

## Section 3.0 History, Development, and Land Use

### Summary

Impacts to the South Arkansas River watershed began in the early 1800s with the trapping and removal of beaver. Thereafter, impacts came from mining, transportation, settlement, and conversion of native habitats for grazing and crops. These activities altered watershed and stream hydrology, removed water from the river, changed the river channel's shape, and altered the quantity and quality of runoff. At present, water diversions and land use are the dominant influences on the watershed and the river corridor. Although the majority of land in the watershed is managed by public agencies, most of the land adjacent to the river is private. How both public and private lands are managed has implications for the health of the watershed, the river, and the river corridor.

This section discusses the history of the South Arkansas River watershed, the impact of past activities on the watershed and river, current land uses and population trends, and current local government planning and development policies.

### Historical Events in the Arkansas Headwaters

The following timeline highlights historical events that significantly impacted the South Arkansas River watershed. Except where indicated, the bullets in this timeline are from Chaffee County (2013a).

- **1706**—Juan de Ulibarri, a Spaniard, was the first European to explore the Arkansas River headwaters (AHRA 2013).
- **1779**—Juan Bautista de Anza, governor of Northern New Spain, brought troops into the Chaffee County area.
- **1806**—Zebulon Pike and his men made their way through South Park into the Arkansas River Valley.
- **1811**—Trappers with the Missouri Fur Company arrived in the Upper Arkansas Valley. Trapping, particularly for beavers, continued for the next 30-40 years.
- **1859**—G.A. Kelley discovered gold on the Arkansas River four miles south of Granite, CO.
- **1872**—Silver was discovered in the Chalk Creek drainage. The following year, the Ute Indians signed the Brunot Agreement which opened areas to the west of the Arkansas Valley to mining and settlement.

- **1874**—A wagon road that would eventually become State Highway 50 was completed between Canon City and Centerville, an agricultural community in the present-day Mesa Antero area.
- **1878**—Nicholas Creede established the Monarch Mine near present-day Monarch Pass. The most productive of the operations was the Madonna Mine.
- **1879**—Arbourville was established between Maysville and Garfield, CO, as a stagecoach stop on the road to Monarch Pass. The town a hotel, boardinghouse, and general store (heritagewest.coalliance.org 2012) (Figure 3-1).
- **1880**—The Denver and Rio Grande (D&RG) Railroad tracks arrived at the town of South Arkansas, as Salida was first called. Construction of the Monarch Pass Toll Road was completed.
- **1881**—The D&RG line was extended to Maysville.
- **1883**—The D&RG line was extended from Maysville to mining areas at Garfield and Monarch (Figure 3-2). By 1884, the area of the Monarch Mine had over 100 homes and three hotels. At its peak, 30 carloads of ore were shipped each day. The silver panic of 1893 ended most activities at the mine. Material continued to be quarried and shipped to mills in Pueblo, CO (Figures 3-3 and 3-4).



**Figure 3-1. Camphouse at Arbourville, ca. 1880 (DPL 2013a)**



**Figure 3-2. D&RG Railroad near Garfield, ca. 1880 (DPL 2013b)**



**Figure 3-3. Monarch Mine, 1884 (DPL 2013c)**

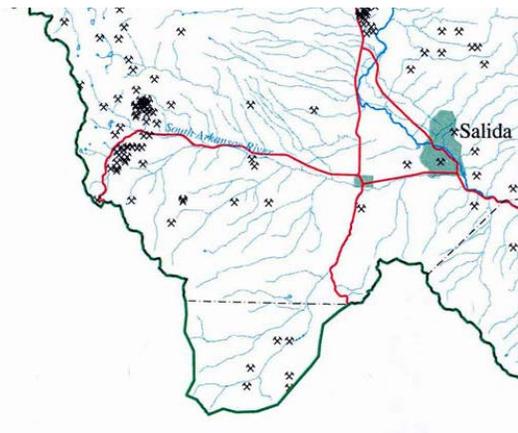
- **1919**—Work on a new road over Monarch Pass began. During this work, a campground complete with ovens and shelter houses was built at Monarch Park in 1920. The new Monarch Pass road was opened in 1921.
- **1980s**—The rails in the DR&G Railroad corridor from Salida to the Monarch Quarry were removed.



