

Air, Watershed, and Aquatic Resources

2.1 Air

Area of Analysis

The characterization of air resources is oriented towards the conditions above GMUG National Forest lands but those conditions are affected by activities within the region and beyond. Air and various air-borne emissions know no surface area boundaries.

Condition and Trend

Air resource management is focused on compliance with National Ambient Air Quality Standards and related air quality values (e.g., visibility). Air quality standards are broken into different classes. For the GMUG, airsheds are designated as either Class I or Class II. Three Wilderness areas with NFS lands on the GMUG (West Elk Wilderness, LaGarita Wilderness, and the Maroon Bells-Snowmass Wilderness) are all managed as Class I airsheds with the highest standards for air quality. The Black Canyon of the Gunnison National Park adjacent to the GMUG near Montrose, Colorado, is also managed as a Class I airshed. The other airsheds of the GMUG are managed as Class II areas.

There are no locations within the geographic scope of the GMUG that are listed by the State of Colorado as non-attainment areas with regard to air quality standards. The Telluride area was listed as a non-attainment area, but now has been re-designated as in attainment after restrictions and control of particulate emissions were successfully implemented.

Air quality is affected by activities both on the GMUG and emissions from other activities and areas in both the Rocky Mountain and Colorado Plateau region. Smoke from both wildfire and prescribed burns; dust from road construction, maintenance, and use; emissions from vehicle and equipment use; agricultural activities; and methane venting from coal mining on the GMUG all affect air quality. None of these emissions have reached levels that have demonstrated non-attainment conditions on the GMUG.

The National Ambient Air Quality Standards established by the EPA are human health-based standards looking at levels of six pollutants – carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. Monitoring of nitrogen dioxide deposition in Alpine areas is occurring in the San Juan Mountains (Waterfall Canyon, near Telluride) and some lake water chemistry monitoring has occurred within the West Elks Wilderness and Raggeds Wilderness areas (Class I areas) to determine if there is pollutant deposition. Evaluation of monitoring data for these high elevation areas has not indicated any recognizable trends associated with air quality.

Visibility is an important aspect of air resources; while not an air quality standard, it does provide an indicator of pollutants in the air. The Forest Service has conducted limited visibility monitoring using camera images in the West Elks Wilderness (1992 to 1996) and the LaGarita Wilderness (1997 to 2001) to document visibility conditions in those Class I areas. The LaGarita site showed a uniform haze during more than 70 percent of the sampling period.

Methane is a recognized greenhouse gas but is not a pollutant under the EPA air quality standards. There has been an increased need to vent methane from coal mines in the North Fork Valley. Since 2001, there have been numerous venting wells drilled in the area and one coal mine near Summerset, Colorado, vents an estimated 4.9 to 6.9 billion cubic feet of methane gas per year, which represents about 0.03 percent of the total United States greenhouse gas emissions (Forest Service, 2002). The Mineral Leasing Act of 1920 that regulates these coal mining operations does not allow operators of federal coal leases to capture gas (methane) resources for economic purposes so there is no indication that venting of methane for mine safety reasons will be reduced in the near future through capture or energy production.

Desired Conditions

Maintain Class I air quality conditions for those designated areas on the GMUG. Do not allow on-forest activities to elevate emissions to levels of non-attainment for the Class II areas.

Coordinate with local, regional, and State interests to resolve regional air quality emission issues that may influence air quality and visibility on the GMUG.

Management Implications

Fuels management projects that rely on burning would need to incorporate air quality management practices with regards to timing and atmospheric conditions to minimize particulate emissions.

Need for greater involvement in regional planning review of large-scale emission sources, such as coal-fired power generation plants.

Condition Gap

Currently there is not a gap between the desired conditions for air quality and air resource management and existing conditions.

Risks to Achieving Desired Conditions

Wildfire, because of its unpredictable and unplanned timing, is the greatest threat to air quality on the GMUG.

Increasing urbanization of communities surrounding the GMUG has the potential to increase fossil-fuel emissions related to increased vehicle trips and traffic.

Development of coal-fired power generation plants within the region could increase emissions that would further impact visibility or cause impacts on high elevation receptors, such as sensitive alpine vegetation, lakes, and streams in the Wilderness areas on the GMUG.

Need for Change

There is no identified need for change from the current Forest Plan regarding air resource management.

Performance Measures

- Non-attainment conditions
- Source emissions
- Visibility ratings

2.2 Forest-wide Water and Aquatic Resources

Area of Analysis

The characterization of water and aquatic resources is based only upon lands within the proclaimed boundaries of the GMUG National Forest.

Condition and Trend

Approximately 2.8 million acre-feet of runoff is generated annually from the GMUG, supporting approximately 3,600 miles of perennial streams and supplying about 11,650 surface acres of lakes and reservoirs. Water yield from the Forest provides water for both surface and groundwater drinking sources, a large number of agricultural and recreational uses, and supports cool and cold-water fisheries including rainbow, brown, brook, and Colorado River cutthroat trout (CRCT). The Colorado Department of Public Health and Environment (CDPHE) includes all of those as classified beneficial uses and has established water quality guidance to protect them. The Forest has a variety of forested and non-forested riparian areas and wetlands (approximately 100,000 acres total) and additional acreage associated with lakes and reservoirs occurring over a wide range of ecological settings.

The most prominent values sustained by water originating on the GMUG include drinking and agricultural water supplies, as well as aquatic threatened, endangered, and sensitive species (TES). Thirty-two surface water and 84 groundwater drinking water systems are supplied by runoff generated on the GMUG. Those providers serve a combined population of approximately 175,000. There are approximately 1,600 surface water rights (direct withdrawals and reservoirs) within the GMUG boundaries. Aquatic TES species on or near the Forest include Colorado River cutthroat trout, roundtail chub, bluehead sucker, and boreal toad. The GMUG provides most of the available habitat for CRCT and boreal toad in southwestern Colorado and, therefore, plays a key role in recovery efforts. There are also seven sensitive plant species on the Forest that are dependent on water related habitats, primarily wetlands and/or fens.

Aquatic conditions and water quality are generally excellent based on the support of classified uses and attainment of numeric and narrative water quality standards established by the CDPHE. However, the State of Colorado has identified 11 stream segments totaling approximately 43 miles within the GMUG that do not meet water quality standards due to metal concentrations related to historic mining activities.

Overall physical watershed condition and trend on the GMUG are inferred by combining elements related to physical sensitivity and management activities into physical integrity class ratings. The methodology and complete results are available in Chapter 5 of the GMUG NF Comprehensive Assessment of Watershed and Aquatic Resources (USDA Forest Service, 2005).

In summary, the ratings are based on the premise that a high degree of physical integrity is defined by an absence or limited amount of human activity (see Figure 2.2.A.). The integrity class ratings are not considered absolutes, but serve as an indicator of the likelihood of systems being within the historic range of variation. Watersheds with high integrity ratings (Class I) are considered to be functioning within a long-term range of

historic variability. Low ratings (Class IV) do not imply the entire sub-watershed or stream network is in poor condition, but rather where local upland, riparian, or stream reach degradation is more likely. The ratings greatest utility will be aiding in the evaluation of project proposals and in defining watershed and fisheries program area priorities. The proportion of the total area within GMUG NF boundaries in each class is as follows: I = 30 percent, II = 40 percent, III = 17 percent and IV = 13 percent.

