STANDARD 4 - Wildlife/Threatened and Endangered Species/Fisheries Habitat Health, Weeds:

> *Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened species, endangered species, species of special concern, or sensitive species will be maintained or enhanced*.

Wildlife/Threatened and Endangered Species

1) Characterization:

The plant communities/habitat types that occur within this watershed have been described under the Characterization section of Standard 2 (Wetland/Riparian Health) and Standard 3 (Upland Plant Health). These habitat types vary greatly in their ability to support wildlife, depending on species composition, age classes, single-species dominance, horizontal and vertical structure, type abundance, mosaic mix with other habitats, and proximity to features such as migration corridors and winter concentration areas. Over 374 species of wildlife, including birds, mammals, reptiles and amphibians, are known or are expected to occur within the Rawlins Field Office (RFO). While some wildlife species use several to many habitat types, other species are very specific in their habitat needs, and are known as obligate species. Graph #5 lists the number of wildlife vertebrate species by standard habitat type found within the Rawlins Field Office. In general, aquatic habitats support the greatest diversity of species (up to 165) and are the least common type of habitat (about 1% of landscape). Aspen woodlands are next in terms of supporting the greatest diversity of species, followed by big sagebrush, conifer, mountain shrub, and juniper woodland habitat types. The woodland plant communities are also uncommon in occurrence (about 4% of landscape), while big sagebrush and sagebrush/mixed grass are the most common plant communities in this watershed. Habitats with the lowest diversity of plants, cover, and structure, such as sand dunes, badlands, and rock outcrops, correspondingly support the lowest number of wildlife species.

Resource management plans have categorized these less common, high wildlife diversity habitats as higher priority for protection from impacts due to projects or other developments. This does not mean that more common habitats with lower wildlife diversity are any less important. The recent rise in the status of both the greater sage-grouse and mountain plover has also elevated the importance of managing the more abundant habitats of sagebrush, saltbush, and short grassland. Management of all habitats to be healthy in terms of diverse species, cover, age classes and structure, will ultimately provide the most optimum habitat for all wildlife, rather than trying to manage for each particular species or priority species, the status of which can change rapidly.

Species of Interest or Concern:

The mule deer herd designation in this watershed is the Baggs Herd Unit, which includes the area south of Interstate 80, north of the Colorado-Wyoming state line, west of the Continental Divide to Sage Creek and then north to Rawlins and east of the Bitter Creek Road (picture 67-1). Many of the low and mid-elevation areas are winter-yearlong habitat as long as water is available during dry periods. Crucial winter range is along the Colorado border from Savery to Powder Rim, up Muddy Creek in the bottoms and juniper woodlands, and in the Sand Hills area (see Map #7). The better summer habitat is in areas along streams, or where precipitation is 10 inches or higher that support greater production and diversity of forbs and shrubs. Recent studies have shown mule deer moving greater distances seasonally than previously suspected. Deer that spent their summer south of Rawlins on Atlantic Rim were found in the winter on Powder Rim west of Baggs. Mule deer prefer a mixed diet of forbs, grasses, and shrubs in the spring and summer, moving to mostly shrubs in the fall and winter months. Stands of bitterbrush, mountain mahogany, serviceberry, chokecherry, and snowberry are important shrub species to manage for deer. Utah juniper is also eaten, but is much more valuable as winter thermal and escape cover. Mule deer and antelope diets are very similar to that of domestic sheep and, therefore, they compete with these animals for

forage where their use areas overlap. Since the herd management units for mule deer, antelope, and elk all border Colorado, there is extensive movement of animals back and forth between the states.

The antelope herd designations in this watershed are the Baggs and Bitter Creek Herd Units (picture 68-1). The Baggs Herd Unit is bounded by Interstate 80 to the north, the Colorado-Wyoming state line to the south, Highway 789 on the west, and Atlantic Rim and the Continental Divide to the east. Crucial winter range is located primarily along Muddy Creek between Dad and Baggs and on Red Rim along ridges that blow free from snow. The area along Muddy Creek overlaps with crucial winter range for mule deer. Antelope move farther west or south into Colorado during severe winters. During more mild winters, antelope make more extensive use of transition habitat adjacent to crucial winter range. While winter range is more limited, summer habitat for antelope extends across the entire herd unit except for the areas supporting forest woodland habitat. The Bitter Creek herd unit is bounded by Interstate 80 to the north, the Colorado state line to the south, by Highway 789 to the east, and Highway 430 to the west. Antelope are the principal big game species observed here, with mule deer and elk found in the Flat Tops and Powder Rim areas along the southern border. The wide open basins provide more season-long habitat, with antelope moving north to Patrick Draw or south to Colorado during more severe winters. Antelope rely heavily on Wyoming and mountain big sagebrush habitats in addition to other "open" communities like saltbush, greasewood, and short grasslands. During the winter, antelope diets may consist of up to 98% Wyoming big sagebrush. However, spring and summer diets include higher amounts of forbs, grasses, and other shrubs.

The elk herd designations in the watershed are the Sierra Madre and Petition Herd Units (picture 68-2). The Sierra Madre Herd Unit is bounded on the north by Interstate 80, Wyoming Highway 71, Sage Creek and the North Platte River, on the east by Wyoming Highways 130 and 230, on the south by the Colorado-Wyoming Stateline, and Wyoming Highway 789 on the west. This means that only about half of this management unit is contained within the upper Colorado River watershed. Elk will summer in the MBNF and surrounding foothills where there is aspen or other habitat to provide hiding cover. Elk move to lower elevations off the forest, with distances traveled often dictated by the availability of forage. Crucial winter ranges include the wind-blown rims south of Rawlins, stretching south along Atlantic Rim, the Sand Hills, and slopes bordering the Browns Hill plateau to the Little Snake River valley and Horse Mountain area. The Petition herd unit is bordered by Wyoming Highway 430 on the west, interstate 80 to the north, Wyoming highway 789 to the east, and the Colorado-Wyoming state line to the south. This is a relatively new herd management unit that was created in the 1990s after wintering elk began to stay year-round in this area. Because the elevation in this area is generally low, the elk do not generally move the distances as does the Sierra Madre herd. The principal elk cover in this area are juniper woodlands and patches of tall sagebrush and serviceberry. Elk primarily eat grasses, with a higher proportion of shrubs and aspen taken during the fall and winter. This predominately grass diet means that elk compete for forage with cattle and wild horses, rather than with antelope, mule deer, or domestic sheep.

Greater sage-grouse and Columbian sharp-tailed grouse both occur within this watershed (see Map #8 and pictures 68-3 thru 68-5). Greater sage-grouse populations have exhibited long-term declines throughout North America, 33% over the past 30 to 40 years (Braun 1998). No one causal factor has been solely identified for these declines. Wyoming supports the largest populations of greater sage-grouse, more than all other states combined. However, this population decline is also happening in Wyoming. Greater sage-grouse are a sagebrush obligate species. Throughout the life cycle of the species, sagebrush plays an important role; from breeding habitats of open areas surrounded by sagebrush to nesting sites under sagebrush to wintering habitat in sagebrush, each aspect of the life cycle requires slightly different elements within the sagebrush communities. It appears that during nesting, grass height and cover play an important role in the nesting success of greater sage-grouse. Early brood-rearing habitats may be relatively open stands of sagebrush with greater than 15% canopy cover of grasses and forbs. (Lyon 2000). Great plant species diversity with abundant forbs and insects characterize brood areas (Klott and Lindzey 1990). As summer progresses, grouse move to more mesic sites rich in forbs. Movements to winter range are slow and meandering and occur from late August to December (Connelly et al. 1988). During winter, greater sage-grouse feed almost exclusively on leaves of sagebrush (Patterson 1952,Wallestad et al. 1975). Currently, the Rawlins Field Office has contracted with industry for a consultant to complete a wintering sage grouse study within this watershed. The study is ongoing, and the purpose is to identify and describe

greater sage-grouse severe winter relief habitat within two oil and gas environmental analysis areas. During the winter of 2000/2001, aerial surveys identified 25 separate areas being used by greater sage-grouse when snowfall restricted birds to small, exposed areas of sagebrush habitat.

Columbian sharp-tailed grouse occur only in this watershed within the RFO. Larger populations are found in northwest Colorado and two other separate populations are found in southern Idaho/Utah and British Columbia. Small, remnant populations exist in Washington and Montana. These birds occupy grasslands to open shrublands mixed with grasses with adequate cover (up to 40% shrubs) for nesting and brood-rearing habitat. Within the watershed, they occur in the foothills and forest edge from Savery and Battle Mountain north to Muddy Creek and Truckdriver's Creek. Young birds rely on insects and forbs before switching to berries in the summer and fall. Winter diets are primarily buds from taller berry-shrubs that stand above the snow, such as serviceberry and chokecherry. Taller roosting habitat is needed close to nesting and brood-rearing habitat and can include riparian habitat, aspen, and pockets of taller shrubs. The Colorado populations have not shown the declines of other states, but there is concern about the species' extensive use of private lands and artificial habitats (reclaimed minelands). In fact, 44% of active lek sites occur on these reclaimed mining areas and Conservation Reserve Program (CRP) lands (Hoffman, 2001).

Ferruginous hawks are common within the RFO and the upper Colorado River watershed (picture 69-1). Once proposed as a candidate for listing, it is currently on the Wyoming BLM sensitive species list. This hawk is maintaining stable populations in Wyoming, although it is still declining across its entire range. The local populations are primarily influenced by the abundance of prey, namely ground squirrels, which fluctuate with the trends in climate and vegetation. In the wide open rangelands that characterize much of the basins, lack of suitable nesting structures often leads to birds nesting on old structures, windmills, and oil and gas facilities. Use of artificial nesting structures has proven successful in alleviating these types of problems and actually improved fledgling rates.

Numerous other raptors live and nest in this watershed and include golden eagles; red-tailed hawks, Swainson's hawks, sharp-shinned hawks, and Cooper's hawks; northern harrier; American kestrels; prairie falcons; and burrowing owls, short-eared owls, long-eared owls, and great-horned owls (see Map #9). Other common species are jack and cottontail rabbits, coyote, red fox, skunk, badger, beaver, muskrat, ground squirrels, white-tailed prairie dogs, and a variety of songbirds and small mammals. Riparian habitat and wetlands support these species and numerous other migratory waterfowl and shorebirds, including the white-faced ibis and long-billed curlew.

