



East Pioneer Watershed Assessment Report
Dillon Field Office
January 12, 2009



North of Cherry Creek; August 2008.

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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 Pioneer Watershed (EPW).

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 EPW 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, 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 2009, 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 EPW is located in Beaverhead County, Montana and drains portions of the East Pioneer mountain range. The watershed lies within Townships 1-5 South and Ranges 9-10 West, Montana Principal Meridian (MPM.).

The assessment area covers public lands administered by the BLM from the crest of the East Pioneer Mountains in the west to the Big Hole River in the east, and from Maiden Rock in the north, south to Birch Creek. The assessment area boundary, shown on the East Pioneer 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 EPW may have been completed in other assessments (e.g., Beaverhead West, Southwest Highlands).

Within the EPW assessment area there are approximately 81,202 total acres of land, of which 26,635 are public lands administered by the BLM. Of the total BLM-administered lands within the EPW, 25,004 acres are allotted for livestock grazing, 253 acres are unleased, and 1,378 acres are unallotted (unavailable for livestock grazing). This report addresses only land health conditions on public lands administered by the BLM.

Many of the allotments within the EPW are also part of the East Pioneer Experimental Stewardship Program (ESP). The ESP was established by the Public Rangelands Improvement Act (PRIA) of 1978, which authorized and directed the Secretaries of Interior and Agriculture “to develop and implement, on an experimental basis on selected areas of the public rangelands

which are representative of the broad spectrum of range conditions, trends, and forage values, a program which provides incentives to, or rewards for, the holders of grazing permits and leases whose stewardship results in an improvement of the range condition of lands under permit or lease. Such program shall explore innovative grazing management policies and systems which might provide incentives to improve range conditions.” As a result, many of these allotments are managed under Allotment Management Plans (AMP), and have numerous structural range improvement projects and established monitoring sites.

Fire History

The presence or absence of fire plays an integral role in the composition and structure of the vegetation that occurs in the EPW. Fire has shaped western landscapes for the past 10,000 years, but more than a century of settlement activities have seriously disrupted that crucial role (Arno 1980, Pyne 1982, Quigley et.al 1996). Since the mid-1800s the frequency of wildland fires occurring in southwestern Montana and the west in general have been reduced by domestic livestock grazing, land use practices, and aggressive fire suppression. Ignitions were primarily due to lightning and Native Americans, who used fire to signal, drive game, rout enemies and rejuvenate pastures to ensure the return of game from year to year. Fire scarred trees and charred pieces of wood are found throughout the Pioneer Mountains, primarily on Forest Service managed land. 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, making long-term fire history difficult to confirm.

Local agencies have records of several recent wildfires in the EPW, most of which burned relatively small areas. The BLM conducted a several hundred acre prescribed burn in the Louie Lowe Basin area in 1988.

Wilderness Study Areas

There are no areas designated as Wilderness or Wilderness Study Areas in the EPW.

Prehistory and History of East Pioneer Watershed

In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resource inventory was completed for a 10% sample of lands within the DFO. Results of the inventory located a mixture of prehistoric and historic sites throughout the watershed. The EPW was occupied continuously from approximately 10,000 years ago. Prehistoric sites within the watershed consist primarily of small habitation and/or procurement sites (Earle 1980).

Historically, the EPW was first explored during the fur trade of the 1830s. Mining became the predominant economic interest in the EPW when, in 1873, the Bryant mining district (now called Hecla) was organized producing rich silver-lead ore that cropped out of Lion Mountain at the head of Trapper Creek. The district reached its peak under management of the Hecla Consolidated Mining Company, at which time 20 miles of underground workings were driven into Lion Mountain and a 40-ton lead smelter placed in operation in Glendale. The decline of the district occurred about 1901 due to dwindling ore reserves and the low price of silver. The district has produced nearly \$20 million, primarily in silver and lead. The EPW also contains the route of the Union Pacific Railroad (UP), the first railway constructed west of the Missouri River. The portion of the UP known as the Utah and Northern Line was the first to enter

Montana, beginning in 1873 (MTDEQ 2008a). Livestock grazing near Glendale began in the late 1860s and early 1870s as livestock were brought in to support nearby mining operations. Areas, such as Louie Lowe Basin, were heavily grazed by mules and horses, and later by cattle and sheep.