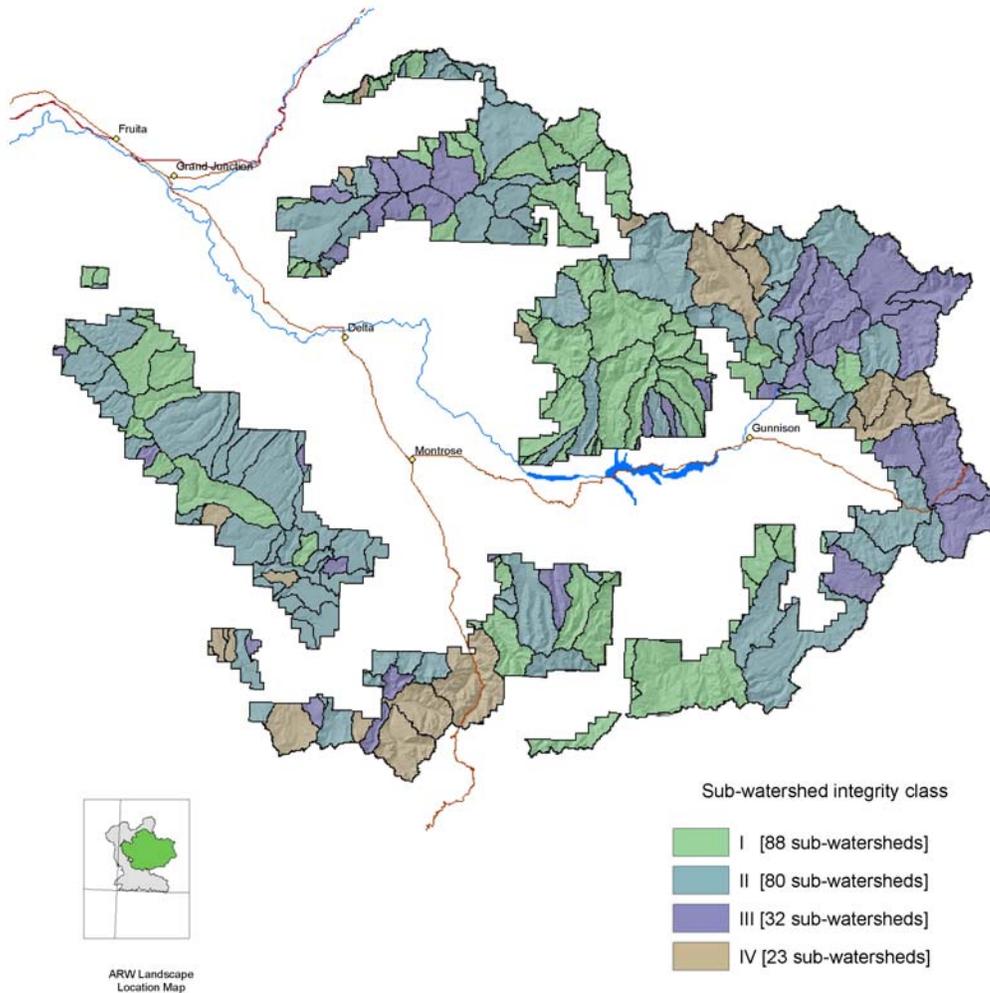


Figure 2.2.A. GMUG NF sub-watershed physical integrity rating classes.

Because aquatic integrity depends on physical integrity, we believe those results generally suggest the likelihood of aquatic condition and trend as well. Watersheds with high aquatic integrity include well-connected high quality water and habitats supporting a diverse assemblage of native and desirable non-native species.

This section addresses general Forest-wide plan direction needs for soil and water resources. Two separate sections address key program area needs (Reference Watersheds

and Restoration); while three other watershed related values merit more detailed guidance (Riparian & Wetland Resources, Aquatic TES, and Public Drinking Water Supplies).

Desired Conditions

Healthy watersheds (upland soils, riparian, channel, and groundwater components) that include productive and stable soils provide for absorption of precipitation and attenuation of runoff so streams are in dynamic equilibrium with their channels and floodplains, and are resilient to normal flood and drought events. Robust stream health provides water of sufficient quantity, quality, and timing to meet the needs of classified uses and habitat capable of supporting an abundance and diversity of aquatic, riparian, and wetland associated species.

Where those conditions do not occur, both passive and active restoration is used to improve them. Watershed Condition Classes are maintained or improved, and water quality of listed 303(d) streams improving.

Appropriate protection of in-stream flow and lake level dependent values is provided. Reference watershed catchments are established to determine reference conditions and monitor trends.

Management Implications

Review and adjust, as needed, current Forest Plan guidance to ensure the following elements are addressed:

General

Management activities are planned and implemented to maintain or improve conditions to support aquatic resources.

Improve stream segments that are not fully functional (PFC standard) or achieving robust stream health.

Forest in-stream flow needs should be addressed during evaluation of new water development proposals or re-issuing water development related special-use authorizations.

The ecological importance of riparian areas and wetlands require specific guidance. The spatial location and extent can be estimated, but narrative definition for project level validation or identification is needed.

Fens or springs of special conservation or botanical interest are identified and protected as Special Interest Areas (Theme 2).

Guidance for selected aquatic TES will apply where populations occur or where populations are subsequently identified during further inventory.

Specific guidance for maintaining reliable drinking water supplies will be developed.

The sub-watershed physical sensitivity and integrity classes, together with existing or potential values, will be used to guide evaluation of project proposals, determine program area emphasis, and restoration priorities.

By Integrity Class

Integrity Class I

- Evaluate potential for reference watersheds
- Management direction should emphasize natural processes
- New activities should not compromise natural hydrologic processes

Integrity Class II

- Generally suitable for active management

Integrity Class III

- New activities require more detailed analysis to assess current and cumulative effects to demonstrate integrity is maintained or improved

Integrity Class IV

- New activities require more detailed analysis to assess current and cumulative effects to demonstrate integrity is improved
- New activities shall not delay/inhibit improvement and may require prior restoration
- Restoration potential may be limited by existing private rights or ownership

Biophysical Gap

Integrity Class I

- Highest probability of physical and aquatic conditions being within natural ranges determined by inherent capabilities
- Least likely to have reach specific sediment related water quality degradation

Integrity Class II

- Low probability of physical and aquatic conditions being outside the natural range determined by inherent capabilities
- Low probability of reach specific sediment related water quality degradation

Integrity Class III

- Intermediate probability of physical and aquatic conditions being outside the natural range determined by inherent capabilities
- Intermediate probability of reach specific sediment related water quality degradation

Integrity Class IV

- Greatest probability of physical and aquatic conditions being outside the natural range determined by inherent capabilities
- Greatest probability of reach specific sediment related water quality degradation
- Currently listed 303d segments do not meet CDPHE numeric standards

Procedural Gap

The derived physical integrity ratings include uncertainty and will require some degree of ground-verification to determine strengths and weaknesses.

Desired conditions are not described or need updating in the current Forest Plan.

Current Forest Plan lacks Region 2 Watershed Conservation Practices (BMPs).

Current Forest Plan lacks guidance or requires updating regarding riparian and wetland resources, as well as in-stream flow needs.

Current Forest Plan lacks guidance or framework for addressing restoration needs and priorities.

Current Forest Plan lacks provisions for reference watersheds.

Risks to Achieving Desired Conditions

The lack of intensive or active management inherent to Management Themes 1 through 3 eliminates or minimizes use related risks to watershed and aquatic resources. From that perspective, Management Themes 1 through 3 are most consistent with the overall desired conditions. However, because of the emphasis on natural processes, there is greater risk of large or intensive fire, insect, or disease outbreaks with potential deleterious affects.

The introduction or expansion of non-native species.

Extent or severity of natural disturbances (flood, drought, fire, etc.).

Development of pre-existing development rights (mineral development, conditional water rights).

Ability to fund program area needs.

Need for Change

Integrity ratings alone do not suggest a need for change in land management emphasis (management area or theme designations) or suitable uses (suitability).

Although uncertainty remains, advances in our knowledge have occurred since the 1991 Forest Plan amendment which can be incorporated to maintain or improve overall watershed condition, aquatic TES populations, riparian and wetland resources, and public water supplies.

