

Appendix B

Madison Watershed Monitoring Plan

Monitoring Plan for Madison Watershed

Introduction

The purpose of this resource monitoring plan is to measure the effectiveness of management changes, structural projects and vegetative treatments in meeting the goals and objectives developed for the Madison Watershed (MW). This plan has been designed to measure progress towards site specific objectives developed by an ID team where resource concerns were identified during the Madison Watershed Assessment.

This plan will identify when, where and how studies will be conducted, as well as the types of data that will be collected, how the data will be evaluated, and who will participate in the process. All monitoring methodologies are approved BLM monitoring methodologies and are described in various BLM or Interagency Handbooks. All this information, including technical references, BLM policy and procedure handbooks, and monitoring guidelines and methodology descriptions are available for review at the Dillon Field Office. Technical references and BLM procedural handbooks are also available on the BLM library website; <http://web.nc.blm.gov/blmlibrary>.

All *existing* monitoring studies that are needed to measure progress towards objectives or Standards will continue to be read on the same time schedule as new studies.

Site Specific Objectives

There were four primary land health issues and six additional resource concerns identified during the Madison Watershed Assessment and through public scoping. Site specific objectives have been developed for each issue and resource concern. The amount of change desired for each of the objectives will be determined once additional baseline data is gathered during the 2010 or 2011 field seasons. The goal is to make measurable progress towards site specific objectives by 2019.

Issue # 1: Riparian, Wetland, and Aquatic Habitat and Associated Species

Objectives for riparian, wetland and aquatic habitat and associated species are:

- Restore stream dimension, pattern and profile to the natural range of variation where concerns were documented.
- Restore deciduous woody and herbaceous riparian habitat types, with emphasis on reducing juniper and non-native species composition.
- Increase deep-rooted riparian vegetation (sedges, willows) where decreased composition was documented.
- Reduce sediment inputs into streams where human activities such as authorized grazing, recreational impacts and roads are contributing to un-naturally high sediment loads.
- Maintain/enhance habitat for cold water fisheries in occupied streams within the watershed.
- Restore, maintain and/or enhance native vegetation and hydrology of springs, seeps and wet meadows with emphasis on ecological function and biodiversity.
- Protect developed springs (spring sources) from impacts by ungulates.

Monitoring Activities to measure progress towards meeting Riparian, Wetland and Aquatic Habitat and Associated Species objectives:

- Continue monitoring existing riparian studies to measure progress towards objectives.
- Springs that are developed/redeveloped will be photographed before and after development and inspected and photographed periodically after development (every 2-3 years), including prior to the next scheduled assessment.
- Dysfunctional spring developments that are removed/cleaned up will be photographed before and after project clean-up.

Table A-1. Site specific Riparian and Wetland Habitat and Associated Species Monitoring Objectives

Allotment Name and #	Stream and Stream Reach	Objective	Monitoring Methodology
Aspen Creek	Quaking aspen 2035 Quaking aspen 600	Improve streambank stability and channel morphology by reducing trailing impacts Increase composition of sedges along the greenline Increase aspen and willow (reach 600)	Cumulative width/depth ratio; Greenline transect, and/or photo points
Elmer	Hot Springs Cr trib 2036	Restore natural channel by removing old mining debris and replacing plugged culvert Increase native deep rooted riparian vegetation Decrease noxious weed composition. The road fill will be monitored to assure that excessive erosion, including head cutting from the downstream side as well as sheet and rill erosion over the road surface does not occur.	Photo point(s) Ocular monitoring of road fill impacts.
Jourdain Creek	Trail Creek 606	Increase deciduous woody riparian vegetation by decreasing juniper composition	Photo point(s)
Michel	Bradley Creek 607	Restore natural channel by removing old mining debris and reclaiming mining disturbance	Photo point(s)
Preacher Creek	Canadian Creek trib 611 Preacher Creek 658	Improve streambank stability and channel morphology by reducing trailing impacts (both) Increase woody browse regeneration (both) Increase composition of sedges along the greenline (658)	Cumulative width/depth ratio; Greenline transect, Woody Browse Regeneration transects, and/or photo points
Revenue Common	S. Fork Hot Spr. Cr 626 S. Fork Hot Spr. Cr 671 Lower Revenue Spr. 2043	Increase composition of deep rooted riparian species along the greenline (both). Improve streambank stability and channel morphology by reducing trailing impacts (all 3 reaches) Reduce composition of noxious weed species (2043)	Cumulative width/depth ratio; Greenline transect, and/or photo points Photo point(s)