T&E Species:

Threatened, endangered, proposed, and candidate species for listing that occur, or may occur, within this watershed include the black-footed ferret, Canada lynx, bald eagle, mountain plover, blowout penstemon, Ute ladies'-tresses, boreal toad, and yellow-billed cuckoo (picture 69-2). Also, since this watershed is a subset of the Colorado River System, any projects that lead to a water depletion in the system will affect the following fish species: bonytail chub, Colorado pikeminnow, humpback chub, and the razorback sucker

Black-footed Ferret

Status

The black-footed ferret is considered the rarest and most endangered mammal in North America and receives full protection under the Endangered Species Act of 1973 (P.L. 93-205).

Habitat

The close association of black-footed ferrets and prairie dogs is well-documented. The ferrets rely on prairie dogs for both food and shelter. The original range of the black-footed ferret corresponded closely with the prairie dog, extending over the Great Plains area from southern Canada to the west Texas plains and from east of the 100th Meridian to Utah and Arizona (USDI-BLM, 1984).

Watershed Occurrence

This watershed supports fairly large populations of white-tailed prairie dogs towns. Therefore, there is still the potential that the watershed may support black-footed ferrets. There are no known populations within the watershed. Black-footed ferrets have been reintroduced into the Craig BLM Field Office, which is just south of the watershed in Colorado.

Canada Lynx

Status

The current status of the Canada lynx is threatened.

Habitat

Lynx occur in the boreal, sub-boreal, and western montane forests of North America. Snowshoe hares are the primary prey of lynx, comprising 35-97% of their diet throughout the range. Other prey species include red squirrels, ground squirrels, mice, voles, porcupines, beaver, and ungulates as carrion or occasionally as prey. Lynx seem to prefer to move through continuous forest and particularly use ridges, saddles, and riparian areas. In studies in Montana and Wyoming, adult lynx made exploratory movements outside their home range, and lynx have been found to cross large rivers and lakes and have been documented in habitats such as shrub-steppe, juniper, and ponderosa pine (USDI-FWS, 1999a).

Watershed Occurrence

Although it is highly unlikely that lynx use the habitat types in which the watershed occurs, it is always possible that this animal may travel through the watershed, specifically using riparian habitats for cover.

Bald Eagle

Status

The current status of the bald eagle is threatened.

Habitat

Bald eagles are found in conifer, cottonwood-riparian, and river ecosystems and forage in adjacent upland rangelands.

Watershed Occurrence

Bald eagles live year-round in the Little Snake River drainage. They are most commonly observed on public lands during the winter and spring when they feed on big game carcasses along highways and on winter ranges.

Mountain Plover

Status

The U.S. Fish and Wildlife Service proposed listing the mountain plover as a threatened species in February 1999, without critical habitat, under authority of the Endangered Species Act of 1973.

Habitat

The mountain plover is a bird of short-grass prairie and shrub-steppe landscapes at both breeding and wintering locales. Breeding Bird Survey trends analyzed for the period 1966 though 1996 document a continuous decline of 2.7% annually for this species, the highest of all endemic grassland species. The plover is classified as common in Wyoming. Range management projects to improve forage conditions for domestic livestock, such as pitting, introduction of exotic grass species, watershed improvement projects, and fire suppression, enhance the development of taller vegetation and may eliminate suitable habitat for nesting plover (USDI-FWS, 1999b).

Watershed Occurrence

Within the watershed, mountain plovers appear to be fairly common during breeding and nesting, using short grassland, saltbush-steppe, and sagebrush-steppe habitats. Mountain plovers are rarely found near water and use both native rangelands and disturbed areas such as bedgrounds, reclaimed sites, and prairie dog towns. Currently the Rawlins Field Office, in cooperation with the oil and gas industry and the U.S. Fish and Wildlife Service (FWS) are surveying for mountain plover and their habitat n several EIS development areas in the watershed. There are also studies involving insect populations and plover diet selection to help further define habitats preferred by mountain plovers. Several mountain plover occupied habitat areas have been identified within the watershed, primarily in the more open habitat of the Barrel Springs drainage between Wamsutter and the Flat Tops. An occupied habitat area is defined as two or more observations within two miles of each other during one breeding season of any of the following: territorial adults, nests, adult distraction displays, or broods. Mountain plovers have a tendency to come back to the same areas each year to nest.

Blowout Penstemon

Status

The blowout penstemon is considered an endangered species and receives full protection under the Endangered Species Act of 1973.

Habitat

The blowout penstemon is located in areas of sparsely vegetated shifting sand dunes or wind carved depressions (blowouts). In Wyoming, so far, this species is found primarily on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges.

Watershed Occurrence
No known population occurs in the watershed. There is potential habitat for the plant in the blowout areas of the Sand Hills between Cow Creek and Muddy Creek. Walt Fertig from WYNDD spent one day in this watershed looking for blowout penstemon in 2000. Survey results were negative.

Western Boreal Toad

Status

This species is a candidate species under the Endangered Species Act of 1973.

Habitat

The western boreal toad is found in riparian areas above 7,500 ft in elevation adjacent to and within the MBNF.

Watershed Occurrence

The southern Rocky Mountain population of the boreal toad has suffered drastic population reductions since the early 1980s thoughout the southern Rockies, and declines in the Sierra Madres have also been severe. Boreal toads may potentially be found at higher elevations within the watershed bordering MBNF lands.

Ute's Lady's Tresses

Status

The Ute's lady's tresses is considered a threatened species under the Endangered Species Act of 1973.

Habitat

The Ute's lady's tresses is a perennial, terrestrial orchid with stems 2 to 5 dm tall, narrow leaves, and flowers consisting of few to many small white or ivory flowers clustered into a spike arrangement at the top of the stem. It blooms from late July through August; however, depending on location and climatic conditions, orchids may bloom in early July or still be in flower as late as early October. This plant is endemic to moist soils in mesic or wet meadows near springs, lakes, seeps, and riparian areas within the 100-year flood plain of perennial streams ranging from 4,300-7,000 ft in elevation. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows. The orchid colonizes early successional riparian habitats such as point bars, sand bars, and low lying gravelly, sandy, or cobble edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The plant seems generally intolerant of shade and is found primarily in open grass and forb-dominated sites where vegetation is relatively open and not dense or overgrown.

Watershed Occurrence

The Ute's lady's tresses has not been found in this watershed. The plant occurs in all of the states that border Wyoming, so the FWS has concluded that the plant may occur about anywhere in the state that meets the habitat requirements.

Yellow-billed Cuckoo

Status

The yellow-billed cuckoo is a candidate species at this time.

Habitat

This species generally inhabits open woodlands and streamside habitat with willow, cottonwood, and alder groves; however, it has been observed in riparian areas west of the Continental Divide.

Watershed Occurrence

Within the watershed, the best habitat for yellow-billed cuckoos appears to be found on private lands. There may be a few relatively-small isolated parcels of habitat occurring on BLM lands.

Colorado River System Species

Colorado Pikeminnow

Status

The Colorado pikeminnow was listed as endangered in 1967.

Habitat

This fish evolved as the main predator in the Colorado River system. The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America. The decline of the fish can be closely correlated with the construction of dams and reservoirs during the 1960s, the introduction of nonnative fishes, and the removal of water from the Colorado River system (USDI-FWS, 1992).

Potential Effects

Migration cues such as high spring flows, increasing river temperatures, and possible chemical inputs from flooded land are all factors that signal the onset of the reproductive cycle in Colorado pikeminnow. These factors, including high spring flows, are critical to maintain successful reproduction. In the summer, water flow requirements change, and a gradual decline of summer flows following spring scouring maintains the natural sediment transport equilibria, prevents siltation of spawning substrate, aids downstream drift of larvae, and creates productive nursery areas. High flows in late summer and fall reduce availability of nursery habitat for young Colorado pikeminnow. Stable flows in the winter reduce ice scouring of the shoreline habitats that are used by overwintering adults and young (Tyus, 1989).

Any water depletions that would occur as a result of a project may affect, and is likely to adversely affect, the range, distribution, and reproductive success of the Colorado pike minnow, which has the potential to decrease the likelihood of the species' survival and recovery.

Humpback Chub

Status

The humpback chub was listed as endangered in 1964.

Habitat

The humpback chub inhabits narrow, deep canyon areas and is relatively restricted in distribution. Although this fish has been regularly found dispersed in the Green and Yampa Rivers, the only major populations of humpback chub known to exist in the upper Colorado River basin are located in Black Rocks and Westwater Canyons of the Colorado River (USDI-FWS, 1992).

Potential Effects

Humpback chub spawning occurs shortly after highest spring discharge. There may be competition between this fish and channel catfish (Tyus, 1989). Water depletion that would occur as a result of projects may affect, and is likely to adversely affect, the range, distribution, and reproductive success of the humpback chub, which has the potential to decrease the likelihood of its survival and recovery.

Bonytail Chub

Status

The bonytail is listed as endangered. On January 22, 1988, a recovery plan for this species was established.

Habitat

Little is known about the biological requirements of the bonytail chub, as the species greatly declined in numbers in the upper basin shortly after 1960. Until recently, the FWS considered the species extirpated from the upper basin; however, a specimen which exhibited many bonytail characteristics was collected prior to 1992, possibly indicating that a small extant population

exists. Large river reaches in the Colorado River are probably used by this species (USDI-FWS, 1992).

Potential Effects

This fish may exhibit the same water flow requirements as the Colorado pike minnow and the humpback chub; therefore, any water depletion that occurs as a result of a project may affect, and is likely to adversely affect, the likelihood of the reproductive success and survival of the bonytail.

Razorback Sucker

Status

The razorback sucker was listed as endangered in Colorado in 1979.

Habitat

The current distribution and abundance of the razorback sucker has been significantly reduced throughout the Colorado River system. The largest population of razorback suckers in the upper Colorado River basin is found in the upper Green River and lower Yampa River. Specific information on biological and physical habitat requirements of the razorback sucker is very limited, and habitat requirements for juvenile fish are also unknown (USDI-FWS, 1992).

Potential Effects

Spawning of the razorback sucker occurs with increasing flows associated with highest spring runoff. Curtailment of spring runoff in the mainstream Green River may be associated with loss of recruitment to the juvenile stage (Tyus, 1989). This fish may exhibit the same water flow requirements as these three fish listed above; therefore, any water depletions that occur as a result of projects may affect, and are likely to adversely affect, the likelihood of the reproductive success and survival of the razorback sucker.

BLM state sensitive species:

Many wildlife and plant species populations are declining, and though there may be many reasons for this, one of the causes of this decline is loss of suitable habitat from the landscape. The objective of the sensitive species designation is to ensure that BLM consider the overall welfare of these species when undertaking actions on public lands and that these actions do not contribute to the need to list the species under the provisions of the Endangered Species Act. The lack of demographic, distribution, and habitat requirement information compounds the difficulty of taking management actions for many species.