Performance Measures

- Changes to State 303(d) and Monitoring/Evaluation Listings
- Distribution and trend of Watershed Condition Classes as defined in FSM 2521.1
- Compare Integrity Rating modeling results to field verified physical conditions
- Results of field based assessments (potentially including Stream Health, PFC, BMP reviews, and Rangeland Health)

2.2.1 Aquatic Species of Concern

2.2.1.1 Colorado River Cutthroat Trout

Area of Analysis

The GMUG NF falls within the Gunnison, Dolores, and Upper Colorado River (Plateau Creek drainage) Geographic Management Units (GMU) identified in the *Conservation Agreement for Colorado River Cutthroat Trout in the States of Colorado, Utah, and Wyoming (CAS)*. Data presented and conclusions drawn in this Comprehensive Evaluation Report (CER) only applies to watersheds and/or streams administered by the GMUG in these GMUs unless otherwise specified.

Condition and Trend

Background

Colorado River cutthroat trout - CRCT (*Oncorhynchus clarki pleuriticus*) historically occupied portions of the Colorado River drainage in Wyoming, Colorado, Utah, Arizona, and New Mexico (Behnke 1992). Today the species is believed to occupy less than five percent of its historic range and is often isolated in small headwater streams. Colorado River cutthroat trout is classified as sensitive by the Rocky Mountain Region of the Forest Service (Region 2) and a species of concern by the State of Colorado. A CRCT assessment for the GMUG is available as part of the 2005 Management Indicator Species (MIS) Forest Plan Amendment (James and Speas, 2005). This assessment provides detailed information concerning CRCT biology and management status. A summary and key findings from that assessment are provided below.

In 2001, an assessment detailing the status of CRCT populations and habitat was completed by various state and Federal agencies. The document, entitled *The Conservation Agreement for Colorado River Cutthroat Trout in the States of Colorado, Utah, and Wyoming (CAS)*, provides a comprehensive and strategic plan for maintaining the viability of CRCT across the species natural range. The Plan identifies population and habitat objectives for 15 Geographic Management Units (GMU) across the historic distribution of CRCT in Colorado, Utah, and Wyoming. Streams on the GMUG support nearly all the known populations in the Gunnison GMU and some of the known populations in the Dolores and Upper Colorado River GMU (Plateau Creek drainage).

Existing CRCT Populations

In 2004, a management and accomplishment report was prepared summarizing work accomplished in the years 1999-2003 by members of CAS (CAS 2004). The number and miles of streams occupied by CRCT increased substantially in the Colorado and Gunnison GMU from 1998 to 2003 (Table 2.2.1.1.A.). This increase was largely due to the discovery of new CRCT populations through extensive inventory work conducted by State and Forest Service biologists during this period. While significant progress has been made, objectives identified in the CAS for the number and miles/acres of occupied streams have not been attained.

Table 2.2.1.1.A. Comparison of the number and miles/acres of CRCT Conservation populations in GMU in which the GMUG NF has ownership – 1998 versus 2003.

GMU	1998				2003			
	Stream (#)	Stream (mi)	Lake (#)	Lake (ac.)	Stream (#)	Stream (mi.)	Lake (#)	Lake (ac.)
Upper Colorado	47	107	7	171	75	184	19	234
Dolores	3	2.5	0	Na	4	9	0	Na
Gunnison	3	10	0	Na	21	84	2	75

The CAS established an objective of two meta-populations per GMU. Only two meta-populations are known or suspected to exist in the three GMUs in which the GMUG has ownership (Table 2.2.1.1.B.). Of these two, only one occurs on the GMUG and is located in the Upper Muddy Creek watershed on the Paonia Ranger District. However, more recent data indicates the Upper Muddy Creek populations may not meet the meta-population definition in the CAS (five subpopulations (streams) that are connected).

Table 2.2.1.1.B. Frequency of CRCT Conservation populations with adult abundance (>150 mm) and the number of identified meta-populations in GMU in which GMUG has ownership (2003).

GMU	Abundance of CRCT populations				Number of meta-populations (5 or more)	Number of meta-populations (2-4)
	0-100	101-499	500-999	>1000		
Colorado	18	32	16	8	1	3
Dolores	2	1	0	0	0	0
Gunnison	2	5	3	1	1	2

Genetic status has been determined on 27 of the 32 known populations on the GMUG. Twenty-two of these populations are considered core Colorado River cutthroat trout populations with less than one percent genetic influence from other cutthroat subspecies (i.e., Yellowstone) or rainbow trout. Four populations are slightly hybridized with other salmonids and five populations are unknown.

Quantitative population sampling has been conducted on 23 of the 32 streams containing conservation populations occurring on the Forest. Nine populations (29 percent) have 100 or fewer adult fish, 13 (42 percent) have 100-499 adult fish, none have 500-1000 fish, and only one population (three percent) have more than 1000 adult fish. The data indicate that the majority of conservation populations have fewer than 500 adults (71 percent) and largely occur in headwater streams.

Conservation populations occur in 22 catchments (7th field HUC) on the GMUG (Figure 2.2.1.1.A.). Two additional populations exist on public lands adjacent to the GMUG. Conservation populations are restricted to approximately 96 miles of stream, with most populations occurring in tributaries of the North Fork of the Gunnison River. The GMUG supports 27 percent of the known CRCT conservation populations in the Colorado, Dolores, and Gunnison GMUs. Populations occur in streams ranging from two to four miles in length. Two CRCT conservation populations have been established in lakes totaling approximately 75 surface acres on the Grand Mesa; however, severe

drought and dam reconstruction have likely resulted in the loss or decline of these populations.

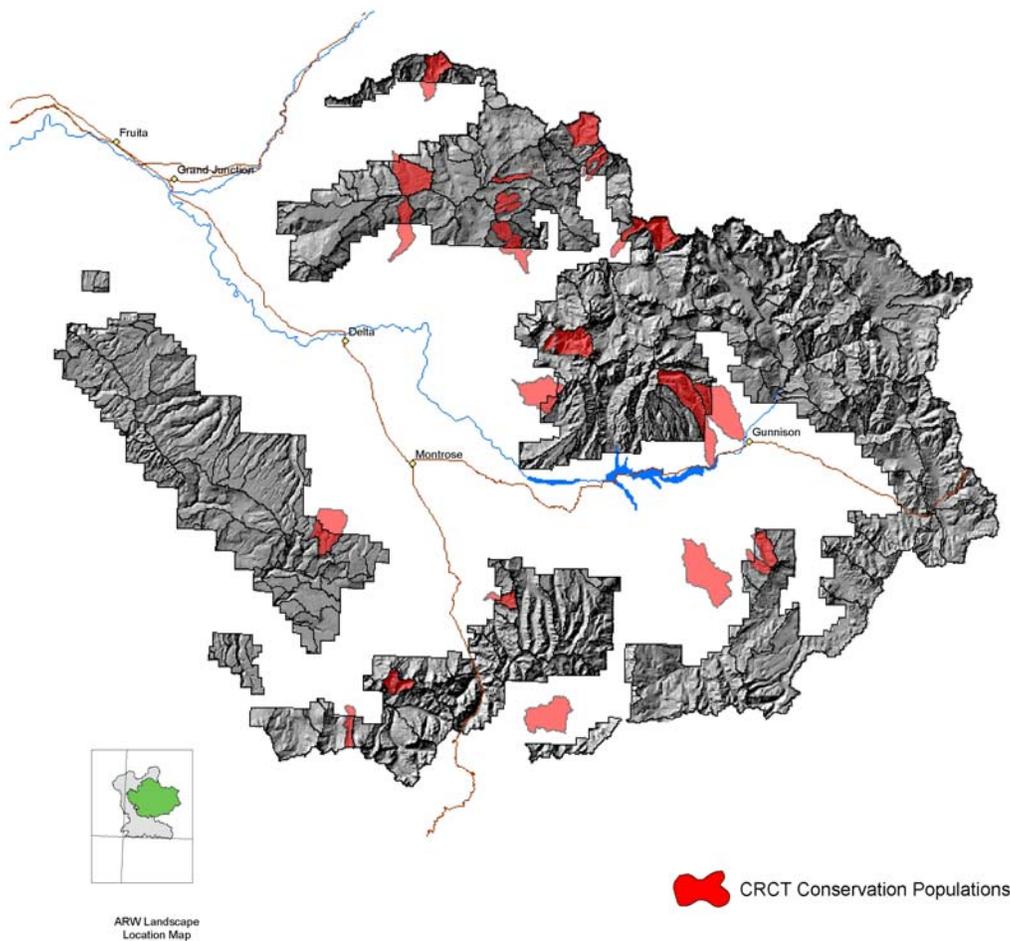


Figure 2.2.1.1.A. Seventh-level sub-watersheds currently supporting conservation populations of CRCT.