Mining History in Relationship to Mining Districts and General Geology

Vipond/Quartz Hill Mining District – The Vipond/Quartz Hill mining District lies at the north end of the East Pioneer Watershed, it includes the area from the Divide Bridge to south of Trapper Creek. There are no known lode mines on BLM lands; however, some of the most significant silver lodes of the Pioneer Mountains are located to the west on Forest Service lands. Geologically, the Vipond District is predominantly Paleozoic limestone, some of which is overlain by glacial gravels. Mineralization occurs in veins and shoots that generally strike north and dip west. The first claim was filed in 1886. From 1902 to 1965 the Vipond/Quartz Hill district produced 1,118 oz Au, 1,024,485 oz Ag, 198,991 lbs Cu, 72,032 lbs Pb and 500 lbs Zn (MTDEQ 2008a).

The Maiden Rock Phosphate district is located within the northern portion of the Vipond District at Maiden Rock. Phosphate mines are located on lands administered by both the Butte and Dillon Field Offices, as well as on private and Forest Service lands. Geologically, the phosphate mineralization occurs in sedimentary beds ~20 feet thick. Overlying the phosphate are beds of silicified cherty fine-grained sediments. Below the phosphates are clay beds ~9 feet thick, these are underlain by limestone. The silicified sediments and the limestone are very strong competent rocks, which do break along bedding planes. The phosphate and clay beds are incompetent rocks that collapse easily. This area is folded into a regional anticline, such that beds in the east (Maiden Rock and North Central Area) dip very steeply to the west and beds in the west (Canyon Creek area) dip very steeply to the east. It is unclear when phosphate mining was initiated, but it continued until 1967 (MTDEQ 2008a).

The Cannavan Gulch deposit, Montana's largest molybdenum (Mo) property, lies on Forest Service lands in the western portion of the Vipond District. This deposit is presently undergoing exploration and will likely see development in the near future (+/- 10 years).

Lost Creek Mining District – The Lost Creek Mining District (AKA Rock Creek or Browns Gulch) is located on the northeast side of the Pioneer Mountains from north of Cherry Creek to south of Lost Creek, it includes Rock Creek near Browns Lake, and Twin Adams Mountain at the head of Lost Creek. The Glen Mill site is the only known mining feature on BLM lands in this district. All other features are located upstream on Forest Service or private lands. This district was not important for precious metals; however, it was a significant producer of tungsten. The first discovery of tungsten was along Lost Creek in 1907. Additional ore was discovered at Browns Lake in 1942. Technology which evolved during World War II and the post-war encouragement by the government for stockpiling non-precious metals enabled the Browns Gulch deposit to evolve into Montana's leading tungsten deposit. The Glen Tungsten Mill, a 300-ton flotation mill was built by Minerals Engineering in 1948, it operated until 1958. In 1952, American Alloys Metals, Inc. took over the Browns Gulch mine. Total production for the Glen mill was 625,107 tons of a concentrate containing 35% tungsten. The Lost Creek Mine,

operate by Minerals Engineering Company, was the largest tungsten mine in the district producing 21,150 tons of 18% tungsten (MTDEQ 2008a).

Utopia/Birch Creek Mining District – The Utopia/Birch Creek Mining District is located on the southeast end of the East Pioneers in the vicinity of Birch Creek. It ranges from south of the Vipond District to south of Lost Creek. Mines in this district are located on Forest Service or private lands significantly above BLM lands. To date, no mines have been recognized on BLM lands. The first lode deposits were discovered in 1860's. The districts primary resources are copper, lead, zinc, and tungsten. These resources were developed from 1902 to 1923. Production was primarily from the Indian Queen Mine, which produced \$244,004 of ore from 1,771,824 tons copper (Cu), 5,464 lbs lead (Pb), 43,744 oz silver (Ag), and 308 oz gold (Au) (MTDEQ 2008).

