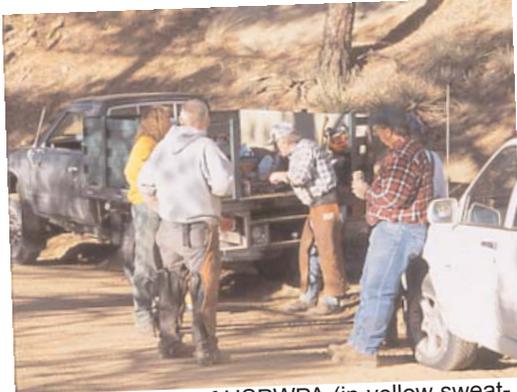
Chuck talked about how interesting the fire research was. He explained, "Low frequency fires were common in the area. When they struck their character was mixed intensity." Sometimes the fires would stay low to the ground, replenishing the grasses and wildflowers, while killing small trees. The same fire would meet a more dense stand of trees, blow up into the crown and become a short-lived, raging inferno, consuming the fuel load that time had accumulated.

Fire is how nature kept her home in order.

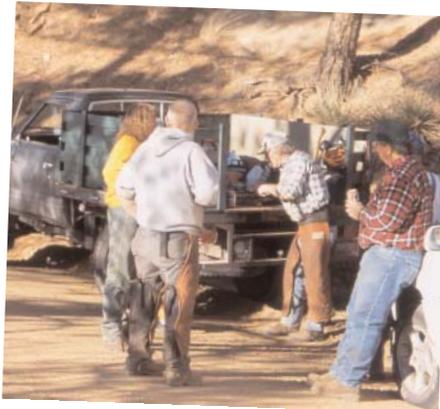
Prescriptions

The partners have thousands of sick patients. Their mindset became that of holistic forest doctors. They needed to incorporate secondary disease prevention into their regime. Mountain pine beetle, ponderosa pine dwarf mistletoe and Armillaria root disease were at the top of the bad guys list. The partners worked together to write a forest restoration prescription with a detailed treatment strategy.

Steps in the treatment plan are: save the largest-diameter trees, reduce density, distribute trees in clumpy groups, keep standing-dead-trees (snag retention), conduct prescribed burns,



Theresa Springer of USPWA (in yellow sweat-shirt) interviews Chuck Dennis (in red plaid shirt) of CSFS, and his crew of tree doctors.



A forest doctor at work at Cheesman Reservoir.

monitor natural regeneration, manage grazing activity and work to control noxious weeds.

To assure that the work they were doing would be beneficial, and not do more harm than good, they decided to first do a series of smaller demonstration projects using their prescriptions, and to then monitor the effects. If the small projects accomplished what they wanted, then they would expand the scale of the project. Denver Water's Trumbull land was an ideal site for a demonstration.

Preparing for surgery

Chuck, along with his specialist team, went to the Trumbull site to plan for surgery. Two methods of marking trees were used. In one area, they marked the trees that were to be left; in another, they marked the trees to be removed. Regardless of marking method, generally all trees in excess of sixteen inches in diameter would be left standing.

In keeping with the prescription, they saved snags in excess of 10 inches. The snags have nesting cavities used by birds of prey as well as housing a banquet of insect for songbirds to feast on. When a nesting raptor is discovered the plan's flexibility allows the trees around it to become one of the groups of trees that is left alone.

Sensible logging.

In November 1999, Chuck brought out his work force, equipped with chainsaws to begin the reconstructive procedure. As the chainsaws harvested trees the temperatures dropped. The timing was easy on the forest, but harsh on the humans. The ground became protected by its frozen status (the crew, however, put on lots of extra clothes). "This is very good from a soil disturbance view point," said Chuck in his characteristically energetic manner.

What little they did disturb, the local deer population found exceptional. "We don't know what they came to feed on, but they came daily", Chuck said. "They were so close that the logging crew had to chase them away before starting work."

One of the biggest problems with logging is the damage done when removing the logs. A four-wheel drive, articulating tractor, and a rubber-tired skidder pulled the logs out of the woods. With the ground frozen, very little damage was done.

The partners are realistic that not all restoration projects can be done in the winter, so they are working with a private contractor who is experimenting with new technology (which will impact the soil minimally) to remove logs during summer conditions. There is quite a bit of excitement about the new technology.