Twenty-seven of 32 (87 percent) known conservation populations occur in integrity class I (15 populations) or II (12 populations) sub-watersheds. All of the populations with 100 or more adults occur in Integrity Class I or II sub-watersheds. Three populations are in Integrity Class III and one population in Integrity Class IV. The occurrence of the majority of the known conservation populations in high integrity sub-watersheds is not surprising since CRCT are known to be sensitive to habitat changes resulting from land management activities (Binns 1977, Oberholtzer 1987, Jespersion 1981, and Quinlan 1980). In addition, 61 miles (64 percent) of occupied habitat occur in Class I watersheds, 21 miles (22 percent) in Class II, ten miles (ten percent) in Class III, and four miles (four percent) in Class IV.

Potential Expansion of CRCT populations

Population and distribution goals and objectives described in the CAS have not been attained in the Colorado, Dolores, or Gunnison GMUs. The GMUG is a key player in attainment of these goals, particularly in providing high quality habitat and in re-

establishment of meta-populations in cooperation with CDOW. Several streams have been identified by CDOW and Forest Service biologists as having the greatest potential to expand CRCT populations (James and Speas, 2005). This list is not intended to be an exhaustive list of potential expansion sites and is subject to change as additional information is made available. Watersheds included are a combination of 7th and 6th level HUCs where expansion of existing populations to connect them to other existing populations is technically feasible. Five of the proposed expansion watersheds are in the Gunnison GMU and two watersheds occur in the Dolores GMU (Figure 2.2.1.1.B.). All seven potential expansion areas are in sub-watershed integrity Class I or II.

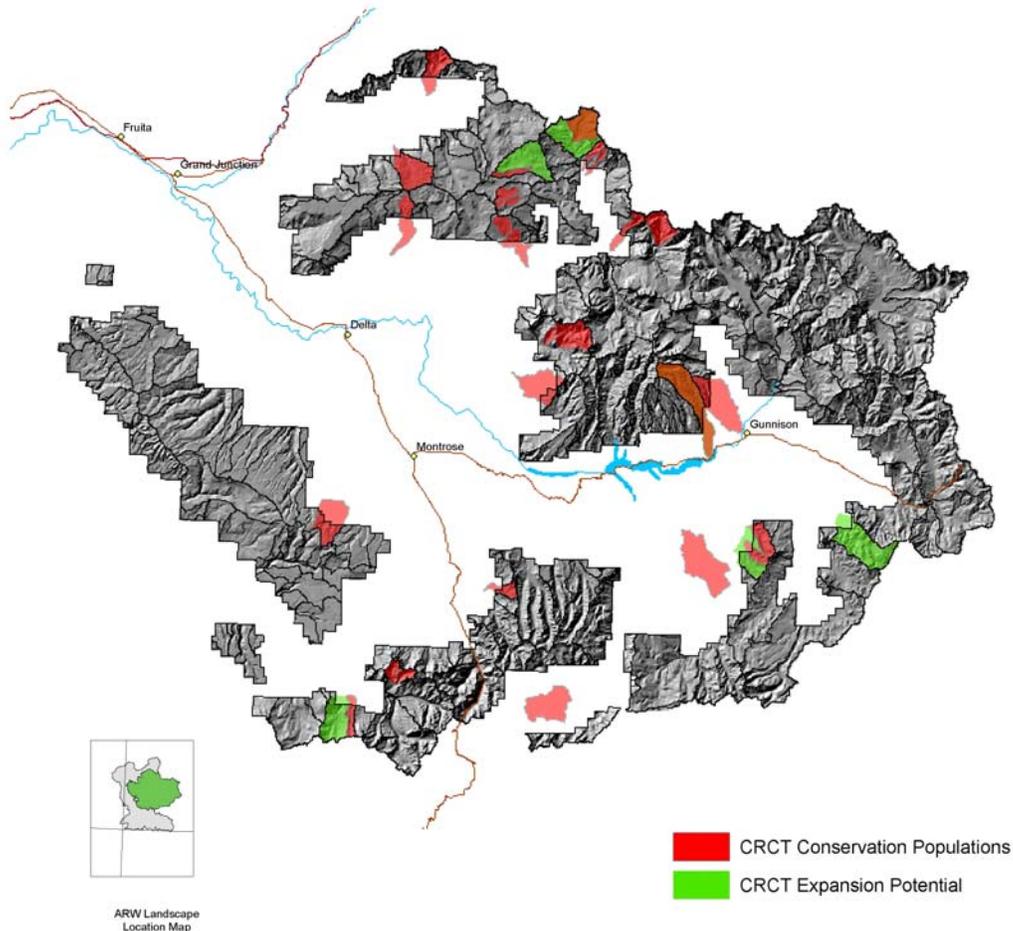


Figure 2.2.1.1.B. Subwatersheds currently supporting conservation populations of CRCT and watersheds where expansion of CRCT may be feasible to establish meta-populations.

Desired Conditions

The CAS establishes the following goals for management and conservation of CRCT:

- To maintain or, where appropriate, improve watershed and instream habitat conditions currently supporting abundant CRCT and manage other areas to increase their abundance,

- To maintain genetic diversity of the species, and
- To increase the distribution of CRCT where ecologically and economically feasible.

Desired conditions for watersheds/streams currently supporting CRCT or areas identified for CRCT reintroduction and expansion:

- Maintain watersheds determined to be in good ecological health so that they continue to support CRCT populations.
- Watersheds determined to be potentially “at risk” because of past or current management activities will be assessed and causes of degradation identified. Factors considered are water quality, instream habitat, channel morphology, riparian areas, and population stability.
- In cooperation with CDOW, protect and maintain existing CRCT populations and seek opportunities to expand populations where ecologically and economically feasible. Maintaining existing populations includes the number, distribution, and genetic purity of CRCT on the GMUG. Expansion of existing populations will assist the GMUG and CDOW toward achieving establishment of two meta-populations per GMU as required by the CAS.

Management Implications

Review and adjust, as needed, current Forest Plan guidance to ensure the following elements are addressed:

General

Management actions will be planned and implemented to maintain or restore high quality CRCT habitat (robust stream health).

Reaches or stream segments supporting CRCT should be priorities for providing appropriate in-stream flow and lake level protection.

New water development proposals should demonstrate a high level of population and habitat protection within the immediate sub-watershed (6th field HUC) supporting a CRCT population.

By Integrity Class

Integrity Class I and II

- In Class I and II sub-watersheds, management should focus on maintaining and/or improving instream flows, riparian vegetation, and stream morphology needed to support healthy populations of CRCT. Future land management activities in these watersheds, particularly Class I, should be carefully assessed to determine long-term impacts to the sustainability of CRCT. Only those activities determined to be compatible with the goals and objectives of the CAS and maintain high quality habitat or improve degraded habitat or watershed function should be allowed.

Specific considerations include:

- During project level evaluation, determined whether or not the project is compatible with the goals and objectives of the CAS and maintains high quality instream habitat or watershed function.
- Localized areas of existing management-induced degradation should be evaluated and restored to provide high quality aquatic habitat and properly functioning watersheds.
- Evaluate potential for reference conditions with an emphasis on Class I watersheds.
- Incorporate results of the stream/riparian driver analysis recently completed under the auspicious of the Aquatic Riparian and Wetland Assessment completed for the GMUG. These data plus other empirical data will be used to evaluate instream and watershed capability to support CRCT populations.

Integrity Class III and IV

- In Class III and IV watersheds, management should focus on maintenance and/or improvement of stream flows, riparian vegetation, and stream morphology needed to rebuild CRCT populations.
- Sustain status of existing native species and their habitat.
- New land-use activities require more detailed analysis to assess site-specific and cumulative effects to determine compatibility with recovery efforts for CRCT.
- New activities should not delay attainment of robust stream health conditions.