Each mining town/camp brought their horses, mules and livestock (cattle and sheep). Grazing adjacent to mining camps/towns was yearlong and unregulated prior to 1934. Use of timber and forest products to build these towns and mines, heat homes, etc. was also unregulated.

Authorized Uses

Forest Products

There have been no recent forest management activities (timber harvests) on BLM administered lands in the watershed.

Special Recreational Uses

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

One commercial outfitter is authorized under a Special Recreation Use Permit to conduct big game hunting and/or summer horseback riding in all or part of this area. Most of the outfitted big game hunting probably occurs on adjacent National Forest lands, but the permit includes most of the BLM lands within this watershed. Total commercial use days associated with this permit are approximately 100 client-days.

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.

The EPW varies greatly in mineral potential. Much of the BLM-administered lands have a low potential for locatable minerals, however, on adjacent Forest Service lands, there is a moderate to high potential for locatable minerals. Therefore, historic mining activity in the East Pioneers was conducted primarily on lands administered by the Forest Service and there was very little activity on lands administered by BLM.

Currently there is one approved 43 CFR 3809 Plan of Operation in the watershed. This operator is reprocessing tails at the Glen Mill site to recover garnet, a byproduct of the tungsten that was originally milled. This is a small project and mostly operates in a closed basin that was originally constructed as an impoundment for the mill tails.

There are currently no active exploration Notices (43 CFR 3809) in the watershed. This area does have potential for salable material such as decorative stone, building stone, gravel and other commodities. BLM has no community pits in the watershed. Community pits are sites that are set up specifically for the sale of mineral material. Neither are there any current exclusive sales of mineral materials in the watershed. The watershed area is considered to have low to moderate potential for oil and gas. No exploration is known to have taken place in the watershed in recent years.

Livestock Grazing

There are 13 individual operators that have grazing permits/leases on 25,004 acres (17 allotments) of public land administered by the BLM in the watershed. The allotments are shown on the map of East Pioneer Assessment Area Allotments (Map 2). Public lands, administered by BLM, provide a large proportion of the late spring, summer and fall forage base in the watershed. There are 1,948 animal-unit months (AUMs) of livestock forage allocated on public lands within the 17 allotments included in this assessment. The livestock grazing allocation and management for allotments within the EPW is displayed in Table 1.

Table 1. Livestock grazing allocation and management within the East Pioneer Watershed.

| Allotment Name, Number, and Category | Livestock Number & Kind ¹ | Season of Use | Grazing System ² | BLM Stocking Rate | BLM AUMs | BLM Acres | Acres in Other Ownership | Total Acres |
|--------------------------------------|--------------------------------------|---------------|-----------------------------|-------------------|----------|-----------|--------------------------|-------------|
| Birch Creek, 30365, (I) | 40 C | 05/15-10/15 | CU | 19.0 | 38 | 2,881 | 12,434 | 15,315 |
| | 146 C | 05/22-08/01 | RR | | 114 | | | |
| Burk SGC, 20657, (C) | 1 C | 05/01-11/30 | CU | 10.0 | 7 | 80 | 647 | 727 |
| Cherry Creek, 20321, (M) | 100 C | 05/28-06/15 | SL | 22.7 | 62 | 1,407 | 119 | 1,526 |
| Childs Individual SGC, 20310, (C) | 10 C | 05/15-11/14 | CU | 4.5 | 60 | 267 | 0 | 204 |
| Lost Creek, 20322, (C) | 1 C | 03/01-02/27 | CU | 10.0 | 12 | 80 | 572 | 652 |
| Lost-Willow, 30364, (I) | 125 C | 05/15-06/16 | RR | 16.6 | 136 | 5,400 | 22,575 | 27,975 |
| | 174 C | 05/15-06/16 | | | 189 | | | |