Allotment Name and #	Stream and Stream Reach	Objective	Monitoring Methodology
Strawberry Ridge	Antelope Creek trib 2046	Improve streambank stability and channel morphology by reducing trailing impacts.	Cumulative width/depth ratio and/or photo points
Trail Creek	Spring Creek 604	Improve streambank stability and channel morphology by reducing trailing impacts. Increase composition of deciduous woody riparian species by reducing juniper composition.	Coverboard; and/or photo points
Wallace Peak	Canadian Creek 610 M. Fork Hot Spr. Cr. 623 N. Fork Hot Spr. Cr. 625 N. Fork Hot Spr. Cr. 670	Increase composition of deep rooted riparian vegetation; sedges and willows (610) Improve streambank stability and channel morphology by reducing trailing impacts (All reaches listed).	Greenline Transect and/or photo point(s) Cumulative width/depth ratio; and/or photo points
Windy Pass	Antelope Creek 664 Antelope Creek trib. 665 Antelope Creek trib. 666	Increase composition of deep rooted riparian vegetation in seeps and meadow adjacent to the stream reaches. Improve streambank stability and channel morphology by reducing trailing impacts (All 3 reaches).	Greenline Transect and/or photo point(s); Cumulative width/depth ratio; and/or photo points

Issue #2: Upland Habitat and Associated Species

Objectives for upland habitat and associated species are:

- Restore the soil/site stability, hydrological function, and biotic integrity of upland sites in allotments where one or more of these attributes of rangeland health was determined to be reduced.
- Increase cover and frequency of native perennial cool season herbaceous species where concerns were documented, which will improve the hydrological function and site productivity.
- Reduce bare ground and interspaces between plants to reduce potential wind and/or water erosion.
- Restore/maintain open sagebrush communities in habitats that are currently dominated by Douglas-fir.
- Maintain existing sagebrush habitat so that 75% or more of big sagebrush communities provide vegetative composition and structure for sagebrush obligate species.
- Create big game winter utilization and daubenmire transects on Wall Creek Game Range allotment to monitor habitat quality.

Monitoring Activities to measure progress towards meeting upland habitat and associated species objectives:

Table A-2. Site Specific Upland Objectives

Allotment Name	Objective	Monitoring Methodologies
McAtee Bridge Bar Seven North Morgan Shirley Michel	Increase frequency and cover of cool season perennial bunchgrasses to protect soil, allow for more efficient precipitation infiltration, provide cover and forage for wildlife species, and forage for authorized livestock.	- Daubenmire - Quadrat (nested) Frequency - and/or photo points
Shirley Michel	Decrease bare ground (measured by an increase in total cover)	-Daubenmire and/or photo points
McAtee Bridge	Reduce composition of noxious and invasive species	-Daubenmire and/or photo points
Wall Creek Game Range	Monitor elk utilization on winter range.	-Big game utilization transects, pellet counts and daubenmire plots

Table A-3. Site Specific Objectives for Sagebrush Habitat

Allotment Name	Objective	Monitoring Methodologies
North Meadow Creek Revenue Common	As sage grouse habitat is delineated: Maintain nesting/early brood rearing canopy cover of 15–25% sagebrush and an average of 6 to 7 inches herbaceous understory within site potential on the majority of the area. Maintain brood rearing canopy cover of 15–25% sagebrush near riparian areas or wet meadows while maintaining available forbs in the wet meadows. Maintain or increase composition of highly nutritious forbs (ie composites and legumes) in nesting/early brood rearing habitat.	Line Intercept and Daubenmire plots to measure canopy cover of sagebrush, and herbaceous and forb understory. Forage utilization and herbaceous understory cover will be measured annually within time constraints of staff.

Issue #3: Forest and Woodland Habitat

Objectives for forest and woodland habitat are:

- Maintain/enhance existing aspen and whitebark pine stands and promote successful regeneration of aspen and whitebark pine.
- Increase diversity of seral stages and structures in forested habitats.
- Reduce hazard rating for spruce budworm and/or Douglas-fir beetle activity.
- Where possible, salvage dead/dying forest stands from epidemic insect activity. Utilize forest products where feasible.

