



Beaverhead West Watershed Assessment Report
Dillon Field Office
December, 2007



Middle Fork of Gallagher Creek; July 2007.

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 Beaverhead West Riparian Areas (South)
 Beaverhead West Areas of Conifer Expansion and/or Fuel Loading Concerns

Introduction

This document is a land health assessment of the public lands administered by the Bureau of Land Management (BLM) in the Beaverhead West Watershed (BWW).

This is the first in a series of documents: the Watershed Assessment Report, the Authorized Officer's Determination of Standards, and the appropriate National Environmental Policy Act (NEPA) documentation and subsequent Decision(s) changing management where needed.

The Assessment reports the condition and/or function of public land resources within the BWW to the authorized officer. The authorized officer reviews the findings in this report to determine if the five standards of rangeland health are currently being met. The authorized officer then signs a Determination of Standards documenting where Land Health Standards are met and where they are not.

In addition to the condition/function assessment, the report also contains initial recommendations developed by the interdisciplinary team (IDT) during field assessments. The recommendations in the report focus primarily on livestock grazing and timber and fuels management, but also include other programs, land uses, and activities. These include: noxious weed control, recreation activities, wildlife and fisheries habitat, and road maintenance. Impacts from all uses and programs were assessed and documented as part of this process.

The assessed condition, function and recommendations in the Assessment Report and Determination of Standards will be used in the NEPA process. An environmental assessment (EA) will be written addressing all resource concerns in the watershed. The EA will include all BLM-administered public lands covered in the assessment.

Alternative management will be analyzed wherever it is determined that:

- specific grazing allotments are not meeting the Standards
- allotments are meeting the Standards but have site specific concerns
- there are unhealthy forest conditions in the watershed
- fuels conditions are outside the natural range of variability
- there are other documented resources concerns

Also, if existing grazing management practices or levels of grazing use on public lands are determined to be significant factors in failing to achieve one or more of the five Standards, the BLM is required by regulation (43 CFR 4180.1) to make grazing management adjustments.

Implementation of new plans will begin in 2008, but full implementation of forest treatments, fuels projects, revised grazing plans and/or range improvement projects associated with these plans may take several years.

The new plans will be developed in consultation and coordination with the affected lessees, agencies having lands or managing resources within the area, and other interested parties.

The Dillon Field Office (DFO) completed a new Resource Management Plan (RMP) in February of 2006. This document will provide program guidance in the Dillon Field Office for the next 20 years. The RMP replaces The Dillon Resource Area Management Framework Plan (1979) and the Mountain Foothills Environmental Impact Statement (EIS) - Rangeland Management Program Summary (1981).

By working on a watershed basis, a broader landscape is considered and more consistent management can be applied. It is the BLM's intent to implement watershed management cooperatively. Any changes in livestock management will be implemented through grazing decisions that address allotments or groups of allotments with a common permittee. Forest health and fuels management treatments or projects and any other management projects or changes will be implemented through decisions appropriate for the respective programs.

As with all similar BLM decisions, affected parties will have an opportunity to protest and/or appeal these decisions.

Background

The BWW is located in Beaverhead County, Montana and drains portions of the Blacktail and Pioneer mountain ranges. The watershed lies within Townships 5-10 South and Ranges 8-13 West, Montana Principal Meridian (M.P.M.).

The assessment area covers public lands administered by the BLM from Big Hole Pass in the west to Beaverhead Rock in the east, and from Birch Creek and the Big Hole River in the north, south to Divide Creek in the Blacktail Mountains. The assessment area boundary, shown on the Beaverhead West Assessment Area map, follows grazing allotment boundaries and includes some allotments that are only partially within the watershed. Technically, the assessed area is not a distinct watershed. Watersheds are defined, and designated on maps, by natural topographical boundaries (ie. ridgelines/ drainages). Grazing allotment boundaries are determined by land ownership and these artificial boundaries may not follow topographical features. Therefore, some of the grazing allotments in the assessment area fall within one or more watersheds or hydrologic units. Grazing allotments within these watersheds have been completed in other assessments (e.g., East Grasshopper, Reservoir Creek, Blacktail).

Within the BWW assessment area there are approximately 158,685 total acres of land, of which 92,109 are public lands administered by the BLM. Of the total BLM-administered lands, 90,076 acres are allotted for livestock grazing and 2,033 acres are unallotted. This report addresses only land health conditions on public (BLM) land.

Vegetative Treatments

According to BLM records, several grazing allotments have had vegetation treatments applied, primarily to reduce or remove big sagebrush species and improve herbaceous production. About 577 acres of the Scudder Creek AMP allotment were plowed and seeded with a mix of wheatgrasses and sweet clover in 1961 (Marchesseau Reseeding #470422). Sagebrush on Scudder Creek AMP was sprayed with 2,4-D, again, in 1971. Since then, the sagebrush has

returned and the canopy cover and species composition of seeded species have declined sharply due to annual spring grazing.

On the Red Mine allotment, an estimated 1,530 acres in pastures 2 and 3 (Taylor Creek Spray #470573), and 1,330 acres in pasture 1, (Lower Dyce Creek Spray #470574) were sprayed with 2,4-D and diesel oil in 1965. In 1968, 540 acres in pasture 4 were sprayed with 2,4-D (Jones Ranch Spray #470720).

The Northwest, Northeast, and Grasshopper pastures of the Anderson Field allotment (2,589 acres) were sprayed with 2,4-D and diesel oil in 1968 (Cold Springs Spray #470721). The Middle, South, and Beacon Hill pastures (2,781 acres) were sprayed with 2,4-D the following year (South Grasshopper Spray #474830).

In 1956, 780 acres of the PHW allotment, in what are now the North and South Seeding pastures, were plowed and seeded to introduced wheatgrasses and legumes (PHW Reseeding #470363). In 1959, 1,637 acres of the PHW allotment's South Cross pasture were sprayed with 2,4-D and diesel oil (Cross Ranch Aerial Spray #470388). In 1967, an estimated 4,055 acres were sprayed with 2,4-D in the Bachelor Mountain and Three-Deer Spring pastures (Bachelor Mtn. Spray #470662). In 1969, about 165 more acres of the North Seeding pasture were plowed and seeded (PHW Reseeding 2 #474826).

On the Gallagher Mountain AMP allotment, 2,624 acres were sprayed with 2,4-D in the Gallagher, Henneberry Flats, and Divide pastures during 1969 (Gallagher Mtn. Spray #474832) and 1,270 acres of the Lovell pasture were sprayed with 2,4-D and diesel oil in 1971 (B&H Spray #474887).

Fire History

The presence or absence of fire plays an integral role in the composition and structure of the vegetation that occurs in the BWW. Fire has shaped western landscapes for the past 10,000 years, but more than a century of settlement activities have seriously disrupted that crucial role (Arno 1980, Pyne 1982, Quigley et.al 1996). Since the mid-1800s the frequency of wildland fires occurring in southwestern Montana and the west in general have been reduced by domestic livestock grazing, land use practices, and aggressive fire suppression procedures. Ignitions were primarily due to lightning and Native Americans, who used fire to signal, drive game, rout enemies and green up pastures to ensure the return of game from year to year. Throughout the assessment area the signs of past fires are evident in the form of fire scars on trees, charred pieces of wood, and ash layers in the soil profile. Variance in sagebrush stand structure demonstrates the effects of more recent wildland fire events in sagebrush/grassland communities. Long term fire history is difficult to determine in the sagebrush/grassland communities due to fire generally killing and completely consuming the vegetation.

State, Forest Service, and BLM fire records show that there have been at least thirteen wildland fires within the assessment area between 1981 and 2005. Due to changes in agency record keeping, this number represents the lowest possible number of suppression resource responses during the time period. The most recent large fire was the Clark Canyon Fire in August of 2006,

when 6,639 acres of BLM lands burned within five allotments. Other recent large fires include the 448 acre Circle S fire near Polaris in 2000, and the 168 acre Pipe Organ fire in 1996.

Wilderness Study Areas

There are no areas designated as wilderness in the BWW. The BWW contains portions of the Henneberry Ridge and Farlin Creek Wilderness Study Areas (WSA) which are managed in accordance with the *Interim Management Policy (IMP) for Lands Under Wilderness Review* (BLM Handbook H-8550-1). Management according to this policy is intended to ensure that wilderness values contained in this area are not impaired until such time as Congress either designates these areas as part of the National Wilderness Preservation System, or releases them from further consideration as wilderness. The Henneberry Ridge WSA contains a total of 9,806 acres and the Farlin Creek WSA contains 1,139 acres identified to complement to the USFS's West Pioneer Mountains WSA. The wilderness recommendation for Farlin Creek WSA included 610 acres recommended for wilderness designation adjacent to FS lands. The remaining lands within Farlin Creek WSA, and all of the Henneberry Ridge WSA, have been recommended by the BLM for non-wilderness. Although this was BLM's recommendation to the President in 1991, the entire area currently remains under the management of the IMP.

Prehistory and History of Beaverhead West Watershed

In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resource inventory was completed for a 10% sample of lands within the DFO. Results of the inventory located a mixture of prehistoric and historic sites throughout the watershed. Four areas of unusually high site density were identified by the inventory within the watershed. The BWW was occupied continuously from approximately 10,000 years ago. Prehistoric sites within the watershed consist primarily of small habitation or procurement sites.

Historically, portions of the BWW were explored by Lewis and Clark in the summer of 1805 eventually leading to further explorations during the fur trade in the 1830s. Early settlements were established following the discovery of precious minerals in Bannack in 1862 and later in Argenta in 1865. A stage stop was located near Point of Rocks for the Bannack to Virginia City stage road, which traveled through the watershed providing transportation between these two important mining towns. Early ranching began in the area in 1866 when Michael B. Henneberry established a ranch near Pipe Organ.

The Beaverhead Rock Area of Critical Environmental Concern (ACEC) is one of a few physiographic features mentioned specifically in the journals of Lewis and Clark and is a prominent and important feature of the Lewis and Clark National Historic Trail. While traveling with Lewis and Clark and the Corps of Discovery on August 8, 1805, Sacajawea recognized the point of a high plain. Sacajawea's people knew this prominent landscape feature as "the beaver's head." Recognition of this feature was important to the Corps of Discovery because it informed the company that the land of the Shoshone was not far and they might obtain horses for faster cross country travel. It also told them that the Continental Divide was close at hand, where they would encounter rivers that flow into the Pacific.

Authorized Uses

Forest Products

Forest resources in the watershed have been utilized since the beginning of European settlement during the 1860's. Evidence in the form of old stumps can be found across all ownerships through forested habitats in the assessment area.

Recent forest management activities (timber harvests) on BLM administered lands include:

- 200 acres of salvage harvest of tornado blowdown timber in Sheep Creek, 1984
- 144 acres of patch cut and overstory removal of lodgepole pine on Black Mountain, 1990
- 150 acres of primarily patch cutting of lodgepole pine and one unit of selective harvest of Douglas-fir in Small Horn Canyon, 1993

Treatment of hazardous fuels and salvage of bug-killed timber on approximately 230 acres of BLM-administered lands in the Shale Creek area of the Grasshopper Valley is anticipated to take place in 2007-2010. This action was previously analyzed in the Forest Service Grasshopper Fuels Management EIS. This EIS also analyzed treatment of approximately 150 acres in Krueger Creek, however legal access must be acquired before treatment can be implemented.

Special Recreational Uses

The majority of lands within the BWW are used yearlong for a variety of dispersed recreational uses including hunting, fishing, off-highway vehicle use, camping, and mountain biking. The heaviest recreational use of these lands occurs during the big game hunting seasons, dramatically increasing the intensity of off-highway vehicle use and camping.

Three commercial outfitters are authorized under Special Recreation Use Permits to conduct big game hunting and/or summer horseback riding in all or part of this area. Total commercial use days associated with these permits is approximately 135 client days.

Mineral Resources

The BWW varies greatly in mineral potential. Much of the area has a low potential for locatable minerals, however areas such as around Bannack and the north part of the watershed (mostly Forest Service), have moderate to high potential for locatable minerals. The major minerals mined in the area have been gold (lode and placer), silver and copper. However, there has been a wide variety of other commodities mined over the years. Silica was removed from an open cut at Dalys for use in the smelter at Anaconda. There are, currently, no active Notices or Plans of Operation in the watershed.

The moderate to high mineral potential areas tend to have a number of abandoned mines, but none located on BLM-administered lands are known to be at high risk for environmental damage.

The entire area has potential for saleable minerals such as gravel, decorative stone, etc. There is currently a community pit in Small Horn Canyon where volcanic type stones can be purchased. BLM also has a small gravel pit in the Lovell's Gulch area, that has not been active in a number

of years, and there are numerous other locations throughout the watershed where mineral materials have been removed.

Some oil and gas potential exists in the southern portion of the watershed and there has been exploration activity in this area in years past.

Livestock Grazing

There are 37 individual operators that have grazing permits/leases on 90,076 acres (51 allotments) of public land administered by the BLM in the watershed. The allotments are shown on the map of Beaverhead West Allotments. All allotments in the Dillon Field Office have been categorized as *Improve* (I) *Maintain* (M) or *Custodial* (C) based on resource values and opportunities for improvement. BLM administered public lands provide a large proportion of the late spring, summer and fall forage base in the watershed. There are 13,188 animal-unit months (AUMs) of livestock forage allocated on public lands within the 51 allotments included in this assessment. The livestock grazing allocation and management for allotments within the BWW is displayed in Table 1.

The BLM has worked cooperatively with individual livestock permittees/lessees in the watershed for many years to develop Allotment Management Plans (AMPs) that prescribe grazing management to improve natural resource conditions. About 78% of the BLM administered lands in the watershed are managed under formal AMPs, or have agreed upon grazing systems, that prescribe rest rotation, deferred rotation, a deferred season of use, or dormant season use (Table 1). Less than 15% of the BLM administered acres are in custodial allotments, where BLM management inputs are minimal because of the small proportion of public land in the allotments (see Beaverhead West Allotments map).

The stocking rate on BLM lands within the watershed averages approximately 6.8 acres/AUM and varies from 2.6 to 71.3 acres/AUM. This wide variation is influenced by soils, vegetation, topography (aspect, elevation, and slope), distance from water, and local weather. Cattle (mature individuals or cow/calf pairs) are the primary type of livestock authorized on the allotments. Several allotments are specifically permitted for, or allow flexibility to graze, yearling cattle, sheep, and/or horses.

Table 1. Livestock grazing allocation and management within the Beaverhead West Watershed.

