East Grasshopper Watershed Assessment Report

Dillon Field Office

December 21, 2011

Cold Spring Creek drainage, June 23, 2011.

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Introduction

This document is a land health assessment of the public lands administered by the Bureau of Land Management (BLM) in the East Grasshopper Watershed (EGW).

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 EGW 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, but also include other programs, land uses, and activities. These include: noxious weed control, conifer expansion and aspen restoration, recreation activities, wildlife and fisheries habitat, abandoned mine lands reclamation, forest management, and travel management. 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 completed to address identified 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 other documented resource concerns or opportunities for improvement/restoration

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 2013, but full implementation of revised grazing plans, range improvement projects, and/or vegetation 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 provides 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. 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 EGW is located in Beaverhead County, Montana and drains portions of the East Pioneer mountain range. The watershed lies within Townships 6-9 South and Ranges 10-13 West, Montana Principal Meridian (MPM.).

The approximate boundary of the assessment area includes public lands administered by the BLM from the Big Hole Divide in the west to Frying Pan Basin in the east, and from the southern U.S. Forest Service (USFS) boundary of the East Pioneer Mountains south to Grasshopper Creek. The assessment area boundary, shown on the East Grasshopper Assessment Area map (Map 1), 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 (i.e., ridgelines, drainages). Grazing allotment boundaries have been determined by previous BLM decisions based primarily on land ownership and these artificial boundaries may not follow topographical features. Therefore, some of the grazing allotments in the assessment area may fall within one or more watersheds or hydrologic units. Grazing allotments within the EGW may have been completed in other assessments (e.g., Beaverhead West, East Pioneers).

Within the EGW assessment area there are approximately 120,396 total acres of land, of which 80,237 are public lands administered by the BLM. Of the total BLM-administered lands within the EGW, 79,000 acres are allotted for livestock grazing and 1,237 acres are unleased. No acres are categorized as unallotted (unavailable for livestock grazing). This report addresses only land health conditions on public lands administered by the BLM.

Vegetation
In this report, sagebrush and grassland areas are discussed under Standard #1 Uplands, while 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 (LANDFIRE 2011b). Table 1 summarizes the estimated cover types on all land ownerships within the EGW.

Table 1. Summary of acres by general cover type within the East Grasshopper Watershed.

Cover Type	BLM Acreage	% of BLM Acreage	Total Watershed Acreage	% of Total Acreage
Forests	4,755	5.9%	6,688	5.6%
Grasslands	389	0.5%	528	0.4%
Sagebrush / Mountain Shrubs	74,192	92.4%	107,986	89.6%
Riparian / Mesic Shrubs	299	0.4%	1,525	1.3%
Mountain Mahogany	365	0.5%	469	0.4%
Aspen	70	0.1%	163	0.1%
Other (Rock /Water/Ag)	208	0.3%	3,138	2.6%
Totals	**80,278***	100.0%	**120,497***	100.0%

*The slight difference between the acreages presented in Table 1, and the acreages previously presented, result from small variations between the two data sets.

Fire History

The presence or absence of fire plays an integral role in the composition and structure of the vegetation that occurs in the EGW. 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. 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. Fire scarred trees and charred wood are found primarily in the mountainous terrain and foothills of the EGW. The sagebrush/grassland communities that dominate the lower elevation BLM-administered land typically retain evidence of past wildfires for a relatively short amount of time.

Wilderness

There are no designated wilderness areas within the EGW. The northwest corner of the Henneberry Ridge Wilderness Study Area (WSA) extends into the EGW totaling approximately 750 acres within the watershed boundary. These lands are managed in accordance with the *Interim Management Policy (IMP) for Lands Under Wilderness Review* (BLM Handbook H-8550-1).

In accordance with Section 201 of FLPMA, BLM is required to maintain on a continuing basis, an inventory of all public lands and their resources and other values, which includes wilderness characteristics. Lands within the EGW were evaluated for the presence of wilderness characteristics, and one area consisting of approximately 13,088 acres south and east of the Bon

Accord Road, referred to as the Cold Springs Creek unit, was identified as having wilderness characteristics in accordance with the most recent policy guidance. Most of this area was identified in BLM's original wilderness inventory as having the requisite characteristics to carry it forward to the intensive inventory process, but was not recommended to be designated as a WSA. Current policy simply requires that the inventory be updated to assess whether or not wilderness characteristics (≥ 5,000 roadless acres, natural conditions, and opportunities for solitude or primitive recreation) still exist, and evaluate the impacts of any proposed actions to those values. (Map 2)

Prehistory and History of East Grasshopper Watershed

The EGW was occupied continuously from approximately 10,000 years ago until European contact, consisting primarily of small habitation and/or procurement sites (Earle 1980). Various tribes continued to use the Grasshopper Valley through European contact as a travel route to areas east and west. Judging from historic accounts, describing abundant wild game and edible plants, it is also assumed that the valley provided good opportunity for food procurement (University of Nebraska Press 2005).

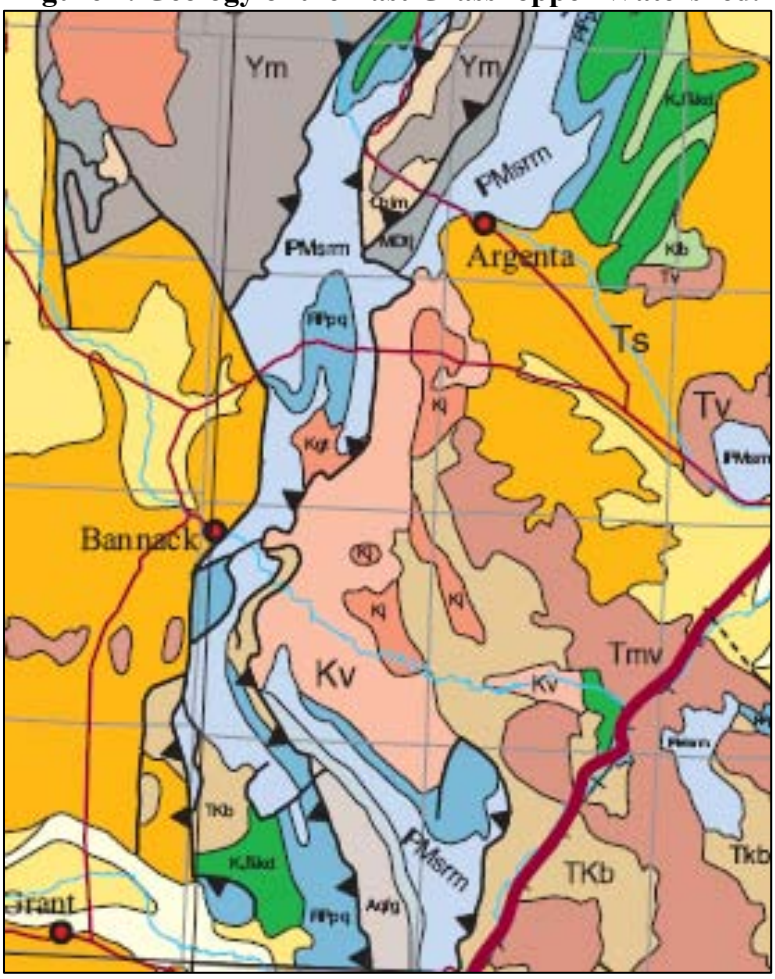
In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resource inventory was completed for a 10% sample of lands within the DFO. Results of the inventory located a mixture of prehistoric and historic sites throughout the watershed. Results of the sample inventory indicated that the cultural site densities in the EGW were considerably higher than that observed in other watersheds, with the average site density of 1 site per 348 acres (2.048 sites per square mile). Sites consist primarily of small prehistoric camp sites and historic mining (Earle 1980).

An examination of existing records on file with the BLM-Dillon Field Office, the Beaverhead National Forest, and the Montana State Historic Preservation Office, provides information on the number of known cultural resource properties and also the amount and level of previous cultural resource inventories that have been conducted. To date, there have been 90 Class III cultural resource inventories conducted within the EGW. Class III cultural resource inventories totaled 3,187 acres surveyed.

General Geology, Mining History, and Abandoned Mine Lands

The East Grasshopper Watershed lies at the leading edge of an extensive series of thrust faults where older sedimentary rocks have been thrust eastward over younger sedimentary rocks as generally represented by darker hashed lines trending north-south in Figure 1. The rocks in the watershed include basement Precambrian Archean gneisses generally not involved in the thrust plates. The thrust plates include Precambrian Proterozoic sedimentary rocks of the Belt Supergroup to Cambrian and lower Paleozoic sedimentary units. These rocks have been thrust over younger sedimentary rocks of Paleozoic through Mesozoic age. Tertiary intrusive and volcanic rocks, represented by the pink to rust colored units in Figure 1 are scattered throughout the watershed, generally east of the thrust plates. Both the Cretaceous and Tertiary volcanic rocks and the Cretaceous sedimentary units (green in Figure 1) can be problematic for land use decisions as they can be erosive and unstable.

Figure 1. Geology of the East Grasshopper Watershed.



The East Grasshopper Watershed includes several areas with historic mineral production, including the placer deposits along Grasshopper Creek. Gold was discovered on Grasshopper Creek at the location of the historic town of Bannack, in 1862. More than a ton of gold was taken from the Grasshopper diggings during the first season, producing some of the purest gold found anywhere in the world. By the summer of 1863, the camp had a population of from 3,000 to 5,000 people, becoming Montana's first territorial capital in 1864. Bannack began to decline in 1863 when new strikes at Alder Gulch drained off a large part of the town's population. It has been estimated that the Bannack mining district produced approximately $12,000,000 in gold from 1862 to 1930 (MTDEQ 2008).

The other historic mining community located in the watershed is the town of Argenta. Argenta and Ermont, slightly to the southwest of Argenta had several producing mines. The mines are generally located along contacts between igneous rocks and sedimentary rocks and exploited deposits, which often occurred as replacement veins in Paleozoic limestones and sometimes granitic rocks. Metals found in the ores included silver, lead, zinc, antimony, and copper with some secondary gold, as well. The Ermont sub-district is relatively recent in origin and is noted with being one of the last gold rushes in the United States. The area was first prospected in 1926

with a gold rush occurring in 1932 culminating with a 100-ton cyanide mill built in 1936. Monthly output during this period was approximately $22,000 a month. Although mining was halted during WWII, the mine continued to produce intermittently until 1963. Total production for the mine was 1.25 ton of gold (MTDEQ 2008).

Within the Baldy Mountain district, ores are found in contact and replacement deposits and disseminations in dikes. The simple ores here were primarily worked for gold, but there was only limited production. Dyce Creek, in the northwest corner of the watershed, has seen both placer and hardrock mining activity. Although placer mining began there as early as 1869, Dyce Creek's most profitable year was 1908 when 100 ounces of gold were recovered from sluices. The majority of the districts occurred prior to the turn of the century with an overall value of only $27,500 for its entire production (MTDEQ 2008).

The BLM Abandoned Mine Lands (AML) program is responsible for cleaning up sites determined to be hazardous to human health, to the environment, or those which present physical safety hazards to the public. This program addresses mine sites abandoned prior to January 1, 1981, the effective date of the BLM's surface management regulations (43 CFR 3809) that implement the "unnecessary or undue degradation" provisions of the Federal Land Policy and Management Act of 1976 (FLPMA). Because early mining prior to 1981 did not require reclamation or bonding, many of these abandoned mines have legacy features such as eroding dumps, abandoned tailings, or open mine features. As mining activity is directly related to the demand for materials, commodity price, and advancing technologies it is a cyclic activity. Therefore, relationships between abandoned mines and active mines/exploration will vary throughout time as demand for the resources change. Changes in reclamation standards, technology, and bonding will prohibit mining problems of the past from developing in the future. Mining activity, after 1981, is administered by the 3809 Mineral Program.

Abandoned Mine Lands (AML) work in southwest Montana is conducted under a zoned program which incorporates the Dillon, Missoula, and the Butte Field Offices. Issues on AML are generally divided into two categories: those with environmental issues, and those with physical safety problems, although it is not uncommon for these issues to overlap on the same project. Numerous inventories of mines with environmental and/or physical safety issues are available from the Department of State Lands (Pioneer Technical Services 1995), the Montana Bureau of Mining and Geology (MBMG 1997), Tetra Tech, Inc. (2003), and BLM. This work has produced a list of sites for reclamation, and areas needing field review in the DFO.

The EGW contains a number of mining districts including the Blue Wing, Bannack, Argenta, Baldy Mountain and others districts. All of the districts contain abandon mine features and some could potentially pose a physical safety hazards. Many of the physical safety features have been mitigated in the past or are on patented lands. More detailed inventories of these features along with land statues determinations will be completed in the future as time and resources permit. Once the features are inventoried and ranked, physical hazards will be mitigated.

Visual Resource Management

The majority of the EGW is within Visual Resource Management (VRM) Class III, with some portions identified to be managed as VRM Class IV. VRM Class III objectives require partial

retention of the existing character of the landscape and moderate changes to the existing landscape. Management activities may attract attention, but should not dominate the view of the casual observer.

The VRM Class IV objective is to provide for management activities which require major modification of the existing character of the landscape. Changes may attract attention and be dominant landscape features but should reflect the basic elements of the existing landscape.

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 throughout forested habitats in the assessment area. Extensive timber harvest occurred on the slopes surrounding Bannack in association with settlement of the area and mining activities.

Recent forest management activities on BLM administered lands occurred in the early 2000s in the West Fork of Dyce Creek drainage and south of Badger Pass. The Dyce Creek timber sale completed timber harvest on approximately 230 acres, and the Badger Pass timber sale completed timber harvest on approximately 50 acres. Both of these sales implemented actions from the East Grasshopper Forest Vegetation Project (1998), and had the objectives of thinning overstocked Douglas-fir stands and restoring a Douglas-fir savannah structure. The Badger Pass Salvage Sale completed fire salvage harvest on approximately 3 acres. Approximately 500 thousand board feet (MBF) of predominantly Douglas-fir were removed in these sales combined.

The Badger Pass area is popular for personal use Christmas tree cutting for Dillon and Argenta residents. There has also been recent interest expressed in commercial Christmas tree cutting for this area.

Recreation

Recreational use within the EGW occurs year round, including horseback riding, hiking, big game hunting, bird hunting, recreational driving, fishing, wildlife-viewing (especially sage grouse viewing near the Reservoir Creek lek), snowmobiling, cross-country skiing, etc. Two big game outfitters are permitted to guide commercial big game hunting in the area, and one outfitter provides commercial horseback rides within the EGW. All of these commercial outfitters use this area lightly, spending the bulk of their time outside the EGW boundary.

The EGW includes portions of the South Pioneers and the potential Rocky Hills Special Recreation Management Areas (SRMAs). These areas are identified in the RMP to provide direction for the types of recreation opportunities to be provided. South Pioneers SRMA is identified to provide opportunities for motorized recreation, mountain biking, and day use. The Rocky Hills SRMA would only be designated a SRMA if the Henneberry Ridge WSA were legislatively released from further consideration as wilderness. If the WSA is released as a WSA, the area would be managed primarily to provide mountain biking opportunities. Management would also emphasize opportunities for hiking and primitive camping.

BLM worked together with Bannack State Park in recent years to provide loop trail routes originating in the park and traversing portions of the BLM land north and east of the park boundaries. These trails accommodate mostly non-motorized recreational use, although portions of the trails also coincide with designated motorized routes.

Mineral Resources

The Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976 (FLPMA), and the Natural Materials and Minerals Policy, Research and Development Act of 1980 direct that the Public lands be managed in a manner that recognizes the Nation's needs for domestic sources of mineral production. Under the 1872 Mining Law, claimants have a statutory right to develop their mineral deposits consistent with applicable environmental laws. Mining activity is typically cyclic with the amount of exploration or development of resources directly related to the demand for the material, technology available, and the market price of the commodity.

Although areas of the watershed are highly mineralized, the East Grasshopper watershed currently has only one 43 CFR 3809 Mining Plan of Operation and one Mining Notice. The plan is a placer operation located north of Grasshopper creek just east of where the Cold Springs road meets Grasshopper Creek. The operation has disturbed approximately 10 acres and currently has processing and other equipment on site. The Notice is also a placer operation located north of Argenta just east of the historic Groundhog mine. The operation is small, disturbance is limited and reclamation is concurrent.

Casual use placer activity generally occurs on a regular basis along Dyce Creek and Grasshopper Creek.

There is currently one authorized mineral material site in the watershed which is a community gravel pit located near Badger pass on the south side of Highway 278. Although overall sales from the pit are small, it does provide a needed gravel source for local roads. Disturbance is approximately 5 acres. Community pits are sites that are set up specifically for the sale of mineral materials. There are currently no exclusive mineral material sales in the watershed.

The watershed is considered to have low to moderate potential for oil and gas and there is currently no exploration or development activity taking place.

Livestock Grazing

There are 9 individual operators that have grazing permits/leases on 79,000 acres (16 allotments) of public land administered by the BLM in the watershed. The allotments are shown on the map of East Grasshopper Assessment Area Allotments (Map 1). Public lands, administered by BLM, provide a large proportion of the late spring, summer and fall forage base in the watershed. There are 7,269 animal-unit months (AUMs) of livestock forage allocated on public lands within the 16 allotments included in this assessment. The livestock grazing allocations and management for allotments within the EGW are displayed in Table 2.

Table 2. Livestock grazing allocations and management within the East Grasshopper 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[3]	Total Acres
Baldy Mountain, 30037, (I)	200 C	05/15-09/15	RR	11.2	726	8,098	ST=655; PVT=2,436	11,189
Bannack, 30015, (I)	282 C	05/10-06/24	RR	16.3	354	6,697	ST=1,756; PVT=384	8,837
	282 C	06/25-06/30	RR		56			
Bannack Road, 20619, (C)	6 C	11/01-12/01	DS	11.5	6	69	0	69
Buffalo Creek, 30617, (C)	11 C	04/01-01/31	CU	7.5	111	829	ST=81	910
Cross, 30033, (I)	375 C	05/16-08/25	RR	8.3	419	3,480	PVT=242	3,722
Ermont, 10598, (M)	145 C	06/06-08/31	RR	4.1	33	136	0	136
Flying N, 20724, (I)	2 C	05/16-10/31	CU	9.3	11	102	0	102
Frenchie, 10121, (M)	103 C	10/01-03/31	DS	9.7	530	11,737	ST=742; PVT=1,418	13,897
	147 C	10/01-03/31	DS		686			
Millpoint, 10751, (C)	12 C	05/15-12/02	CU	9.2	80	734	0	734
Red Mine Isolated, 30609, (C)	1 C	05/15-09/30	CU	3.0	5	15	0	15
Reservoir Creek AMP, 30030, (I)	625 C	05/16-08/31	RR	8.5	1,531	13,010	ST=5,060; PVT=356	18,426
Reservoir Creek Custodial, 20723, (C)	6 C	07/01-12/31	CU	7.3	36	263	PVT=803	1,066
Road Agent Rock, 00759, (C)	7 C	05/01-10/25	CU	7.2	41	296	PVT=605	901
Stonehouse, 30005, (M)	600 C	05/10-06/25	RR	12.4	824	26,581	FS=376; ST=2,967; PVT=5,114	35,038
	600 C	11/10-12/31	RR		852			
	200 C	05/10-06/25	RR		219			
	200 C	11/10-12/31	RR		243			
Taylor-Buffalo, 10122, (I)	200 C	06/01-06/25	SL	15.7	164	5,738	PVT=274	6,012
	200 C	05/25-06/24	SL		202			
Taylor Creek, 10745, (I)	140 C	11/01-12/01	DS	8.5	143	1,215	FS=97; ST=46; PVT=3	1,361
BLM Totals	**3,262 C**			**AVG = 10.9**	**7,269**	**79,000**	**23,415**	**102,415**

[1]*Livestock Kind: C=cattle*
[2]*Grazing System: SL=season long, RR=rest rotation, DS=dormant-season use, CU=custodial use*
[3]*Other Ownerships: FS=US Forest Service, ST=Montana DNRC, PVT=Private*

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. Allotment category refers to BLM's level of management for a given grazing allotment and is used to establish priorities for distributing available funds and personnel during plan implementation to achieve cost-effective improvement of rangeland resources. Categorization is also used to organize allotments into similar groups for purposes of developing multiple use prescriptions, analyzing site-specific and cumulative impacts, and determining trade-offs. Allotments in the I-category are managed more intensively and are monitored more frequently. Allotments in the M-category are usually at a desired condition and are managed to maintain or improve that condition. Allotments in the C-category are usually isolated parcels with few resource concerns that are fenced in with larger parcels of deeded land, are managed in conjunction with the permittee/lessee's normal livestock operation, and are monitored less frequently.

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. Of the BLM-administered lands in the watershed that are available for livestock grazing (76,761 acres), about 97% 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 2). About 3% of the BLM-administered acres that are available for livestock grazing are in custodial allotments, where BLM management inputs are minimal because of the small proportion of public land in the allotments (Map 1).

The stocking rate on BLM lands within the watershed averages 10.9 acres/AUM and varies from 3.0 to 16.3 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; however, several allotments allow the flexibility to graze yearling cattle.

Process

This assessment was done in accordance with the following 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.
- 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 and woodland habitats, and fire ecology. Forest and woodland habitats, and fire ecology 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 (including Special Status Species). These assessments are made on an allotment scale, with the exception of Air Quality, which is 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 (Appendix C), 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 photographic records used for this assessment are available at the Dillon Field Office. Technical references are also available at the Dillon Field office or online at http://www.blm.gov/nstc/library/techref.htm.

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

- **Affected Environment** - This section briefly describes the area and resources that were assessed.
- **Findings and Analysis** - This section describes the findings of the IDT during the field assessment.

- **Recommendations** - This section presents initial recommendations developed by the IDT during the field assessment.

Because of the complexities involved with addressing the Biodiversity Standard, the Affected Environment and Findings and Analysis are presented together and Recommendations are presented at the end of the section.

Uplands

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

Procedure to Determine Conformance with the Standard
The uplands were assessed on an allotment basis according to Interagency Technical Reference 1734-6, *Interpreting Indicators of Rangeland Health*, which is available at the Dillon Field Office or on online at http://www.blm.gov/nstc/library/techref.htm. 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 including photographic records, conducted extensive field surveys, and used the Indicators of Upland Health assessment process to assess the functionality of the upland habitat in the EGW.

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

Affected Environment

Soils
Soils in the EGW 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 EGW receive about 8 to 20 inches of average annual precipitation and fall into the Aridic and Ustic soil moisture regimes. On BLM-administered lands, within the watershed boundary, elevations range from about 5,500 feet, near Grasshopper Creek, to above 8,200 feet, near the USFS Boundary above Dry Gulch.

The soils within the watershed formed in alluvium, colluvium, and residuum mainly from quartzite, limestone, sandstone, andisite, rhyolite, and granitic rock sources. Major landforms

include flood plains, stream terraces, alluvial fans, escarpments, hills, 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 50 percent. Salinity and sodicity (alkalinity) occur within the assessment area to a minor extent and 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's 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: Saline Lowlands, Shallow, Limy, Limy Droughty, Droughty, Droughty Steep, and Loamy. Within the river and stream areas the major Ecological Sites include: Wet Meadow, Riparian Wet Meadow, Riparian Subirrigated, Subirrigated, and Overflow.

Vegetation

Most of the watershed's BLM administered uplands are dominated by sagebrush (92%), including mountain big sagebrush, Wyoming big sagebrush, basin big sagebrush, and three-tip sagebrush. Winterfat and Gardner's saltbush are 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.

Special status plants, noxious weeds, and invasive species are discussed under Standard #5 Biodiversity.

Vegetative Treatments

Historically, the allotments to the west of Badger Pass have been the foci of numerous vegetation treatments. Typically, the objective was to remove or reduce big sagebrush and/or seed crested wheatgrass to reduce erosion, increase water infiltration, and provide spring livestock grazing. The specifics of each treatment are described in Table 3 and the treatment areas are illustrated on Map 3.

Table 3: Historic vegetation treatments within the East Grasshopper Watershed.