Monitoring Activities to measure progress towards meeting forest and woodland habitat

objectives:

Pre- Implementation:

- Commercial Harvest Units:
 - Complete Forest Vegetation Information System (FORVIS) walkthrough survey to classify the existing vegetation type within a representative sample of each stand type. Walkthrough survey data includes canopy species composition and density, understory vegetation, fuel loading, and density and size class of snags and down wood.
 - Establish GPS photo points within a representative sample of stand types, and document general stand conditions with photos. Documentation will reflect the particular objectives of individual units.
 - Establish GPS photo point(s) showing approximate percent cover of habitat type species and any occurrence of insect/disease at the landscape-scale.
- Prescribed Burn Units:
 - Gather fuels and vegetation transect data on up to five representative sites. Photographic documentation should include pre and post-treatment photos from a designated point to verify ocular estimates.
 - If prescribed burns are conducted after May 15, complete migratory bird surveys prior to burning activities.
- Whitebark and Limber Pine Treatments:
 - For trees suspected of being blister rust resistant, GPS and tag tree. Measure DBH, height, and crown ratio.

During Prescribed Burn Treatments:

- Fire behavior, fire weather, and smoke dispersion will be observed and documented throughout the ignition portion of each burn to make sure that these elements are within the prescription defined in the burn plan.

Post Implementation:

- Commercial Harvest Units:
 - Within two years after implementation on a given unit, re-visit each stand to obtain the same data measurements described above and evaluate if the stand objectives were reached.
- Prescribed Burn Units:
 - Directly after treatment: Gather photo points and measurements along each pre-treatment transect to determine if treatment objectives have been attained.
 - One to four years after treatment: Remeasure transects and photo points to show vegetative response to the treatment and progress towards meeting objectives. Changes in use by big game, specifically elk, within the treatment areas will be measured by conducting pellet group transects prior to treatment and then, at least annually, for up to five years following treatment.

- Ungulate browse monitoring of aspen regeneration may be implemented if excessive browsing appears to be restricting new aspen suckers from growing taller than browse height.
- Whitebark and Limber Pine Treatments:
 - Complete re-application of pheromones or insecticide. Inspect tree for evidence of blister rust.
 - Complete stocking surveys in areas planted with whitebark pine.

Issue #4: Noxious and Invasive Species

Objectives for noxious and invasive species are:

- Contain, control and/or eradicate existing infestations of noxious weeds using Integrated Weed Management methods.
- Prevent new infestations of noxious weeds from getting established.
- Obtain and maintain an inventory of weed locations within the area to help develop priority control objectives and methods.
- Educate river users in the methods to stop the spread of invasive species (e.g. whirling disease, New Zealand mud snails, Eurasian water milfoil) either into the Madison or from the Madison to another body of water.
- Prevent or minimize the spread of cheatgrass.

Monitoring Activities to measure progress towards meeting noxious and invasive species objectives are included in Issue #1 Riparian, Wetland, and Aquatic Habitat and Associated Species and Issue #2 Upland Habitat and Associated Species.

Aerial weed treatment areas will be monitored or evaluated for site specific objectives through photo points, ocular observation, and/or vegetative transects. Site specific objectives for aerial treatment will be to reduce composition of noxious weeds with negligible reduction of non-target species.

Resource Concern #1: Special Status Species

Objective for special status species are:

- Provide habitat to maintain viable and diverse populations of native plant and animal species, including special status species.
- Maintain 15-25% sagebrush canopy and residual herbaceous cover for sage grouse nesting and brood rearing success.
- Maintain nesting territories for northern goshawk and great gray owls in timber harvest units.

Additional objectives are included above under Issue #1 Riparian, Wetland, and Aquatic Habitat and Associated Species and Issue #2 Upland Habitat and Associated Species.

Monitoring activities to measure progress towards the Special Status Species objective are included under Issue #1 Riparian, Wetland, and Aquatic Habitat and Associated Species and Issue #2 Upland Habitat and Associated Species.

Additional monitoring activities specific to special status species will include:

- Inventory & map the Hiker's gentian population discovered on BLM in 2009.

- The inventory should include the number of individual plants, a description of the habitat (e.g., associated species, soils, aspect and elevation) and an assessment of any existing and potential threats to the population.
- Coordinate with MTFWP and USFS biologists to locate any active sage grouse leks in the Madison Valley.
- Inventory harvest units for northern goshawk and great gray owl to identify any nesting territories and determine nesting activity.