After thinning, the forest has an open, healthy atmosphere, but large trees are still standing.

high tree stumps. This pocket in the forest that humans call 'a demonstration site' had found equilibrium.

Viewing the site in 2001, I see trees in cliquish groups setting off delightful grassy openings. Down a hill stands a legacy: a twisted leaning tree, that seems to say—I have survived adversity, and am stronger for it.

What's next

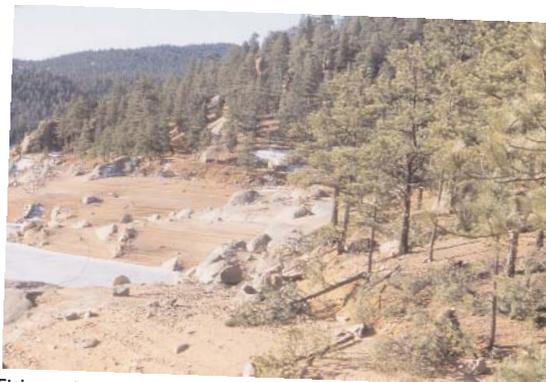
Conducting prescribed burns is next on the agenda. The goal is to expose mineral soil, provide a nutrient flush to soils, reduce competition and stimulate the productions of grasses and forbs that may have evolved under periodic fires. At first the partners will use cool season fires, when the soils are wet and temperatures are cool. Later they will begin using warm season fires, simulating natural fires.

In about seven years, and then again in fifteen years, they will repeat the prescribed burns. In twenty years, it will be time for selective harvesting again.

Chuck and his volunteers have created an educational trail through the site. The partners have justifiably established bragging rights with informational signs being scattered along the trail. They have hosted tours for professional organizations, elected officials, citizen groups, and high school students. They plan to continue providing tours in the future, because they want people to see

what a healthy forest looks like.

The prognosis for this forest patient is very good. Best of all, the ability to copy the procedure elsewhere is highly favorable. This project's a winner.



Thinned trees along edge of Cheesman Reservoir in foreground. Area in background has not been thinned.

Accomplishments

The Environmental Assessment and Decision Notice

NEPA Guides Process

NEPA-or the National Environmental Policy Act-requires all federal agencies to examine the need for, alternatives to, and the environmental consequences of all major actions proposed on federal lands, or that use significant federal funds. NEPA applies both to projects being implemented by the federal government and to projects implemented by others on federal lands.

Depending on the scale of a project, the agency may be required to perform an environmental assessment (EA) or an environmental impact statement (EIS) to evaluate the cumulative impacts of the proposed activity, and alternatives to the proposed activity. Comprehensive input from other agencies and the public is sought throughout the process. After going through an EA or EIS, the federal agency issues a Decision Notice.

Decisions for the Restoration Project

On August 11, 2000 the USFS completed an EA that evaluated four sub-projects in the Upper South Platte, including: 1.) vegetation treatments, 2.) Buffalo Creek burn area revegetation, 3.) road reclamation, and 4.) South Platte River access trail improvements. Decision notices for the four sub-projects were independent of one another, to best address the purpose and need of each sub-project.

The Decision Notice for the Gill Trail improvements was approved on February 2, 2001, and the Buffalo Creek burn revegetation Decision Notice was approved on March 1, 2001.

To address possible concerns raised by commenters during the EA, two separate Decision Notices were issued for the vegetation treatment sub-project: One Decision Notice addressed vegetation treatment in "roadless" areas (5,200 acres), and one addressed treatments in "non-roadless" areas (12,200 acres). Both notices were signed by Gail Kimbell, Forest Supervisor of the Pike San Isabel National Forest, on August 2, 2001. An appeal was received on the Decision Notice for vegetation treatment in roadless areas.



Trail Projects

Recreational trails and gravel roads run throughout the watershed, and often cause trouble, ranging from erosion to loss of biodiversity. Part of the project includes an assessment of unclassified roads (those which are not considered "official" forest roads) and motorized trails.

Using GPS technology, the USFS began an inventory. To date, 250 miles of roads and trails have been mapped, which is the first step in identifying and prioritizing problem areas that need repair or reclamation.

Dutch Fred Gulch

Dutch Fred Gulch is one of the most popular and heavily used motorized trail sites in the area. Thanks to that popularity, resources in the area have been damaged, and the State of Colorado has listed the Gulch and its tributaries on its "monitoring and evaluation list" for impaired waters.