Allotment name, number , and category	Livestock Number & Kind ¹	Season of Use	Grazing System ²	BLM Stocking Rate	BLM AUMs	BLM Acres	Acres in Other Ownership	Total Acres
Anderson Field, 30026, (M)	50 Y	10/01-11/19	RR	6.0	1040	6194	2809	9003
	10 H	03/01-11/12						
	274 C	05/15-06/20						
	281 C	11/01-02/01						
Antelope Butte, 10118, (C)	8 C	05/16-01/12	CU	6.6	63	414	991	1405
Argenta Flats, 10687, (C)	1 C	04/01-01/31	CU	13.6	106	1445	797	2242
	11 C	10/01-06/30						
Bachelor Mountain, 30608, (C)	1 C	05/01-11/30	CU	10.6	8	85	0	85
Barretts, 30014, (M)	60 C	05/10-11/24	RR	6.3	254	1592	1233	2825
Beaverhead Rock, 20537, (C)	4 C	05/15-06/20	CU	24.8	5	124	0	124
Bell Ranch, 20197, (I)	67 C	06/01-10/31	SL	8.2	285	2328	390	2718
Big Hole Road, 10135, (C)	43 C	10/12-04/01	DS	5.6	142	795	494	1289
	115 C	05/01-06/15	SL					
B-Rock, 20599, (C)	2 C	06/01-09/20	CU	6.3	7	44	83	127
Browns Canyon, 20194, (C)	5 C	06/01-11/12	CU	4.6	27	123	0	123
Bryan, 10459, (I)	37 H	10/15-05/01	DS	7.5	122	911	369	1280
Burns Mountain, 10160, (C)	320 C	05/01-05/31	CU	7.6	153	1158	1320	2478
¹ Livestock Kind: C=cattle, Y=yearlings, S=sheep, H=horses ² Grazing System: SL=season long, RR=rest rotation, DR=deferred rotation, DU=deferred use, DS=dormant season use, CU=custodial use								

Allotment name, number , and category	Livestock Number & Kind ¹	Season of Use	Grazing System ²	BLM Stocking Rate	BLM AUMs	BLM Acres	Acres in Other Ownership	Total Acres
Buzztail, 20161, (C)	60 C	10/1-12/31	DS	8.0	69	551	510	1061
Conover AMP, 10117, (M)	720 S	7/15-11/10	DU	15.6	273	4268	2511	6779
	50 C	09/15-11/10						
Farlin Creek, 20191, (I)	14 C	05/17-10/11	RR	20.5	93	1906	6939	8845
	7 C	06/16-09/30						
Flynn Draw, 20538, (C)	8 C	06/01-11/30	CU	8.1	52	420	219	639
Frying Pan, 10131, (I)	170 C	05/01-11/30	SL	8.3	336	2785	5805	8590
Frying Pan Basin, 30691, (C)	3 C	05/01-11/30	CU	6.2	21	131	2167	2298
Gallagher, 20114, (M)	140 C	06/01-10/07	RR	9.4	534	5045	743	5788
Gallagher Mtn AMP, 30013, (I)	1200 C	05/01-11/20	RR/DR	3.4	4177	14214	11219	25433
	15 H	12/01-05/15	DS					
Grasshopper, 30600, (M)	122 C	06/01-07/15	SL	11.4	53	602	1094	1696
Hayden, 10134, (C)	1 C	04/16-09/15	CU	6.6	5	33	292	325
Henneberry Rdg Cust, 20634, (C)	9 C	06/25-07/24	DU	11.4	9	103	431	534
Henneberry Ridge #2, 20171, (M)	20 Y	07/25-10/06	DU	7.4	154	1146	35	1181
	45 C	07/25-10/06						
Hildreth Individual, 30103, (C)	64 S	11/01-02/28	DS	6.3	98	616	644	1260
	12 C	11/01-02/28						

¹Livestock Kind: C=cattle, Y=yearlings, S=sheep, H=horses
²Grazing System: SL=season long, RR=rest rotation, DR=deferred rotation, DU=deferred use, DS=dormant season use, CU=custodial use

Allotment name, number , and category	Livestock Number & Kind ¹	Season of Use	Grazing System ²	BLM Stocking Rate	BLM AUMs	BLM Acres	Acres in Other Ownership	Total Acres
Hogback, 20486, (M)	11 C	03/01-02/28	CU	6.8	354	2393	10366	12759
	19 C	03/01-02/28	CU					
Holland-Carrol Iso., 30618, (C)	2 C	06/01-10/15	CU	52.0	9	468	0	468
Kennison Spring, 20182, (M)	124 C	10/01-02/28	RR	6.6	179	1173	1560	2733
Krueger Creek, 10139, (M)	2 C	06/01-09/30	SL	18.3	8	146	0	146
Lovells Lk Non-AMP, 30605, (C)	4 C	05/01-11/30	CU	9.5	24	229	1161	1390
Lower Reservoir Cr., 760, (C)	3 C	10/21-02/28	DS	13.6	17	231	0	231
	2 C	03/01-04/30						
Meine, 20544, (C)	1 C	06/01-11/30	CU	17.8	4	71	19	90
Meine Cow Camp, 20113, (M)	130 C	10/01-02/28	DS	7.4	45	333	1210	1543
Meine Homestead, 03146, (C)	1 C	06/01-11/30	CU	11.2	5	56	0	56
PHW Allotment, 30031, (I)	320 C	05/16-08/30	RR	7.3	1238	9067	343	9410
	46 C	05/16-08/31						
Pipe Organ Rock, 10110, (M)	7 C	05/15-11/30	CU	12.8	84	1078	918	1996
	25 S	05/15-11/30						
Polaris, 20186, (C)	3 C	05/01-11/30	CU	9.4	21	198	0	198
Rattlesnake, 10510, (C)	16 C	11/25-06/08	CU	15.3	107	1642	865	2507
Rebich, 20174, (C)	10 C	05/09-11/14	CU	5.0	62	309	186	495

¹Livestock Kind: C=cattle, Y=yearlings, S=sheep, H=horses
²Grazing System: SL=season long, RR=rest rotation, DR=deferred rotation, DU=deferred use, DS=dormant season use, CU=custodial use

Allotment name, number , and category	Livestock Number & Kind ¹	Season of Use	Grazing System ²	BLM Stocking Rate	BLM AUMs	BLM Acres	Acres in Other Ownership	Total Acres
Rebich #2, 20184, (C)	5 C	06/01-09/30	CU	36.9	29	1069	0	1069
Red Mine, 30034, (I)	150 C	06/01-09/30	RR	7.4	498	3705	805	4510
Red Spring, 10120, (M)	234 C	11/16-12/15	DS	7.5	228	1705	52	1757
Rocky Hills, 10148, (I)	1343 Y	05/01-06/20	RR	10.3	1544	15906	7243	23149
	986 Y	05/01-05/10						
	1343 Y	05/01-06/20						
Scudder Creek AMP, 30028, (I)	235 Y	05/21-06/20	SL	3.0	221	666	148	814
Selkirk, 20188, (C)	2 C	06/01-10/31	CU	4.7	100	471	0	471
	150 C	09/15-09/27	DU					
Shale Creek, 20718, (C)	1 C	05/15-10/14	CU	71.3	4	285	0	285
Slanger, 20712, (C)	8 C	06/01-08/30	CU	12.1	22	266	63	329
Small Horn Canyon, 20722, (M)	24 C	06/01-11/10	DR	5.7	88	504	245	749
Timber Butte Iso., 30632, (C)	13 C	10/01-02/02	DS	4.7	53	249	604	853
Tucker Creek, 20480, (C)	2 C	06/01-12/14	CU	2.6	16	41	0	41
West Big Hole Road, 10503, (C)	149 C	05/01-06/15	RR	5.5	142	782	1725	2507
	163 C	05/01-06/15						
BLM Totals	4635 C, 3977 Y, 809 S, 62 H			6.8 AVG	13188	90076	68609	158685

¹Livestock Kind: C=cattle, Y=yearlings, S=sheep, H=horses

²Grazing System: SL=season long, RR=rest rotation, DR=deferred rotation, DU=deferred use, DS=dormant season use, CU=custodial use

Process

This assessment was done in accordance with the BLM regulations regarding Rangeland Health Standards (Standards) and other applicable guidance.

- BLM Manual H-4180-1, Rangeland Health Standards Handbook and Guidance for Conducting Watershed-Based Land Health Assessments.
- Code of Federal Regulation 43 CFR, Subpart 4180
- Record of Decision (ROD) - Standards for Rangeland Health and Guidelines for Livestock Grazing Management (S&Gs) for Montana, North Dakota and South Dakota.
- Healthy Forest Initiative
- Healthy Forests Restoration Act
- National Fire Plan

Rangeland Health Standards are described in detail in the ROD Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota, and South Dakota- Western Montana Standards.

The preamble of the Western Montana Standards states: “The purpose of the S&Gs are to facilitate the achievement and maintenance of healthy, properly functioning ecosystems within the historic and natural range of variability for long-term sustainable use.” Standards are statements of physical and biological condition or degree of function required for healthy sustainable lands. Achieving or making significant progress towards these functions and conditions is required of all uses of public lands as stated in 43 CFR 4180.1.

This assessment will report condition and/or function for the following five standards:

- Standard #1 Upland Health
- Standard #2 Riparian /Wetland Health
- Standard #3 Water Quality
- Standard #4 Air Quality
- Standard #5 Biodiversity

In addition, this assessment will report condition and/or function for forest health and fuels. Forest health can affect each of the five standards, but in this assessment will be reflected under Standard #5 Biodiversity, along with other factors that affect biodiversity. These assessments are made on an allotment scale, with the exception of Air Quality and Forest Health which are made at the watershed scale.

Condition/function statements regarding the Standards are made as:

- Proper Functioning Condition (PFC);
- Functioning At Risk (FAR) which is assigned a trend (up, down, static, or not apparent);
or
- Nonfunctioning (NF)

Land Health Standards are met when conditions across an allotment are at PFC or FAR with an upward trend. This is dependent on scope and scale and determined by the Authorized Officer.

Available trend monitoring data, existing inventories, historical photographs and standardized methodology are used by an IDT to assess condition and function. In addition, Ecological Reference Areas are identified by the IDT and used to compare health and productivity of similar sites and soils. Trend monitoring data, riparian assessment data and historic photographs used for this assessment are available at the Dillon Field Office.

Format

The Upland, Riparian, Air Quality, Water Quality, and Biodiversity Standards will follow the following format:

- **Affected Environment** - This section briefly describes the area and resources that were assessed.
- **Findings, Analysis and Recommendations** - This section lists the findings and discloses recommendations developed by the IDT during the field assessments.

Uplands

Western Montana Standard #1: *“Uplands are in Proper Functioning Condition.”*

Procedure to determine conformance with Standard:

The uplands were assessed on an allotment basis according to Interagency Technical Reference 1734-6 “Interpreting Indicators of Rangeland Health.” This qualitative process evaluates 17 “indicators” (e.g., soil compaction, water flow patterns, plant community composition) to assess three interrelated components or “attributes” of rangeland health: soil/site stability, hydrological function, and biotic integrity. The Natural Resource Conservation Service (NRCS) has developed Ecological Site Descriptions based on specific soil types, precipitation zones and location. They describe various characteristics and attributes including what vegetative species and relative percentage of each are expected to be present on the site. The IDT refers to these site descriptions while completing the upland evaluation matrix.

The IDT reviewed the long term trend study data, conducted extensive field surveys, and used the Indicators of Upland Health assessment process to assess the functionality of the upland habitat in the BWW.

The BWW was also evaluated for weed infestations using treatment records and inventories from the Dillon Field Office, the Beaverhead and Madison County Weed Coordinators and the IDT’s collective observations during the field assessments.

Affected Environment

Soils

Soils in the BWV are primarily affected by climate (temperature and precipitation), topography (slope and aspect), and parent material (geology and geomorphology). The soils in this watershed are in the Frigid (generally below 6,400 feet elevation) and Cryic (generally above 6,400 feet elevation) soil temperature regimes. Lands administered by BLM within the BWV receive about 8 to 24 inches of average annual precipitation and fall into the Aridic and Ustic soil moisture regimes. Within the watershed boundary, elevations range from about 4,800 feet, near the Big Hole River, to above 10,000 feet on Baldy Mountain, west of Polaris.

The soils within the watershed formed in alluvium, colluvium, residuum, and glacial till mainly from quartzite, limestone, sandstone, andisite, rhyolite, and granitic rock sources. Major landforms include flood plains, stream terraces, outwash terraces, alluvial fans, escarpments, hills, moraines and mountain slopes. Slopes range from nearly level and undulating (1 to 8 percent), rolling and hilly (8 to 30 percent), to steep and very steep (25 to more than 45 percent). Soil textures are mainly sandy loams, loams, and clay loams; soil depths vary from shallow (less than 20 inches to a root restrictive layer) to very deep (more than 60 inches to a restrictive layer); the relative amount of lime or calcium carbonate within the rooting zone, as measured by observable effervescence with hydrochloric acid, ranges from none to more than 40 percent; salinity and sodicity (alkalinity) occur within the assessment area to a minor extent; rock fragments, both on the soil surface and within the soil profile, range from none to more than 65 percent.

Soil classifications and ecological sites within the assessment area reflect these soil physical and chemical properties and variables. The main soil Orders encountered within the assessment area include: Alfisols, Entisols, Inceptisols, and Mollisols. Major Ecological Sites associated within the upland areas include: Shallow, Limy, Limy Droughty, Droughty, Droughty Steep, Dense Clay, Clayey, Loamy Argillic, and Loamy; within the river and stream areas the major Ecological Sites include: Wet Meadow, Riparian Wet Meadow, Riparian Subirrigated, Subirrigated, and Overflow.

The northeast part of the watershed contains a geologic formation known as the Hogback. The Hogback is partially contained in the southern portion of the Block Mountain ACEC. The Block Mountain ACEC is known for its unique geologic outcrops and is a popular area for geology field camps, geologists, and others interested in studying the formation.

Vegetation

Sagebrush and grassland areas are considered uplands for purposes of this report. According to satellite imagery, 88% of the watershed is classified as sagebrush-steppe and grassland uplands (68% sagebrush, 20% grasslands). Forest and woodland habitats are discussed under Standard #5 Biodiversity.

The variety and distribution of plant communities and seral stages in the watershed area is a function of climate, geology, and soil combined with:

- historic uses (e.g., grazing, mining, etc.)

- short term weather patterns
- disturbance regimes (e.g., drought, fire, floods, and herbivory)

Current vegetative cover was calculated using satellite imagery. Table 2 summarizes the estimated cover types on all land ownerships within the BWW.

Table 2. Summary of acres by general cover type within the Beaverhead West Watershed.

Cover Type	BLM Acreage	% of BLM Acreage	Total Watershed Acreage	% of Total Acreage
Forests	8206	8	100887	22
Grasslands	22368	20	117669	25
Sagebrush / Mountain Shrubs	74944	68	175015	38
Riparian / Mesic Shrubs	672	1	9238	2
Mountain Mahogany	1764	2	3700	< 1
Aspen	489	< 1	2887	< 1
Other (Rock /Water/Ag)	1126	1	55889	12
Totals	109493	100	465285	100

Most of the watershed’s public land uplands are dominated by either grasslands (20%) or sagebrush (68%), including mountain big sagebrush, Wyoming big sagebrush, basin big sagebrush, and three-tip sagebrush. Winterfat is also found on many alkaline sites in the watershed. Some of the prominent herbaceous species included in the grasslands are bluebunch wheatgrass, western wheatgrass, Sandberg’s bluegrass, needle and thread, prairie junegrass, and Idaho fescue. These same cool season grasses are prominent understory vegetation in the sagebrush habitat types. Rubber rabbitbrush, green rabbitbrush, fringed sagewort, and broom snakeweed are common native shrubs found on numerous ecological sites throughout the watershed. If any of these shrubs have greater than 5% canopy cover on a site, it usually indicates that site has been subject to some kind of past disturbance.

Forested habitats occupy eight percent of BLM administered land in the BWW, primarily at higher elevations and on north-facing slopes. A wide elevation variance promotes a diverse mixed conifer forest. Species include Douglas-fir, lodgepole pine, limber pine, Englemann spruce, subalpine fir, whitebark pine, and Rocky Mountain juniper. Also, numerous aspen stands and two species of cottonwoods, black cottonwood and narrowleaf cottonwood contribute to structural diversity and canopy cover.