Resource Concern #2: Wilderness Characteristics

Objectives for wilderness characteristics are:

- Maintain or improve the wilderness characteristics in the Axolotl Lakes WSA that were present at the time of the wilderness inventory (1979-80).
 - Manage the Bear Trap Canyon unit of the Lee Metcalf Wilderness to provide for the long term protection and preservation of the area's wilderness character.
 - Reduce unauthorized livestock use in the Bear Trap Canyon Wilderness to reduce the impacts of livestock use.

Planned monitoring will consist of compliance checks and continuation of existing monitoring. WSA monitoring forms will be completed, and photographic documentation will be used where applicable.

Resource Concern #3: Recreation and Travel Management

Objectives of recreation and travel management are:

- Implement the Dillon RMP Travel Management Plan.
- Maintain motorized wheeled vehicle access to those areas where it already exists, and improve access to public lands where opportunities are currently limited. Revise motorized route designations as necessary to correct mapping errors and improve route designations.
- Reduce unauthorized (non-designated route travel) motor vehicle use which occurs most frequently during the hunting season.
- Reduce resource impacts caused by recreationists, including spread of noxious weeds and aquatic invasive species.

Monitoring will consist of compliance checks to determine if closed roads show signs of use, as well as the enforcement of the travel management plan, specifically during the big game hunting season.

Resource Concern #4: Socioeconomics

Objectives for socioeconomics are:

- Continue to contribute to the local economy by providing an opportunity for sustainable uses on public land through livestock grazing, utilization of forest products, and recreational activities.
- Recover economic value of dead/dying timber before it is lost due to decay, where feasible.

Trends in socioeconomics will not be monitored by the local BLM office.

Resource Concern #5: Wildland Urban Interface

Objectives for wildland urban interface are:

- Reduce fuel loading and continuity to modify potential wildfire behavior and provide greater opportunity for management actions.
- Coordinate with private landowners and other affected agencies to maximize effectiveness of fuel reduction treatments.

Monitoring Activities to measure progress towards meeting Wildland Urban Interface objectives are:

Designate photo points to record fuel conditions pre and post treatment. Plots may be established to estimate the stem count of conifers before and after treatments if the information is necessary to quantify treatment effectiveness.

Observing fire behavior outside of fuels treatment areas and within treatment areas during a wildfire event will be the ultimate effectiveness monitoring.

Resource Concern #6: Cultural Resources

Objectives of cultural resources are:

- Preserve and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations.
- Reduce imminent threats from natural or human-caused deterioration, or potential conflict with other resource uses.
- Ensure that all authorizations for land and resource use avoid inadvertent damage to federal and nonfederal cultural resource in compliance with Section 106 of the National Historic Preservation Act.

Monitoring Activities to measure progress towards meeting cultural resource objectives is: Visit a minimum of 10 previously recorded cultural resource properties that are listed on the National Register of Historic Places or determined eligible for listing, on an annual basis to update the site form to current professional standards and to assess the current condition and trend of significant resource values.

Types of Data Collected

The established permanent vegetative and physical trend transects in the Madison Watershed were read and data was updated during 2008 and 2009. However, in order to adequately measure progress towards site specific objectives, additional studies will be established in key areas during 2010 and baseline data will be gathered on the newly established studies. This baseline data will be considered the starting point from which to measure progress towards meeting objectives or effectiveness of management changes implemented beginning in 2010. Data from existing studies will be compared and evaluated from the time they were established and data was initially collected.

Key areas are defined as relatively small areas that reflect or have the capability to reflect the effectiveness of management of the resources of a larger area. Depending on

management objectives, a key area may be a representative sample of a large stratum, pasture, allotment, or a particular management area. Key areas or monitoring sites should represent the high variability of riparian, upland and forest habitat types, patterns of use, and conditions of forest, rangeland or riparian health. Over the next several years the following data will be collected (See Table 3).