Last summer, 90 volunteers from the Rampart Range Motorcycle Management Committee organized six-work parties to help repair damage. In cooperation with a USFS trail crew, and with funding from the Colorado Off Highway Vehicle program, these volunteers began rehabilitating exposed slopes, and placing control structures that restrict motorized recreation to authorized trails. In the coming years, the project will relocate some of the trails, and provide camping sites that don't impact riparian areas.

Gill Trail Restoration

This two-year project seeks to restore a popular trail along the "Gold-Medal" fishing waters of the South Platte River. The project is creating a safe, sustainable route for anglers while reducing sediment in the river and protecting habitat for the threatened Pawnee montane skipper, a butterfly that lives only in the South Platte drainage.

With tremendous support from Trout Unlimited (TU), Volunteers for Outdoor Colorado (VOC), and the Colorado Mountain Club (CMC) we were able to restore 1.5 miles of the Gill Trail in Cheesman Canyon during 2001. This work include constructing 25 rock walls, installing 92 stone steps, constructing 2,000 feet of new trail and doing maintenance on 3,000 feet of existing trail, and closing

Gill Trail

Before and After Album

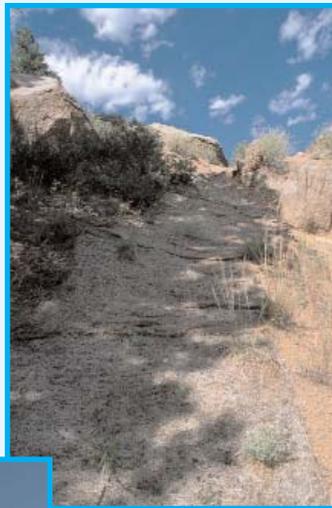
Photos by Todd Scott Parker, Naturalscape

At right, four social trails are clearly visible. Below, the trails were backfilled and naturalized.

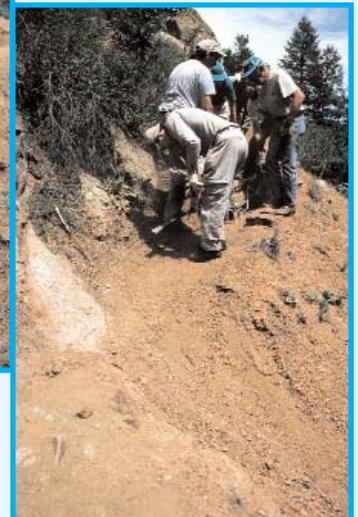
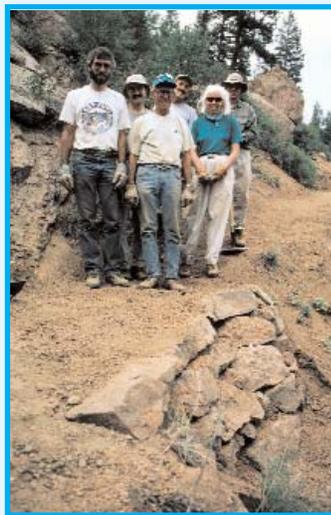
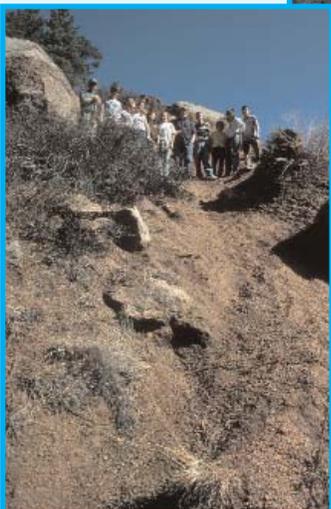


Below, a volunteer crew is filling a three-foot deep gully. At left, the fill was naturalized to restore original slope.

Below, a high school class volunteered to backfill and seed this eroded stretch of trail. After several months, blue grama, a native grass, has sprouted.



Left, a crew of volunteers is proud of the stone wall they created, which repaired a close-to-impassible section of the Gill Trail.



and restoring 30 unstable "social" trails that were contributing sediment to the river. Volunteers contributed over 1,200 hours. An experienced trail crew from USFS Region 5 were on loan to this project for seven weeks. The five-person crew constructed the most difficult sections of trail.

Part of this project also includes constructing new facilities and expanded parking capacity at two trailheads. Designs were completed during 2001, with construction slated to begin in 2002.