| Allotment Name, Number, and Category | Livestock Number & Kind ¹ | Season of Use | Grazing System ² | BLM Stocking Rate | BLM AUMs | BLM Acres | Acres in Other Ownership | Total Acres |
|--------------------------------------|--------------------------------------|---------------|-----------------------------|-------------------|-------------|-----------|--------------------------|-------------|
| North Willow Creek, 30311, (C) | 1 C | 05/15-11/14 | CU | 14.7 | 3 | 44 | 0 | 44 |
| Peck SGC, 20336, (C) | 6 C | 03/31-11/30 | CU | 6.6 | 49 | 325 | 0 | 325 |
| Seven Springs, 20337, (I) | 255 C | 05/28-06/15 | SL | 8.8 | 104 | 2,028 | 1,486 | 3,514 |
| Sisterson, 20329, (M) | (YR 1) 75 C | 05/05-06/15 | RR | 13.0 | 72 | 936 | 233 | 1,169 |
| | (YR 2) 75 C | 10/15-12/15 | | | 107 | | | |
| Skeeters, 10332, (I) | 57 C | 05/15-06/15 | RR | 13.9 | 52 | 723 | 153 | 876 |
| Skeeters Meadows, 30372, (C) | 1 C | 03/01-02/28 | CU | 5.8 | 12 | 58 | 0 | 58 |
| Smith Individual SGC, 10346, (C) | 1 C | 03/01-02/28 | CU | 11.0 | 12 | 165 | 0 | 165 |
| South Seven Springs, 20362, (I) | 80 C | 06/06-06/15 | RR | 31.2 | 24 | 4,496 | 265 | 4,761 |
| | 59 C | 06/01-06/15 | | | 26 | | | |
| | 63 C | 06/01-06/15 | | | 28 | | | |
| | 62 C | 06/01-06/15 | | | 28 | | | |
| | 85 C | 06/01-06/15 | | | 38 | | | |
| Twin Adams, 20347, (M) | (YR 1) 317 C | 04/10-05/15 | RR | 3.5 | 244 | 1,379 | 578 | 1,957 |
| | (YR 2) 88 C | 08/15-11/03 | | | 152 | | | |
| Vipond-Glendale, 30358, (I) | 669 C | 06/01-06/15 | RR | 9.3 | 238 | 4,536 | 17,199 | 21,735 |
| | 174 C | 10/15-12/14 | | | 251 | | | |
| Willow Creek Individual, 20304, (C) | 17 C | 03/01-02/28 | CU | 11.7 | 17 | 199 | 0 | 199 |
| BLM Totals | 2,519 C | | | AVG = 12.8 | 1948 | 25,004 | 56,261 | 81,202 |

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

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 (25,004 acres), about 79% are managed under formal AMPs, or have agreed upon grazing systems, that prescribe rest rotation, deferred rotation, a deferred season of use, or dormant season use (Table 1). About 21% 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 2).

The stocking rate on BLM lands within the watershed averages 12.8 acres/AUM and varies from 4.5 to 31.2 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 health and fuels. Forest health can affect each of the five standards, but in this assessment will be reflected under Standard #5 Biodiversity, along with other factors that affect biodiversity (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. The Authorized Officer's Determination will be prepared and sent out during spring of 2009.

Available trend monitoring data, existing inventories, historical photographs and standardized methodology are used by an IDT to assess condition and function. In addition, Ecological Reference Areas are identified by the IDT and used to compare health and productivity of similar sites and soils. Trend monitoring data, riparian assessment data, and historical photographs 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, Water Quality, and Biodiversity Standards will follow the following format:

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

Uplands

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

Procedure to Determine Conformance with 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, conducted extensive field surveys, and used the Indicators of Upland Health assessment process to assess the functionality of the upland habitat in the EPW.

The EPW 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 EPW 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 EPW receive about 8 to 20 inches of average annual precipitation and fall into the Aridic and Ustic soil moisture regimes. Within the watershed boundary, elevations range from about 4,950 feet, near the Big Hole River, to above 11,100 feet on Torrey and Tweedy Mountains. The highest elevation on BLM-administered lands is about 7,200 feet, near the USFS Boundary above Trapper Creek.

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

Sagebrush and grassland areas are considered uplands for purposes of this report. Forest and woodland habitats are discussed under Standard #5 Biodiversity.