Project Name & Number	Allotment Name	Treatment	Acres	Date
Badger Pass Aerial Spray #470518	Unleased	Sprayed w/ 2,4-D and #2 diesel oil	128	06/07/1968
Baldy Mountain Spray #470572	Baldy Mountain	Sprayed w/ 2,4-D and water	464	06/14/1965

Project Name & Number	Allotment Name	Treatment	Acres	Date
Bannack Aerial Spray #470516	Bannack	Sprayed w/ 2,4-D and #2 diesel oil	4,710	06/29/1964
Bannack Checks #470494	Bannack	Constructed 200 earthen checks and seeded w/ Siberian wheatgrass, alfalfa, & sweet clover	2,250	09/09/1965
Bannack Contour Furrowing #470493	Bannack	Contoured slopes and seeded w/ western wheatgrass, hard fescue, and Whitmar wheatgrass	1,210	07/30/1964
Cottonwood Creek Seeding #470534	Taylor-Buffalo	Plowed and seeded w/ Siberian wheatgrass, alfalfa, & sweet clover	458	11/25/1964
Double Cross Aerial Spray #470515	Taylor-Buffalo	Sprayed w/ 2,4-D and #2 diesel oil	2,463	06/29/1964
Dyce Creek Seeding #470633	Taylor-Buffalo	Plowed and seeded w/ Siberian wheatgrass, alfalfa, & sweet clover	149	09/24/1966
East Grasshopper Burns #000576	Baldy Mountain & Unleased Tract	Prescribed fire	≈ 230	2004-2006
Holland Reseeding #470421	Taylor-Buffalo	Plowed and seeded w/ crested wheatgrass	770	09/23/1961
		Sprayed w/ 2,4-D and #2 diesel oil	893	06/11/1968
North Red Mine Spray #474765	Baldy Mountain	Unknown	1,785	06/25/1970
South Bannack Chisel #476668	Bannack	Plowed and seeded w/ beardless wheatgrass & alfalfa	130	04/30/1984
Taylor Creek Reseeding #470452	Taylor-Buffalo	Plowed and seeded w/ Siberian wheatgrass & alfalfa	400	10/09/1962
Taylor Creek Spray #470573	Taylor-Buffalo Taylor Creek	Sprayed w/ 2,4-D and water	1,973	06/02/1965
Tungsten Spray #470663	Baldy Mountain	Sprayed w/ 2,4-D and #2 diesel oil	576	06/14/1967

Findings and Analysis

Members of the IDT visited all the grazing allotments and the unleased public land in the EGW during 2011 and completed 23 *Rangeland Health Indicator Evaluation Matrices* on various ecological sites and plant associations. In addition, 23 Daubenmire trend studies and 52 permanent photo plots, which were established in the 1970s and early 1980s, were duplicated in 2010 and 2011 to help determine vegetative trends. The data collected were summarized and compared with baseline and interim data providing supporting information, along with the photographic record, for interpreting the upland indicators (see Table 4, Upland Qualitative Assessment Summary). Descriptions of these upland monitoring methodologies are found in Interagency Technical Reference 1734-4, *Sampling Vegetation Attributes*, which is available at the Dillon Field Office or online at http://www.blm.gov/nstc/library/techref.htm.

Conifer expansion into sagebrush/grasslands is affecting Upland Health on a localized basis, and is discussed under the Standard #5 – Biodiversity. 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 of grazing allotments within the East Grasshopper Watershed.

Allotment Name, Number, Pasture Name, & Category	Ecological Site	Dominant Plant Species	Degree of Departure from Expected		
			SOIL SITE STABILITY	HYDROLOGIC FUNCTION	BIOTIC INTEGRITY
Baldy Mountain, 30037, Red Mine, (I)	Loamy-Droughty, 10-14" Precipitation Zone (PZ)	Idaho Fescue / Mountain Big Sagebrush	None-Slight	None-Slight	None-Slight
Bannack, 30015, Sandy, (I)	Clayey, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	None-Slight
Bannack, 30015, South, (I)	Clayey, 10-14" PZ	Sandberg Bluegrass / Wyoming Big Sagebrush	None-Slight	Slight-Moderate	Slight-Moderate
Buffalo Creek, 30617, (C)	Droughty, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Moderate	Slight-Moderate
Cross, 30033, (I)	Limy, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	None-Slight	None-Slight	Slight-Moderate
Cross, 30033, (I)	Sandy Argillic, 10-14" PZ	Sandberg Bluegrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	None-Slight
Frenchie, 10121, Frenchie, (M)	Limy-Droughty, 10-14" PZ	Needle-and-thread / Wyoming Big Sagebrush	None-Slight	None-Slight	None-Slight
Frenchie, 10121, Timber Butte, (M)	Limy, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	None-Slight
Reservoir Creek AMP, 30030, W2, (I)	Loamy-Droughty, 10-14" PZ	Idaho Fescue / Mountain Big Sagebrush	None-Slight	None-Slight	None-Slight
Reservoir Creek AMP, 30030, R1, (I)	Clayey, 10-14" PZ	Sandberg Bluegrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	Slight-Moderate
Reservoir Creek AMP, 30030, R2, (I)	Clayey, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	Slight-Moderate

Allotment Name, Number, Pasture Name, & Category	Ecological Site	Dominant Plant Species	Degree of Departure from Expected		
			SOIL SITE STABILITY	HYDROLOGIC FUNCTION	BIOTIC INTEGRITY
Reservoir Creek Custodial, 20723, (C)	Loamy-Droughty, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	Moderate
Stonehouse, 30005, Ermont, (M)	Limy-Droughty, 10-14" PZ	Needle-and-thread / Bluebunch Wheatgrass	None-Slight	None-Slight	Slight-Moderate
Stonehouse, 30005, Argenta Flats, (M)	Shallow, 10-14" PZ	Needle-and-thread / Bluebunch Wheatgrass	Slight-Moderate	Slight-Moderate	None-Slight
Stonehouse, 30005, McDowell, (M)	Loamy-Limy, 10-14" PZ	Needle-and-thread / Wyoming Big Sagebrush	None-Slight	None-Slight	None-Slight
Stonehouse, 30005, Spring Creek, (M)	Loamy, 15-19" PZ	Idaho Fescue / Three-tip Sagebrush	None-Slight	None-Slight	None-Slight
Stonehouse, 30005, Argenta Springs, (M)	Shallow-Limy, 10-14" PZ	Bluebunch Wheatgrass / Black Sagebrush	None-Slight	None-Slight	None-Slight
Stonehouse, 30005, Frying Pan, (M)	Limy, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	None-Slight
Taylor-Buffalo, 10122, South, (I)	Loamy, 10-14" PZ	Sandberg Bluegrass / Wyoming Big Sagebrush	None-Slight	None-Slight	None-Slight
Taylor-Buffalo, 10122, North, (I)	Loamy, 10-14" PZ	Sandberg Bluegrass / Wyoming Big Sagebrush	Slight-Moderate	Moderate	None-Slight
Taylor-Buffalo, 10122, Cottonwood, (I)	Loamy-Droughty, 10-14" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	Slight-Moderate	Slight-Moderate	Slight-Moderate
Taylor-Buffalo, 10122, Buffalo, (I)	Shallow, 15-19" PZ	Idaho Fescue / Mountain Big Sagebrush	Slight-Moderate	Slight-Moderate	Slight-Moderate
Taylor Creek, 10745, (I)	Loamy, 15-19" PZ	Bluebunch Wheatgrass / Wyoming Big Sagebrush	None-Slight	None-Slight	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 slightly 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 uplands on 13 allotments, and the unleased parcel, comprising about 92% of the BLM-administered uplands in the EGW assessment area, are functioning properly under existing management. Three allotments, comprising about 8% of the public uplands in the EGW, are FAR with a static or downward trend. Generally, pastures that receive longer periods of spring grazing, or receive spring-grazing in successive years, showed a decline in canopy cover and species composition of cool-season bunchgrasses; whereas, pastures that receive dormant-season use, which promotes cool-season bunchgrasses, or receive complete rest from livestock grazing at regular intervals showed stable or increasing canopy cover and species composition of cool-season bunchgrasses. Additionally, in the 30-40 years since most the vegetation treatments occurred, canopy cover of big sagebrush has returned to historic levels and many of the seeded herbaceous species are scarcely found.

Baldy Mountain – This allotment is managed under a rest-rotation grazing system and consists of the Red Mine, Baldy Mountain, Shearing Shed and Sheep Canyon pastures. The Shearing Shed pasture is entirely private and, because there are no riparian concerns, is typically used during the late summer. The Sheep Canyon pasture is separated from the Red Mine pasture by natural barriers and is often left ungrazed, because there are no dependable sources to water livestock.

Although the Red Mine pasture is better watered than Sheep Canyon, it is heavily dependent on winter snowfall to recharge springs and, often, is only usable during the early summer. Despite this constraint, the grazing rotation has largely been followed. Total canopy cover in this pasture was 96% and the dominant species were Idaho fescue, Wyoming big sagebrush, and three-tip sagebrush. Even with the high canopy cover, the IDT observed short, but stable, water flow patterns, slight active pedestalling, and some historic loss of the soil surface, which likely resulted from past vegetation treatments. The study site is currently dominated by sagebrush.

The Baldy Mountain pasture provides dependable water from both forks of Dyce Creek. The uplands of this pasture are in excellent condition and are dominated by bluebunch wheatgrass, Idaho fescue, and mountain big sagebrush and exhibited excellent production, vigor, reproductive capability, and canopy cover of cool-season bunchgrasses and big sagebrush. In 2004, about 110 acres were burned in Dry Gulch to reduce canopy cover of mountain big sagebrush and increase production of herbaceous species with the objective of drawing livestock off of the East Fork of Dyce Creek.

Bannack – The Bannack allotment is managed under a rest-rotation grazing system where all three pastures on the allotment receive complete rest every other year. This conservative grazing approach is aimed at providing ample forage for big game animals (e.g., elk) during fall, winter and early spring months when forage is most difficult to locate due to snow cover. The IDT visited multiple upland locations on the allotment and completed an Upland Health Evaluation Worksheet on two historic data sites. On the Upland Health Worksheet for the Sandy Pasture, the IDT noted none to slight departures, compared to reference conditions, for plant community composition, compaction layer, functional structural vegetative groups, plant mortality and invasive plants to name a few. Slight to moderate departures from reference conditions were found for water flow patterns, bare ground, litter movement, soil surface resistance to erosion, litter amount and annual production to name a few. The IDT's findings in

the South pasture were similar to the Sandy pasture with none to slight and slight to moderate findings on all upland parameters studied. The South pasture had several historical contour furrowing projects which likely increased the pedestalling departure from none to slight to moderate in the pasture. Overall, the IDT determined that the uplands of this allotment were in PFC and were relatively stable. The historic BLM canopy cover data, collected from the 1970s to present, mirrored the IDT's determination showing an overall stable community with some variable numbers in the 1980s.

Bannack Road – On these small isolated BLM-administered parcels, the IDT noted good production, vigor, and reproductive capability of dominant cool-season grasses and forbs. This allotment is used during November, annually.

Buffalo Creek – This allotment exhibited reduced canopy cover, vigor, reproductive capability, and composition of cool-season bunchgrasses and a shift in dominance toward Wyoming big sagebrush and rabbitbrush. The IDT observed active pedestalling, moderately more water flow patterns, bare ground, and litter than expected, and noted that bunchgrasses were only present in the sagebrush. These impacts are likely the result of repeated grazing during the spring in successive years. On those portions fenced in with private property, supplemental feeding is occurring during the winter months. The scattered parcels had more bare ground and water flow patterns than expected and a higher proportion of phlox and less palatable herbaceous species present.

Cross – The Cross allotment consists of a single pasture and is on a rest-rotation system where the pasture receives complete rest once every four years. The IDT observed the allotment and visited two historic canopy cover study sites and completed a Rangeland Health Evaluation worksheet for both areas. The IDT found mostly none to slight departures to what is expected on both historic data sites. The only parameters that were not none to slight on the Limy 10-14" study site, were; water flow patterns, bare ground, plant community composition and distribution relative to infiltration and runoff, litter, annual production and reproductive capability. Some of these parameters are likely due to historic impacts (e.g., water flow patterns). The Sandy Argillic 10-14" study site was similar to the Limy study site with some variance in scores. The historic canopy cover data collected on both sites showed a relatively static trend in cover over the last 30 years. However, the photographic record shows a strong upward trend from the 1970s to the 1990s with a more static trend during the last 10 years. This variance in data and historic photos can often be explained by variances in annual precipitation when the data was collected, timing of data collection and variance of observers. Photos are more objective data while estimates of canopy cover can be more subjective data.

Although the uplands on this allotment were in PFC, grazing distribution could be improved. The southern 1/3 of the pasture is lightly grazed while the north 2/3 of the allotment receives the majority of the grazing use. This uneven distribution is caused by a lack of livestock water in the southern portion of the pasture.

Ermont – The Ermont Allotment is used in conjunction with the Christensen Pasture of the USFS Badger Pass Allotment, which is managed under a rest-rotation grazing system. The dominant vegetative species were Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, and

mountain big sagebrush. Overall, there was good canopy cover, species composition, and production on this allotment.

Flying N – The more level portions of this allotment are dominated by Idaho fescue and mountain big sagebrush, while the ridge and steeper slopes, where it is rockier, are dominated by forbs, mosses, and lichens. This allotment exhibited excellent production, vigor, reproductive capability, and canopy cover of Idaho fescue and mountain big sagebrush. There is a snow fence located in the saddle of this allotment that is not a BLM project, but is in need of maintenance. It was likely constructed to catch snow, which then feeds Taylor Spring on the USFS Badger Pass allotment.

Frenchie – The Frenchie allotment includes the Cold Springs, Frenchie, and Timber Butte pastures, all of which are grazed during the dormant season, between October and April, annually. The Dillon RMP specifies dormant-season use for these pastures to provide habitat for several sensitive plant species. Species present included bluebunch wheatgrass, Idaho fescue, mountain big sagebrush, three-tip sagebrush. Uplands in the Cold Springs pasture contain numerous limestone outcrops with curl-leaf mountain mahogany. The study photos suggest a static trend in this pasture.

There are two vegetative trend studies located in Timber Butte pasture. The dominant vegetative species at one site were bluebunch wheatgrass, elk sedge, and fringed sagewort, and total canopy cover was 33%. At this site, there were large, but stable water flow patterns, slight active pedestalling and evidence of past pedestalling, signs of historic soil loss, and slightly reduced resistance to erosion. The Wyoming big sagebrush has declined in frequency and canopy cover and showed signs of decadence.

Total canopy cover at the other study site, in the Timber Butte pasture, was 42% and the dominant species were bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and mountain big sagebrush. Canopy cover and frequency of mountain big sagebrush have declined, while bluebunch wheatgrass, Idaho fescue, elk sedge, and green rabbitbrush have remained fairly static. Sandberg bluegrass has increased in both frequency and canopy cover.

In the Frenchie pasture, total canopy cover was 41% and the dominant species were dominated by bluebunch wheatgrass, Sandberg bluegrass, needle-and-thread, and Wyoming big sagebrush. Frequency and canopy cover of bluebunch wheatgrass, Sandberg bluegrass, and Wyoming big sagebrush have increased, while needle-and-thread has declined. There were short, stable water flow patterns and signs of historic pedestalling. The dominance of Wyoming big sagebrush has shifted the balance of the functional/structural groups on this site.

Millpoint – The uplands within the Millpoint allotment exhibited excellent production, vigor, reproductive capability, and canopy cover of cool-season bunchgrasses and big sagebrush. The majority of this allotment is secondary range and the only available livestock water is found on private property along Grasshopper Creek.

Red Mine Isolated – This allotment had good canopy cover of bluebunch wheatgrass and big sagebrush, but also contained introduced species, due to its proximity to irrigated pasture. Two irrigation ditches largely limit access to much the allotment by livestock.

Reservoir Creek – Reservoir Creek management plan consists of a nine pasture rest-rotation system. One pasture, Larkspur pasture, is grazed after the growing season each year to avoid larkspur poisoning livestock. The IDT visited all the pastures on the allotment and completed an evaluation sheet on several of the pastures. The Rangeland Health Evaluations resulted in ratings of none to slight or slight to moderate departure from what is expected for each site, except the pedestals parameter in R1 pasture and water flow patterns in the R2 pasture. For both the pedestal parameter in R1 and the water flow patterns in R2, scores were moderate. The IDT evaluation notes point out that the moderate ratings were likely a result of historic grazing use. In the R2 pasture, the IDT noted that bluebunch wheatgrass is slowly increasing in the amount of cover compared to less palatable grasses, while sagebrush is increasing in overall dominance of vegetation compared to historic photos. This same trend is mirrored in the W2 pasture where sagebrush is higher than expected for a reference site and sagebrush regeneration is occurring. In the R1 pasture, the IDT noted upland health on the pasture was PFC and on an upward trend.

The historical data on the two trend study sites in R1 pasture and the W2 pasture showed an overall static trend in canopy cover with some variances in canopy cover of bluebunch wheatgrass and Wyoming big sagebrush over the last 30 years. The Reservoir Creek allotment has incurred historic overuse due to its proximity to Bannack. However, the management plan adopted within the last decade has begun to slowly improve uplands health conditions throughout the allotment.

Reservoir Creek Custodial – This allotment consists of three pastures that mostly contain private land forage. The percent of forage that comes from BLM land parcels in each pasture is <10%. Over the last 100 years, these BLM land parcels were grazed heavily for most of the spring and summer months due to their proximity to Reservoir Creek. The IDT completed a Rangeland Health Evaluation Worksheet which noted moderate departures from what is expected from a reference site for bare ground, Plant Community Composition and Distribution Relative to Infiltration and Runoff, Litter Amount and Annual Production. A moderate to extreme departure was noted for reproductive capability of perennial plants. This historic, heavy grazing use is most evident in the eastern most pasture where dominant cool-season grasses and forbs are found mostly under sagebrush plants where they were protected from grazing. The IDT rated this area as FAR with a static trend.

Road Agent Rock – The allotment is used lightly during the dormant season and is in excellent range condition. Dominant cool-season grasses exhibit high vigor and reproduction on an annual basis.

Stonehouse – The Stonehouse allotment consists of the Ermont, McDowell, Argenta Flats, Argenta Springs, Frying Pan, and Spring Creek pastures. The Ermont and McDowell pastures provide spring livestock grazing in alternate years. The Argenta Flats, Argenta Springs and Frying Pan pasture are grazed using a rest-rotation system that includes spring use, fall use, and complete rest. The Spring Creek pasture is grazed in November and December, annually.

The study site in the Ermont pasture was dominated by bluebunch wheatgrass, needle-and-thread, elk sedge, and Wyoming big sagebrush with a total canopy cover of 36%. The plants exhibited low vigor and the photos and data generally indicate a static trend. Frequency of bluebunch wheatgrass has increased, but canopy cover is static. Needle-and-thread had a slight decline in frequency and a more pronounced decline in canopy cover. Elk sedge was encountered more frequently and canopy cover has increased slightly. Wyoming big sagebrush has increased in frequency and canopy cover throughout the site. There were some sign of active pedestalling, soil surface loss, litter movement, and short, but stable water flow patterns. It also appeared that bunchgrasses did not comprise as much of the plant community as was expected for the site and their reproductive capability was moderately reduced. These findings were also reflected as an overall reduction in annual production for this site.

There are two trend monitoring sites within the McDowell pasture. Total canopy cover, at one site, was 38% and the dominant species were needle-and-thread, Sandberg bluegrass, phlox, and Wyoming big sagebrush. Broom snakeweed, fringed sagewort, and phlox populations are relatively static. Frequency and canopy cover of bluebunch wheatgrass and needle-and-thread have declined, while elk sedge and Sandberg bluegrass have increased in frequency, but add little to total canopy cover. This site had short, stable water flow patterns, signs of past pedestal formation, and annual production and litter were less than expected for this site.

The other study location in the McDowell pasture was dominated by Sandberg bluegrass, phlox, and Mountain big sagebrush, with total canopy cover of 24%. The three dominant species have been relatively static, but the canopy cover and frequency of bluebunch wheatgrass has declined. Overall, this pasture had a slightly downward trend, because of the decline in frequency and canopy cover of cool-season bunchgrasses.

Total canopy cover in the Frying Pan pasture was 28% and the dominant species were bluebunch wheatgrass, Wyoming big sagebrush, rubber rabbitbrush, and broom snakeweed. The bluebunch wheatgrass was productive and vigorous, as was the milkvetch. The trend data and photos indicate a static to slowly improving trend within this pasture. In this pasture, the IDT observed short water flow patterns, some active pedestalling, and movement of small litter. Additionally, the high proportion of broom snakeweed was negatively affecting infiltration and runoff and was affecting the balance of functional/structural groups. The reproductive capability of perennial plants was very high in this pasture.

The Argenta Springs pasture had a total canopy cover of 75% and was dominated by phlox, and a mix of low sagebrush, black sagebrush, and mountain big sagebrush. Idaho fescue, bluebunch wheatgrass, and prairie junegrass were also well represented. The data is somewhat inconclusive, but the photos suggest an upward trend. There was minor evidence of active pedestalling, soil surface loss, and movement of small litter, but the site was otherwise as expected.

In the Argenta Flats pasture, total canopy cover was 40% and the dominant species were bluebunch wheatgrass, Sandberg bluegrass, needle-and-thread, and blue grama. Frequency and canopy cover of bluebunch wheatgrass and Sandberg bluegrass have increased, fringed sagewort broom snakeweed and rubber rabbitbrush have declined, and elk sedge and Wyoming big

sagebrush are relatively static. Observations made by the IDT included, active pedestalling, likely from wind erosion, and other signs of historic degradation, but it appeared that the pasture is recovering from past management practices.

Total canopy cover in the Spring Creek pasture was 55% and the frequency and canopy cover of the dominant species, Idaho fescue, bluebunch wheatgrass, and three-tip sagebrush, were mostly static. Wyoming big sagebrush was also present, but was declining in frequency and canopy cover. There were short, stable water flow patterns, some active pedestaling, movement of small litter, slight soil surface loss, and a slight reduction in annual production and amount of litter.

Taylor-Buffalo – This allotment is comprised of the Buffalo Creek, Cottonwood, North, and South pastures. The North, South, and Cottonwood pastures are grazed in the spring, annually, for 6-10 days each. The North pasture had 42% total canopy cover and the dominant species were Sandberg bluegrass, bluebunch wheatgrass, phlox, and Wyoming big sagebrush. Crested wheatgrass was barely noticeable. The IDT observed active pedestalling and connected water flow patterns that were more numerous than expected for the site. The soil's resistance to erosion was reduced and, despite the presence of organic matter, an A-horizon was not apparent. Some of these impacts are likely due to the historic vegetation treatments that altered the soil's structure. The amount of litter was, also, less than expected for the site, which would have resulted from reduced annual production or removal by livestock.

Total canopy cover in the South pasture was 30% and the dominant species were Sandberg bluegrass, phlox, and Wyoming big sagebrush. Crested wheatgrass was still fairly frequent, while bluebunch wheatgrass and Indian ricegrass were present, but scarce. The IDT noted some active pedestalling, a few water flow patterns, and only slightly reduced annual production and litter amounts.

The Cottonwood pasture had a total canopy cover of 40% and was dominated by bluebunch wheatgrass, Sandberg bluegrass, Wyoming big sagebrush, and green rabbitbrush. The IDT's observations included short, but stable, water flow patterns, a few pedestals, slight soil loss, slightly reduced soil resistance to erosion, larger than expected plant interspaces, and a slight compaction layer. These impacts are likely lingering results of past vegetation treatments that altered the soil's structure. Additional observations that have likely resulted from livestock grazing are the high proportion of broom snakeweed, and slightly reduced annual production, litter amount, and reproductive capability of perennial plants.

The Buffalo Creek pasture is used, annually, for 25 days in June, but the cattle are turned out in either the North or South side, depending on the year. This pasture's total canopy cover was 50% and the dominant vegetation is Sandberg bluegrass, bluebunch wheatgrass, Idaho fescue, and mountain big sagebrush. The study site had moderate movement of small size classes of litter, a moderate reduction in infiltration due to changes in plant community composition or distribution, and moderately reduced reproductive capability of perennial plants. This location was within 200 yards of a water trough and part of the study was disturbed by construction of a pipeline, in 1983. The trend monitoring data indicate an overall decline in canopy cover and composition of bluebunch wheatgrass and Idaho fescue and an increase in canopy cover and

composition of Sandberg bluegrass and mountain big sagebrush, which is likely the result of spring grazing in successive years.