- Actual livestock and wildlife use. Actual use is the grazing use of an area by all classes of forage consumers. This information is necessary to provide a correlation between utilization and trend data. Considered alone, actual use data are essentially meaningless. However, when considered in conjunction with climate and utilization data, this data is necessary to interpret trend data accurately.
- Annual compliance, including utilization of upland forage, browse levels on willows and aspen, measurement of sedge stubble heights and/or measurement of stream bank alteration. This monitoring will occur primarily at established key areas, but may occur in other areas as well. Annual compliance monitoring will be done on a prioritized basis with I category allotments being the highest priority, followed by M, and then C category allotments. In areas where competition for resources may occur between livestock and big game, pre-livestock data may also be collected. This annual data will be used to help determine pasture moves, accurately interpret trend data, and serve as an early indicator on whether implemented changes are effective. If annual monitoring reveals resource degradation or ineffective management changes (as determined by BLM specialists), trend studies may be read at any time prior to the next scheduled assessment (2019), and adjustments in management analyzed.
- Local precipitation and temperature. This data is necessary to interpret trend data accurately.
- Long term trend. Trend data will be used to measure progress towards meeting objectives as described above.

Trend refers to the direction of change and indicates whether the forest, rangeland, riparian area or other resource is being maintained or is moving toward or away from the desired plant community or other specific management objectives. Trend studies are important in the long term for determining the effectiveness of management actions in meeting or moving towards management objectives.

Trend data will be collected again in 2018 or 2019, unless specified otherwise for specific objectives. The Madison Watershed will be re-assessed or evaluated during 2019. In this process, all monitoring data will be summarized, analyzed, interpreted, and evaluated to measure progress toward meeting objectives. Trend data gathered in 2018 will be compared to baseline and existing trend data gathered or updated in 2008 or 2009. The measured change in the data will be used to measure progress toward meeting objectives, thereby evaluating management and making informed decisions regarding subsequent management (continuation or change). This is called adaptive management. For example, if monitoring data shows that progress is being made toward established objectives, current management will be continued or modified slightly as warranted, according to the data. However, if data shows a downward trend (change away from

objectives) or does not show any progress toward meeting objectives by 2018, and it is determined that current livestock management is a significant factor in precluding progress toward meeting objectives, then management will be adjusted by implementing an alternate system, changing the season of use and/or reducing authorized AUMs. The level of adjustment will be determined by the degree of divergence from the objectives.

Monitoring methodology descriptions are available for review at the Dillon Field Office. Technical references and BLM procedural handbooks are also available on the BLM library website; <http://web.nc.blm.gov/blmlibrary>.

Table A-3. Planned Resource Monitoring Activities

Type	Method	Responsibility	Frequency
Actual Use	Actual Use Reports submitted by permittees Wildlife observations Wildlife population monitoring in cooperation with the MFWP Recreation user days	Range, Wildlife and Recreation Staff	Annually
Compliance/ Utilization	Utilization – Key Forage Plant Method, Grazed/Ungrazed Method, or Height/weight method	Range, Wildlife or Fisheries Biologists, Hydrologist	Annually on a prioritized basis
	Stubble height – Stubble Height Method		
	Bank alteration – Stream bank Alteration Methodology as defined by Idaho State Office BLM, 2000		
	Browse use – Extensive Browse Method		
Climate	Precipitation data available from National Oceanic and Atmospheric Administration and other sources	Available from external sources	Annually
Habitat Characterization	Inventory for leks and seasonal habitats Sagebrush canopy and herbaceous understory measurements along established transects in sage grouse, elk calving and mule deer winter habitats	Wildlife Staff, MFWP, NWF	Annually on a prioritized basis
Inventory	Ocular gridded inventory for Hiker’s gentian	Range (TES plants)	2010 and every 3 – 4 years following
Trend (also see Table 3)	Biotic Quadrat Frequency Daubenmire Line Intercept Cover Board Woody Species Regeneration Greenline Macroplots/Belt Transects Photopoints Fire Regime Condition Class (FRCC) Satellite Imagery (as applicable)	Range, Wildlife or Fisheries Biologists, Hydrologists, Foresters, Fuels Specialists	During 2010 for new additional monitoring is needed. Trend data (new and existing studies) will be gathered again in 2018 or 2019 .
	Physical Cross section Rosgens Cumulative width/depth ratio		
Watershed Evaluation	Analysis, Interpretation, Evaluation and Recommendations	ID team	FY2019

Budget Requirements

This monitoring plan was prepared with the assumption that funding will remain at or near existing levels for the foreseeable future. In this light, it is anticipated that the bulk of the monitoring load will have to be borne by the existing range, wildlife, fisheries, forestry, fuels, hydrology, recreation, wilderness and cultural resource specialists along with a minimum of six seasonal employees each field season for the duration of this plan. Litigation workload associated with Watershed Assessments also directly effects how much monitoring the existing staff is able to complete.