

Appendix B
STR Monitoring Plan

Monitoring Plan for South Tobacco Roots Watershed

Introduction

The purpose of this resource monitoring plan is to measure the effectiveness of management changes, range projects and vegetative treatments in meeting the goals and objectives developed for the South Tobacco Roots (STR) Watershed. This plan has been designed to measure progress towards the realization of site specific objectives developed through an interdisciplinary approach to mitigate resource (land health) concerns identified during the STR Watershed Assessment process.

This plan will identify when, where and how new 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 accepted BLM monitoring methodologies and are described in various BLM or Interagency Handbooks. All existing monitoring studies that are needed to measure progress towards goals and objectives will continue to be read on the same time schedule as new studies.

Site Specific Objectives

There were five primary land health issues and two additional resource concerns identified during the STR 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 2007 or 2008 field season. The goal is to make measurable progress towards site specific objectives by 2016.

Issue #1 – Forest Health and Fuels Management

The objectives for forest and fuels management are:

- Restore/maintain historic density, structure, and species composition of forest and woodland habitats with special emphasis on reducing juniper and Douglas-fir encroachment in former grass/sage dominated communities.
- Improve forest health and increase resiliency to insects, disease, drought and wildland fire.
- More effectively control wildfire, especially in WUI areas.
- Maintain/enhance existing aspen stands and promote successful regeneration of aspen.
- Where possible, salvage dead, dying forest stands from epidemic insect activity and treat remaining stands to increase their resistance to insect activity. Utilize resulting forest products where feasible.
- Manage Douglas-fir habitat to maintain security and thermal cover in important big game fall and winter range between Wisconsin Creek and Mill Gulch.

Monitoring Activities to measure progress towards meeting Forest Health and Fuels Management objectives:

Pre- Implementation:

- 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 habitat type plants and any occurrence of insect/disease at the landscape-scale (e.g. viewpoint of Granite Creek drainage from Granite Creek Road).
- 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.

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:

- Within two years after implementation on a given unit, re-visit stand to obtain the same data measurements described above and evaluate if the stand objectives were reached.
- Prescribed Burn Units:
 - Right after treatment: Photo points and measurements along each pre-treatment transect to determine if treatment objectives have been attained. Place range cage on site to measure production and use.
 - 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.
- Monitor change in migratory bird use in Douglas-fir and juniper (uplands and riparian) treatment areas with control areas. Point count transects will provide baseline (pre-treatment) census data and post treatment census data (5 and 10 years after treatment).

Issue #2 – Wildland Urban Interface (WUI) and Protection of Private Property from Wildland Fire

The objectives for Wildland Urban Interface and Protection of Private Property from Wildland Fire are:

- Reduce fuel loading and continuity to protect private property from wildfire and protect historic cultural values in the Virginia City ACEC and neighboring Virginia City historic district.
- Reduce fuel loading and continuity near or along ingress/egress routes to facilitate effective emergency evacuation procedures and wildfire suppression efforts.
- Coordinate with private landowners and other affected agencies to maximize effectiveness of fuel treatments.

Monitoring Activities to measure progress towards meeting Wildland Urban Interface and Protection of Private Property objectives:

- Designated photo points will be established to record fuel conditions pre and post-treatment. Plots may be established to estimate the stem count of conifers or the total fuel loading before and after treatments.

Issue #3 – Riparian, Wetland and Aquatic Habitat and Associated Species

The objectives for riparian, wetland and aquatic habitat and associated species are:

- Restore deciduous woody and herbaceous riparian habitat types with emphasis on reducing juniper and disturbance induced species composition.
- Restore stream dimension to a functional pattern and profile.
- Reduce sediment loads into streams from adjacent public lands.
- Maintain or enhance habitat for WCT in Harris and California Creeks.
- Maintain and enhance habitat for cold water fisheries.
- Restore, maintain or enhance native vegetation and hydrology to springs, seeps and wet meadows with emphasis on ecological function, biodiversity, and rare plant species and their habitats.
- Protect springs and spring brooks from excessive ungulate impact.

