Smith Fork of the Gunnison River
Watershed Assessment

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LIST OF ACRONYMS

BCRLT: Black Canyon Regional Land Trust
BLM: Bureau of Land Management:
COL: Colorado Open Lands
CPW: Colorado Parks and Wildlife
CRWCD: Colorado River Water Conservation District
CWCB: Colorado Water Conservation District
CFWE: Colorado Foundation for Water Education
CWT: Colorado Water Trust
CWMP: Cooperative Watershed Management Plan
CWCD: Crawford Water Conservation District
CWR: Division of Water Resources
CYCA: Colorado Youth Corps Association
GOCO: Great Outdoors Colorado
NRCS: Natural Resources Conservation Service
TNC: The Nature Conservancy
TU: Trout Unlimited
UCRA: Upper Colorado River Authority
USFWS: US Fish and Wildlife Service
USGS: US Geologic Survey
WCCC: Western Colorado Conservation Corps
WSCC: Western Slope Conservation Center

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BACKGROUND AND INTRODUCTION

The Western Slope Conservation Center (WSCC) is a grassroots organization in western Colorado. We began in 1977 when neighbors joined together to protect the North Fork of the Gunnison River. Over the years, we have worked to maintain and improve the health of the North Fork and Lower Gunnison watersheds by working with diverse partners to improve instream infrastructure, restore the streambank and wetlands areas, monitor water quality, and improve river access opportunities. In addition to watershed stewardship, our primary goal areas include public lands advocacy and community education and engagement.

Our mission is to build an active and aware community to protect and enhance the lands, air, water, and wildlife of the Lower Gunnison Watershed. As a result of our work, the communities of the Lower Gunnison Watershed will be characterized by intact and functioning ecosystems, clean and abundant water resources, well-managed lands with the highest level of protection they deserve, and an informed and engaged citizenry that understands the connection between the vitality of its ecological and social communities.

The purpose of this watershed assessment is to describe existing conditions, identify watershed needs, and outline project concepts that address those needs. This assessment will be a useful guide for stakeholders interested in learning more about the needs of the watershed, determining eligibility and priorities for future project concepts, and developing and implementing those projects.

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STATE OF THE SMITH FORK WATERSHED

Physical Environment

LOCATION

The Smith Fork watershed is located in the Upper Gunnison Watershed (4th field level Hydrologic Unit Code 14020002). Smith Fork Creek is a tributary of the Gunnison River in the lower Gunnison River watershed of the upper Gunnison River basin. The Smith Fork watershed is subdivided as a 5th field level hydrologic unit and consists of approximately 3761 acres of land (Figure 1).

The Smith Fork is south of the North Fork of the Gunnison River and south to southeast of the towns of Hotchkiss and Paonia. The town of Crawford is located within the watershed. Headwaters of the Smith Fork are located in the West Elk Wilderness. The stream originates from the North Smith Fork Creek at the base of Smith Fork Mt. at an elevation of 11, 230 feet and the South Smith Fork Creek on the north slope of Bald Mt. at an elevation of 11,787 feet. The North and South Smith Fork join just below the Hawks Nest Ranch property at an elevation of 7,400 feet to form main Smith Fork Creek.

The watershed supports a traditional western farming and ranching economy that is increasingly supplemented in summer months by a tourism economy centered around hunting, outdoor recreation and visitation to the Black Canyon of the Gunnison National Park. Recreation development and population growth in recent years have the potential to affect both water quantity and quality.

The Natural Resource Conservation Service (NRCS) Rapid Watershed Assessment for the Upper Gunnison Watershed identified three primary concerns within the Delta District portion of HUC 14020002. The number one concern identified is water quality and quantity, the number two concern is land utilization and number three concern is weed control. These concerns coincide with findings in this report.

Tributaries that flow into the Smith Fork include Virginia Creek, Cow Creek Second Creek, Little Coal Creek, Buck Canyon, Diamond Joe Gulch, and several unnamed intermittent tributaries originating along the northern edge of Fruitland Mesa.

LANDFORM AND TOPOGRAPHY

The main Smith Fork flows for approximately 24 miles in a southwesterly direction through a valley of multiple river terraces that run parallel to the river. The topography of the watershed area has three distinct terrains: 1) steeply sloping to gently rolling, gullied bedrock (mostly shale) uplands; 2) poorly dissected, connected and disconnected, continuous and discontinuous hillslope fans and mass wasting features, and alluvial terraces; and 3) continuous alluvial valley bottoms. The upper reaches of the watershed include the North Smith Fork which flows for approximately 8 miles in the higher elevation West Elk Wilderness and the South Smith Fork which flows for approximately 6 miles, also in the West Elk Wilderness.

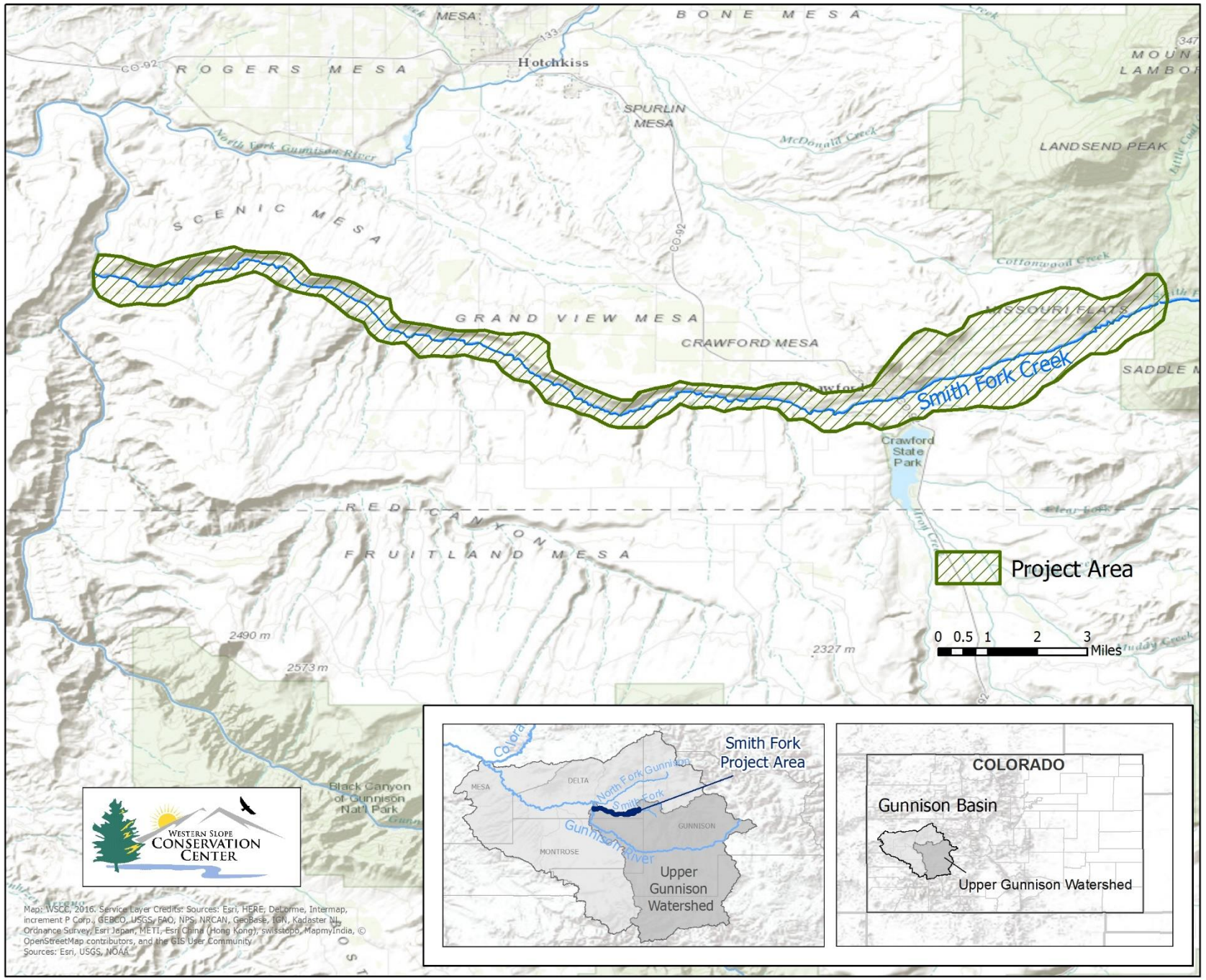

FIGURE 1: SMITH FORK WATERSHED PROJECT AREA

FIGURE 0-3: LOOKING SOUTH SMITH FORK VALLEY WITH CLIPPER DITCH AND SMITH FORK IN FOREGROUND (10-31-15)

FIGURE 0-2: LOOKING EAST AT THE UPPER SMITH FORK WATERSHED FROM NEEDLE ROCK (10-31-15)

FIGURE 0-4: LOOKING EAST AT THE SMITH FORK IN THE LOWER CANYON, BLM SECTION (06-29-16)

FIGURE 0-5: LOOKING NORTHEAST AT THE SMITH FORK IN THE MIDDLE CANYON SECTION (04-27-16)

Elevations of the Smith Fork drainage range from 11,700 feet to 5,100 feet. The midsection of the drainage is approximately 6,000 feet. Young's Peak and Needle Rock are prominent landforms in the drainage (Figure 0-2, Figure 0-3).

The Gunnison uplift (Black Canyon) is a dominant landform at the lower end of the watershed. It is deeply cut by the Gunnison River, forming a very steep walled two-tiered canyon (Figure 0-4). The Smith Fork canyon begins just below the town of Crawford, along with Red Canyon and North Fork of the Gunnison are important drainages that define other prominent landforms including Black Ridge, Scenic Mesa, and Fruitland Mesa (Figure 0-5).

CLIMATE

Annual precipitation varies from about 10 inches at the lower elevations in the valley bottoms to more than 24 inches at the higher elevations. From 25% to 50% of the annual precipitation falls as snow during the colder months, depending on elevation. Most of the precipitation outside of the mid to late summer season occurs from frontal type storm systems, which are typically regional in size. Precipitation from frontal events occurs over a relatively long duration but at low intensity rates. In contrast, summer precipitation is commonly associated with the southwest monsoon air flow pattern, which can produce localized, short duration, and intense precipitation events.

On average there are 246 sunny days per year in Crawford, CO. The average July high is around 89 degrees. The average January low is around 14 degrees. The growing season typically lasts 126 days. The prevailing winds are from the west-southwest.

GEOLOGY AND SOILS

The geology of the watershed changes considerably from east to west. The West Elk Mountains to the east are igneous intrusive and extrusive rocks of Tertiary age and are associated with widespread volcanic activity that began around 36 million years ago. Many of the rocks in the West Elk Range are made of breccias and welded tuff (Hansen, 1987). The primary underlying geologic formations in the watershed are the Cretaceous age Mancos Shale in the eastern portion of the watershed and the Dakota Sandstone and Burro Canyon Formation in the western portion. The Mancos Shale is a significant contributor of salinity to water systems where present (Richards et al 2014).

Mountain slopes of the eastern portion of the Smith Fork Creek contain active geologic instability visible in the form of landslides, scarps, cracks, springs and seeps. The north slopes of Saddle Mountain are composed of very permeable rock glacier material and therefore contains many old and active landslide areas. Agricultural lands in the upper portion of the watershed are situated on gravel washes, stream terraces, and shale slopes. Muddy, Alkali and Iron Creeks drain across large Mancos Shale mud fans and into Crawford Reservoir, most likely contributing to salinity loads in Smith Fork Creek.

Canyon walls and slopes of the western portion of Smith Fork Creek are composed of Dakota sandstone, and Burro Canyon and Morrison Formation. Geology at the mouth of the Smith Fork where it enters the Gunnison River consists of metamorphic schist. One of the lowest Entrada Sandstone formations in Colorado is located at the mouth of Smith Fork Creek.

The soils at the lower elevations of the watershed area are primarily those classified in the orders of Aridisols and Entisols. These soils have limited development from their parent material due to low climatic intensity, and have a limited potential for plant establishment and growth. At the higher elevations of the watershed area the soils are in the orders of Mollisols and Alfisols. These soils have a higher degree of development with distinct horizons in the soil profile. Surface soil horizons are typically darkened by accumulations of organic matter. The potential for vegetation production on these higher elevation soils is much greater than the lower elevation soils.

2.2 Environmental Resources

This section describes the environmental resources of the Smith Fork Watershed, including vegetation, wetlands and riparian zones, flora and fauna, species of special concern, biodiversity focal areas, invasive species and wildlife corridors.

VEGETATION

Vegetation in the Smith Fork watershed is influenced by the semi-arid climate. Vegetation in the upper watershed is primarily mixed and coniferous forest dominated by aspen, spruce-fir and mountain meadows. The mid-watershed portion is primarily Gambel oak-mountain shrubland, pinyon-juniper and juniper woodland on the steeper slopes, and large patches of irrigated agricultural land and rangeland in the valley floor. In the mid to lower portion of the

watershed, the dominant vegetation types are irrigated agricultural lands, shrub/brush rangeland consisting of pinyon-juniper/sagebrush mix and sagebrush/grass mix on less rocky soils. Mesic pinyon-juniper woodlands occur in the ravines and drainage bottoms of protected side canyons. The drought tolerant vegetation class described as saltbush community occurs at the lowest elevations of the watershed, and is broadly distributed across saline soils.

WETLANDS AND RIPARIAN ZONES

FIGURE 0-6: RIPARIAN VEGETATION ALONG THE UPPER SMITH FORK (07-18-16)

Wetlands provide a multitude of ecological, economic and social benefits. They provide habitat for fish, wildlife and a variety of plants. Wetlands are nurseries for many freshwater fishes and amphibians. Wetlands are also important landscape features because they hold and slowly release flood water and snow melt, recharge groundwater, recycle nutrients, and provide recreation and wildlife viewing opportunities. There are several wetland areas in the watershed often bordering pastures and interspersed within narrowleaf cottonwood forest and coyote willow communities. Several ponds and reservoirs have been developed on the lower canyon ranch properties. Figure 7 shows wetlands mapped by the USFWS National Wetlands Inventory for the Smith Fork watershed.

Most drainages in the watershed with intermittent or perennial water contain healthy, functioning riparian vegetation. Riparian vegetation is most prevalent along streams and drainages with reliable or augmented flow. Perennial streams include North and South Smith Fork Creeks, main Smith Fork Creek, Virginia Creek, Cow Creek, Second Creek, Little Coal Creek, Clear Fork Creek, Muddy Creek, Iron Creek, and Alkali Creek. Intermittent drainages include Buck Canyon, Diamond Joe Gulch, Alum Gulch and unnamed drainages originating along the northern edge of Fruitland Mesa (Figure 0-6).

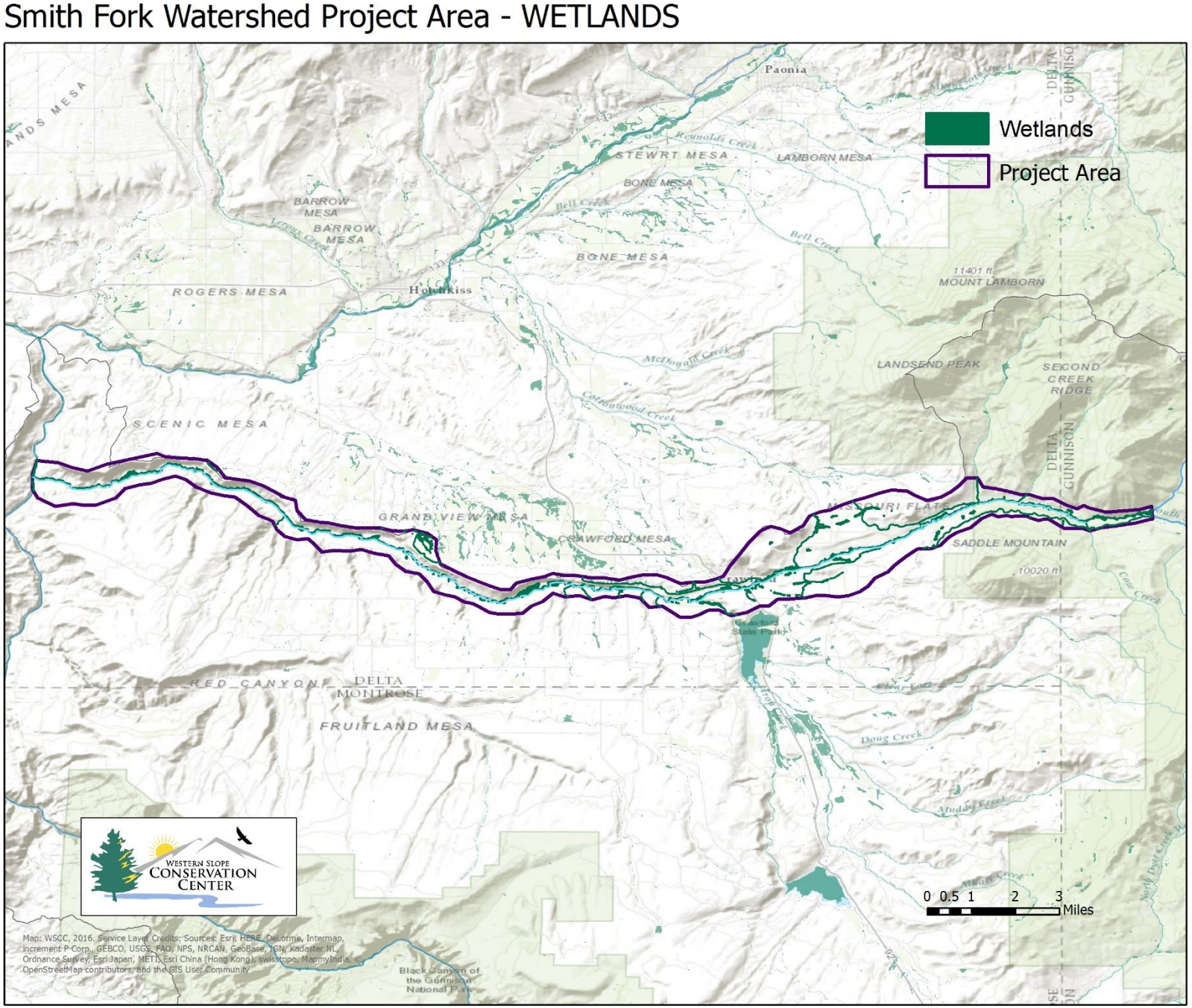

FIGURE 7: SMITH FORK WATERSHED PROJECT AREA - WETLANDS

FIGURE 0-8: RIPARIAN VEGETATION ALONG LOWER SMITH FORK CANYON, LOOKING WEST (07-10-15)

In the moister valley bottoms, riparian vegetation communities are dominated by narrowleaf cottonwood (Populus angustifolia) and associated shrubs and trees including thinleaf alder (Alnus tenuifolia), blue spruce (Picea pungens), Douglas fir (Pseudotsuga menziesii), river hawthorn (Crataegus rivularis), box elder maple (Acer negundo), sandbar willow (Salix exigua), skunkbush sumac (Rhus trilobata), and red osier dogwood (Cornus sericea). Some willow dominated communities are also present, with sandbar willow occurring alone or in combination with strapleaf willow (Salix ligulifolia) or Pacific willow (Salixlucida). Communities of coyote willow occur in the lower canyon. Thinleaf alder forms a somewhat common community alongside the water's edge along some drainages. Small pockets of saltmarsh bullrush community (Scirpus maritimus), and narrowleaf cattail (Typha angustifolia)-broadleaf cattail (Typha latifolia) can also be found at lower elevations.