This project received great coverage in the press. It was repeatedly covered by outdoor writers for the Denver Post, and was filmed by ESPN for its Outdoor Program (to be broadcast in December, 2001).

The Colorado branch of TU bestowed its "Best Project in the State" award to the Cutthroat Chapter for their exemplary work on this project. TU, VOC and CMC have committed to donate over 2000 hours to this project in 2002.

Plans for 2002 include construction of trailhead improvements, restoration of one mile of existing trail, and construction of one mile of new trail.



Private Landowner Outreach

The project watershed is in an urban interface zone. This area has seen significant growth in recent years, so the Steering Committee identified outreach to private landowners as an important part of the project.

In 2001, the CSFS hired Jen Chase. Jen is stationed full-time at the Elk Creek Fire Protection District, and is available to assist private landowners. This year she has concentrated on the areas around the towns of Pine and Buffalo Creek, and in the Spring Creek, Douglas Ranch, and Elk Falls subdivisions.

So far, Jen has marked over 100 defensible spaces around homes and structures on private property. Of these, 76 have been cut. Jen has also interfaced with contractors to thin and cut fuel breaks on an additional 75 acres.

CSFS is working on management plans for Lower Elk Creek and the Lower North Fork that will, among other things, develop pre-wildfire attack plans for Pine, Buffalo Creek and the



Pawnee Montane Skipper

Theresa Springer

The Upper South Platte Watershed has a unique inhabitant, one that lives nowhere else in the world, except for along a 23 mile stretch of the South Platte River drainage system on the Pikes Peak granite formation. (The granite formation can be found in parts of Park, Teller, Douglas and Jefferson counties.) The inhabitant is the Pawnee montane skipper, a butterfly.

The U.S. Fish and Wildlife Service (FWS) lists the skipper as threatened under the Endangered Species Act. The Nature Conservancy, a nonprofit-environmental group, ranks it as a "T1", or "critically-imperiled" species, because of its global rarity.

Butterfly biology

All butterflies rely on a host plant and a nectar plant. The skipper's host plant is the common blue grama grass. Its nectar plant is primarily the prairie gayfeather, which is found only in the ponderosa pine forest of the Pikes Peak granite formation.

Skippers can normally be seen from early August to mid-September. For approximately 30 days, a single generation takes flight to feed off the nectar of the prairie gayfeather flowers. Then they mate, and like all butterflies, lay their eggs to begin their four-stage life cycle. The eggs remain dormant throughout the winter, nestled in the root crown of the blue grama grass, safe from foraging animals. In spring, the caterpillars hatch out and begin feeding on the blue grama grass. In late summer, the caterpillars spin their cocoon in preparation for metamorphosis into the butterfly stage.

Notoriety

This isolated rare population, found notoriety in the late 1980's and early 1990's, when Front Range communities proposed to build the Two Forks dam and reservoir in the South Platte drainage. The skipper was one of the reasons the Environmental Protection Agency (EPA) did not approve the permit to construct the dam.

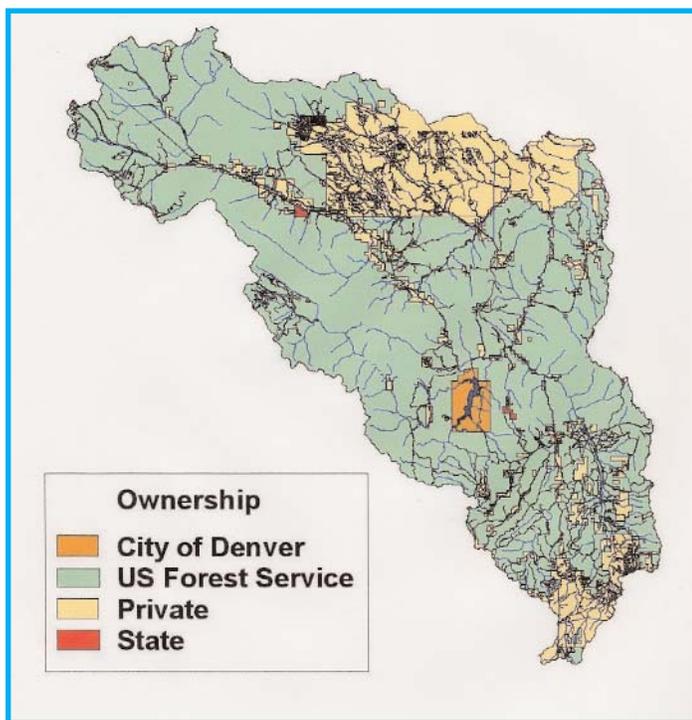
According to the FWS recovery plan, when the dam was disapproved it, "removed the immediate principal threat to the skipper's habitat", but even without the threat of a dam, the skipper was still in trouble: Its habitat is insufficient and fragile. Dense forest canopies choke out the blue grama and gayfeather habitat. Without intervention, this population could very easily disappear, and an unexpected environmental event could trigger its disappearance.