Taylor Creek – This allotment is grazed in November, annually. Total canopy cover was 43% and the dominant species were bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue, phlox, and Wyoming big sagebrush. There was good root structure and organic matter in the soil, but there were signs of some active pedestalling and short, but stable, water flow patterns. A historic gully was vegetated and stable under current management.

Unleased Tract – In 2005, this parcel was the focus of a prescribed fire to reduce Douglas-fir encroachment into sagebrush grassland. The site is dominated by bluebunch wheatgrass, Idaho fescue, and mountain big sagebrush and his used heavily by big game species in the spring and fall.

Recommendations

1. Analyze opportunities to develop new or improve existing livestock water facilities in the Red Mine pasture of the Baldy Mountain allotment to increase the reliability of this pasture.
2. On the largest pasture of the Buffalo Creek allotment, adjust grazing management to incorporate deferment and/or rest, with occasional spring grazing, or convert to dormant season use, and change the management category to "Improve."
3. Consider developing water in the southern portion of the Cross Allotment to improve livestock distribution.
4. Request that the USFS, or permittee, repair or remove the snow fence on the Flying N allotment.
5. Revise the grazing management on the Reservoir Creek Custodial allotment to provide some growing season rest in all pastures on an annual basis.
6. Adjust grazing management in the Stonehouse allotment by slightly shortening the spring grazing season in the Ermont and McDowell pastures, to reduce the opportunity for livestock to regraze plants, and improve livestock watering facilities to increase storage capacity by adding troughs or a storage tank.
7. Adjust grazing management on the Taylor-Buffalo allotment to incorporate deferment and/or rest, with occasional spring grazing, or convert to dormant season use.
8. Change the Taylor Creek allotment management category to "Maintain."
9. Continue to manage the Unleased Tract as such and authorize occasional use to achieve resource objectives, or analyze designating this area as unallotted (unavailable to livestock grazing).

Riparian and Wetland Areas

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

Procedure to determine conformance with Standard
BLM policy specifies using several complimentary monitoring and evaluation methodologies to determine conformance with the Riparian Health Standard. The IDT used the Lotic and Lentic Riparian Area Management Assessment Methodologies (TR 1737-15 and TR 1737-16), also known as Proper Functioning Condition (PFC) Assessment Methodologies, to evaluate riparian systems and wet meadows. The lotic methodology is used for flowing water systems. The lentic methodology is used for ponds and still water systems. Applicable portions of the lentic methodology are used to assess springs and wet meadows. A Guide to Managing, Restoring, and Conserving Springs in the Western United States (TR 1737-17) is also used for springs. These technical references are available online at http://www.blm.gov/nstc/library/techref.htm.

The lotic PFC assessment utilizes attributes and processes that can be judged visually to evaluate riparian wetland areas with flowing water against their capability and potential. Some of these attributes and processes include the stream channel's physical characteristics or stream geometry (dimension, pattern and profile). To function properly, adequate vegetation, landform or woody debris should be present to dissipate energy associated with relatively frequent high flow events and to filter sediment, capture bedload and aid floodplain development so the stream does not excessively aggrade or degrade (downcut). The IDT uses the Rosgen Stream Classification System as a tool to help determine stream potential.

During the summer of 2011, the IDT assessed 26 stream reaches, flowing through approximately 15 miles of BLM administered land, visited most of the springs and wetlands within the watershed, and completed PFC evaluations on each.

Many of the riparian areas in the assessment area were originally described, and mapped, based on aerial photos and U.S. Geological Survey (USGS) topographical maps. This information was the basis for GIS mapping. In recent years springs and wetlands have been added to the GIS inventory and mapping effort. Subsequent ground-truthing has verified that a number of drainages previously mapped as riparian habitat are actually dry washes which lack riparian characteristics. These reaches have been removed from the stream/wetland inventory. Conversely, several stream reaches, springs and wetlands not previously identified, were assessed and added to the BLM riparian-wetland data base during the assessment process.

Data was collected on all the streams in the EGW using the Montana Riparian Wetland Assessment (MRWA) during the 2010 field seasons prior to the IDT's PFC assessments. In accordance with the Dillon Resource Management Plan, the MRWA methodology has been adapted and modified by the Dillon Field Office to include channel morphology parameters. The MRWA methodology includes inventories of physical and vegetative characteristics and streambed materials, and measurements of channel dimensions (bank full width, mean bank full depth, flood prone width). Physical measurements are utilized to assess channel morphology and stability and tentatively classify streams at Rosgen Level II. The MRWA also includes

inventories and observations of the composition, cover, vigor and the amount of recruitment, regeneration and utilization of vegetative species within the riparian zone. The data gathered was used by the IDT in conjunction with the PFC assessment process to ascertain riparian health and trends on a reach by reach basis.

Riparian Coverboards were established on a number of stream reaches in the assessment area, dating back to the 1980's. The Riparian Coverboard system includes measurements of actual changes in woody species cover. A photographic record of changes is also included with each of these monitoring methodologies. This data, along with the photographic record associated with Coverboard studies, was used by the IDT to help determine vegetative trend.

Appendix B includes a summary of the MRWA data collected within the EGW. In addition, data collected using MRWA and Cover Board monitoring methodologies are included in the EGW project file and available for review at the Dillon Field Office.

Affected Environment

The streams in EGW assessment area drain 120,396 acres of BLM, Forest Service, State and private land. About 80,237 acres (67%) is public land administered by the BLM. The assessment area is mainly within the Beaverhead Hydrologic Unit. A small portion drains to the Red Rock Hydrologic Unit. The Reservoir Creek AMP allotment drains to both the Red Rock River and the Beaverhead River, via Horse Prairie Creek and Grasshopper Creek, respectively. The Cross allotment flows to Red Rock River, by way of Horse Prairie Creek.

National Wetland Inventory
The National Wetlands Inventory has not been completed in Montana. To address this problem, the State of Montana established the Montana Wetland and Riparian Mapping Center, in 2007. The BLM assists with funding for this project. The Montana Natural Heritage Program is using National Agricultural Imagery Program (NAIP) imagery to inventory and map Montana's wetland and riverine resources. According to the Montana National Heritage Program, the wetland mapping status as of July 2011 is fairly evenly spread between areas currently being mapped and areas with completed provisional mapping. Once the US Fish and Wildlife Service reviews the provisional NWI mapping, the public and the BLM will have a more comprehensive database.

Soils
Hydric soils are a small (<1%) component of the landscape, but play an important role in ecological processes. Hydric soils have prolonged exposure to water and are poorly drained. They are commonly found in depressions, swales, floodplains, springs, wet meadows and marshes.

Streams
The EGW is limited in terms of water resources with many dry gulches: Ermont and Frying Pan Gulch are the largest, with Dexter, Good Friday, Spring and Stapleton being smaller tributary gulches. The main water resources, Grasshopper, Rattlesnake and Reservoir Creek, are primarily in private ownership. The BLM has no management on Grasshopper Creek and very little

management on Rattlesnake and Reservoir Creeks. Stream management across the entire watershed is limited to approximately 15 stream miles. Dry Gulch, Dyce Creek and Taylor Creek account for 9.5 (62%) of the total miles.

Wetlands and Springs
All known wetland and spring information within the EGW is included in this document. Numerous isolated wetlands and springs exist within the assessment area. However, no comprehensive database of wetland and springs was available for this assessment. The National Wetland Inventory (NWI) is nearing completion for the State of Montana and will be a valuable resource in the future. The Montana/Dakotas BLM, in recognition of the need for a comprehensive wetland inventory, is working with and providing funding to Montana Natural Heritage Program to update and ground truth NWI information. Absent this information, the IDT assessed known spring and wetland areas, as well as inventoried areas likely to incorporate wetland resources.

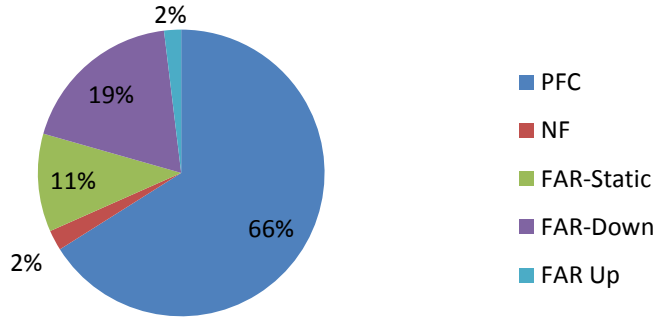
Developed springs within the EGW were inventoried and assessed. These springs are listed and described in the Findings, Analysis and Recommendations section.

Findings and Analysis

Streams
Of the 26 stream reaches assessed, 15 reaches, totaling 8.6 miles, were rated PFC. One reach, totaling 0.25 miles, was rated FAR with an upward trend. Five reaches, totaling 1.4 miles, were rated FAR with a static or no apparent trend. Four reaches, totaling 2.5 miles, were rated FAR with a downward trend. One reach, totaling 0.3 miles, was rated NF. The percentage of the total stream miles in each functional class is illustrated in Figure 2. The locations and functional class ratings for streams in the EGW are also illustrated on Maps 4 and 5.

Where streams were not PFC, concerns included: alteration of stream morphology, reduced access to floodplains, down cutting, reduction in species diversity and composition, reduced vegetative cover, limited species recruitment and regeneration, reduced structural diversity, and decreased vigor of streamside vegetation. Generally, livestock grazing and issues related to roads were the causal factors.

Figure 2: Functional Condition, by Proportion of Miles, for Streams within the East Grasshopper Watershed.



Stream morphology (channel shape and dimensions, including width and depth, and gradient) and bed materials provide important information to determine a stream's function. Stream power is reduced as a channel becomes wider. With a reduction in power, the ability of a stream to maintain riffles and pools, and its ability to move and sort channel materials, is diminished. Sediments accumulate, forcing the stream to widen even more. The BLM strives to promote conditions that enhance a streams ability to maintain stable dimensions, patterns and profiles. Table 5 summarizes the functional status of all the surveyed stream reaches in the EGW.

Table 5. Functional status of stream reaches within the East Grasshopper Watershed.

Stream Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles
Dyce Creek	Baldy Mountain	16	Geyer willow/Beaked sedge	FAR-Static	0.35
Dyce Creek, WF Upper	Baldy Mountain	18	Quaking aspen/Red osier dogwood	FAR-Down	0.2
Dyce Creek WF, Upper	Baldy Mountain	1591	Quaking aspen/Red osier Dogwood	FAR-Down	1.67
Dyce Creek WF, Mid	Baldy Mountain	1593	Quaking aspen/Red Osier Dogwood	PFC	1.19
Dyce Creek WF, Lower	Baldy Mountain	1564	Geyer willow/Beaked sedge	PFC	0.35
Trib to WF Dyce	Baldy Mountain	1575	Geyer willow/Beaked sedge	FAR Down	0.1
Dyce Creek, EF Upper	Baldy Mountain	15	Engelmann spruce/Horsetail	PFC	0.49
Dyce Creek, EF Upper	Baldy Mountain	1572	Geyer willow/Beaked sedge	FAR-Static	0.67
Dyce Creek, EF Lower	Baldy Mountain	1571	Geyer willow/beaked sedge	PFC	1
Trib to EF Dyce Creek	Baldy Mountain	17	Geyer willow/Beaked sedge	PFC	0.15
Dry Gulch	Baldy Mountain	1592	Shrubby cinquefoil	PFC	1.39
Lily Wetland Ermont trib	Ermont	1556	Beaked Sedge	PFC	.56
Cold Spring Creek	Frenchie	1551	Coyote willow/Beaked sedge	NF	.3
Reservoir Creek	Reservoir Creek	1594	Narrowleaf cottonwood	FAR-Static	0.15
Sagebrush Creek	Reservoir Creek	63	Nebraska sedge	PFC	0.64
Sagebrush Creek	Reservoir Creek	64	Baltic rush	PFC	0.43
Watson Creek	Reservoir Creek	1580	Geyer willow/Beaked sedge	FAR-Up	0.25
Watson Creek	Reservoir Creek	1590	Geyer willow/Beaked sedge	PFC	0.01
Watson Creek South Fork	Reservoir Creek	41	Geyer willow/Beaked sedge	PFC	0.49
Cold Spring Creek	Stonehouse	1550	Geyer willow/Beaked sedge	PFC	0.08

Stream Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles
Ermont Gulch trib	Stonehouse	1559	Geyer willow/Beaked sedge	FAR-Static	0.12
Rattlesnake Creek	Stonehouse	1566	Drummond willow/Beaked sedge	FAR-Static	0.15
Rattlesnake Creek	Stonehouse	1567	Drummond willow/Beaked sedge	PFC	0.3
Taylor Creek	Taylor-Buffalo	1553	Geyer willow/Beaked sedge	FAR-Static to Down	0.46
Taylor Creek trib	Taylor-Buffalo	1560	Kentucky bluegrass	PFC	0.22
Taylor Creek	Taylor Creek	1552	Geyer willow/Beaked Sedge	PFC	1.3

Reaches are discussed in more detail by allotment in the following paragraphs. Additional data for any of the riparian/wetland areas in the EGW is available at the Dillon Field Office.

Baldy Mountain – The East and West forks of Dyce Creek flow through the Baldy Mountain allotment. The main stem of Dyce Creek (16) begins at the confluence of the East and West forks, flows for 0.3 miles, and then leaves Public Lands. The reach is impacted at the upper end by a culvert under the road which alters the channel morphology and by a fish barrier at the lower end which controls gradient. Livestock impacts were also contributing to the resource concerns. The reach was rated functioning at risk with a static trend.

Habitat along the West Fork of Dyce Creek is managed by the BLM from the point where it leaves Forest Service land and enters Public Lands until it joins the main stem. The upper reaches of the West Fork (18 and 1591) flow through two ponds and is influenced by the road. Current and historic mining, as well as livestock grazing influence this portion, which the IDT rated functioning at risk with a downward trend. About halfway between the FS boundary and the confluence with the East Fork, the influence of the road diminishes as it moves farther to the west. The IDT determined that remainder of the West Fork (1593 and 1564) was functioning properly. Juniper encroachment was noted in the lowermost part of this section.

The IDT evaluated the East Fork of Dyce Creek (15 and 1572) from the USFS Boundary to the patented parcels. Reach 15 was functioning properly, while the lower reach, 1572, was functioning at risk with a static trend. The IDT noted that the road runs through the stream in two locations. The fill covering the culvert at in T.6S, R.12W, Sec. 23, is eroding and could lead to the culvert washing out. Livestock grazing impacts were also contributing to the FAR rating of reach 1572.

Ermont – A tributary to Ermont Gulch (1556) originates in the Ermont allotment and flows a short distance into the Stonehouse allotment. The portion within Ermont was functioning properly. The Ermont Pipeline originates in this reach, where the source is an excavated wetland with a dam that is leaking.

Frenchie – Cold Spring Creek (1551), which drains to Grasshopper Creek, was not functioning properly. The creek originates in a wet meadow split by the road. Water on the east side flows through a culvert and joins the tributary on the west side where it flows southwest in its channel until reaching a point where roadwork prohibits it from reaching the channel to the south. From

this point the stream flows in a roadside ditch to a low spot where it floods a sagebrush community.

Reservoir Creek – There is 1.8 miles of riparian habitat on public land within the Reservoir Creek allotment. Two perennial reaches (1590 and 41) and two intermittent reaches (63 and 64) of Watson Creek were rated PFC by the IDT. One reach of Watson Creek (1580) was rated as FAR with an upward trend. One reach of Reservoir Creek (1594) was functioning at risk with a static trend. The Reservoir Creek reach has some dysfunctional fencing and livestock are using the reach as a water gap with unacceptable impacts. A small water gap is located on the north side of this stream on the Taylor-Buffalo Allotment. This water gap has a steep grade and is not hardened (armored with rock). Therefore, it is contributing sediment to Reservoir Creek.

Stonehouse – Four reaches flow through Stonehouse Allotment: Cold Spring Creek (1550), a tributary to Grasshopper Creek, Rattlesnake Creek (1566 and 1567), and a tributary to Ermont Gulch (1559). Reach 1559 is a headwaters spring which flows only a few tenths of a mile.

Cold Spring Creek (1550) and Rattlesnake Creek (1567) were both functioning properly.

Rattlesnake Creek (1566) was functioning at risk with a static trend. Resource concerns identified include ungulate browsing of willows without adequate regeneration and streambank impacts. The stream channel has been over-widened making it less effective in accessing its floodplain to dissipate energy or transporting sediment.

Taylor-Buffalo – Taylor Creek (1553), and a tributary of Taylor Creek (1560), flow through the Taylor-Buffalo allotment. Taylor Creek (1553) is impacted by livestock. Resource concerns include channel over-widening and bank shearing. The tributary to Taylor Creek (1560) is located downstream of a water project, which is located in a draw and catches runoff. The stream below the project does not receive upstream flows and relies on groundwater seepage. It was functioning properly.

Taylor Creek – Taylor Creek (1552) flows through the Taylor Creek allotment and was functioning properly. Noted concerns included an over-widened channel adjacent to the county road, likely affected by the road, culvert, and livestock trailing along the county road. Scattered spotted knapweed was noted along this reach.

Wetlands

In addition to the stream reaches (lotic systems), the IDT assessed wetlands, lentic systems. Table 6 summarizes the functional status and acres of the surveyed lentic systems (ponds, lakes, wetland areas) within the EGW.

Table 6. Functional status of springs, wetlands, and ponds within the East Grasshopper Watershed.

Resource Name	Allotment	BLM Reach ID	Functional Rating & Trend	Acres
Dyce Creek Ponds	Baldy Mountain	1573 1574	PFC	1.2
Buffalo Creek Wetland	Buffalo Creek	1570	FAR Static	13
278 Wetland	Stonehouse	1576	Far-Down	1.43
Puddles Spring	Stonehouse	1554	FAR-Up	0.83
Frenchie Place Springs	Frenchie	1597	FAR-Static	2.05

The largest wetland in the EGW watershed is 1570 in the Buffalo Creek Allotment. This allotment has been categorized as a custodial allotment and has been used along with the adjacent private land. It appears that this area is used annually during the fall and winter months. This wetland was littered with livestock manure and old hay bales and was rated as FAR with a static trend.

The BLM constructed an exclosure around the Dyce Creek Ponds in 2003. This area rated as PFC. The livestock permittee constructed an exclosure around Puddles Spring in 2009 and this wetland was rated as FAR with an upward trend.

The 278 Wetland (1576) includes a relatively dense infestation of spotted knapweed and found to be FAR with a downward trend.

Three additional springs and a short spring brook (1597) were discovered by the IDT, north of Frenchie Place, in T.8S, R.10W, Sec. 19. The area has been disturbed in the past, likely associated with the adjacent homestead. All three springs were impacted by livestock and the surrounding area was infested by houndstongue, black henbane, spotted knapweed, and cheatgrass. The IDT rated this area as FAR Static.

Developed Springs

The BLM's RIPS database shows 18 spring developments in the East Grasshopper Watershed. BLM staff visited these developments to determine resource condition, condition of infrastructure, and water production (flow).

Table 7. Developed springs within the East Grasshopper Watershed.

Spring Name	Allotment	Functional Rating
Dyce Creek	Baldy Mountain	FAR-Static
El Ante	Baldy Mountain	FAR-Static
El Venado	Baldy Mountain	FAR-Static
La Gallina	Baldy Mountain	FAR-Static
Red Mine	Baldy Mountain	FAR-Static
Hangman's Gulch	Bannack	PFC

Spring Name	Allotment	Functional Rating
Ermont Pipeline	Ermont	PFC
Black Hill	Frenchie	Not riparian
East Frenchman	Frenchie	Not riparian
Frenchman	Frenchie	Not riparian
Horse Mountain	Frenchie	PFC
Duck Pond	Reservoir Creek AMP	PFC
278	Stonehouse	Far-Static
Dinosaur	Stonehouse	PFC
Grassy Draw	Stonehouse	Not riparian
Montana 29R	Stonehouse	FAR-Static
Puddles	Stonehouse	FAR- Up
Stagecoach	Stonehouse	Not riparian
Road Agent Rock	Taylor-Buffalo	PFC

Maintenance of water developments was a noted concern in several allotments across the watershed. Maintenance problems frequently encountered with water developments were lines not being drained, sediment in troughs, plumbing not properly working, lack of float valves and or shutoff valves, and leaking troughs. These maintenance issues can negatively impact wetland hydrology and do not help attain the objective(s) that the development was originally intended to achieve (i.e., livestock distribution or mitigation of impacts to perennial streams).

Properly maintained water developments function as Best Management Practices. The BLM must report on BMP effectiveness as part of our participation in Montana's Nonpoint Source Management Strategy. Permittee partnership and cooperation is critical to achieve these goals.

Baldy Mountain – In the Baldy Mountain allotment, the Dyce Creek, El Ante, El Venado, La Gallina, and Red Mine Springs were constructed between 1968 and 1982.

El Ante, El Venado and La Gallina were constructed at the same time. The exclosures are not protecting the resource and need to be reconstructed and expanded. The troughs at El Ante and La Gallina are located within the wetland and are being impacted by livestock. Red Mine Spring development is not currently functioning. Hydric soils in these localized areas are compacted. Similarly Dyce Creek Spring has a small exclosure and the adjacent wetland area is being impacted by livestock.

Bannock – The Bannock allotment has one developed spring, Hangman's Gulch spring, which was constructed in 1985. The exclosure is adequately sized and functioning, but is in need of repair, and the development is not currently producing water. Hydric soils, wetland vegetation and standing water are present. This spring source (wetland) is properly functioning.

Ermont – A water development located at the head of Ermont Gulch (1556) is the source for the Ermont Pipeline. The pipeline, constructed in 1988, included the excavation of an existing

spring development and the construction of a dam. Rodent activity and high spring run-off has caused the dam to leak. The wetland area associated with the pond and development is properly functioning.

Frenchie – Black Hill, East Frenchman, Frenchman and Horse Mountain springs are located in the Frenchie Allotment. Black Hill, East Frenchman and Frenchman springs were developed in 1963. These springs are no longer producing water and appear to have been marginal at the time of development. There was no evidence of hydric soils or obligate hydric vegetation. Horse Mountain spring was originally developed in the early 1980s. The spring and exclosure were reconstructed in 2007 and are properly functioning.

Reservoir Creek – Duck Pond spring, originally developed in 1985, is located in the Reservoir Creek Allotment. The project was abandoned in 1992. The original exclosure was removed and replaced by two larger exclosures in 2001. This spring was rated as PFC.

Stonehouse – Six springs were originally developed on the Stonehouse allotment between 1940 and 1992. The 278 Spring, constructed in 1971, is excluded from livestock, however the exclosure is smaller than the wetland. Hydric soils are present, but they are hummocked and compacted. Dinosaur Spring, developed in 1973, and redeveloped in 1986, has two headboxes created by welding a series of steel tanks. This development needs some maintenance. The resource conditions at this spring were FAR-Static.

Grassy Draw and Stagecoach Springs, constructed in 1972 and 1973, respectively, have dried out; only the troughs are left. These areas have no evidence of hydric soils or obligate hydric vegetation. The Montana 29 Spring was originally developed in 1940 and was rebuilt in the early 1970's. Currently the development is dysfunctional. Materials from the original spring development are still on site and there is no exclosure around the spring source.

Puddles Spring was originally constructed in 1992. The tanks have been moved away from the wetland and an exclosure was added in 2009 to protect the spring source. The resource conditions are improving.

The spring and spring brook (1559) located near New Departure Mine were functioning at risk with static trends. The spring source was historically developed for livestock (likely before the BLM kept records). The development does not appear to be used by the current permittee, is in disrepair and the area is littered with old mining equipment and debris. A spring exclosure consists of a small page wire fence. The spring and spring brook have been impacted by a road, historic mining activity and livestock.

Taylor–Buffalo – Road Agent Rock Spring/Pipeline was originally developed in 1963. The water table was eight feet below grade when the project was excavated. The pipeline was originally 600 feet in length, but an additional pipe was added in 1967, for a total length of 7,900 feet. The spring source (1560) for this development is PFC.