In the lower canyon cottonwood regeneration is prevalent however, larger old growth cottonwoods are not abundant. Tamarisk has become established in the lower canyon. Some of the lower canyon stretches of the stream show signs of extensive bank erosion from past agricultural and grazing practices. These sites appear to be recovering, banks are generally stable and vegetated throughout the watershed (Figure 0-8).

NON-NATIVE SPECIES

State listed noxious weeds are scattered in isolated infestations across the watershed. Russian knapweed (Acroptylonrepens) and hoary cress (Cardaria draba) are the most common in disturbed areas at lower elevations. Tamarisk (Tamarix chinensis) is present in the lower canyon portion of the watershed. Houndstongue (Cynoglossum officinale) and Canada thistle (Cirsium arvense) are found in some areas in the mountain shrub vegetation type, and a few small populations of leafy spurge (Euphorbia esula) are present near agricultural lands. Fruitland Mesa has very large, well established populations of Russian knapweed on private lands and along county roads. Whitetop is a secondary infestation on this mesa.

According to the Delta County Noxious Weed Management Plan (2010) the most common state designated noxious weeds in Delta County on private and BLM lands are Russian knapweed, whitetop, and Canada thistle. The most common weeds along the Gunnison River

from the Smith Fork drainage to Pleasure Park and Lawhead Gulch are Russian knapweed, whitetop, and tamarisk. Non-native annuals are pervasive throughout the watershed.

FIGURE 0-9: RUSSIAN KNAPWEED, LOWER SMITH FORK CANYON (06-29-16)

Documented weed control efforts in the main Smith Fork drainage were not found. The 2010 Delta County Noxious Weed Management Plan reported removing approximately 90 percent of tamarisk between the Smith Fork and Lawhead Gulch (16 miles). The report also identified minor infestations of yellow toadflax and oxeye daisy between Pleasure Park and Delta. The primary weeds warranting long-term treatment efforts include Russian knapweed, Canada musk, scotch thistle and hoary cress (whitetop). Russian knapweed is especially prevalent in the lower canyon portion of the Smith Fork (Figure 0-9).

FISHERIES

The headwater reaches of the North Smith Fork supports a non-aboriginal conservation population of Colorado River cutthroat trout which is being supplemented with additional stocking by Colorado Parks and Wildlife (personal communication with Eric Gardunio, CPW fish biologist). Information regarding fish species in the South Smith Fork drainage could not be found. It is likely that this drainage and its tributaries do contain small populations of brook trout and possibly rainbow trout.

FIGURE 0-10: FISHERIES HABITAT ALONG THE UPPER SMITH FORK ON FOREST SERVICE LAND (10-31-15)

FIGURE 0-11: CRAWFORD RESERVOIR SPILLWAY INTO IRON CREEK WHICH FLOWS FROM THE SOUTH INTO THE SMITH FORK (07-10-15)

The main Smith Fork begins at an elevation of 7,400 feet, stream reaches in this section support rainbow trout, cuthroat, cutbows (cutthroat trout hybridized with rainbow trout), and brown trout. The Smith Fork Ranch provides guests with guided fishing trips along a three-mile stretch of the stream along their private property. Fishing guides from the ranch report

that the average catch in this section of stream is made up of between 50-70 percent rainbow trout, 20-30 percent brown trout and 10-15 percent cutbows. The ranch only allows catch and release fishing. Second Creek, a tributary to the Smith Fork also contains Colorado River cutthroat trout however this population has been documented to contain more than 10% introgression with non-native species and therefore is not a tracked conservation population. The Smith Fork Ranch stocks rainbow trout in man-made fishing ponds in lower Second Creek.

The highest potential for recreational fishing opportunities occur in the upper portion of the main Smith Fork, beginning on Forest Service lands on down to just above the town of Crawford (Figure 0-10). Other than Smith Fork Ranch providing guided trips it's unknown how many other people fish Smith Fork Creek especially in light of there being little to no public access below the confluence with Cow Creek at the Forest Service boundary.

As the stream drainage drops into the mid and lower elevations water quantity decreases and water temperatures increase limiting fish habitat. There may be small isolated populations of rainbow and brown trout that have made their way downstream below the Daisy Ditch on down to Fruitland Mesa Road above the Canyon Ranch. Below Canyon Ranch fish habitat becomes very limited to non-existing due to low flow and de-watered sections of the stream.

Crawford Reservoir is a popular fishery that provides angling opportunity for yellow perch, channel catfish, northern pike, rainbow trout, black crappie, and largemouth bass. This reservoir, located in Crawford State Park, covers 414 surface acres at full capacity and is open year round to angling. The spillway/outlet of Crawford Reservoir (Figure 0-11) may inadvertently be releasing non-native fish into the Smith Fork drainage. It would be detrimental if these fish species made their way downstream to the Gunnison River where they could potentially compete with desired wild trout species.

There is little data on fish species for the section of stream in the Smith Fork Canyon. Historically it is likely that warm water fish species such as roundtail chub in the Gunnison River made spawning runs up tributaries such as the Smith Fork. Bluhead and flannelmouth sucker in the Gunnison River may also have historically moved up into the Smith Fork.

The Gunnison River in the Black Canyon and Gunnison Gorge (Figure 0-12) is a Gold Medal wild trout fishery that stretches over 40 miles from Crystal Reservoir to the town of Austin and provides many diverse wading and float fishing opportunities. The Gunnison River contains populations of brown trout, rainbow trout and a few cutthroat may be found. The Gunnison River is managed primarily as a wild trout water, with the exception that since 2004 whirling disease resistant rainbow trout have been stocked throughout the river to re-establish wild rainbow reproduction. Rainbow trout are regulated as catch and release, brown trout are regulated to 4 fish of any size limit. Some brook trout, rainbow trout, brown trout, and cutthroat trout also may be found in small numbers in perennial tributaries of the Gunnison River. Native fish species, bluehead sucker, speckled dace, sculpin, and flannelmouth sucker, are known to be present in the Gunnison

FIGURE 0-12: CONFLUENCE OF THE SMITH FORK AND GUNNISON RIVER IN THE GUNNISON GORGE WILDERNESS AREA (07-10-15)

River and some sections of other tributary streams. Some frogs, toads, and water snakes are known to be present, but their status is unknown. It is likely that cutthroat trout that may be present are hybrids rather than native Colorado River cutthroat.

WILDLIFE

The watershed provides valuable habitat for wildlife species typically found region wide in semiarid coniferous forest, montane shrublands, cliff-bordered canyons, and rural agricultural lands. Wildlife species in the area include a broad array of reptiles and amphibians, songbirds, game birds, birds of prey, rodents and rabbits, big game, and small to large carnivores.

The majority of the Smith Fork watershed contains healthy functioning riparian areas which provides important habitat for a diverse mix of wildlife. These areas also function as corridors of riparian vegetation connecting lower portions of the watershed to headwater and upland areas, enabling wildlife movement. Lower elevation riparian forests represented in the lower canyon section of the Smith Fork are some of the most valuable wildlife habitats in Colorado, because at least two-thirds of Colorado wildlife species occur there. Statewide, riparian habitats are increasingly altered or destroyed by competing land uses. Conservation of riparian habitats such as those in the Smith Fork watershed is critical to wildlife. In addition, healthy riparian areas protect aquatic life in the stream by keeping water temperatures cool, providing organic matter, filtering out pollutants, and increasing stream flow year-round.

The proximity of irrigated pastures, riparian and wetland areas, cliffs, and natural plant communities in the watershed is extremely valuable to wildlife, providing many ecotones or "edges" between adjacent habitats. Agricultural areas provide significant foraging habitat for herbivores including mule deer, elk, rabbits, and rodents, especially in late summer, winter, and early spring when forage is scarce in natural communities. Open agricultural fields provide abundant small mammal populations attracting predators such as hawks, owls, vultures, coyotes and weasels.

Wildlife habitats in the watershed provide important linkages with adjacent tracts of wildlands, which helps protect biological diversity and maintain habitat for animals with large home ranges such as bobcats and mountain lions. The Smith Fork watershed also provides wildlife habitat linkages to adjacent public land (BLM Gunnison Gorge National Conservation Area and Wilderness and US Forest Service).

Structural diversity provided in the pinyon-juniper and mixed shrubland communities of canyon slopes and ravines provides excellent breeding habitat for neotropical migrant songbirds as well foraging and nesting habitat for Merriam's turkeys.

Tall cliffs associated with the watershed provide important habitat for cliff-nesting birds, including swift, swallows, canyon wrens, hawks, owls, ravens, peregrine falcons, and golden eagles. Cliffs also support cliff-inhabiting small mammals such as woodrats, canyon mice, ringtail cats, and several bat species.

Colorado Parks and Wildlife (CPW) identifies the entire Smith Fork watershed as mule deer and elk severe winter range. CPW has also identified the area northwest of Crawford and the area along the eastern edge of the Black Canyon as winter elk concentration areas.

Table 1 shows a list of the most common or noted wildlife species, their occurrence and the general habitat type in which they are found. Some species are yearlong residents, while others are migrants. A variety of small mammals, bird species and reptiles are scattered throughout the watershed where their specific habitats are present.

Species (Common Name)	*Habitat Type*	*Occurrence*
Mule Deer	Pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland	Common yearlong, mostly during winter
Elk	Pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland	Common mostly during winter
Black Bear	Spruce-aspen, oak-mountain shrub riparian	Uncommon, mostly spring and fall
Bighorn sheep	Canyon benches, mesa tops, and valley bottoms	Uncommon, may be present in the Black Canyon area
Mountain Lion	All types mostly along rim-rock areas	Common, year long
Bobcat	All types	Uncommon, year long
Coyote	All types	Common, year long
Cottontail rabbit	All types	Common, year long
Porcupine	Pinyon-juniper, riparian	Common, year long
Prairie dog (White Tail)	Sagebrush, desert shrub	Common, year long
Raptors, Eagles, Hawks, Falcons	All types	Common, year long
Merriam's Turkey	Riparian forests, Pinyon-juniper, Oak-mountain shrub	Riparian communities and PJ in winter and oak-mountain shrub spring and fall
Great Blue Heron	Wetlands, riverbanks, deciduous forest, agricultural fields	Spring, summer
Dusky Grouse	Oak/Serviceberry	Common, yearlong
Chuckar	Salt desert	Uncommon, year long
Neo-tropical birds	All types	Common, warm season
Small Mammals	All types	Common, year long
Amphibians-Reptiles	All types	Common, year long
Bats	All types	Common year long, mostly warm season

TABLE 0-1: A LIST OF SMITH FORK WATERSHED MOST COMMON OR NOTED TERRESTRIAL WILDLIFE SPECIES, THEIR OCCURRENCE, AND BASIC HABITAT TYPES IN WHICH THEY ARE FOUND

THREATENED, ENDANGERED AND SPECIES OF SPECIAL CONCERN

Within the Smith Fork watershed there are several species listed as threatened or endangered as well as species that are candidates for listing under the Endangered Species Act, as amended. For this report the Delta County species list was obtained from the U.S. Fish and Wildlife Service website (USFWS 2015). Also based on data from Colorado Natural Heritage Program (CNHP) and Colorado Parks and Wildlife and BLM Uncompahgre Field Office, there are other species of special concern in the area. Table 2 below is a list of the Threatened, Endangered and Species of Concern that are found, or potentially found within the watershed area.

Common Name	*Scientific Name*	*Status*	*May Be Present*
Yellow-billed cuckoo	*Coccyzus americanus*	T	Yes
Gunnison sage-grouse	*Centrocercus minimus*	T	Yes
Bonytail chub	*Gila elegans*	E	No*
Colorado pikeminnow	*Ptychocheilus lucius*	E	No*

Humpback chub	*Gila cypha*	E	No*
Razorback sucker	*Xyrauchen texanus*	E	No*
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	T	No
Colorado hookless cactus	*Sclerocactus glaucus*	T	Yes
Canada lynx	*Lynx canadensis*	T	No
American Peregrine falcon	*Falco peregrinus anatum*	SC	Yes
Bald Eagle	*Haliaeetus leucocephalus*	SC	Yes
Ferriginous hawk	*Buteo regalis*	SC	Yes
Greater sandhill crane	*Grus canadensis tabida*	SC	Yes
Northern leopard frog	*Rana pipiens*	SC	No*
River otter	*Lutra canadensis*	SC	Yes
Colorado River cutthroat	*Oncorhynchus clarki pleuriticus*	SC	No*
Bluehead sucker	*Catostomus discobolus*	SC	No*
Flannelmouth sucker	*Catostomus latipinnis*	SC	No*
Roundtail chub	*Gila robusta*	SC	Yes
Rocky Mountain thistle	*Cirsium perplexanus*	S1	Yes
Colorado desert parsley	*Lomatium concinnum*	S1	Yes
Adobe beardtongue	*Penstemon retrorsus*	S1	

TABLE 0-2: LIST OF POTENTIAL THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN FOR THE SMITH FORK WATERSHED

STATUS: E- Federally-listed Endangered species
T- Federally-listed Threatened species
C- Federally-listed Candidate species
SC- State Special Concern species
S1- CNHP Critically Imperiled in state because of extreme rarity
*Species not known or suspected to occur in the Smith Fork watershed; water depletions may affect these species

Gunnison sage grouse - Sage-grouse require large, contiguous areas of sagebrush (>200 acres) with an abundant herbaceous understory, interspersed with wet swales. Loss and fragmentation of sagebrush habitats are chief causes in the decline of Gunnison sage-grouse populations. The current rangewide population is estimated at 5,000 birds across seven population areas. As of 2015, the Gunnison Basin, Colo. population contains more than 86% of the total number of birds. The Crawford, Colo. estimated breeding population is a much smaller and isolated satellite population estimated to contain 103 birds. The Crawford population has been declining over the past ten years and is below population objective of 275 birds. Smith Fork watershed is within the Crawford Area Gunnison Sage-grouse Conservation Plan Study Area (2011) which includes current, probable and historic range. A summary report compiled in 1964, "Sage Grouse Investigations in Colorado" by Glenn Rogers reported that there was a "light" population in the Smith Fork drainage. Currently Fruitland Mesa bordering the south side of Smith Fork drainage is mapped as occupied and potential grouse habitat, Grandview Mesa which borders the north side of Smith Fork drainage is mapped as vacant/unknown habitat. Suitable habitats within the Smith Fork drainage could serve as potential linkage areas to connect larger landscapes.

Yellow-billed cuckoo - The cuckoo breeds in low elevation river corridors with an over story of fairly extensive mature cottonwood galleries and dense understories of native and exotic shrub species; breeding birds have been identified in nearby North Fork River valley almost annually since 2003. This species may occur incidentally in the lower canyon of the Smith Fork.