Protecting the Skipper

Protecting the skipper requires giving it healthy host and nectar plants. This is one of the goals of the project.

Spring Creek Subdivision, and evaluate and prioritize a list of work needed for all Denver Water structures in the area. USFS thinned and hand piled on 40 acres around Spring Creek Subdivision with support from the homeowner's association.

NRCS and CSFS have worked jointly in assisting private landowners in areas that were burned by the Hi Meadow and Buffalo Creek fires. According to Gene Backhaus of NRCS, in 2000 1,300 acres were aerially reseeded and 1,200 acres received contour tree felling and straw waddle erosion control structures. During the summer of 2001, grass seed was provided free of charge to landowners working on weed control with the Jefferson County Weed Management Team, and 7,500 trees and shrubs were donated by corporate donors, and planted by 262 volunteers who put in 2,096 hours. The total contributed value of work and materials in 2001 was about \$40,000.



Denver Water Properties

Chuck Dennis has been supervising work on these, and other Denver Water properties, for the last two years. At Trumbull, thinning has occurred on 145 acres. Grass is coming back strong in the thinned areas, and a trail has been created with interpretive signs for use during tours.

The Trumbull site has served science over the last two years, with test plots for prairie gayfeather plantings, monitoring of Pawnee montane skipper numbers, and experimenting with approaches to improve willow vigor and reproduction.

Thinning has been completed on 323 acres, and 425 acres are already under contract for thinning next year at Cheesman, with more planned. Much of the salvaged material is being sold to a business that sells bundled firewood to grocery stores, and to local sawmills.

CSFS crews have cut fuel breaks and prepared defensive space around structures on Denver properties, like Camp Kotami and the historic South Platte Hotel, as well as around the community of Deckers.

Dwarf mistletoe is a problem in the area, so CSFS is planning a commercial harvest project that will help control mistletoe. Weeds are also a concern, so a weed survey was completed for Cheesman. Mapping has also been done on other Denver Water properties, like 4-Mile Ranch, 63 Ranch, and around Antero Reservoir.

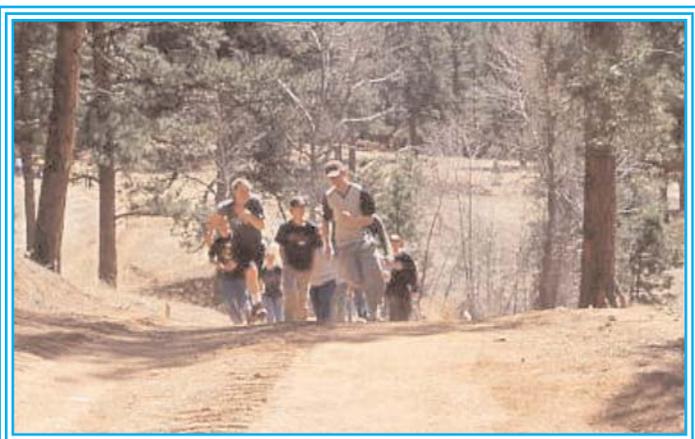
Mapping indicates that weeds are generally heaviest to roadways, water edges, and some areas. Weed treatment has occurred on about 259 acres this year.

Cheesman is home to a bald eagle communal roost. In order to better protect the roost site, CSFS has surveyed and inventoried it this fall.

Education

Members of the Steering Committee and staff of the participating agencies have attended numerous community events and meetings to discuss the project, defensible space, and restoration possibilities on private lands. For example, CSFS staff members and volunteers attended a town clean-up work day at Deckers, and staffed a booth during the Deckers' Artisans Fair.

USPWPA coordinated educational outreach to area schools, bringing high school science students out to Deckers for a day to learn about fire ecology and forest health. Rocky Mountain



Students from area schools on a field trip to Trumbull demonstration area.