Recommendations

1. Revise livestock management in the following allotments to mitigate impacts to riparian/wetland habitat: Baldy Mountain, Buffalo Creek, Stonehouse, and Taylor-Buffalo. Consider changes in timing, duration, frequency and/or intensity of use as well as number and/or kind of livestock. Incorporation of rest into a grazing system and structural projects will also be considered.
2. Develop alternatives to prevent/mitigate Cold Spring Creek (1551) from running in/along the county road and direct it back to the natural channel (e.g., culvert, hardened crossing)
3. To improve Reservoir Creek (1594), consider constructing an exclosure to exclude livestock from the Reservoir Creek Allotment (south side) and add rock to the water gap on the Taylor-Buffalo Allotment (north side) to "harden" the water gap and mitigate sediment input to the stream.
4. Consider the following actions to improve condition/function and effectiveness of developed springs:
    - Enlarge exclosures or construct new larger exclosures at Dyce Creek, El Ante, El Venado, La Gallina, Red Mine, and 278 Springs. All old project materials should be cleaned up and removed from the sites.
    - Consider relocating and replacing troughs at Dyce Creek, El Ante, El Venado, and La Gallina Springs. Replace the trough at Dinosaur Springs and consider removing upper headbox.
    - Clean up and abandon spring developments at Red Mine, Black Hill, East Frenchman, Frenchman, Grassy Draw and Stagecoach Springs. Clean up old project materials at Duck Pond Spring
    - Consider redeveloping Montana 29 Spring and construct an exclosure to protect the spring source.
    - Consider either redeveloping Hangman's Gulch Spring or removing the infrastructure.
    - Analyze alternatives to re-develop the spring or to abandon the project at the spring near New Departure Mine. Remove page wire exclosure, contruct a new exclosure, and clean up old material and debris at this site.
    - Repair exclosures where necessary and verify that routine maintenance is conducted by permittees at spring developments annually.
    - Ensure that all livestock troughs have functioning wildlife escape ramps.
    - Repair dam at the head of Ermont water development.
5. Continue treating noxious weeds along riparian areas. Treat cheatgrass and noxious weeds at Frenchie Place Springs (1579). Consider a spray day or an aerial spray to treat spotted knapweed in the big draw that includes 278 Spring (from Badger Pass Gravel Pit to Bon Accord Road) to reduce the infestation to a more manageable level.
6. Consider replacing the culvert on Dyce Creek (16) with a larger culvert.
7. Analyze alternatives to the existing culvert on East Fork Dyce Creek (1572) which is washing out, (e.g., larger culvert, hardened crossing, re-route road). Consider water bars, drain dips, and/or hardened crossing where the road crosses the stream to mitigate sediment input to the stream.
8. Consider water bars, drain dips, silt fence, or re-routing the road along West Fork Dyce Creek (18 and 1591) to mitigate sediment input to stream.

9. Consider mechanical treatments to reduce the Rocky Mountain juniper on the lower portion of the West Fork Dyce Creek (1564).
10. Develop an alternative to mitigate livestock watering impacts to the upper portion of Rattlesnake Creek (1566) (e.g., fencing, off-site water and/or hardened water gap).

Water Quality

Western Montana Standard #3: *"Water quality meets State standards."*

Procedure to determine conformance with Standard
The Montana Department of Environmental Quality (DEQ), Water Quality Planning Bureau, and Watershed Protection Section provide guidance on assessing water quality in relation to non-point source (NPS) water pollution. Montana DEQ recognizes PFC as a qualitative method of assessing the condition of riparian-wetland areas. DEQ believes PFC is an effective tool for riparian assessment and evaluation of the impacts of grazing management and other authorized uses on riparian health. Montana's NPS Agricultural Strategy for Pasture and Range Lands supports the BLM's use of PFC for assessment. Montana DEQ publishes a Water Quality Report every two years. The BLM's 2010 "Memorandum of Understanding Regarding Water Quality Management on Bureau of Land Management (Administered) Lands in Montana between the Montana Department of Water Quality and the United States Department of the Interior Bureau of Land Management" documents the BLMs strategy for managing and controlling nonpoint source water pollution from the BLM managed lands and authorizations. As part of this MOU the BLM reports to DEQ actions taken to address NPS water pollution as well as effectiveness of Best Management Practices (BMP).

Affected Environment

The EGW assessment area is within the Beaverhead and Red Rock TMDL Planning areas within Beaverhead County. Reservoir Creek AMP drains to both the Red Rock and the Beaverhead via Horse Prairie Creek and Grasshopper Creek respectively. Cross allotment flows to Red Rock by way of Horse Prairie Creek. BLM administered public lands are one spatial component within the EGW with other ownerships being private, Forest Service, and State Lands.

TMDLs and a framework for a water quality restoration plan are nearing completion for the Beaverhead Watershed. No significant TMDL activity is occurring in the Red Rock TMDL Planning Area (TPA). Given that understanding, on a statewide basis, nonpoint source (NPS) pollution is the leading cause of surface water impairments in Montana. NPS pollutants are generated by the same land uses that have traditionally driven the state's economy, including grazing, logging, mining, roads and many other activities (MTDEQ 2007). Grazing on pasture and rangeland is one of the state's leading sources of NPS pollution. Principle pollutants of concern associated with grazing activities are bacteria, nutrients, sediment, and stream temperature alteration.

Findings and Analysis

In conducting watershed assessments, the BLM evaluates uplands for land cover (ability of plants, rocks, and litter to protect soil from erosion, promote infiltration and reduce runoff). PFC facilitates evaluation of channel erosion. Channel morphology, width and depth, bed materials, condition of stream banks and riparian vegetation provide information used to assess stream function, riffle stability, shear stress and sediment loads. Sediment and bacteria from animal waste can be concerns related to water quality. The less time livestock have access to streams the less sediment and manure generated bacteria there is to affect water quality.

According to Montana's 2010 integrated 303d/305b Water Quality Report, sedimentation and siltation and alterations to streamside vegetation continue to be the top two causes of impairment. Low flow alterations came in third. Grazing in riparian and shoreline areas is the number one source of impairment in Montana. Stream NPS pollution is directly related to land use. Since farms and ranches cover two thirds of the state and agriculture is Montana's leading industry, it follows that the non-point source pollutant concerns would be associated with grazing. Montana DEQ has found that pollutants from agricultural nonpoint sources include sediment, nutrients, salinity, thermal impacts, bacteria and pesticides.

Table 8 provides information for 303d listed streams in the EGW. Horse Prairie Creek is included in the table even though its tributary, Watson Creek, is not listed.

Table 8: Montana DEQ 303-d listed streams within the East Grasshopper Watershed.

Name	Beneficial Uses	Probable Sources of Impairment	Probable Causes of Impairment
Dyce Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [1], Industrial [1], Primary Contact Recreation [2]	Grazing in Riparian or Shoreline Zones, Irrigated Crop Production	Alteration in streamside or littoral vegetative covers, Low flow alterations, Sedimentation, siltation, Total Kjehldahl Nitrogen
East Fork Dyce Creek	Agriculture[1], Aquatic Life [1], Cold Water Fishery [1], Drinking Water [1], Industrial [1], Primary Contact Recreation [1]	N/A	N/A
West Fork Dyce Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [1], Industrial [1], Primary Contact Recreation [1]	Grazing in Riparian or Shoreline Zones, Placer mining, Impacts from Abandoned Mine Lands, Forest Roads, Silviculture Harvesting	Alteration in streamside or littoral vegetative covers, Sedimentation, siltation, Total Nitrogen, Manganese
Grasshopper Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [1], Industrial [1], Primary Contact Recreation [2]	Agriculture, Grazing in Riparian or Shoreline Zones, Streambank Modifications, Destabilization	Alteration in streamside or littoral vegetative covers, Low-flow alterations, Cadmium, Copper, Zinc
Rattlesnake Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [3], Industrial [1], Primary Contact Recreation [1]	Grazing in Riparian or Shoreline Zones, Irrigated Crop Production, Subsurface (Hardrock) Mining	Alteration in streamside or littoral vegetative covers, Sedimentation, siltation, Total Nitrogen, Total Phosphorous, Cadmium, Copper, Lead

Name	Beneficial Uses	Probable Sources of Impairment	Probable Causes of Impairment
Reservoir Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [1], Industrial [1], Primary Contact Recreation [1]	Grazing in Riparian or Shoreline Zones	Alteration in streamside or littoral vegetative covers, Sedimentation, siltation, Phosphorous (Total), Total Kjehldahl Nitrogen (TKN)
Taylor Creek	Agriculture[1], Aquatic Life [2], Cold Water Fishery [2], Drinking Water [1], Industrial [1], Primary Contact Recreation [1]	Grazing in Riparian or Shoreline Zones	Alteration in streamside or littoral vegetative covers, Sedimentation, siltation, Phosphorous (Total), Total Kjehldahl Nitrogen (TKN)
Horse Prairie Creek	Agriculture1, Aquatic Life 3, Cold Water Fishery 3, Drinking Water 3, Industrial 1, Primary Contact Recreation 2	Abandoned mine lands, Irrigated crop production	Arsenic, Cadmium, Copper, Lead, Low flow alterations, Mercury, Zinc

[1] Fully Supporting, [2] Partially Supporting, [3]Not Supporting

The BLM understands that NPS pollution needs to be addressed for waters of the State regardless of whether they are meeting or are not meeting water quality standards. The BLM further understands that non-degradation rules apply to waters that meet state standards. Section 319 of the Clean Water Act addresses non-point source pollution through the application of Best Management Practices (BMPs). AMPs are recognized as BMPs to the extent that they address non-point pollution (EPA2003). The BLM uses AMPs developed to improve riparian and upland conditions as an effective BMP to improve water quality. Western Montana Guideline #10 states "Livestock management should utilize BMPs for livestock grazing that meet or exceed those approved by the State of Montana in order to maintain, restore or enhance water quality."

The BLM's responsibilities under the 1987 amendments of the Clean Water Act are to evaluate the effectiveness of their BMPs. The watershed assessment is an evaluation of BMP effectiveness. For the EGW assessment, the IDT used a combination of methodologies to evaluate the watershed characteristics, as well as condition and function of floodplains, springs, streams, and wetlands.

Upland and riparian assessments were used to determine how BLM management is affecting water quality. Upland indicators focus on condition and density of vegetative cover, erosion, and soil loss. Riparian indicators specific to streams evaluate channel dimensions, patterns and profiles, bed materials, access to floodplains, species composition and condition of riparian vegetation. Wetlands are assessed to determine their condition and ability to recharge ground water filter sediments and mitigate flooding. Wells, pipelines and spring developments are recognized as BMPs and are evaluated to determine effectiveness. The assessment team also looks for evidence of current and historic mining, abandoned beaver dams, erosion from roads, and concentrated livestock waste.

Refer to sections on upland and riparian health above for BMP effectiveness, PFC determinations and information that helps indicate where BLM resource conditions and/or authorized uses may be either contributing to or mitigating water quality impairment. The State makes Beneficial Use Determinations. The BLM shares their findings to assist DEQ in making Beneficial Use Determinations.

MT DEQ is currently working on the Beaverhead Watershed sediment TMDL. DEQs initial recommendations in preparing a framework for a water quality restoration plans are included below.

- Improve ground protection in disturbed areas on small acreages, develop and implement grazing management plans, reduce the amount of erodible soil and runoff rate from agricultural lands
- Improve and restore streamside vegetation to provide shade, filter sediment, and stabilize eroding streambanks and floodplains
- Install all appropriate BMPs to road and road crossing networks and maintain & upgrade culverts to reduce the risk of failure in large events.

Recommendations

1. Continue working with Montana DEQ and local Watershed Committees in the development and implementation of water quality restoration plans.
2. Continue BMP implementation and effectiveness monitoring to address NPS pollution.
3. Continue to share Watershed Assessment findings with DEQ.
4. Continue implementation of Water Quality MOU (BLM-MOU-MT923-1030) between Montana DEQ and BLM, including submission of biannual reports.

Air Quality

Western Montana Standard #4: "*Air quality meets State standards.*"

Procedure to determine conformance with Standard
The Clean Air Act (CAA) of 1990, as amended (42 U.S.C. 7401 et seq), and Executive Order 12088 require the BLM to work with appropriate agencies to protect air quality, maintain Federal and State designated air quality standards, and abide by the requirements of State Implementation Plans.

The EPA delegated the authority to implement the provisions of the CAA to the State of Montana. Determination of compliance with air quality standards is the responsibility of the State of Montana. To address the issue of wildland fire, the EPA developed the 1998 Interim Air Quality Policy for Wildland and Prescribed Fires which required states to develop smoke management plans. Montana and Idaho responded by forming the Montana/Idaho Airshed Group and by developing the Montana/Idaho Smoke Management Program.

Affected Environment

The United States Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) that limit air pollutant concentrations of six principal pollutants (particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead). The EPA also regulates additional pollutants such as hazardous air pollutants and greenhouse gases (GHGs), although these pollutants have no regulatory thresholds for ambient concentrations.

Emissions of GHGs, including primarily carbon dioxide and methane, contribute to climate change.

Under the Clean Air Act Amendments of 1990, the EPA must regularly review and revise the NAAQS, ensure that the standards are attained (in cooperation with States), require control of hazardous air pollutant emissions, and set standards for air quality monitoring. Installation and operation of monitors is primarily carried out by State and local agencies and the monitors are typically located in population centers or near certain industrial sites. Monitors are rare in rural areas, unless air quality agencies have reason to believe that pollutant concentrations may approach or exceed ambient air standards in rural locations.

The closest air quality monitor is located in Butte, Montana. Pollutant concentrations at this monitor indicate high levels of small particulate, known as PM_{10}, that have a diameter less than or equal to 10 microns. PM_{10} exceeds the NAAQS within the Butte valley and the area is designated nonattainment for PM_{10}. Recent monitoring data also indicate some high $PM_{2.5}$ (diameter less than 2.5 microns) concentrations in winter due to wood burning on days with temperature inversions. According to Montana DEQ, high $PM_{2.5}$ concentrations are confined to a small area within Butte city limits.

For most of the year, air quality in rural southwestern Montana is excellent. Air quality issues in the EGW develop predominantly during wildfires and are limited to $PM_{2.5}$ emissions, which can travel hundreds and even thousands of miles. Consequently, air quality in the EGW can be affected by fires located far from the EGW. Because pollutant emissions associated with wildfires are largely beyond human control, exceedances of air quality standards that are associated with large wildfires are considered to be natural events and are typically exempted from consideration when determining NAAQS compliance.

The closest population to the EGW is Dillon, Montana. The 2010 U.S. Census population estimate for Dillon Census County Division was 7880. Beaverhead County's population estimate, also for 2010, was 9246 (http://epa.gov/airquality/qa/monprog.html).

Findings and Analysis

Air quality concerns in the planning area are primarily related to smoke. Smoke contributors in the planning area 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. Smoke from wildland and prescribed fires is the primary concerns affecting human health.

Prescribed burning is conducted 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.

Recommendations

1. Continue to follow Burn Plans and to coordinate with the Smoke Monitoring Unit.

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 the Standard
This Standard is an overall assessment of biodiversity and plant 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 and condition of available habitat to determine the condition/function of biodiversity. The wildlife habitat niches expected are: grasslands (short and mid grasses), bare ground, small streams, rivers, riparian/wetlands, sagebrush steppe, conifer forests, aspen and cottonwood stands, and various mixes of these components.

Because of the complexities involved with addressing the Biodiversity Standard, the Affected Environment and Findings and Analysis are presented together, primarily by habitat, and Recommendations are presented at the end of the section.

Affected Environment, Findings, and Analysis

Generalist or Widespread Species
The EGW lies within portions of Montana hunting districts (HD) 329 and 331 for deer and elk and lies within the Pioneer Elk Management Unit. The Pioneer Elk Management Unit is currently within the elk management objectives (C. Fager, personal communication, 2011). The mule deer population is healthy and migration into winter range occurs from as far as the headwaters of Wise River.

Antelope populations have increased in HD 310 and 318 in the last ten years but recent trend (due to increased hunting permits) is on the decline to reach population objectives of 800 in HD 310 and 1200 in HD 318. Winter migration for antelope into the EGW occurs from as far as 70 miles north from Mount Haggin. Moose populations in HD 301 and 324 are also doing well (C. Fager, personal communication, 2011). Table 9 lists the season of use for habitats used by primary game species.

Table 9. Primary game species and habitat use within the East Grasshopper Watershed.

Species	Forested	Sagebrush	Riparian
Black Bear *(Ursus americanus)*	**Y**	**S**	
Dusky grouse *(Dendragapus obscurus)*	**Y**		**Y**
Elk *(Cervus canadensis)*	**S,C**	**W,C**	**Y**
Moose *(Alces americanus)*	**Y**	**Y**	**Y**
Mountain Lion *(Puma concolor)*	**Y**		
Mule deer *(Odocoileus hemionus)*	**S,C**	**W,C**	**W**
Pronghorn Antelope *(Antilocapra americana)*		**Y**	
Ruffed grouse *(Bonasa umbellus)*	**Y**		**Y**
Sage grouse (*Centrocercus urophasianus*)	**S**	**Y**	**B**
White-tailed deer *(Odocoileus virginianus)*			**Y**

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

The EGW provides habitat for migratory and resident elk. Elk winter habitat, at lower elevations, extends along the southern 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. Several hundred elk migrating out of the Big Hole Divide use winter habitat in the Rocky Hills along with approximately 200 elk that reside in the area yearlong. Hunting pressure, fall weather and winter snow depths throughout the area influence actual numbers and timing of winter habitat use.

Special Status Species

"Special Status Species" refers to both plants and animals and includes proposed species, listed species, and candidate species under the Endangered Species Act; State-listed species; and BLM State Director-designated sensitive species (USDI 2001b). Providing habitat for special status plant and animal species is integral to meeting the biodiversity standard. Table 10 lists the special status species that occur within the EGW during all or part of the year.

Table 10. Special status species occurring within the East Grasshopper Watershed.

Wildlife Species	Current Management Status	Occurrence*	Preferred habitat
Greater Sage Grouse (*Centrocercus urophasianus*)	Candidate	R	Sagebrush shrubland
Gray Wolf (*Canis lupus*)	Sensitive	R	All
Bald Eagle (*Haliaeetus leucocephalus*)	Sensitive	R	Riparian/wetland
Black-backed Woodpecker (*Picoides arcticus*)	Sensitive	R	Forest
Brewer's sparrow (*Spizella breweri*)	Sensitive	R	Sagebrush shrubland
Bobolink *(Dolichonyx orysivorus*)	Sensitive	R	Grassland
Boreal/Western toad (*Bufo boreas*)	Sensitive	R	Riparian/wetland/forest
Burrowing Owl (*Athene cunicularia*)	Sensitive	T	Sagebrush shrubland /grassland

Wildlife Species	Current Management Status	Occurrence*	Preferred habitat
Ferruginous Hawk (*Buteo regalis*)	Sensitive	R	Sagebrush shrubland
Flammulated Owl (*Otus flammeolus*)	Sensitive	R	Forest
Fringed myotis (*Myotis thysanodes*)	Sensitive	T	Forests/woodland
Golden Eagle (*Aquila chrysaetos*)	Sensitive	R	Riparian/wetland Sagebrush shrubland
Great Basin pocket mouse (*Perognathus parvus*)	Sensitive	R	Sagebrush shrubland
Great Gray Owl (*Strix nebulosa*)	Sensitive	R	Forest
Loggerhead Shrike (*Lanius ludovicianus*)	Sensitive	R	Sagebrush shrubland
Long-billed Curlew (*Numenius americanus*)	Sensitive	R	Grassland
Long-eared Myotis (*Myotis evotis*)	Sensitive	R	Grassland/woodland
Long-legged myotis (*Myotis volans*)	Sensitive	R	Forest/ Riparian
McCown's longspur (*Calcarius mccownii*)	Sensitive	R	Grasslands
Northern Goshawk (*Accipiter gentilis*)	Sensitive	R	Forest
Pygmy Rabbit (*Brachylagus idahoensis*)	Sensitive	R	Sagebrush shrubland
Sage thrasher (*Oreoscoptes montanus*)	Sensitive	R	Sagebrush shrubland
Sage Sparrow (*Amphispiza belli*)	Sensitive	R	Sagebrush shrubland
Swainsons Hawk (*Buteo swainsoni*)	Sensitive	R	Wetland
Three-toed Woodpecker (*Picoides tridactylus*)	Sensitive	R	Riparian/wetland Sagebrush shrubland
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	Sensitive	R	Forest
Fish Species	**Current Management Status**	**Known from BLM lands?**	**Preferred habitat**
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	Sensitive	Yes	Aquatic, streams
Plant Species	**Current Management Status**	**Known from BLM lands?**	**Preferred habitat**
Beautiful Bladderpod (*Physaria pulchella*)	Sensitive	Yes	Open mountain mahogany or limber pine woodlands
Bitterroot Milkvetch (*Astragalus scaphoides*)	Sensitive	Yes	Sagebrush steppe and grasslands
Chicken Sage (*Sphaeromeria argentea*)	Sensitive	Yes	Sagebrush steppe and grasslands

Plant Species	Current Management Status	Known from BLM lands?	Preferred habitat
Idaho Sedge (*Festuca idahoensis*)	Sensitive	Yes	Moist alkaline meadows
Lemhi Beardtongue (*Penstemon lemhiensis*)	Sensitive	Yes	Moderate to steep, east- to southwest-facing slopes, often on open soils
Linearleaf Fleabane (*Erigeron linearis*)	Sensitive	Yes	Sagebrush steppe and open coniferous forests
Railhead Milkvetch (*Astragalus terminalis*)	Sensitive	Yes	Sagebrush steppe and grasslands
Railroad Canyon Wild Buckwheat (*Eriogonum soliceps*)	Sensitive	Yes	Open, often barren slopes and ridgetops
Slender Thelypody (*Thelypodium sagittatum ssp. sagittatum*)	Sensitive	Yes	Moist, alkaline meadows, often with greasewood or shrubby cinquefoil
Taper-tip Desert-parsley (*Lomatium attenuatum*)	Sensitive	Yes	Moderate to steep slopes and canyon bottoms, often associated with mountain mahogany

*Resident (R), Transient (T)

No species listed as threatened or endangered under the Endangered Species Act (ESA) occur within the watershed. Gray wolves were delisted in 2011 and are currently under management by MFWP and a hunting season was implemented in fall 2011. Widespread occurrences of gray wolves within the EGW have continued to increase. Wolf–livestock conflicts generally result in removal or relocation of offending wolves which may preclude the potential establishment of packs in the EGW.

Bald eagles and Golden eagles are currently managed as a BLM sensitive species. Golden Eagles are found widespread throughout the EGW. Bald Eagles are known to nest along the Grasshopper creek corridor. Winter concentrations of bald eagles occur in EGW near open water and where prey is available. Cooperative interagency monitoring is occurring through the Montana Bald Eagle Management Plan. Other special status species are discussed under their respective habitat.

Sagebrush Habitats

Sagebrush and grassland habitat types are the dominant vegetation communities comprising 93% 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.

Sage grouse are currently listed as a candidate species under the ESA (Federal Register March 5, 2010), as the FWS determined that listing was warranted, but precluded by other priority listing actions. This emphasizes the importance of managing for, and maintaining the integrity of, all seral stages within sagebrush habitats on public lands, not only for sage grouse, but for all sagebrush-obligate species. 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 management of sagebrush habitat.

Southwest Montana provides some of the most intact sagebrush habitat in the west. The EGW is in core habitat for sage grouse and includes the largest lek complex in the DFO. There are nine known active leks on BLM lands within the allotments assessed in the EGW as well as numerous active leks on private and state lands and in the adjacent watersheds. Important sage grouse seasonal habitat is centered on breeding and winter complexes. Brood rearing habitats require a mix of forbs and insects for a high protein diet, usually in association with riparian habitats adjacent to sagebrush habitat. Winter diets consist of almost 100% sagebrush.

Many vegetation treatments occurred to sagebrush habitat in the early 1960's through the early 1980's. Most areas have returned to pre-treatment conditions, where sagebrush canopy cover has recovered and may possibly be higher than pre-settlement conditions. An exception would be the herbaceous species composition in some of the seeding's that have non-native wheatgrasses and legumes, along with native bunchgrasses. Refer to Table 3, under Standard #1 Uplands, for locations and the types of treatments applied.