**Figure 3-4. Monarch mine and quarry, 2012**

### **Impacts from Past Land Use and Development Activities**

Past land use and development impose “legacy effects...[that] continue to influence environmental conditions long after the initial appearance of the disturbance” (Allan 2004). Examples in the South Arkansas River watershed include removal of beaver, widespread logging, construction of roads and railroads, and mining (Figure 3-5). Harding et al. (1998) referred to such activities as the “ghost of land use past”, and indicated that understanding the influence of past watershed activities is important for correctly assessing current watershed conditions and for guiding proposed restoration efforts. The influence of past watershed activities is discussed in more detail in Section 8.0, Wildlife, Fish, and Aquatic Invertebrates, and Section 10.0, Channel and Floodplain Processes.



**Figure 3-5. Historic mine locations in South Arkansas River watershed (SCR 2002)**

### **Population**

Table 3-1 provides population figures for Chaffee County, Salida, and Poncha Springs for 2000 and 2011.

Population growth projections. The Chaffee County comprehensive plan estimates that, by 2020, the county will have over 25,000 permanent residents. This represents a 28% increase over the 2011 population and excludes seasonal residents and tourists. Currently about half of the county’s population lives in unincorporated areas (Chaffee County 2000), and second homes represent about 15% of households in the county (Salida 2013). One forecast in Salida’s comprehensive plan sets the city’s

population at nearly 10,000 by 2033, a 37% increase (Salida 2013). An estimate for the 2040 population of Poncha Springs was over 3,000 (Poncha Springs 2011).

Table 3-1  
**Population Estimates for Chaffee County, Salida, and Poncha Springs  
 between 2000 and 2011<sup>1</sup>**

	<b>2000</b>	<b>2011</b>	<b>Pct. Change – 2000 to 2011</b>
Chaffee County	16,242	17,932	10.4
Salida	5,504	7,274	32.2
Poncha Springs	1,591	1,727	8.5

Population growth and water use. Salida collects its drinking water from the South Arkansas River. Water used in Poncha Springs and unincorporated areas of the watershed is drawn from groundwater wells. Local government planning documents estimate that there is currently enough water available to support modest increases in population (Chaffee County 2000, Poncha Springs 2011, Salida 2013).

### **Land Ownership**

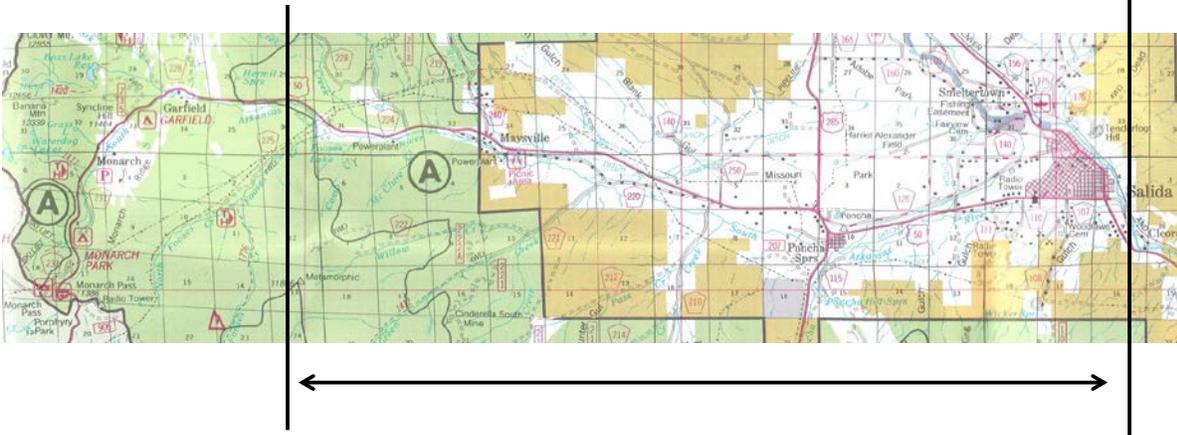
Over 80 percent of the land in Chaffee County is publicly owned—70 percent of the county’s acreage is managed by the U.S. Forest Service; 8 percent is managed by the Bureau of Land Management; and 3 percent is state land, including the Colorado State Land Board and Colorado Parks and Wildlife. The remaining 19 percent of land is privately owned (CNHP 2009a), nearly all of it adjacent to the South Arkansas River in the project corridor (Figure 3-6). By virtue of this proximity, the condition of and activities on private land strongly influence the South Arkansas River. Appendix A contains aerial photographs of the project corridor.