Research Station Dendrologist Laurie Huckaby demonstrated techniques used for studying historic events-like fires and droughts-by viewing tree rings. She also showed students how to take tree borings, and count rings to establish tree age.

After lunch, the kids headed out to the Trumbull demonstration site for a tour guided by CSFS staff and volunteers. The kids got to see first-hand what a healthy forest should look like.

As part of a Boy Scout project, local scouts helped to plant 100 acres of seedlings in the Buffalo Creek burn area.



Monitoring

Monitoring is a crucial element of the project, providing a scientific basis for decision making, and a tool for implementing adaptive management. For example, monitoring for sensitive wildlife species will help guide on-the-ground activities. No ponderosa pine will be cut where there are signs of Abert's squirrel nesting or feeding, and no treatment activities will take place within 650 feet of any northern goshawk nesting site.

Deb Entwistle (USFS) has taken the lead on developing and coordinating hydrologic and water quality monitoring program, and Barry Johnston (USFS) has taken the lead on vegetation and fuels monitoring. In August of 2001, the Monitoring Strategy was approved by the partners, and the USFS entered into an agreement with Colorado State University to design and conduct many of the key activities in the monitoring strategy. Dr. Lee MacDonald, a professor at Colorado State University, and several students, are performing sample collection and analysis.

Hydrologic monitoring, including channel cross-sections, pebble counts, bank stability surveys, stream-flow, temperature, pH, and conductivity sampling has taken place in Saloon Gulch, Brush, Spring, Sugar, Pine, Russell, Deep, and "No-Name" Creeks. Water quality monitoring for cations, anions, total suspended solids and total organic carbon has begun on eight streams in the project area, and will be collect monthly during the low-flow period of the

year, and twice-a-month during runoff.

Erosion and sedimentation monitoring is underway in the Trumbull, Upper Saloon Gulch, and Spring Creek areas, and has included surveys of vegetation points, slope, contributing areas, and aspects. Silt fences have been constructed to monitor erosion from existing roads and swales. Rain gauges and flumes have been set.

Monitoring of plant and animal species that are federally listed as Threatened and Endangered, or that are considered "Management Indicator Species" or Forest Sensitive Species in the Forest Plan has also started. The species monitoring covers a wide variety of plants and animals, from Abert's squirrel to the Virginia's warbler.

Pretreatment monitoring for fuels and vegetation has been performed. This monitoring provides the baseline that's needed for the project's adaptive management approach.



Publications

Two recent publications from the staff at the USFS Rocky Mountain Research Station provide insights into the structure and regulating processes of the ponderosa pine/Douglas fir landscapes in the Colorado Front Range.

Kaufmann, M.R., P.J. Fornwalt, L.S. Huckaby, and J.M. Stoker. 2001. Cheesman Lake-A historical ponderosa pine landscape guiding restoration in the South Platte watershed of the Colorado Front Range. In Vance, R.K., W.W. Covington, and C.B. Edminster (tech coords), Ponderosa pine ecosystems restoration and conservation: Steps toward stewardship. (In Press)

Huckaby, L.S., M.R. Kaufmann, J.M. Stoker, and P.J. Fornwalt. 2001. Landscape patterns of montane forest age structure relative to fire history at Cheesman Lake in the Colorado Front Range. In Vance, R.K., W.W. Covington, and C.B. Edminster (tech coords), Ponderosa pine ecosystems restoration and conservation: Steps toward stewardship. (In Press)

The Middle East Connection

What do resource managers in the Upper South Platte and their counterparts in the Middle East have in common? First, they share a recognition that sound watershed management is fundamentally important in arid and semi-arid environments. But more important still, they are working on a collaborative project to develop monitoring plans, and evaluate monitoring tools used in watershed management.

Until the middle ages, people believed that water flowing from springs and in rivers simply came from the center of the earth. It wasn't until the late seventeenth century—when Edmund Halley compared the flow from rivers draining into the Mediterranean Sea with the amount of precipitation falling on their watersheds and found them to be similar—that people recognized precipitation as the source of flow for both springs and rivers.

Since that time, we've learned a great deal about the disposition of precipitation and its influence on natural systems. We know that some precipitation evaporates back into the atmosphere; some infiltrates into the soil to be used by vegetation, or to percolate to streams, springs, and aquifers; and some flows over the surface of the soil, causing erosion. Erosive flow across the surface is the least desirable outcome of precipitation, and in a healthy ecosystem represents the smallest fraction. But in ecosystems that are out of balance, particularly those in arid and semi-arid environments, surface runoff increases as a result of poor land practices.