It is the intent of the BLM state sensitive species policy to emphasize the inventory, planning consideration, management implementation, monitoring, and information exchange for the sensitive species on the list in light of the statutory and administrative priorities.

BLM state sensitive species occurring in the watershed include: greater sage-grouse, Columbian sharp-tailed grouse, ferruginous hawk, white-faced ibis, long-billed curlew, burrowing owl, sage thrasher, loggerhead shrike, sage sparrow, Brewer's sparrow, white-tailed prairie dog, swift fox, Colorado River cutthroat trout, roundtail chub, bluehead sucker, flannelmouth sucker, and Gibbens beardtongue. Species thought to occur within the watershed are: Baird's sparrow, boreal toad, great basin spadefoot, northern leopard frog, Nelson's milkvetch, pale blue-eyed grass, dwarf shew, Wyoming pocket gopher, long-eared myotis, and Townsend's big-eared bat.

Species Common Names	Scientific Name	Habitat
Greater Sage-Grouse	*Cenrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*	Grasslands
Ferruginous Hawk	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops
White-Faced Ibis	*Plegadis chihi*	Marshes, wet meadows
Long-Billed Curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows
Burrowing Owl	*Athene cunicularia*	Grasslands, basin-prairie shrub
Sage Thrasher	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub
Loggerhead Shike	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub
Sage Sparrow	*Amphispiza billineata*	Basin-prairie shrub, mountain-foothill shrub
Brewer's Sparrow	*Spizella breweri*	Basin-prairie shrub
White-tailed Prairie Dog	*Cynomys leucurus*	Basin-prairie shrub, grasslands
Swift Fox	*Vulpes velox*	Grasslands
Colorado River Cutthroat Trout	*Oncorhynchus clarkipleuriticus*	CO River drainage, clear mountain streams
Roundtailed Chub	*Gila robusta*	CO River drainage, mostly large rivers, also streams and lakes
Bluehead Sucker	*Catostomus discobolus*	Bear, Snake and Green drainages, all waters
Flannelmouth Sucker	*Catostomus latipinnis*	CO River drainage, large rivers, streams and lakes
Gibbens Beardtongue	*Penstemon gibbensii*	Sparsely vegetated shale or sandy – clay slopes 5,500-7,700'
Baird's Sparrow	*Ammodramus bairdii*	Grasslands, weedy fields
Great Basin Spadefoot	*Spea intermontana*	Spring seeps, permanent and temporary waters
Northern Leopard Frog	*Rana pipiens*	Beaver ponds permanent and temporary waters
Nelson's Milkvetch	*Astragalus nelsonianus* –or- *Astragalus pectinatus var. platyphyllus*	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, & cushion plant communities at 5200-7600'
Pale Blue-Eyed Grass	*Sisyrinchium pallidum*	Wet meadows stream banks, roadside ditches, & irrigated meadows 7,000-7,900'
Dwarf Shew	*Sorex nanus*	Mountain-foothill shrub, grasslands
Wyoming Pocket Gopher	*Thomomys clusius*	Meadows with loose soil
Long-Eared Myotis	*Myotis evotis*	Conifer and deciduous forests, caves, and mines
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	Forests, basin-prairie shrub, caves, and mines

2) Issues and Key Questions:

The critical objective with regards to wildlife is maintaining or improving the quality of habitat while still providing for human uses. This watershed area includes a number of priority habitats. These habitats contain important plant communities or terrestrial features that are important to wildlife. Priority wildlife habitats include streamside riparian areas, seeps, meadows, wetlands, sagebrush-grass communities, quaking aspen groves, saline influenced communities, such as saltbush steppe or greasewood lowlands and playas, juniper woodlands and mountain-foothills shrublands. Some of the terrestrial features may include cliffs, badlands, and caves/mines.

The issue that most directly impacts wildlife and their habitat is livestock grazing (picture 76-1). Livestock compete with wildlife for forage, water, and space. Livestock management can affect species composition, vegetative health and production, and vertical and horizontal structure of habitats that wildlife depend upon. Tools used in livestock management, such as water developments, fencing, and treatments, may have positive and negative impacts depending on the species of wildlife, habitat requirements, and the cumulative impacts. The most visible issue with livestock grazing is cattle impacts on riparian habitat. How can cattle grazing be managed to maintain healthy vegetation in riparian areas, seeps, springs, meadows and wetlands? These areas support the greatest diversity of wildlife species and occur on only about one percent of the landscape; therefore, they must be managed for all beneficial uses. Another important issue is fencing, both existing and proposed projects. This includes the location, design, and cumulative impacts that fences can have on big game movements, migration corridors, and within crucial winter ranges. New fences are constructed to BLM standards, which were designed to minimize impacts to wildlife. However, older fences are not constructed to these standards, and can cause impediments to wildlife (i.e. sheep type designs). How can older style fences be converted in a timely manner to "wildlife friendly" standards, and how can cumulative impacts from fences on big game and other wildlife be adequately assessed? Another livestock related issue is water development projects in wildlife crucial winter ranges. How can livestock distribution problems be resolved without promoting year-round wildlife use and ensuring adequate forage is available for wildlife?

Second to livestock in directly competing with wildlife are wild horses, which occur in the western third of the evaluation area. While they don't tend to congregate around water sources as much as cattle, wild horses compete with wildlife on a year-round basis for water, forage, and space. During times of drought, which is the current situation, there are less resources and increased competition. To compound this, current wild horse populations are 2 ½ times the estimated desired population. Within the wild horse herd management area, current wild horse use is equal to livestock potential use (preference). However, due to nonuse by permittees because of wild horse numbers and drought, livestock use in 2001 was only 33% of the use by wild horses. What impacts are occurring to wildlife and their habitat as a result of too many wild horses? What steps or political processes must occur in order to keep wild horse populations at responsible levels?

Healthy populations of wildlife require healthy habitat. What constitutes healthy habitat? The best one-word answer is diversity. Diversity of plant species within communities and diverse amounts of plant cover and age structure. Many plants, and plant communities, require some sort of disturbance, such as disease, fire, or climate change to provide the mechanism to start afresh. Aspen and chokecherry are two species which require fire to stimulate regeneration and reduce competition from other species. The lack of fire or other forms of disturbance has resulted in many shrub and tree populations with too many old plants and not enough young ones. Wildlife which like older, denser plant communities are currently thriving, but the ones that like younger, more open habitats with early successional species are not doing as well. How many young plants or communities should we have and what is the right mix of young, middle-aged and old plants or communities to support diverse and healthy populations of wildlife? What are the best tools, such as fire, chemicals, or mechanical methods, to achieve this mixture?

An issue that is expanding at a rapid rate is mineral/oil and gas development, both in the scope of area in which impacts occur and the scale, particularly with in-field drilling (picture 76-2). Wildlife concerns involve fragmentation of habitat, which breaks undisturbed vegetation into smaller and smaller units. This

is usually caused by roads, pipelines, utility corridors, and other facilities constructed in or across previously undisturbed habitat. Road development also results in increased human presence or activity, either by industry or public recreation. Wildlife may be negatively impacted by these activities due to increased stress, movement and energy loss at critical seasons, and total loss of habitat through avoidance of these areas. With some species like greater sage-grouse, noise from industrial developments may also be an impact deserving greater recognition. How can mineral development proceed without creating impacts to wildlife and their habitat? Should additional measures be implemented to reduce impacts from mineral development and associated recreational use, such as seasonal road closures in crucial winter ranges? Can resources be developed in such a way as to minimize fragmentation of habitat?

In addition to increasing vehicular access by the public through road development, there is also an expanding off-highway vehicular impact from people driving their pickups, motorcycles, and three/four-wheelers anywhere they can. Whether for hunting, joy-riding, or collecting antlers, these activities can cause the same types of impacts to wildlife as described above: stress, energy loss with movement, and loss of habitat through avoidance of activity areas. Laws and enforcement can not work everywhere at all times. How can members of the general public be educated or informed to make better decisions about where and when they use their off-highway vehicles?

Wildlife also compete with other wildlife for forage, water, and space. This competition has often been studied between species of big game, particularly between elk and mule deer, since one seems to be up when the other is down. Although there is a moderate overlap in winter diets, primarily shrubs, there is little else to quantify and substantiate the competition between them. In many cases, the data supports habitat health and trend as the principal factor in determining whether one species does better than another. In 1994, the WGFD published the Baggs Mule Deer Crucial Winter Range Analysis. It documented a 74% winter diet overlap between mule deer and antelope in this area. Despite this fact and the concern over the health and trend of mountain shrub communities within mule deer crucial winter range, antelope herd objectives were raised in the late 1990s. There is currently a heightened concern over the national trend in greater sage-grouse numbers, with habitat the principal factor in question. Deer and antelope doe/fawn ratios are down from historic figures, so herds don't grow as fast or bounce back after winter die-offs. The banning of poisons and reducing hunting pressures over the last 20 to 30 years has led to increased predator populations. With this will come shifts in predator/prey balances and relationships. Do the current wildlife herd objectives have the habitat to support them? Should we concentrate more on spring through fall ranges and the health of the animals going into the winter, rather than on the condition of the winter range itself? Are trends in wildlife populations relating to changes in inter-species competition and not just changes in habitat, climate, or impacts from human uses?

3) Current Conditions:

Refer to Current Conditions for Standards #2 and #3 for habitat descriptions.

4) Reference Conditions:

The following are excerpts from "The Wyoming Landscape, 1805–1878," regarding the Little Snake River valley. The earliest Euro-American to visit and document his observations was F. A. Wislizenus, a St. Louis physician, who passed through the area in August of 1839. As his party approached Savery Creek from the Baggs area, buffalo were observed singly and in small herds. E. Willard Smith accompanied the fur trading party of Vasquez and Sublette into the area in the fall and winter of 1839-40. His party killed some buffalo and grizzly bears in mid-October of 1839 near the confluence of Muddy Creek and the Little Snake River. In early February of 1840, they returned to this same area and killed more buffalo.

In 1844 John C. Fremont, an army topographer, was also a visitor to this area. They killed three antelope west of Baggs. They then turned more northward across the hills "where every hollow had a spring of running water, with good grass." They shortly began seeing buffalo. On "St. Vrain's fork" (Savery Creek) they killed some bighorn sheep and buffalo. The creek was only wooded with willow thickets. There were aspen groves on the hills above. A band of elk was chased from one of these groves. Antelope were running over the hills and herds of buffalo could be seen on the opposite river plains. They also shot some

deer. "The country here appeared more variously stocked with game than any part of the Rocky Mountains we had visited; and its abundance is owing to the excellent pasturage, and its dangerous character as a war ground."