### **Current Land Use and Development**

During the last 40 to 50 years, the Arkansas River headwaters region has transitioned from a resource-based agricultural and mining economy to one more dependent on recreation and tourism. Still, except for the extent of residential development, current land use in the South Arkansas River watershed remains much the same. As such, moving forward, growth and development and future water resources are critical issues (CGS 2006).

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<sup>1</sup> Numbers for 2000 for Chaffee County and Salida are from Salida Chamber of Commerce (2013); 2000 numbers Poncha Springs from SDO (2012). Numbers for 2011 are from US Census (2013).



**Figure 3-6. Land ownership in South Arkansas River watershed and project corridor**  
 U.S. Forest Service (green), Bureau of Land Management (tan), private (white)

### Local Government Planning and Land Use Codes

Within the South Arkansas River watershed, Chaffee County, Salida, and Poncha Springs have planning documents intended to guide land use and development within their jurisdictions. Aspects of those plans that will likely affect the South Arkansas River and the river corridor are outlined below.

Chaffee County. The Chaffee County comprehensive plan contains the following statements related to the South Arkansas River and the river corridor.

- “Improve county land use regulations to protect air/water quality, scenic areas... and wildlife habitat.”
- “Use incentives such as conservation easements and other non-regulatory means to help protect river corridors, wildlife habitat, agricultural lands, and ranching.”
- “Maintain existing public access to state and federal lands, including river corridors.”
- Use regulations and incentives “to improve the quality and amount of open space in and around rural residential projects.”
- Work with the state and federal land management agencies to limit the impacts of development on sensitive natural resources and critical wildlife habitat and migration corridors.
- Adopt regulations that require building setbacks of at least 100 feet “from wetlands, rivers, streams, and other aquatic resources...to preserve vegetative habitat and protect water quality by reducing sedimentation from runoff.”

The plan also mentions creation of an open space acquisition program “to protect critical wildlife habitat, river, and stream corridors, and other sensitive natural and

cultural resources” (Chaffee County 2000). The county plan indicates that over 75% of survey respondents expressed the view that protection of wildlife habitat and river corridors and wetlands should be a priority.

Chaffee County recently updated its land use code (Chaffee County 2013b). In terms of this assessment, provisions address stormwater arising from developments and control of erosion and sedimentation within 50 feet of a waterbody during construction. The code encourages landowners to “minimize disturbance to riparian areas”, and mitigation of impacts to riparian areas may be required for new subdivisions, commercial, and non-residential uses. The board of county commissioners may waive or modify requirements related to setbacks from waterbodies, and it may alter open space requirements related to river corridors and wetlands. Colorado Parks and Wildlife may comment on proposed developments in areas with significant wildlife habitat (1041 Regulations – “activities of state interest”; see Appendix B).

The county’s flood prevention resolution provides guidance regarding activities and construction within stream channels and the 100-year floodplain (Chaffee County 1987). The purpose is to prevent changes in the floodplain that will divert flood waters or increase flood hazards on other lands. Existing floodplain maps in the project corridor date from 1978-1979, and extend from the confluence with the Arkansas River to one-half mile west of U.S. 285 (Chaffee County 1978, 1979). New floodplain maps are planned, but the date of completion is not known (Reimer 2014).

Salida. The City of Salida’s comprehensive plan notes that “...floodplains, wetlands and riparian corridors are rare and valuable resources in the Arkansas River valley” and that the city is “fortunate to have such a unique asset in the Arkansas and South Arkansas Rivers and their associated habitats” (Salida 2013). The plan acknowledges many of the impacts that development has had on the river and incorporates policies and actions within the plan to address those impacts. Examples include non-point source pollution, invasive plant species, and watershed protection through regulation of individual sewage disposal (septic) systems in upstream developments.

The plan notes the need to actively protect and preserve surface and groundwater resources, maintain and improve habitat for fish and wildlife species, and establish mandatory setback requirements in sensitive lands, including river corridors. The plan also indicates that the city “will actively seek access rights along river corridors and create trails and maintain habitat” (Salida 2013). The city currently owns several parcels adjacent to the South Arkansas River, including the “water gallery” property west of Chaffee County Road 110 and other parcels at the east end of town.