Four endangered Colorado River fish - None of the four endangered Colorado River fishes occur in the Smith Fork; however, the Smith Fork is adjacent to designated critical habitat. The closest designated critical habitat and the closest potential populations of the Colorado

pikeminnow, and razorback sucker are in the Gunnison River. The bonytail has recently been stocked in the Gunnison River and humpback chubs have been recorded. Impacts to Colorado River endangered fishes may result from continued or additional water depletions in the Smith Fork and Crawford Reservoir (on Iron Creek), both of which drain to the Gunnison River. Water depletions in these basins has the potential to diminish backwater spawning areas and other habitat in the downstream designated critical habitat.

Colorado hookless cactus- Known range for this species in the area is limited to alluvial river terraces and Mancos Shale formation of the Gunnison River valley from near Delta, Colorado to southern Mesa County, Colorado. Plant associations include semi-desert shrublands, big sagebrush shrublands, and sagebrush-juniper woodland transition areas.

Peregrine falcons and bald eagles - Peregrines nest in the Gunnison Gorge and could potentially be nesting along the south facing cliffs in the lower canyon of the Smith Fork drainage. The watershed provides suitable foraging habitat for wintering bald eagles, who hunt along rivers including the Smith Fork for waterfowl and fish, and forage over open rangelands.

BIODIVERSITY FOCAL AREAS

The Colorado Natural Heritage Program has been inventorying Colorado counties to identify sites that contain high quality plant communities, or assemblages of rare plants, and/or animals that they feel warrant protection and management for biodiversity conservation at a statewide level. Delta County was inventoried in 1996 and 1997 (Lyon and Williams, 1998).

The Nature Conservancy (TNC) has sponsored eco-regional assessments to identify areas important for regional biodiversity conservation. The Smith Fork watershed area falls into the Southern Rocky Mountains assessment (The Nature Conservancy, 2001).

Site Name	*Resource Value*	*Biodiversity or Conservation Value Rank*	*Management Protection Urgency Rank*
CNHP: Crawford Mesa	Excellent population of globally restricted adobe beard tongue	B3	M3, P3
CNHP: Hotchkiss Hills	Two excellent occurrences of globally imperiled Colorado desert-parsley	B2	M4, P3
CNHP: Little Coal Creek	Good quality examples of two plant communities (aspen wetland forests and lower montane riparian forests), northern leopard frog occurrence, and globally imperiled plant Rocky Mountain thistle	B4	M4, P5
CNHP: Needle Rock	Scattered population of globally restricted adobe beardtongue high quality example of mesic pinyon-juniper woodland	B4	M4, P5
TNC: Hotchkiss Hills	Montane, Foothill and Desert Riparian Woodland/Shrublands, Lower Montane Shrubland, Pinyon-Juniper and Juniper Woodland, Sagebrush Shrubland, Semidesert Chaparral, low and high elevation perennial and intermittent headwaters and creeks small river systems. BlackFire Sagebrush/Salinus Lyme Grass and Narrowleaf Cottonwood-Rocky Mountain Juniper Woodland communities, Narrowleaf Cottonwoo/Skunkbush Sumac Woodland, Eastern Cottonwood/Skunkbush Sumac Woodland, Rocky Mountain thistle, Colorado Desert parsley, Gunnison sage grouse, northern leopard frog	Moderate	Overall moderate with high threat from fire regime alteration, habitat loss, and vehicle roads and recreation. Moderate threats from energy and mineral development and invasive plants
TNC: Little Coal Creek	Alpine/montane steep and very steep gradient headwaters, creeks (granite/volcanic), Colorado River cutthroat trout, Gambel's oak shrubland	NA	Fire management grazing practices, invasive plants, special spp. management

TABLE 0-3: BIODIVERSITY FOCAL AREAS LOCATED IN THE VICINITY OF SMITH FORK WATERSHED

1Biodiversity Rank: B1= Outstanding significance such as the only known site for a globally species. B2= Very high significance, such as one of the best examples of a community type, or good occurrence of a globally imperiled species or a species with very restricted range. B3= High significance, such as an excellent example of any community type or a good occurrence of any species with very restricted range or a good occurrence of a state rare species. 2Management Urgency Rank: M1=Management action required at once to prevent the loss or irreversible degradation of one or more of the species or communities for which the PCA was identified. M2= Management action required within 5 years to prevent the loss of one of the items for which the PCA was identified. M3= Management action needed within 5 years to maintain the current quality of identified resources. M4= Management actions may be needed in the future to maintain the quality of the identified resources. M5= No serious management needs identified. U=Uncategorized. 3Protection Urgency Rank: P1: Immediately threatened by severely destructive forces, within 1 year of rank date; protect now or never. P2: Threat expected within 5 years.P3: Definable threat but not in the next 5 years. P4: No threat is known for the foreseeable future. P5 Land protection complete or adequate reasons exist not to protect the site; do not act on this site.

Hydrology

RIVER FLOWS

The Smith Fork watershed drains approximately 167 square miles in the upper Colorado River Basin. The Smith Fork is a tributary of the Gunnison River. The headwaters of the Smith Fork are located in the Gunnison National Forest and are formed by the confluence of North and South Smith Fork Creeks just below the Hawks Nest Ranch private property at an elevation of 7,400 feet.

Streamflow data in the Smith Fork watershed has been measured sporadically at four recorded gaging stations.

Table 0-4 lists the flow gaging station, period of record, and mean annual stream flow in the Smith Fork.

Gage Number	Station Name	Elevation	Period of Record	Mean Annual Stream Flow (CFS)
09128500	Smith Fork Near Crawford, CO	7,000 feet	1936-1994	42
09129000	Smith Fork at Crawford, CO	6,600 feet	1955-1960	39
09129500	Iron Creek Near Crawford, CO	6,443 feet	1947-1952	17
09129600	Smith Fork Near Lazear CO	5,800 feet	1977-1987	39
			2012*	4
			2014*	25

TABLE 0-4: STREAM GAGES, *OPERATED APRIL THROUGH JULY. SOURCE: USGS AT*

Gage Number	Station Name	Elevation	Period of Record	Mean Annual Stream Flow (CFS)
09128500	Smith Fork Near Crawford, CO	7,000 feet	1936-1994	42
09129000	Smith Fork at Crawford, CO	6,600 feet	1955-1960	39
09129500	Iron Creek Near Crawford, CO	6,443 feet	1947-1952	17
09129600	Smith Fork Near Lazear CO	5,800 feet	1977-1987	39
			2012*	4
			2014*	25

HTTP://WATERDATA.USGS.GOV/NWIS/RT

Stream flows in the Smith Fork are highly variable depending on the season. Natural flow of the stream is affected by diversions for irrigation and return flow from irrigated areas. Flows range from approximately 1.28 to 37.5 cfs in late summer and winter to between .5 and 486 cfs during peak runoff. The highest peak flow on record is 1,610 cfs, recorded on May 18,

1984 at the USGS gage; Smith Fork Near Lazear, CO gage. The mean annual high water runoff at the Smith Fork Near Lazear gage is approximately 160 cfs. This is the only stream flow gage currently operating in the watershed. Average flows are highest during spring snowmelt runoff typically on Memorial Day in May.

IRRIGATION DIVERSIONS

There are 38 irrigation diversions along the main channel of Smith Fork Creek or along tributaries of the Smith Fork between the Virginia Ditch diversion and the confluence with Gunnison River. Un-used irrigation water or outflow from ditches may be taken in by other ditches or returned to the Smith Fork either through direct tributaries or tailwater channels or indirectly through groundwater recharge. Some percentage of outflow is lost to evaporation and ditch seepage. In the late summer, some reaches of the Smith Fork are left with almost no water. At certain points in late summer, such as from the Daisy Ditch intake to approximately 1 mile downstream and in sections below the Canyon Ranch, the Smith Fork is almost completely dried up.

Table 0-5 lists the decreed ditches and the total amount of cubic feet per second (cfs) decreed. In some of these ditches a portion of the total cfs decreed includes stock water. Stock water decrees only run during the non-irrigation season. In some cases, the stock water decree makes up the majority of the water decreed to a ditch. The Hice ditch has been combined with the Needle Rock ditch and the water is divided among the shareholders. The highest (most upstream) diversion along a tributary of the Smith Fork is the Virginia Ditch. The highest diversion along the Smith Fork itself is the Saddle Mt. Highline Ditch, and the lowest diversion along the Smith Fork is the Smith Fork Canyon Creek Ditch.

Ditch name	Total decreed amount(cfs)	Diverts water from Smith Fork or from a tributary
McNeil	2.1	T
Preston	1	SF
Young	1	SF
Crawford Clipper	164.316	SF
Gove	15.863	T
Pilot Rock	19.801	T
Daisy	18.855	SF
Lone Rock	10	SF
Wilson & Pankey	1.5	SF
Barnard	5.75	T
Hice	4	SF
Needle Rock	42.951	SF
Mcleod	0.3	SF
Shadeland	0.469	T
Scrub Oak 2	3.657	SF
Reeder 1&2	5.033	SF
Anderson	5.951	SF
Jersey	0.393	ST
Virginia	9.722	T
Freeman 1	4.094	SF
S F Creek Canyon	4.35	SF
Freeman 2	1.194	SF
Scrub Oak 1	3.394	SF
Spring Brook	0.225	T
Saddle Mtn. Highline	83.72	SF
Reeder 3	0.075	SF
Diamond Joe	5.265	SF
Mayho	1.75	T
Grandview	90.5	SF
Barnard and Shearer	0.5	T
Howard	0.8	T
Buck Canyon	0.47	T
Crissler	0.62	SF
Bean	0.37	T
Morrow	1.5	SF
Pine Creek	1.5	T
Smith Fork Feeder	150	SF
Upper Mcleod	3	SF

TABLE 0-5: SMITH FORK WATERSHED DECREED DITCHES. *SOURCE: GREG POWERS, WATER COMMISSIONER, DISTRICT 40, COLORADO DIVISION OF WATER RESOURCES*

THE SMITH FORK PROJECT / CRAWFORD RESERVOIR

The Smith Fork Project was authorized by an Act of Congress on April 11, 1956 and the Crawford Water Conservancy District (CWCD) was formed May 30, 1957 for the purpose of operating the Smith Fork Project. In 1959, CWCD filed water right claims for the Smith Fork Feeder Canal, the Crawford Reservoir, and the Aspen Canal, and in early 1960 landowners contracted for project water in Crawford Reservoir once they would become available following the construction of the reservoir. The Project was completed in 1963 and operations turned over to CWCD in 1964.

Crawford Reservoir was created by Crawford Dam which crosses Iron Creek, a tributary of the Smith Fork of the Gunnison River. The Crawford Dam was completed in 1962 by the United States Bureau of Reclamation with a height of 162 feet and 575 feet long at its crest. It impounds Iron Creek and is filled from Iron Creek and Smith Fork Feeder Canal. The dam is now owned and operated by the local CWCD. The reservoir has a water surface of 406 acres, about seven miles of shoreline, and has a storage decree of 14,395 acre-feet and an active storage capacity of 14,064 acre-feet. The reservoir provides recreational activities including fishing (for yellow perch, northern pike, black crappie, largemouth bass, trout, and channel catfish), hunting, boating, camping on 66 campsites, and hiking. A peninsula on the northeastern shore is the site of the Crawford State Park.

Crawford Reservoir is filled from Iron Creek and Smith Fork Creek, via the Smith Fork Feeder Canal. The Smith Fork Feeder Canal originates on Smith Fork Creek northeast of the Town of Crawford. The canal is 3 miles long and was originally the diversion and structure for the Daisy Ditch. The canal usually diverts water to the reservoir from November 1 through April 30 of each year or until a call is placed on the Smith Fork Creek and/or until the reservoir spills. During the irrigation season the canal diverts decreed and project water to Daisy Ditch shareholders. The canal has a decree for 150 cfs and a carrying capacity of 90 cfs.

Crawford Reservoir delivers water to the Aspen Canal via a 34-inch siphon. The canal has an initial carrying capacity of 125 cfs which is measured by a flow meter at the control house below Crawford Dam. Once the canal crosses 3850 Drive, it becomes an open ditch. Water is delivered to the Crawford Clipper and Grandview Ditches. The Aspen Canal carries water for 5.8 miles.

Prior to the construction of the Smith Fork Project, the Aspen Ditch diverted water from Iron Creek and its tributaries and delivered water to the Grand View Ditch headgate. When the Smith Fork Project was completed, the Aspen Ditch became the main distribution canal for Project water. The Grand View Ditch is decreed for 57.5 cfs from Iron Creek and its tributaries, which is delivered to the Aspen Ditch for irrigation, stock, and domestic use through the Crawford Reservoir and syphon.

The CWCD provides Project water to irrigate approximately 8000 acres by storage releases and by exchange. Most irrigation waters are delivered to farms through open, unlined ditches and applied directly to fields. As ditch companies are improving open transportation of decreed water through grant-funded piping projects, more fields are being converted to gated pipe and pressurized systems where pressure is available. Approximately 60% of farm users currently under pressurized pipe delivery systems have or intend to convert to more efficient irrigation practices, including gated pipe, side-roll, and center-pivot sprinkler systems. Although these systems do not provide return water flow to the Smith Fork Creek, they encourage increased water quality and storage benefits which could improve water flow in

the Smith Fork Creek.

Before construction of the Smith Fork Project, all ditches were administered on a strict priority basis. After the Smith Fork Project was constructed and shares were purchased by landowners in the District, the Crawford Reservoir provided this additional water for agricultural users. In addition, an exchange system was implemented by CWCD so that agricultural users located upstream of Crawford Reservoir could receive their water store.

In 2005, CWCD received a decree of 70 cfs from the Division 4 Water Court for the Smith Fork Project Exchange. The exchange reach was defined as "from the lowest diversion from Smith Fork Creek, which is the headgate of the Grand View Ditch, upstream to each of the headgates listed...". Table 0-6 lists the structures receiving exchange waters as well as exchange amounts.

Ditch	*Exchange Amount (cfs)*
Clear Fork Ditch	2.0
Daisy Ditch	5.0
Mayho Ditch	2.5
Needle Rock Ditch	15.0
Saddle Mountain Highline	30.0
Shadeland Ditch	3.0
Virginia	5.0
Virginia on Clear Fork	5.0

TABLE 0-6: EXCHANGE STRUCTURES AND AMOUNTS

CWCD records of water diverted to reservoir storage and water released for irrigation from 2002-2007 show that the minimum diversion to storage occurred in 2002 in the amount of 5,634 acre-feet and the maximum diversion to storage occurred in 2005 in the amount of 13,196 acre-feet. Over the five-year period, water diverted to storage averaged 9,284.6 acre-feet. The minimum water released for irrigation (including evaporation) occurred in 2002 in the amount of 5,369 acre-feet and the maximum released occurred in 2004 in the amount of 10,492 acre-feet.

GROUNDWATER

Ground water in the Smith Fork watershed occurs in bedrock aquifers in the Mesa Verde formation, and in unconsolidated surface deposits of alluvium and colluvium. Ground water in the bedrock aquifers flows in the direction of the geologic dip, approximately 4 degrees to the northeast. Because of this condition, groundwater in the Mesa Verde formation is eventually lost to the North Fork Valley, then flowing to the northeast under Grand Mesa.

The extensive network of ditches in the Smith Fork watershed have been inventoried by Bureau of Reclamation and Delta County. Generally, some ditches flow more or less continuously, at least during part of the year, others are only used when fields are being irrigated. Some ditch alignments coincide with stream sections, resulting in so-called “enhanced stream flows” or “enhanced streams.” Other ditch alignments contour throughout the landscape, and affect the various streams and mesas that are traversed. Most ditches are unlined, and leak water into the subsurface. Practices of piping have minimized this water loss. Wetlands and aquatic vegetation are indicators of groundwater discharge to the land surface. The irrigation ditches located on the terraces and along stream valleys often have wetlands, aquatic plants and seeps, indicative of leaky, unlined ditch perimeters, which can be a source of significant groundwater recharge to a hydrogeologic unit that may naturally be

dry in normal conditions, but may be an aquifer due to long time ditch leakage into the hydrologic system. Given this situation, there may be an effect of increased surface water flow in springs and drainages due to reservoir and ditch releases that ultimately can affect groundwater recharge to shallow and bedrock systems in various areas. These diversions and man-made changes to the surface water system are an important part of the water balance calculations, including springs, for the overall hydrologic system of the watershed.

River Condition

The Smith Fork is a primarily stable, healthy stream system. In a distance of approximately 24 miles the stream runs from high elevation Forest Service designated West Elk Wilderness to its terminus with Bureau of Land Management (BLM) designated Gunnison Gorge Wilderness Area. The headwaters are relatively pristine, having little human influence and well protected by Forest Service and wilderness land designations. From the Forest Service boundary east of the town of Crawford down to the lower-canyon section, the Smith Fork runs entirely through private lands consisting of houses, ranches, agricultural pastures and hayfields. Just west of Crawford the river enters the scenic Smith Fork Canyon within distinctive towering sandstone cliffs and streamside cottonwood forest. The stream continues through the canyon, private lands cover the canyon bottom and consist of irrigated pastures, hayfields and several developed ponds. In the mid-portion of the canyon several sections of the stream are de-watered, riparian and upland vegetation condition decreases in vigor and invasive weeds become more prevalent. The stream terminates in a steep, narrow canyon section. The stream channel flows through small drops and waterfalls. This lower section is within the Gunnison Gorge Wilderness Area.