In 1850, Howard Stansbury, another army topographer who was part of a group surveying the route for the Overland Trail, wrote the following while crossing the Barrel Springs Draw portion of the Muddy Creek watershed. Tuesday, September 17: "Several buffalo were seen today, and one antelope killed." Wednesday, September 18: "A few buffalo bulls were quietly grazing upon the plain, and now and then a small herd of antelope, bounding away over the hills, gave life and spirit to the picture. An occasional drain was crossed, which gave indications of having contained water quite recently; but all of these were now dry. As long as the water lasted, the whole plain must have been covered with buffaloe and antelope, as the profusion of sign abundantly proved; but as this indispensable article was absorbed by the sandy soil, they seemed, from the direction of their trails, to have struck a course for the Vermillion. Many large bear-tracks were also seen, making in the same direction."

W. A. Richards was with the party that surveyed the southern border of Wyoming in 1873. At their camp just east of Sheep Mountain, "Lon and Texas caught a fine string of trout and Pat killed a goose." The next day "Max went out in the morning on Sheep Mt. just west of here and killed a mountain sheep and an antelope. Lon went out in p.m. after supper and killed a sheep and a black-tailed buck….Boys caught lots of trout." The next day Campbell killed two antelope. The following day "I killed a young buck on the steep side of the Mt." On August 7, Lon "killed a black tailed buck. Have high living nowadays and no work (weather bad for observations). Deer, antelope, sheep, geese, trout and grouse" are here.

Livestock first came to the area in 1871 when Noah Reader settled near the mouth of Savery Creek with a few head of cattle (Barnhart 1969). Later, in early 1873, George Baggs brought around 2,000 head of cattle to the Little Snake River Valley (Burroughs 1962). Cattle were the principal type of livestock until severe winters in 1886-87 and 1889-90 left some livestock owners bankrupt and opened the door for sheepmen to enter the picture. In the early 1900s, problems between cattle and sheep operators led to an agreement, where cattle would be grazed south of the Colorado-Wyoming state line and sheep to the north. Sheep numbers peaked in Carbon County between 1910-1920 at over ½ million sheep. Grazing on unclaimed public lands (what became BLM-managed lands in 1946) was widespread and uncontrolled until 1934. At this time the Taylor Grazing Act was enacted, which created grazing allotments and allocated grazing privileges. Giving ranchers their own area to graze and care for helped begin the process of improving resource conditions, which also meant improving habitat conditions for wildlife. As sheep numbers have dropped over time and allotments converted from sheep to cattle grazing, management concerns have become more focused on riparian habitat, which is usually more prone to impacts from cattle use.

5) Synthesis and Interpretation:

From the accounts above, the detectable changes are the disappearance of buffalo, grizzly bears, and bighorn sheep from this area. Livestock impacts, although still present, have been reduced, and range conditions on uplands and riparian habitat are improving in most areas. Antelope, elk, and mule deer are generally thriving, and Wyoming has the largest population of greater sage-grouse in the country. The principal reason for this is the slower settlement and development in Wyoming, compared to other states, which has slowed the rate of habitat loss and fragmentation. Our native plant species are all still present and weeds, though an issue, have not taken over large areas of the range. However, there is still progress to be made. Improvement in resource conditions following changes in livestock management can take many years to reach desired conditions. Lack of fire has created mature to decadent shrub and woodland communities with lower vigor and poor age-class and species composition. Wild horse population levels are currently above objective in a long-term drought with potentially large impacts on wildlife habitat. Impacts from oil and gas development, off-highway vehicles, and loss or modification of habitats near towns and outlying homes continue to increase.

The current status of big game herd levels and population objectives are: Antelope numbers within the Bitter Creek herd unit are currently between 12,000-14,000. In 1994 , the population objective was changed from 11,000 to 25,000. Antelope numbers within the Baggs herd unit are currently 7,000-7,500.

This population objective was also raised, from 7,100 to 9,000 animals. Prior to raising these objectives, antelope populations had tended to be at or above objective levels in most years. Habitat for antelope is in good condition for the Bitter Creek herd (picture 79-1). Whether the current herd objective is supportable is not yet known. Principal concerns are with the Baggs herd in terms of the 74% diet overlap with mule deer in this area and the high concentration of animals in the Muddy Creek crucial winter range during severe winters caused by Highway 789. Current trends in this sagebrush community are stable. However, as populations are raised toward the higher population objective, and if more severe winter weather returns to this portion of Wyoming, the trend in these communities will have to be closely watched. Perhaps compounding this issue is the potential coalbed methane field development in antelope transition range and adjacent to crucial winter range. This transition range is important in receiving more use by antelope in milder winters and reducing the browsing pressure on the crucial winter range (pictures 79-2, 79-3). If disturbances in this transition range lead to less antelope use here and more use of the crucial winter range, it will likely lead to downward trends in the Wyoming big sagebrush communities in crucial winter range.

Elk numbers within the Sierra Madre herd unit are currently around 6,300. This is about 2,100 above the population objective of 4,200 animals, and this herd has been above objective for 5+ years. The Petition elk herd unit has a population objective of 300 animals and is close to that number. This herd has been slowly building up to objective and can vary a lot due to migration to and from other herd units. Habitat for elk is abundant, generally healthy, and capable of supporting the existing herd objectives and potentially higher numbers. Elk from the Sierra Madre herd are pushing winter habitat boundaries farther to the north and west due to improved forage condition and prescribed burning (picture 79-4).

Mule deer numbers within the Baggs herd unit are near or at objective with an estimate of around 17,800 mule deer. They have been at this objective for 5+ years, but were previously as high as 27,000 in 1987, prior to a winter die-off in February 1993. Of the three commonly found big game species in this watershed, their habitat, and particularly crucial winter range, is of the highest concern. The first sidebar to addressing this concern is that some areas within the crucial winter range are more heavily impacted than others. The most concentrated mule deer use occurs from Horse Mountain down to Poison Basin and north along Muddy Creek, at lower elevations (79-5, 79-6). Adjacent to this area and to the north and west are areas in better condition that are used in mild winters but act more as transition habitat in severe winters (picture 79-7). The second factor is that a much higher percentage of mule deer crucial winter range is on private lands than compared to antelope and elk crucial winter range. Therefore, federal land managers should be aware of and take into account (when possible) actions occurring on lands adjacent to public lands and realize that actions taken on public lands will only affect perhaps 20% of the most heavily utilized areas within the crucial winter range.

Observed habitat concerns in the mule deer crucial winter range include single species dominance by Utah juniper and big sagebrush species, mature-to-decadent age class structure of all shrub communities, poor vigor and heavy-to-severe utilization of desired shrub species, dense stands of shrubs that inhibit use and movement, and low composition of forbs on deer ranges used first in the spring (picture 79-8). The Baggs Crucial Mule Deer Winter Range Analysis (WGFD, 1994) states the following about the need for vegetative treatments under Management Recommendations: “Fire suppression in some areas of the crucial winter range has had a negative impact on browse condition. Areas that were historically a mosaic of varying age classes of important browse species are now primarily older stands with considerable dead or decadent shrubs. Sage-grass communities, especially in Area IV(Flattops, Powder Rim), are now dominated by climax stands of big sagebrush with very little diversity in age and species composition.” Other concerns are wildfire potential in the Sand Hills and above Dixon and Savery that could burn large blocks of crucial winter range; impediments to deer movement such as fences in poor locations or not constructed to BLM standards or sheep-style fences that are no longer needed and restrict movement, and seasonal disruptions to deer on crucial winter range from the activities of commercial users and recreationists on improved and unimproved roads and cross-country (pictures 79-9, 79-10). There is also potential to improve lower-value mule deer habitat such as the alkali sagebrush habitat in the transition range northeast of Baggs.

Habitat for grouse, both greater sage-grouse and Columbian sharp-tailed grouse, could be improved (picture 79-11). The recommendations in recent publications about greater sage-grouse nesting and early

brood-rearing habitat features, which was developed in Idaho and then modified based on research conducted in Wyoming, can be used for assessments and to justify treatments (picture 80-1). In a study completed within this watershed, sharp-tailed habitat typically contained 28% shrub cover, while greater sage-grouse habitat consisted of areas with total shrub cover averaging 30% (Klott, 1987). In many cases, existing grouse habitat contains too much big sagebrush, lack of species diversity and forb abundance, and not enough herbaceous residual cover for high nesting success. Although Wyoming does have healthy grouse populations, there are still many opportunities in which habitat conditions can be improved for grouse and all wildlife which utilize these plant communities.

6) Recommendations:

Habitat needed to support healthy wildlife populations and listed or proposed threatened and endangered species is generally in acceptable condition. This does not mean that there aren't problems or concerns about wildlife habitat. The discussion under Standard #2 – Wetland/Riparian Health and Standard #3 – Upland Plant Health outlines the current conditions and recommendations for improving management of these resources. In many cases we may be meeting a standard but have a ways to go in order to meet our "desired or future" condition. On the other hand, our composition of native species is good, with just spot problems at this time with weeds. Due to the existing good condition of native vegetation and its ability to support the diverse wildlife populations we currently have, it is determined that the majority of Upper Colorado River watershed is meeting Standard #4 with respect to wildlife. The principal area deemed not to be meeting Standard #4 for wildlife habitat is the mule deer crucial winter range located between Horse Mountain and Poison Basin and north from Baggs along Muddy Creek through the Wild Horse and Dad juniper woodlands. This area encompasses about 40,000 acres of public land. The following recommendations address action to help meet future desired resource conditions. Livestock grazing is not a principle factor in the non-attainment of this standard.

Implement recommendations described for Standards #2 and #3. Improving the health of riparian/wetland and upland plant communities will help meet the needs of all wildlife, which use this watershed.

Modify existing sheep-type fences and older cattle-type fences to meet BLM standards. When possible, relocate fences to reduce impacts to wildlife movements. Encourage livestock permittees to leave gates open when not needed and/or through as much of the fall through spring seasons to help wildlife move between seasonal ranges.

Implement treatments in and adjacent to crucial winter ranges to improve the diversity of cover, species, age-class, vertical structure, and mosaic mix of plant communities. This may require experimentation on small scale projects, such as juniper woodland and alkali sagebrush, to determine which type(s) of treatments are most effective in meeting resource objectives. In fire-sensitive communities, create fire control zones of sparser vegetation between blocks of denser vegetation to reduce the likelihood of large wildfire impacts.