The city recently updated its land use code. No specific language addresses impacts to streamside areas. Provisions regarding activities and construction within designated floodplains are similar to those noted for the county. Drainage studies and stormwater

control structures are required for various developments. Erosion and stormwater controls during construction must follow state standards (Salida 2014).

Poncha Springs. The comprehensive plan for Poncha Springs included the following goals related to the South Arkansas River and the river corridor.

- Protect the town’s natural resources—floodplains, wildlife habitat, riparian areas, natural vegetation, and drainage-ways—from adverse impacts.
- Protect surface and ground waters of the South Arkansas River from land uses and practices that may degrade water quality or impair the natural processes in wetlands, floodplains and riparian areas that protect water quality.
- Encourage use of natural runoff filtration, such as grass swales and pervious pavement, to limit the impacts of non-point source pollution.
- Work with Chaffee County and the City of Salida to develop a long-range plan for the South Arkansas River corridor.
- Support development of a trail system along the South Arkansas River, but ensure that trails are located, designed, and managed to minimize impacts on native ecosystems (Poncha Springs 2011).

Poncha Springs updated its land use code in 2013. No specific language addresses impacts to streamside areas, but the code notes that the area “should retain its natural infrastructure, cultural heritage and visual character derived from topography, U.S. Forest, BLM, farm and ranch lands, water rights and riparian corridors.” Provisions regarding stormwater controls for subdivisions as well as construction in designated floodplains are similar to those noted above (Poncha Springs 2014).

The planning documents for Chaffee County, Salida, and Poncha Springs encourage the establishment and integration of a county-wide trail system, including along the South Arkansas River.

### **History, Development, and Land Use— Impacts and Issues in the South Arkansas River and Watershed**

Past beaver trapping, mining, agricultural operations, and development contributed to the current condition of the South Arkansas River watershed, the river, and river corridor. They did so by removing beaver, diverting water, building roads, removing timber, and converting native plant communities to grazing and crop production. In the main, changing land uses altered the amount and timing of water in the stream channel; the quality of the water arriving at and flowing in the river; and the shape, character, and location of the river channel. Impacts of beaver removal are detailed in Section 8.0, Wildlife, Fish, and Aquatic Invertebrates. Past mining has left its mark in the watershed, and a limited amount of mining continues today. Based on water samples tested, impacts to water quality from past and current activity are apparently minimal. Current agricultural operations, development and land use, and public land management influence watershed and stream functions and processes in similar ways.

## Current Zoning and Land Use

Local government zoning and land use regulations direct the location of various types of land use activities, and impose conditions on that development. Those regulations and the resulting activities affect the land, wildlife, and other natural resources (Odell and Knight 2001, Fraterrigo and Wiens 2005).

Developed areas in Salida and Poncha Springs have straightened and confined the river channel and reduced or eliminated the floodplain, changes that adversely affect a variety of stream functions and processes. Reversing such impacts would be contentious and costly. Local zoning and land use codes will determine the extent to which impacts to the river and floodplain will continue, especially in cases of conversion of agricultural lands to residential and commercial development.

Local codes contain general language regarding construction in floodplains and impacts to streamside areas and other sensitive habitats. However, in instances where construction would occur within the 100-year floodplain, fill material may be brought in to raise an area above the 100-year elevation. Although the results may comply with floodplain requirements, they adversely impact streamside habitat and stream channel functions. Three alternatives are described below.

- Vermont's fluvial erosion hazard areas "provide the minimum space necessary for a stream to achieve and maintain a stable depth and slope, and represent a least-cost alternative to reducing severe erosion and flood losses that take place when streams are unstable due to encroachment and channelization" (VRMP 2010). "Fluvial" refers to moving water, processes associated with rivers and streams, and the features created by such processes.
- Montgomery (MD) County's Countywide Stream Protection Strategy is based on watershed assessments that evaluated stream conditions based on water quality, aquatic life, and stream habitat indicators. These assessments identify conditions that adversely impact stream health, the location of impacted streams, and a series of action items and goals to address those conditions, such as changes to county zoning and improved coordination with other local governments (Montgomery County 2003).
- In Montana, a state-issued "310 permit" is required for activities that would affect the bed or banks of the stream up to the high water mark (MDNRC 2013). Colorado has similar requirements, but those apply only to state agency projects or projects funded by state agencies (33-5-101, et seq., C.R.S.).