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

- historic uses (e.g., grazing, mining, etc.)
- short term weather patterns
- disturbance regimes (e.g., drought, fire, floods, and herbivory)

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

Table 2. Summary of acres by general cover type within the East Pioneer Watershed.

| Cover Type | BLM Acreage | % of BLM Acreage | Total Watershed Acreage | % of Total Acreage |
|-----------------------------|---------------|------------------|-------------------------|--------------------|
| Forests | 569 | 2 | 101,128 | 46 |
| Grasslands | 5,473 | 21 | 19,137 | 9 |
| Sagebrush / Mountain Shrubs | 19,200 | 72 | 65,564 | 30 |
| Riparian / Mesic Shrubs | 234 | < 1 | 3,756 | 2 |
| Mountain Mahogany | 1,010 | 4 | 3,261 | 2 |
| Aspen | 6 | < 1 | 669 | < 1 |
| Other (Rock /Water/Ag) | 161 | < 1 | 25,645 | 12 |
| Totals | 26,653 | 100 | 219,160 | 100 |

Most of the watershed's BLM administered uplands are dominated by either grasslands (21%) or sagebrush (72%), including mountain big sagebrush, Wyoming big sagebrush, basin big sagebrush, and three-tip sagebrush. Winterfat and red sage 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 are discussed under biodiversity.

Vegetative Treatments

According to BLM records, there has been one vegetation treatment completed to improve herbaceous production within the EPW. The Childs Reseeding #476537 project was completed in 1982 and seeded 50 acres of BLM-administered land (Sec. 3, T5S, R9W, MPM) to crested wheatgrass, likely to provide for spring livestock grazing.

Findings, Analysis, and Recommendations

Members of the IDT visited all the grazing allotments, as well as the unallotted public land in the EPW during 2008 and completed 10 *Rangeland Health Indicator Evaluation Matrices* on various ecological sites and plant associations. In addition, 20 Daubenmire trend studies and 42 permanent photo plots, which were established in the 1970s and early 1980s, were duplicated in 2008 to help determine vegetative trends. The data collected were summarized and compared with baseline and interim data providing supporting information for interpreting the upland indicators (see Table 3, 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>.

The vast majority (98%) of the uplands in the watershed are functioning properly. Conifer expansion into sagebrush/grasslands is affecting Upland Health on a localized basis, and is discussed under the Standard #5 – Biodiversity. Table 3 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 3. Upland qualitative assessment summary of the East Pioneer Watershed.

| Allotment Name, Number, & Category | Ecological Site | Plant Association | Degree of Departure from Expected | | |
|------------------------------------|--|---|-----------------------------------|---------------------|-------------------|
| | | | SOIL SITE STABILITY | HYDROLOGIC FUNCTION | BIOTIC INTEGRITY |
| Birch Creek, 30365, (I) | Loamy-Limy, 11-14" Precipitation Zone (PZ) | Wyoming Big Sagebrush / Bluebunch Wheatgrass | Slight - Moderate | Slight - Moderate | None - Slight |
| Cherry Creek, 20321, (M) | Loamy-Limy, 11-14" PZ | Needle and thread / Blue Grama | Slight - Moderate | Slight - Moderate | Slight - Moderate |
| Lost-Willow, 30364, (I) | Loamy-Limy, 11-14" PZ | Wyoming Big Sagebrush / Thickspike Wheatgrass | Slight - Moderate | Slight - Moderate | None - Slight |