Management plans should consider other grazers, such as wildlife and wild horses, in making recommendations and to properly assess impacts. Water developments should benefit as many species as possible. This includes running projects in the summer even after livestock have left. In winter ranges, projects should be controllable, or small (ephemeral) in nature, to not encourage year-round wildlife use. Monitoring information, particularly trend data for big game crucial winter range, should be shared with the WGFD for use in evaluating and changing herd objective levels.

Management efforts should also emphasize maintaining or improving the health of vegetative communities on spring/summer/fall ranges. Big game, as well as other wildlife, will be in better condition going onto winter ranges in the fall if spring and summer ranges are in optimum condition. Utilize habitat recommendations for greater sage-grouse and Columbian sharp-tailed grouse in both assessing and planning habitat treatments.

Reduce and maintain wild horse populations within established herd population levels. Monitor to evaluate the impacts on vegetative communities and wildlife habitat and whether these levels represent a proper long-term population of wild horses.

Evaluate the need and institute measures where necessary to reduce disturbance to big game species on crucial winter ranges, particularly mule deer. This could involve seasonal closures of roads, seasonal closures of habitat for antler collecting, general off-highway vehicle use, transportation planning for oil and gas development, and other activities.

Fisheries: Aquatic Populations and Viability

1) Characterization:

The native fishes inhabiting the waters of the Muddy Creek and Little Snake River watersheds of south-central Wyoming include members of the families Salmonidae (trout and salmon), Catostomidae (suckers), and Cyprinidae (minnows). These fishes are the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), mountain sucker (*Catostomus platyrhynchus*), roundtail chub (*Gila robusta*), and speckled dace (*Rhinichthys osculus*) (Baxter and Stone 1995, Wheeler 1997, Oberholtzer 1987). Several of these species have experienced population declines throughout their native range in the Colorado River basin and are currently listed on the BLM Wyoming Sensitive Species List (picture 81-1).

Salmonid Fishes

Colorado River Cutthroat Trout

The Colorado River cutthroat trout (CRCT) historically occupied habitats within the Colorado River basin in Wyoming, Colorado, Utah, Arizona, and New Mexico. This range likely included portions of large rivers such as the Green, Yampa, White, Colorado, and San Juan rivers as well as small headwater streams. The historical distribution of this subspecies was disjunct. It has been suggested that CRCT were absent from the lower reaches of many large rivers because of summer thermal barriers (Behnke and Zarn 1976). These thermal barriers may have become acceptable habitat in winter, which allowed for the movement of fishes among populations and the maintenance of disjunct populations. Most remaining populations of CRCT are fluvial (utilize tributaries for spawning) or resident and generally occupy a home range of less than 1,000 linear meters of stream (Young 1995).

The habitat requirements of CRCT are thought to be typical of other cutthroat subspecies, requiring cold, clear, well-oxygenated water. CRCT spawn in substrate predominantly composed of gravel (Young 1995). Bozek and Rahel (1991a) found summer fry densities to be related to sites with water velocities slower than 6 cm/s and water deeper than 3 cm, many of which were sheltered from higher water velocities by woody debris, boulders, and rootwads. Adult CRCT favor pool habitat, though the importance of individual pool types is not clear (Herger 1993, Young 1995).

CRCT evolved in the absence of other trout species. This evolutionary path has left this subspecies, like other inland forms of the species, vulnerable to hybridization with rainbow trout and to displacement by brook trout and brown trout (Behnke 1992). Land use practices that may affect populations of CRCT including overgrazing (Binns 1977), willow spraying (Little Snake River Working Group 1994), removal of beaver, heavy metal pollution (Oberholtzer 1987, Jespersen 1981, Quinlan 1980), and water depletion and diversion (Jespersen 1981).

The CRCT is currently designated as a special status species by the states of Colorado, Utah, and Wyoming as well as regions 2 and 4 of the USFS and the BLM in Colorado, Utah, and Wyoming. In April 2001, representatives of these agencies finalized the *Conservation agreement and strategy for Colorado River*

cutthroat trout (Oncorhynchus clarki pleuriticus) in the States of Colorado, Utah, and Wyoming in order to ensure the long-term prosperity of CRCT throughout their historic range (CRCT Task Force 2001). The goals and objectives of this conservation agreement and strategy currently guide management of CRCT in the states of Colorado, Utah, and Wyoming.

Catostomid and Cyprinid Fishes

Some of the least studied fishes in the Colorado River Basin are members of the families Catostomidae (suckers) and Cyprinidae (minnows). Most people do not recognize the native fish fauna of this region as an indication of ecosystem function or sustainability. For this reason, these fishes have received little attention. The common names given many of these native fishes can be confusing as well. The term "minnow" is generally a reference to a little fish, while the term "sucker" is often used to describe a bottom-feeding scavenger. In reality, the Cyprinidae family (minnows) includes species that can grow rather large, such as the roundtail chub, which can easily reach lengths of 13 inches in the Muddy Creek watershed. Most members of the Catostomidae family (suckers) eat a combination of algae and aquatic invertebrates similar to other stream fishes (Rinne and Minckley 1991).

Flannelmouth Sucker

The flannelmouth sucker is native to the Colorado River drainage basin, where it is known to occupy both mainstem and tributary streams. It resides in pools, deep runs, and riffles. Similar to the behavior of other members of this genus, it ascends streams in the spring to spawn. This species is a benthic omnivore, consuming algae, detritus, plant debris, and aquatic invertebrates. Little is known of the habitat requirements of the flannelmouth sucker. Wyoming BLM, as well as the Wyoming Game and Fish Department, have designated the flannelmouth sucker as a sensitive species.

Bluehead Sucker

Bluehead suckers are known to occur within the Colorado River basin, as well as in portions of the Bonneville Basin and Snake River drainages (Lee et al. 1980). Migratory spawning behavior has been documented in the spring within Kanab Creek, Arizona, and tributaries of the Snake River in Wyoming (Maddux and Kepner 1988, Baxter and Stone 1995). Bluehead suckers are often associated with large, cool (20° C) streams with rocky substrates (Utah DNR 2002). This fish is a facultative herbivore, consuming algae, detritus, plant debris, and occasionally aquatic invertebrates (Utah DNR 2002). Algae are scraped from rocks by utilizing rigid cartilaginous biting edges of the jaws. Wyoming BLM, as well as the Wyoming Game and Fish Department, have designated the bluehead sucker as a sensitive species.

Mountain Sucker

The mountain sucker is a widely-distributed species occurring in the Columbia, Fraser, Saskatchewan, Missouri, and Green River drainages. It can be found in large rivers, small creeks, and montane lakes. Spawning takes place in the late spring to early summer. Mountain suckers feed primarily on algae. Like the bluehead sucker, algae are scraped from rocks by utilizing rigid cartilaginous biting edges of the jaws. The mountain sucker is categorized as a sensitive species by the Wyoming Game and Fish Department.

Roundtail Chub

The roundtail chub occurs in the Colorado River basin in both mainstem and tributary streams. Information pertaining to the seasonal movements of roundtail chub is scarce. Roundtail chub are carnivorous, opportunistic feeders, consuming a combination of insects, fish, snails, crustaceans, algae, and occasionally lizards (Osmundson 1999, Brouder 2000). Roundtail chubs occupy pool and riffle habitats that they use for cover and feeding. They do not tend to utilize shallow water habitats and areas lacking cover. Habitat requirements for all age classes of roundtail chub include a variety of substrate types from silt to sand and gravel to rocks, and turbid water rather than clear (Sigler and Sigler 1996, Brouder et al. 2000). Wyoming BLM, as well as the Wyoming Game and Fish Department, have designated the roundtail chub as a sensitive species.

Speckled Dace

The speckled dace is native to drainage basins west of the Continental Divide and ranges north into Canada. It can inhabit both streams and lakes. These fish are omnivorous feeders, consuming a combination of vegetable matter, insects, snails, and plankton (Baxter and Stone 1995). This species has a remarkable capability to survive periods of drought in pools of the deepest and most permanent parts of a channel, even though the water in these habitats becomes heated and deoxygenated. It can then re-colonize former habitats a few hours or days upon the return of streamflow (Rinne and Minckley 1991).

Introduced Fishes

Fish species introduced to the Muddy Creek and Little Snake River watersheds include the creek chub (*Semotilus atromaculatus*), white sucker (*Catostomus commersoni*), Iowa darter (*Etheostoma exile*), sand shiner (*Notropis stramineus*), fathead minnow (*Pimephales promelas*), brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*) (Baxter and Stone 1995, Wheeler 1997, Oberholtzer 1987). Additional information regarding the life history and ecology of these species can be found in Baxter and Stone (1995).

2) Issues and Key Questions:

Salmonid Fishes

In 2001, the BLM signed the *Conservation agreement and strategy for Colorado River cutthroat trout (Oncorhynchus clarki pleuriticus) in the States of Colorado, Utah, and Wyoming* in order to coordinate conservation actions among agencies and states and remove or reduce threats to the long-term persistence of CRCT range-wide. One goal in this plan is the creation of two self-sustaining metapopulations, each consisting of five separate, viable but interconnected subpopulations, in each Geographic Management Unit (GMU). One of these GMUs is located within the boundaries of the Rawlins Field Office – the Little Snake River GMU. A conservation plan specific to this GMU was signed in 1994 to guide specific conservation actions (Little Snake River Working Group 1994). This plan established the upper Muddy Creek watershed as a reintroduction site for one of the metapopulations. Goal 2 of this plan is to "Restore continuous habitat previously occupied by Colorado River cutthroat trout and other endemic species (i.e., mottled sculpin, flannelmouth sucker, and roundtail chub) in sufficient quantities to assure stable populations of these endemic species within the Little Snake River drainage. This habitat must provide unobstructed routes to areas critical for fulfilling life history requirements of the species of concern." In order to accomplish this goal it is necessary to restore habitat conditions and, in preparation for reintroduction, remove non-native fishes that have potential to hybridize with and compete with CRCT.

Specific management actions completed or initiated to restore continuous habitats for CRCT include the implementation of livestock management practices such as rotational grazing systems, the removal of barriers to fish movements, the enhancement of spawning habitats, and the stabilization of areas of stream channel degradation (picture 83-1). One focus of habitat restoration efforts has been the reestablishment of "Proper Functioning Condition" (PFC) to streams of the upper Muddy Creek watershed. Tremendous progress has been made toward reaching this goal (pictures 83-2, 83-3). However, the PFC method was designed to address stream stability, not fish habitat. For this reason, streams classified as functioning properly may not provide all of the habitat components necessary to support CRCT. For example, the PFC assessment method does not address water temperature, but maximum water temperature has been shown to limit trout populations. Desired future condition beyond PFC, and associated shading cover for streams, especially mature shrubs, will take up to 10-20 years to accomplish. For CRCT to thrive in the upper Muddy Creek watershed, or elsewhere, it will likely be necessary to manage these streams in favor of late-successional stream habitat, rather than stopping management when stream stability has been achieved. Two components of late-successional stream habitats that could improve the success of CRCT reintroduction are the amount of coarse woody debris (willows) for cover and shading and the amount of gravel substrates available for spawning. It is currently not possible to assess the success of previous habitat restoration activities for CRCT in the upper Muddy Creek watershed, though the survival of fish

reintroduced to Littlefield Creek through their first winter in 2002 was encouraging. The true test of the habitat's suitability will be if CRCT are able to complete their life cycle within the upper Muddy Creek watershed.