The headwaters of the Smith Fork originate from the North and South Smith Fork tributaries located on USFS lands. These tributaries contain high gradient, narrow, confined channels with an average width of 4 to 6 feet, a gravel/small cobble substrate. The stream channel is comprised mostly of riffles and small step pools. The headwaters are in relatively pristine watersheds with little to no degradation associate d with human activity. The North Smith Fork is within the federally designated West Elk Wilderness Area.

In the upper portion of the Smith Fork (one mile above confluence with North Smith Fork downstream to the Needle Rock area) the valley begins to open up but is still somewhat confined to the surrounding mountains. Private agricultural lands occur in narrow strips along the semi-steep valley floor. The Saddle Mountain ditch is the first significant diversion located on the South Smith Fork tributary. The second significant diversion is the Needle Rock and together, the two can divert most of the stream’s flow, especially during June to late August.

Approximately 0.5 mile below the Saddle Mountain ditch diversion, the stream picks up waters flowing from the North Smith Fork tributary. From this point down the stream meanders slightly, average channel width is between 5-10 feet, channel is dominated by riffles, and small shallow pools exist intermittently. There is evidence of streambed scour and bank erosion due to extreme events and fluctuating flows. Variation in width and width to depth ratios is relatively low. The riparian corridor is well developed and healthy. In most areas the riparian corridor is adjacent to or soon transitions to upslope vegetation of Gambel oak and other woodland shrubs.

The Saddle Mountain ditch system on the north facing slopes of Saddle Mountain seeps a significant amount of water which contributes flows to wetland areas and into small

drainages that eventually flow into the Smith Fork. There are also some small slide and slough areas below irrigated fields on the north side of Saddle Mountain.

Through the mid-elevation portion of the Smith Fork (below Needle Rock to Crawford) the valley opens, agricultural fields become much larger and more expansive and extend close to the stream. The stream channel widens as it meanders through lower gradient slopes. The stream is primarily riffle habitat with lower frequency of pools. The riparian corridor becomes narrower and patchy, and more confined to the channel with an average width of 200 feet on either side of the stream. Disturbance to stream banks increases in this section of the Smith Fork. Disturbances are related to livestock grazing, in-stream road crossing(s), wood cutting, houses and buildings and associated human activities close to the stream.

FIGURE 0-13: FEEDER CANAL DIVERSION ON THE MAIN SMITH FORK (04-22-15)

FIGURE 0-14: SMITH FORK FEEDER CANAL CARRIES WATER DIVERTED AT THE FEEDER CANAL DIVERSION TO CRAWFORD RESERVOIR (04-22-15)

The Daisy Ditch, Smith Fork Feeder Canal (Figure 0-13, Figure 0-14), and Clipper Ditch are within this portion of the stream. These are structurally the largest diversions on the Smith Fork. Together these diversions are decreed for 332 cfs (Daisy - 18.8 cfs, Smith Fork Feeder - 150 cfs, Clipper Ditch 164 cfs). The Clipper Ditch diverts all of the in-stream flow except for a small amount that the diversion cannot completely capture which is turned back into the Smith Fork (Figure 0-16, Figure 0-18, Figure 0-17). The Grandview Ditch is located just south of the town of Crawford. This ditch diverts 90 cfs from the Smith Fork, leaving extremely low flow conditions as the main channel enters the upper Smith Fork Canyon.

Below the town of Crawford, the stream enters the upper Smith Fork Canyon. The canyon floor forms a wide valley with private irrigated fields interspersed with a handful of residences and ranches. During the irrigation season water flow conditions are very low (Figure 0-17) and depending on the current year's snowpack, lower sections of the stream in the canyon can be completely de-watered (Figure 0-15).

FIGURE 0-17: CLIPPER DIVERSION: DRY BED IN FOREGROUND WHERE GRAVEL WAS PUSHED TO DAM THE SMITH FORK MAIN CHANNEL TO CREATE A BYPASS (04-22-15)

FIGURE 0-16: CLIPPER DITCH JUST BELOW DIVERSION (04-22-15)

FIGURE 0-15: LOOKING EAST AT DE-WATERED CHANNEL ALONG LOWER CANYON PORTION OF THE SMITH FORK (04-22-15)

FIGURE 0-18: RETURN FLOW FROM CLIPPER DITCH TURN-OUT TO SMITH FORK CREEK (07-18-16)

There is some flow recharge to the stream in the lower canyon section from tail water originating from irrigated fields on Fruitland Mesa. Tail water makes its way via side canyons (Buck Canyon, Diamond Jo Gulch and unnamed tributaries) located on the south side of the Smith Fork (Figure 0-19). The canyon portion of the stream channel becomes entrenched especially as you travel down canyon. The channel slope is less than 2% and there is low to moderate sinuosity. The riparian corridor in the upper portion of the canyon is healthy however as you move down canyon particularly below the last privately developed pond, riparian vegetation is not well developed, and there is a predominance of non-native invasive species. A section below a BLM boundary marker is covered entirely with knapweed as well as pockets of tamarisk (Figure 0-20). There is evidence of higher bank erosion and higher sediment supply as the stream moves down canyon.

FIGURE 0-19: SMITH FORK CREEK IN FOREGROUND. UNNAMED TRIBUTARY ENTERING FROM THE SOUTH (06-29-16)

FIGURE 0-20: LOOKING WEST AT PASTURE LANDS WITH RUSSIAN KNAPWEED ENCROACHMENT (04-22-15)

FIGURE 0-21: LOOKING WEST AT OLD WOOD PLANK BRIDGE. BLM GUNNISON GORGE WILDERNESS AREA BEGINS AT THIS POINT (07-10-15)

FIGURE 0-22: LOOKING EAST AT SMITH FORK CREEK JUST ABOVE CONFLUENCE WITH GUNNISON RIVER (07-10-15)

FIGURE 0-23: SEDIMENT LOAD IN SMITH FORK CREEK JUST ABOVE CONFLUENCE WITH GUNNISON RIVER (07-10-15)

The lower 1.5 miles section of canyon from the end of the canyon road at an old wood plank bridge (Figure 0-21) to the Gunnison River the stream enters a very narrow portion of the canyon. This lower canyon section is within the BLM designated Gunnison Gorge Wilderness Area (Figure 0-22). The stream channel narrows, there are deeper step pools created by large boulders and drops, average stream width is 6-8 feet (Figure 0-22).

The stream bottom consists of gravel/small cobble substrate. At the time of reconnaissance (07/10/15) the stream bottom and substrate were covered with fine sediment (Figure 0-23). During the irrigation season water flow in this section of stream is supplied from tailwater received from irrigated fields along the canyon floor. This portion of the stream is remote; there is no access immediately adjacent to the stream. The four-wheel-drive road climbs out of the canyon shortly after the wood plank bridge and onto the canyon's south rim. With the exception of an isolated area near the wood plank bridge that has a dense infestation of knapweed, riparian vegetation is dense and in excellent condition.

Relationship to Other Projects

SALINITY CONTROL PROJECTS - Salinity control projects are implemented by the Bureau of Reclamation (BOR), the Bureau of Land Management (BLM), and the Natural Resource Conservation Service (NRCS). Projects implemented to date by these agencies prevent an estimated 1.30 million tons of salt from reaching the Colorado River system. Bureau of Reclamation, BLM, and NRCS have a combined salinity control target of 1.85 million tons by the year 2030.

Off-farm salt loading is targeted by Bureau of Reclamation in the Basinwide Salinity Control Program. The Basinwide Salinity Control Program seeks to control salt loading through a grant program whereby applications are accepted throughout the Colorado River Basin that propose methods for reducing salt loading to the Colorado River system. Applications to the Basinwide Program are primarily proposals for piping or lining irrigation delivery systems that reduce seepage and, consequentially, off-farm salt loading. The Crawford Water Conservancy District *Master Plan & Funding Plan 2016* outlines ditch improvement project descriptions to improve efficiency and serve irrigators' needs.

The Clipper Ditch which diverts water from the Smith Fork has received approval and grant funding from BOR to replace approximately 3.5 miles of open irrigation ditch with buried pipe, both to improve efficiency of water delivery, and to reduce salinity loading in the Colorado River Basin. The project is located in the lower section of Clipper Ditch approximately 8 miles northwest of the Smith Fork drainage.

On-farm salt loading is targeted by the NRCS through its EQIP program. Individual landowners and producers participate in the EQIP program through an application sign-up process. Qualifying applicants typically receive 50% cost share towards on-farm irrigation improvements. Improvements such as sprinklers or improved flood irrigation practices increase efficiency which reduces deep percolation and, consequentially, on-farm salt loading. It is unknown how many projects have been approved and implemented in the Smith Fork watershed.

CONSERVATION EASEMENTS - There are five Conservation Easements (CE's) within the main Smith Fork drainage. Two of these easements are within the upper portion of the Smith Fork drainage. Camels Garden is a 224 acre easement granted to Black Canyon Regional Land Trust (BCRLT) in 2007. This easement is located on the west flank of Saddle Mt. and includes a 1,200-foot reach of the Smith Fork River. The Smith Property easement also granted to BCRLT in 2005 is located just west of the Camels Garden CE. The Smith Property is a 108 acre easement and includes a 1,900-foot reach of the Smith Fork River. Both of these easements are north-by-northeast of the town of Crawford. Three conservation easements are located in the canyon portion of the Smith Fork River. The Smith Fork Ranch easement granted to BCRLT in 2008 contains 159 acres in the very upper portion of the Smith Fork Canyon. The Canyon Ranch conservation easement also granted to BCRLT in 1996 contains 666 acres. This easement is located in the mid-portion of the Smith Fork Canyon. Two additional easements located on the mesas above the main Smith Fork drainage were granted at same time as the Canyon Ranch easement. They are the Alum Creek easement consisting of 985 acres located on the south rim of the canyon and the Mesa Ranch easement containing 1,009 acres located on the north rim of the Smith Fork Canyon. Sunrise Canyon Ranch easement granted to Colorado Open Lands in 2002 contains 1005 acres. Sunrise Canyon Ranch is located in the very lower portion of the Smith Fork Canyon (Figure 24).

CRAWFORD STATE PARK - Crawford State Park is located immediately south of the Smith

Fork. The park was established in 1964 on the shores of Crawford Reservoir, a 400-acre lake with boat ramps and a swimming beach. Other facilities include camp sites, picnic sites and a visitor center. There's 1.8 miles of trails available to both hikers and bicyclist within the park. The park receives over 100,000 visitors each year.

SMITH FORK RANCH - The Smith Fork Ranch is a private seasonal guest ranch located in the upper Smith Fork drainage. The ranch provides horseback riding on Forest Service trails and fly fishing on Smith Fork Creek and private ponds on Second Creek.

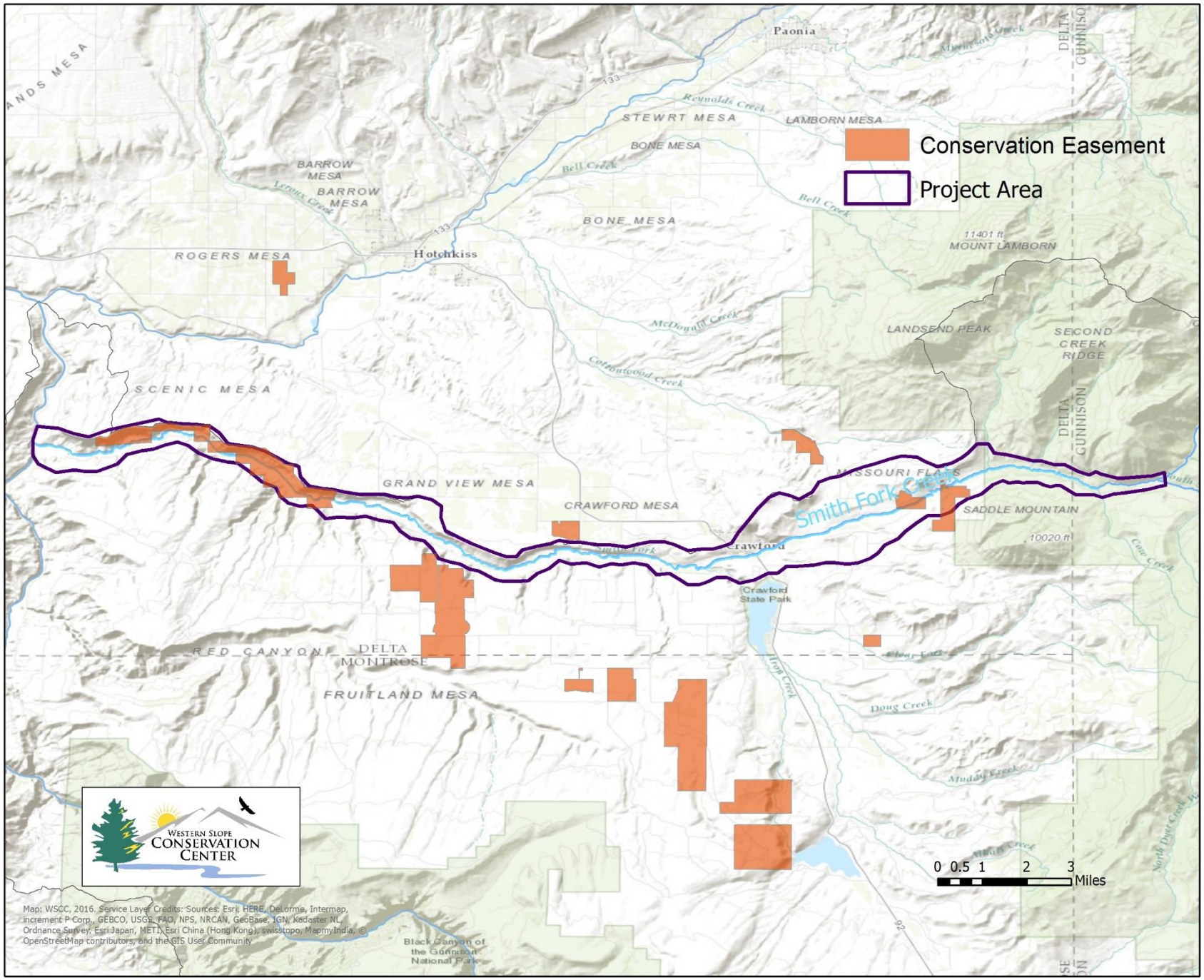

FIGURE 24: SMITH FORK WATERSHED PROJECT AREA - CONSERVATION EASEMENTS

ISSUES OF CONCERN

The Smith Fork watershed has had a moderate level of human influence. Irrigation diversions structures are the most prevalent human disturbance to the stream and have been in place since the late 1800's. Agricultural practices in the uplands (pastures and irrigated hayfields) adjacent to the stream have had little negative impacts in the upper stream reaches east of the town of Crawford. In the mid to lower canyon portion of the stream low water and de-watering have had impacts to aquatic species and have caused stream channel degradation. In the mid-lower portion of the canyon grazing has impacted surrounding uplands and riparian habitats resulting in conversion of isolated areas to invasive weed species, predominantly Russian knapweed and tamarisk.

Concerns for this watershed center around maintaining and/or improving water quantity and quality, stream channel integrity, healthy riparian condition and terrestrial and aquatic species habitat.

WATER QUANTITY

In-stream flows in the canyon portion of the Smith Fork, especially between Fruitland Mesa Road (just above Canyon Ranch) and the Smith Fork Creek Canyon Ditch (the last diversion in the canyon) remain low to nonexistent during the summer. A decrease in instream flow due to water diversions reduces the area and depth of instream aquatic habitats. It also decreases the water available to downstream riparian vegetation, affecting its vigor and productivity. Low flow and dewatered reaches most affected by altered flow regimes lie between the last private developed pond and the BLM Gunnison Gorge Wilderness boundary.

WATER QUALITY

There is a marked lack of water quality data in the Smith Fork drainage. Characterization of water quality from pristine wilderness headwaters down to its confluence with Gunnison River, a Gold Medal wild trout fishery and BLM managed National Conservation Area and Wilderness Area, should be prioritized to gather baseline conditions and monitor short and long-term changes.

There is an apparent increase in in-stream sediment in the sections of stream within the canyon. Sediment loading is partly caused by the surrounding topography consisting of steep slope sloughing and small landslide events from side canyons. There is likely some sediment transported with tailwater and runoff from irrigated fields within the canyon and from above fields on Fruitland Mesa. Some diversions dams are trapping a significant amount of sediment that is flushed into the stream during high flow events.

The Smith Fork watershed is identified by BOR as a contributor of salt to the Colorado River System. The U.S. Geological Survey, in cooperation with the Bureau of Reclamation, developed a study to characterize the salinity and selenium loading of seven subbasins in the Smith Fork Creek region and identify where control efforts can be maximized to reduce salinity and selenium loading (Richards et.al 2014).