Procedural Gap

There are no explicit Desired Conditions in the current Plan for CRCT.

Region 2 Watershed Conservation Practices handbook has not been incorporated into the Forest Plan.

Management direction identified in the CRCT Conservation Agreement and Strategy (CAS) has not been incorporated into the Forest Plan.

Management responsibility for fish and wildlife populations is primarily a responsibility of the State and, therefore, implementation of the CAS must be carried out in cooperation with CDOW.

Biological Gap

Objectives for miles and acres of occupied habitat and establishment of meta-populations in the Gunnison, Dolores, and Upper Colorado River have not been achieved.

Full implementation of the CAS will reduce the likelihood of listing under the Endangered Species Act.

Risks to Achieving Desired Conditions

Non-native trout species impacts have been well documented to have a significant affect on distribution, abundance, and genetic integrity of CRCT. To achieve population

objectives, non-native trout will have to be removed from targeted streams prior to re-introduction of CRCT. These tasks are primarily the responsibility of CDOW.

Transmission of whirling disease to wild cutthroat trout populations through hatchery-based fish stocking is recognized as a potential threat to local CRCT populations.

Extent and severity of natural disturbances potentially affecting CRCT sub-watershed integrity.

Development of conditional water rights on CRCT streams.

Ability to fund program needs.

Need for Change

Development of habitat and populations guidance to achieve goals and objectives in CAS.

Integration of the Region 2 Watershed Conservation Practices (WCP) Handbook into the revised Forest Plan.

Develop additional guidelines for land management activities, beyond WCP, if deemed necessary to achieve CAS goals and objectives.

Performance Measures

- Miles of stream or acres occupied by conservation populations of CRCT
- Number of interconnected sub-populations (streams) to form meta-populations
- Miles of occupied CRCT streams in a robust stream health

2.2.1.2 Boreal toad

Area of Analysis

The Southern Rocky Mountain Populations (SRMP) of boreal toad, which extends from the mountains of southeastern Wyoming to the San Juan Mountains in northern New Mexico. The GMUG National Forest contains historic and currently occupied habitat for boreal toad.

Condition and Trend

A complete description of the biology, habitat requirements, and status of boreal toad (*bufo boreas boreas*) is described in Loeffler (2001) and Keinath and McGee (2005). A summary of their information is presented below. Forest-level information is included in the discussion as appropriate.

The boreal toad was once widely distributed in 11 geographic areas/mountain ranges across the Rocky Mountain Region from the mountains of southeastern Wyoming to the San Juan Mountains in northern New Mexico. Over the past 25 years boreal toad populations have decreased dramatically, so much so that the Fish and Wildlife Service (FWS) in 1995 designated the SRMP a candidate for Federal listing. Subsequent reviews by FWS found the toad warranted for listing, but it is currently precluded due to a backlog of species listing actions of higher priority. Through a legal settlement, the FWS agreed to decide to list boreal toad by September 2005. Boreal toad is also considered to be sensitive by Region 2 of the Forest Service and endangered by the State of Colorado.

In 1994, a multi-agency Boreal Toad Recovery Team (BTRT) was established to provide coordinated recommendations on the conservation and management of boreal toad. The first Conservation Plan completed by this group was done in 1994. Subsequent additions to the Plan have been completed since 1994, with the most recent completed in 2001 with an accompanying agreement signed by participating groups, including the Rocky Mountain Region of the Forest Service (Loeffler 2001).

The BTRT Conservation Plan (Conservation Plan) established recovery objectives before they can be de-listed in the State of Colorado. Criteria established for de-listing are:

There must be at least two viable breeding populations of boreal toad in each of at least nine of the eleven areas/mountain ranges, and State-wide there must be at least 25 viable breeding populations. The BTRT Plan also provides criteria to determine whether or not a population is viable.

Geographic areas/mountain ranges on the GMUG with historic boreal toad occurrences are the Grand Mesa, West Elk Mountains, and Sawatch Range. Specific locations in these geographic areas historically (occurrence > ten years old) occupied by boreal toad include the headwaters of Tongue and Currant Creek watershed (1402000513), Kannah Creek watershed (1402000515), Upper Gunnison River (14020002), East Taylor River (14020001), and Tomichi Creek (14020003) watersheds on the Sawatch Range.

Current (occurrences < ten years old) distribution of boreal toad has been reduced to less than one percent of their historic breeding sites in the SRMP. While extensive surveys are lacking for the GMUG, similar reductions from historic levels have most likely occurred. Current distribution is restricted to a few breeding sites in scattered 6th and 7th

level HUCs on the GMUG (Figure 2.2.1.2.A.). Most of these known populations are small and restricted.

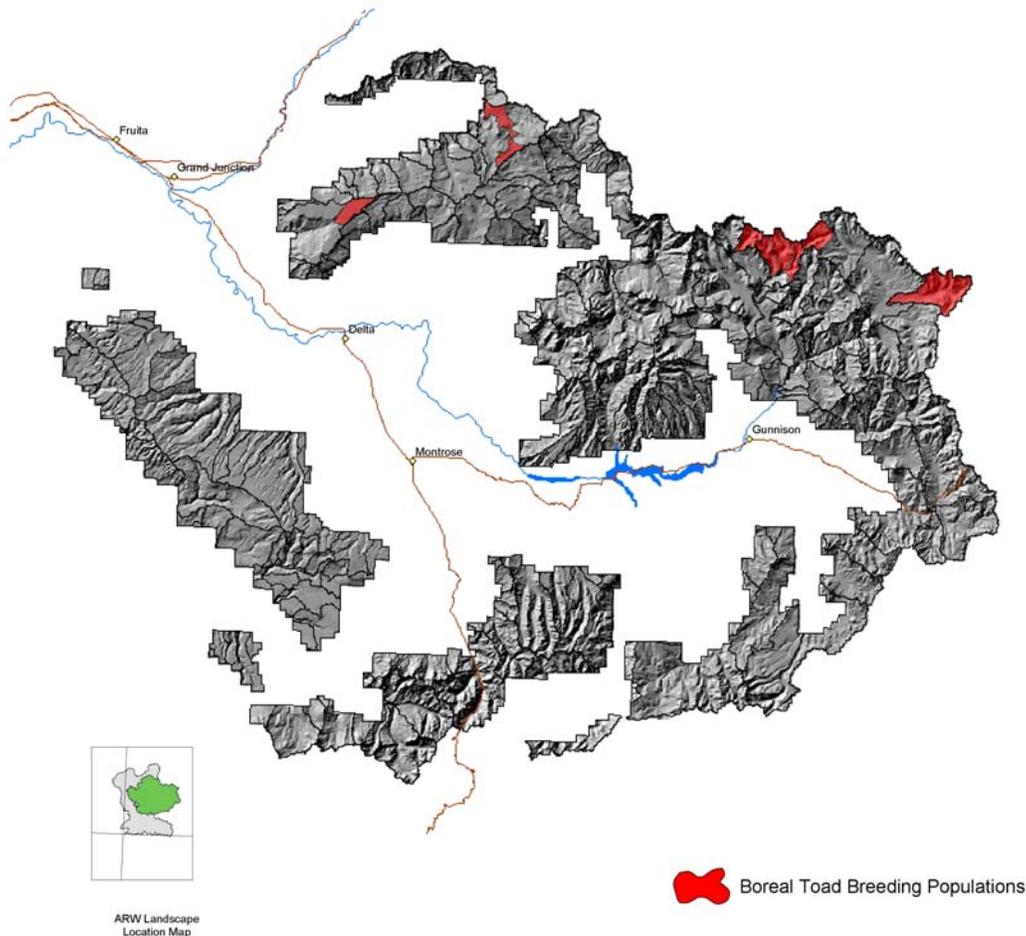


Figure 2.2.1.2.A. Current distribution of documented or suspected boreal toad breeding populations on the GMUG by 6th or 7th level HUC. Actual breeding areas are generally restricted to a few locations within the sub-watersheds.