Efficient management of available water resources, beginning with precipitation, and ending with high-quality water in streams and springs, is critical to the sustainability and survival of both humans and natural resources. Vegetation is a key factor in developing this efficiency. It allows greater infiltration while maintaining soil stability and reduc-

ing erosion. It's critical to the long-term sustainability of wildland resources.

Sound forest and grassland management focuses on maintaining vegetation, while allowing utilization of vegetation for forage, fuel, and timber. Wise management insures resource sustainability, which in turn assists communities and countries in their quest for sustainable economic development.

In arid and semi-arid environments, rainfall events are often rare, but intense, and storm runoff can cause severe erosion and sedimentation problems. Forest and grassland management at the watershed level is frequently implemented to mitigate erosion and sedimentation, but is rarely monitored for appropriateness and effectiveness.

The need for improved monitoring has been recognized by many authorities, ranging from academic experts to the World Forestry Congress. In 2000, a collaborative study project to improve monitoring of watershed initiatives was developed between the United States and Israel, Jordan, Palestine, and Turkey. The parties to this project already had experience working together on vegetation and soil conservation projects, and valued these projects as a positive force in the Peace Process.

The Upper South Platte Watershed was selected as the monitoring landscape for the United States, and staff from the USFS associated with it serves as members of the "Local Study Team". Susan Gray, of the USFS Cooperative Forestry staff serves on both the Local Study Team, and the International Study Team, which works with Local Study Teams in each country. These teams develop their monitoring plans and evaluate monitoring tools. Preliminary work plans have already been developed in each country.

The scientific benefit will be the development of guidelines for monitoring protocols, which can be used on watershed projects internationally.

Vegetation Treatment

Vegetation treatments on national forest lands are designed to move the forest to a healthy and sustainable condition. They include thinning, creating openings, prescribed burning and removing trees on up to 17,400 acres within the Waterton/Deckers/Horse Creek sub-watersheds. The treatments will generally be in the montane forest, below 7,500 feet elevation. Similar treatment strategies are being used on private lands through the efforts of the partners. The main elements of treatment are:

1. Treat vegetation using adaptive management to ensure protection of resources. Phase work during the first two years, thus allowing time to evaluate treatment activities and identify potential problems that may require remedial measures or modifications to the treatment prescriptions. Up to 2,000 acres will be treated the first year, and up to 4,000 during the second year. Upon completion of the project approximately 75% of the treated acres will be thinned, 25% will be created openings, and 100% will be prescribed burned.

2. Thin trees to a canopy closure of about 25% on up to 9,200 acres. The residual-basal area will average between 40 and 60 square feet per acre (or 50-75 trees per acre). Larger, more-mature trees will typically be retained, with preference given to retaining ponderosa pine over Douglas fir (except on north aspects and higher elevations). The spacing will be variable, resulting in natural and clumpy stand characteristics. Snags that are not a hazard will be kept for cavity-dependent species of wildlife. To enhance old growth characteristics, trees that are identifiable as being 150 years old, or that meet old growth standards as defined by Forest Service Technical Report RM-213 (*Old-Growth Forests in the Southwest and Rocky Mountain Regions: Proceedings of a Workshop*) will be retained.

3. Create 1 to 40 acre openings on up to 3,000 acres. Openings will be dispersed, and will be sited in areas that have regenerated within the last 120 years. They will primarily be located on south and west aspects. Most will be 5 acres or smaller, and those over 5 acres will only be created where there is evidence that a larger opening existed historically. Approximately 40% of the acres in openings will have no trees; the rest will have canopy closures between one and ten percent.

4. Prescribe burn up to 17,400 acres. Prescribed burning will follow mechanical treatment after logs and slash have had time to sufficiently dry—typically one to two years after mechanical treatment. New openings will again be burned five to six years later to minimize tree regeneration, and then every ten to thirty years as needed to maintain openings.

5. Remove logs from up to 17,400 acres. Conventional logging systems will be used to remove logs from about 8,600 acres that are accessible from existing roads. No logging will take place on slopes that are greater than 40%, and on slopes greater than 30%, logs can't be removed unless the contractor can demonstrate the ability to remove logs without environmental damage.