The agricultural salinity load study was separated into three components: tail water, deep percolation, and canal seepage. Subbasin SF1, SF2 and SF3 were directly sampled from

Smith Fork Creek. Annual tail-water salinity loads ranged from 48.0 to 2,750 tons in the Smith Fork Creek region. The largest tail-water salinity load sample was 2,750 tons in subbasin SF3, located in the Smith Fork Creek just above Diamond Jo Gulch. The largest deep percolation component of the agricultural salinity load ranged from 3,300 t/yr in subbasin AL1 to 51,800 t/yr in subbasin SF2. Subbasin SF2 sample is located at the confluence of Smith Fork Creek and Iron Creek below the Crawford Reservoir. The canal seepage component of the agricultural salinity load ranged from 1,100 t/yr in sub-basin AL1 to 15,300 t/yr in subbasin CK1. Subbasins B1, R1, SF2, and SF3 had canal seepage salinity loads of 6,610 t/yr, 3,890 t/yr, 9,430 t/yr, and 12,100 t/yr, respectively.

STREAM CHANNEL AND RIPARIAN HEALTH

The upper reaches of the Smith Fork contain healthy, well developed riparian habitat. High quality plant communities have been identified by Colorado Natural Heritage Program in adjacent tributaries and upslope areas of the Smith Fork watershed. There is a threat that large tracts of land could potentially be divided into smaller parcels resulting in more development and increasing infrastructure threatening the health and integrity of the existing stream channel and riparian habitat. Threat of development would greatly change the serene, primitive character of this idyllic valley.

FIGURE 25: SMITH FORK CREEK IN THE LOWER CANYON REACHES (07/10/15)

Some of the lower canyon stretches of the stream show signs of extensive bank erosion from past agricultural and grazing practices (Figure 25). These sites appear to be recovering, banks are generally stable and vegetated throughout the watershed. Russian knapweed has encroached on a sizeable area of this portion of the canyon. Tamarisk has become well established with a substantial amount of coverage in the lower canyon.

FIGURE 26: NEEDLE ROCK DIVERSION (07-18-16)

TERRESTRIAL AND AQUATIC SPECIES HABITAT

The larger water diversion structures: Saddle Mt., Daisy, Clipper, Grand View Ditch, and Needle Rock (Figure 26) channel most of the in-stream water into their respective ditches during summer, it's likely fish either enter or are swept into

these ditches and are unable to return to the main channel. The Feeder Canal and Clipper diversion dams also impede upstream movement (Figure 27), preventing fish and other aquatic organisms from finding spawning sites, food, and refuge from warm water temperatures.

FIGURE 27: OLD DAM AND DIVERSION STRUCTURE ON SMITH FORK BELOW CLIPPER DITCH (07-18-16)

The spillway/outlet of Crawford Reservoir may inadvertently be releasing non-native fish into the Smith Fork drainage. It would be detrimental if these fish species made their way downstream to the Gunnison River where they could potentially compete with desired wild trout species.

Lining or piping open ditches to reduce salinity could negatively impact existing wetlands, small drainages, and seeps which contribute aquatic and terrestrial species habitat and instream-flows in to the Smith Fork drainage.

Potential and occupied habitat for the federally threatened Gunnison sage- grouse exists on Fruitland Mesa and the Black Ridge area south of Smith Fork Creek drainage. Wet meadow and riparian habitats are critical to grouse for successful brood-rearing. These areas are relatively rare in the Crawford habitat area. Actions that create new wet meadow water structures or modify existing ones should be given a high priority.

RECREATION

Public access in the Smith Fork drainage exists in the very upper reaches on Forest Service lands. The only other access is in the very lowest reach on BLM lands at the confluence with the Gunnison River.

Public access to the Gunnison Gorge Wilderness is currently via four trails on the west side of the wilderness and two trails that enter from the north along both shorelines of the Gunnison River. There is one trail on the east side (Smith Fork Trail), which is an old mining route that connects to private land in Smith Fork Canyon. Under the direction of the GGNCA Resource Management Plan (RMP) (November 2004) the BLM has recently constructed 1.8 miles the Black Ridge trail to provide hiking and equestrian access into the Gunnison Gorge Wilderness from the east side of the canyon and connect to existing the Smith Fork Way trail.

There is a road that parallels the drainage for almost the entire length of the Smith Fork Canyon, it is privately owned and maintained and not accessible to the public.

The Crawford State Park is outside of the project area although it is inside the broader Smith Fork Watershed, and it provides significant recreation opportunities including motorized and

non-motorized boating and water sports, fishing, ice fishing, picnicking, camping, walking, and hiking.

GOALS, OBJECTIVES, AND PROJECT CONCEPTS

The following goals, objectives and project concepts have been identified for the Smith Fork Watershed in order to address the five issues of concern outlined in Section 3. Some of the proposed projects fulfill more than one goal and/or objective. Additionally, Goal 5 objectives are achieved by project concepts associated with each goal and are thus included under each respective goal and objective rather than within its own category.

Goals:

1. Increase flows in Smith Fork Canyon
2. Improve water quality
3. Maintain and improve the integrity of terrestrial and aquatic species habitats
4. Improve recreation opportunities consistent with private landowner rights
5. Continue community outreach and education in the Smith Fork watershed around respective goals, objectives, and projects

Goal #1: Increase flows in Smith Fork Canyon

OBJECTIVE 1.1: IDENTIFY AND PURSUE LONG TERM STRATEGIES TO INCREASE FLOWS IN SMITH FORK CANYON

#	Project Concept	Watershed Benefits	Partners
1	Improve available information regarding flow supply and demand by installing water gages.	• Improve water resource management • Determine fluctuations in water volume to determine flow regime and effects to the Gunnison River • Provide information for future remote monitoring efforts • Improve irrigation infrastructure efficiency • Fulfill Goal 5	BLM, BOR, CWCD, DWR, Ditch Companies, NRCS, Private Landowners and Conservation Easement Holders, USGS, WSCC
2	Develop water supply/demand schematic that is available to the public.	• Monitor and educate around actual water flows and demand to inform future decision making • Provide flow information for future project implementation • Provide replicable model for supply/demand water resource education • Fulfill Goal 5	BOR, CFWE, CWCD, CWCB, Ditch Companies, TU, USGS, WSCC
3	Support voluntary efforts from conservation easement holders to place water rights under easement.	• Increase instream flows • Improve warm water fish species spawning habitat • Improve summer fish and other aquatic species habitat • Fulfill Goal 5	CPW, CWCB, CWT, DWR, GOCO, Land Trusts, Private Landowners and Conservation Easement Holders, TNC, TU, WSCC

4	Investigate voluntary strategies to reduce system demand.	• Increase instream flows • Improve summer fish and other aquatic species habitat • Increase understanding of feasibility, mechanisms, and system-wide impacts • Develop drought contingency strategies	CWCB, CRWCD, CWCD, Ditch Companies, TU, UCRA, Private Volunteers

Goal #2 Improve water quality

OBJECTIVE 2.1: CHARACTERIZE BASELINE WATER QUALITY CONDITIONS

#	Project Concept	Watershed Benefit	Potential Partners
1	Plan and execute water quality monitoring plan.	• Establish long-term science based data • Provide better data for decision making • Fulfill Goal 5	BOR, Community Volunteers, Community K-12 Schools, NRCS. Private Landowners, River Watch, USGS, WSCC
2	Disseminate relevant information regarding the findings of water quality sampling.	• Provide public data for decision making • Increase knowledge of baseline conditions • Fulfill Goal 5	BOR, Community Volunteers, Community K-12 Schools, NRCS. Private Landowners, River Watch, USGS, WSCC

Goal #3: Maintain and improve the integrity of terrestrial and aquatic species habitats

OBJECTIVE 3.1: PROVIDE SUPPORT FOR LANDOWNERS INTERESTED IN CONSERVATION EASEMENT AGREEMENTS

#	Project Concept	Watershed Benefit	Potential Partners
1	Facilitate workshop with landowners to educate and promote conservation easement agreements.	• Maintain and increase species habitat • Maintain integrity of stream channel and riparian health • Fulfill Goal 5	BCRLT, COL, GOCO, Private Landowners and Conservation Easement Holders, WSCC
2	Provide local support for landowners to facilitate conservation easement agreements.	• Maintain and increase species habitat • Maintain integrity of stream channel and riparian health • Fulfill Goal 3	BCRLT, COL, GOCO, Private Landowners and Conservation Easement Holders, WSCC

OBJECTIVE 3.2: REHABILITATE IMPAIRED RIPARIAN HABITAT

#	Project Concept	Watershed Benefit	Potential Partners
1	Eradicate invasive weeds.	• Restore riparian habitat • Decrease of in-stream sediment and bank erosion	BCRLT, BLM, COL, Delta Conservation District, Delta County Weed Program, DRC, COL, Private Landowners and

		• Decrease spread of invasive species • Increase native species habitat • Fulfill Goal 5	Conservation Easement Holders, Tamarisk Coalition, WCCC, WSCC
2	Establish and maintain native vegetation to replace invasive species and promote healthy riparian habitats.	• Restore riparian habitat • Decrease of in-stream sediment and bank erosion • Increase native species habitat • Maintain and enhance riparian buffer • Fulfill Goal 5	BCRLT, BLM, COL, Delta Conservation District, Delta County Weed Program, DRC, COL, Private Landowners and Conservation Easement Holders, Tamarisk Coalition, WCCC, WSCC

OBJECTIVE 3.3: IMPROVE FISH AND AQUATIC SPECIES PASSAGE

#	Project Concept	Watershed Benefit	Potential Partners
1	Install fish passage structures at ditch diversions that limit instream habitat connectivity.	• Improve fish and aquatic species habitat • Increased habitat conductivity for fish population • Improved habitat connectivity for aquatic species	BOR, CPW CWCD, CRWCD, Ditch Companies, DWR, TU, USFWS, WSCC
2	Construct check dam with sluice gate just below Clipper Ditch diversion.	• Improve fish and aquatic species habitat • Minimize seasonal instream disturbance to habitat by eliminating push up dam • Improve stream channel structure and complexity • Increase irrigation infrastructure efficiency and seasonal costs savings	BOR, Clipper Ditch Company, CPW, CRWCD, CWCD, CWCB, DWR, NRCS, TU, WSCC
3	Determine potential for construction of fish screening or barrier at the Crawford Reservoir outlet/spillway.	• Decrease potential ingress of competitive species in the Gunnison River • Improve native fish species populations	BOR, CPW, CRWCD, CWCD, CWCB, Crawford State Park, DWR, Ditch Companies, TU, USFWS, WSCC

OBJECTIVE 3.4: COORDINATE WATERSHED COMMUNITY AROUND HABITAT IMPROVEMENT PROJECTS INCLUDING SALINITY CONTROL EFFORTS AND MITIGATION

#	Project Concept	Watershed Benefit	Potential Partners
1	Connect ditch companies with additional resources and information to assist in coordination and identification of effective mitigation projects associated salinity control projects.	• Improve and maintain riparian and wetland habitat • Better coordination and implementation of salinity reduction projects and mitigation measures with community benefit	BCRLT, BOR, COL, CPW, NRCS, Conservation Easement Holders, Ditch Companies, USFS, WSCC
2	Coordinate with water users and managers on projects that can fulfill conservation values to ensure that all projects meet multiple objectives.	• Improve and maintain riparian and wetland habitat • Improve summer fish and other aquatic species habitat	CPW, CRWCD, CWCB, CWCD, Ditch Companies, NRCS, DWR, Private Landowners and Conservation Easement Holders, USFWS, WSCC

		• Improve warm water fish species spawning habitat • Reduce redundancies in planning between multiple agencies and organizations	
3	Update and maintain conservation easement properties map.	• Improve coordination and implementation of salinity reduction projects and mitigation measures • Helps fulfill Goal 3 • Fulfill Goal 5	Conservation Easement Holders, CWCD, Delta County, Land Trusts, WSCC

OBJECTIVE 3.5: MAINTAIN AND CREATE WETLANDS, WETLAND MEADOWS, SEEPS AND WET DRAINAGES IN KEY HABITAT AREAS

#	Project Concept	Watershed Benefit	Potential Partners
1	Identify wetland and seepage areas.	• Protect key habitat areas for terrestrial and wildlife species including Gunnison sage-grouse • Improve and maintain riparian and wetland habitat • Reduce redundancies in planning between multiple agencies and organizations	BLM, CPW, Crawford Gunnison Sage Grouse Working Group, Private Landowners and Conservation Easement Holders, WSCC, USFWS,
2	Maintain database of potential wetland creation/improvement project locations.	• Improve and maintain riparian and wetland habitat • Improve coordination and implementation of habitat improvement/wetland mitigation projects • Reduce redundancies in planning between multiple agencies and organizations	CWCD, CWCB, Ditch Companies, TU, WSCC
3	Identify potential habitat replacement focusing in Gunnison sage grouse occupied habitats and potential habitat areas.	• Protect key habitat areas for terrestrial and wildlife species including Gunnison sage-grouse • Improve and maintain riparian and wetland habitat • Coordinate Watershed Community Around Salinity Control Efforts And Mitigation • Maximize planning efforts between multiple agencies and organizations. • Better coordination and implementation of habitat improvement/wetland mitigation projects	Crawford Gunnison Sage Grouse Working Group, CPW, BLM, WSCC, USFWS, Private Landowners and Conservation Easement Holders
4	Build, enhance, and maintain wetland habitat to benefit Gunnison sage grouse and other wildlife.	• Build, protect, and enhance key habitat areas for terrestrial and wildlife species including Gunnison sage-grouse	BOR, BLM, CPW, CWCB, Crawford Gunnison Sage Grouse Working Group, Private Landowners and

		• Improve and maintain riparian and wetland habitat • Fulfill Goal 2 • Fulfill Goal 3	Conservation Easement Holders, WSCC, USFWS,

Goal #4: Improve recreation opportunities consistent with private landowner rights

OBJECTIVE 4.1: INCREASE RECREATIONAL ACCESS

#	Project Concept	Watershed Benefit	Potential Partners
1	Coordinate with water users, landowners and land managers on potential access points.	• Increase use and access to river corridor consistent with private landowner rights • Fulfill Goal 5	BLM, CPW, Crawford State Park, GOCO, Private Landowners and Conservation Easement Holders, USFS, WSCC
2	Construct a section of hiking and horseback trail in the Gunnison Gorge Wilderness area in the Lower Smith Fork Canyon.	• Increase use and access to public lands including wilderness. • Improve recreational connectivity within wilderness areas. • Fulfill Goal 5	BLM, Community Volunteers, CYCA, GOCO, WCCC
3	Connect existing trails and replace existing pedestrian bridge at Crawford State Park and install educational signage that increases understanding of the watershed.	• Increase use and access to public lands • Improve recreational trail connectivity in existing areas • Improve recreational • Fulfill Goal 5	CPW, Crawford State Park, CWCD, Delta Country School District, GOCO, Town of Crawford, The Nature Connection, WSCC
4	Improve angler access on upper Smith Fork	• Increase use and access to river corridor consistent with private landowner rights • Fulfill Goal 5	TU, USFS, WSCC

Goal #5: Increase community involvement and educational outreach in the Smith Fork watershed.

Objectives and project concepts which address Goal 5 are noted above. Increasing community involvement and educational outreach is important because it builds an active and aware community which will better understand and appreciate water resources and water resource management. As such, project implementers should endeavor to include involvement, education, and outreach opportunities in every project.

Other Opportunities

Explore the feasibility of a micro hydro-power systems. Potential sites could include the Daisy Ditch diversion and, as noted in the CWCD *Master Plan & Funding Plan 2016*, the outlet works of the Crawford Reservoir. Potential partners include BOR, CWCD, and DMEA.

PROJECT CONCEPT IMPLEMENTATION STRATEGIES

Goal 1: Increase flows in Smith Fork Canyon

The Smith Fork has highly variable flows that are dependent upon the season, ranging from approximately 1.28 to 37.5 cfs in late summer and winter to between .5 and 486 cfs during peak runoff. During the summer, in-stream flows in the canyon portion of the Smith Fork especially between Fruitland Mesa Road (just above Canyon Ranch) and the Smith Fork Creek Canyon Ditch (the last diversion in the canyon) remain low to non-existent. Additionally, little consistent data exists regarding flow as currently, only one gage seasonally measures flow.

Objective 1.1: Identify and pursue long term strategies to increase flows in Smith Fork Canyon

Project Concept 1.1.1: Improve available information regarding flow supply and demand by installing water gages

In order to increase an understanding of the flows in the Smith Fork Canyon, installing water gages throughout the watershed will provide invaluable information that will assist in water resource decision making, evaluate water efficiencies, help determine fluctuations in water volume to determine flow regime and the effects to the Gunnison River, and provide foundational information for future remote monitoring efforts. In order to gather the most useful information, gages should be placed throughout the drainage at locations like the Smith Fork Ranch, the Highway 92 bridge, and near the confluence with the Gunnison River. Additional gage locations should include ditch intakes (such as the Clipper Ditch, Needle Rock Ditch, and Daisy Ditch) placed with the voluntary support of the ditch companies and CWCD.

The CWCD *Master Plan & Funding Plan 2016* includes a project to install Supervisory Control and Data Acquisition (SCADA) on "each major ditch and at the drainages into the reservoir," however the remote sites listed as installation locations do not include the Smith Fork Ranch, Highway 92 bridge, and confluence locations (11).