Nine sub-watersheds on the GMUG are known to support boreal toad populations (Table 2.2.1.2.A.). Breeding ponds are known to occur in six of the nine sub-watersheds. Most of the breeding ponds are small (<1 acre) and generally occur in a few locations in the sub-watersheds. Two watersheds (Buzzard Creek sub-sheds) have documented occurrence of boreal toad but specific breeding ponds have not been located to date. Boreal toad translocation efforts have been conducted by CDOW in Kannah Creek sub-watershed since 2003. Most of the known populations occur in Integrity Class 2 sub-watersheds, although Texas Creek and Cooper Creek are in Integrity Class 3 and 4, respectively.

Table 2.2.1.2.A. Occupied boreal toad habitat by 6th or 7th field HUC on the GMUG NF.

Watershed Name	6 th or 7 th Field HUC	Documented breeding sites	Watershed Integrity Class
Texas Creek	140200019508	Yes	3
Upper Taylor River	14020001950905	Yes	2
East Brush Creek	14020001990602	Yes	2
Middle Brush Creek	14020001990603	Yes	2
West Brush Creek	14020001990604	Yes	2
Copper Creek	140200019909	Yes	4
Upper Buzzard Creek Composite	14010005190601	No – Adults observed along Buzzard Creek.	2
Upper Buzzard Creek	14010005190605	No - Adults observed along Buzzard Creek.	2
Upper Kannah Creek	14020005150107	No – CDOW translocation site.	2

The distribution and abundance of boreal toad have declined on the GMUG from historic levels. A combination of factors is likely attributing to this decline, but no single factor has been identified as the primary threat to boreal toad habitat. Current information about habitat condition and trends are generally unavailable and population inventories have only occurred in a few locations on the GMUG.

Boreal toads are susceptible to a variety of bacterial and fungal pathogens. In particular, chytrid fungus (*Batrachochytrium dendrobatidis*) is believed to be the primary disease causing pathogen. This pathogen is believed to be the most pervasive factor affecting the number of toads and habitat quality range-wide and on the GMUG. Although this pathogen is a major factor leading to decline of boreal toad, land management activities that negatively affect breeding and other habitats of boreal toad also are believed to be attributing to their decline.

Desired Conditions

In cooperation with the BTRT, work to establish at least two viable breeding populations in the Grand Mesa, West Elk Mountains, and Sawatch Range. As a part of Recovery efforts, the GMUG will protect and manage existing breeding sites, other occupied habitat, and suitable unoccupied habitat to assure their long-term sustainability. Specific desired conditions and management actions are described in the Conservation Plan by categories of land management activities.

Management Implications

The Conservation Plan identifies desired conditions, potential impacts (direct and cumulative) of management actions on boreal toad, appropriate mitigation measures, and direction where conservation efforts should be applied. Recommended strategies for management activities potentially affecting boreal toad habitat are related to:

- Air Quality and Atmospheric Deposition
- Water Management
- Minerals Management

- Roads and Utility Corridors
- Recreation
- Livestock Management
- Timber and Fire Management
- Land Exchanges

Management strategies presented for each of these land management activities need to be incorporated in the revised Forest Plan, as appropriate.

Reaches or stream segments supporting boreal toad should be priorities for providing appropriate in-stream flow and lake level protection.

New water development proposals should demonstrate a high level of population and habitat protection within the immediate sub-watershed (6th field HUC) supporting a boreal toad population.

Procedural Gaps

Applicable recommended strategies for habitat management in the Conservation Plan have not been formally included in the Forest Plan. Region 2 of the Forest Service committed to evaluate the compatibility of existing Forest Plans with direction in the Conservation Plan in March 2001.

Biological Gap

Objectives for the establishment of two breeding populations on the Grand Mesa, West Elk Mountains, and Sawatch Range have not been achieved.

Risks to Achieving Desired Conditions

Presence and susceptibility of boreal toads to bacterial and fungal pathogens, in particular chytrid fungus (*Batrachochytrium dendrobatidis*). The presence of chytrid fungus in occupied and suitable unoccupied habitat represents a substantial challenge for boreal toad conservation.

Possible inadequate project level analysis for riparian and wetland protection and preservation.

Lack of funding to carry out activities described in the Conservation Plan.

Need for Change

Incorporate pertinent management recommendations for boreal toad habitat protection.

Continue work with Boreal Toad Recovery Team to achieve meta-population objectives.

Performance Measures

- Compliance with pertinent management recommendations at the project level
- Progress toward achieving meta-population objectives on the Grand Mesa and West Elks Mountains and, as appropriate, on the Sawatch Mountain Range

2.2.2 Public Drinking Water Supplies

Area of Analysis

The characterization of Public Drinking Water Supplies is focused largely upon lands within the proclaimed boundaries of the GMUG National Forest. Although off-forest portions are recognized, no information regarding condition and trend are included.

Condition and Trend

An initial purpose of the National Forest System was and remains to “secure favorable conditions of water flows”. A wide variety of values or uses depend upon the surface runoff and ground-water recharge generated from the GMUG. Those values or uses are realized both on and off the GMUG. The most prominent consumptive uses are for agricultural and municipal purposes.

A number of communities rely on surface and ground water originating on the GMUG for their public drinking water supplies. The Colorado Department of Public Health and Environment (CDPHE) is the lead agency in assuring that safe drinking water is provided by all public systems in the state, and for enforcing standards established by the Safe Drinking Water Act. There are a total of 18 surface water and 42 private ground-water providers serving a combined population of about 175,000 people identified by the CDPHE (see Figure 2.2.2.A.). In addition, 39 Forest Service facilities (campgrounds, trailheads, etc.) provide ground-water dependent public drinking water.

Surface water supplies have the greatest potential to be directly affected by land use or Forest Service management activities. Forest-wide water quality is generally excellent based on the support of classified uses and attainment of numeric and narrative water quality standards established by the CDPHE. All system providers relying on surface supplies were formally requested to provide feedback regarding the quality of their pre-treatment or ‘raw’ water quality. Respondents identified no extraordinary treatment needs to the raw water supply and generally expressed their interest in future management continuing to maintain its high quality. Several providers also noted increasingly stringent EPA standards place an even greater premium on high quality raw water to avoid costly treatment needs.

Forest Service direction to manage lands for multiple-uses requires balancing present and future resource use with domestic water supply needs. Source areas range widely in total size from just 500 acres to over two million acres, while the proportion lying within GMUG boundaries varies from approximately four percent to as much as 100 percent. The greater the proportion of NF lands in a source water area the greater the potential to be directly affected by Forest Service land use and management activities.

The GMUG is considered the principal source where 70 percent or more of the source area lies within Forest boundaries (16 providers and 21 separate source areas) totaling approximately 1,038,000 acres. The current Forest Plan includes a Management Prescription 10E emphasizing municipal watersheds for the Fruita division of the Grand Mesa NF, a total of approximately 7,850 acres. All other source areas emphasize multiple use prescriptions.