Scattered, isolated patches of curleaf mountain mahogany are found on rocky slopes and ridges throughout the watershed. It provides year-round cover and forage for deer and is a crucial source of winter forage for many wildlife species.

Special Status Plants

Upland habitats within the BWW currently support at least eleven sensitive plant species. These plants and a brief description of their habitat and any known threats are presented in Table 3.

Table 3. Sensitive plants known or suspected from BLM upland habitats within the Beaverhead West Watershed.

Sensitive Plant Species	Habitat	Threats in the BWW
Beautiful Bladderpod	Open mountain mahogany or limber pine woodlands	May benefit from disturbances that reduce competition
Bitterroot Milkvetch	Sagebrush steppe	May be vulnerable to impacts associated with cattle grazing
Buff Fleabane	Ridge crests, slopes and outcrops	Probably not threatened by anthropogenic sources
Chicken Sage	Sagebrush steppe	Probably not threatened by anthropogenic sources
Hoary Phacelia	Steep talus slopes, often associated with mountain mahogany	Probably not threatened by anthropogenic sources
Idaho Fleabane	Rocky or gravelly slopes and ridges in alpine zones	Probably not threatened by anthropogenic sources
Lemhi Beardtongue	Sagebrush steppe and open coniferous forests	May be vulnerable to impacts associated with cattle grazing, road maintenance and fire suppression
Linearleaf Fleabane	Sagebrush steppe	May benefit from disturbances that reduce competition
Railhead Milkvetch	Sagebrush steppe	May be vulnerable to impacts associated with cattle grazing
Railroad Canyon Wild Buckwheat	Open, often barren slopes and ridgetops	Probably not threatened by anthropogenic sources
Taper-tip Desert-parsley	Moderate to steep slopes and canyon bottoms, often associated with mountain mahogany	Probably not threatened by anthropogenic sources

Findings, Analysis, and Recommendations

Members of the IDT visited all the grazing allotments, as well as the unallotted public land in the BWW during 2007 and completed 17 *Rangeland Health Indicator Evaluation Matrices* on various ecological sites and plant associations. In addition, 30 Daubenmire trend studies, 1 nested-frequency trend study, and 50 permanent photo plots, which were established in the 1970s and early 1980s, were duplicated in 2006 and 2007 to help determine vegetative trend. The data collected were summarized and compared to baseline and interim data providing supporting information for interpreting the upland indicators (see Table 4, Upland Qualitative Assessment Summary).

The vast majority of the uplands in the watershed are functioning properly and meeting the Standard for Upland Health. Conifer expansion into sagebrush/grasslands is affecting Upland Health, and is discussed under the Biodiversity Standard – Forest Health and Fuels Management section. Table 4 outlines the findings at sites throughout the watershed where the IDT completed the Indicators of Rangeland Health evaluation matrix. A moderate departure from expected conditions is analogous to a FAR rating (USDI 2000). Upland sites that were found to be in the none-to-slight or slight-to-moderate departure from expected conditions category are generally considered to be in PFC.

Table 4. Upland qualitative assessment summary for the Beaverhead West Watershed.

Allotment Name, Number, & Category	Ecological Site	Plant Association	Degree of Departure from Expected		
			SOIL SITE STABILITY	HYDROLOGIC FUNCTION	BIOTIC INTEGRITY
Anderson Field, 30026, (M)	Loamy, 10-14" Precipitation Zone (PZ)	Wyoming Big Sagebrush / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Anderson Field, 30026, (M)	Limy, 10-14" PZ	Wyoming Big Sagebrush / Needle and thread	None - Slight	None - Slight	Slight - Moderate
Antelope Butte, 10118, (C)	Limy-Droughty, 10-14" PZ	Wyoming Big Sagebrush / Needle and thread	Slight - Moderate	Slight - Moderate	Moderate
Argenta Flats, 10687, (C)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Needle and thread	Slight - Moderate	Slight - Moderate	Slight - Moderate
Barretts, 30014, (M)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Moderate	Moderate	Slight - Moderate
Bell Ranch, 20197, (I)	Limy-Droughty, 10-14" PZ	Wyoming Big Sagebrush / Needle and thread	None - Slight	None - Slight	None - Slight
Big Hole Road, 10135, (C)	Loamy-Droughty, 10-14" PZ	Needle and thread / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Bryan, 10459, (I)	Loamy, 7-10" PZ	Needle and thread / Blue Grama	Slight - Moderate	Slight - Moderate	Slight - Moderate
Burns Mountain, 10160, (C)	Loamy-Droughty, 10-14" PZ	Needle and thread / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Buzztail, 20161, (C)	Limy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Frying Pan, 10131, (I)	Limy, 10-14" PZ	Needle and thread / Blue Grama	None - Slight	Slight - Moderate	Slight - Moderate
Henneberry Ridge #2, 20171, (M)	Limy, 10-14" PZ	Needle and thread / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Hogback, 20486 (M)	Limy-Droughty, 7-10" PZ	Needle and thread / Blue Grama	None - Slight	None - Slight	None - Slight
Kennison Spring, 20182, (M)	Loamy-Limy, 10-14" PZ	Wyoming Big Sagebrush / Western Wheatgrass	None - Slight	None - Slight	None - Slight
Meine Cow Camp, 20113, (M)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight

Allotment Name, Number, & Category	Ecological Site	Plant Association	Degree of Departure from Expected		
			SOIL SITE STABILITY	HYDROLOGIC FUNCTION	BIOTIC INTEGRITY
PHW Allotment, 30031, (I)	Loamy-Droughty, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Slight - Moderate	Slight - Moderate	Slight - Moderate
Pipe Organ Rock, 10110, (M)	Limy-Droughty, 10-14" PZ	Needle and thread / Bluebunch Wheatgrass	None - Slight	None - Slight	None - Slight
Polaris, 20186, (C)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	None - Slight	Slight - Moderate	Slight - Moderate
Rattlesnake, 10510, (C)	Limy, 7-10" PZ	Needle and thread / Blue Grama	Slight - Moderate	Slight - Moderate	Slight - Moderate
Red Mine, 30034, (I)	Limy-Droughty, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Slight - Moderate	Slight - Moderate	Slight - Moderate
Rocky Hills, 10148, (I)	Limy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Slight - Moderate	Slight - Moderate	Slight - Moderate
Rocky Hills, 10148, (I)	Limy, 10-14" PZ	Mountain Big Sagebrush / Bluebunch Wheatgrass	None - Slight	Slight - Moderate	Slight - Moderate
Scudder Creek AMP, 30028, (I)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Slight - Moderate	Moderate	Moderate
West Big Hole Road, 10503, (C)	Loamy, 10-14" PZ	Wyoming Big Sagebrush / Bluebunch Wheatgrass	Slight - Moderate	Slight - Moderate	None - Slight

On the sites rated PFC or FAR with an upward trend, the quantitative monitoring data supports the findings of the IDT. The ecological condition at these upland sites is stable or improving. Evidence of erosion appears to be remnant of historical impacts, and generally matches what is expected for that ecological site. Tall cool season bunchgrasses, specifically bluebunch wheatgrass, are moderately reduced in many sites throughout the watershed in comparison to the Ecological Site Guides. This is likely due to long-term spring and summer cattle grazing in these areas. The IDT also found sites that were in excellent ecological condition and used them as Ecological Reference Areas.

Forty-five grazing allotments, as well as the unallotted parcels, comprising 94% of the public uplands in the BWW assessment area, are functioning properly under existing management. Six allotments, comprising approximately six percent of the public uplands in the BWW, are FAR with a static or downward trend.

On the Scudder Creek AMP allotment, trend data indicates a declining vegetative trend, or ecological state, and estimates total vegetative canopy cover at 34%. The crested and western wheatgrasses that were previously seeded are nearly non-existent. Present erosion exceeds what is expected for that ecological site, as evidenced by pedestals around the vegetation, water flow patterns larger than expected, especially in plant interspaces, and moderate soil surface loss. Annual production and litter amount are moderately below what is expected, as is the reproductive capability of the perennial plants. The IDT also noted a shift in plant community composition that is likely contributing to reduced infiltration and increased runoff.

Trend data from studies on the Frying Pan allotment suggest static to downward trends in species composition and canopy cover of cool season bunchgrasses. An area of particular concern is located about one mile south of Overnight Reservoir, where the IDT noted active gullying, a shift toward warm-season grasses, and a decline in canopy cover of needle and thread and bluebunch wheatgrass, resulting in decreased infiltration and increased runoff. Annual production is also moderately reduced on this site.

An IDT tour of the approximately 40 BLM-administered acres in the B-Rock allotment revealed unauthorized horse-use by a non-permittee using adjacent deeded land. This allotment is an isolated, hilltop parcel comprised of very shallow soils. Although there is a lack of vegetation on this parcel, the site potential is very low and the rocky composition prevents erosion from being a concern.

On the Antelope Butte allotment, the IDT estimated bare ground at 44% and noted some soil erosion, as evidenced by water flow patterns and active pedestalling. The amount of litter, annual production, and the reproductive capability of perennial plants were all moderately reduced, relative to what is expected for the site.

On the east side of the Rattlesnake allotment, the IDT noted water flow patterns and pedestalling, particularly in and near livestock trails, and a shift from cool-season bunchgrasses toward warm-season grasses. The greatest concerns expressed by the IDT are the lack of annual production and the low reproductive capability of perennial plants, which were moderately less than what is expected for the site. The only seedheads are on grasses located in patches of prickly-pear cactus and the winterfat has low production and vigor. Uplands on the west side of the Rattlesnake allotment, which is rarely grazed due to a lack of water, are PFC.

On the Beaverhead Rock allotment, the IDT noted heavy grazing and horse use on approximately 80 acres in the north pasture. This area receives extensive trailing as livestock travel from state and deeded lands to a deeded water source. The vegetation was dominated by blue grama, needle and thread, prickly-pear cactus, and broom snakeweed. While this ecological site is not very productive, the cool-season grasses were difficult to locate. Conversely, the approximately 40 acres in the south pasture exhibited productive bluebunch wheatgrass and needle and thread and much less broom snakeweed. The south end is separated from the north by a fence and is further from water.

The Anderson Field, PHW, and Rocky Hills grazing allotments were meeting the upland standard, overall, but the IDT identified concerns in specific pastures. In the Middle Chandler

pasture, of the Anderson Field allotment, the IDT noted moderate soil compaction and moderately reduced reproductive capability of perennial plants, relative to what is expected for the site. The IDT also observed slight to moderate reductions in the amount of litter and annual production, as well as a shift in the dominant functional/structural groups away from cool season bunchgrasses. The uplands in the remaining pastures are either PFC, or FAR with an upward trend.

On the PHW Allotment, the IDT noted that conditions in most of the uplands matched what is expected for the sites and are at, or near, PFC. In the North Seeding pasture, however, the IDT expressed concerns about the reduced production and vigor of the grasses and the greater than expected proportion of bare ground.

In the Browns Spring pasture of the Rocky Hills allotment, trend data and IDT observations indicate a decline in canopy cover and composition of bluebunch wheatgrass and an overall reduction in annual production and vegetative litter. The Windmill East pasture had moderately more water flow patterns than expected and a decline in reproductive capability of perennial grasses.

Other IDT concerns are a decline in the composition and vigor of cool-season bunchgrasses on the Argenta Flats allotment, unauthorized grazing by feral goats impacting mountain mahogany on and near the Barretts allotment, off-highway vehicle use on the Kennison Spring and Rattlesnake allotments, and noxious weed and cheatgrass infestations that are discussed below.

The upland plant composition along the forest/sagebrush ecotone and within mid-elevation aspen stands, within the BWW, is changing toward a more conifer-dominated community. Aerial photographs show the spread of coniferous forest species downslope onto benches previously dominated by sagebrush and cool season grasses. The spread of primarily Douglas-fir and Rocky Mountain juniper can be attributed, in part, to the reduced frequency of wildfire. This is discussed in more detail in the Biodiversity Standard # 5 and Forestry/Fuels sections of this report.

Noxious Weed and Cheatgrass Infestations

Three noxious weeds of concern, leafy spurge, spotted knapweed, and houndstongue, were found in the BWW. Leafy spurge, a very aggressive noxious weed, is found in three small infestations in the BWW. One is an infestation that was found in a small adit on the Bill Hill road in the Gallagher allotment, the second is on a small unallotted parcel along the Big Hole River and the third is found in the bottom of a draw in the Beaverhead Rock allotment. All these infestations are small enough that containment and eventual eradication are possible; in fact no plants were found in the Gallagher allotment site in 2007.

Spotted knapweed is one of the more aggressive noxious weeds in the area administered by the Dillon Field Office. Spotted knapweed is found scattered in small infestations throughout the watershed, primarily along roads accessible to the public. Another invasive plant in the knapweed family, diffuse knapweed, is found along the Airway Beacon road in the Pipe Organ allotment. Because of where they are found, the potential is high for these knapweeds to be spread by vehicles, livestock, wildlife, recreation and other activities.

Houndstongue, a noxious weed that is toxic to animals due to high levels of alkaloids contained in the plant, is found scattered in trace amounts in various locations within the watershed along roads, trails, and streams. Because of its seed's ability to cling to hair and clothing, the potential is high for it to be spread rapidly within the watershed.

Other noxious or invasive weeds present as small widely scattered infestations in the watershed include cheatgrass, black henbane, and Canada thistle. Cheatgrass is found in small patches throughout the watershed primarily on south and west facing slopes where there has been some past disturbance. Black henbane is found primarily along roads and disturbed sites within the area. Canada thistle is common in riparian bottoms that have had past disturbance.

Since 1989, BLM has been involved in cooperative control efforts with Beaverhead County and private land owners in the BWW area. Throughout this period, the goal has been to prevent new noxious weed infestations and control or eradicate existing infestations in Beaverhead County using Integrated Pest Management.

In the Ney ranch area, along the Beaverhead River, ten releases of a stem boring weevil (*Ceutorhynchus litura*) were made on Canada thistle in 2004. Due to the small size of the spotted knapweed infestations, no biological controls have been released. Herbicide treatments have been applied primarily by ground; however, an aerial application in the Bill Hill/Gallagher Creek area was conducted in 2005. Table 5 shows the herbicide treatments applied in the BWW, including the aerial treatments mentioned above, during the past four years.

Table 5: Acres treated and inventoried for noxious weed infestations within the Beaverhead West Watershed.

Year	Acres Treated	Acres Inventoried
2004	50	6,200
2005	240	4,000
2006	40	5,000
2007	80	5,000

Special Status Plants

Competition from invasive, introduced species and noxious weeds, especially spotted knapweed, yellow sweet clover, and cheatgrass, may pose the biggest threat to the sensitive plant species that are found in upland habitats in the BWW.

Lemhi beardtongue, Bitterroot milkvetch, and railhead milkvetch are palatable and are sensitive to intensive grazing, especially during spring and early summer. A large number of fruiting Bitterroot milkvetch plants were observed in the Rocky Hills allotment in late June, 2007. The area had not been grazed by cattle and there wasn't any evidence of wildlife herbivory.

Recommendations for Upland Health

1. Consider adjusting grazing management on Antelope Butte so that grazing occurs after seedripening of cool-season bunchgrasses or incorporate occasional rest.