| Allotment Name, Number, & Category | Ecological Site | Plant Association | Degree of Departure from Expected | | |
|------------------------------------|--------------------------|--|-----------------------------------|---------------------|-------------------|
| | | | SOIL SITE STABILITY | HYDROLOGIC FUNCTION | BIOTIC INTEGRITY |
| Lost-Willow, 30364, (I) | Droughty, 11-14" PZ | Wyoming Big Sagebrush / Bluebunch Wheatgrass | None - Slight | None - Slight | None - Slight |
| Seven Springs, 20337, (I) | Loamy-Limy, 11-14" PZ | Wyoming Big Sagebrush / Bluebunch Wheatgrass | None - Slight | None - Slight | None - Slight |
| Seven Springs, 20337, (I) | Shallow-Limy, 11-14" PZ | Needle and thread / Blue Grama | Slight - Moderate | Slight - Moderate | Slight - Moderate |
| Sisterson, 20329, (M) | Loamy-Limy, 11-14" PZ | Wyoming Big Sagebrush / Bluebunch Wheatgrass | None - Slight | None - Slight | None - Slight |
| Skeeters, 10332, (I) | Shallow, 11-14" PZ | Wyoming Big Sagebrush / Bluebunch Wheatgrass | None - Slight | None - Slight | None - Slight |
| Twin Adams, 20347, (M) | Droughty-Limy, 11-14" PZ | Wyoming Big Sagebrush / Bluebunch Wheatgrass | None - Slight | None - Slight | None - Slight |
| Vipond-Glendale, 30358, (I) | Loamy, 15-19" PZ | Mountain Big Sagebrush / Idaho Fescue | 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 15 allotments, and the unleased and unallotted parcels, comprising 98% of the BLM-administered uplands in the EPW assessment area, are functioning properly under existing management. Two allotments, comprising 2% of the public uplands in the EPW, are FAR with a static or downward trend.

Birch Creek – This allotment is co-managed with the USFS Dillon Ranger District. The BLM has management responsibility for the three lower pastures, Greenstone, Limestone, and Barbour Gulch, which contain about 2550 acres of USFS-administered land. This allotment has been managed under a rest-rotation grazing system since the early 1980s. This allotment does not have any established quantitative monitoring sites, but the photo-monitoring studies indicate a strong upward trend. The IDT observed some active pedestalling, but in many areas water flow

patterns and pedestals are decreasing and historic gullies are revegetating. The IDT noted that the reproductive capability of perennial plants matches what is expected, but the annual production is slightly less than expected, and cover and production of Wyoming big sagebrush is slightly higher than expected. The IDT rated the uplands in this allotment as PFC.

Burk SGC – This custodial allotment includes about 80 acres of BLM-administered land. Vegetation in the uplands includes bluebunch wheatgrass, needle and thread, Sandberg bluegrass, and Wyoming big sagebrush. Annual production and litter are slightly reduced on this site and some pedestalling is present, but reproductive capability and representation among functional/structural groups matches what is expected. The uplands in this allotment were rated as PFC.

Cherry Creek – The majority of the uplands in this allotment have limited exposure to livestock grazing and exhibited good production and vigor of cool-season bunchgrasses and soils are stable. On the more accessible sites, the IDT observed some active pedestalling, short stable water flow patterns, and a loss of the soil's A-horizon. Although bare ground was calculated to be about 38% and a shift in dominance toward needle and thread was observed, nearby gullies are revegetating and it was noted that rocks and lichen are contributing to the soils stability. Trend data from a Daubenmire transect indicates little to no change in the frequency and canopy cover of the primary species in the plant community. Annual production was also slightly less than expected for the site, which corresponds to a decrease in litter. The amount of plant mortality and decadence, and the reproductive capability of perennial plants matched what was expected and only a small infestation of spotted knapweed was observed along the road, near the USFS boundary. The uplands in this allotment were rated as low PFC with concerns about soil erosion and the changes in plant community composition.

Childs Individual SGC – This custodial allotment is split into two parcels, one adjacent to Willow Creek Individual, and the other near the confluence of Birch Creek and the Big Hole River. The western-most parcel was the location of the Childs Reseeding #476537 project that seeded about 50 acres to crested wheatgrass. It appeared to the IDT that the seeding had been grazed out and replaced by a mat of blue grama. There are very few shrubs present on this site and the IDT rated it as FAR-Static. The eastern-most parcel was dominated by blue grama, Sandberg bluegrass, and needle and thread, with pockets of bluebunch wheatgrass and Wyoming big sagebrush on overflow sites. Livestock trailing contributed to some pedestalling and water flow patterns. This site was also rated as FAR-Static by the IDT. Infestations of spotted knapweed and common tansy were found near a gravel pit located on this parcel.