In addition to physical habitat restoration, actions have been completed or initiated to remove competing introduced species from areas identified for CRCT reintroduction. It must also be recognized that recreational fishing opportunities will be temporarily impacted while the removal of introduced fishes is completed. Those waters would then be restocked with native CRCT, thus replacing one fishing opportunity with another. Opportunities to enhance beaver habitats in Littlefield Creek while stabilizing areas of vertical instability have been pursued. The use of beaver as a tool to manage both stream stability and fish habitat has been very successful. Beaver ponds in Littlefield Creek have the potential to produce fish of a larger than average size, creating a unique angling opportunity. Additionally, removing competing species and reestablishing a trout fishery in upper Muddy Creek for CRCT should enhance angling opportunities. The public has expressed an interest in maintaining recreational fishing opportunities for introduced trout such as rainbow and brook trout in this area. The desire to maintain these recreational fisheries will need to be balanced with the need to reintroduce CRCT to portions of its historic range. The recent creation of several reservoirs in this area should help to provide recreational fishing opportunities for introduced trout that are not in direct conflict with the goals of the CRCT conservation agreements.

Catostomid and Cyprinid Fishes

For various reasons, the viability of native Catostomid and Cyprinid populations have received little attention within the Muddy Creek and Little Snake River watersheds. Work has recently been initiated to investigate the distribution, habitat requirements, and life history of the bluehead sucker, flannelmouth sucker, mountain sucker, roundtail chub, and speckled dace within the Muddy Creek watershed. It is the intention of these distribution and life history investigations to provide answers to several questions that are key to the proactive development of habitat suitability criteria and conservation strategies for bluehead sucker, flannelmouth sucker, and roundtail chub both within the Muddy Creek watershed and range-wide. These questions include:

- What is the current distribution of the native fishes within the Muddy Creek watershed? Obtaining baseline distribution data is preliminary to conducting life history investigations.
- What are the characteristics of the fish community within which these species reside? Initial sampling has indicated that introduced fishes dominate many of the fish communities of the Muddy Creek watershed. If this proves to be common in the Muddy Creek watershed, the native fishes would be susceptible to replacement by and hybridization with introduced fishes.
- What types of movements are exhibited by these fishes within the Muddy Creek watershed? Research in other areas has indicated that Catostomid species are often highly migratory, moving long distances between wintering habitats and spawning habitats. The ability of these fishes to navigate instream structures of differing design and size is unknown. The ability to navigate instream structures and complete migrations may be important to the completion of their life cycle.
- What habitats are adult and juvenile fishes using respectively? In order to effectively manage the habitats of these native fishes, it will be necessary to develop habitat suitability criteria.
- Are there any habitats, habitat variables, or events that would favor native species over introduced species? Native fishes have been shown to respond positively to natural hydrography, allowing them to fend off introduced species, while the flattened hydrograph, diminished seasonal fluctuations in water temperature and sediment load, and greater average water temperatures resulting from impoundment may increase the competitive advantage of introduced fishes over native fishes (Rinne and Stefferud 1997).
- Are these fishes using habitats outside of the Muddy Creek watershed? Preliminary results of fish trap monitoring at the mouth of Muddy Creek have indicated that both flannelmouth sucker and bluehead sucker are migrating into Muddy Creek from the Little Snake River. The degree to which other species utilize the Little Snake River is yet unknown.

- To what extent is hybridization contributing to population declines? The potential for these fishes to hybridize with introduced species exists within the Muddy Creek watershed. This potential may be strongest among the Catostomid fishes. Samples have been taken and will be analyzed to determine if hybridization has occurred or if pure populations of these fishes remain.

Conservation planning has recently been initiated for the roundtail chub, bluehead sucker, and flannelmouth sucker. A range-wide conservation agreement and strategy for these three species is currently in draft form. This effort has emphasized the collection and integration of information in order to develop conservation actions. By collecting information in the Muddy Creek watershed pertaining to the distribution, habitat requirements, and life history of native Catostomid and Cyprinid fishes, it will be possible to provide site-specific information for conservation planning, and develop strategies to restore the function of aquatic ecosystems.

Coalbed methane development has recently begun in the Muddy Creek watershed (picture 85-1). This development is in the vicinity of sites known to harbor roundtail chub, bluehead sucker, and flannelmouth sucker. The potential impacts to these fishes from surface disturbances, water discharges, and changes to the natural hydrography will need to be considered when developing alternatives during preparation of environmental assessments and environmental impact statements.

3) Current Conditions:

Salmonid Fishes

Colorado River Cutthroat Trout

In September of 2001, the CRCT was reintroduced to approximately 11 miles of its native range in Littlefield Creek (Muddy Creek watershed) (pictures 85-2, 85-3). Pure populations of CRCT can also currently be found in portions of Dirtyman Creek and Hell Canyon Creek within the Little Snake River watershed, as well as many streams draining the MBNF. Within the Muddy Creek watershed, plans are in place to restore CRCT to approximately 20 miles of upper Muddy Creek within the next three to four years. This will connect Littlefield and Muddy Creeks and expand both the range and stability of CRCT populations within the watershed.

The suitability of habitat conditions in the Muddy Creek and Little Snake River watersheds for CRCT has not been fully determined. An inventory was conducted for the upper Muddy Creek watershed in 1994. Hoffman (1995) found there to be a lack of large woody debris, other large structural elements, and pool habitat suitable for adult CRCT. Stream temperatures in these mid-elevation streams are potentially limiting to CRCT. Maximum water temperatures in the Muddy Creek watershed regularly exceeded 70°F during the summer months of 1993 and 1994 (Hoffman 1995). Stream temperature trend should be down due to increasing encroachment of sedges and grasses into the channels in the past eight years. Many of the streams within the Muddy Creek and Little Snake River watershed have suffered from past periods of vertical instability. This instability has resulted in wider and shallower stream channels that offer little or no shading and a lack of habitat complexity.

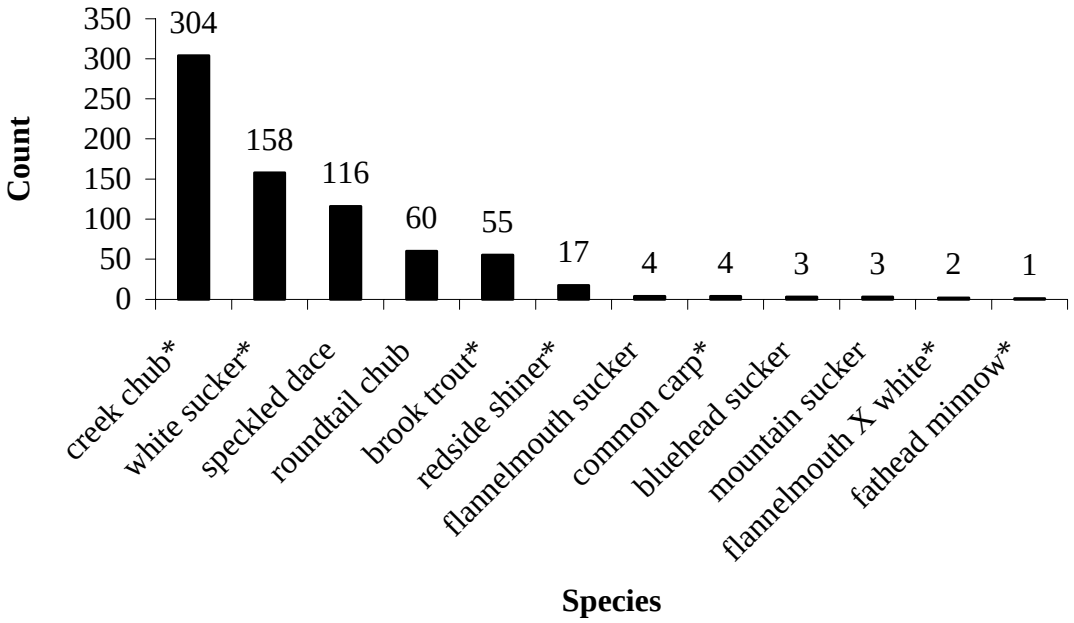
In addition to the CRCT, there are several introduced salmonid species within the Muddy Creek and Little Snake River watershed that provide recreational fishing opportunities. These species include brook trout, rainbow trout, and brown trout. These fishes have been stocked in many reservoirs throughout these watersheds and can also be found in many of the perennial streams.

Catostomid and Cyprinid Fishes

In 2001, a systematic fish population inventory of the Muddy Creek watershed was initiated as the first step in defining the current distribution of sensitive non-game fishes, the life history of those fishes, and the stability of native fish communities. To date, 18 of 65 inventories have been completed. Though inferences made based on these initial inventories may not be representative of the Muddy Creek watershed, many of the sites inventoried to date have been dominated by introduced fishes (Graph #2).

In addition to conducting fish population inventories, a fish trap was placed at the mouth of Muddy Creek in April 2002 to monitor the movement of fish into Muddy Creek from the Little Snake River. It was found that flannelmouth suckers and bluehead suckers were migrating into Muddy Creek from the Little Snake River. It is not known where these fishes were migrating to, but it is likely that they were attempting to utilize Muddy Creek or one of its tributaries as spawning habitat. It remains unclear whether these fishes were able to reach suitable spawning habitats.

The most current information pertaining to the distribution of fishes within the Little Snake River watershed can be found in Oberholtzer (1987). To date there have been no inventories of stream habitat conditions as they pertain to Cyprinid or Catostomid fishes in these watersheds.



Graph #2. Composition of fish communities sampled within the Muddy Creek watershed during 2001.
* Indicates introduced species.

4) Reference Conditions:

Salmonid Fishes

Colorado River Cutthroat Trout

The distribution and abundance of CRCT have declined from historical levels (Young 1995, Martinez 1988, Binns 1977, Behnke and Zarn 1976). It has been stated that CRCT currently occupy less than 1% of their historical range (Behnke 1979). Within the Muddy Creek watershed, historical accounts of "speckled trout" date to 1850. Reference was also made to beaver dams at short intervals in the vicinity of the "speckled trout."