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

- Continue monitoring westslope cutthroat trout population and distribution in coordination with Montana Fish, Wildlife and Parks (MFWP).
- Continue monitoring existing riparian studies as applicable.
- Springs that are developed/redeveloped will be photographed before and after development.
- Monitor change in migratory bird use in Douglas-fir and juniper (uplands and riparian) treatment areas with control areas. Point count transects will provide baseline (pre-treatment) census data and post treatment census data (5 and 10 years after treatment).

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

Allotment Name and #	Stream and Stream Reach	Objective	Monitoring Methodology
Brandon #20481	Spring Park Creek RU-52	<ul style="list-style-type: none"> • Increase riparian vegetation (sedges, willows, aspen) • Decrease noxious weeds and 	<ul style="list-style-type: none"> • Greenline, woody browse regeneration and/or photo point(s)

Allotment Name and #	Stream and Stream Reach	Objective	Monitoring Methodology
		<ul style="list-style-type: none"> juniper • Improve channel morphology 	
Cal Creek #10507	Butcher Gulch RU281 Daylight Creek RU282 Water Gulch RU287 Threemile Creek RU279 California Creek RU21 Upper Cal. Creek RU60 Upper Harris Crk RU25	<ul style="list-style-type: none"> • Increase riparian vegetation, decrease noxious weeds (decrease juniper @ RU279). • Improve channel morphology by reducing streambank impacts. • Increase riparian vegetation along the greenline (decrease juniper) 	<ul style="list-style-type: none"> • Greenline, woody browse regeneration and/or photo point(s) • Photo point(s)
Fletcher-Moore #30428	Moore Creek MA110	<ul style="list-style-type: none"> • Increase riparian vegetation • Decrease streambank impacts to improve channel morphology 	<ul style="list-style-type: none"> • Photo point
Georgia Gulch #20348	Wet Georgia Cr RU35 Wet Georgia Cr RU132	<ul style="list-style-type: none"> • Increase riparian vegetation along the greenline • Decrease noxious weeds and juniper • Slow channel entrenchment and allow natural channel evolution to begin healing channel 	<ul style="list-style-type: none"> • Greenline, woody browse regeneration and/or photo point(s) • Rosgens modified (Cumulative width/depth ratio).
Granite-Moore North #10427	Postlewaite Cr. RU200 Moore Creek MA109 East Fork Granite RU209 Moore Creek MA111	<ul style="list-style-type: none"> • Increase riparian vegetation • Decrease noxious weeds and juniper • Improve hydrology at spring source and associated wetland of RU200 • Improve channel morphology by reducing streambank impacts. 	<ul style="list-style-type: none"> • Greenline and/or photo point(s) • Rosgens (modified) and/or photo point(s)
Hungry Hollow #10491	Browns Gulch RU277 Browns Gulch RU278	<ul style="list-style-type: none"> • Increase riparian vegetation; decrease juniper and noxious weeds • Reduce soil erosion 	<ul style="list-style-type: none"> • Greenline and/or photo point(s) • Photo points
McGovern #00957	Brown's Gulch RU186	<ul style="list-style-type: none"> • Increase riparian vegetation; decrease noxious weeds and juniper • Reduce soil erosion 	<ul style="list-style-type: none"> • Greenline and/or Photopoint(s)
Mill Gulch Iso. #20450	Mill Gulch RU53B Mill Gulch RU79	<ul style="list-style-type: none"> • Improve channel morphology by reducing streambank impacts • Increase sedges along the greenline 	<ul style="list-style-type: none"> • Greenline and/or Photopoint(s)
Ramshorn	Currant Creek RU-74	<ul style="list-style-type: none"> • Improve channel morphology 	<ul style="list-style-type: none"> • Greenline, woody browse