Lost Creek – The BLM-administered portions of this custodial allotment show a good composition of cool-season bunchgrasses and Wyoming big sagebrush on the north-facing aspect, but are dominated by blue grama, needle and thread, and pricklypear cactus on the south-facing aspect. Bottlebrush squirreltail and threeawn are also present. This is somewhat expected for this site and the IDT rated the uplands a low PFC. This allotment is currently grazed prior to the growing season and is expected to continue improving.

Lost-Willow – This allotment is co-managed with the USFS Dillon Ranger District. The BLM has management responsibility for the four lower pastures, Lower Willow, Little Lost, Tungsten

Mill, and South Cayuse, which contains lands administered by the USFS. Monitoring data from the Tungsten Mill pasture indicate an increase in the frequency and canopy cover of bluebunch wheatgrass and Sandberg bluegrass at one site, with little to no change at another site. Canopy cover of Wyoming big sagebrush is relatively unchanged at both sites and ranges from 16 to 20 percent. Because of the rocky nature of the soils in this pasture, no indicators of soil erosion were noted. The distribution and composition of functional/structural groups, annual production, and reproductive capability of perennial plants match what is expected for the site. Photo-monitoring in Sassman Gulch indicates some expansion of Rocky Mountain juniper and the IDT also noted infestations of spotted knapweed, Canada thistle, houndstongue and cheatgrass.

In the Lower Willow pasture, the distribution and composition of functional/structural groups, annual production, and reproductive capability of perennial plants match what is expected for the site, but slightly active pedestalling and water flow patterns were observed. Monitoring data indicate increased frequency and canopy cover of bluebunch wheatgrass and bottlebrush squirreltail, and no change in Wyoming big sagebrush.

In the South Cayuse pasture, monitoring data indicates an increase in the canopy cover of bluebunch wheatgrass and Sandberg bluegrass, and a decline in canopy cover of blue grama and mountain big sagebrush. Monitoring data from the Little Lost pasture indicate a decline in blue grama and an increase in Sandberg bluegrass, western wheatgrass, and Wyoming big sagebrush. Photo-monitoring from these pastures also suggests improved canopy cover and species composition. The IDT rated the uplands in this allotment as PFC.

North Willow Creek – The vegetative community on this custodial allotment is composed of needle and thread, bluebunch wheatgrass, and blue grama. This matches the IDT's expectations for annual production, representation among functional/structural groups, and reproductive potential. In addition, the soils appear to be stable with only slight pedestalling present. Some evidence of use by horses was observed. The IDT rated the uplands in this allotment as PFC.

Peck SGC – The vegetative community on the southern parcel of this allotment is dominated by needle and thread, Sandberg bluegrass, threadleaf sedge, and Wyoming big sagebrush. Bluebunch wheatgrass appears to be increasing, but is still sparse. Annual production and litter are less than expected for this site and there has been a slight shift in the dominance of functional/structural groups, but reproductive capability of perennial plants matched the IDT's expectations. Some pedestalling and water flow patterns, resulting from historic use, were observed, but these appear to be recovering. The northern parcel is dominated by bluebunch wheatgrass, needle and thread, and Wyoming big sagebrush. Reproductive capability of perennial plants, annual production, and representation of functional/structural groups match what is expected for the site and the soils are stable, with only slight pedestalling present. The uplands in this allotment were rated as PFC with opportunities to continue improving the southern parcel.

Seven Springs – This allotment had an AMP signed in the late 1980s, but the projects and grazing rotation were not implemented. This allotment is currently permitted to be grazed every spring and a review of the allotment file suggests that the current allotment boundary includes deeded property that is not owned or controlled by the permittee. A majority of the uplands were

rated as PFC by the IDT and exhibited good composition and production of cool-season bunchgrasses and Wyoming big sagebrush. Plant interspaces are decreasing, but some signs of pedestalling and short water flow patterns are present. In the late 1980s, gully plugs were constructed in several locations and have trapped a significant amount of sediment. These plugs have aided in stabilizing and revegetating the gullies. On other sites in this allotment a shift toward warm-season grasses and shrubs was noted. These sites are dominated by blue grama, needle and thread, and pricklypear cactus. These sites also exhibit reduced soil stability, as evidenced by pedestals with exposed roots, connected, extensive water flow patterns, and reduced annual production and litter. Spotted knapweed is also found along several of the roads. These sites were rated as FAR-Static by the IDT.

