Executive Summary

One Watershed, Two Rivers
South Arkansas River Watershed Assessment

In the western U.S., rivers, streams, and adjacent streamside habitats represent about one percent of the surface area, but are considered the most productive and biologically diverse. Their economic impact—water, ranching, fishing—adds to that importance. Climate, geology, and topography create the template on which these flowing waters work and on which vegetation grows. Together these elements form the character of a given watershed. A watershed assessment examines those elements—the physical, chemical, and biological components of the watershed, plus the human influences on them. That process establishes a baseline regarding the watershed's overall health, identifies problems and their causes, and clarifies and prioritizes potential solutions.

The assessment of the South Arkansas River watershed was conducted during 2012 and 2013 and focused on the 15 miles of river from Chaffee County Road (CCR) 225 (upstream of where Fooses Creek enters) down to the confluence with the main stem of the Arkansas River just east of Salida. Overall, the South Arkansas River watershed is in good condition—plant communities are largely intact and water quality is good. However, closer examination of the project corridor reveals one river between CCR 225 and CCR 210 and another from CCR 210 to the confluence with the Arkansas River. Both qualitative and quantitative assessment methods were used. Specific methods are detailed in each section.

Water falling on and moving across and under the watershed knits the whole together. As a result, a change in one aspect of the watershed inevitably results in a change or, more likely, a series of changes in other aspects of the watershed. Sometimes the changes are obvious, immediate, and nearby, like a dam, and sometimes they are silent, gradual, and occur many miles downstream, like declining water quality.

Critical to the character and health of rivers and riparian (streamside) habitat is the "natural flow regime"—the seasonal patterns of spring runoff, summer thunderstorms, and late season low water. In unaltered watersheds, these flows arrange and re-arrange the river and its corridor in cycles of natural disturbance that range from years to centuries to tens of thousands of years. Those cycles are responsible for creating and sustaining the wide variety of in-stream and streamside habitats that define a functioning stream ecosystem. They are so fundamental that many native animals and plants are adapted to—and in many cases require—the natural flow regime to survive. Examples include riffles and pools for trout, barren point bars for cottonwood seedlings, and clean water to drink and to irrigate pastures.

Historically, flows in the South Arkansas River were larger and more varied than at present. Dams, water diversions, and drought have significantly altered and diminished the amount, timing, and location of the water in the channel, and the extent of overbank flooding. The physical footprint of today's river—how sinuous, deep, and wide the channel and its floodplain—reflect natural processes that operated over millennia. Those processes are largely no longer at work. Simply put, today there is not enough water for the original channel. This change limits or eliminates the river's ability to create and sustain a fully functioning ecosystem.

Here is the first of two different South Arkansas rivers—in the upper reaches is the river with its physical template created over millennia, but which now carries a fraction of its historical flows. The second of two rivers arises gradually downstream as the impacts of past and present human activity intensify, creating a river less and less able to function properly and provide what society values. A line between the two rivers is crossed in the vicinity of Chaffee County Road (CCR) 210.

In that portion of the project corridor upstream of CCR 210, the influence of human activity is moderate and in many ways less obvious. Although dammed and constricted in places, relative to areas downstream, the following is evident:

- In-stream habitat is more diverse, both from more large woody debris in the channel, and larger and more varied channel substrate.
- Impacts from fine sediment deposition are limited.
- There are fewer barriers to fish movement, such as in-stream structures and areas of shallow water.
- Streamside plant communities are fairly extensive, healthy, and functioning properly, that is, they provide shade, stream bank stability, and organic matter at the base of the stream food chain.

Downstream of CCR 210, the adverse impacts from human activity accumulate through more intensive and extensive uses of water and land that degrade in-stream and streamside habitat quality and quantity. The consequences of these impacts include:

- Diversion of surface flows draws increasing amounts of water out of the channel, both temporarily and permanently.
- The channel has been straightened and large woody debris in the channel is largely absent. As a result, in-stream habitat is homogenous, there are fewer areas of slower, deeper water, and overwintering habitat for trout is limited.
- Areas of sediment deposition are more frequent and larger than in upper reaches. These bury potential habitat for trout and aquatic insects that are the trout's food.
- Potential barriers to fish movement are more frequent, whether such obstructions are from low water or from channel obstructions.
- Riparian habitat is degraded and eliminated, often in association with tall, steep banks subject to erosion and extensive areas with little or no overbank flooding.

These observations are based on quantitative and qualitative evaluation of the following **natural components** in the South Arkansas River watershed and project corridor—stream flows, in-stream habitat, streamside habitat, and excessive erosion and deposition.