Allotment Name and #	Stream and Stream Reach	Objective	Monitoring Methodology
#10552	Ramshorn Trib RU76 Ramshorn Trib RU77 Horse Creek RU1 Horse Creek RU73 Ramshorn Cr RU3 Ramshorn trib RU111 Ramshorn trib RU75	and reduce sediment input <ul style="list-style-type: none"> Increase riparian vegetation (willows, sedges, aspen) (cottonwood along RU111) Improve channel morphology Increase riparian vegetation 	regeneration, photo point(s); especially in reaches treated for juniper. <ul style="list-style-type: none"> Belt transects to measure increase in aspen. Greenline and/or photo point(s)
Sand Coulee #20679	Horse Creek RU2	<ul style="list-style-type: none"> Improve channel morphology and reduce sediment input Increase riparian vegetation (willows, sedges, aspen) 	<ul style="list-style-type: none"> Greenline, woody browse regeneration, photo point(s); especially in reaches treated for juniper.
Virginia City Hill #10521	Slade Creek RU198 Slade Creek RU199 Postlewaite Cr. RU201	<ul style="list-style-type: none"> Increase riparian vegetation; decrease noxious weeds and juniper Slow channel entrenchment and allow natural channel evolution to begin healing channel on lower Slade Ck. Improve channel morphology by reducing streambank impacts 	<ul style="list-style-type: none"> Greenline and/or photo points Modified Rosgens (cumulative width/depth ratio) and/or photopoint(s)
Wisconsin Creek #10501	Wisconsin Creek trib. RU135	<ul style="list-style-type: none"> Reduce impacts to spring source Increase cover of wetland vegetation 	<ul style="list-style-type: none"> Photopoint

Issue #4 – Upland Health, Sagebrush Steppe Habitat and Associated Species

The objectives for upland health, sagebrush steppe habitat and associated species are:

- Increase cover and frequency of native perennial herbaceous species where concerns were documented.
- Maintain residual herbaceous cover for ground nesting birds, specifically sage grouse.
- Manage big sagebrush communities in the watershed so that at least 70% provide the vegetation composition and structure to sustain sage grouse populations and other sagebrush obligate species such as antelope and pygmy rabbits.
- Maintain 15-25% of taller sagebrush canopy cover (primarily big sagebrush subspecies), as applicable within site potential.
- Restore open sagebrush communities and enhance elk calving on Copper Mountain and between Mill Gulch and Granite Creek in habitats that are currently dominated by Douglas-fir.
- Restore sagebrush communities in suitable habitats that are currently dominated by juniper.

Monitoring Activities to measure progress towards meeting Upland Health, Sagebrush Steppe Habitat and Associated Species objectives:

- Continue prevention, early detection, treatment and monitoring of noxious weeds in cooperation with Madison counties and other partners.
- Monitor change in migratory bird use in Douglas-fir and juniper (uplands and riparian) treatment areas with control areas. Point count transects will provide baseline (pre-treatment) data and post treatment census data (5 and 10 years after treatment).

Table 2. Site Specific Upland Objectives

Allotment Name and #	Objective	Monitoring Methodologies
Hungry Hollow #10491 Brandon Pasture #20481 Cow Creek #20446 Sand Coulee #20679	Increase frequency and cover of cool season perennial bunchgrasses to protect soil, allow for more efficient precipitation infiltration, provide cover wildlife species and provide forage for wildlife and authorized livestock; decrease noxious weeds. Where applicable, decrease juniper canopy cover.	- Daubenmire; - Quadrat (nested) Frequency - and/or photo points
Cal Creek #10507	Decrease conifers in sagebrush steppe habitat	Belt transects, macroplots and/or photo points

Table 3. Site Specific Objectives for Sagebrush Habitat

Allotment Name and #	Objective	Monitoring Methodologies
Virginia City Hill #10521 Granite-Moore North #10427 Benchmark #20489 Cal Creek #10507 Dry Lakes #20526	Delineate seasonal habitats of sage grouse. Maintain sagebrush canopy cover on sage grouse winter habitats. Maintain herbaceous understory and increase forb composition in sage grouse breeding and brood-rearing habitat.	Aerial and ground lek inventories. Radio telemetry. Habitat characterization using line intercept plots to measure canopy cover of sagebrush and herbaceous understory.

Allotment Name and #	Objective	Monitoring Methodologies
Copper Mountain #10531 Californina Creek #10507 Mill Gulch #10475 Ballard #10456	Restore open sagebrush communities and enhance elk calving on Copper Mountain and between Mill Gulch and Granite Creek in habitats that are currently dominated by Douglas-fir. Restore sagebrush communities in suitable habitats that are currently dominated by juniper.	Line intercept plots to measure canopy cover of sagebrush and herbaceous understory.