2. Consider rehabilitating the Scudder Creek AMP allotment using, either native or introduced, grasses and forbs, and adjusting grazing management to prevent continued annual spring grazing. Grazing management options may include alternating rest between the two pastures and adjusting active AUMs until the vegetation had recovered.
3. Improve livestock distribution on the Frying Pan allotment using water and salting locations. Cross-fencing the middle pasture may be an option if other methods are not effective. Develop a grazing rotation that includes rest or deferment to mitigate the decline in cool-season bunchgrasses.
4. Consider reducing the frequency of spring grazing on the east side of the Rattlesnake allotment and explore opportunities to develop water on the west side.
5. Consider creating a livestock lane across the north end of the Beaverhead Rock allotment that will allow livestock to trail from state land to water, on deeded property, and removing livestock grazing from the allotment.
6. Consider eliminating livestock grazing on the B-Rock allotment and schedule for disposal.
7. Adjust livestock grazing to reduce the length of time livestock spend in each pasture on the Anderson Field allotment.
8. Adjust grazing management on the PHW allotment to prevent spring grazing in the North Seeding pasture in consecutive years and shorten the grazing period in each pasture.
9. Adjust grazing management on the Rocky Hills allotment to include rest and/or deferment.
10. Continue to maintain or improve upland health in the 19 allotments and the unallotted parcels of public land that exhibit healthy or improving upland conditions.
11. Continue or increase the use of Integrated Weed Management tools to treat noxious weeds within the BWW with spotted knapweed being the highest priority noxious weed to treat. Where accessible and cost effective, treat houndstongue to prevent further spread. When a biological control for houndstongue is approved for use by the Animal and Plant Health Inspection Service (APHIS), release these insects into the larger infestations, generally along riparian areas, in the BWW to help control the spread of houndstongue.
11. Continue to address localized weed infestations cooperatively with Beaverhead and Madison Counties, other landowners, and partners, as appropriate. Continue the existing education effort on weed identification with permittees and other people who use this area.
13. Maintain intensive treatment efforts on the three known leafy spurge infestations to reduce their vigor and eventually eradicate these infestations.
14. Establish study plots to help develop appropriate measures to reduce the size and expansion of cheatgrass infestations within the BWW.

Riparian and Wetland Areas

Western Montana Standard #2: *"Riparian and wetland areas are in proper functioning condition."*

Procedure to determine conformance with Standard:

The BWW contains both lotic (e.g., streams) and lentic (e.g., ponds, wet meadows) systems. Lotic and Lentic Riparian Area Management Assessment Methodologies (TR 1737-15 and TR 1737-16), also known as PFC Assessment Methodologies, were used to evaluate riparian systems.

Monitoring data obtained through Montana Riparian Wetland Assessment (MRWA) and riparian coverboard methodologies were used to help support the IDT in the assessment process. Prior to the IDT's assessment, BLM personnel re-read established coverboard plots and inventoried streams and wetlands in the watershed using the MRWA method. Dillon Field Office staff assessed streams and wetlands during the 2006 and 2007 field seasons. MRWA and coverboard monitoring data (where available) were evaluated and considered before making a functionality call on each stream.

Federal protection of wetlands and riparian systems became official policy under the authority of two Executive Orders issued in 1977. The majority of developed springs in the BWW were developed prior to the issuance of these orders, other federal laws, directives, or regulations for the management and protection of wetlands (Mitch 1986). Current management direction requires minimization of wetland loss or degradation as well as preservation and enhancement of natural and beneficial values. This includes maintenance of hydrology. Alternatives analyses are conducted to determine whether it is feasible to develop springs and where spring boxes might be best located to maintain resource values. Management, restoration and conservation of springs are resource management objectives for the BLM.

Many of the resources within the DFO stream and wetland database have been identified based upon mapped information, aerial photos, and USGS Quads. As part of the BWW assessment process, the resource inventory has been updated based upon field notes, photographs and ground surveys. The riparian areas within the BWW are illustrated on the maps of Beaverhead West Riparian Areas (North & South).

Affected Environment

The BWW assessment area is located within three Level 4 USGS Hydrologic Units. The USGS Hydrologic Units become progressively smaller as the level increases and are nested, (i.e., a group of level six units comprise a level five unit; a group of level five units comprise a level four unit). Portions of Beaverhead River, Red Rock River, and Big Hole River hydrologic units are all located in the BWW assessment area.

There are approximately 36 miles of streams within the BWW. Major streams within BWW include Bill Hill, Frying Pan, and Gallagher Creeks, which drain to the Beaverhead River; Farlin,

Krueger, and Shale Creeks, which drain to Grasshopper Creek; and Sheep Creek, which drains to Blacktail Deer Creek.

Wetland and soil survey information within the assessment area are limited. The Montana/Dakotas BLM is working with and providing funding to NRCS and the Montana Department of Environmental Quality (DEQ). The NRCS is conducting a soil survey of Beaverhead County, which will include wetland soils, and the DEQ is working to develop a National Wetland Inventory (NWI) that will greatly assist the BLM in quantifying existing wetland resources.

Riparian habitats along the Beaverhead and Big Hole Rivers are primarily cottonwood/redosier dogwood. Habitats associated with mountain streams include spruce/dogwood, spruce/sweetscented bedstraw, cottonwood/snowberry, Douglas-fir/redosier dogwood, and geyer willow/redosier dogwood. Habitat associations that include sedges and willows (plants with deep binding root masses) tend to provide higher levels of bank stability. Of these habitat associations found in BWW, the spruce types are the most unstable and susceptible to impacts from disturbance.

Special Status Plants

A small population of Ute ladies'-tresses which is listed as threatened in Montana is known from privately-owned wetlands located within the BWW. Systematic surveys for Ute ladies'-tresses conducted in 1997 across potential habitat in southwest Montana failed to discover Ute ladies'-tresses on BLM lands (Heidel 1998). Riparian and wetland habitats within the BWW currently support at least five sensitive plant species. These plants and a brief description of their habitat and any known threats are presented in Table 6.

Table 6. Sensitive plants known or suspected from BLM riparian and wetland habitats within the Beaverhead West Watershed.

Sensitive Plant Species	Habitat	Threats in the BWW
Idaho Sedge	Subirrigated soils and streamside meadows associated with low-gradient streams, springs & seeps.	May be vulnerable to impacts associated with cattle grazing and competition with Kentucky bluegrass
Meadow Lousewort	Wetlands and riparian meadows	May be vulnerable to hydrologic alterations
Mealy Primrose	Saturated, often calcareous wetlands and wet meadows	May be vulnerable to impacts associated with cattle grazing and hydrologic alterations
Rocky Mountain Dandelion	Open riparian and wetland areas	May be vulnerable to competition from the introduced dandelion
Slender Thelypody	Moist swales & alkaline meadows	May be vulnerable to impacts associated with cattle grazing

Developed Springs

Historically, the sole purpose for these spring developments was to provide water for livestock. As such, livestock exclosures around spring sources were minimal. The IDT did not do a comprehensive inventory of spring sources, many of which date back fifty years or more. The

IDT did look at a number of developed springs. Construction techniques typically altered hydrology and diminished resource values. In some cases a small area was fenced to protect the spring, but in many cases the spring source was not protected. Often spring structures have fallen into disrepair and fences have become dysfunctional. Well managed springs have the potential to support rare plants, macroinvertebrates, insects, fish, springsnails, amphibians and migratory birds as well as to provide water for wildlife and livestock.

According to the Range Improvement Project database (June 2007) there are 30 developed springs in the BWW. Six of these are in the Anderson Field allotment. There are five spring developments each in the Conover AMP and Gallagher allotments, and four spring developments on the Rocky Hills allotment. The PHW and Red Mine allotments have two spring developments each, while the Bell Ranch, Frying Pan, and Scudder Creek AMP allotments each have one spring development.

Findings, Analysis and Recommendations

Riparian condition of streams, springs, ponds, potholes and wet meadows was placed into one of five categories: Proper Functioning Condition (PFC), Functioning At Risk with an Upward trend (FAR Up), Functioning At Risk with a static trend or no apparent trend (FAR), Functioning At Risk with a Downward Trend (FAR Down), or Non Functional (NF) using the lentic and lotic methodologies described above. The functional ratings of perennial streams, springs, and meadows/ponds are shown in Tables 7-11.

Table 7. Riparian (lotic) resources in the Beaverhead River Hydrologic Unit.

Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles
N/A	Beaverhead River	Ney Ranch	1	Coyote willow	PFC	0.83
“	Beaverhead River	Ney Ranch	2	Coyote willow	PFC	2.15
“	Beaverhead trib	Grasshopper	3	Geyer willow / beaked sedge	PFC	0.40
“	Beaverhead trib	Grasshopper	4	Nebraska sedge	PFC	0.45
“	Beaverhead trib	Gallagher	71	Nebraska sedge	PFC	0.38
“	Little Basin Canyon	Gallagher Mtn AMP	81	Geyer willow / beaked sedge	PFC	0.47
“	Lovells Gulch	Gallagher Mtn AMP	80	Geyer willow / beaked sedge	FAR Up	0.65
Bill Hill Creek	Bill Hill Creek	Gallagher	13	Beaked sedge	PFC	0.74
“	Bill Hill Creek	Gallagher	14	Geyer willow / Kentucky bluegrass	FAR	1.26
“	Bill Hill trib	Gallagher	35	Quaking aspen / Kentucky bluegrass	FAR	0.73

Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles
Bill Hill Creek	Bill Hill trib	Gallagher	78	Beaked sedge	FAR	0.72
“	Bill Hill trib	Gallagher	79	Geyer willow / beaked sedge	FAR	0.25
Blacktail Deer Creek	Sheep Creek	Conover	84	Douglas-fir / redosier dogwood	PFC	1.12
“	Sheep Creek WF	Unallotted	82	Geyer willow / beaked sedge	PFC	0.59
“	Sheep Creek WF	Conover	83	Engelmann spruce / redosier dogwood	PFC	0.77
“	Sheep trib	Flynn Draw	6	Beaked sedge	FAR	0.08
“	Sheep trib	Flynn Draw	7	Beaked sedge	FAR Up	0.31
“	Sheep trib	Gallagher Mtn AMP	8	Beaked sedge	PFC	0.21
“	Sheep trib	Gallagher Mtn AMP	9	Beaked sedge	PFC	0.51
“	Sheep trib	Flynn Draw	30	Engelmann Spruce / redosier dogwood	FAR	0.53
“	Sheep trib	Gallagher Mtn AMP	31	Beaked sedge	PFC	0.57
“	Sheep trib	Conover	85	Englemann spruce / horsetail	PFC	0.62
“	Sheep trib	Gallagher Mtn AMP	86	Geyer willow / beaked sedge	PFC	0.45
“	Sheep trib	Meine	95	Geyer willow / beaked sedge	PFC	0.27
Gallagher Creek	Gallagher Creek	Gallagher Mtn AMP	23	Douglas-fir / redosier dogwood	PFC	0.56
“	Gallagher Creek	Gallagher	24	Narrowleaf cottonwood / common snowberry	FAR Up	0.26
“	Gallagher Creek	Gallagher	25	Narrowleaf cottonwood / common snowberry	FAR Up	0.74
“	Gallagher Creek	Gallagher	26	Narrowleaf cottonwood / common snowberry	FAR Up	0.83
“	Gallagher Creek trib	Gallagher Mtn AMP	22	Douglas-fir / redosier dogwood	PFC	0.28
“	Gallagher Creek trib	Gallagher Mtn AMP	28	Geyer willow / beaked sedge	PFC	0.12
“	Gallagher trib	Gallagher	74	Quaking aspen / redosier dogwood	FAR Up	0.27
“	Gallagher trib	Gallagher	75	Nebraska sedge	FAR	0.10
“	Gallagher trib	Gallagher	76	Nebraska sedge	FAR	0.10

Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles
Grasshopper Creek	Farlin Creek	Farlin Creek	19	Engelmann spruce / redosier dogwood	FAR Up	0.94
“	Farlin Creek	Farlin Creek	20	Engelmann spruce / redosier dogwood	FAR Up	0.58
“	Krueger Creek	Krueger Creek	55	Quaking aspen / redosier dogwood	PFC	0.58
“	Scudder Creek	Farlin Creek	33	Douglas-fir / redosier dogwood	FAR	1.05
“	Shale Creek	Shale Creek	53	Engelmann spruce / horsetail	PFC	0.26
“	Taylor Creek	Red Mine	43	Coyote willow	FAR	0.88
“	Taylor Creek	Red Mine	44	Quaking aspen / redosier dogwood	FAR	0.50
“	Taylor Creek	Holland - Carroll Isolated	89	Geyer willow / beaked sedge	FAR	0.20
“	Taylor Creek	Holland - Carroll Isolated	98	Engelmann spruce / sweetscented bedstraw	PFC	0.48
“	Taylor Creek	Holland - Carroll Isolated	99	Engelmann spruce / sweetscented bedstraw	PFC	0.42

Table 8. Riparian (lotic) resources in the Big Hole River Hydrologic Unit.

Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating	Miles
N/A	Big Hole River	Bryan	45	Narrowleaf cottonwood / redosier dogwood	PFC	0.34
“	Big Hole River	Rattlesnake	46	Narrowleaf cottonwood / redosier dogwood	PFC	0.60
“	Big Hole River	Bryan	47	Narrowleaf cottonwood / redosier dogwood	PFC	0.47
“	Big Hole River	Rattlesnake	48	Narrowleaf cottonwood / redosier dogwood	PFC	0.50
“	Big Hole River	Rattlesnake	49	Narrowleaf cottonwood / redosier dogwood	PFC	0.37
“	Big Hole River	Rattlesnake	50	Narrowleaf cottonwood / redosier dogwood	PFC	0.29
“	Big Hole trib	Tucker Creek	10	Narrowleaf cottonwood / redosier dogwood	PFC	0.21
“	Big Hole trib	Tucker Creek	11	Narrowleaf cottonwood / redosier dogwood	PFC	0.28

Table 9. Riparian (lotic) resources in the Red Rock River Hydrologic Unit.

Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating	Miles
Horse Prairie Creek	Browns Canyon	PHW	60	Nebraska sedge	PFC	0.25
“	Cedar Creek	Rocky Hills	96	Coyote willow	NF	0.41
“	Watson Creek	PHW	34	Nebraska sedge	FAR	2.75
“	Watson Creek SF	PHW	38	Geyer willow / beaked sedge	FAR	1.04
“	Watson Creek SF	PHW	39	Geyer willow / beaked sedge	FAR Up	0.42
“	Watson Creek SF	PHW	40	Geyer willow / beaked sedge	FAR	0.28
“	Watson Creek trib	PHW	61	Nebraska sedge	FAR	0.48
Sage Creek	Divide Creek	Gallagher Mtn AMP	42	Geyer willow / beaked sedge	PFC	1.30
“	Divide Creek trib	Gallagher Mtn AMP	87	Geyer willow / beaked sedge	PFC	0.12

Table 10. Wetland (lentic) resources within the Beaverhead West Watershed.