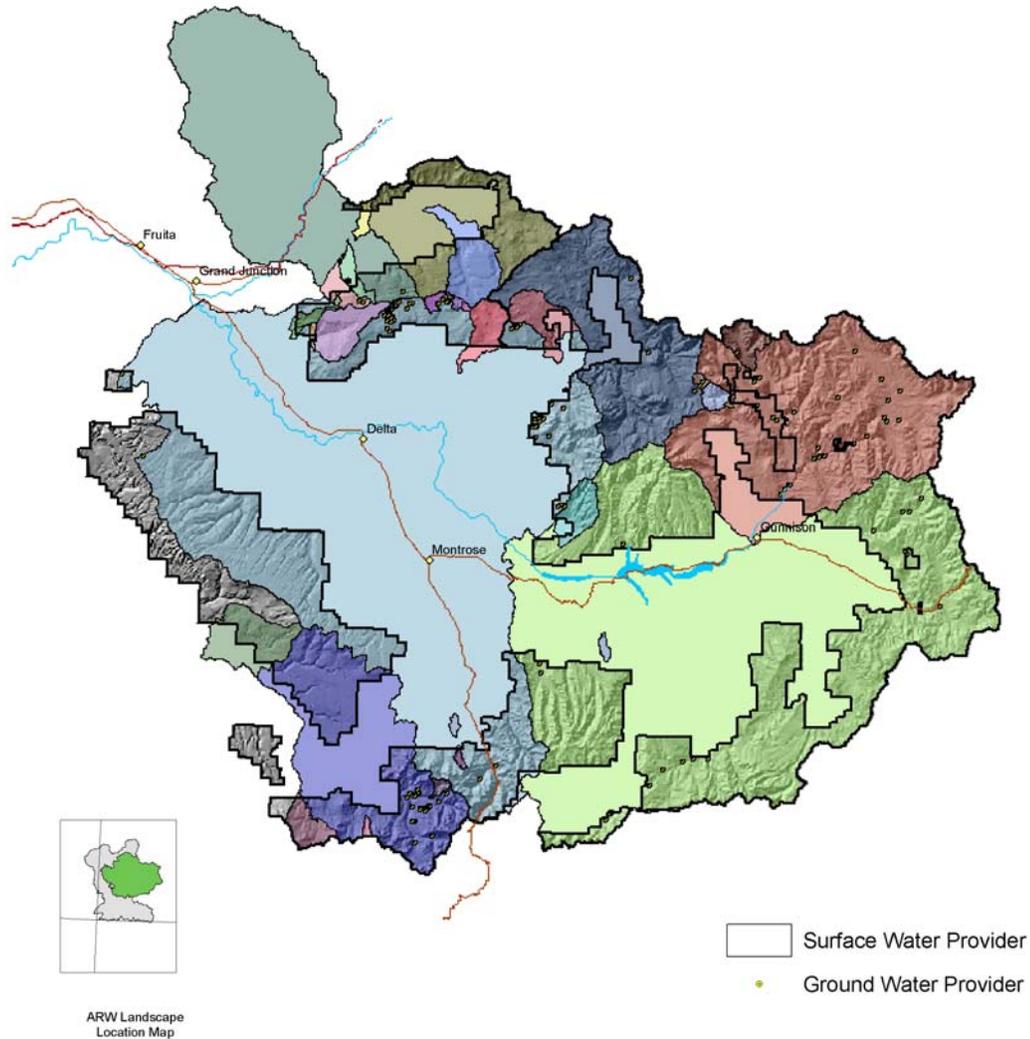


Figure 2.2.2.A. Public drinking water providers.

The CDPHE added Coal Creek (which serves as the Town of Crested Butte’s principal drinking water source) to the 2004 state-wide 303d list of impaired stream segments. The contaminants of concern (cadmium, lead, and zinc) are associated with historic operations at the Standard Mine site. In April 2005, the site was proposed for inclusion on the National Priorities List which, if adopted, would make it eligible for “Superfund” remediation. Despite the 303d listing, Coal Creek currently meets Safe Drinking Water Act standards.

Desired Conditions

Maintain favorable conditions of flow and sustain supplies of high quality ‘raw’ water while providing for multiple-use management

Management Implications

Continue management for multiple uses, but assure no adverse affects to 'raw' water quality.

Assure economically treatable 'raw' water supplies and develop a tracking mechanism with system providers.

Future adjustments to management themes, suitable uses, or guidelines may be necessary to meet water quality needs.

Biophysical Gap

Coal Creek's 303d listing as an impaired water body.

Procedural Gap

The current Forest Plan lacks Region 2 Watershed Conservation Practices.

The current Forest Plan 10E designation is out of date based on current information available from the CDPHE.

Risks to Achieving Desired Conditions

Unmanaged or uncontrolled multiple-use activities within source areas.

Influence of natural disturbances (flood, drought, fire, etc.).

Mineral exploration and development.

Hazardous materials spill.

Standard Mine containment pond failure.

Cumulative affects of the above.

Need for Change

None attributable to current NF management activities or uses.

Integrate Region 2 Watershed Conservation Practices.

Revise current Theme 10E designation.

Performance Measures

- Track raw water supply quality

2.2.3 Reference Watersheds

Area of Analysis

The evaluation of reference watershed potential is based only upon lands within the proclaimed boundaries of the GMUG National Forest.

Condition and Trend

The current Forest Plan does not provide guidance regarding reference watersheds.

The R2 Watershed Conservation Practices Handbook defines reference condition as: “The set of selected measurements and/or conditions used as representative of the natural potential condition of a stream. The selected measurements and/or conditions describe a minimally impaired watershed or reach characteristic of a stream type in an ecoregion.” Stream health classes are then defined in terms of a reference condition as follows: robust (74 percent or greater of reference condition), at-risk (59 – 73 percent of reference), and diminished (<58 percent of reference).

The Colorado Water Quality Control Commission has adopted guidelines for determining sediment deposition impacts to aquatic life based upon a five-step process for comparing actual sediment conditions in a study stream with the expected conditions for the same stream.

Desired Conditions

Several 6th or 7th level HUCs are identified and managed as reference watersheds in order to evaluate water quality and channel conditions within natural or minimally altered watersheds. These serve as comparative baselines for monitoring management actions or activities.

Reference watersheds are distributed across the geologic and climatic settings found across the Forest as well as representative stream types. At least two 6th or 7th level HUCs are identified in each geo-climatic zone to ensure back-ups in the event a catastrophic event significantly alters the natural functions in the primary watershed.

Management Implications

Allow natural processes to dominate management and land-use activities.

Management themes where natural processes dominate best meet the desired condition.

Minimize the risk of altering sediment production and runoff regimes until final reference watersheds are established (five-year evaluation cycle).

Generally, activities such as grazing, existing motorized road/trail use, and perhaps prescribed fire or small stock ponds would be generally consistent with maintaining current sediment and runoff regimes, assuming the activities remain at current levels or spatial extent and that Watershed Conservation Practices or BMPs are used.

Certain activities such as new road and trail construction, timber harvesting, riparian vegetation manipulations, chemical vegetation or stream treatments, new in-channel water diversions or impoundments, and mechanical vegetation manipulation would generally be inconsistent.

In-stream flow protection should be pursued to protect existing flow regimes pursuant to the procedures and concepts contained in the Pathfinder Project Steering Committee Report (2004).

Reference watershed evaluations and related monitoring needed to clearly define reference watersheds would be a new or additional program component for the watershed and fisheries programs.

Condition Gap

No guidance in the current Forest Plan.

Risks to Achieving Desired Conditions

Extensive natural disturbances or extremes in the hydrologic cycle (e.g., flood, drought, fire, etc.) would add greater uncertainty in maintaining reference watershed conditions. Although, natural disturbances can be expected to some degree or spatial extent under the natural processes management themes and are an inherent risk under such management emphasis.

Need for Change

No specific theme designations are required for reference watersheds, but those potential reference watersheds with Theme 1 – 3 designations are most consistent with the desired conditions. In other theme areas, compatible suitability determinations may be required to meet desired conditions for reference watersheds.

Performance Measures

- More refined criteria for reference watersheds will need to be determined and may involve an array of physical and biological indicators that, when monitored or measured, would identify reference watershed conditions

2.3 Riparian/Wetland Resources

Area of Analysis

The characterization of riparian/wetland resources includes only GMUG National Forest lands.

Condition and Trend

Riparian areas and wetlands occur in a variety of settings and support a variety of plant communities, but all depend on water more than surrounding uplands, at least seasonally. The majority are adjacent to and depend on surface water streams, lakes, or ponds, while others are isolated and associated with groundwater supported springs and wetlands.