Catostomid and Cyprinid Fishes

By comparing the results of surveys completed in 1965 by Dr. George T. Baxter with those completed during 1995-1996, Wheeler (1987) was able to determine distributional changes of fishes in Wyoming west of the Continental Divide. Each of the species native to the Muddy Creek and Little Snake River watersheds were found to be in various stages of decline throughout their range in Wyoming. Three of

these species, the bluehead sucker, flannelmouth sucker, and roundtail chub, were restricted to a fraction of their native ranges in Wyoming. Both the mountain sucker and speckled dace showed early signs of decline. The non-native white sucker had greatly increased its geographic range in western Wyoming between 1965 and 1996.

5) Synthesis and Interpretation:

After suffering from periods of instability, habitat conditions within the upper Muddy Creek watershed continue to improve as the result of rotational grazing systems, barrier removal, spawning habitat enhancement, and headcut stabilization. The implementation of rotational grazing systems in the Little Snake River watershed has also resulted in marked improvements in stream habitat conditions. Though much time and effort has been spent on the restoration of CRCT habitats, this work can be viewed as ongoing. There is still work to be done to connect habitats by removing barriers to fish movement. There is also work to be done to increase the amount of woody vegetation in these streams in order to increase stream shading and habitat complexity. The management of streams in the upper Muddy Creek for late-successional habitats would improve their suitability for CRCT. The suitability of spawning and rearing habitats has not yet been determined, as reproduction has not yet been documented. Finding a balance between native and non-native fishing opportunities will continue to be a challenge, as they are often mutually exclusive.

In many cases it is not currently possible to assess the suitability of habitats in the Muddy Creek or Little Snake River watersheds for Catostomid and Cyprinid fishes. Knowledge of the life history of these fishes as observed in other areas can provide some direction for making land management decisions. However, current investigations into the distribution, habitat requirements, and life history of these fishes within the Muddy Creek watershed will allow the development of site-specific conservation strategies. This information will also be useful in assessing impacts related to development activities. Work by Wheeler (1997) showed that these fishes have witnessed dramatic reductions in range since 1965. Of the greatest concern were the roundtail chub, bluehead sucker, and flannelmouth sucker. Both mountain sucker and speckled dace appeared to be in the early stages of decline.

6) Recommendations:

The improved management of riparian habitats and successful reintroduction of Colorado River Cutthroat Trout into upper Muddy Creek, as well as other cold water fisheries that exist within the watershed, indicate both an upward trend and meeting Standard #4 for fisheries. However, many other sites that should support fisheries, currently do not. Standard #4 for fisheries is not being met on streams, which currently fail Standard #2 – Riparian/Wetland Health and/or Standard #5 – Water Quality. There are also sites that are rated in proper functioning condition, but due to the lack of overhead cover (stream shading) exceed temperature requirements for some fish species and won't support them. However, these sites have not yet been defined. Due to the lack of credible data on the status of Catostomid and Cyprinid fishes in the watershed, whether Standard #4 is being met for these species is unknown.

Now that CRCT have been reintroduced to Littlefield Creek, monitoring their success will be critical. The reintroduction of CRCT into upper Muddy Creek should receive a high priority in coming years in order to connect two populations and work toward establishing a metapopulation in the upper Muddy Creek watershed. Historical range of CRCT in this watershed consisted of the upper Muddy Creek watershed including Littlefield Creek and McKinney Creek downstream to Alamosa Gulch. Opportunities to add additional stream miles to this metapopulation in order to increase its long-term viability should be pursued. CRCT habitats should remain a high priority for conservation actions such as barrier removal and habitat enhancement. The management of stream habitat beyond proper functioning conditions to a later successional stage should be considered for areas that have been identified for CRCT reintroduction. Opportunities to monitor movements of CRCT should be pursued in the upper Muddy Creek watershed. This would help to define habitat use and the importance of connectivity. Existing populations of CRCT and their habitats within the Little Snake River watershed in Hell Canyon Creek and Dirtyman Creek should be monitored to ensure that habitat conditions remain suitable. Balancing conservation actions for CRCT with ongoing land uses will continue to be crucial. Additionally, the maintenance of recreational

fishing opportunities for rainbow and brook trout should be a high priority where they are not in conflict with CRCT.

Investigations into the distribution, habitat use, and life history of native Catostomid and Cyprinid fishes in the Muddy Creek watershed should be continued. This research will provide managers with the information necessary to make informed land management decisions and develop conservation strategies that will help to reduce or eliminate the need to list these fish under the Endangered Species Act. Future work should be targeted at the native fish assemblage of the Little Snake River watershed. Specific information needs include the distribution and movements of fishes within the watershed.

The native fish of the Colorado River basin have witnessed dramatic population declines. Many of these fishes are nearing extinction and some are already gone. Neither legislation nor determined attempts at conservation have succeeded at reversing this trend. Competition and hybridization with alien species, as well as changes to the natural habitats of these fishes are the principal factors causing this trend (Rinne and Minckley 1991). The conservation of these fishes will be contingent on their recognition as important indicators of ecosystem function and sustainability. The importance of conserving native species, and limiting the number of species listed under the Endangered Species Act should be considered when making land management decisions.

Continue to implement or manage using best management practices (BMPs) for livestock grazing. This primarily means controlling the season, duration, and distribution of livestock use to meet desired resource objectives for both riparian and upland habitats. Objectives more specific to fisheries should include restoring riparian function while reducing stream width/depth ratios and increasing the abundance and cover of riparian shrubs and trees to improve bank stability and stream shading. Methods used to improve fish habitat conditions, should be chosen based on the life history requirements of the fish species present or of concern.

Continue to eliminate or control active head-cuts, along with the necessary livestock management, in order to promote long-term, vegetative stabilization of these sites. Reduce soil erosion entering streams from adjacent, eroding banks and side-hills. Continue exploring options like supplying aspen to beaver, in order to heal and restore riparian habitat (picture 88-1).

Remove or modify, where needed, barriers to fish migrations. Small drop structures may still be used to stabilize banks, catch sediment and woody debris, raise or maintain water tables, and create pool habitat. Existing structures should be maintained if they are not a barrier to fish movements. Continue to plant riparian species to stabilize banks and increase overhead cover for shading.

Identify and correct problems with improved roads, which affect water flows and contribute soil erosion into streams and reservoirs. Two-track roads are too numerous to deal with as a whole; however, problem areas should identified and fixed or the road should be closed and reclaimed.

Implement vegetation treatments to restore plant communities and to increase base flows in streams to meet fish habitat objectives where appropriate. Promote composition of communities to maximize herbaceous cover and litter, and therefore, minimize surface runoff and soil erosion.

Weeds

1) Characterization:

Weeds, or invasive non-native plants, threaten natural ecosystems and greatly impact natural plant communities throughout the West. Ecologically, these invaders may threaten ecosystems. The reduction of light, water, nutrients, and space available to native species can change the hydrological patterns, soil chemistry, erodibility and may even change fire patterns on a localized basis (NPS ref). These invaders can reduce biodiversity, affect threatened and endangered species, change habitats and natural plant/animal

associations, and prevent native species from remaining or encroaching upon a site. Unlike many areas of the West, overall the Rawlins Field Office has a comparatively smaller weed problem than other areas in the Rocky Mountain region. The analysis area is relatively noxious weed free, with just small problem areas. The term ***noxious*** is a legal designation used specifically for plant species that have been determined to be major pests of agricultural ecosystems and are subject, by law, to certain restrictions. The U.S. Department of Agriculture regulates noxious weeds (NPS web). Within the analysis area, noxious species are predominantly found along roadways and other disturbed areas associated with oil and gas development, recreational use, and livestock grazing activities. Road building, development, grazing, fire suppression, and other activities can directly increase weed establishment and/or maintain their presence within the ecosystem.

The main noxious species present within the area are whitetop, saltcedar, houndstongue, musk thistle, and Russian knapweed. Other noxious species include yellow and Dalmation toadflax, plumeless thistle, Canada thistle, spotted knapweed, and burdock. There are also several non-native invasive species present which are normally restricted to disturbed areas. These include halogeton, Russian thistle, bull thistle, begonia dock, henbane, gumweed, annual goosefoot, mullein, and several annual mustards. Halogeton and henbane stand out in this group as being poisonous to livestock.

The following weed descriptions and associated photographs were taken from *Weeds of the West*, the authorization for which is in Appendix E. Whitetop is a deep-rooted perennial up to two feet tall, which reproduces from root segments and seeds (picture 89-1). It occurs on alkaline, disturbed soils along roads and the edge of meadows and irrigation ditches, and is highly competitive with other species. Saltcedar is a deciduous shrub introduced from Eurasia as an ornamental (picture 89-2). In many places it has become naturalized along streams and reservoirs and tends to form monocultures that limit biodiversity. Saltcedar can transpire up to 200 gallons of water per plant each day and can dry up ponds and streams. In addition, it brings large amounts of salt up from the soil and deposits it on the surface, thus rendering adjacent sites uninhabitable by native species. Houndstongue is a biennial that reproduces by seed (picture 89-3). It was also introduced from Europe. Like thistle, it forms a rosette the first year and a reproductive stalk the second year. It us usually found in pastures, roadsides and disturbed habitats. Houndstongue is toxic. Musk thistle is a biennial that was introduced from Europe and western Asia and is now widespread (picture 89-4). It occurs in pasture, range, and forest lands along roads and disturbed areas. In our area it is found between Savery and Battle Mountain. It spreads rapidly, forming dense stands, and can crowd out native forage. Russian knapweed is a poisonous perennial, and can also form dense colonies (picture 89-5). It is a native of Eurasia and is found throughout the West. It spreads by seeds and adventitious roots that can penetrate up to eight feet.

2) Issues and Key Questions:

The area is seeing an expansion of some of these species as new disturbances are continually being created. Appropriate reclamation practices slow the spread of weedy species. The main concern is to keep the noxious weeds from spreading into undisturbed rangeland from the initial sites of introduction along roadsides, well pads, pipelines, livestock water developments, hunter camps, and other disturbed areas. Are there adequate mitigation measures in place to address weed control in high priority development areas, and is enforcement of existing stipulations occurring? In addition, are rules concerning certified hay requirements appropriate for controlling livestock issues? Is livestock management adequate to keep weed species from encroaching into native rangelands? Is more direct action needed, especially in allotments where livestock movements are possibly increasing weed presence? Are high populations of wild horses reducing conditions of native rangelands, making them more susceptible to invasion by weed species? In the isolated cases where recreation is a factor in weed establishment, are adequate measures being taken to address this problem?