Major Stream	Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating	Acres
Big Hole River	N/A	Tucker Meadow	Tucker Creek	21	Narrowleaf cottonwood / Kentucky bluegrass	PFC	40.00
Beaverhead River	Grasshopper Creek	Steel Creek	Farlin Creek	32	Douglas-fir / redosier dogwood	FAR UP	4.76
“	Grasshopper Creek	Eli Spring	Unalloted	70	Nebraska sedge	FAR	2.26
“	Grasshopper Creek	Grasshopper trib	Red Mine	56	Nebraska sedge	FAR	22.30
“	Beaverhead trib	Gravel Pit Pond	Gallagher	5	Common cattail	PFC	0.59
“	Gallagher Creek	Gallagher Butte Pothole	Gallagher Mtn AMP	93	Beaked sedge	PFC	1.38
Red Rock River	Horse Prairie Creek	Watson Creek	PHW	62	Quaking aspen / redosier dogwood	PFC	3.47

Table 11. Spring resources within the Beaverhead West Watershed.

Major Stream	Minor Stream	Resource	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating
Beaverhead River	N/A	Beacon Spring	Gallagher	73	Geyer willow / beaked sedge	FAR Up
“	Frying Pan Creek	Albers Spring	Bell Ranch	52	Nebraska sedge	FAR
“	Gallagher Creek	Gallagher Mtn Spring	Gallagher Mtn AMP	97	Geyer willow / beaked sedge	PFC
“	Gallagher Creek	Push Up #1	Gallagher Mtn AMP	72	Beaked sedge	PFC
“	Blacktail Deer Creek	Ashbough Spring	Conover AMP	88	Nebraska sedge	PFC

Across the BWW, 49% of the lotic (i.e., streams, rivers) resources are properly functioning and 19% are functional-at-risk with an upward trend. Thirty-one percent of the lotic resources are rated as functional-at-risk and one percent is rated as non-functional. The following is not an all encompassing list of conditions found by the IDT during the assessment, but explains the issues and concerns that prevented certain reaches from meeting Western Montana Standard #2.

General resource concerns observed by the IDT include alteration of stream morphology (channel shape and gradient), sedimentation and deposition, and composition, cover, structure, and vigor of streamside vegetation. Some additional observations, frequently noted when inspecting spring developments, are reduced wetland function due to soil compaction, loss of vegetation, loss of the potential for diversity of life forms, leaking troughs, poor location of troughs, and missing wildlife escape ramps. The enclosure at Albers Spring (52) was recently repaired, but there are livestock impacts around the spring source that are affecting its soil-water storage capacity.

Reaches and tributaries of the Big Hole River (45-50) in the Bryan, Rattlesnake, and Tucker Creek allotments are in properly functioning condition.

Scudder Creek (33) is an interrupted stream that flows through the Farlin Creek allotment. It has been subjected to heavier utilization while the Farlin Creek pasture has been rested. Scudder Creek is overwidened and moving laterally due to livestock trailing, has poor willow regeneration, and has several headcuts.

The upper reaches of Taylor Creek (98 & 99) flow through an Engelmann spruce/sweetscented bedstraw community type on the Holland–Carroll Isolated allotment and are properly functioning. Downstream, Taylor Creek (89) changes to a geyer willow/quaking aspen community type. This reach has decadent willows with no middle age-class and poor recruitment, is overwidened, shows signs of bank shearing, and has abnormal hydrologic heaving (hummocking) in the seeps adjacent to the stream. Livestock grazing is physically impacting

this reach, but wildlife are likely responsible for the poor willow vigor and recruitment. Water is also diverted from this reach in several locations for irrigation on adjacent deeded property.

On the Red Mine allotment, Taylor Creek (44) crosses BLM, but is fenced in with a deeded pasture. This reach has many decadent willows with poor quaking aspen and willow regeneration. It is also overwidened and shows signs of active streambank shearing at livestock crossings, waterholes, and anywhere that the stream is not armored. After crossing several miles of deeded land, Taylor Creek (43) returns to BLM-administered land and becomes an intermittent, and possibly an interrupted, system. Reach 43 has poor willow recruitment and very little obligate riparian vegetation. This reach is entrenched in several locations because the poor vegetative cover is not able to dissipate energy and stabilize the streambank during high-flow events. Livestock are likely impacting this reach, but use has been fairly limited due to poor water availability. The few willows that are found along reach 43 are heavily browsed and significant moose sign was found nearby. Houndstongue, spotted knapweed, and black henbane are abundant along the lower portion of this reach. This reach reemerges as several springs, just north of the Taylor Creek Road, and is perennial for the remainder of its length. Reach 56 is a Nebraska sedge wetland, also on the Red Mine allotment, that receives heavy grazing pressure and has extensive hummocking, which has reduced the soils water-storage capacity, and does not have a defined channel.

Watson Creek flows through the PHW allotment. The Watson Creek road parallels Watson Creek and in some places the road goes through wet meadows and wetland soils. The mainstem of Watson Creek (34 & 61) is a Nebraska sedge community type, a disclimax type according to Hansen et al. (1995). These reaches have old, decadent willows with no diversity of age-classes, no clearly defined channel, extensive hummocking, and trailing and hoof impacts along their banks. The south fork of Watson Creek (38 & 40) has no middle age-class of quaking aspen or willow and has poor willow regeneration. These reaches also exhibit trailing, hummocking, some entrenchment, and overwidening was noted at crossings on the upper end of reach 40.

The reach of Cedar Creek (96) on the Rocky Hills allotment is non-functional and livestock grazing is a contributing factor. A recent high-flow event deposited a large sediment load at the bottom of the reach and debris from an old fence or enclosure was also strewn along the reach. There is very little water in the Rocky Hills allotment and this lower reach is a perennial water source. Upstream, Cedar Creek (Spring Gulch) only carries storm runoff, so there is increased pressure on this limited resource. Eli Spring (70) is on an unallotted parcel that is fenced within the Rocky Hills allotment. This parcel was grazed by livestock prior to BLM acquiring it and, more recently, has had unauthorized livestock grazing due to gates being left open. This wetland has altered flow patterns and extensive hummocking, with exposed soil on the hummocks and facultative riparian vegetation on their tops.

The headwater tributaries of Sheep Creek flow through the Gallagher Mountain AMP and Flynn Draw Allotments. Reaches 8, 9, and 31 are properly functioning and reach 7 is functional-at-risk with an upward trend. Reaches 6 and 30 are functional-at-risk due to overwidening, active streambank shearing, and extensive hummocking due to livestock grazing.

Downstream, along the mainstem and the west fork of Sheep Creek (82, 83, & 84) in the Conover Allotment, the stream type changes from a B to an A-type and the substrate changes from cobble to boulder/bedrock. The channel was dry at the time of assessment, but appears to carry primarily snowmelt, when it does flow. These reaches are properly functioning.

Gallagher Creek was recently impacted by the Clark Canyon fire in 2006. Gallagher Creek's headwaters emerge on the private land in the Gallagher Mountain AMP allotment and flow into public lands. The upper reaches (22 & 23) flow through sagebrush uplands and Geyer willow riparian habitat and are properly functioning. Gallagher Creek is a high energy system and was impacted by at least one rain-on-snow event in the 1980s. There was substantial channel erosion, which moved a significant amount of material, however, the current hydrologic regime has not produced sufficient flows to reshape the channel or sort the streambed materials. The lower reaches of Gallagher Creek (24-26) and a tributary reach (74), which flow through the Gallagher allotment, are FAR with an upward trend. Due to the presence of the Union Pacific Rail bed, the bottom reach of Gallagher Creek (26) must flow down the county road, parallel to the rail bed, before it encounters a culvert and can access the Beaverhead River. Gallagher Creek's ability to transport sediment is compromised along this section. Tributary reaches 75 and 76 are functional-at-risk, but current livestock management is reducing grazing pressure in this pasture. Douglas-fir and juniper species are increasing in these lower Gallagher Creek reaches, which were outside the perimeter of the Clark Canyon fire. Cheatgrass and spotted knapweed are also prevalent along the lower reaches.

Bill Hill Creek (14) and its tributaries (35, 78, & 79) have experienced increased grazing pressure due to extended rest in the pasture along Gallagher Creek. Reach 14 has some quaking aspen, but no willow regeneration and poor vigor in existing willows. The IDT also noted some overwidening and headcuts, and that the road and an old dam are contributing sediment into the channel. The spring source at the head of reach 35 is developed to provide off-site livestock water, but the livestock enclosure is too small and the source is being trampled. This reach does, however, have a productive stand of quaking aspen. Reaches 78 and 79 are interrupted systems that have limited potential, but are experiencing the same impacts as reaches 14 and 35. Reach 79 does have some quaking aspen at the top of the reach.

Reaches of the Beaverhead River (1 & 2), in the Ney Ranch acquisition, are in proper functioning condition. The area immediately adjacent to the Beaverhead River (1) has been excluded from livestock grazing since 2002. This area is an unallotted parcel that is flooded to provide seasonal wetland habitat for migratory birds. The herbaceous vegetation on this parcel is becoming decadent and forming a thick mat. The pasture adjacent to the Beaverhead River (2), on the Gallagher allotment, has not been achieving the desired level of utilization, due in part to the subirrigated condition of the soils on the north end.

Noxious Weed Infestations

Houndstongue, a noxious weed that is found mostly in disturbed or moist sites, is found scattered in trace amounts in riparian areas throughout the watershed. Infestations are most numerous around willows and other shrubs, where the seed is deposited after being brushed from the transporting agent. Because of its seeds ability to cling to hair and clothing, the potential is high for it to be spread rapidly within the watershed.

Other noxious or invasive weeds present as small widely scattered infestations in the riparian areas include black henbane, and Canada thistle.

Special Status Plants

At least 30 springs on BLM lands within the BWW have been developed to provide water for livestock. Spring diversions can decrease biological diversity by reducing aquatic habitat and reducing soil moisture in riparian zones (USDI 2001). In most cases in the BWW only the spring source associated with developments is fenced. Kentucky bluegrass and common dandelion both of which can compete with rare plants are common along unprotected spring brooks associated with developed springs. Canada thistle, houndstongue, black henbane, and cheatgrass were also noted in riparian habitats adjacent to developed springs.

Evidence of unauthorized livestock use was noted at Eli Spring by the IDT during the 2007 riparian assessment. Trampling by livestock and wildlife is contributing to abnormal hydrologic heaving and a disproportionate amount of bare ground within the wet meadow (70). Western yarrow, common dandelion and Canada thistle were all observed in the wet meadow and are most likely competing with Rocky Mountain dandelion.

Recommendations for Riparian Health

1. Coordinate with the USFS regarding management on the Farlin Creek allotment, with the objective of continuing improving conditions on Farlin Creek (19 & 20) and Steel Creek (32), while reducing livestock impacts to Scudder Creek (33).
2. Improve livestock distribution on the Holland-Carroll Isolated allotment, along the West Fork of Taylor Creek (89), repair adjacent fences, and encourage the return of diverted flows to the stream reach after the growing season.
3. Consider enlarging livestock enclosures at Upper Bill Hill Spring (35) and Lower Bill Hill Spring. Improve livestock distribution or shorten grazing period to reduce livestock impacts along Bill Hill Creek and its tributaries (14, 35, 78, & 79). Continue grazing management that is improving conditions on Gallagher Creek (24, 25, & 26).
4. Consider fencing BLM-administered land along Taylor Creek (44) and providing a water gap to reduce livestock impacts. Explore opportunities to develop water on upland sites in Pasture 3 of the Red Mine allotment to mitigate livestock impacts to Taylor Creek (43). If feasible, improve water availability in pastures 2, 3, and 4 to reduce dependency on Pasture 1 and reduce livestock impacts to the wetland (56).
5. Adjust grazing management on the Flynn Draw allotment to a shorter and/or deferred-season of use to improve resource conditions on Sheep Creek tributaries (30, 6, & 7).
6. Consider dividing the Three-Deer Spring pasture into two pastures, to benefit the south fork of Watson Creek (38 & 40), and create a riparian pasture within the Bachelor Mountain pasture on Watson Creek (34) on the PHW allotment. Adjust grazing management to prevent spring grazing in the North Seeding pasture in consecutive years and shorten the grazing period in each pasture.

7. Consider constructing a livestock enclosure around Cedar Creek (96) on the Rocky Hills allotment.
8. Continue or increase the use of Integrated Weed Management tools to treat noxious weeds within the BWW, with spotted knapweed as the highest priority. Where accessible and cost effective, treat houndstongue to prevent further spread. When a biological control for houndstongue is approved for use by the Animal and Plant Health Inspection Service (APHIS), release these insects into the larger infestations, generally along riparian areas, in the BWW to help control the spread of houndstongue.
9. Enlarge the enclosure around Albers Spring (52) in Frying Pan Gulch in the Bell Ranch Allotment to protect the spring source and associated riparian habitat.
10. Consider ecological restoration (USDI 2001) of degraded spring habitats that provide, or have the potential to provide, habitat for rare plants (e.g., Canyon and Rocky Point springs).
11. Maintain the perimeter fence (S½ section 3, N½ section 10, Township 9 South, Range 11 West) around the unallotted Eli Spring parcel and replace wire gates with metal gates. Conduct compliance checks of Eli Spring when livestock are present in adjacent pastures.
12. Consider authorizing high-intensity, short-duration livestock grazing as a vegetative treatment, when necessary, on the Ney Ranch parcel during the late-fall or winter months to remove decadent vegetation and improve habitat conditions. Re-treatment may be necessary every 4-6 years. Late season grazing would also benefit the meadow pasture of the Gallagher allotment.

Water Quality

Western Montana Standard #3: *“Water quality meets State standards”*

Procedure to determine conformance with Standard:

Montana DEQ is responsible for making calls on water quality and is in the process of assessing the condition of streams, establishing reference sites and developing water quality restoration plans. The Dillon Field Office shares assessment findings with DEQ to support their efforts.

The foundation for Montana Water Quality Law is the Federal Clean Water Act. The goal of the Clean Water Act is to “restore and maintain the chemical, physical and biological integrity of the Nation’s waters.” To meet that goal, waters of Montana are required to support beneficial uses. According to Montana’s 2006 Integrated 303d/305b Water Quality Report, several of the streams and rivers in the BWW assessment area are not supporting their beneficial uses because of non-point source pollution. Non-point source pollution accounts for 90% of the stream impairments statewide. For Montana’s streams, pollutants resulting from land uses are responsible for most non-point source pollution.

Affected Environment

Montana DEQ has no reference sites within the BWW assessment area. There are four reference sites in southwest Montana. Two are located on Willow Creek, north of the assessment area. Two more are located southeast of the assessment area in the Blacktail Valley.

The BWW includes streams which drain to three USGS Hydrologic Units: Beaverhead (10020002), Big Hole (10020004) and Red Rock (1002001). Beaverhead, Big Hole and Red Rock Rivers as well as Farlin, Grasshopper, Horse Prairie, and Rattlesnake Creeks are within, or near, the BWW and are listed as water quality impaired streams. Montana DEQ has not typically assessed headwater streams, since headwater streams were not generally nominated for 303d listing. Table 12 lists the beneficial uses and probable sources of impairment for 303d-listed streams within the BWW that appear in the 2006 Report.

Table 12. Montana DEQ 303-d listed streams within the Beaverhead West Watershed.