## Land Use, Grazing, and Impacts to Riparian Vegetation

If allowed, cattle tend to concentrate in riparian areas (Kauffman and Krueger 1984, Armour et al. 1991), as much as 5-30 times as much time than would be predicted from surface area alone (Belsky et al. 1999). Potential adverse impacts include:

- excess nutrients due to defecation and urination;
- compacting soils and breaking down streambanks;
- decreasing woody species and reducing regeneration rates; and
- shifting plant composition away from species adapted to the flooding and scouring that are common along streambanks toward upland and weedy species.

Subsequent impacts can include increased turbidity and sedimentation, increased water temperatures, and changes in surface and subsurface water flows (USFS 1990). Based on these impacts, some authors have concluded that livestock grazing is incompatible with improving or protecting riparian vegetation. Others identify the unrestricted access of cattle to riparian areas as the cause of most adverse effects (Wyman et al. 2006).

Prior to major settlement, riparian areas were used by most wildlife species, including herbivores like deer and elk. It is, therefore, reasonable to assume that grazing domestic livestock in the same areas does not, in and of itself, adversely impact streamside habitat. This is illustrated by Figures 3-7 through 3-9. Figure 3-7 is an area of the South Arkansas River that is grazed; Figure 3-8 is less than a half-mile away and is not grazed; and Figure 3-9 is several miles upstream that is grazed.



Figure 3-7. South Arkansas River, 2012



Figure 3-8. South Arkansas River, 2012



Figure 3-9. South Arkansas River, 2013

Grazing impacts in Figure 3-7 are apparent, i.e., lack of woody species streamside, bank collapse, and the sloughing of sod into the river. By comparison, riparian conditions are better in Figure 3-8, but conditions in Figure 3-9 are arguably even better even though it is grazed.

The trees, shrubs, and grasses native to riparian areas, such as cottonwoods, willows, and sedges, provide a stronger and deeper rooting zone than does vegetation that often follows intensive grazing (Manning et al. 1989). Along these lines, Wyman et al. (2006) concluded that impacts from grazing – adverse as well as beneficial – arise from prior site uses, current site conditions, and the timing, intensity, frequency, and duration of grazing.

Heavy prior grazing may justify exclusion of livestock for a period of time to allow vegetation and other riparian functions to recover. Exclusion also “appears to allow for better recovery of other in-channel factors, such as width-depth ratio, channel entrenchment, bank angle, and fine sediment.” Recovery of deeply incised channels should be expected to take longer. However, because riparian areas are disturbance-driven systems, permanent exclusion may not be the best long-term solution. Some grazing can help maintain riparian diversity (Roni et al. 2008). A wide variety of grazing systems and strategies are available, depending on site conditions and production requirements (Wyman et al. 2006).

### **Current Public Land Use**

As noted above, nearly all of the land above the South Arkansas River project corridor is managed by the U.S. Forest Service and Bureau of Land Management (Figure 3-6). Thus, management decisions by those agencies influence conditions in the watersheds tributary to the South Arkansas River by determining the types of land uses in those areas, such as logging, mining, grazing, road and trail construction, and motorized and non-motorized recreation. In turn, those decisions determine the types and extent of impacts that may occur, such as soil disturbance and compaction, increased runoff, erosion, and deposition. For instance, where recreational trails are placed relative to rivers and wildlife habitat has implications for their short- and long-term impacts (Lindenmayer and Nix 1993, Johnson and Buffler 2008). The proximity of those uses and potential impacts to the tributary creeks may affect the quality of the waters flowing to the South Arkansas River.

Impacts from land use and development are also discussed in the following sections.

- Section 4.0, Geology, Topography, and Soils
- Section 6.0, Hydrology and Flow Regime
- Section 7.0, Vegetation
- Section 8.0, Wildlife, Fish, and Aquatic Invertebrates
- Section 9.0, Water Quality
- Section 10.0, Channel and Floodplain Processes

Restoration goals and recommendations for the South Arkansas River and watershed are discussed in Section 11.0, Establishing Watershed and Riparian Restoration Goals.

*Human activity has profoundly affected rivers and streams in all parts of the world, to such an extent that it is now extremely difficult to find any stream which has not been in some way altered, and probably quite impossible to find any such river.*

H.B.N Hynes (1970)

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