In addition to gathering data on Smith Fork flows, the installation of these gages should maximize the ease at which flow information is available for agricultural producers and ditch companies. Monitoring systems should be remotely/digitally accessible to the greatest extent possible in order to save users time and money. It follows that as water conveyance systems become more efficient through piping and lining, the monitoring systems that reflect the use of the resource increase in efficiency and serve use, management, planning, and educational purposes as well.

Potential funding sources: BLM, BOR, CWCD, DWR, NRCS, USGS, US Department of Commerce/NOAA

Project Concept 1.1.2: Develop water supply/demand schematic that is available to the public

While the Smith Fork is a relatively small drainage, it is highly complex. 38 irrigation diversions divert water for consumptive and non-consumptive uses, the Crawford reservoir provides storage and mechanisms for water transfers, and much of the water diverted from the Smith Fork is delivered to the North Fork of the Gunnison River through return flows. The development of a supply/demand schematic will utilize water resource information made

available from gages installed throughout the watershed (supported by Objective 1.1.1), and could also utilize information gathered from the CWCD SCADA project described in the *CWCD Master Plan & Funding Plan 2016.*

This project is scalable and serves many purposes. In its most basic permutation, the schematic can reflect real-time supply and demand. However, more complex permutations could allow users to adjust variables to create different situations such as decreased supply, increased demands, increased on-farm efficiency, decreased off-farm efficiency, etc. As the complexity increases, so do the management and educational opportunities for resource managers, producers, educators, and students, as it allows for a greater exploration of "what ifs" associated with the functioning of the watershed.

Because many aspects of the Smith Fork reflect similar uses, mechanisms, and challenges of other, larger watersheds, this schematic would provide a replicable pilot project that could be applied to other watersheds as a monitoring and educational tool. The information gathered would be easily available and accessible for the public, and the platform would be available for other agencies and organizations interested in replicating the project.

Potential funding sources: BOR, CFWE, CWCD, CWCB, Private Grants, USGS

Project Concept 1.1.3: Support voluntary efforts from private landowners and conservation easement holders to place water rights under easement.

The Colorado Water Conservation Board holds instream water rights that may be used for minimum flows, and water rights owners may donate, sell, lease or loan existing decreed water rights to the CWCB on a permanent or temporary basis. Additionally, other state programs such as Great Outdoors Colorado and non-profit organizations such as the Colorado Water Trust support can support efforts to place water rights into conservation easements in order to protect the conservation values of a property.

However, the process for interested parties to use their water rights for instream flows or conservation values can be complicated and unwieldy, and much misinformation about the programs exist. In order to provide water rights holders with the best information possible and support should they be interested transferring water rights to instream flows, non-profit organizations and water resource agencies should provide educational opportunities and organizational capacity to interested participants. These educational opportunities could include but are not limited to initial outreach, site visits and consultations, workshops, informational literature, and resource distribution. Organizational capacity could include assistance in communications, developing/utilizing effective contacts, providing human resources, and helping streamline and negotiate administrative processes.

Potential funding sources: CPW, CWCB, CWT, DWR, GOCO, Land Trusts, Private Landowners and Conservation Easement Holders, Private Grants

Project Concept 1.1.4: Investigate voluntary strategies to reduce system demand.

Colorado and other western states have already begun investigating programs and mechanisms for system conservation. As the relationship between the supply and demand of water resources changes, volunteers who are interested in exploring the opportunity to decrease their water demand should be provided the support to do so. To the greatest extent

possible these efforts should maintain the goals of the Gunnison Basin Implementation Plan, foremost of which includes protecting existing water uses in the Gunnison Basin. Already, volunteers in the Gunnison Basin have participated in the Upper Colorado River Commission (UCRC) and its funding partners' System Conservation Pilot Program to test methods of water efficiencies that could be part of a drought contingency plan for the Upper Basin of the Colorado River.

This project concept should be addressed in multiple ways. First, agencies and organizations should recognize the Smith Fork's characteristics that could make it an effective watershed for system conservation which include but are not limited to: significant storage capacity, existing system of water conveyance mechanisms, the propensity of return flows to contribute to another drainage, low seasonal flows in the Lower Canyon, and the presence of two wilderness areas. As such, interested stakeholders should pursue the development of projects and programs that provide support for a voluntary reduction in system demand and engage in formal and informal education and outreach activities to develop voluntary user support.

Additionally, should agricultural producers or resource managers be interested in voluntarily engaging in system demand reductions, non-profit organizations in particular should be willing and able to provide capacity to ensure that the process is as effective and streamlined as possible for the interested parties.

Potential funding sources: CWCB, CRWCD, CWCD, UCRA, Private Grants and Capital

Goal 2: Improve water quality

There is a marked lack of water quality data in the Smith Fork drainage, although the BLM has gathered some limited macroinvertebrate data. Thus, before any water quality improvements are taken on, a scientifically supported water quality baseline must be characterized. Currently, because of general watershed conditions, it can be assumed that instream sedimentation and concentrations of salinity and selenium may be high in some stream segments.

Objective 2.1: Characterize baseline water quality conditions

Project Concept 2.1.1 Plan and execute water quality monitoring plan

Characterization of water quality from pristine wilderness headwaters down to its confluence with Gunnison River, a Gold Medal wild trout fishery and BLM managed National Conservation Area and Wilderness Area, should be prioritized to gather baseline conditions and monitor short and long-term changes.

The development and implementation of a water quality monitoring program will establish long-term science based data and provide better data for decision making. The plan should monitor conditions high in the watershed and in the Lower Smith Fork canyon in order to connect the two wilderness areas through which the Smith Fork flows. Additionally, it is recommended that the monitoring sites isolate the lower Smith Fork canyon cliffs just above the confluence with the Gunnison River. Parameters should include but are not limited to general field parameters, conductivity, and dissolved metals. Furthermore, utilizing a program like CPW's River Watch would promote citizen science, community education and outreach in addition to characterizing a baseline.

The implementation of the plan will require landowner support, a sponsoring/organizing agency or organization, and funding. Utilizing community-driven, volunteer sampling would minimize costs of water quality sampling; however, volunteer coordination, supplies, and data dissemination is not free. Monitoring could also be implemented by an agency like USGS. Potential funding sources could include the NRCS National Water Quality Initiative, Colorado Department of Public Health and Environment Supplemental Environmental Projects, and private funding.

Potential funding sources: BOR, CPW, NRCS, Private Grants, River Watch, USGS, WSCC

Project Concept 2.1.2: Disseminate relevant information regarding the findings of water quality sampling

All relevant information regarding the findings of water quality sampling should be distributed to the public in order to provide data for decision making and to increase the knowledge of baseline conditions. Additionally, the dissemination of the findings will promote community outreach and education in the Smith Fork watershed.

It is recommended that memorandums or reports are published every year in order to ensure that ongoing decisions are made with as current data as possible. Previous water quality reports developed by the WSCC could be used as a report frame work in order to maintain consistency between reports throughout the Lower Gunnison watershed and to maximize the efficiency and effectiveness of future reports on the Smith Fork. The reports and the data that informs them should be available to the public online.

Potential funding sources: BOR, CPW, CRCD, CWCB, NRCS, Private Grants, River Watch, USGS, WSCC

Goal 3: Maintain and improve the integrity of terrestrial and aquatic species habitats

While upper reaches of the Smith Fork contain healthy, well developed riparian habitat, large private tracts of land could be divided into smaller parcels and developed which would greatly change the character of the valley and could threaten the health and integrity of the existing stream channel and riparian habitat. In the lower canyon, some stretches shows signs of bank erosion and have been encroached upon by invasive species like Russian knapweed. Instream habitat would benefit from improved connectivity to allow fish and other aquatic species to find spawning sites, foods, and refuge from warm water temperatures, and special care should be given to maintain and improve wetland habitats. Maintaining and improving the integrity of terrestrial and aquatic species habitats is important for the health of the riparian system, and it will also likely support requirements of future funding that require habitat mitigation.

Objective 3.1: Provide resources and support for landowners interested in conservation easement agreements.

Project Concept 3.1.1: Facilitate workshop with landowners to educate and promote conservation easement agreements

Conservation easements provide important services to maintain stream channel and riparian health, traditional agricultural uses, and open space. Much of the Smith Fork has

already been placed in conservation easement, and there is now great potential to permanently protect the upper section of the watershed. In the upper and middle sections of the Smith Fork large tracts of land could potentially be divided into smaller parcels resulting in more development and increasing infrastructure threatening the health and integrity of the existing stream channel and riparian habitat. Real estate development would greatly change the serene, bucolic character of this idyllic valley.

However, the process of implementing a conservation easement can be costly and complicated and may dissuade future holdings, especially is the benefits are unclear. Thus, educating landowners interested in conservation easements on their property is critical. To that end, workshops with landowners will help engage landowners that might not otherwise be interested in developing a conservation easement on their property.

Potential funding sources: GOCO, Land Trusts, Private Grants, USFWS

Project Concept 3.1.2: Provide local support for landowners to facilitate conservation easement agreements.

As interest grows in the value of preserving the Smith Fork's agricultural traditions and open spaces, ongoing support should be provided to interested landowners who would like to place their property under easement. Local organizations can help property owners make connections with land trusts, navigate what is often a complicated and costly process, and potentially help offset the costs of the process through fundraising, depending on the conservation values of respective properties.

As more property owners place parts of their property under easement, the integrity of stream channel and riparian health can be maintained, species habitat can be maintained and even increased, and community members will become more engaged in their watershed as they become more involved in long-term conservation efforts. Additionally, by placing more acreage under easement, the availability of potential habitat mitigation sites will increase which will in turn support objectives to further support the goal of improving terrestrial and aquatic species habitats and/or maintain the integrity of stream and riparian habitats.

Potential funding sources: GOCO, Land Trusts, Private Grants

Objective 3.2: Rehabilitate impaired riparian habitat.

Project Concept 3.2.1: Eradicate invasive weeds.

The Lower Smith Fork Canyon is inundated with Russian knapweed, and a tamarisk community is beginning to establish itself. These invasive species reduce wildlife habitat, impede agriculture, and increase wildfire risk. Additionally, they reduce the ecologic value of the Smith Fork's riparian habitat. Eradicating the Smith Fork's invasive species is an important step in rehabilitating impaired riparian habitat and will help decrease instream sediment and bank erosion, decrease the spread of weeds, increase species habitat, and restore riparian vegetation.

In order to minimize the application of chemicals to the Smith Fork, biologic controls should be used as the primary method of removal. However, should biologic controls prove ineffective the application of herbicide will help eradicate the knapweed and tamarisk. The project will require multiple seasons of treatment and ongoing monitoring to ensure that key

objectives are met. Many organizations have great experience While this project could be completed by private contractors, it is recommended that implementing stakeholders consider hiring a local conservation corps such as the Western Colorado Conservation Corps in order to provide education and work opportunities for local youth.

Potential funding sources: CWCB, Delta County Weed Program, DRC, Private Landowners and Conservation Easement Holders, Tamarisk Coalition, Private Grants, USFWS

Project Concept 3.2.2: Establish and maintain native vegetation to replace invasive species and promote healthy riparian habitats

Upon the removal of invasive species in the Lower Smith Fork canyon, native species, such as willows, cottonwoods, native shrubs, etc, should be planted to replace them in order to encourage the development of habitat within the riparian corridor. Native vegetation must be purchased, planted, fenced, and should be monitored to ensure viability and project success. In other stretches of the Smith Fork, efforts to promote healthy riparian habitats by establishing and/or maintaining native species through various methods to protect the riparian buffer along the stream corridor and flood plain should be supported.

This work will decrease in-stream sediment, reduce bank erosion, increase species habitat, provide shade along the stream, and restore riparian vegetation. It will also provide an opportunity to expand community education and outreach opportunities if replanting and monitoring efforts involve local youth and community members by hiring a local conservation corps and utilizing volunteers.

Potential funding sources: CWCB, Delta County Weed Program, DRC, Private Landowners and Conservation Easement Holders, Tamarisk Coalition, Private Grants, USFWS

Objective 3.3: Improve fish and aquatic species passage.

Project Concept 3.3.1: Install fish passage structures at ditch diversions that limit instream habitat connectivity.

Along the Smith Fork, multiple diversion structures limit instream habitat connectivity for fish and other instream species. By developing fish passage structures on ditch diversions, stakeholders can increase habitat connectivity which will in turn have positive impacts on fish habitat and fish population, particularly in the upper and middle sections of the Smith Fork. These projects could be effectively implemented as part of general infrastructure improvements and delivery efficiency improvement projects. Identified project sites could include but are not limited to the Needle Rock diversion, Daisy Ditch diversion, and the Clipper Ditch diversion.

At the Needle Rock diversion, a fish passage structure can be installed adjacent to the diversion structure with little to no changes on the flows within the stream or Needle Rock ditch. Additionally, the CWCD *Master Plan and Funding Plan 2016* outlines a project description for the Needle Rock Ditch that requires a replacement of the existing diversion, and it is recommended that the replacement includes a fish passage structure (10). A Daisy Ditch fish passage will need to address two stream impediments: the diversion dam itself and a small concrete barrier just downstream. However, construction for fish passage could be completed utilizing the existing infrastructure. Before installing a fish passage structure at the

Clipper Ditch diversion, interested stakeholders should ensure that flows are significant enough to merit construction. In the meantime, during high flows, fish could benefit from screening the Clipper Ditch diversion. Should these projects be implemented in tandem with general maintenance and construction needs, costs will likely stay lower and will help ensure that future projects meet multiple objectives.

Potential funding sources: BOR, CPW, CRWCD, CWCD, CWCB, DWR, NRCS, Private Grants

Project Concept 3.3.2: Construct check dam with sluice gate at Clipper Ditch diversion.

Every season, the Clipper Ditch company builds a push up dam in the Smith Fork in order to direct flows and in doing so, Clipper Ditch inadvertently disturbs the instream habitat. By constructing a check dam with a sluice gate at the Clipper Ditch, stakeholders will be able to minimize instream disturbance, keep seasonal costs lower, and utilize more efficient and reliable diversion infrastructure. As efforts to increase flows succeed and as the fish community grows, this sluice dam will also provide the first important step in restoring fish passage within the Smith Fork just below the Clipper diversion.

Potential funding sources: BOR, Clipper Ditch Company, CPW, CRWCD, CWCD, CWCB, DWR, NRCS, Private Grants

Project Concept 3.2.3: Install fish screening or barrier at the Crawford Reservoir outlet/spillway.

It may be necessary to install fish screening or other barrier to prevent the potential inadvertent release of non-native fish into the Smith Fork drainage. It would be detrimental if non-native fish species made their way downstream to the Gunnison River where they could potentially compete with desired wild trout species. Consequently, the feasibility and need for a fish screen or barrier should be investigated and, if necessary, implemented in order to decrease the potential ingress of competitive species in the Gunnison River.

Potential funding sources: BOR, CPW, CRWCD, CWCD, CWCB, Crawford State Park, DWR, USFWS

Objective 3.4: Coordinate watershed community around habitat improvement projects including salinity control efforts and mitigation.

3.4.1: Connect ditch companies with additional resources and information to assist in coordination and identification of effective mitigation projects associated with salinity control projects.

As salinity control efforts continue to develop in the Smith Fork and other watersheds, stakeholders should work collectively to maximize the environmental and public good of mitigation projects. By providing support for ditch companies required to implement mitigation projects, organizations, agencies, and interested individuals will assist in the implementation of projects that have the greatest collective good. This is important because the dollars provided for the salinity control projects are taxpayer dollars, and ditch companies will enjoy the added benefit of additional planning support.

Some identified mitigation projects within the Smith Fork drainage include 1. Russian knapweed and tamarisk treatment in the Lower Canyon, 2. Construction of fish passage structures at the Needle Rock, Daisy, and Clipper ditch diversions, and 3. Improving angler access area on Forest Service land (above Cow Creek). Additionally, the construction of a regulating reservoir on the Center Clipper Ditch as described in the *CWCD Master Plan & Funding Plan 2016* could provide valuable wetland habitat while absorbing fluctuations in supply and demand. Projects identified outside of the Smith Fork include 1. wetland development at the confluence of Tongue Creek and the Lower Gunnison River, 2. Invasive species removal and open water development at Lawhead Gulch.

Potential funding sources: BLM, BOR, CPW, CWCB, NRCS, USFS

Project Concept 3.4.2: Coordinate with water users and managers on projects that fulfill conservation values to ensure that future projects meet multiple objectives.

As future projects are developed and implemented by different agencies and organizations, special care should be taken to ensure that all projects meet multiple objectives, including the development of conservation values. This could be as simple as installing a fish passage on an existing diversion structure during scheduled maintenance or other improvement initiatives. Meeting multiple objectives within a single project effectively leverages typically public dollars to improve infrastructure and conservation values, minimizes redundancy, and concentrates and reduces habitat impact over time.

This coordination can be achieved by a commitment to clear lines of communication by key stakeholders who are coordinating respective projects. One way to evaluate the success of this objective is by evaluating the number of partners involved in any given project and the interests that they represent. It follows that the greater the number of partners and interests committed to any project, the greater the scope of objectives the project will likely achieve.

Potential funding sources: CPW, CRWCD, CWCB, CWCD, NRCS, DWR, USFWS, WSCC

Project Concept 3.4.3: Update and maintain conservation easement properties map.