Name	Beneficial Uses	Probable Sources of Impairment	Probable Causes of Impairment
BEAVERHEAD RIVER, Clark Canyon Dam to Grasshopper Creek	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Agriculture, dam or impoundment, irrigated crop production, impacts from abandoned mine lands.	Alteration in streamside or littoral vegetative covers, low flow alterations, lead.
BIG HOLE RIVER, Divide Creek to Jefferson River	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Streambank modification/destabilization, dam construction, grazing in riparian zones, habitat modification, highway/road/bridge runoff, irrigated crop production, acid mine drainage, abandoned mine lands	Physical substrate habitat alterations, low flow alterations, cadmium, copper, lead, zinc, temperature.
FARLIN CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Grazing in riparian or shoreline zones	Alteration in streamside or littoral vegetative covers, sedimentation/siltation.
GRASSHOPPER CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Agriculture, grazing in riparian or shoreline zones, streambank modification/destabilization, mine tailings, irrigated crop production.	Alteration in streamside or littoral vegetative covers, low flow alterations, cadmium, copper, zinc.
HORSE PRAIRIE CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Irrigated crop production, impacts from abandoned mine lands	Low flow alterations, arsenic, cadmium, copper, lead, mercury, zinc.

Name	Beneficial Uses	Probable Sources of Impairment	Probable Causes of Impairment
RATTLESNAKE CREEK (headwaters to Dillon PWS off channel well)	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Grazing in riparian or shoreline zones, irrigated crop production, subsurface (hardrock) mining	Alteration in streamside or littoral vegetative covers, cadmium, copper, lead, nitrogen (total), phosphorous (total), sedimentation/siltation.
SCUDDER CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Grazing in riparian or shoreline zones	Alteration in streamside or littoral vegetative covers, sedimentation/siltation, total Kjehldahl nitrogen (TKN).
STEEL CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Grazing in riparian or shoreline zones, subsurface (hardrock) mining	Alteration in streamside or littoral vegetative covers, arsenic, nitrogen (total), phosphorous (total), sedimentation/siltation, solids (suspended/bedload).
TAYLOR CREEK	Agricultural, aquatic life, cold water fishery, drinking water, industrial, primary contact recreation	Grazing in riparian or shoreline zones	Alteration in streamside or littoral vegetative covers, sedimentation/siltation, total Kjehldahl nitrogen (TKN).

The BLM understands that non-point source pollution needs to be addressed for waters of the State regardless of whether they are or are not meeting water quality standards and that non-degradation rules apply to waters that are meeting state water quality standards. For additional information refer to Riparian and Wetland Areas section above.

Findings, Analysis and Recommendations

While the BLM IDT does not make beneficial use determinations, the upland and riparian aspects of the watershed assessment do consider land health factors of significance to water quality. Upland evaluations consider soil condition and erosion. Riparian evaluations consider sources of sediment and stream condition. Specific findings and recommendations are described in the upland and riparian sections.

Recommendations for Water Quality

1. Continue working with Montana DEQ and local Watershed Committees by sharing information and technical expertise for the development and implementation of watershed water quality restoration plans.
2. Continue to implement Best Management Practices to address non-point source pollution.

Air Quality

Western Montana Standard #4: “*Air quality meets State standards*”

Procedure to determine conformance with Standard:

The Clean Air Act of 1990 as amended (42 U.S.C. 7401 et seq) requires the BLM to protect air quality, maintain Federal and State designated air quality standards, and abide by the requirements of State Implementation Plans.

The Environmental Protection Agency has delegated the authority to implement the provisions of the Clean Air Act to the State of Montana. Determination of compliance with air quality standards is the responsibility of the State of Montana. All of southwest Montana is in attainment, meaning that the air resource meets or exceeds all National Ambient Air Quality Standards.

Affected Environment

The BWW is located within the Montana/Idaho Airshed Management Area. The closest population center in the vicinity is Dillon, Montana. Dillon's population is 4,035, with a population of 8,950 for all of Beaverhead County, most of the latter living within a few miles of Dillon (Cantrell 2006).

The 1977 Amendments to the Clean Air Act resulted in the development of Air Quality Classes under the provisions of Section 160, Prevention of Significant Deterioration. The BWW is located within a Class II airshed.

The 1998 Interim Air Quality Policy for Wildland and Prescribed Fires requires states to develop smoke management plans. The Montana/Idaho Airshed Group developed the Montana/Idaho Smoke Management Program. Prescribed burning is done in accordance with the Montana/Dakotas Fire Management Plan and is coordinated with MT DEQ and the Montana/Idaho Airshed Group. During prescribed fire season, the Smoke Monitoring Unit supports the Montana/Idaho Airshed Group to prevent or reduce the impact of smoke on area communities—especially when that smoke could contribute to a violation of national air quality standards. During the summer wildfire season, the Smoke Monitoring Unit assists state and local governments in monitoring smoke levels and providing information about smoke to the public, firefighters, and land managers.

Findings, Analysis and Recommendations

Generally Air Quality in southwest Montana is excellent. The closest Ambient Air Quality monitoring site to the assessment area is located in Idaho Falls, south of the area administered by the Dillon Field Office. Butte is the closest Montana State Particulate Matter (PM) 10 Non-attainment Area. A PM 2.5 emission is a pollutant level of concern and the State of Montana is charged with developing a strategy to address PM 2.5 emissions. Most PM 2.5 emissions are generated by fire.

Predominant winds in BWW are out of the northwest, west and southwest. For the major part of the year, the Air Quality Standard is met throughout southwest Montana. Air quality issues in the planning area center mainly around smoke. Smoke contributors include wildfire, prescribed fires, private debris burning, agricultural burning, slash burning, and wood burning stoves and fireplaces. Wildfire can produce short-term adverse effects on air quality. Air quality and visibility can deteriorate due to temporary air stagnation during wildfire events, which are most common during the months of July, August, and September. Concerns regarding human health revolve around smoke from wildland and prescribed fire. Southwest Montana experienced several weeks of poor air quality during the months of July, August and September 2007, due to fires in Idaho and on the Beaverhead National Forest upwind of the assessment area.

Recommendation for Air Quality

1. Continue to follow Burn Plans and coordinate with the Smoke Monitoring Unit of the Montana/Idaho State Airshed Group.

Biodiversity

Western Montana Standard #5: *“Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species”*

Procedure to determine conformance with standard:

This Standard is an overall assessment of biodiversity and wildlife habitat. The present state of each allotment and habitat type was compared to the natural and historic condition. The indicators described under the definition of Standard #5, as well as condition/function of the other standards, specifically uplands and riparian, were considered to determine whether or not the Biodiversity Standard was met.

The IDT considered the range of natural variation within this ecosystem as well as the species composition, condition of available habitat, and forest health to determine the condition/function of biodiversity. The wildlife habitat niches expected are: grasslands (short and mid grasses), bare ground, small streams, riparian/wetlands, sagebrush steppe, conifer forests, aspen stands, and various mixes of these components. Providing habitat for special status plant and animal species is key to meeting the biodiversity standard.

Affected Environment

Upland and riparian habitats, which are used to assess the biodiversity finding, are described in the affected environments of those respective sections above.

Special Status Wildlife Species

Special status species are vital to maintain the biodiversity in the watershed. The only species listed under the Endangered Species Act (ESA), that currently occurs in the watershed is the gray wolf. Table 13 lists all Special Status Species, including BLM sensitive species that occur within the BWW during all or part of the year.

Table 13. Special status wildlife species occurring within Beaverhead West Watershed.

List of all Special Status Species that are known to occur within the watershed.	Current Management Status of the Species.	Occurrence: Resident (R) Transient (T)	Preferred habitat
Gray Wolf (<i>Canis lupus</i>)	Proposed threatened in experimental areas.	T	All
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Sensitive	R	Riparian/wetland
Burrowing Owl (<i>Athene cunicularia</i>)	Sensitive	T	Sagebrush shrubland /grassland
Ferruginous Hawk (<i>Buteo regalis</i>)	Sensitive	R	Sagebrush shrubland
Golden Eagle (<i>Aquila chrysaetos</i>)	Sensitive	R	Riparian/wetland Sagebrush shrubland
Great Gray Owl (<i>Strix nebulosa</i>)	Sensitive	T	Forest
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	Sensitive	R	Sagebrush shrubland
Northern Goshawk (<i>Accipiter gentilis</i>)	Sensitive	R	Forest
Sage thrasher (<i>Oreoscoptes montanus</i>)	Sensitive	R	Sagebrush shrubland
Sage Grouse (<i>Centrocercus urophasianus</i>)	Sensitive	R	Sagebrush shrubland
Sage Sparrow (<i>Amphispiza belli</i>)	Sensitive	R	Sagebrush shrubland
Swainsons Hawk (<i>Buteo swainsoni</i>)	Sensitive	R	Riparian/wetland Sagebrush shrubland
Pygmy Rabbit (<i>Brachylagus idahoensis</i>)	Sensitive	R	Sagebrush shrubland
Prebles Shrew (<i>Sorex preblei</i>)	Sensitive	R	Sagebrush shrubland
Westslope cutthroat trout (<i>Oncorhynchus clarki lewisi</i>)	Sensitive	R	Streams

Sagebrush Habitats and Sagebrush Dependent Species

Sagebrush and grassland habitat types are the dominant vegetation communities comprising 88% of public lands in the assessment area. Mountain big sagebrush is the dominant habitat type, providing crucial winter habitat for mobile wildlife species such as mule deer, pronghorn antelope, and sage grouse, and localized yearlong habitat by sagebrush-obligate species such as pygmy rabbit. Intermingled occurrences of basin big sagebrush, tall three-tip sagebrush, and several low sage species add to the diversity of vegetation and habitat structure.

Important sage grouse seasonal habitat is centered on breeding and winter complexes. Nesting usually occurs within two miles of the lek, where suitable habitat is available. Brood rearing habitats require a mix of forbs and insects for a high protein diet, usually in association with riparian habitats. Winter diets consist of almost 100% sagebrush. The *Management Plan and Conservation Strategies for Sage Grouse in Montana* completed by the Montana Sage Grouse Working Group is being used as a guideline for future management of sagebrush habitat.

Generalist or Widespread Species

The BWW lies within portions of Montana hunting districts (HD) 322, 325, 329, 331 and 340 for deer and elk, HD 310, 321, 318, and 341 for antelope, and HD 301,324 and 332 for moose. Elk populations within the watershed have fluctuated, but are generally on the increase within the past ten years. Antelope populations have increased in HD 340 and moose have increased in HD 332 (pers. com. Boccadori, Brannon, and Fager). Table 14 lists the season of use for habitats used by primary game species.

Table 14. Primary game species and habitat use within the Beaverhead West Watershed.

Species	Forested	Sagebrush	Riparian
Antelope		Y	
Elk	S,C	W,C	Y
Moose	Y	Y	Y
Mule deer	S,C	W,C	W
Blue grouse	Y		Y
Ruffed grouse	Y		Y
Sage grouse	S	Y	B

Y=yearlong, W=winter, S= summer, C=calving/fawning, B=breeding/brooding

The BWW provides habitat for migratory and resident elk. Elk winter habitat extends at lower elevations along the foothills of the Pioneer Mountains extending off of the Beaverhead-Deerlodge National Forest, south along Badger Pass throughout the Rocky Hills and extending west towards Bachelor Mountain and southeast towards Gallagher Mountain. Several hundred elk migrating out of the Big Hole Divide use winter habitat in the Rocky Hills along with approximately 200 elk that are resident in the area yearlong. Clark Canyon winter habitat generally supports 100-200 elk. Hunting pressure, fall weather and winter snow depths throughout the area influence actual numbers and timing of winter habitat use.

Riparian, Aquatic, and Wetland Habitat and Associated Species

Riparian habitats receive a disproportionate amount of wildlife use with approximately 75% of all wildlife species in this area utilizing riparian habitat for at least some portion of their annual life cycle. These riparian areas provide essential habitat for moose, elk, beaver, sage grouse brood rearing and neo-tropical migrant songbird nesting. This habitat is used extensively by sage grouse during brood rearing.

The Partners in Flight Bird Conservation Plan for Montana was prepared “to focus on restoring healthy ecosystems that will sustain productive and complete bird communities” (Montana Partners in Flight, 2000), and identified 141 species for priority status in five habitat groups. Most of these birds are summer residents that use habitats ranging from lower elevation wetlands to high elevation forests for breeding and raising young. Some species are migratory but small populations may be present yearlong depending on seasonal conditions. The USFWS has also identified a list of 28 “Birds of Conservation Concern” for the Rocky Mountain Region, many of which rely on riparian habitat for all or part of their lifecycle.

Fisheries

There are eight streams within the BWW area that support fisheries. Fish species common in the assessment area include westslope cutthroat trout (WCT), brown, rainbow, and brook trout, cutthroat trout hybrids, white, mountain, and long nose sucker, mottled sculpin, long nose dace, mountain whitefish and burbot

The Big Hole River supports one of the most popular cold water sport fisheries in the state, with over 40,000 angler-use days recorded for 2005. Most use occurs in the middle reaches of the drainage. The upper reaches of the Beaverhead River also support an extremely popular sport fishery. Anglers from all over the world come to fish the upper reaches of the river. The Beaverhead provided over 39,000 angler-use days in 2005. The majority of use occurs in the upper five miles of the river. Other streams that support fisheries include Farlin, Divide, Grasshopper, Taylor, and Browns Canyon Creeks.

Findings, Analysis, and Recommendations

The only species listed under the Endangered Species Act (ESA) that currently occurs in the watershed is the gray wolf. Gray wolves are currently proposed for delisting in Montana. Widespread occurrences of gray wolves outside of primary recovery zones have continued to increase. The minimum recovery goal for wolves in the northern Rocky Mountains is 30 breeding pairs and at least 300 wolves for three consecutive years, a goal that was attained in 2002 (USFWS 2006). Under the reintroduction rules, wolves that are within the re-introduction area but are not within a national park or national wildlife refuge are treated as a “proposed threatened” species, rather than endangered, for Section 7 consultation purposes under the ESA. Wolves occurring within the BWW are outside of the primary recovery zone, and are considered non-essential experimental populations. Wolf – livestock conflicts generally result in removal or relocation of offending wolves which may preclude the potential establishment of packs in the BWW. A Montana state management plan is being developed to direct wolf management after delisting.

Bald eagles have recently been delisted from the ESA and are currently managed as a BLM sensitive species. They are known to nest along the Beaverhead and Big Hole River corridors. Winter concentrations of bald eagles occur in BWW near open water and where prey is available. Cooperative interagency monitoring is occurring through the Montana Bald Eagle Management Plan

Many vegetation treatments occurred to sagebrush habitat in the late 1950’s through the early 1970’s. Much of that habitat has returned to pre-treatment habitat conditions, with the exception being the herbaceous species composition in some of the seedings. Refer to the Background section beginning on page two for locations and the type of treatments applied. The Clark Canyon wildfire in 2006 burned over 6,000 acres of sagebrush habitat, creating a mosaic of habitat niches. Sagebrush canopy cover is expected to return to pre-burn conditions within 20-30 years.

Sage grouse populations and sagebrush habitats have declined throughout the west due to significant habitat losses range-wide from habitat conversion for agricultural needs, urbanization,

livestock grazing, and wildland fire. Previous petitions for listing the sage grouse under the ESA emphasize the need for region-wide assessments addressing habitat conditions and population stability. This emphasizes the importance of maintaining the integrity of mid- to late-seral sagebrush habitats on public lands, not only for sage grouse but for all sagebrush obligate species.

Pygmy rabbits are found within the BWW west of the I-15 corridor and south to Clark Canyon Reservoir in suitable sagebrush habitat. Habitat conditions appear to be suitable for existing populations to persist. Ongoing studies to determine genetic variance between populations thought to be isolated between Montana and Idaho are currently being conducted by the University of Idaho.