6. Access to the treatment areas will protect existing conditions. No roads will be constructed or reconstructed. Existing roads will be routinely maintained to prevent resource damage. Vegetation screens will be left standing immediately adjacent to open roads, where there is the potential to increase unauthorized off-road access. Existing unclassified roads used to access treatment areas will be obliterated after treatment is completed.

7. Work cooperatively with private landowners to address their concerns. Where treatment will occur within 500 feet of private property, meet landowners and work to address their concerns.

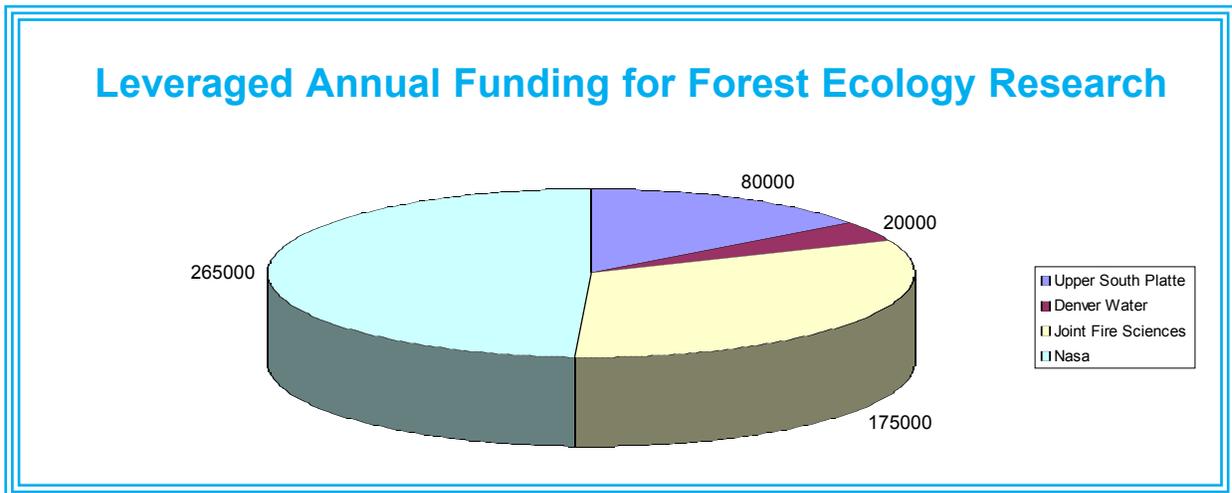
Funding

Leveraging for Research

Funding comes to the project in the form of cash and in-kind match. By leveraging the contributions of various partners, the project has expanded the work of each group. For example, funding of \$100,000 for research provided by the project partners to the Rocky Mountain Research Station has been leveraged by two major grants to \$540,000 per year for three years beginning in FY2002.

Funding from the Joint Fire Sciences Program is to address the development of a landscape strategy for treatment in the South Platte watershed using simulation modeling of vegetation changes and fire behavior, and assessment of trade-offs associated with treatment resources to obtain the largest ecological benefit over the greatest land area at the least cost.

NASA funding addresses the use of state-of-the-art, remote-sensing technologies to assess vegetation cover and fuel structure, and the use of remotely sensed data in fire simulation models to predict fire behavior in ponderosa pine/Douglas fir landscapes in the South Platte watershed. This research seeks to provide fine-scale detail of the horizontal and vertical structure of forests and fuels using remotely-sensed data, with the potential for mapping these conditions over large areas in the Colorado Front Range.



Volunteers and Partners Contribute to Efforts

Cooperating partners, like the Colorado State Forest Service, Denver Water, Trout Unlimited, Volunteers for Outdoor Colorado, Colorado Mountain Club, Rampart Range Motorcycle Management Committee, and the Upper South Platte Watershed Protection Association contribute significantly to the project. In FY2001, the total project budget was almost \$2.5 million dollars, with about \$600,000 coming from non-USFS partners. The Colorado State Forest Service contributed \$150,000; Denver Water contributed \$75,000. Volunteers from TU, VOC, and other groups racked up close to \$60,000 in time on trail projects; USPWA contributed \$12,000 in labor to coordinate educational outreach. Corporations and local businesses contributed almost \$20,000 for trees, seeds and tools for revegetation on private lands in the wake of the Hi Meadow fire, and volunteer labor doubled the value of the effort.

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