Salinity control mitigation projects must be implemented on public property or conservation easements (with some exceptions). In order to streamline the mitigation process, a map of conservation easement properties should be updated and maintained. Additionally, the map should notate which conservation easement holders are interested in habitat projects on their property. This map and corresponding resources may need to remain a private resource for implementing agencies and organizations in order to protect the privacy of the conservation easement holders.

Potential funding sources: BOR, CWCB, Delta County, Land Trusts

Objective 3.5: Maintain and create wetlands, wetland meadows, seeps, and wet drainages in key habitat areas.

Project Concept 3.5.1: Identify wetland and seepage areas.

In order to maintain and improve wetlands, existing wetlands and seepage areas must be identified and shared with stakeholders involved in habitat improvements and projects. By creating a single, accurate resource that all stakeholders use to plan projects and draft reports, redundancies in planning and implementation instigated by multiple agencies and organizations will be reduced while key habitat areas for terrestrial and wildlife species including the Gunnison sage-grouse are protected.

Potential funding sources: BLM, CPW, CRWCD, CWCB, CWCD, NRCS, DWR, USFS, USFWS

Project Concept 3.5.2: Develop and maintain database of potential wetland creation/improvement project locations.

By utilizing resources such as pre-identified wetland and seepage areas and a conservation easement map, the development and maintenance of potential wetland creation and improvement project locations will improve coordination and implementation of habitat improvement/wetland mitigation projects, assist in the restoration and enhancement of riparian vegetation and habitat, and reduce redundancies in planning between multiple agencies and organizations. Additionally, by utilizing a landscape level resource of potential project locations, the ability to develop landscape level habitat resources will be improved.

This project could be implemented by many entities, however, the database should be stored by a public entity and promoted as a public resource.

Potential funding sources: BOR Delta County, Land Trusts, WSCC

Project Concept 3.5.3: Identify potential habitat replacement sites, focusing on Gunnison sage grouse occupied habitats and potential habitat areas.

The Gunnison sage grouse is a federally listed threatened species that depends on large, contiguous areas of sagebrush (>200 acres) with an abundant herbaceous understory, interspersed with wet swales. Loss and fragmentation of sagebrush habitats are chief causes in the decline of Gunnison sage-grouse populations. A summary report compiled in 1964, “Sage Grouse Investigations in Colorado” by Glenn Rogers reported that there was a “light” population in the Smith Fork drainage. Currently Fruitland Mesa bordering the south side of Smith Fork drainage is mapped as occupied and potential grouse habitat, Grandview Mesa which borders the north side of Smith Fork drainage is mapped as vacant/unknown habitat. Suitable habitats within the Smith Fork drainage could serve as potential linkage areas to connect larger landscapes. Specific sites must still be identified and mapped in order to protect key habitat area for terrestrial and wildlife species like the Gunnison sage grouse, improve coordination and implementation of habitat improvements, and maximize planning efforts between multiple agencies and organizations.

Potential funding sources: BLM, CPW, USFS, USFWS

Project Concept 3.5.4: Build, enhance, and maintain wetland habitat to benefit Gunnison sage grouse and other wildlife.

Using multiple sources of funding, interested stakeholders should work to build, enhance, and maintain wetland habitat to benefit Gunnison sage grouse and other wildlife in order to improve habitat and species viability. These projects should be focused in landscapes that support or have historically supported Gunnison sage grouse—primarily on Fruitland Mesa, just south of the Smith Fork. These projects can be instigated on private property, depending on landowner interest and conservation easements, and they should support the Gunnison Sage-grouse Rangewide Steering Committee's *Gunnison sage-grouse rangewide conservation plan.* Gunnison sage grouse habitat mitigation projects have already begun on Fruitland Mesa. Thus, other projects should work to replicate the success of past projects and incorporate previous lessons learned to maximize resources.

Potential funding sources: BLM, CPW, NRCS, DWR, USFS, USFWS

Goal 4: Improve recreation opportunities consistent with private landowner rights
While the upper and lower sections of the Smith Fork fall within USFS and BLM wilderness areas that provide quiet recreation opportunities, little opportunity exists within the middle section of the Smith Fork where most of the river access is privately owned. Crawford State Reservoir does provide seasonal recreation opportunities, and this resource should be supported.

Objective 4.1: Increase recreational access
Project Concept 4.1.1: Coordinate with water users, landowners, and land managers on potential stream access points.

Because nearly all land on the Smith Fork is privately owned (with the exception of the USFS and BLM managed lands in the very upper and lower sections of the drainage), almost all access will have to be developed with the support of water users, landowners, and land managers. This access could be developed through access easements and donations and could take the form of an educational trail system, picnicking sites, and fishing sites. This is would provide a particularly valuable resource for the Smith Fork youth who otherwise lack places to recreate on the river that are safe to access without a vehicle.

Potential funding sources: BLM, CPW, Crawford State Park, GOCO, Private Grants, USFS

Project Concept 4.1.2: Construct a section of hiking and horseback trail in the Gunnison Gorge Wilderness area in the Lower Smith Fork Canyon.

While much of the recreation opportunity in the Smith Fork is limited, great potential exists in the Lower Smith Fork Canyon in the Gunnison Gorge Wilderness area. Already, two BLM managed trails exist. The Black Ridge trail winds along the Gunnison Gorge just south of the Lower Smith Fork Canyon, and the Fisherman's Trail follows the Gunnison River from the confluence of the Gunnison and the North Fork of the Gunnison Rivers upstream/south towards the Lower Smith Fork Canyon. By constructing a short trail through the Lower Smith Fork to connect the two existing trails, recreational connectivity with the wilderness area would be improved and use and access to public lands would be increased. While the project would provide great recreation benefit for the local community, including

anglers and horsemen, it may not be supported by the BLM's Resource Management Plan which is being revised from 2016 to 2017 (approximately).

By hiring the Western Colorado Conservation Corps, construction would provide valuable educational and work experience for local youth and create an opportunity to build connections with their local environment. Additionally, the project should recruit local volunteers to increase awareness of local recreation access opportunities. By involving these two groups of stakeholders, the project would also help increase community outreach and education.

Potential funding sources: BLM, CPW, GOCO, Private Grants, WCCC

Project Concept 4.1.3: Connect existing trails and replace existing pedestrian bridge at Crawford State Park and install educational signage that increases understanding of the watershed.

While Crawford State Park is not within the project area encompassed by this report, it is within the Smith Fork watershed, and it provides important storage and recreational resources for the local and regional community. Crawford Reservoir and the surrounding state park is currently utilized as a boating and other water-sport recreation, fishing, walking, picnicking, and camping site during the spring and summer. However, approximately 700 feet of trail need to be built to connect the existing trails, and the existing bridge needs to be replaced to promote quiet recreation values and ensure visitor safety. Additionally, in order to increase awareness and understanding of the watershed, from the importance of habitat connectivity to the legacy of agriculture, educational signs will be installed along the walking trail. This expansion of trails and educational signage will increase use and access to public lands, improve recreational trail connectivity in existing areas, and increase community involvement and educational outreach in the Smith Fork watershed. Plans for the project already exist and can be found by contacting the Crawford State Park manager.

Potential funding sources: BLM, CPW, Crawford State Park, GOCO, Private Grants, USFS

Project Concept 4.1.4: Improve angler access on upper Smith Fork.

On US Forest Service land near Cow Creek, anglers use unofficial pullouts and social trails to access the Smith Fork. These pullouts and trails could be developed to concentrate user impact and improve safety.

Goal 5: Increase community involvement and educational outreach in the Smith Fork watershed.

Increasing community involvement and educational opportunities for community members in the Smith Fork watershed is critical to develop broader understanding and engagement around water resources and habitats. Every project and program should incorporate some kind of community outreach and education as the need for understanding and support is ongoing. Some of the project concepts listed above explicitly promote community involvement and education, but all of the project concepts can include the potential for outreach and education activities.

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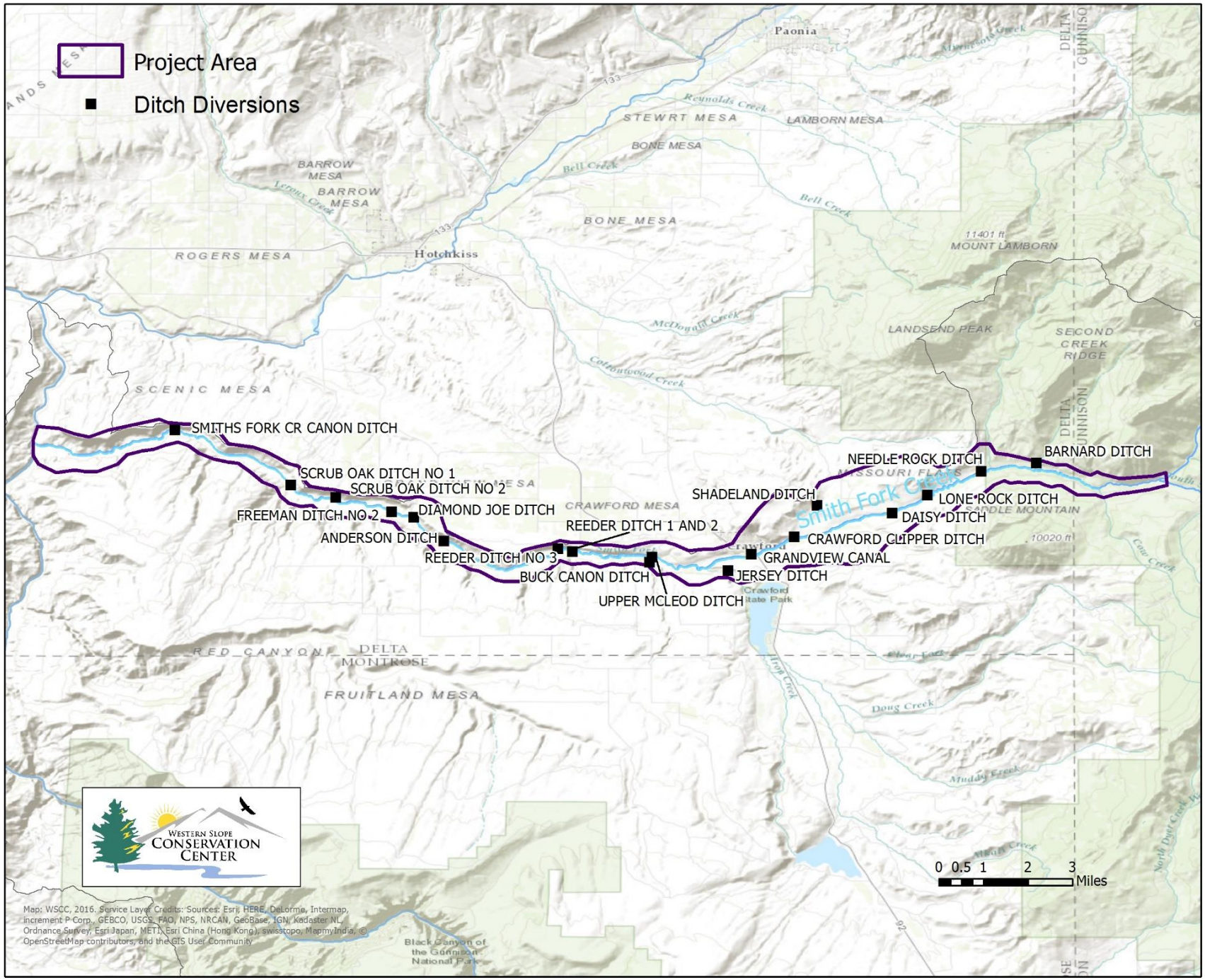
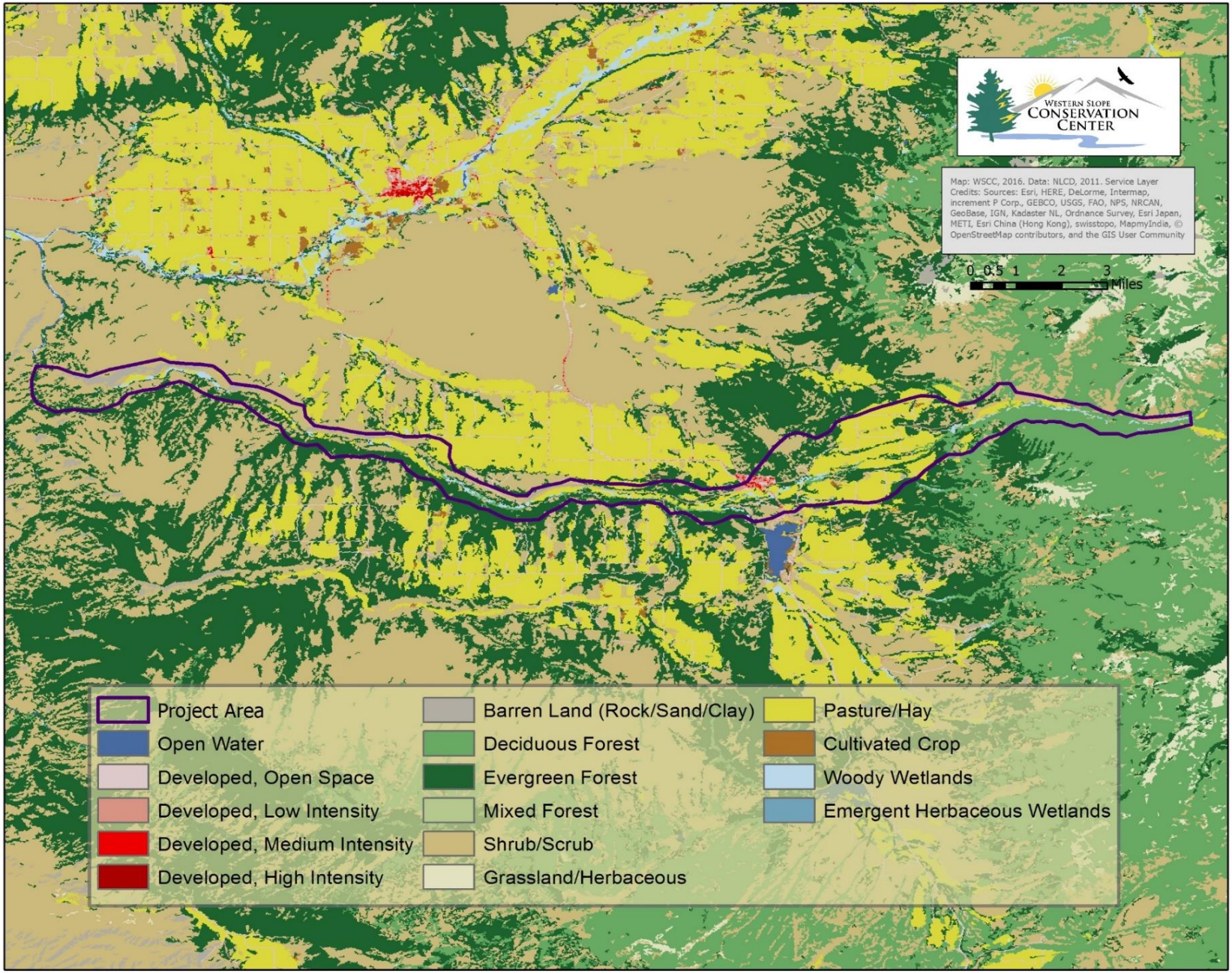
APPENDIX

1. Smith Fork Watershed Project Area –Ditch Diversions
2. Smith Fork Watershed Project Area –Land Cover
3. Smith Fork Watershed Project Area—Geology
4. Smith Fork Watershed Project Area—Gunnison Sage-Grouse
5. Smith Fork Watershed Project Area—Bighorn Sheep
6. Smith Fork Watershed Project Area—Elk
7. Smith Fork Watershed Project Area—Mule Deer