There are 6 known active leks within the allotments assessed in the BWW. There are numerous active leks in the adjacent watersheds as well as several leks that have not had any activity for the last few years. Overall, throughout the watershed, sagebrush habitat requirements are being met. The exceptions to this would be herbaceous cover for nesting habitat and brood rearing within pastures of the Rocky Hills, Red Mine, Scudder Creek AMP and Anderson field allotments, that may not be meeting requirements as outlined in the *Management Plan and Conservation Strategies for Sage Grouse in Montana*.

Net-wire and barbed-wire fences that are no longer in use represent an entanglement hazard, especially for antelope, deer, and elk and moose calves. Fences for modification or removal have been identified in the Big Hole Road, West Big Hole Road, Gallagher, and Bell Ranch allotments.

The allotments on the south-east face of the Pioneer Mountains (Kennison Spring, Bell Ranch, Frying Pan, and West Big Hole Road) and the Rocky Hills allotment have very limited water resources. Dependable water is a limiting factor in the use of these allotments by wildlife and prohibits wildlife use during certain times of the year or wildlife may have to travel up to five miles for water. There are few dependable springs or running water and livestock water may only be available when livestock is present. Existing wildlife guzzlers in similar habitats within the DFO have proven to provide adequate water for wildlife throughout the year and use by big game species, as well as sage grouse and small mammals, has been documented.

Spring developments can provide a clean water source for wildlife, but have often proved to be fatal when escape ramps are not installed in them. Some water developments were found to be in disrepair and some stock tanks were lacking escape ramps for birds and small mammals. Perennial streams within the BWW are not widespread and therefore become more important to sustain the existing wildlife populations.

Generally, fish habitat conditions on streams within the BWW ranged from fair to good. Impacts to fish habitat primarily come from historic mining sites, livestock use, dewatering, roads, and wildlife. Impacts to WCT come from riparian impacts, habitat fragmentation, and non-native species competition. Table 15 lists the fish species present and the habitat conditions for each fishery.

Table 15. Fisheries within the Beaverhead West Watershed.

Fishery	Fish Species Present	Habitat Conditions
Beaverhead River	Rainbow, brown, and brook trout; mountain whitefish; burbot; white, mountain, and longnose sucker; mottled sculpin; longnose dace; carp.	Habitat quality is being severely impacted by large water level fluctuations, due to seasonal water releases from the Clark Canyon Reservoir. Due to the water level fluctuations, banks are highly susceptible to destabilization. Winter habitat is very limited with low flows that greatly affect fish populations.
Big Hole River	Arctic grayling; rainbow, brown, and brook trout; mountain whitefish; burbot; white and longnose sucker; mottled and slimy sculpin; longnose dace; reaside shiner.	Habitat conditions are very good on the assessed portions of the river. Fish habitat is seasonally affected by reduced flows related to irrigation resulting in very high water temperatures.
Browns Canyon Creek	WCT/100%; Brook trout	Fair to poor habitat conditions. Stream channel is very confined. Lack of pools and hiding cover are likely restricting WCT use in the stream reach.
Divide Creek	Rainbow x WCT hybrids; brook trout; mottled sculpin	Fish habitat is in fair to good condition. Portions of the stream are over widened with some localized areas of bank shearing.
Farlin Creek	WCT/100%	Habitat conditions are generally good, some trampling and stream crossing impacts from livestock and wildlife are evident, resulting in excess sediment.
Grasshopper Creek	Rainbow, brown, and brook trout; mountain whitefish; burbot; white and longnose sucker; mottled sculpin; longnose dace	Habitat conditions range from poor to good. Most of the creek is being impacted from excess sediment runoff from harsh hillsides with little vegetation and from chronic low water from irrigation diversions.
Sheep Creek Tributary	Undetermined	Fish habitat is impacted from over widening and bank shearing. Most fish habitat is confined to deeper pools
Taylor Creek	100% WCT (upstream reach), Brook Trout (downstream reach)	Lower portions are over widened and sediment amounts are excessive. Excessive browsing of willows was observed.

The reaches of the Beaverhead River (1 & 2) that flow through the Gallagher allotment and the Ney Ranch parcel are currently being impacted by severe water fluctuations related to seasonal water releases from Clark Canyon Reservoir. Extreme low flows released from the dam in winter is reducing winter habitat for all species. Brown trout in particular have been impacted, due to low flows impacting their spawning success in the river.

The Big Hole River supports the last self-sustaining population of strictly fluvial Arctic grayling in the lower 48 states. A petition to list the Fluvial Arctic grayling species under the ESA is currently being reviewed, and they are a Montana Species of Special Concern. The current distribution of this species represents only 5% of its historic range. Recent population surveys have found historic low numbers in traditional survey reaches for this population.

Farlin Creek (19 & 20) is currently the only known pure WCT stream on BLM-administered land in the assessment area. Genetic testing of WCT in Farlin Creek, in 1990, indicated a genetically pure population. A non-native population of eastern brook trout in this stream poses a serious threat to the long term persistence of this population. A 2004 fishery survey of Farlin Creek, conducted by BLM fishery personnel, found non-native brook trout the most common species in all surveyed stream sections.

A genetically pure population of WCT occupies the upper reaches of Taylor Creek, located on Forest Service lands. To date, WCT have not been found on the lower portion that borders BLM-administered land. Browns Creek also supports 100% genetically pure WCT in stream reaches upstream of the BLM. Reach 60 does not likely support a fishery, however, occasional WCT may be present when stream conditions permit (i.e., high stream flows). These small isolated populations are at high risk of extirpation due to non-native species competition or hybridization.

Divide Creek (42), located in the Blacktail Mountains, supports populations of highly-hybridized cutthroat trout, eastern brook trout and mottled sculpin. During the assessment of this stream, large numbers of salmonids, which appeared to be cutthroat, were observed by the IDT. A nearby tributary to Sheep Creek (30) supports a small population of un-identified salmonids. Observations by the IDT indicate the species present appeared to be cutthroat or rainbow trout.

While the BLM does not manage any lands that border Grasshopper Creek, it does manage land within a very close proximity to the stream. Due to the proximity to the stream, management actions taken by the BLM on these lands could affect water quality and fish habitat within the drainage.

Recommendations for Biodiversity

1. Maintain current upward riparian trends on Farlin Creek through livestock management. Coordinate with the USFS to complete the fencing above Farlin Creek to prevent livestock drifting into the drainage.
2. Maintain current levels of livestock use on grazing allotments adjacent to the Beaverhead and Big Hole Rivers to protect the river banks from destabilization impacts.
3. Modify old sheep fences to facilitate wildlife passage and remove old dilapidated barb wire fences that are no longer in use in the West Big Hole Road, Big Hole Road, Bell Ranch, Kennison Spring, Gallagher, and PHW allotments.
4. Improve sage grouse nesting and brood rearing habitat conditions in Rocky Hills, Red Mine, Scudder Creek AMP, and Anderson field allotments.
5. Consider feasibility of installing wildlife guzzlers in the Rocky Hills, Kennison Spring, Bell Ranch, Frying Pan, and/or West Big Hole Road allotments.
6. Conduct a fishery survey of Sheep Creek tributary (30) to determine if WCT are present.

Forest Health and Fuels Management

Affected Environment

Forest and Woodland Condition

The Dillon RMP defines forest land as land that is now, or has the potential of being, at least 10 percent stocked by forest trees (based on crown closures) or 16.7 percent stocked (based on tree stocking). The Dillon RMP defines woodlands as forest communities occupied primarily by noncommercial species such as juniper, mountain mahogany, or quaking aspen groves; all western juniper forest lands are classified as woodlands, since juniper is classified as a noncommercial species. Woodland tree and shrub canopy cover varies, but generally individual plant crowns do not overlap. Forest and woodland habitats comprise approximately 22% of all ownerships, and approximately eight percent of BLM-administered lands within the BWW.

In broad terms, a healthy forest is one that maintains desirable ecosystem functions and processes. Aspects of forest health include biological diversity; soil, air, and water productivity; ability to withstand natural disturbances; and the capacity of the forest to provide a sustaining flow of goods and services for people.

Low elevation forest/woodlands contain Douglas-fir, limber pine, mountain mahogany, and scattered Rocky Mountain juniper. Conifer expansion into openings and sagebrush/grassland is most evident at the low to mid-elevations of the assessment area. Douglas-fir colonization has affected more than 1,000 acres of what was once grass and sage in the Rocky Hills allotment. In the Gallagher and Anderson Field allotments, Rocky Mountain juniper is replacing grasses, sage, and willows in the main stems of drainages and is advancing into the side canyons throughout the sagebrush steppe. Areas with conifer expansion and fuel loading concerns are shown on the map titled Beaverhead West Areas of Conifer Expansion and Fuel Loading Concerns. Mid-elevation forests are dominated by Douglas-fir. With increasing elevation, Douglas-fir gives way to lodgepole pine dominated communities. At higher elevations, forested habitats contain mixed conifer communities of subalpine fir, spruce, Douglas-fir, and lodgepole pine. Whitebark pine is a minor type found at the highest forested elevations, generally about 8,600 feet on wind-swept ridgelines.

As a result of fire exclusion, conifer densities have increased within forested stands. The recent drought and increased densities has resulted in forest susceptibility to insect and/or disease infestations and subsequent mortality.

Spruce budworm activity is present and increasing throughout most areas of the BWW. Defoliation caused by spruce budworm is most evident on Douglas-fir, but also affects subalpine fir and spruce species. While spruce budworm does not usually cause direct tree mortality, it will predispose trees to attacks by other insects or diseases. Budworms grow more vigorously in stressed trees, and budworm populations can increase dramatically during drought conditions. Densely stocked and/or multi-storied stands with predominantly Douglas-fir or subalpine fir are at high risk to budworm infestation (Forest Health Protection, 2006). Defoliation from spruce budworm was noted throughout the watershed, but was most extensive in the Sheep Creek and Small Horn Canyon areas.

Mountain pine beetle is present throughout the watershed and is causing mortality in lodgepole and limber pine. During low beetle population levels, attacks are primarily on trees under stress due to injury, drought, overcrowding, etc. However as beetle populations increase, attacks may involve most trees 8 inches diameter at breast height (DBH) or greater, regardless of their apparent health (Forest Health Protection, 2006). Mountain pine beetle activity is currently endemic and expected to increase due to suitable stand conditions. Balsam bark beetle is present and causing mortality of subalpine fir in patches.

Douglas-fir beetle activity is increasing and at epidemic levels in the Grasshopper Valley. Douglas-fir most susceptible to bark beetle attack are larger than 14 inches DBH; older than 120 years; growing in dense stands; weakened by drought, root disease, or defoliation; or are located near existing beetle-infested trees (Forest Health Protection, 2006). Extensive mortality of large, mature Douglas-fir is evident in the Shale Creek, Krueger Creek, and Farlin Creek areas. Treatment of hazardous fuels and salvage of bug-killed timber in the Shale Creek and Krueger Creek areas was analyzed in the Forest Service Grasshopper Fuels Management EIS completed in 2005. Treatment in Shale Creek is anticipated to take place in 2007-2010; treatment in Krueger Creek is dependent on acquiring legal access to the sale area. If access for commercial harvest is not possible in the Krueger Creek drainage, prescribed fire may be used to alter the stand structure and remove a portion of young age class that is dominating the understory.



Figure 1. Douglas-fir mortality in the Shale Creek area, June 2007.

The Black Mountain area (Holland-Carroll Isolated allotment) contains mainly lodgepole pine, with some areas of Douglas-fir. Previous timber management completed in the early 1990's removed overstory lodgepole and targeted trees affected by mistletoe and/or Commandra blister rust. Currently this area exhibits good structural diversity, with extensive lodgepole reproduction in treated areas. Lodgepole in untreated areas are approximately 180-200+ years old and are starting to be affected by mountain pine beetle, mistletoe, and/or Commandra blister rust. Mortality in overstory lodgepole is currently limited, but is expected to increase over time and cause substantial mortality. A 40-acre grass/sagebrush park is being colonized by the expansion of lodgepole pine in the Holland-Carroll Isolated allotment.



Figure 2. Black Mountain area, showing previously treated area on left and untreated area on right, June 2007.

Previous timber management in the early 1990's in Small Horn Canyon clearcut harvested patches of lodgepole pine, and thinned one unit of Douglas-fir (total of 150 acres harvested). Previously clearcut stands currently have small, patchy lodgepole regeneration and some scattered large Douglas-fir that were left during treatment. Forested areas that were untreated during this sale are currently being affected by spruce budworm and mountain pine beetle. Mortality of lodgepole from mountain pine beetle has mainly been in the last few years, and will likely increase in the near future due to suitable stand conditions. Defoliation by spruce budworm has increased fuel loading in these dense stands, and is decreasing forest health.



Figure 3. Spruce budworm and mountain pine beetle activity in Small Horn Canyon, June 2007.

Findings, Analysis and Recommendations

Historical Fire Regimes

Fire exclusion, caused primarily by fire suppression and the removal of fine fuels by livestock grazing in the area since the 1860's, has changed the structure, density, and plant species composition within the lower grassland and the upland communities. The need for and subsequent harvesting of forest products to support mining and agricultural activities in the late 1800's and early 1900's also greatly affected forest distribution, species composition and structure.

High-intensity fires are now more likely to occur in areas that historically experienced more frequent low-intensity fires. Due to increasing fuel continuity fires are also more likely to be of significantly greater size than those which historically occurred. Large-scale, high-severity fires present risks to human life and property, watershed stability, fish and wildlife habitat.

In fire adapted ecosystems, recurrent fire is the dominant disturbance that affects vegetation patterns. One method to describe this disturbance is by using historical fire regimes (Table 16). The fire regime concept is used to characterize the personality of a fire in a given vegetation type, how often it visits the landscape, the type of pattern created, and the ecological effects. The historical fire regimes for the watershed are arranged based on fire severity and fire frequency.

Table 16: Historical fire regimes for BLM-administered lands within the Beaverhead West Watershed.

Historical Fire Regime	Severity (% Overstory Replacement)	Fire Interval (Years)	BLM Acres	% of BLM Forested	Representative Ecosystem
NL – non-lethal	low - <20%	10 to 25	1,355	17%	Dry pine, conifer encroachment and juniper forests
MS1 – mixed severity, short interval	low - 20-30%	20 to 40	2,842	36%	Lower elevation conifer forests
MS2 – mixed severity, long interval	mod - 30-80%	40 to 120	1,219	16%	Shrublands, mixed conifer forests
MS3 – mixed severity, variable interval	variable - 10-90%	45 to 275	52	1%	Higher elevation conifer forests
SR1 – stand replacement, short interval	high - >80%	95 to 180	2,186	28%	Certain lodgepole pine, dry Douglas-fir forests
SR2 – stand replacement, long interval	high - >80%	200 to 325	208	3%	High elevation whitebark pine, spruce-fir
SR3 – stand replacement, nonforest	high - >80%	<35	108,547		Grasslands, many shrub communities

* The acreage calculation for each historical fire regime is based on the hydrologic unit scale. Acreage discrepancies occur through calculations made in GIS.

The majority of forested habitats, on BLM-administered lands within the BWW (64%), is in short interval fire regimes and has missed 2 or more fire intervals.