Sage grouse populations and sagebrush habitats have declined on a regional basis due to significant habitat losses range-wide from habitat conversion for agricultural needs, urbanization, livestock grazing, and wildland fire. Currently the largest threat to sage grouse is the loss of sagebrush habitat and fragmentation. As stated earlier, the EGW is in core sage grouse habitat and has the largest complex of leks in the DFO. There are currently 12 known active leks in the EGW, nine of which occur on BLM-administered lands, as well as several active leks within a mile of the EGW allotments. Male lek counts on these leks declined since the 1970's and were at a low in the 1990's and appear to have stabilized in the past 10 - 15 years.

Sage grouse habitat monitoring data collected in the EGW allotments shows that requirements are being met for all seasons of use on most allotments. The exceptions to this are the Taylor-Buffalo and Buffalo Creek allotments. Radio telemetry data of sage grouse movements, collected from by DFO personnel in 1999-2000 and 2010-2011, show that sage grouse are still using these allotments. The Reservoir Creek AMP allotment and the Ermont pasture of the Stonehouse allotment provide habitat for large concentrations of wintering sage grouse.

Pygmy rabbits are found throughout the EGW. Habitat conditions appear to be suitable for existing populations to persist. Ongoing studies to determine implications of forage quality and quantity and perceived risks of predation are currently being conducted by the University of Idaho through a cooperative project with the BLM. Recent genetics studies have shown genetic linkages between pygmy rabbits in Idaho and Montana.

A few fences in the EGW were found not to be meeting BLM fence specifications for wildlife passage. Net-wire fences and barbed wire fences with five or more wires and wires only a few inches off the ground can become entanglement hazards for big game, especially antelope which prefer to go under fences. Sage grouse and other raptors are also susceptible to collisions with these fences. This becomes increasingly hazardous during winter depending on snow depth, when winter antelope and sage grouse populations are high and can cause entanglement and

mortality. Several fences in the Reservoir Creek AMP allotment have been modified in the last three years and fitted with fence markers to make the wires more visible to wildlife in high concentration areas.

Within the EGW, there are four sensitive plant species found, primarily, in sagebrush habitats. Bitterroot milkvetch, chicken sage, linearleaf fleabane, and railhead milkvetch are found in sagebrush steppe and grassland habitat. Bitterroot milkvetch and railhead milkvetch are palatable and are sensitive to intensive grazing, especially during spring and early summer. Repeated herbivory, particularly between mid-May and mid-July may lead to population declines. Rest-rotation grazing regimes may allow enough recruitment to maintain stable populations of these palatable sensitive plants. Chicken sage prefers sparsely vegetated habitats with low competition. Many of the known populations of this plant species, in the EGW, face no anthropogenic threats. They appear to tolerate and may benefit from disturbances that reduce competition such as livestock grazing. Observations suggest that linearleaf fleabane may respond positively to disturbance. Some populations might have been established through human activity, because the species is highly localized within what appears as extensive suitable habitat, in locations of historically intense mining activity. The low stature of this plant probably means that it responds positively to the disturbance of livestock grazing. Competition from introduced, invasive, and noxious weed species, especially spotted knapweed, leafy spurge, and cheatgrass, may pose the biggest threat to the sensitive plant species that are found in sagebrush habitats in the EGW.

Riparian, Aquatic and Wetland Habitats

Perennial streams within the EGW are not widespread and therefore become more important to sustain the existing wildlife populations. 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.

The EGW Assessment area has 4 perennial streams with a total of 8.28 miles of fishery habitat on public land. Common sport fish species in the assessment area are brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*). These non-native species were introduced into the area in, or before, the early 1900's. Brook trout are the most common salmonid found in the assessment area, occurring in all of the streams capable of supporting a fishery. Rainbow trout and brown trout (*Salmo trutta*) are incidentally found in the lower reaches of Rattlesnake Creek.

There is limited recreational fishing on streams within the EGW Assessment area due to the small size of the streams. However, portions of Rattlesnake Creek, Taylor Creek and Grasshopper Creek support a small sport fishery for rainbow trout and brook trout.

Native species such as mountain whitefish (*Prosopium williamsoni*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersoni*), mottled sculpin (*Cottus bairdi*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*) (WCT) are found in portions of some streams.

Table 11. Fish species present in streams on BLM-administered lands within the East Grasshopper Watershed.

Stream	Reaches	Fish Species Present on BLM
Dyce Creek	15,16,18,1591,15931564,1572,1571	Westslope cutthroat trout
Rattlesnake Creek	1566,1567	Brook, rainbow, and brown trout, mottled sculpin,
Taylor Creek	1553,1552	Brook trout
Reservoir Creek	1594	Brook trout

The quality of fishery habitat is directly linked to existing riparian conditions and habitat on streams within the EGW Assessment area ranged from fair to good. Impacts that cause riparian habitat to not be in PFC also, generally, result in low quality fish habitat. The main impacts to fishery habitat within the EGW were related to sediment and, to a lesser extent, bank alteration, which have resulted, primarily, from current and past mining activities, roads, and livestock. Several streams were experiencing excessive use by livestock. Issues impacting fishery habitat along Taylor Creek (1553), Dyce Creek (16, 18, 1591, 1593, and 1572), Rattlesnake Creek (1566) and Reservoir Creek (1594) are discussed above under Standard #2 – Riparian and Wetland Areas.

Westslope cutthroat trout are designated as a sensitive species for the BLM and USFS, and have been listed as a Class A, State Species of Special Concern by the Montana Department of Fish, Wildlife and Parks (MFWP) and the Montana Chapter of the American Fisheries Society since 1972. Class A designation indicates limited numbers and/or limited habitats both in Montana and elsewhere in North America; elimination from Montana would be a significant loss to the gene pool of the species or subspecies. The management goal for WCT in Montana is to ensure the long-term self-sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana (Clark Fork, Kootenai, Flathead, upper Missouri, and Saskatchewan), and to maintain the genetic diversity and life history strategies represented by the remaining local populations.

Historically, WCT were found in most of the perennial streams within the EGW. Competition with non-native eastern brook trout, hybridization with non-native rainbow and Yellowstone cutthroat trout, as well as past habitat degradation have combined to extirpate pure populations of WCT from most of their historic habitat within the assessment area. Within the watershed, genetically pure WCT have drastically declined from historic levels. As of 2011, the Dyce Creek drainage supports the only population of westslope cutthroat trout located on public land in the assessment area. Several streams within the greater area, but not within the assessment area, contain populations that are pure, or slightly hybridized (90% or greater). For example, sampling efforts on Reservoir Creek, by the USFS in 2004, documented WCT in the main stream channel several miles upstream of tributary (1594), on BLM. Sampling of stream reach 1594, by the DFO fishery biologist in 2011, failed to locate any WCT. However, brook trout were present in low numbers. The headwaters of Taylor Creek support a population of genetically-pure WCT. However, brook trout are the only species present on the BLM-administered portions of Taylor Creek (1552 and 1553) in this assessment area.

Within the Dyce Creek Drainage there is approximately 7.5 miles of occupied WCT habitat. Habitat issues are primarily related to sediment and historic mining. The Dyce Creek road

traverses the drainage and in places the road is closely adjacent to both forks of Dyce Creek with several primitive stream crossings present. Runoff from the road and road crossings is contributing to sediment loads that in places, is causing the stream channel to braid and shift, as well as likely have some localized impacts to WCT spawning.

Historically, the entire Dyce Creek drainage was heavily placer mined. In many cases, miners lowered the stream channel six to eight feet resulting in a relatively incised stream corridor in most of the drainage. This has substantially altered the stream potential in the drainage. Current livestock impacts in the form of bank trampling and heavy utilization of riparian vegetation in proximity to the stream is also a causal factor contributing to sediment and to a lesser extent bank alterations. As a result of historic mining, in most areas the banks are relatively well armored with larger substrate material that is more resistant to erosion. A small recreational mining area on the West fork is a significant source of sediment that is causing the stream channel to fill with fine sediment as well as shift in course.

A habitat survey, conducted by MFWP in 2005, indicates that the Dyce Creek drainage is dominated by riffle habitat. Pools were found to be relatively small, but deep and in moderate proportion to other habitat types. Spawning habitat was found to be abundant in most sections of the East Fork, and not as common in the West Fork, which contains a much higher level of sands and silts. Woody debris was common throughout sample sections with larger material more common in the East Fork. Recent population surveys in the East fork show a strong increase in overall abundance of WCT. In 2004, a population estimate of the lower East Fork indicated approximately 100 WCT that were 100mm or greater in size were present in lower mile of stream. In 2010, the estimate showed the current population to be approximately 450. In addition to the population of WCT present in the lower East Fork, there is another population of approximately 450 WCT present in the upper 1.25 miles of the East Fork, where eastern brook trout were not present. Due to the heavy streamside vegetation in the West Fork, recent population estimates have not been conducted. However, while conducting physical removal of non-natives in the West Fork, from 2004 to 2009, hybridized WCT and brook trout where found to be abundant in relation to stream size. Where access to the stream was possible, fish were readily collected.

Thermograph data from 2005 and 2010 indicates that the drainage maintained an average summer (June-Sept) temperature of around 50 and 48 degrees in 2005 and 2010, respectively. The cooler water temperatures in 2010 are likely a result of the better water year as well as overall cooler summer temperatures. The West Fork drainage was slightly warmer, with temperatures ranging from 58 degrees just downstream of the ponds to about 55 degrees lower in the drainage. Overall, WCT habitat condition was found to be in good condition in the East Fork and fair in the West Fork. Excess sediment originating from the road and a small mining area is a noted concern on the West Fork and is likely having an impact on fishery habitat.

Over the last 8 years, the BLM, in cooperation with private landowners and state and federal agencies, has been actively conducting projects designed to secure the WCT population in Dyce Creek. In the fall of 2003, a riparian exclosure was constructed in the headwaters of the West Fork of Dyce Creek to protect the shoreline around two small ponds that provide important WCT habitat. In 2004, in conjunction with initiation of a non-native brook trout removal, a fish

passage barrier was installed on private land. Starting in 2004, and running through 2010, an effort to remove non-native fish took place using backpack electro fishing gear. The effort was very effective on the East Fork drainage, resulting in a fourfold increase in WCT numbers and causing collection efforts for eastern brook trout to go from more than 200 fish per day, in 2004, to only 15 individuals, in 2010. However, removal efforts in the West Fork were not as successful.

In 2009, the results of the ongoing non-native removal were assessed. From 2004 to 2010, 4,200 non-native brook trout were removed from the drainage above the fish barrier. However, due to the difficulty in removing the non-natives from the West Fork drainage, it was decided to conduct a chemical fish removal in portions of the lower East Fork and the entire West Fork Drainage. During August 2011, the fish toxicant CFT legumine was applied to 3.5 miles of the West Fork drainage and 1.5 miles of the East Fork drainage to remove non-native trout. Prior to application of the fish toxicant, a WCT salvage took place on a portion of the East Fork that was to be treated. Presonnel from MFWP and the DFO collected over 480 WCT that were held during toxicant application and later released back into the stream following treatment.

Two sensitive plant species are found in riparian habitats within the EGW. Idaho sedge and slender thelypody are found in moist alkaline meadows, are palatable, and are sensitive to intensive grazing, especially during spring and early summer. Repeated herbivory, particularly between mid-May and mid-July may lead to population declines. Rest-rotation grazing regimes may allow enough recruitment to maintain stable populations of these palatable sensitive plants. Kentucky bluegrass and common dandelion are present in most wet meadow habitat and along many stream reaches. Kentucky bluegrass may compete with Idaho sedge. Canada thistle and houndstongue are scattered throughout the EGW and were observed in many riparian and wetland habitats, especially along intermittent stream reaches. These noxious weeds may also compete with Idaho sedge which prefers these streamside and meadow habitats.

Forest and Woodland Habitats

Forest and woodland habitats comprise approximately 6% of all ownerships, and approximately 6% of BLM administered lands within the EGW. Effective precipitation and aspect influences the establishment and composition of forests and woodlands. The close association of forests with adjoining sagebrush and riparian habitats supports a broad array of wildlife species. Forests in the EGW provide habitat for a large variety species such as black bear, bobcat, mountain lions, dusky grouse, northern goshawk and big game. This habitat provides year-round security cover for deer, elk, and moose and offers high protein browse species in the fall and winter. Forest-dwelling bird species require suitable nesting and foraging habitat. Several bird species help protect forests by eating millions of damaging insects, such as the western spruce budworm. It also provides nesting, roosting and foraging habitat for numerous bird species including great grey owls, coopers hawks, and northern goshawks; all of which prey on small mammals and rodents that utilize forested habitats.

Limber pine, Rocky Mountain juniper, and curl-leaf mountain mahogany woodlands are present on drier, rocky slopes and lower elevations. Limber pine is found on some of the driest sites capable of supporting trees (Pfister et al, 1977), and is often found with Douglas-fir and juniper. Limber Pine is an important source of food for several species, including red squirrels, Clark's

nutcrackers and black bears. Squirrels, northern flickers, and mountain bluebirds often nest in the trees.

Mountain mahogany is mostly found on well drained slopes with shallow, coarse rocky soils, most often associated with limestone in southwest Montana. Sites can be pure stands or intermixed with conifers, where there is a potential for conifers to overtop and outcompete the shade intolerant mahogany. In some areas, particularly in the Baldy Mountain Allotment, intensive browse has stunted mountain mahogany shrubs, reducing the vigor of the plant, reducing the value as a browse species for wildlife, and increasing the ability for other species to overtake the site.

Intensively-browsed mountain mahogany, Baldy Mountain allotment, 2011.

The majority of Baldy Mountain allotment provides summer habitat for mule deer. The mahogany on west side of Baldy Mountain allotment is crucial deer winter range. Mahogany also provides nesting habitat for a myriad of migratory birds and the seeds provide food for dusky grouse and a host of small mammals.

Douglas-fir is the dominant species of forests in the EGW. Forested stands at lower elevations and on south aspects are composed primarily of Douglas-fir with intermixed juniper, limber and lodgepole pine. North aspects and higher elevation stands have higher proportions or may be dominated by lodgepole pine, with intermixed subalpine fir in addition to Douglas-fir and limber pine.

Spruce is found in most forested areas, either scattered throughout, or concentrated in wetter areas. A hardwood component, including quaking aspen, willows, Rocky Mountain maple, red-osier dogwood, alder, and cottonwood may also be found in the wetter forested areas or around springs. Aspen stands are relatively minor in area, but are an important component on the landscape for wildlife values. In many areas, conifers have established in aspen stands and without disturbance may result in overtopping and shading out aspen trees.

Aspen stand with understory juniper, Baldy Mountain allotment, 2011.

The majority of Douglas-fir stands in the EGW are dense (300-600+ trees per acre), closed canopy stands (≥60% canopy closure) consisting mainly of Douglas-fir trees 150 years or less in age. The increased density within stands has resulted in trees competing

for limited nutrients and moisture, leading to reduced vigor and growth of individual trees. Some stands also contain scattered "relic" Douglas-fir trees greater than 200 years old with evidence of historic fire, but these "relics" may be absent where extensive harvest related to mining and settlement occurred (mostly around the Bannack area).

In comparison, 2011 inventory of harvested stands in the Dyce Creek area showed an average of 100-200 trees per acre, with open (<40% canopy closure) to moderately closed (40-59% canopy closure) canopy stands. Treatment in these areas also opened up around "relic" Douglas-fir trees to improve tree vigor and reduce ladder fuels, and create more of a Douglas-fir savannah structure.

Harvested stand in the Dyce Creek area, Baldy Mountain allotment, 2011.

There have been no whitebark pine trees identified in the EGW to date. However, there is similar habitat to other areas in the Dillon Field Office where whitebark is found, and scattered whitebark pine trees may occur in the EGW.

Portions of the EGW were analyzed for vegetation treatments under the East Grasshopper Forest Vegetation Project Environmental Analysis (EA) #MT-076-98-12. The Decision for this project was signed in 2001, and prescribed vegetation treatments in the Dyce Creek and Badger Pass areas (see Map 6). The treatment units and status of their treatment are listed in Table 12.

Table 12. East Grasshopper Vegetation Project EA projects and status.

Unit	Treatment Type	Status
1	Douglas-fir savannah restoration	Completed, Dyce Creek Timber Sale
1A	Douglas-fir savannah restoration	Completed, Dyce Creek Timber Sale
2	Douglas-fir savannah restoration	Partially completed, Dyce Creek Timber Sale
4	Douglas-fir savannah restoration	Dropped – sedimentation concerns on E. Fork Dyce Creek
6	Douglas-fir savannah restoration	Dropped – sedimentation concerns on E. Fork Dyce Creek
7	Douglas-fir savannah restoration	Not completed
8	Douglas-fir savannah restoration	Not completed
9	Douglas-fir savannah restoration	Dropped – sedimentation concerns on E. Fork Dyce Creek
10	Douglas-fir savannah restoration	Dropped – sedimentation concerns on E. Fork Dyce Creek
11	Aspen treatment	Not completed
12	Aspen treatment	Not completed
13	Douglas-fir savannah restoration	Completed, Badger Pass Timber Sale
14A	Douglas-fir savannah restoration	Completed, Badger Pass Timber Sale
14B	Douglas-fir savannah restoration	Completed, Badger Pass Timber Sale
Encro-Badger Pass	Douglas-fir encroachment treatment	Completed on BLM administered land
Encro – Dyce Ck.	Douglas-fir encroachment treatment	Partially completed
MM	Mountain mahogany treatment	Not completed

Some mountain mahogany habitats have experienced intensive browsing and increasing conifer competition, and a species conversion to Douglas-fir, limber pine or juniper is likely. Loss of mountain mahogany is a concern in the Baldy Mountain allotment. The Scudder Creek exclosure (just north of Baldy mountain allotment) was built in 1953 as part of a statewide study to determine the impacts from browse on mountain mahogany. Monitoring was conducted by Montana State University (MSU) inside and out of the exclosure every ten years from 1953-1983 to determine the impacts from winter deer browse. Monitoring results showed heavy browsing for the last 60 years even during periods of increased mule deer harvest throughout the 1960's. Current mahogany within this exclosure was dense and above browse height, plants outside of the exclosure are heavily browsed, and the rocky mountain juniper shows signs of browsing. Mountain mahogany seedlings can be found outside of the exclosure, but are browsed. Mountain mahogany stands in the rest of the EGW are not showing this heavy browsing pressure and are in relatively good condition.

The structure of Douglas-fir forests has been altered from the historic range of variation to become more homogenous with a higher dominance of mid-seral, closed canopy structure. These stands have high hazard ratings for spruce budworm and Douglas-fir beetle. Densities within Douglas-fir stands have increased, and there has been a loss of mountain meadows and aspen due to conifer expansion. The loss of variety of successional stages across the landscape increases the susceptibility to widespread insect and disease outbreaks.

Big game populations are doing well in the EGW and use of forest and woodland habitat associated, with adjoining sagebrush steppe habitat, is widespread. The increase in canopy cover in some of the Douglas-fir stands may have created a shift in species use, especially for migratory birds. Northern goshawks continue to use the Douglas-fir habitat in the Dyce Creek drainages after harvest has been completed to restore the Douglas-fir savannah.

Four sensitive plant species are found, primarily, in forest and woodland habitats within the EGW. Beautiful bladderpod, taper-tip desert-parsley, Lemhi beardtongue, and Railroad Canyon wild buckwheat prefer sparsely vegetated habitats with low competition. Many of the known populations of these plant species, in the EGW, face no anthropogenic threats. They appear to tolerate and may benefit from disturbances that reduce competition such as livestock grazing. Lemhi beardtongue, however, is palatable and is sensitive to intensive grazing, especially during spring and early summer. Repeated herbivory, particularly between mid-May and mid-July may lead to population declines. Rest-rotation grazing regimes may allow enough recruitment to maintain stable populations of these palatable sensitive plants. Competition from introduced, invasive, and noxious weed species, especially spotted knapweed, may pose the biggest threat to the sensitive plant species that are found in forest and woodland habitats in the EGW.

Forest Insects and Disease

There are many species of insects and disease that play a role in forest and woodland habitats. Only the major forest insects and diseases causing widespread disturbance in the EGW are discussed here.

Mountain pine beetle is a native bark beetle which attacks most native and introduced species of pines (Hagle et al, 2003). Mountain pine beetle is attacking and killing lodgepole and limber

Predominantly Douglas-fir stand with scattered, dead lodgepole pine, Stonehouse allotment, 2011.

pine in the EGW. Most lodgepole pine stands and scattered individuals in the EGW are greater than 80 years old and 6" DBH, making them highly susceptible to attack by mountain pine beetle. The majority of mature lodgepole pine in the EGW have either already been attacked and killed by mountain pine beetle, or will likely be in the near future with continuing beetle activity.

In addition to the mountain pine beetle, the exotic white pine blister rust also attacks limber pine and results in additional mortality of this species. This combination has caused varying levels of limber pine mortality throughout the watershed. In some places there is extensive mortality of limber pine, and a species conversion to Douglas-fir and/or juniper is likely. Loss of limber pine is a concern in the Baldy Mountain allotment. In other places, limber pine mortality is scattered and there are still many healthy-looking limber pine trees intermixed on the same site. This may be a result of differing site capabilities, competition, and/or genetic variability of individual trees. If whitebark pine trees are present in the EGW, they would be experiencing similar insect and disease pressure as limber pine.

Limber pine, Douglas-fir, juniper woodland with limber pine mortality, Baldy Mountain allotment, 2011.

Limber pine, Douglas-fir, juniper woodland with minimal mortality, Bannack allotment, 2011.

Western spruce budworm is a native defoliating insect which is present in the EGW. Defoliation caused by spruce budworm is most evident on Douglas-fir, but also affects subalpine fir and spruce species. Throughout the watershed, western spruce budworm defoliation is targeting Douglas-fir and its current activity level is moderate, although tree form suggests intensive historic defoliation in previous outbreaks. Western spruce budworm benefits from dry summer conditions and mild winters, and has the greatest impact on trees that are stressed from dense

stocking, found in multi-storied stands, and/or are impacted by drought conditions (Kamps et al., 2008). Budworms grow more vigorously in stressed trees, and budworm populations can increase dramatically during drought conditions. Prolonged budworm epidemics cause reduced diameter and height growth (Bulaon and Sturdevant, 2006). While spruce budworm does not usually cause direct tree mortality, it will predispose trees to attacks by other insects or diseases. Spruce budworm defoliation also reduces the quality of Christmas trees. The spruce budworm hazard rating is high throughout the watershed due to suitable stand conditions.

Douglas-fir beetle is a native bark beetle which kills Douglas-fir trees, preferring mostly large diameter Douglas-fir trees growing in mixed or pure stands. Douglas-fir trees most susceptible to attack are those larger than 14" DBH, older than 120 years, and growing in dense stands (Weatherby and Their, 1993). Douglas-fir beetle normally kills small groups of trees, but at epidemic levels may kill groups of 100 trees or more (Schmitz and Gibson, 1996). Patches and individual trees killed by Douglas-fir beetle within the last 5 years were noted in Douglas-fir stands throughout the watershed, with the exception of areas around Bannack that lacked older Douglas-fir trees.

Patch of Douglas-fir beetle caused mortality, Baldy Mountain allotment, 2011.

In the Dyce Creek timber sale area, Douglas-fir bark beetle was active post-harvest and resulted in mortality of some of the large diameter Douglas-fir trees that were left to restore the savannah structure. Completing follow up prescribed burning in the timber sale units while Douglas-fir beetle was active in the area, and while trees were already stressed due to drought conditions, may have led to an increased susceptibility of these trees to beetle attack (N. Sturdevant, personal communication, 2011). However, 2010 inventory data showed that treated areas had an average of 11% mortality in the overstory Douglas-fir, compared to an average of 33% in untreated areas.

Noxious Weeds and Invasive Species

Noxious weeds are defined in the Montana Weed Management Plan as "plants of foreign origin that can directly or indirectly injure agriculture, navigation, fish or wildlife, or public health." Currently there are 35 weeds on the statewide noxious weed list that infest about 7.6 million acres in Montana. Of these 35, there are only two of major concern in the EGW, they are spotted knapweed and houndstongue. Canada thistle, another state declared noxious weed also found in the EGW, is widespread throughout the Dillon Field Office, mostly in riparian areas, making treatment difficult. Three other weeds that Beaverhead County has designated as noxious; black henbane, common mullein, and musk thistle, are found scattered throughout the watershed, mostly in disturbed areas.