Issue #5 – Noxious and Invasive Species

The objectives for noxious and invasive species include:

- Contain, control and/or eradicate existing infestations of noxious weeds using Integrated Weed Management (IWM) methods.
- Prevent new infestations of noxious weeds from getting established in the area.
- Obtain and maintain an inventory of weed locations within the area to help develop priority control objectives and methods.
- Prevent or minimize the spread of cheatgrass.

Monitoring Activities to measure progress towards meeting Noxious and Invasive Species objectives are generally included in upland and riparian monitoring. In addition, specific treatment areas will be monitored or evaluated for site specific objectives through photo points, ocular observation, and/or vegetative transects (Daubenmire, nested frequency, quarter corner, line intercept, etc).

Resource Concern #1 – Threatened and Endangered (T&E) Species including Special Status Species

The objective for Special Status Species is:

- Provide habitat to maintain a viable and diverse populations of native plant and animal species, including special status species.

A habitat management plan (HMP) is scheduled to be completed for Idaho sedge (*Carex idahoensis*) in 2007. The one known population of Idaho sedge in the STR Watershed will be revisited, photographed and mapped prior to the preparation of the HMP. Numbers of Idaho sedge plants will be counted or estimated to serve as the baseline for the HMP. Additional monitoring of Idaho sedge may be accomplished through such things as demographic studies, density, cover, and frequency (inside enclosures versus open areas). Specifics will be worked out and detailed in the HMP.

Point count transects will monitor changes in migratory bird use in conifer treatment areas. Censuses will be conducted pre-treatment and at five and ten years post-treatment.

Resource Concern #2 – Socioeconomics

The objective for socioeconomics is:

- 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 opportunities.

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

Types of Data Collected

Most established permanent vegetative and physical trend transects in the STR Watershed were read and data was updated during 2006. However, to adequately measure progress towards site specific objectives, additional studies will be established in key areas during 2007 or 2008 and baseline data will be gathered. The baseline data will be considered the starting point from which to measure progress towards meeting objectives or effectiveness of management changes implemented beginning in 2007.

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 4).

- Actual livestock and wildlife use. Actual use is the grazing use made on 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 measurement of stream bank alteration, where applicable. This monitoring will occur primarily at established key areas, but may occur in other areas as well. 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 accurately interpret trend data.
- 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 toward meeting management objectives.

Trend data will be collected again in 2016 unless specified otherwise for specific objectives. The STR Watershed will be re-assessed or evaluated during the winter of 2017. In this process, all monitoring data will be summarized, analyzed, interpreted, and evaluated to measure progress toward meeting objectives. Trend data gathered in 2016 will be compared to baseline trend data gathered in 2007 or 2008. 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). For example, if monitoring data shows that progress is being made toward established objectives, current management will be continued or modified slightly as warranted or allowed 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 2011, 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.

Table 4. 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 Staffs	Annually;
Compliance/ Utilization	Utilization – Key Forage Plant Method, Grazed/Ungrazed Method, or Height/weight method.	Range, Wildlife or Fisheries Biologists, Hydrologist	Annually, where applicable
	Stubble height – Stubble Height Method		
	Bank alteration – Stream bank Alteration Methodology as defined by Idaho State Office BLM, 2000		
	Browse use – To be determined		
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

Type	Method	Responsibility	Frequency
Trend (also see Table 3)	Biotic <i>Migratory Bird Census</i> <i>Quadrat Frequency</i> <i>Daubenmire</i> <i>Line Intercept</i> <i>Cover Board</i> <i>Woody Species Regeneration</i> <i>Greenline</i> <i>Macroplots/Belt Transects</i> <i>Photopoints</i> <i>Fire Regime Condition Class (FRCC)</i> <i>Satellite Imagery (as applicable)</i>	Range, Wildlife or Fisheries Biologists, Hydrologists, Foresters, Fuels Specialists	By 2008 where new baseline data is needed. Trend data will be gathered again in 2016
	Physical <i>Cross section</i> <i>Rosgens</i> <i>Cumulative width/depth ratio</i>		
Watershed Evaluation	Analysis, Interpretation, Evaluation and Recommendations	ID team	FY2017

Monitoring Methodology descriptions are available at the Dillon Field Office.

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.