There are approximately 100,000 acres of general riparian habitat currently inventoried across the GMUG and additional acreage along shorelines associated with the some 11,500 surface acres occupied by lakes and reservoirs. The current extent is certainly less than historic levels due to historic livestock pressure, road development and use, mineral development, reductions in beaver populations, de-watering due to water diversions, and inundation following dam construction. Reliable local information to estimate the magnitude of those losses is unavailable. The 1983 Forest Plan includes general and specific direction to protect and manage riparian areas (Management Area 9A). Implementation of the 1983 Plan reduced the types and/or conduct of activities within riparian areas.

Most of the past inventory and monitoring of riparian areas on the Forest has been in conjunction with ongoing rangeland inventories. As a result, current condition and trend has been characterized for entire grazing allotments or for selected riparian sites or stream reaches. Neither is useful for quantifying Forest-wide condition and trend. However, observations and limited monitoring suggest that riparian area and wetland degradation or loss that has occurred since the 1983 Forest Plan is minimal across most of the Forest. A few small areas have experienced moderate wetland losses, while others have seen riparian improvement.

Desired Conditions

Riparian areas and wetlands contain diverse self-perpetuating native plant communities providing for a variety of aquatic as well as terrestrial values. Riparian areas and wetlands support an array of physical and biological functions including flood attenuation and thermal regulation (stable banks, effective vegetative cover and root strength, and shade), ground-water recharge and slow release, nutrient absorption and sediment filtering, nutrient inputs (organic matter), structural habitat complexity (over-hanging vegetation and banks, or large wood), and provide habitat connectivity to facilitate the movement of terrestrial species.

Wetlands are ecologically stable with all natural processes intact and in operation, free of invasive plants and animals, and dominated by complete cover of healthy native plant communities (in good riparian/wetland condition).

Ground-water flows to dependent ecosystems are maintained through natural patterns of discharge and recharge, and the water quality is protected to continue support of native

community structures and functions. In fens, peat forming vegetation should be alive and accumulating and the organic substrate intact and undisturbed.

Management Implications

Review and adjust, as needed, current Forest Plan guidance to ensure the following elements are addressed:

- Un-inventoried riparian/wetlands will be added to the inventory and will be managed as Theme 3 or other special emphasis management area wherever they are identified within project areas.
- Spatial delineation of riparian areas has increased the acreage removed from the suitable timber base.
- Riparian areas and wetlands are generally unsuitable for roads, programmed timber harvest, skid trails or landings, trails, developed recreational facilities, high use dispersed sites, gravel or borrow sources, or construction staging areas and opportunities to relocate such existing uses should be pursued. Where such uses are unavoidable, appropriate design criteria will be applied.
- Opportunities to adjust operations of existing water facilities to enhance riparian/wetland conditions may exist.
- Prevent establishment of invasive species and address existing occurrences with eradication treatments.
- Pursue in-stream flow protection where appropriate.
- Identify improvement needs for areas not meeting desired conditions.

Condition Gap

The current Forest Plan has a Management Area 9A allocation and direction for riparian areas and wetlands wherever they exist, but there is no spatial delineation of those areas.

No evaluation procedure of current condition or ecological potential has been accepted or systematically applied Forest-wide.

No Forest-wide inventory program is in place for riparian areas or wetlands to address short and long term goals, priority areas, and procedures and protocols.

Risks to Achieving Desired Conditions

The current Forest-wide riparian area GIS coverage represents the best available estimate of the aerial extent of general riparian areas but will require project level validation.

A focused inventory of wetlands and fens is lacking, some are likely included in the general riparian GIS coverage but to an unknown degree.

Inadequate project level evaluation of riparian extent and condition.

Prior existing rights that impact surface water or groundwater supplies (water rights, mineral leases, mining claims).

Existing uses that are difficult or costly to remove or relocate (county and State roads).

Unauthorized or illegal uses.

Development of conditional water rights.

Severe natural disturbance event (flood, drought, fire, and insect or disease outbreaks).

Establishment or expansion of invasive species (e.g., tamarisk, Russian olive, purple loosestrife, etc).

Increasing dispersed recreational pressures.

Lack of funding to monitor activities and impacts at the project level as well as Forest-wide.

Need for Change

Utilize the current riparian area GIS coverage and include the acreage as a component of the Theme 3 designation (Natural Landscapes with Limited Management) or other special emphasis management area with similar desired conditions and goals.

Selected fens or springs of special conservation or botanical interest are identified and protected as Special Interest Areas (Theme 2).

Develop narrative riparian area and wetland definitions and descriptions to be applied at project level.

Develop protocol for evaluating riparian and wetland condition to be applied at project level.

Integrate Region 2 Watershed Conservation Practices.

Update current Plan guidance related to riparian utilization standards.

Develop guidance for invasive species that specifically addresses riparian areas and wetlands needs.

Performance Measures

- Best Management Practices (BMP) field review results
- Field level evaluation or inventory results (PFC inventory, BLM Rangeland Health)
- Project level documentation of riparian area and wetland extent and condition
- Development of a riparian area and wetlands strategy addressing inventory, monitoring, and restoration needs

2.4 Watershed Improvements/Restoration

Area of Analysis

The characterization of aquatic habitat and soil and water improvement or restoration is focused only on GMUG National Forest lands.

Condition and Trend

The 1991 Forest Plan identified annual targets of 40 structural fisheries habitat improvements and 76 acres of general soil and water resource improvements. The aquatic habitat improvements were to include cooperative planning with the Colorado Division of Wildlife and focus on needs based on survey results (Pfkuch, Cowfish, or other) or where habitat was below productive potential. The current Forest Plan also encourages cooperation with state agencies in identifying and protecting minimum flows where needed to support resident fish populations. The 1991 Forest Plan provides no guidance regarding priority areas or needs related to general soil and water resource improvements.

During the Forest Plan period, fisheries targets have been accomplished each year but how those targets are reported has changed. Fisheries structural targets have now been replaced with miles/acres of streams or lakes and reservoirs restored or enhanced. Targets identified in FY05 are 13 miles of stream restored or enhanced and 14 acres of lakes restored or enhanced. The types of projects include replacement of culverts in cooperation with engineering to provide passage for aquatic organisms and restoration of floodplain function, construction of in-channel habitat structures, construction of in-channel fish barrier to prevent immigration into habitats occupied by Colorado River cutthroat trout (CRCT), and chemically treating streams to remove non-native trout prior to re-establishment of CRCT populations.

Approximately 1,100 miles of stream Forest-wide have in-stream flow water rights held by the Colorado Water Conservation Board. The bulk of those reaches were identified and protected prior to or early in the previous Forest Plan period (priority dates in the early to mid 1980s). Identification and protection of additional streams is continuing.

During the previous Forest Plan period, approximately 100 acres of watershed related improvements were completed annually. Improvements largely occurred as needed and as funding allowed. The projects included road relocation, road obliteration, road-stream crossing redesign and re-construction, dispersed recreation site mitigation, and reintroduction of Colorado River Cutthroat trout. More recently, the results of the Inland West Watershed Initiative (IWWI) assessment were used to guide improvement efforts.

Desired Conditions

Improvement needs are identified based upon the aquatic values affected or at risk in conjunction with the physical integrity rating results. The general philosophy will be to “secure the best” and “restore the rest”. Improvement priorities and planning utilize a multi-disciplinary approach (physical and renewable resources, recreation, and engineering).

Management Implications

Participate in the development and or validation of State of Colorado 303d and Monitoring and Evaluation lists.

Watershed improvements may be necessary prior to implementation of some project proposals.

Improvements made at certain sites may cause a shift of the use and associated impacts to a new location.

The need for improved flow conditions should be identified.

Priorities may result in unequal distribution of available funds between Ranger Districts.

Condition Gap

Current inventory of aquatic habitat and soil and water resource improvement needs is inconsistent and does not incorporate the aquatic values at risk or affected. The method/rationale for determining priorities needs refinement.

Risks to Achieving Desired Conditions

Funding is unpredictable.

Extent or severity of natural disturbances (flood, drought, fire, etc.).

Need for Change

Partnership opportunities should be developed to leverage available funds.

Focus efforts to areas with the greatest priority need.

Performance Measures

- Watershed Condition Class summaries (FSM 2521)
- Total acres of watershed improvements completed