Spotted knapweed, a biennial or short lived perennial, whose early spring growth allows it to outcompete other plants for moisture and nutrients and whose ability to produce a chemical that

prevents other plants from growing in the immediate area, is found scattered throughout the EGW. Most infestations are found along roads and trails but the larger infestations are found around past disturbance sites and old mining claims. Of these infestation sites the one with the highest potential for seed spread is the gravel pit located on Badger Pass. With the widespread use of gravel from this pit, treatment methods are limited. Although it has been treated three times annually with 2,4-D it has been observed that almost everywhere this gravel is used knapweed plants are found. Due to where it is found in the EGW, the potential is high for knapweed to be spread by vehicles, livestock, wildlife, recreation and other activities. Houndstongue, a biennial and sometimes an annual or short lived perennial, is toxic to animals due to high levels of alkaloids contained in the plant, is found scattered in trace amounts along roads and trails, with the larger infestations occurring along streams and in riparian areas. Because of its seeds ability to cling to hair and clothing, the potential is high for it to be spread rapidly within the watershed. Houndstongue, like Canada thistle, is generally found in areas that make treatment difficult

Another invasive weed that could present a threat to the EGW in the future is cheatgrass. Cheatgrass is found in small patches throughout the watershed primarily on south and west facing slopes naturally devoid of vegetation or where there has been some past disturbance.

Since 1989, BLM has been involved in cooperative control efforts with Beaverhead County, Beaverhead – Deer Lodge National Forest and Private land owners in the EGW. 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 2006, the Beaverhead Watershed Committee, along with some sportsman and private landowners who were concerned about the increasing size of knapweed infestations in the Dyce Creek drainage, worked with Beaverhead County to organize a cooperative spray day to address the problem. Then, in 2008, the landowners in the Argenta area received a Montana Noxious Weed Trust fund grant, through Beaverhead County, to help them treat noxious weed infestations in the area. Both of these projects have shown good results in reducing the size of the weed populations.

Table 13 shows the herbicide treatments applied in the EGW during the past five years.

Table 13. Recent weed inventories and treatments within the East Grasshopper Watershed.

Year	Acres Treated	Acres Inventoried
2007	20	2500
2008	22	2800
2009	20	2700
2010	30	3000
2011	25	4500

Fire Ecology and Fire Regimes within the East Grasshopper Watershed

As a prominent disturbance process in southwestern Montana, fire is directly tied to land health by affecting seral stage diversity, age classes, and landscape structures. Understanding the historic role of fire helps inform decisions on ecological status, trend and treatment needs. Recently, fire regimes for most terrestrial communities have been mapped and textually

described for vegetation types across the entire U.S. (LANDFIRE 2011a). These descriptions give context to assessing land health, reference conditions, and functioning ecosystems.

Biophysical Settings

Biophysical Settings (BpS) are most simply defined as the native vegetation communities present in the pre-settlement era, and therefore developed under the influence of natural disturbances such as fire. BpS's describe vegetation communities at a larger scale than Ecological Sites, and as such can be applied to characterize broad areas such as landscapes or watersheds. Each BpS description describes the historic composition and dominance of seral stages for that type, as well as the historic fire frequency and severity. Together, this information describes a reference condition, or a standard against which current conditions may be compared.

Comparing Biophysical Settings to current conditions is useful for identifying trends in forest and non-forest vegetation communities. Based upon field reconnaissance and LANDFIRE National data, the dominant BpS's found in the entire EGW include several species of big sagebrush, Douglas-fir forest, and foothill-valley grasslands. Curl-leaf mountain mahogany makes up a small percentage of the watershed, but is of particular interest due to high value to wildlife. Many other individual BpS's are present within this watershed that are isolated or comprise a small percentage of the total area; these BpS's are grouped in the "other" category in the table below.

Successional processes, seral stage descriptions, and historic fire regimes for these types are described in the LANDFIRE BpS description documents for Map Zone 19 (LANDFIRE 2011a). These descriptions of historic conditions were compared with current conditions to depict landscape trends in vegetation and fire regime departure. The approximate distribution of dominant BpS's in the watershed is presented in Table 14.

Table 14. Biophysical settings across all ownerships within the East Grasshopper Watershed.

Biophysical Setting Name (Number)	Total Acres by BpS in Watershed	% of Watershed
Inter-mountain basins big sagebrush steppe (1911250)	49,921	41 %
Inter-mountain basins montane sagebrush steppe (1911260)	42,154	35 %
Northern Rocky Mountain lower montane foothill-valley-grassland (1911390)	12,202	10 %
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest-Douglas-fir (1910451)	5,544	5 %
Inter-mountain basins curl-leaf mahogany woodland and shrubland (1910620)	1,106	1 %
Other	9,460	8 %

Fire Regimes in the East Grasshopper Watershed

The fire regime concept is used to describe the fire frequency, behavior, ecological effects, seasonality, pattern, and type for a given ecosystem or vegetation type. Based upon the most current fire regime classification system, each BpS corresponds to a unique fire regime group (Schmidt et al., 2002).

Table 15. Natural Fire Regime Groups and descriptions.

Group	Frequency	Severity	Severity Description
I	0-35 years	Low/Mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory.
II	0-35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation.
III	35-200 years	Mixed/Low	Generally mixed-severity; can also include low-severity fires.
IV	35-200 years	Replacement	High-severity fires.
V	200+ years	Replacement/ Any severity	Generally replacement-severity; can include any severity type in this frequency range.

Wyoming Big Sagebrush and Basin Big Sagebrush (BpS 1911250)

Fire Regime: Big sagebrush dominated vegetation communities are found in valley bottoms, swales and the toeslopes below about 7000 feet in elevation are characterized by Fire Regime Group III, but may also encompass Group IV. Fire return intervals are estimated to average approximately 60yrs, and range from 10-150yrs. Fires were mostly stand replacing, though mixed severity fire was probably present where fuels were discontinuous. The fire disturbance size likely resembled the patch size of the vegetation, ranging from tens to thousands of acres. Reestablishment of these big sagebrush species following fire is slow due to lengthy successional development and site limitations.

Current Conditions: The lower elevation big sagebrush stratum is slightly departed from reference conditions and its historic fire regime. Most of this plant community is in a late development succession class, resulting in predominately mature sagebrush plants. Young sagebrush plants are generally present below the mature sage overstory, but there are very few patches of post-disturbance early development sagebrush/grassland. Much of this plant community is important habitat for sage grouse and pygmy rabbits.

Mountain Big Sagebrush (BpS 1911260)

Fire Regime: Mountain big sagebrush dominated communities are found above about 7,000 feet in elevation, and on sites that annually receive 12-20 inches of effective precipitation. This vegetative community is characterized by Fire regime Group I. Fire is a major disturbance factor for mountain big sagebrush and likely played a large role in maintaining this habitat as a sagebrush/grassland. Periodic fire restricted conifer establishment on sites capable of supporting trees, and held in check the conversion of sagebrush habitat to forest habitat. Mountain big sagebrush has the fastest recovery rate of the three subspecies of big sagebrush. Fire size for this type is larger than other big sagebrush species because of greater fine fuel load, but some unburned pockets remain after fires, often resulting in a patchy mosaic. The fire return intervals reported in the literature for this type vary from 10-200yrs. However, estimating historic fire regimes for sagebrush ecosystems is tenuous at best and often based on fire scar and age structure data from adjacent forest types, shrub age structure and fuel characteristics. Fire regimes also vary considerably across the range of mountain big sagebrush, based on factors like elevation, soil depth, slope, aspect, adjacent vegetation, frequency of lightning, and climate. While the majority of fires were likely stand-replacing, some mixed severity fire may have occurred. Mixed severity fires were likely small in area, but ignitions may have occurred as frequently as 5-20yrs. There were probably also portions of this system that never carried fire

because of sparse fuel. Historic fires likely occurred during the summer months and were wind driven events. Lightning ignitions are variable and affect fire frequency on regional landscapes in the Northern Rockies. Mountain big sagebrush does not resprout following fire and recolonization of burned areas must come from either a short-lived seed bank or seed dispersed by plants in unburned patches or adjacent stands.

Current Conditions: The mountain big sagebrush stratum is slightly departed from reference conditions due to fire exclusion and the effects of conifer encroachment. The proportions of mid- to late-development mountain big sagebrush are near reference conditions, however the early development sagebrush component is lacking throughout the watershed. Douglas-fir and juniper are establishing in areas where conditions are suitable for conifers and are converting former sagebrush habitat into closed canopy, dense forest habitat.

Several recent prescribed burns have been implemented in the mountain big sagebrush vegetation type within the EGW. During the spring of 2004, approximately 110 acres was burned in Dry Gulch, adjacent to the East Fork of Dyce Creek and, in 2005, approximately 120 acres was burned on Badger Pass. The primary objective of the Dry Gulch burn was to improve livestock distribution, and the Badger Pass burn objective was to reduce conifer encroachment.

Grasslands (BpS 1911390)

Fire Regime: The foothill and valley bottom grasslands in this watershed are dominated by bluebunch wheatgrass, with Idaho fescue as an associate. This vegetation type has frequent replacement fires and is characterized by Fire Regime group II. Most species in this type are fire adapted and respond favorably to these fire types.

Where these systems occur within forested ecosystems, fire frequency will be strongly influenced by the surrounding forest's fire regime (e.g., 10-20yrs). Where these systems occur below lower treeline, fire frequencies may be longer (e.g., 20-30yrs). Drier sites with more bare ground will likely have a slightly higher mean fire interval. In large valleys, fires may have been expansive historically, up to thousands of acres.

Current Conditions: The grassland stratum is moderately departed from reference condition due primarily to the lack of early seral plant communities. Late development grasslands now have higher than expected densities of shrubs due to long-term grazing and fire exclusion. On productive sites with deeper soil, conifers are encroaching into grasslands. The sagebrush expansion within this stratum does offer more suitable habitat for some sagebrush obligate wildlife species.

Douglas-fir Forest (BpS 1910451)

Fire Regime: The Douglas-fir forest in this watershed is best characterized by Fire Regime Group I. Fires were predominantly surface and mixed-severity, with a mean fire interval of 7-80 years. Occasional stand replacement fires may also occur. Much of the Douglas-fir forest is at the sagebrush-forest interface and was historically affected by fires in adjacent vegetation. Abundant evidence of past fires is present in mature Douglas-fir timber stands, primarily in the form of fire scars on large diameter relic trees. The low frequency and wide spacing of existing relic trees and stumps in these stands indicates historic low-severity fires likely promoted and

maintained a Douglas-fir forest savannah structure. Mixed-severity fires occurred primarily in denser stands, and at higher elevations. Douglas-fir increases in canopy density in the absence of fire disturbance. Much of this landscape today has canopy cover denser than the historic range of variability. Canopy closure of >80% in this BpS is considered uncharacteristic. Many of the young, dense Douglas-fir stands (<100 year old) in this watershed have sagebrush skeletons on the ground, which indicates these sites were previously dominated by sagebrush.

Current Conditions: The Douglas-fir forest stratum is moderately to severely departed from reference conditions due to altered stand structure. Past timber harvesting followed by more than a century of fire exclusion has promoted an increase of dense, single age-class Douglas-fir forest. Herbaceous understory vegetation is sparse in many stands due to nearly complete canopy closure.

Curl-leaf mountain mahogany (BpS 1910620)

Fire Regime: Curl-leaf mountain mahogany is found scattered throughout the EGW, primarily on dry sites with shallow soil or on rock outcrops. Though mountain mahogany occupies a relatively small percentage of the landscape, it is of very high value to wildlife and a therefore an elevated management consideration.

Mountain mahogany does not resprout following fire, and is easily killed by fire. Curl-leaf mountain mahogany is a primary early successional colonizer rapidly invading bare mineral soils after disturbance. Fires are not common in early seral stages, when there is little fuel. Several fire regimes can affect this community type. It is clear that being very sensitive to fire and very long lived would suggest Fire Regime Group V and development in fire-safe sites (Gruell et al. 1985). This is true of late development classes, but younger classes can resemble more the surrounding sagebrush communities in their fire behavior and exhibit a Fire Regime Group IV. In this watershed, surface fires likely affected the adjacent vegetation relatively frequently, but often did not burn into mahogany stands due to the rocky terrain or bare soil in which it grows. At longer intervals, when sufficient fuels accumulated to carry fire, fires burning under dry, windy conditions likely killed entire mahogany stands. The resulting bare mineral seedbed provided the ideal conditions for a replacement stand.

Current Conditions: The mountain mahogany stratum is moderately departed from reference conditions in portions of the EGW due to heavy browsing by native ungulates that is affecting every accessible mahogany plant. As a result, the majority of this plant community cannot advance beyond a mid-development succession class. On the foothills of the Pioneer Mountains, limber pine, Douglas-fir, and Rocky Mountain juniper is shading-out some mahogany stands.

Fire Regime Condition Class

Fire Regime Condition Class (FRCC) is a general index providing two pieces of information: the historic fire regime group, and the condition class. Fire Regime Groups are described in the previous section and summarized in Table 16. Condition class reflects the degree of ecological departure when current conditions are compared against modeled reference conditions in terms of two main ecosystem components: fire regime and associated vegetation. This departure is from changes to one (or more) of the following ecological components: vegetation characteristics (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 fire regime condition classes have been defined (Schmidt et al. 2002) based on the following criteria: FRCC 1 represents ecosystems with low (<33 percent) departure and that are still within an estimated historical range of variation as determined by modeling for the pre-EuroAmerican era; FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure; and FRCC 3 indicates ecosystems with high (>66 percent) departure (Hann and Bunnell 2001; Hardy et al. 2001, and Schmidt et al. 2002). A low departure indicates current conditions are characteristic of those occurring in the natural fire regime and associated vegetation. A high departure indicates uncharacteristic conditions that did not occur within the natural fire regime. Condition classes were assessed using the FRCC Software Application.

Table 16. Summary of Fire Regime Condition Classes across all ownerships within the East Grasshopper Watershed.

Biophysical Setting	Fire Regime Group (I-V)	Condition Class 1 (ac)	Condition Class 2 (ac)	Condition Class 3 (ac)	Total Acres
Intermountain basins big sagebrush steppe	III	2,496	47,425	0	49,921
Intermountain basins montane sagebrush steppe	I	8,430	29,509	4,215	42,154
Northern Rocky Mountain lower montane foothill-valley-grassland	II	6,711	0	5,491	12,202
Northern Rocky Mountain dry-mesic montane mixed conifer forest- Douglas-fir	I	1,385	3,605	554	5,544
Intermountain basins curl-leaf mountain mahogany	III	165	609	332	1,106
Other BpS acres not included in FRCC assessment					9,460
Total Acres		19,187	81,148	10,592	120,387
% of Watershed		17%	73%	10%	

Fire Regime Condition Class Summary

The FRCC table above shows that, considering only the five dominant non-riparian BpS's, approximately three-fourths of the EGW is in Condition Class 2, which corresponds to a moderate departure from pre-EuroAmerican settlement conditions. Fire exclusion has caused some big sagebrush and low elevation forest communities to stall in mid to late-development succession classes, with little representation of an early seral class. Conifer expansion into big sagebrush communities and the heavy browse of curl-leaf mountain mahogany in the northern portion of the watershed also contributes to the departure.

Recommendations

1. Continue to address localized weed infestations cooperatively with Beaverhead County and other landowners and partners as appropriate. Continue the existing education effort on weed identification with permittees and other people who use this area.

2. Where accessible and cost effective, treat Canada thistle and 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 EGW.
3. Consider options to stop the spread of knapweed from the Badger Pass gravel pit.
4. To improve WCT habitat conditions along Dyce Creek, consider constructing riparian exclosures in strategic locations along the East Fork drainage. Water gaps should be considered along these exclosures.
5. To reduce sediment input to East Fork Dyce Creek, consider the following:
   - Hardening the primitive road crossing on the East Fork of Dyce Creek on BLM upstream of the private/BLM property boundary in T.6S, R.12W, Sec. 23 and installing water bars on the road to divert runoff away from the stream.
   - Modifying the road crossing on the East Fork of Dyce Creek located on private land in T.6S, R.12W, Sec. 23 with either an oversized culvert of suitable size to pass all age classes of WCT, installing a bridge or re-routing the road along the west side of the East Fork to join up with the primitive road in T.6S, R.12W, Sec. 23.
   - Closing the East Fork Dyce Creek Road prior to the primitive stream crossing in T.6S, R.12W, Sec. 14 or installing an oversized culvert capable of being installed below stream bed grade.
   - To prevent the culvert from washing out, it is recommended that the road grade over the culvert crossing the East Fork of Dyce Creek, in T.6S, R.12W, Sec. 23, be repaired.
6. Explore opportunities with Montana FWP and the Forest Service to re-establish or expand current populations of genetically pure WCT in suitable habitat.
7. Explore opportunities to maintain/restore/improve limber pine, mountain mahogany and aspen habitats.
8. Explore opportunities to increase diversity of seral stages and structure in forested habitats.
9. Explore opportunities to recover the economic value of dead/dying timber resources.
10. Explore opportunities to supply forest products where demand exists.
11. Improve sage grouse seasonal habitats in the Taylor-Buffalo and Buffalo Creek allotments.
12. Explore opportunities to improve curl-leaf mountain mahogany habitat in the Baldy Mountain allotment.
13. Identify fences that pose collision hazards and fit with fence markers or modify for easier wildlife passage.
14. Evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or restore sage-grouse habitat.
15. To reduce outright sage-grouse strikes and mortality, remove, modify or mark fences in high risk areas within priority sage-grouse habitat based on proximity to lek, lek size, and topography (Christiansen 2009, Stevens 2011).
16. Incorporate sage-grouse habitat objectives and management considerations into all BLM grazing allotments through AMPs or permit renewals.
17. Design any new structural range improvements and location of supplements (salt or protein blocks) to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. (Structural range

improvements include but are not limited to: cattleguards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks [including moveable tanks used in livestock water hauling], windmills, ponds/reservoirs, solar panels and spring developments). Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction.

18. Authorize new water developments for diversion from spring or seep source only when sage-grouse habitat would benefit from the development this includes developing new water sources for livestock as part of an AMP/conservation plan to improve sage-grouse habitat.
19. Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within sage-grouse habitats. Make modifications where necessary, considering impacts to other water uses when such considerations are neutral or beneficial to sage-grouse.
20. Consider implementing uncompleted treatments from the East Grasshopper Vegetation Project EA.
21. Consider using prescribed fire, mechanical treatment, or other means to mitigate conifer encroachment into existing sagebrush in the Baldy Mountain allotment (Map 7).
22. Consider mechanical treatments to reduce Douglas-fir and/or Rocky Mountain juniper that is shading-out mature mountain mahogany stands. Conifer encroachment into sagebrush and conifer shading of mountain mahogany are concerns primarily on the Baldy Mountain allotment.

Additional Issues and/or Concerns

Abandoned Mine Lands

In 2006, the BLM contracted the mitigation of the tailings impoundment at the Ermont Mine and Mill site, located approximately 2 miles north of Badger Pass. This consisted of placing approximately 24 inches of borrow material over the eight acres of historic mill tails. In the process, the abandon mine features in the area that posed a human safety hazard were mitigated.

The AML program is an ongoing program which has been addressing legacy mining issues throughout southwest Montana. AML work will continue until all environmental and physical safety issues that can be resolved have been completed. Reclamation will be prioritized by the magnitude of the environmental problem, the severity of the safety risk, funding available, and/or the partnerships available to conduct the work. It will be conducted on a watershed or district scale when possible.

To determine the best reclamation method for each mine a detailed field evaluation must be conducted. Sites with potential water quality issues are reviewed under the CERCLA process, those with physical safety issues only are addressed under the NEPA process. Site assessment includes, but is not limited to, a review for a potentially responsible party (PRP), the geochemical character of the waste rock and tailings impoundments, delineation of the extent of contaminant transport, a cultural inventory and clearance through SHPO, evaluation of the sites for potential animal habitat, and a sensitive plant species review. The reclamation method

chosen for each mine is based on the relative importance of the critical components of the site as well as the accessibility/workability of the area. As work progresses, mining areas which have not been sufficiently inventoried will be assessed. To date, significant reclamation work has been conducted at Ermont, southwest of Dillon, and at isolated open mines with safety issues throughout the DFO area. At this time there are no major environmental hazards within the watershed known to exist on public land as the result of historic mining.

Recommendation

1. Continue addressing legacy mining issues within the EGW through the AML program.

Travel Management

Motorized vehicles were limited to designated routes only in the Dillon Field Office's 2006 RMP. Any mapping errors or other issues identified, regarding these route designations, will be addressed in the environmental assessment.

Recommendation

1. Analyze, and make necessary adjustments to route designations where concerns were documented.

Interdisciplinary Team Composition

Core IDT members for the EGW Assessment include:

Brian Thrift, Rangeland Management Specialist (IDT Leader)
Ryan Martin, Rangeland Management Specialist
Kelly Bockting, Wildlife Biologist
Paul Hutchinson, Fisheries Biologist
Aly Piwowar, Forester
Kipper Blotkamp, Fire Ecologist
Stephen Armiger, Hydrologist (Soil, Water & Air)
Pat Fosse, Supervisory Natural Resource Specialist

Support IDT members include:

Michael Mooney, Weeds Specialist
Jason Strahl, Archaeologist
George Johnson, Fuels Specialist
Laurie Blinn, GIS Specialist
Rick Waldrup, Outdoor Recreation Planner
Emily Guiberson, Forester
Katie Benzel, Wildlife Biologist
Kelly Urresti, Rangeland Management Specialist (Special Status Plants)
Bob Gunderson, Geologist
David Williams, Geologist (AML)
Corey Meier, Soil Scientist (AML, Hazardous Materials)
Vinita Shea, Supervisory Land Use Specialist

Other specialists involved:

Mike Philbin, Supervisory Physical Scientist, Montana/Dakotas BLM State Office
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GLOSSARY OF TERMS

Anthropogenic: Caused or influenced by humans.

Bankfull stage: "The bankfull stage corresponds to the discharge at which channel maintenance is most effective, that is, the discharge at which moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing the work that results in the average morphologic characteristics of channels." Dunne and Leopold (1978).

Census County Division: Census county divisions (CCDs) are geographic statistical subdivisions of counties established cooperatively by the Census Bureau and officials of state and local governments in states where minor civil divisions (MCDs) either do not exist or are unsatisfactory for census purposes.

Channel stability: the ability of the stream, over time, to transport the flows and sediment of its watershed in such a manner that the dimension, pattern and profile of the river is maintained without either aggrading nor degrading.

Entrenchment: the vertical containment of river and the degree to which it is incised in the valley floor.

Entrenchment ratio: a quantitative expression of the ratio of the floodprone width to the bankfull width.

Floodprone width: width measured at an elevation which is determined at twice the bankfull depth.

Forest land: land that is now, or has 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).

Functional at risk (FAR): riparian wetland areas that are functional, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Greenline: that specific area where a more or less continuous cover of vegetation is encountered when moving away from the center of an observable channel. The greenline is often, but not necessarily, located at the water's edge.

Hummocking: a form of micro-topographic relief characterized by raised pedicels of vegetated soil as much as 0.6 m (2ft) higher than the surrounding ground which results from long term large animal trampling and tracking in soft soil. Vegetation on the pedicels usually differs from that on the surrounding lower area due to moisture difference between the two levels. Hummocking is also caused by abnormal hydrologic heaving.

Hydric soil: soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrophyte: Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Hydrologic Unit: The USGS has developed a system of geographic units based upon watersheds. These units were originally subdivided to four levels. Subsequently two additional subdivisions have been developed. Currently there are six levels, with the sixth being the smallest unit.

Lacustrine: from the French "lacustre" or lake. Permanently flooded lakes and reservoirs, generally over 20 acres, exhibiting wave-formed or bedrock shoreline features. (Cowardin *et al*., 1979).

Lands with Wilderness Characteristics: those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in Section 2 (c) of the Wilderness Act. These are separate from lands already designated as Wilderness or wilderness study areas.

Lentic: standing or still water such as lakes and ponds.

Lotic: flowing or actively moving water such as rivers and streams.