Current Condition Classes

Fire Regime Condition Class (FRCC) is a classification of the amount of departure from the natural fire regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy et al. (2001) and Schmidt et al. (2001), based on a relative measure describing the degree of departure from the historical natural fire regime. This departure is from changes to one (or more) of the following ecological components: vegetation characteristics (e.g., species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought).

Three Condition Classes were developed to categorize the current condition with respect to each of the historic Fire Regime Groups. The three classes are based on low (Condition Class 1), moderate (Condition Class 2), and high (Condition Class 3) departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2001). Criteria used to determine current condition include the number of missed fire return intervals with respect to the historic fire return interval, and the current structure and composition of the system resulting from alterations to the disturbance regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside. The relative risk of fire-caused losses of key ecosystem components increases as condition class designation increases.

The FRCC classifications for the BWW based on the coarse-scale data are presented in Table 17. The data presented is the most current available and is valuable information to aid managers in estimating actual ground conditions. However, due to the limits of satellite-based imagery the coarse-scale estimates presented in Table 17 may differ from site-specific assessments made by members of the IDT. For example, the coarse-scale assessments obtained through satellite imagery do not take into account finer scale factors influencing condition class such as recent insect and/or disease outbreak, individual stand structure and associated biodiversity issues.

Based on the coarse-scale FRCC analysis, site-specific FRCC assessments, and historic photos of the area, the lower to mid elevation forested portions of the BWW are moderately to severely departed from natural (historic) conditions.

Table 17. Fire regime condition class for BLM-administered lands within the Beaverhead West Watershed.

Condition Class	Description	BLM Acres*	% of BLM Forested	Example of Typical Management
1	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Fires burning in CC1 lands pose little risk to the ecosystem and have positive effects to biodiversity, soil productivity, and hydrologic processes.	5,625	72%	Historical fire regime is replicated through periodic application of prescribed fire or through fire use.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased) resulting in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Wildland fires burning in CC2 lands can have moderately negative impacts to species composition, soil conditions, and hydrologic processes.	109,305 (NOTE: Actual forested cover in this condition class is approx. 758 acres. The remainder is sagebrush/grassland.)	10%	Moderate levels of restoration treatments are required, such as a combination of prescribed fire with mechanical/hand treatment.
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Wildland fires burning in CC3 lands may eliminate desired ecosystem components, exacerbate the spread of unwanted non-native species, and result in dramatically different ecological effects compared to reference conditions.	1,477	19%	High levels of restoration treatments, such as mechanical treatments, are required before fire can be used to restore desired ecosystem function. Intensive efforts, which may include seeding, herbicide application, biomass removal, and other types of rehabilitation, are required for CC3 lands.
Current conditions are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, grazing, introduction, and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Lavery, Williams 2000).				

*The acreage calculation for each condition class is based on the hydrologic unit scale. Acreage discrepancies occur through calculations made in GIS.

Recommendations for Forest Health and Fuels Management

1. Analyze the use of mechanical treatments and/or prescribed fire to reduce fuel loading and improve forest health in areas affected by insects/disease, particularly in the Small Horn Canyon area, and the Holland-Carroll Isolated, Farlin Creek and Kreuger Creek allotments.
2. Analyze the use of mechanical treatments followed by prescribed fire to reduce fuel loading and improve forest health in areas affected by Douglas-fir colonization in the Rocky Hills allotment and in areas affected by Rocky Mountain juniper colonization in Gallagher and Anderson Field allotments.
3. Explore opportunities for Wildland Fire Use in the Farlin Creek WSA, in coordination with the USFS.

Interdisciplinary Team Composition

Core IDT members for the BWW Assessment include:

Brian Thrift, Rangeland Management Specialist – IDT Leader
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Kelly Bockting, Wildlife Biologist
Stephen Armiger, Hydrologist
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Support IDT members include:

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APPENDIX

An Incomplete List of Plants Found On or Near BLM-Administered Lands within the Beaverhead West Watershed

(Plant scientific names and alphanumeric codes presented in the following table correspond to those found in “The PLANTS Database” and the “Synthesis of the North American Flora”. Plant common names are generally those listed for the State of Montana in the above references unless BLM resource specialists are aware of a more frequently used locally accepted plant name.)

Common Name	Scientific Name	USDA Symbol
Alfalfa	<i>Medicago sativa</i>	MESA
Alkali Sagebrush	<i>Artemisia arbuscula ssp. longiloba</i>	ARARL
Alpine Forget-me-not	<i>Eritrichium spp.</i>	ERITR
Baltic Rush	<i>Juncus arcticus ssp. littoralis</i>	JUARL
Basin Big Sagebrush	<i>Artemisia tridentata ssp. tridentata</i>	ARTRT
Basin Wildrye	<i>Leymus cinereus</i>	LECI4
Beaked Sedge	<i>Carex utriculata</i>	CAUT
Bearded wheatgrass	<i>Elymus trachycaulus ssp. trachycaulus</i>	ELTRT
Bebb Willow	<i>Salix bebbiana</i>	SABE2
Bitterroot	<i>Lewisia rediviva</i>	LERE7
Bitterroot milkvetch	<i>Astragalus scaphoides</i>	ASSC4
Black cottonwood	<i>Populus balsamifera ssp. trichocarpa</i>	POBAT
Black Henbane	<i>Hyoscyamus nigar</i>	HYNI
Black Sagebrush	<i>Artemisia nova</i>	ARNO4
Blue Flax	<i>Linum perenne</i>	LIPE2
Blue Grama	<i>Bouteloua gracilis</i>	BOGR2
Blue Wildrye	<i>Elymus glaucus</i>	ELGL
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>	PSSP6
Bluejoint Reedgrass	<i>Calamagrostis canadensis</i>	CACA4
Booth's Willow	<i>Salix boothii</i>	SABO2
Bottlebrush Squirreltail	<i>Elymus elymoides</i>	ELEL5
Broom Snakeweed	<i>Gutierrezia sarothrae</i>	GUSA2
Bull Thistle	<i>Cirsium vulgare</i>	CIVU
Canada Thistle	<i>Cirsium arvense</i>	CIAR4
Cheatgrass	<i>Bromus tectorum</i>	BRTE
Chicken Sage	<i>Sphaeromeria argentea</i>	SPAR2
Clustered Field Sedge	<i>Carex praegracilis</i>	CAPR5
Cluster-head Chicken Sage	<i>Sphaeromeria capitata</i>	SPCA8
Common Cattail	<i>Typha latifolia</i>	TYLA
Common Dandelion	<i>Taraxacum officinale</i>	TAOF
Common Juniper	<i>Juniperus communis</i>	JUCO6
Common Mullein	<i>Verbascum thapsus</i>	VETH
Common Yarrow	<i>Achillea millefolium</i>	ACMI2
Contracted Ricegrass	<i>Achnatherum contractum</i>	ACCO22
Coyote Willow	<i>Salix exigua</i>	SAEX
Creeping Juniper	<i>Juniperus horizontalis</i>	JUHO2
Curl-leaf Mountain Mahogany	<i>Cercoarpus ledifolius</i>	CELE3
Currant	<i>Ribes spp.</i>	RIBES
Cutleaf daisy	<i>Erigeron compositus</i>	ERCO4
Deathcamas	<i>Zigadenus spp.</i>	ZIGAD
Diffuse knapweed	<i>Centaurea diffusa</i>	CEDI3
Douglas-fir	<i>Pseudotsuga menziesii</i>	PSME
Dyer's woad	<i>Isatis tinctoria</i>	ISTI
Engelmann Spruce	<i>Picea engelmannii</i>	PIEN
Field Scabiosa	<i>Knautia arvensis</i>	KNAR
Foxtail Barley	<i>Hordeum jubatum</i>	HOJU
Fringed Sagewort	<i>Artemisia frigida</i>	ARFR4
Geyer Willow	<i>Salix geyeriana</i>	SAGE2
Greasewood	<i>Sarcobatus vermiculatus</i>	SAVE4
Green Needlegrass	<i>Nassella viridula</i>	NAVI4
Green Rabbitbrush	<i>Chrysothamnus vividiflorus</i>	CHVI8
Grey Horsebrush	<i>Tetradymia canescens</i>	TECA2

Common Name	Scientific Name	USDA Symbol
Hangingpod Milkvetch	<i>Astragalus atropubescens</i>	ASAT2
Heartleaf Arnica	<i>Arnica cordifolia</i>	ARCO9
Hoary phacelia	<i>Phacelia incana</i>	PHIN9
Houndstongue	<i>Cynoglossum officinale</i>	CYOF
Idaho Fescue	<i>Festuca idahoensis</i>	FEID
Idaho Fleabane	<i>Erigeron asperugineus</i>	ERAS
Idaho Sedge	<i>Carex idahoa</i>	CAID
Indian Ricegrass	<i>Achnatherum hymenoides</i>	ACHY
Kentucky Bluegrass	<i>Poa pratensis</i>	POPR
Kinnikinick	<i>Arctostaphylos uva-ursi</i>	ARUV
Leafy Spurge	<i>Euphorbia esula</i>	EUES
Lemhi Beardtongue	<i>Penstemon lemhiensis</i>	PELE8
Lewis Flax	<i>Linum lewisii</i>	LILE3
Limber Pine	<i>Pinus flexilis</i>	PIFL2
Limestone Larkspur	<i>Delphinium bicolor ssp. calcicola</i>	DEBIC
Lodgepole Pine	<i>Pinus contorta</i>	PICO
Low Sagebrush	<i>Artemisia arbuscula ssp. arbuscula</i>	ARARA
Lupine	<i>Lupinus spp.</i>	LUPIN
Meadow Barley	<i>Hordeum brachyantherum</i>	HORR2
Montana Sweet Pea	<i>Thermopsis montana</i>	THMO6
Mountain Big Sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>	ARTRV
Mountain Brome	<i>Bromus carinatus</i>	BRCA5
Mountain Snowberry	<i>Symphoricarpos oreophilus</i>	SYOR2
Musk Thistle	<i>Carduus nutans</i>	CANU4
Narrowleaf Cottonwood	<i>Populus angustifolia</i>	POAN3
Nebraska Sedge	<i>Carex nebrascensis</i>	CANE2
Needle & Thread	<i>Hesperostipa comata</i>	HECO26
Nodding Brome	<i>Bromus anomalus</i>	BRAN
Owl-clover	<i>Orthocarpus spp.</i>	ORTHO
Phlox	<i>Phlox spp.</i>	PHLOX
Pinegrass	<i>Calamagrostis rubescens</i>	CARU
Plains Pricklypear	<i>Opuntia polyacantha</i>	OPPO
Plains Reedgrass	<i>Calamagrostis montanensis</i>	CAMO
Planeleaf Willow	<i>Salix planifolia</i>	SAPL2
Prairie Junegrass	<i>Koeleria macrantha</i>	KOMA
Prairie smoke	<i>Geum triflorum</i>	GETR
Purple Reedgrass	<i>Calamagrostis purpurascens</i>	CAPU
Pussy-toes	<i>Antennaria spp.</i>	ANTEN
Quaking Aspen	<i>Populus tremuloides</i>	POTR5
Railhead Milkvetch	<i>Astragalus terminalis</i>	ASTE9
Railroad Canyon Wild Buckwheat	<i>Eriogonum soliceps</i>	not listed
Red-oiser Dogwood	<i>Cornus sericea ssp. sericea</i>	COSES
Rocky Mountain Butterweed	<i>Packera streptanthifolia</i>	PAST10
Rocky Mountain Dandelion	<i>Taraxacum eriophorum</i>	TAER2
Rocky Mountain Iris	<i>Iris missouriensis</i>	IRMI
Rocky Mountain Juniper	<i>Juniperus scopulorum</i>	JUSC2
Rubber Rabbitbrush	<i>Ericameria nauseosa</i>	ERNA10
Rush	<i>Juncus spp.</i>	JUNCU
Russian Thistle	<i>Salsola kali</i>	SAKA
Sandberg Bluegrass	<i>Poa secunda</i>	POSE
Sandwort	<i>Arenaria spp.</i>	ARENA
Scarlet Globe-mallow	<i>Sphaeralcea coccinea</i>	SPCO

Common Name	Scientific Name	USDA Symbol
Sedge	<i>Carex spp.</i>	CAREX
Shy Wallflower	<i>Erysimum inconspicuum</i>	ERIN7
Short-fruited Willow	<i>Salix brachycarpa</i>	SABR
Shrubby Cinquefoil	<i>Dasiphora fruticosa ssp. floribunda</i>	DAFRF
Silver Sagebrush	<i>Artemisia cana</i>	ARCA13
Slender Cinquefoil	<i>Potentilla gracilis</i>	POGR9
Slender Sedge	<i>Carex lasiocarpa</i>	CALA11
Slender Thelypody	<i>Thelypodium sagittatum ssp. sagittatum</i>	THSAS
Slender Wheatgrass	<i>Elymus trachycaulus</i>	ELTR7
Smooth Brome	<i>Bromus inermis</i>	BRIN2
Spike Fescue	<i>Leucopoa kingii</i>	LEKI2
Spotted Knapweed	<i>Centaurea stoebe ssp. micranthos</i>	CESTM
Spruce	<i>Picea spp.</i>	PICEA
Stemless Mock Goldenweed	<i>Stenotus acaulis</i>	STAC
Sticky Geranium	<i>Geranium viscosissimum</i>	GEVI2
Stiffleaf Penstemon	<i>Penstemon aridus</i>	PEAR2
Subalpine Fir	<i>Abies lasiocarpa</i>	ABLA
Sweetscented Bedstraw	<i>Galium triflorum</i>	GATR3
Taper-tip Desert-parsley	<i>Lomatium attenuatum</i>	LOAT
Thick-spike Wheatgrass	<i>Elymus lanceolatus</i>	ELLA3
Three-tip Sagebrush	<i>Artemisia tripartita</i>	ARTR4
Timothy	<i>Phleum pratense</i>	PHPR3
Tufted Hairgrass	<i>Deschampsia cespitosa</i>	DECE18
Ute Ladies' Tresses	<i>Spiranthes dilivialis</i>	SPDI6
Water Birch	<i>Betula occidentalis</i>	BEOC2
Water Sedge	<i>Carex aquatilis</i>	CAAQ
Western Fescue	<i>Festuca occidentalis</i>	FEOC
Western Meadow-rue	<i>Thalictrum occidentale</i>	THOC
Western Wheatgrass	<i>Pascopyrum smithii</i>	PASM
Western Yarrow	<i>Achillea millefolium var. occidentalis</i>	ACMIO
Wheeler's bluegrass	<i>Poa wheeleri</i>	POWH2
Whiplash Willow	<i>Salix lucida ssp. lasiandra</i>	SALUL
White Clover	<i>Trifolium repens</i>	TRRE3
White Sagebrush	<i>Artemisia ludoviciana</i>	ARLU
White Spruce	<i>Picea glauca</i>	PIGL
Whitebark Pine	<i>Pinus albicaulis</i>	PIAL
White-stemmed Globe-mallow	<i>Sphaeralcea munroana</i>	SPMU2
Winterfat	<i>Krascheninnikovia lanata</i>	KRLA2
Wolf's Willow	<i>Salix wolfii</i>	SAWO
Wyoming Big Sagebrush	<i>Artemisia tridentata ssp. wyomingensis</i>	ARTRW8
Yellow Sweetclover	<i>Melilotus officinalis</i>	MEOF
Yellow Willow	<i>Salix lutea</i>	SALU2