Smith Fork Watershed Project Area - DITCH DIVERSIONS

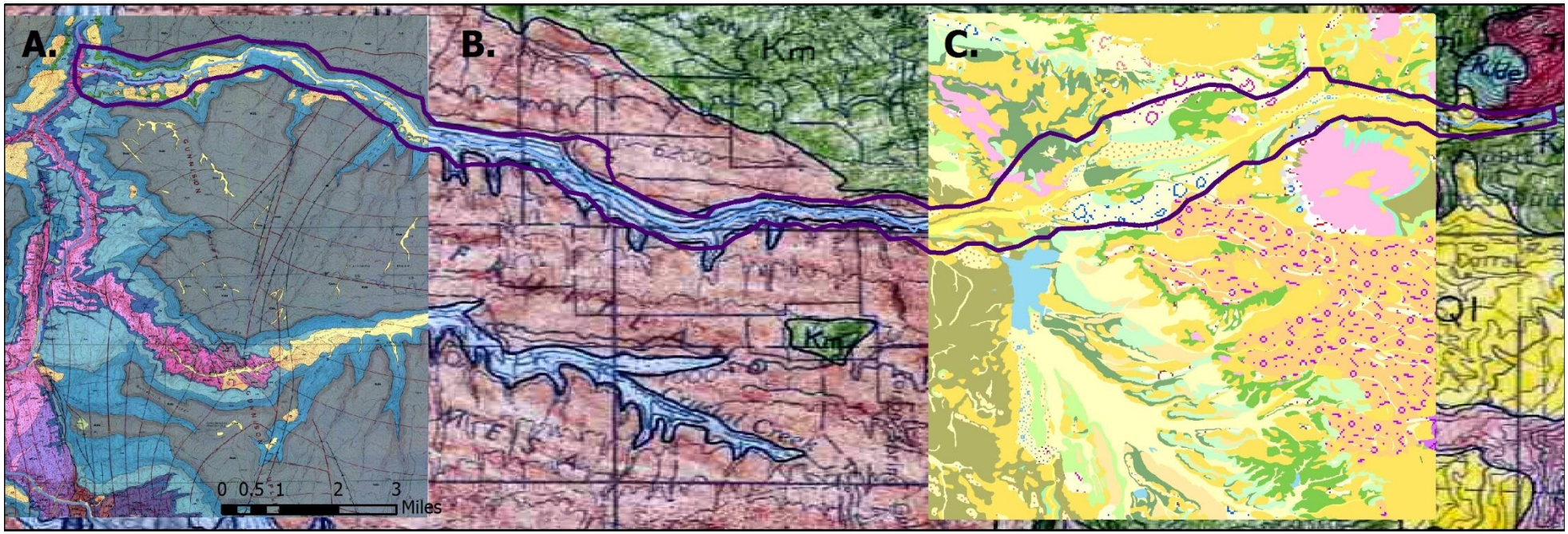


Smith Fork Watershed Project Area - LANDCOVER



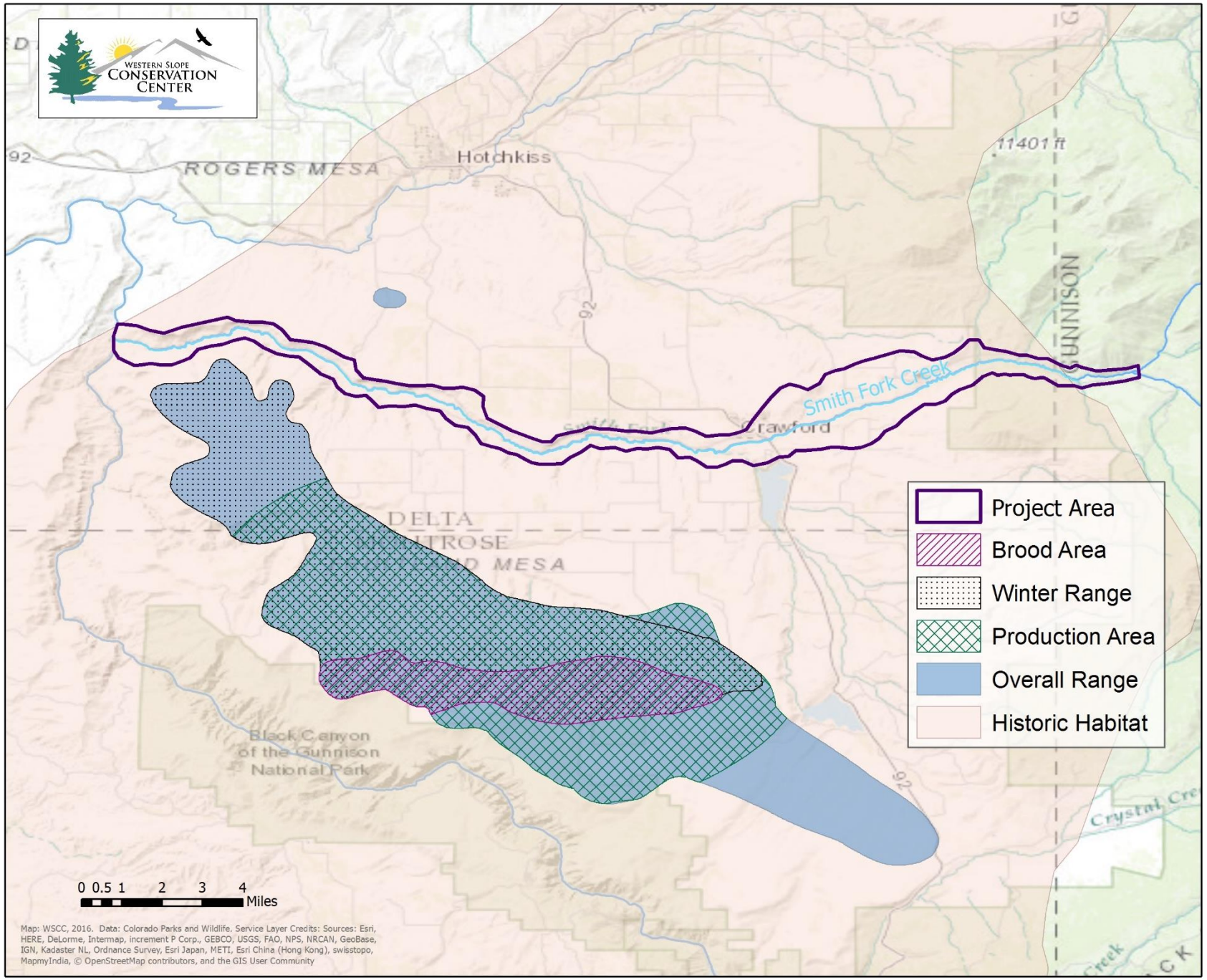
Smith Fork Watershed Project Area - GEOLOGY

Project Area

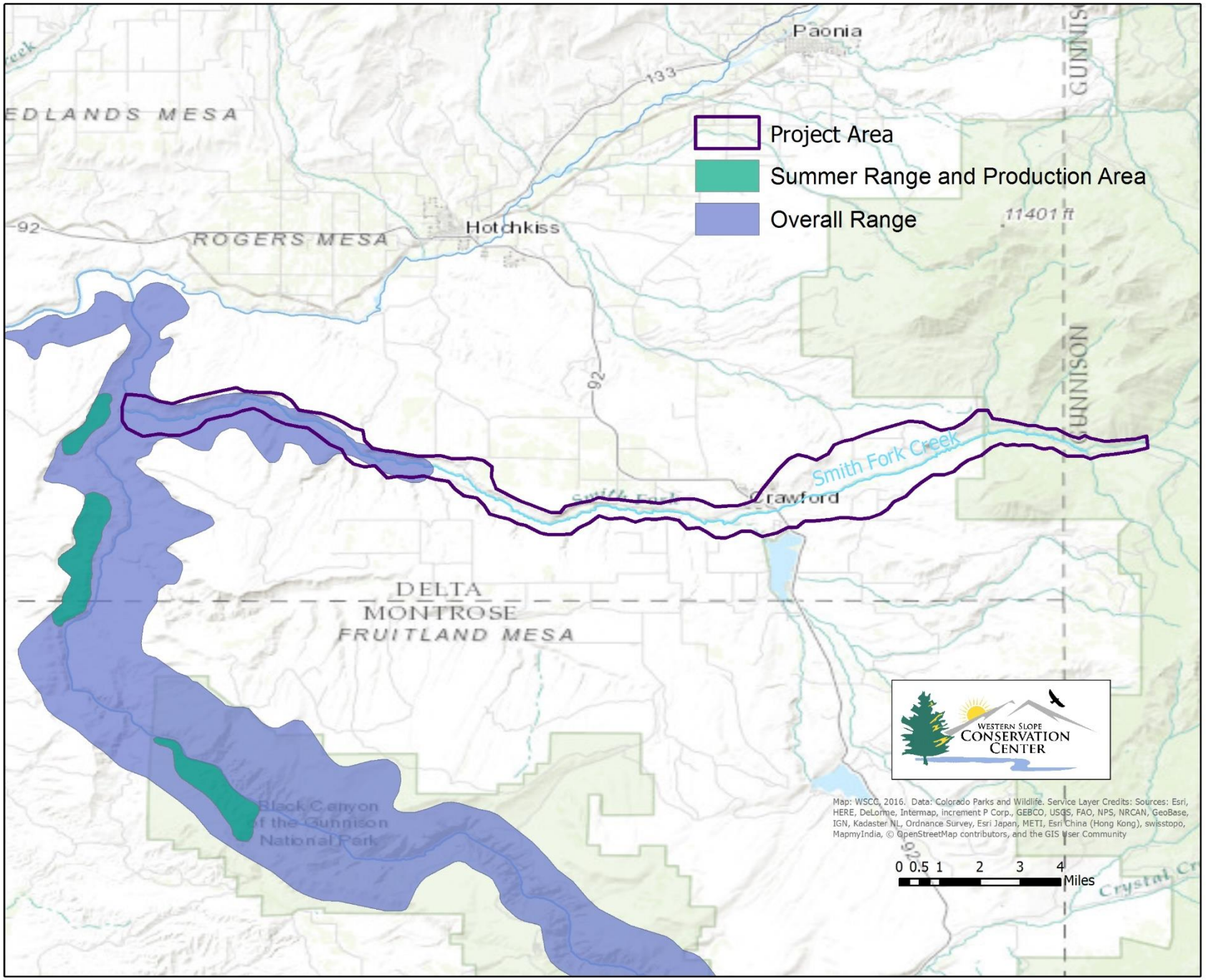


A.) USGS "Geologic map of the Black Ridge quadrangle, Delta and Montrose Counties, Colorado" (GQ-747), Scale 1:24,000;
B.) USGS "Preliminary geologic map of the Montrose 1 degree x 2 degrees quadrangle, northwestern Colorado" (MF-761), Scale 1:250,000
C.) USGS "Geologic map of the Crawford quadrangle, Delta and Montrose Counties" (OF-1506), Scale 1:24,000.

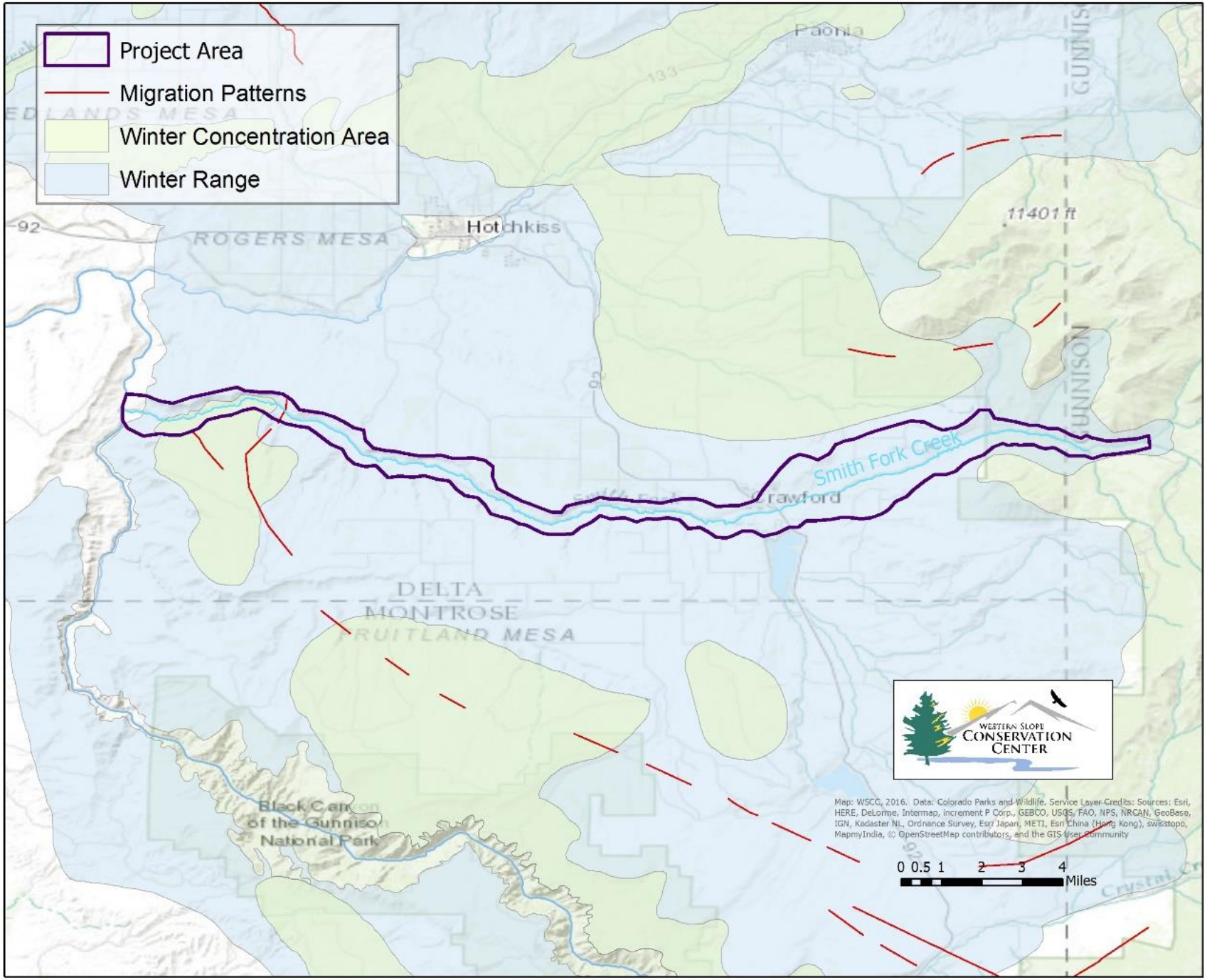
Smith Fork Watershed Project Area - Gunnison Sage-grouse



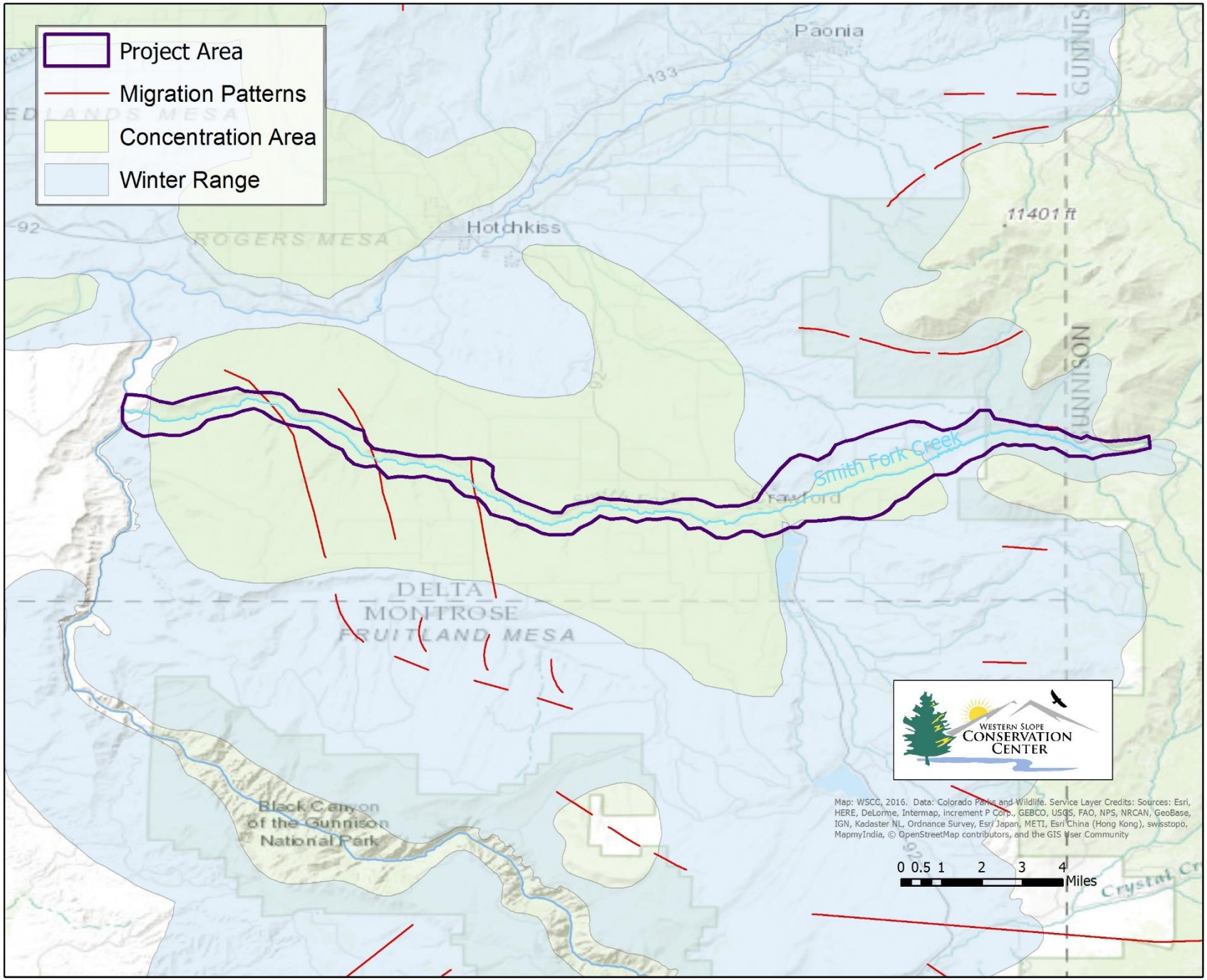
Smith Fork Watershed Project Area - Bighorn Sheep



Smith Fork Watershed Project Area - Elk



Smith Fork Watershed Project Area - Mule Deer



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