Nonpoint source pollution: pollution originating from diffuse sources (land surface or atmosphere) having no well-defined source.

Palustrine: from the Latin "palus" or marsh. All non-tidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens. (Cowardin *et al.*, 1979)

Proper functioning condition (PFC): Lotic riparian-wetland areas are considered to be in proper functioning condition when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and ground-water recharge;
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses;
- Support greater biodiversity

Pugging: the small depressions and areas of compaction in saturated soils caused by the hoof action of animals.

Riparian zone: the banks and adjacent areas of water bodies, water coursed, seeps, and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally so as to provide a moister habitat than that of contiguous flood plains and uplands.

Rosgen Classification System: A classification system for natural rivers in which a morphological arrangement of stream characteristics is organized into relatively homogeneous stream types. Morphologically similar stream reaches are divided into 7 major stream type categories that differ in entrenchment, gradient, width/depth ratio, and sinuosity in various landforms. Within each major category are six additional types delineated by dominant channel materials from bedrock to silt/clay along a continuum of gradient ranges.

Spring brook: a channel that carries water from a spring. Where there is sufficient flow, the channel forms a perennial stream. Frequently in arid environments, the flow is insufficient to create a perennial stream. Groundwater emerges at the springhead, flows a short distance within the spring brook, and then submerges.

Spring province: a group of springs in close geographical proximity.

Total Maximum Daily Load (TMDL): The goal of the Clean Water Act (CWA) is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Under section 303(d) of the CWA, states are required to develop lists of impaired waters. The law requires that states establish priority rankings for waters on the lists and develop TMDLs for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards.

TMDL Planning Areas: Montana DEQ is using a watershed approach to address TMDLs based on the premise that water quality restoration and protection are best addressed through integrated efforts within a defined geographic area. DEQ has divided the state into 91 watershed planning areas to facilitate development of TMDL/water quality restoration plans.

Wilderness Characteristics: These attributes include the area's size, it's apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values.

Woodland: 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.

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Appendix A

A List of Known Plants
Found On or Near BLM Lands
Within the East Grasshopper Watershed

(Plant scientific names and alphanumeric codes presented in the following table correspond to those found in *The PLANTS Database*/http://plants.usda.gov; 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
Agoseris	*Agoseris* spp	AGOSE
Alfalfa	*Medicago sativa*	MESA
Alkali sagebrush	*Artemisia arbuscula ssp. longiloba*	ARARL
Alpine forget-me-not	*Eritrichium spp.*	ERITR
Alpine timothy	*Phleum alpinum*	PHAL2
Alumroot	*Heuchera spp.*	HEUCH
American bistort	*Polygonum bistortoies*	POBI6
Baltic rush	*Juncus arcticus ssp. littoralis*	JUARL
Basin big sagebrush	*Artemisia tridentata ssp. tridentata*	ARTRT
Basin wildrye	*Leymus cinereus*	LECI4
Beaked sedge	*Carex utriculata*	CAUT
Beautiful bladderpod	*Physaria pulchella*	LEPU15
Bearded wheatgrass	*Elymus trachycaulus ssp. trachycaulus*	ELTRT
Bebb willow	*Salix bebiana*	SABE2
Bitterroot	*Lewisia rediviva*	LERE7
Bitterroot milkvetch	*Astragalus scaphoides*	ASSC4
Black cottonwood	*Populus balsamifera ssp. trichocarpa*	POBAT
Black henbane	*Hyoscyamus nigar*	HYNI
Bladderwort	Utricularia spp.	UTRIC
Blue flax	*Linum perenne*	LIPE2
Blue grama	*Bouteloua gracilis*	BOGR2
Blue wildrye	*Elymus glaucus*	ELGL
Bluebells	*Mertensia*	MERTE
Bluebunch wheatgrass	*Pseudoroegneria spicata*	PSSP6
Bluegrass	*Poa spp.*	POA
Bluejoint reedgrass	*Calamagrostis canadensis*	CACA4
Booth's willow	*Salix boothii*	SABO2
Bottlebrush squirriltail	*Elymus elymoides*	ELEL5
Broom snakeweed	*Gutierrezia sarothrae*	GUSA2
Buckwheat	*Eriogonum spp.*	ERIOG
Bull thistle	*Cirsium vulgare*	CIVU
Canada thistle	*Cirsium arvense*	CIAR4
Cheatgrass	*Bromus tectorum*	BRTE
Chicken-sage	*Sphaeromeria argentea*	SPAR2
Cinquefoil	*Potentilla spp.*	POTEN
Clustered field sedge	*Carex praegracilis*	CAPR5
Common cattail	*Typha latifolia*	TYLA
Common dandelion	*Taraxacum officinale*	TAOF
Common juniper	*Juniperus communis*	JUCO6
Common mullein	*Verbascum thapsus*	VETH
Common snowberry	*Symphoricarpos albus*	SYAL
Common yarrow	*Achillea millefolium*	ACMI2
Cow parsnip	*Heracleum maximum*	HEMA80
Coyote willow	*Salix exigua*	SAEX
Creeping juniper	*Juniperus horizontalis*	JUHO2
Curl-leaf mountain mahogany	*Cercoarpus ledifolius*	CELE3
Currant	*Ribes spp.*	RIBES

Common Name	Scientific Name	USDA Symbol
Cutleaf daisy	*Erigeron compositus*	ERCO4
Deathcamas	*Zigadenus spp.*	ZIGAD
Douglas-fir	*Pseudotsuga menziesii*	PSME
Dyer's woad	*Isatis tinctoria*	ISTI
Drummond's willow	*Salix drummondiana*	SADR
Elephanthead	*Pedicularis groenlandica*	PEGR2
Elk thistle	*Cirsium foliosum*	CIFO
Engelmann spruce	*Picea engelmannii*	PIEN
Foxtail barley	*Hordeum jubatum*	HOJU
Fringed sagewort	*Artemisia frigida*	ARFR4
Geyer willow	*Salix geyeriana*	SAGE2
Greasewood	*Sarcobatus vermiculatus*	SAVE4
Green needlegrass	*Nassella viridula*	NAVI4
Green rabbitbrush	*Chrysothamnus vividiflorus*	CHVI8
Grey horsebrush	*Tetradymia canescens*	TECA2
Heartleaf arnica	*Arnica cordifolia*	ARCO9
Houndstongue	*Cynoglossum officinale*	CYOF
Idaho fescue	*Festuca idahoensis*	FEID
Indian paintbrush	*Castilleja spp.*	CASTI2
Idaho sedge	*Carex idahoa*	CAID
Inflated sedge	*Carex vesicaria*	CAVE6
Indian ricegrass	*Achnatherum hymenoides*	ACHY
Kentucky bluegrass	*Poa pratensis*	POPR
Leafy spurge	*Euphorbia esula*	EUES
Lemhi beardtongue	*Penstemon lemhiensis*	PELE8
Lewis flax	*Linum lewisii*	LILE3
Limber pine	*Pinus flexilis*	PIFL2
Limestone larkspur	*Delphinium bicolor ssp. calcicola*	DEBIC
Lodgepole pine	*Pinus contorta*	PICO
Linear-leaf fleabane	*Erigeron linearis*	ERLI
Low sagebrush	*Artemisia arbuscula ssp. arbuscula*	ARARA
Lupine	*Lupinus spp.*	LUPIN
Meadow barley	*Hordeum brachyantherum*	HORR2
Montana sweet pea	*Thermopsis montana*	THMO6
Mountain big sagebrush	*Artemisia tridentata ssp. vaseyana*	ARTRV
Mountain brome	*Bromus carinatus*	BRCA5
Mountain snowberry	*Symphoricarpos oreophilus*	SYOR2
Musk thistle	*Carduus nutans*	CANU4
Narrowleaf cottonwood	*Populus angustifolia*	POAN3
Nebraska sedge	*Carex nebrascensis*	CANE2
Needle-and-thread	*Hesperostipa comata*	HECO26
Nodding brome	*Bromus anomalus*	BRAN
Northwestern groundsel	*Packera conterminal*	PACO53
Oniongrass	*Melica bulbosa*	MEBU
Owl-clover	*Orthocarpus spp.*	ORTHO
Phlox	*Phlox spp.*	PHLOX
Pinegrass	*Calamagrostis rubescens*	CARU

Common Name	Scientific Name	USDA Symbol
Plains pricklypear	*Opuntia polyacantha*	OPPO
Planeleaf willow	*Salix planifolia*	SAPL2
Prairie junegrass	*Koeleria macrantha*	KOMA
Prairie smoke	*Geum triflorum*	GETR
Pussy-toes	*Antennaria spp.*	ANTEN
Quaking aspen	*Populus tremuloides*	POTR5
Railhead milkvetch	*Astragalus terminalis*	ASTE9
Railroad Canyon wild buckwheat	*Eriogonum soliceps*	Not listed
Redoiser dogwood	*Cornus sericea ssp. sericea*	COSES
Redtop	*Agrostis gigantean*	AGGI2
Rocky mountain groundsel	*Packera streptanthifolia*	PAST10
Rocky mountain iris	*Iris missouriensis*	IRMI
Rocky mountain juniper	*Juniperus scopulorum*	JUSC2
Rubber rabbitbrush	*Ericameria nauseosa*	ERNA10
Rush	*Juncus spp.*	JUNCU
Sandberg bluegrass	*Poa secunda*	POSE
Sandwort	*Arenaria spp.*	ARENA
Scarlet globe-mallow	*Sphaeralcea coccinea*	SPCO
Sedge	*Carex spp.*	CAREX
Shy wallflower	*Erysimum inconspicuum*	ERIN7
Short-fruited willow	*Salix brachycarpa*	SABR
Shrubby cinquefoil	*Dasiphora fruticosa ssp. floribunda*	DAFRF
Silverweed cinquefoil	*Argentina anserine*	ARAN7
Silver sagebrush	*Artemisia cana*	ARCA13
Slender sedge	*Carex lasiocarpa*	CALA11
Slender thelypody	*Thelypodium sagittatum ssp. sagittatum*	THSAS
Slender wheatgrass	*Elymus trachycaulus*	ELTR7
Smooth brome	*Bromus inermis*	BRIN2
Spotted knapweed	*Centaurea stoebe ssp. micranthos*	CESTM
Spruce	*Picea spp.*	PICEA
Stemless mock goldenweed	*Stenotus acaulis*	STAC
Sticky geranium	*Geranium viscosissimum*	GEVI2
Stiffleaf penstemon	*Penstemon aridus*	PEAR2
Stonecrop	*Sedum spp.*	SEDUM
Subalpine fir	*Abies lasiocarpa*	ABLA
Sweetscented bedstraw	*Galium triflorum*	GATR3
Taper-tip Desert-parsley	*Lomatium attenuatum*	LOAT
Thick-spike wheatgrass	*Elymus lanceolatus*	ELLA3
Thinleaf alder	*Alnus incana*	ALIN2
Three-tip sagebrush	*Artemisia tripartita*	ARTR4
Threadleaf sedge	*Carex folifolia*	CAFI
Timothy	*Phleum pratense*	PHPR3
Tufted hairgrass	*Deschampsia cespitosa*	DECE18
Water birch	*Betula occidentalis*	BEOC2
Water sedge	*Carex aquatilis*	CAAQ
Water smartweed	*Polygonum amphibium*	POAM8
Western meadow-rue	*Thalictrum occidentale*	THOC

Common Name	Scientific Name	USDA Symbol
Western wheatgrass	*Pascopyrum smithii*	PASM
Western yarrow	*Achillea millefolium var. occidentalis*	ACMIO
Wheeler's bluegrass	*Poa wheeleri*	POWH2
Whiplash willow	*Salix lucida ssp. lasiandra*	SALUL
White clover	*Trifolium repens*	TRRE3
White sagebrush	*Artemisia ludoviciana*	ARLU
Whitebark pine	*Pinus albicaulis*	PIAL
White-stemmed Globe-mallow	*Sphaeralcea munroana*	SPMU2
Winterfat	*Krascheninnikovia lanata*	KRLA2
Wolf's willow	*Salix wolfii*	SAWO
Wyoming big sagebrush	*Artemisia tridentata ssp. wyomingensis*	ARTRW8
Yampa	*Perideridia gairdneri*	PEGA3
Yellow sweetclover	*Melilotus officinalis*	MEOF
Yellow willow	*Salix lutea*	SALU2

Appendix B: East Grasshopper Watershed
MRWA Inventory/Monitoring Data Summary

Allotment: Baldy Mountain

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Dyce Creek #16	50-100’	0.35	Perennial	B, D, G	”7.0	Geyer willow/ Beaked sedge	72	85	79
Dyce Creek WF, Upper #1591	25’	1.67	Perennial	B	2.5	Quaking aspen/ Red osier dogwood	79	78	78
Dyce Creek WF, Mid #1593	50-100’	1.19	Perennial	NO DATA	2.6	Quaking aspen/ Red osier dogwood	92	85	88
Dyce Creek WF, Lower #1564	40-80’	0.35	Perennial	B, G	5.8	Geyer willow/ Beaked sedge	79	81	80
Trib to WF Dyce #1575	30’	0.1	Perennial	B	3.0	Geyer willow/ Beaked sedge	75	74	75
Dyce Creek, EF Upper #15	20-50’	0.49	Perennial	A, B	6.7	Engelmann spruce/ Horsetail	72	67	70
Dyce Creek, EF Upper #1572	50-100’	0.67	Perennial	B, C	5.6	Geyer willow/ Beaked sedge	71	63	67
Dyce Creek, EF Lower #1571	50-150’	1	Perennial	B	6.0	Geyer willow/ Beaked sedge	71	68	69
Trib to EF Dyce Creek #17	20’	0.15	Perennial	A, B	4.8	Geyer willow/ Beaked sedge	68	93	81
Dry Gulch #1592	5-10’	1.39	Intermittent	B	3.8	Shrubby cinquefoil	75	73	74

Allotment: Frenchie

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Cold Spring Creek #1551		0.3	Perennial	B, G	8.0	Coyote willow/ Beaked sedge	71	44	56

Allotment: Reservoir Creek AMP

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Watson Creek #1590	50’	0.01	Perennial	NO DATA	10.7	Geyer willow/ Beaked sedge	62	93	80

Allotment: Stonehouse

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Cold Spring Creek #1550	20-150’	0.08	Perennial	B, G	6.7	Geyer willow/ Beaked sedge	82	78	80
Ermont Gulch trib #1559	10-60’	0.12	Intermittent	B, G	16.0	Geyer willow/ Beaked sedge	67	22	45
Rattlesnake Creek #1566	50-100’	0.15	Perennial	C	6.4	Drummond willow/ Beaked sedge	76	63	70
Rattlesnake Creek #1567	100-150’	0.3	Perennial	C	4.8	Drummond willow/ Beaked sedge	79	85	82

Allotment: Taylor-Buffalo

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Taylor Creek #1553	100-130’	0.46	Perennial	C, E	3.0	Geyer willow/ Beaked sedge	75	59	68

Allotment: Taylor Creek

Stream Name & BLM Reach ID	Riparian Zone Width Range	Reach Length	Stream Type (e.g., Perennial)	Rosgen Channel Type	Average Width/Depth Ratio	Habitat Type	Vegetation Score	Soils/ Hydrology Score	Total Score
Taylor Creek #1552	50-175’	1.3	Perennial	B, C	3.3	Geyer willow/ Beaked sedge	67	93	80

Appendix C: East Grasshopper Watershed
Upland Vegetation Trend Monitoring Data Summary

Allotment: **Baldy Mountain**
Pasture: **Red Mine**
Study # **06S12W2701**

			Idaho Fescue (FESIDA)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Prairie Junegrass (KOEMAC)			Wyoming Big Sagebrush (ARTRWY)			Three-tip Sagebrush (ARTRIP)			Green Rabbitbrush (CHRVIC)			Yarrow (ACHILLEA)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/16/1982	100	52	100	18	35	65	5	9	50	1	2	69	2	3	4	0	0	58	10	19	58	2	5	77	4	7
8/19/1986	100	64	100	30	47	73	4	7	81	2	3	19	1	1	4	1	1	73	19	30	4	0	0	73	2	3
8/25/1999	92	43	100	21	49	38	1	3	35	1	2	4	0	0	15	1	3	69	10	23	8	0	0	46	1	3
6/21/2010	69	96	100	25	26	23	1	1	69	4	4				65	31	32	73	15	16				46	2	2

Crazyweed (OXYTROPIS)			Pussytoes (ANTENNARIA)			Lupine (LUPINUS)			Phlox (PHLLON)			Indian Paintbrush (CASTILLEJA)			Groundsel (TEPHROSERIS)			Oniongrass (MELBUL)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
58	2	5	23	2	3																88	6	12
38	1	2	31	1	1																65	3	4
46	1	3	42	3	7	35	2	4	23	1	1										15	0	1
62	3	4	50	3	3	46	5	5	62	2	2	4	0	0	46	3	3	31	1	1	42	2	2

Allotment: Bannack
Pasture: Sandy
Study # 08S12W0301

			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Western Wheatgrass (PASSMI)			Wyoming Big Sagebrush (ARTRWY)			Phlox (PHLO)			Buckwheat (ERIOGUNUM)			Fringed Sagewort (ARTFRI)			Saltbush (ATRIPLEX)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/28/1979	100	31	100	21	68	77	5	16	8	0	1	8	0	1	4	0	0	4	0	0	12	2	6	8	2	5
7/25/1985	100	25	85	14	57	100	6	24				23	2	8	8	0	1				15	1	5	4	1	2
6/30/1987	100	50	100	22	43	92	9	19				23	6	12	8	0	0				19	2	5	42	3	7
9/29/1999	100	36	100	20	54	69	6	16				35	6	15	4	0	0	4	0	0	19	0	1	12	1	3
6/22/2010	100	35	88	11	31	96	7	21				31	7	21	23	1	3				8	1	2	4	1	2

Rubber Rabbitbrush (CHRNAU)			Pepperweed (LEPIDIUM)			MISC. FORBS																	
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
						19	1	2															
						31	1	3															
						77	7	14															
4	0	0	85	3	7																		
			92	6	16																		

Allotment: Bannack
Pasture: South
Study # 08S12W1401

			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Needle-and-thread (STICOM)			Western Wheatgrass (PASSMI)			Bottlebrush Squirreltail (SITHYS)			Idaho Fescue (FESIDA)			Sedge (CAREX)			Wyoming Big Sagebrush (ARTRWY)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/11/1979	100	60	65	6	11	92	19	31	27	3	4	42	2	3	4	1	1	4	0	0	42	2	3	42	11	19
7/23/1980	100	76	80	14	19	90	6	8	100	23	30	30	2	3										70	17	23
7/12/1984	96	19	31	1	7	19	1	5				23	1	6	31	1	4	12	0	2	50	3	14	39	8	39
7/7/1987	100	51	58	9	18	15	0	1				35	6	12	8	1	1	35	2	5				50	17	33
9/29/1999	100	36	62	4	12	69	4	10				62	8	23	4	0	0	4	0	0	35	1	2	54	10	28
6/9/2010	100	34	50	3	9	85	6	19				46	3	9							38	1	4	58	2	7

Phlox (PHLO)			Phlox (PHHO)			Fringed Sagewort (ARTFRI)			Three-tip Sagebrush (ARTRIP)			Fleabane (ERIGERON)			Bluebells (MERTENSIA)			Buckwheat (ERIOGUNUM)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
35	2	3	96	10	16	27	2	4				35	1	2	8	0	0						
																					65	11	18
			19	1	3	12	1	4	8	1	6	12	1	4				4	0	1	35	1	7
			19	1	1	15	1	2	12	5	10	23	1	2				4	0	0	89	8	16
27	1	2	38	3	9	31	3	7				8	0	1				12	0	1	4	1	4
58	2	7				23	2	5							4	0	0	27	1	2			

Allotment: Bannack
Pasture: South
Study # 08S12W1403

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Western Wheatgrass (PASSMI)			Sandberg Bluegrass (POASEC)			Prairie Junegrass (KOEMAC)			Sedge (CAREX)			Bottlebrush Squirreltail (SITHYS)			Sheep Fescue (FESOVI)			Wyoming Big Sagebrush (ARTRWY)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
9/7/1983	100	54				76	7	13	76	6	10	20	1	1	60	4	7				4	1	1	88	36	67
7/12/1984	100	19	8	0	1	12	0	2	46	1	6				46	2	9	33	1	7	12	1	4	50	13	66
7/16/1987	100	49				72	7	15	48	4	8							20	1	1				72	23	48
6/9/2010	96	46	96	5	11	17	0	1	67	7	16				25	1	1							83	31	68

Note: This area was chisle-plowed between '83-'84.

Stickseed (LAPPULA)			Phlox (PHLOX)			Yarrow (ACHILLEA)			Pussytoes (ANTENNARIA)			MISC. FORBS											
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
												16	0	1									
												8	1	4									
80	9	19										60	4	9									
			21	1	1	4	6	1	4	0	0	21	1	1									

Allotment: Cross
Pasture:
Study # 08S12W3401

	BG	% Total	Western Wheatgrass (PASSMI)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Indian Ricegrass (ORYHYM)			Phlox (PHLHOO)			Phlox (PHLLON)			Fleabane (ERIGERON)			Fringed Sagewort (ARTFRI)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
Jun-89	100	39	8	1	2	88	11	27	23	1	3	12	0	1	42	3	9				15	0	1	12	0	1
Sep-99	100	41	27	4	11	31	4	9	54	2	6	42	5	13	4	0	0	12	1	2	15	0	1	12	0	1
May-04	92	58	27	3	5	65	11	19	50	4	7	42	6	11	38	3	5	27	1	1	23	3	4			
Jun-11	92	42				46	5	13	81	4	9	31	3	7	38	3	7	15	1	2	23	2	4			

Wyoming Big Sagebrush (ARTRWY)			Winterfat (CERLAN)			Green Rabbitbrush (CHRVIC)			Sedge (CAREX)			Needle-and-thread (STICOM)			Milkvetch (ASTRAGALUS)			MISC. FORBS					
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
58	20	51	8	0	1	31	1	3										38	1	3			
50	16	40				38	4	10	4	0	0	31	2	4	15	0	1						
50	23	39				23	3	6															
46	15	37	4	0	0	35	2	4	4	0	0	23	2	5	31	2	5	12	0	1			

Allotment: Cross
Pasture:
Study # 09S12W0402

			Western Wheatgrass (PASSMI)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Needle-and-thread (STICOM)			Phlox (PHLHOO)			Phlox (PHLLON)			Wild Onion (ALLIUM)			Fringed Sagewort (ARTFRI)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
Jun-79	100	38	27	2	4	58	6	15	46	5	14	38	2	6	23	1	3	15	1	2	8	0	1	42	3	7
Jun-89	100	28	35	3	10	65	3	11	58	2	9	12	0	1	46	3	9							77	6	21
Sep-99	100	33	38	4	11	35	5	14	50	4	12	27	1	3										50	1	4
May-04	96	39	27	3	7	62	7	18	54	4	10	15	1	2	23	1	3	35	1	2	23	1	1	27	1	2
Jun-11	100	29	12	1	3	50	4	14	81	6	20				15	0	1	27	1	2	4	0	0	38	2	7

Biscuitroot (LOMATIUM)			Pussytoes (ANTENNARIA)			Wyoming Big Sagebrush (ARTRWY)			Green Rabbitbrush (CHRVIC)			Fleabane (ERIGERON)			Buckwheat (ERIOGONUM)			Sedge (CAREX)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
8	0	1	8	0	1	62	18	47															
						42	2	9	38	3	11	42	1	4	15	0	1				50	1	5
						35	13	38	27	2	5	35	2	5	12	0	1	42	2	5			
8	0	0	8	0	0	46	18	45	8	2	5	31	1	2	8	0	0						
			31	1	3	31	6	20	15	1	5	38	1	3				19	0	2			

Allotment: Frenchie
Pasture: Frenchie
Study # 08S11W2401

			Bluebunch Wheatgrass (AGRSPI)			Needle-and-thread (STICOM)			Indian Ricegrass (ORYHYM)			Sandberg Bluegrass (POASEC)			Wyoming Big Sagebrush (ARTRWY)			Black Sagebrush (ARTNOV)			Rubber Rabbitbrush (CHRNAU)			Broom Snakeweed (GUTSAR)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/25/1984	100	34	28	2	5	96	16	49	36	1	4	36	1	4	8	0	1	36	7	20	4	0	0	36	1	3
7/8/2009	84	41	60	3	6	60	5	11	16	0	1	48	3	7	60	23	55							36	1	3