3) Current Conditions:

Weed locations are primarily restricted to disturbed areas associated with oil and gas development, recreational use, and livestock grazing activities such as water developments. Most noxious weed locations associated with manmade disturbances are being treated either by lease/ROW holders, Weed and Pest, or

BLM. There are only a few areas where the noxious weeds are spread throughout the native rangeland. These areas are being treated to contain the weeds where they are and try to avoid having them spread elsewhere by vehicle, equipment, or animal movements. Most improved roadways are being treated for noxious weeds. Oil and gas activity and recreation areas are being treated for noxious weeds and are the main source of weed introduction and spread. The increase in oil and gas activity will result in expansion of some of these species as development-related disturbance continues.

As stated earlier, the principal noxious species found within the analysis area include houndstongue, musk thistle, Russian knapweed, whitetop, and saltcedar. Houndstongue is primarily in the lower Savery Creek drainage, including Loco Creek (picture 90-1). It is a biennial plant, with a small sticky seed, which sticks to anything it touches and, therefore, is easily moved around by animals and people. Improved livestock management practices to increase native plant cover, along with chemicals and hand pulling are used to control this species. It is also showing up along disturbed roadsides. Musk thistle occurs in meadows and along highways and is spreading into adjacent native rangelands. It is being treated both chemically and biologically through the release of beetles whose larvae eat the developing seeds or mine out the roots. Russian knapweed and whitetop primarily occur in disturbed areas along roads in small spots. The knapweed is aggressively treated. At this time, saltcedar is not yet as significant a problem as it is in other parts of the state and the West. Saltcedar, or tamarisk, occurs along ephemeral drainages like Sand Creek and Shell Creek, in spots along Muddy Creek, and around reservoirs. It has not received much attention yet, but that is changing as it replaces native willows in riparian habitat. Spring livestock use appears to offer some control. The other common specie of interest is Canada thistle, which occurs in and along riparian habitat, and in some cases along roads. As long as the riparian habitat is being properly managed, Canada thistle is not expanding and just occupies the niche between the riparian and upland habitats. It is being treated along roads. Other species, which occur in very isolated patches, include spotted knapweed (along the highway ROW), yellow and Dalmation toadflax, plumeless thistle and burdock. Other noxious species in the watershed occur only on private lands. These are leafy spurge and perennial pepperweed. These species are currently associated with the Little Snake River corridor, but the spurge can occur in all habitats and will need to be closely monitored.

The two invasive, non-native species of concern are halogeton and black henbane. Halogeton is widespread throughout the oil and gas areas, lining roadways and in some cases dominating inadequately reclaimed sites (picture 90-2). It is also invading into nearby native rangelands on shale and saline upland sites in the Sand Creek allotment from untreated oil and gas roads. Halogeton is poisonous and in the past caused sheep losses due to its prevalence in certain areas. Since the sheep numbers have declined, fewer losses due to halogeton poisoning have occurred. However, it is still a high priority for control along trail routes and in the remaining sheep allotments. It often provides lush forage along roads due to the late summer flowering habit and added moisture from road runoff (picture 90-3). Halogeton has also been known to kill cattle. Although it is a stipulation on oil and gas APDs and ROWs to treat and control weed species, in many cases this is not occurring, particularly in the winter sheep allotments west of Highway 789 (picture 90-4). Black henbane is also poisonous and can expand rapidly in disturbed areas, so it is targeted for treatment, primarily along disturbed roads (picture 90-5). Most non-native invasive species, including halogeton, are not treated unless they are interfering with reclamation of disturbances or are a fire hazard around well locations.

Specific areas within the analysis area with noxious weeds and the status of treatment are as follows:

- ✓ Powder Rim Road, by Powder Mountain: henbane—being treated
- ✓ Moonshine Springs: saltcedar—been treated
- ✓ Road paralleling Powder Rim to north: Russian knapweed, one patch—being treated
- ✓ Hangout Road: houndstongue and henbane—being treated, but still expanding
- ✓ Sand Creek & Willow Creek: saltcedar—expanding, not treated
- ✓ Robber Gulch/Blue Gap area Reservoirs: saltcedar—expanding, being treated
- ✓ Wamsutter/Dad road (Carbon County 701): whitetop—mostly not treated
- ✓ Standard Road, most gas field roads: whitetop—mostly not treated; isolated patches of Russian knapweed and saltcedar—treated as found

- ✓ North Barrel Springs, Barrel Springs, South Barrel Springs, Shallow Creek, Windmill Draw: whitetop along roads and down drainages in rangeland—mostly not treated except some along roads
- ✓ Highway 789: scattered patches of Russian and potted knapweeds in ROW—treated as found
- ✓ Gas field in Smiley Draw and along Wild Horse Road 3309: houndstongue, bull thistle, Russian knapweed—being treated
- ✓ Highway 70 ROW: musk thistle, scattered small patches of Dalmatian toadflax, whitetop, perennial pepperweed--treated as found
- ✓ Baggs/Dixon/Savery area: perennial pepperweed, leafy spurge, musk thistle mostly private lands—some treatments are ongoing
- ✓ Oil field north of Savery & Carbon county 501: henbane, houndstongue, yellow toadflax, whitetop—County ROW treated only
- ✓ Savery Creek/Loco Creek/Carbon County 561: houndstongue, bull thistle, plumeless thistle, mullein—Some areas treated along Loco Creek, most private land is not treated
- ✓ Battle Creek south of Battle Mountain: houndstongue, bull thistle, musk thistle, burdock, whitetop—some areas started treatment 2002, not completely inventoried
- ✓ Rendle Rim Road/Canary Grove 3308/McCarty Canyon Carbon County 503—mostly ROW: henbane, whitetop, houndstongue—areas treated as found

A significant portion of the watershed has not been inventoried for weeds, but it is assumed that unless there are disturbances, there probably are not any weedy species present. General range condition is good to excellent, with good vigor and cover of native species. Most non-native invasive species are not treated unless they are interfering with reclamation of disturbance. As native vegetation is reestablished, many of the non-native invasive species will be crowded out. The species of long-term concern within the assessment area are the noxious species and halogeton.

4) Reference Conditions:

"Early European settlers in North America inadvertently brought weed seeds with them, perhaps in the hay they brought for their animals or in the dirt they used as ballast for their ships, or even in their clothes or bedding. Some activities, such as clearing the land, opened up niches that created places for weeds to grow. Settlers also purposely brought plants from their 'home country' to reseed areas, make dye for clothing and use as ornamental plants. Some of these non-native plants became invasive, reducing the diversity and quantity of native plants. Weeds are continuing to spread rapidly in many areas across the country. Weeds spread to an estimated 4,000 acres each day on public lands managed by the BLM and Forest Service" (BLM Noxious Weed Webpage).

For the most part, this assessment area has been weed-free until relatively recent disturbances by man over the past 50 or 60 years. Petroleum development, especially in the western portion, has greatly increased noxious and invasive non-native species introduction. The advent of motorized travel and subsequent increasing miles of road have resulted in the spread of weedy species. Settlers along riparian corridors have historically impacted these areas by clearing the land, irrigation, and overall human presence-associated disturbances. These areas also tended to have higher concentrations of livestock, especially historically, when riparian systems were "sacrifice areas" and did not receive the management attention that they do currently.

5) Syntheses and Interpretation:

The highest priorities for treatment are the aggressive weed species, such as musk thistle, Russian knapweed, and leafy spurge, which are able to spread throughout stable native plant communities. These are promptly treated and monitored, and are not specifically related to livestock grazing. Where livestock grazing is contributing to the invasion or expansion of weed species, then management must be changed, as in what happened in the Morgan Boyer allotment containing Loco Creek.

Due to BLM's multiple use philosophy, oil and gas development will continue to occur and provide increasing areas for sites of additional weed establishment (picture 91-1). Mitigative practices to control these noxious weeds will continue to be necessary. In addition, the presence of roads and their associated maintenance will also continue to provide additional weed areas. Some annual weed species are initially beneficial in terms of providing cover on reclaimed pads and pipelines that trap snow, reduce runoff, and shade young perennial grasses. However, these species should not continue to be the dominant species several years and beyond after reclamation has occurred.

Some areas have weed problems that are spread by animals, people and vehicles. The highest priority areas related to livestock grazing include Baggs, Dixon, Savery, and eastward. The species involved are musk thistle, Canada thistle, houndstongue, leafy spurge, perennial pepperweed, plumeless thistle, and burdock. These are either eaten or physically spread by livestock movements.

6) Recommendations:

Due to the existing good condition of native vegetation and the weed treatment program in place to control and/or eradicate weed problem areas as they are identified, it is determined that the majority of Upper Muddy Creek watershed is meeting Standard #4 with respect to weeds. There are no known areas of noxious weeds that are rapidly expanding and are not being treated. Although saltcedar is not yet being treated on a broad scale, it does not appear to be rapidly spreading to new locations. The few locations that do not meet Standard #4-Weeds are sites containing halogeton in Sand Creek allotment where the weed is invading native rangelands as a result of oil and gas road development and is not being treated. These areas affect approximately 50 acres. The following recommendations would expand upon the success already achieved and help to meet desired resource conditions in the future.

Continue inventory and treatment efforts in the area to identify and contain or eradicate noxious weeds. Continue to work with ROW/lease holders in their treatment of weedy species, as well as work with landowners on concurrent treatments with private lands. Enforcement of stipulations on APDs/ROWs to control weeds must occur. Most importantly, reduce disturbance due to development as much as possible, thereby reducing weed spread potential.

Continue to implement "best management practices" for livestock grazing to maintain or improve the health of rangeland plant communities so that fewer opportunities for weed invasion or expansion exist.

The BLM must maintain wild horse populations within appropriate management levels. Current high numbers of wild horses reduce plant vigor and cover, and may lead to expansion of weed species in native rangelands within the Adobe Town herd management area.

Identify non-native weed species that need to be treated throughout the assessment area. Although they are not a major focus for treatment, they can be a significant problem within localized areas.

Address road maintenance equipment movement procedures to address the spread of noxious weeds from/to other areas. Procedures such as cleaning equipment from one site to the next, minimizing disturbance of native vegetation, and prompt reseeding after construction are important.

Continue to support a certified weed-free hay program for those recreational and livestock grazing users that bring in livestock and hay from other areas. In addition, there may be a need to address livestock movement from pasture to pasture to curtail weed spread within an allotment. There may also be a need to monitor livestock shipped into the area from other states, a potential source of noxious weeds.

Continue to support a certified weed-free seed and mulch program for reclamation of disturbed lands.