- **Stream flows**—Water storage and water diversions have altered the river's natural flow regime, that is, how much water is in the channel, when, and where. Current flows are inadequate to support in-stream and streamside habitats and organisms. These conditions are aggravated by the recent drought.
- **In-stream habitat**—Changes in stream flows, channel straightening and constriction, and removal of large woody debris have diminished in-stream habitat diversity and degraded remaining habitats. These habitats are required to support the various life stages of trout as well as for the aquatic invertebrates on which trout feed.
- **Streamside habitat**—Changes in stream flows, land use, and development have degraded, replaced, and eliminated streamside habitat. This compromises the river's ability to provide a variety of normal ecological functions, such as improving water quality, shading (keeping the river cool), and providing wildlife habitat. Riparian areas also serve to connect the river corridor laterally to adjacent uplands as well as up and downstream along its length.
- **Excessive erosion, deposition**—Changes in land use and development have increased erosion and the deposition of fine sediments in the river bottom. These sediments cover the bottom of the river in many areas and limit or eliminate areas for spawning and which support aquatic invertebrates.

Consideration of these watershed components clarifies problems that adversely affect stream health, the cause(s) of those problems, and potential solutions. Perhaps more important, watershed assessment clarifies what will likely not work. Recall that the movement of water knits the watershed and the river together such that they usually function as a single entity. With that in mind, failure of watershed and stream restoration often arises from a limited view of specific problems at specific locations. Instead, restoration efforts should remain mindful that successful watershed and riparian projects require the following:

- Understanding the ecological context of the project, particularly the processes at work or, as likely, processes that are not working or that are missing.
- Understanding that the components of the watershed and stream interact in a variety of ways that may reinforce or offset the desired change.
- Understanding that the watershed and its rivers are dynamic systems that depend on a certain amount of disturbance to function correctly.

A wide variety of restoration techniques exist to address identified problems and causes. Some are fairly easy and inexpensive to implement while others are contentious and expensive. As important is the fact that the condition of natural components in the watershed and stream is only half the situation, and in many

respects the easier half. Watershed and stream restoration efforts also involve **social components**, that is, competing interests and values related to water, the stream, and its corridor, plus differing opinions of and decisions about restoration. This larger social context influences—and sometimes controls—whether restoration occurs, what occurs, where, and when. Thus, community involvement is critical to restoration success.

In the South Arkansas River watershed, social components include water rights, private lands, public lands, funding, and planning and zoning.

- **Water rights**—Changes in water storage, diversion practices, and water uses are contentious, complicated, and costly.
- **Private lands**—Most of the land immediately adjacent to the South Arkansas River in the project corridor is privately owned. Therefore, the opinions of those landowners and their willingness to participate in restoration activities are critical.
- **Public lands**—Most of the watershed above the South Arkansas River project corridor is publically owned. How those lands are managed has implications for the health of the watershed, the river, and the river corridor.
- **Funding**—Many public and private programs exist to finance watershed and stream restoration projects. However, the amount of money is limited, its use is often restricted as to the type of project allowed and whether it can be used on public or private land, and competition for funds is usually intense.
- **Planning and zoning**—Local government planning and zoning requirements direct the location and type of development that may adversely affect watershed conditions, the river, and the river corridor.

In terms of restoration, the two South Arkansas rivers—upstream compared to downstream—require different techniques and strategies.

In the upper portion of the project corridor, the main approaches to restoration include (1) preservation of existing land uses, such as through conservation easements and other habitat protection programs; and (2) technical assistance for issues related to land management that would prevent the degradation that is more common downstream. The need for structural work, whether in-stream or streamside, is limited.

In the lower portion of the project corridor, the increasing extent and intensity of adverse impacts, both in-stream and streamside, require reversing existing conditions at many locations. Restoration in downstream sections will, therefore, require more time and money relative to upper reaches. In many areas, the footprint of the river needs to be reduced to use existing flows more effectively. For in-stream habitat, a narrower footprint would concentrate existing flows and thereby better maintain fish habitat and provide flushing flows to remove fine sediments. For streamside habitat, more frequent overbank flooding would better support riparian vegetation. Such projects require more site investigation and data collection prior to initiation, and they will need to employ a greater variety of construction techniques. Restoration projects in the lower portion of the project corridor are also complicated by the presence of more landowners, a greater number of small parcels, and a wide variety of land uses.

The techniques used to address both the natural and social components impacting the South Arkansas River and watershed also influence the likelihood of project success. Because the watershed, the river, and its corridor act as a single entity, a change needed on one location may require a change at another location in order to be successful. For instance, in-stream habitat improvements may not improve conditions if erosion from upstream areas continues to fill newly-created holes and bury spawning habitat. Conversely, a project poorly conceived or poorly implemented may create new problems or aggravate problems elsewhere.

The South Arkansas River watershed assessment was initiated by the South Arkansas Watershed Coalition, a partnership between the Land Trust of the Upper Arkansas and the Collegiate Peaks Anglers Chapter of Trout Unlimited.

There is a phenomenal resiliency in the mechanisms of the earth. A river or lake is almost never dead. If you give it the slightest chance by stopping pollutants from going into it, then nature usually comes back.

Rene Dubos (1981)

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