Fringed Sagewort (ARTFRI)			Sedge (CAREX)			Phlox (PHLLON)			Indian Paintbrush (CASTILLEJA)			Chickweed (CERARV)			Penstemon (PENSTEMON)			MISC. FORBS					
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
28	1	2	16	0	1	12	0	1	4	0	0				24	1	2	44	2	5			
12	1	2	20	1	1	8	0	0	16	1	2	20	1	1	8	0	0	60	3	6			

Allotment: Frenchie
Pasture: Timber Butte
Study # 07S10W2101

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Western Wheatgrass (PASSMI)			Needle-and-thread (STICOM)			Sandberg Bluegrass (POASEC)			Sedge (CAREX)			Blue Grama (BOUGRA)			Rubber rabbitbrush (CHRNAU)			Wyoming Big Sagebrush (ARTRWY)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/16/1979	100	39	77	8	20	35	5	12	38	4	10	35	3	8	81	6	16				8	2	4	38	5	12
7/2/1985	100	27	46	4	15	50	7	26	58	6	23	4	0	0				4	0	0	4	1	2	23	2	9
7/9/2009	100	33	85	18	54	23	2	5	8	0	1	8	1	2	73	3	10	8	0	1				4	1	2

Broom Snakeweed (GUTSAR)			Phlox (PHLLON)			Fringed Sagewort (ARTFRI)			Pricklypear Cactus (OPUPOL)			Pussytoes (ANTENNARIA)			Pennycress (THLASPI)			MISC. FORBS					
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
23	2	4	12	1	2	46	4	9	4	1	2												
42	2	6	23	1	2	58	4	16										8	0	1			
4	1	2				58	5	15	4	1	2	8	0	1	27	1	4	46	1	4			

Allotment: Frenchie
Pasture: Timber Butte
Study # 07S12W3301

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Idaho Fescue (FESIDA)			Green Neddlegrass (STIVIR)			Sandberg Bluegrass (POASEC)			Western Wheatgrass (PASSMI)			Sedge (CAREX)			Wyoming Big Sagebrush (ARTRWY)			Green Rabbitbrush (CHRVIC)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
7/22/1980	100	40	80	15	38	36	3	8	4	0	0	56	1	4	24	1	2	28	1	3	52	12	30	48	3	8
7/2/1985	77	38	62	3	7	58	4	10	19	1	3	27	1	2	19	1	3	35	1	4	81	25	66	4	1	2
7/8/2009	96	42	76	10	24	52	7	16				84	9	21				44	1	3	40	7	16	24	3	7

Fringed Sagewort (ARTFRI)			Pricklypear Cactus (OPUPOL)			Needle-and-thread (STICOM)			Prairie Junegrass (KOEMAC)			Phlox (PHLLON)			Buckwheat (ERIOGONUM)			Pussytoes (ANTENNARIA)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
4	0	0	4	1	2																48	3	8
						12	0	1	4	0	0	12	1	3	4	1	2						
4	1	1	4	0	0							36	1	3				12	1	2	24	2	4

Allotment: Reservoir Creek AMP
Pasture: R-1
Study # 08S12W2602

			Western Wheatgrass (PASSMI)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Phlox (PHLHOO)			Fringed Sagewort (ARTFRI)			Wyoming Big Sagebrush (ARTRWY)			Bitterroot (LEWRED)			Pussytoes (ANTENNARIA)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
Jun-80	100	41	8	0	1	88	11	27	64	3	6	32	1	3	64	4	9	48	14	33						
Jun-91	100	39	16	0	1	8	8	21	60	3	6	48	2	4	60	3	8	48	17	43						
Jun-01	100	47	16	1	2	88	8	17	76	6	13	60	3	6	76	3	7	56	16	34	20	1	1	56	3	6
May-04	100	46	32	2	4	72	10	22	72	6	14	16	1	2	12	1	2	52	17	36						
Jun-08	100	41	30	1	3	67	12	30	63	2	4	53	2	4	17	1	2	53	14	33	20	1	1	20	1	1
Jun-11	96	33	16	1	3	60	5	15	88	6	17	44	2	6	32	1	4	36	9	27	12	0	1	28	2	5

Fleabane (ERIGERON)			Hawksbeard (CREPIS)			Milkvetch (ASTRAGALUS)			Green Rabbitbrush (CHRVIC)															
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
52	2	5	40	2	3	4	1	1	8	0	0													
73	5	12	20	1	1	7	0	0	37	2	4													
28	2	5	52	2	5	8	0	1	4	0	0													

Allotment: Reservoir Creek AMP
Pasture: W-2
Study # 08S13W2601

			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Idaho Fescue (FESIDA)			Bluebells (MERTENSIA)			Phlox (PHLLON)			Lupine (LUPINUS)			Death Camas (ZIGADENUS)			Goatbeard (TRADUB)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
Jun-79	96	71	69	6	8	77	11	15	50	8	12	38	1	2	85	5	6	46	10	13	12	1	1	8	0	0
Jun-82	85	63	92	8	13	100	8	13	38	3	5							62	9	15	19	0	1			
Aug-98	88	39	65	5	13	58	2	5	65	13	33				15	0	1	12	0	1						
Jun-04	81	53	85	5	9	81	6	11	65	10	20	46	2	3	31	1	2	4	0	0	19	1	2			
Jun-08	100	30	62	3	11	73	3	9	69	5	17				12	0	1	4	0	0	19	0	2	4	0	0
Jun-11	81	60	58	2	3	81	6	10	85	12	20	46	2	3	23	2	3	15	0	1	12	0	0			

Pussytoes (ANTENNARIA)			Milkvetch (ASTRAGALUS)			Biscuitroot (LOMATIUM)			Fleabane (ERIGERON)			Wyoming Big Sagebrush (ARTRWY)			Green Rabbitbrush (CHRVIC)			Western Wheatgrass (PASSMI)			Hawksbeard (CREPIS)		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
4	1	1	69	6	9	12	1	1	4	0	0	77	20	28	15	2	3						
8	0	0	96	8	13	8	0	0	4	0	0	69	20	31	27	1	2	23	1	1	15	0	1
			31	1	2				8	0	1	65	13	34	27	3	7				8	1	2
8	1	1	31	1	2	27	1	1	8	1	1	62	23	43							19	1	2
			35	1	3							58	15	51	19	1	3						
4	0	0	38	2	4	27	1	1				54	23	39	12	1	2				42	1	2

Allotment: Stonehouse
Pasture: Argenta Flats
Study # 07S10W1001

	BG	% Total	Needle-and-thread (STICOM)			Sedge (CAREX)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Bottlebrush Squirreltail (SITHYS)			Blue Grama (BOUGRA)			Wyoming Big Sagebrush (ARTRWY)			Rubber rabbitbrush (CHRNAU)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/13/1979	100	62	92	12	20	85	4	7	31	2	4	81	11	19	8	0	0	4	1	2	4	0	0	23	4	7
6/30/1986	100	31	65	4	12	42	1	4	27	1	4	42	2	5	8	0	1	12	1	3	8	1	2	23	4	12
9/21/1999	100	30	85	11	37	42	2	7	23	2	7	46	2	7				15	3	11	4	1	2	35	2	8
6/10/2010	100	40	85	6	16	88	2	6	69	6	14	88	10	25				23	4	11	8	3	6	15	1	3

Fringed Sagewort (ARTFRI)			Broom Snakeweed (GUTSAR)			Phlox (PHLLON)			Wild Onion (ALLIUM)			Pricklypear Cactus (OPUPOL)			Fleabane (ERIGERON)			Clover (TRIFOLIUM)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
100	16	25	58	6	9	12	1	2	4	0	0	19	2	4	8	0	0						
85	8	28	58	4	14				4	0	0	27	1	4	23	2	8				12	0	1
92	5	17	19	0	2	8	0	1				12	0	1	19	0	2						
54	4	9	27	1	2	8	0	0				12	1	3				27	1	2	12	0	1

Allotment: Stonehouse
Pasture: Argenta Springs
Study # 06S10W1801

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Prairie Junegrass (KOEMAC)			Low Sagebrush (ARTARB)			Black Sagebrush (ARTNOV)			Green Rabbitbrush (CHRVIC)			Three-tip Sagebrush (ARTRIP)			Phlox (PHLHOO)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
7/23/1981	92	63	76	4	6	64	2	3	76	6	9	84	22	34	4	1	1	32	2	3	4	2	2	84	18	28
9/21/1999	96	43	77	4	9	46	1	3	96	9	21	4	0	0	23	5	11	31	1	2	62	9	20	77	11	25
6/6/2010	100	75	40	3	4	8	1	2	60	6	7				8	3	4	12	0	0				88	24	31

Phlox (PHLLON)			Fringed Sagewort (ARTFRI)			Milkvetch (ASTRAGALUS)			Fleabane (ERIGERON)			Idaho Fescue (FESIDA)			Mountain Big Sagebrush (ARTRVA)			Bluebells (MERTENSIA)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
			40	3	4	40	1	2													100	5	7
38	1	2	12	0	1				35	1	2										35	1	3
			8	1	2	36	1	1				52	5	6	88	24	31	12	3	4	48	2	2

Allotment: Stonehouse
Pasture: Ermont
Study # 07S10W0801

			Bluebunch Wheatgrass (AGRSPI)			Needle-and-thread (STICOM)			Prairie Junegrass (KOEMAC)			Western Wheatgrass (PASSMI)			Sandberg Bluegrass (POASEC)			Sedge (CAREX)			Wyoming Big Sagebrush (ARTRWY)			Rubber rabbitbrush (CHRNAU)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
8/30/1982	100	39	28	3	7	100	11	29	16	0	1	4	0	0	16	0	1	76	4	11	36	7	18	20	3	9
6/30/1986	100	48	31	2	4	88	20	41	23	1	1	8	0	0	4	0	0	12	0	1	31	6	12	23	7	13
9/20/1999	100	39	24	4	9	88	21	53				8	0	1	16	0	1	32	1	3	32	8	20	16	1	4
6/7/2010	100	36	52	3	9	72	5	13							60	2	6	88	8	23	36	9	25	4	3	7

Broom Snakeweed (GUTSAR)			Crazyweed (OXYTROPIS)			Fringed Sagewort (ARTFRI)			Stonecrop (SEDUM)			Indian Ricegrass (ORYHYM)			Green Rabbitbrush (CHRVIC)			Phlox (PHLHOO)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
48	2	4	44	1	3	60	5	12	12	1	2										48	1	3
42	5	10	4	0	0	65	5	11	8	0	0	15	1	3							19	0	1
12	0	1	20	1	1	48	2	6							20	1	1	12	0	1			
24	2	4	12	0	1	32	2	5							4	1	7	16	1	2			

Allotment: Stonehouse
Pasture: Frying Pan
Study # 06S10W2501

			Western Wheatgrass (PASSMI)			Needle-and-thread (STICOM)			Indian Ricegrass (ORYHYM)			Sandberg Bluegrass (POASEC)			Blue Grama (BOUGRA)			Bluebunch Wheatgrass (AGRSPI)			Wyoming Big Sagebrush (ARTRWY)			Green Rabbitbrush (CHRVIC)		
	BG	% Total																								
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
7/1/1985	100	28	85	5	19	31	3	10	4	0	0	23	2	5	8	0	1				27	3	9	27	3	9
9/21/1999	100	36	54	6	17	27	3	7	8	1	3	8	0	1	4	0	0	19	3	9	12	2	6	15	0	1
6/7/2010	100	28	24	1	2	36	1	5	4	1	2	8	1	3	12	1	3	36	6	22	20	3	10			

Rubber rabbitbrush (CHRNAU)			Fringed Sagewort (ARTFRI)			Pricklypear Cactus (OPUPOL)			Broom Snakeweed (GUTSAR)			Milkvetch (ASTRAGALUS)			Buckwheat (ERIOGONUM)			Phlox (PHLHOO)			Sedge (CAREX)		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
			31	1	5	12	1	3	65	5	16	31	1	3	27	2	8						
27	4	12	54	3	9	4	1	2	65	7	20	35	2	5	4	1	2	12	3	7			
32	5	18	20	1	2	4	0	0	52	6	20	8	0	1				12	1	5	20	1	4

Allotment: Stonehouse
Pasture: McDowell
Study # 07S10W2001

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Needle-and-thread (STICOM)			Sedge (CAREX)			Sandberg Bluegrass (POASEC)			Western Wheatgrass (PASSMI)			Indian Ricegrass (ORYHYM)			Wyoming Big Sagebrush (ARTRWY)			Winterfat (CERLAN)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/13/1979	100	69	27	1	2	100	37	54	92	5	8	38	3	5	8	1	1	4	1	1	12	3	4	42	4	5
9/21/1999	100	54	8	1	2	96	32	60	19	0	1	35	2	4				4	0	0	4	1	1	19	0	1
6/9/2010	100	38	4	0	0	85	12	32	69	3	7	54	4	10							12	5	14	23	2	4

Fringed Sagewort (ARTFRI)			Broom Snakeweed (GUTSAR)			Milkvetch (ASTRAGALUS)			Phlox (PHLHOO)			Scarlet Globemallow (SPHCOC)											
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
65	5	7	27	1	1	19	1	1	77	8	12												
85	5	10	23	1	1				62	10	18												
50	3	8	12	1	2	8	0	1	50	8	20	12	0	1									

Allotment: Stonehouse
Pasture: McDowell
Study # 07S11W1301

	BG	% Total	Bluebunch Wheatgrass (AGRSPI)			Sedge (CAREX)			Sandberg Bluegrass (POASEC)			Needle-and-thread (STICOM)			Western Wheatgrass (PASSMI)			Mountain Big Sagebrush (ARTRVA)			Rubber rabbitbrush (CHRNAU)			Green Rabbitbrush (CHRVIC)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
7/23/1981	96	47	60	9	20	8	1	2	28	1	3	8	1	2	8	0	0	44	22	47	4	0	0	12	2	4
7/8/1987	100	41	39	6	14				65	6	14	4	1	2	12	1	2	27	4	9	8	1	2	46	6	15
9/22/1999	100	24	44	4	15	8	0	1	56	2	8				8	1	3	20	7	29				32	4	16
6/9/2010	96	24	36	2	10	32	1	3	60	5	18				8	0	1	24	8	32				4	0	0

Broom Snakeweed (GUTSAR)			Fringed Sagewort (ARTFRI)			Phlox (PHLLON)			Milkvetch (ASTRAGALUS)			Idaho Fescue (FESIDA)			Phlox (PHLHOO)			Oniongrass (MELBUL)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
16	2	4	20	1	1	24	1	2	12	1	2										76	6	14
			23	2	5				8	1	2				62	7	17				81	8	19
			36	2	8	8	0	1	24	1	3	4	1	3	20	1	4				12	0	1
20	3	10	16	1	4				8	0	1	4	0	0	44	3	11	40	1	4			

Allotment: Stonehouse
Pasture: Spring Creek
Study # 07S11W2601

	BG	% Total	Idaho Fescue (FESIDA)			Bluebunch Wheatgrass (AGRSPI)			Western Wheatgrass (PASSMI)			Sedge (CAREX)			Wyoming Big Sagebrush (ARTRWY)			Three-tip Sagebrush (ARTRIP)			Green Rabbitbrush (CHRVIC)			Phlox (PHLHOO)		
Date	Freq	Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/13/1979	96	90	100	33	36	81	11	12	4	0	0	8	0	0	31	9	10	23	8	8	15	1	1	85	7	8
7/3/1986	92	81	96	24	29	96	14	17	15	1	1	15	0	1	23	6	7	19	8	10						
9/22/1999	88	50	100	25	51	88	6	11	4	0	0	4	0	0	19	4	8	12	1	2						
6/8/2010	100	55	96	20	36	85	6	12				15	0	1	8	4	7	19	10	18	19	4	7	73	5	9

Fringed Sagewort (ARTFRI)			Broom Snakeweed (GUTSAR)			Milkvetch (ASTRAGALUS)			Lupine (LUPINUS)			Pussytoes (ANTENNARIA)			Sandberg Bluegrass (POASEC)			Needle-and-thread (STICOM)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
12	0	0	8	1	1	96	14	15	46	4	5	27	2	2									
23	1	1	42	2	2	92	11	14	39	6	7	35	2	3	58	3	4	8	1	1	69	3	4
23	2	3	27	3	6	62	3	7	19	1	2	31	2	4	27	1	1						
4	0	0				50	2	4	4	1	1	8	0	0	4	1	1				27	2	3

Allotment: Taylor-Buffalo
Pasture: Buffalo
Study # 08S12W0501

Date	BG Freq	% Total Canopy	Idaho Fescue (FESIDA)			Bluebunch Wheatgrass (AGRSPI)			Mountain Big Sagebrush (ARTRVA)			Wyoming Big Sagebrush (ARTRWY)			Three-tip Sagebrush (ARTRIP)			Green Rabbitbrush (CHRVIC)			Phlox (PHLLON)			Phlox (PHLHOO)		
			Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/8/1979	91	63	94	28	45	94	11	18	18	1	2	18	6	10	3	3	4	6	2	4	15	1	2	35	2	3
7/2/1984	88	45	82	17	38	88	7	16				26	5	10	32	3	7	18	2	3				6	0	0
6/30/1999	76	47	85	20	43	59	2	5				65	14	31				15	1	2	15	0	1	24	1	1
6/10/2010	100	50	85	15	30	56	3	5	44	18	36				26	3	6	9	0	0				47	2	3

Note: 35m - 44m disturbed in 1983 by construction of Buffalo Pipeline.

Milkvetch (ASTRAGALUS)			Biscuitroot (LOMATIUM)			Bluebells (MERTENSIA)			Yarrow (ACHILLEA)			Pussytoes (ANTENNARIA)			Stonecrop (SEDUM)			Fringed Sagewort (ARTFRI)			Broom Snakeweed (GUTSAR)		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
38	2	3	41	2	3	24	1	2	3	0	1	24	1	2	21	1	1						
												24	1	1	47	2	3	3	0	0	32	1	2
24	1	1	3	0	0				6	0	0	18	1	2	12	0	1	6	0	0			
38	1	2	9	0	0	29	1	1	6	1	2	15	1	1	9	0	0						

Sandwort (ARENARIA)			Low Sagebrush (ARTARB)			Sandberg Bluegrass (POASEC)			Dandelion (TARAXICUM)			Wild Onion (ALLIUM)			Buckwheat (ERIOGONUM)			Indian Paintbrush (CASTILLEJA)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
									3	0	0												
56	2	4																			94	4	8
			9	1	3	71	3	7	29	1	2										21	1	1
						71	4	9	3	0	1	3	0	0	6	0	0	3	0	0	6	0	0

Allotment: Taylor-Buffalo
Pasture: Cottonwood
Study # 07S12W1302

			Crested Wheatgrass (AGRCRI)			Sandberg Bluegrass (POASEC)			Wyoming Big Sagebrush (ARTRWY)			Green Rabbitbrush (CHRVIC)			Fringed Sagewort (ARTFRI)			Stonecrop (SEDUM)			Phlox (PHLHOO)			Buckwheat (ERIOGONUM)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
8/30/1982	100	38	100	10	26	80	5	12	64	12	30	32	5	12	16	1	4	40	1	3	40	3	8	12	1	2
6/28/1985	80	26	48	2	9	60	4	15	52	15	59	24	1	2	4	0	0	48	1	5	8	0	1	28	2	7
6/30/1999	92	34	56	4	13	64	3	9	60	9	27	36	3	10	8	1	2	72	2	7	64	6	17	28	1	2
6/21/2010	84	40	16	1	4	64	5	12	52	16	40	32	4	9	4	0	0	48	2	4	68	2	4	12	0	1

Milkvetch (ASTRAGALUS)			Bird's Beak (CORDYLANTHUS)			Blue Grama (BOUGRA)			Bluebunch Wheatgrass (AGRSPI)			Dandelion (TARAXICUM)			Sandwort (ARENARIA)			Mustard (BRASSICA)					
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
24	1	2	12	1	2										4	0	0	4	0	0			
16	0	2	4	0	0	8	0	1				4	0	0									
									40	3	9												
4	0	0							76	9	24												

Allotment: Taylor-Buffalo
Pasture: North
Study # 07S11W1903

			Western Wheatgrass (PASSMI)			Crested Wheatgrass (AGRCRI)			Sandberg Bluegrass (POASEC)			Bluebunch Wheatgrass (AGRSPI)			Wyoming Big Sagebrush (ARTRWY)			Broom Snakeweed (GUTSAR)			Phlox (PHLLON)			Clover (TRIFOLIUM)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/28/1979	96	40	27	2	5	100	23	59	77	6	16	12	1	3	38	5	12	4	0	0	19	1	1	8	1	2
6/15/1999	100	28	54	3	12	4	2	9	73	4	15	35	2	7	58	11	39	4	0	0	46	5	16			
6/8/2010	100	42	8	0	0				73	10	25	69	6	16	69	20	49				73	4	10			

Allotment: Taylor-Buffalo
Pasture: South
Study # 07S11W3004

			Crested Wheatgrass (AGRCRI)			Sandberg Bluegrass (POASEC)			Bluebunch Wheatgrass (AGRSPI)			Indian Ricegrass (ORYHYM)			Wyoming Big Sagebrush (ARTRWY)			Rubber rabbitbrush (CHRNAU)			Phlox (PHLHOO)			Broom Snakeweed (GUTSAR)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
6/28/1984	100	39	92	9	24	80	5	12	28	1	3	20	1	3	32	5	13	4	1	2	76	3	7	88	4	11
6/15/1999	100	29	8	1	2	92	9	31	65	5	16	8	0	1	27	3	12				58	4	15	42	2	5
6/8/2010	100	30	35	2	8	81	9	30	8	1	2	15	0	1	31	6	20				81	6	22	4	0	0

Fringed Sagewort (ARTFRI)			ERCO? (ERIGERON)			ERSP? (ERIOGONUM)			Sandwort (ARENARIA)			Alfalfa (MEDSAT)			Yellow Salsify (TRADUB)			Penstemon (PENSTEMON)			MISC. FORBS		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
36	1	4	32	1	2	72	2	6	20	1	1	28	2	4	8	0	1	8	0	1	80	3	8
12	0	1	50	2	6	65	2	7															
8	1	2				50	1	4													38	1	3

Allotment: Taylor Creek
Pasture:
Study # 07S11W1802

			Idaho Fescue (FESIDA)			Western Wheatgrass (PASSMI)			Prairie Junegrass (KOEMAC)			Bluebunch Wheatgrass (AGRSPI)			Sandberg Bluegrass (POASEC)			Wyoming Big Sagebrush (ARTRWY)			Rubber rabbitbrush (CHRNAU)			Broom Snakeweed (GUTSAR)		
Date	BG Freq	% Total Canopy	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
5/17/1979	96	36	68	12	34	92	3	9	8	0	1	52	3	8	24	1	3	40	10	27	8	1	3	24	1	2
6/26/1984	96	48	40	6	12	100	15	31	16	1	3	32	2	4	72	3	7	36	10	21	4	2	3	12	6	12
6/7/1989	92	56	20	1	2	100	17	31	4	0	0	12	0	1	92	15	26	48	11	19	4	0	0	12	0	1
9/30/1999	76	34	76	14	40	76	6	19	16	0	1	28	2	6	32	1	2	12	2	6				4	0	0
6/17/2010	96	43	28	2	5	48	1	3	12	1	2	76	12	27	60	7	16	16	5	11	4	0	0	4	1	1

Yarrow (ACHILLEA)			Phlox (PHLLON)			Pussytoes (ANTENNARIA)			Gray Horsebrush (TETCAN)			Yellow Salsify (TRADUB)			MISC. FORBS			Green Needlegrass (STIVIR)			Muttongrass (POAFEN)		
Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp	Freq	Can	Comp
24	1	2	36	2	5	8	1	2	4	2	4	4	0	0									
36	1	3	36	1	3	20	2	3	4	0	0	12	0	1	88	5	10						
40	3	5	36	2	4	20	2	3	4	0	0				88	4	8						
12	0	1	4	0	0													80	4	10			
28	1	2	84	5	12										60	2	5				52	4	10