Sisterson – This allotment has been managed under a rest-rotation grazing system since the early 1980s. The uplands exhibited a good composition of cool-season bunchgrasses and Wyoming big sagebrush. Monitoring data, collected in the North pasture, indicates an increase in frequency and cover of Sandberg bluegrass and bottlebrush squirreltail, and no change for Wyoming big sagebrush. No pedestalling or water flow patterns were observed and only grass litter was moving. An infestation of cheatgrass was also observed near the salting ground in the North pasture. The IDT rated the uplands in this allotment as PFC.

Skeeters – This allotment exhibited slight pedestalling and the plant community composition and distribution appeared to be affecting infiltration and runoff. Some mortality and decadence was observed in the Wyoming big sagebrush. Monitoring data at one site indicate that canopy cover of Idaho fescue is increasing, bluebunch wheatgrass is unchanged, and Sandberg bluegrass and Wyoming big sagebrush are decreasing. Data from another monitoring site indicate that canopy cover of Idaho fescue, bluebunch wheatgrass, and Sandberg bluegrass are increasing, while frequency and canopy cover of Wyoming big sagebrush is decreasing. Spotted knapweed was observed along the road and in the adjacent wash. Upland conditions on this allotment are continuing to improve and it was rated as PFC.

Skeeters Meadows – This 58-acre custodial allotment consists of three parcels that are fenced and utilized with an irrigated pasture. The vegetation includes bluebunch wheatgrass, Sandberg bluegrass, needle and thread, and Wyoming big sagebrush. These parcels exhibit good annual production and reproductive capability of perennial plants and the soils show only slight signs of erosion. Upland health in this allotment was rated as PFC.

Smith Individual SGC – This custodial allotment is split into two 80-acre parcels. The western most parcel has a good composition of bluebunch wheatgrass, and Wyoming big sagebrush on the hillsides, but alkali sacaton and inland saltgrass were observed on the flat. There is also a pocket of cheatgrass in an area that appears to have burned, but it does not seem to be expanding. The eastern parcel was dominated by blue grama and needle and thread, with some bluebunch wheatgrass in the draw. The soils on this site appear stable because of the high proportion of coarse fragments. The uplands in this allotment were rated as PFC, but certainly provide some opportunities for improvement.

South Seven Springs – The majority of the uplands on this allotment are dominated by bluebunch wheatgrass, needle and thread, Sandberg bluegrass, and Wyoming big sagebrush. On

more limy sites, blue grama and needle and thread tend to dominate, while on several alkaline sites black greasewood, inland saltgrass, and alkali sacaton are present. In the Grose pasture, monitoring data indicate an increase in frequency and canopy cover of Sandberg bluegrass and bluebunch wheatgrass, no change in blue grama, and an increase in canopy cover of Wyoming big sagebrush. Monitoring data from the Bradley pasture indicate increases in frequency and canopy cover of bottlebrush squirreltail, western wheatgrass, and Wyoming big sagebrush and a decrease in black greasewood and rubber rabbitbrush. Canopy cover of Sandberg bluegrass also increased, while blue grama decreased. In the Burk pasture, monitoring data indicate that frequency and canopy cover of bluebunch wheatgrass, Sandberg bluegrass, and Idaho fescue increased, while threadleaf sedge and Wyoming big sagebrush have decreased. Soils throughout the allotment show slight pedestalling and signs of soil erosion are more evident on lower elevation, limy and alkaline sites. The IDT rated the uplands of this allotment as PFC.

Twin Adam – The IDT observed signs of historic soil loss, including slight pedestalling and a gully that is revegetating. Mortality was also higher than expected for Wyoming big sagebrush. Representation of functional/structural groups, annual production, and reproductive capability of perennial plants matches what is expected for the site. Monitoring data for canopy cover indicate increases for bluebunch wheatgrass and Sandberg bluegrass, a decrease for blue grama, and no change for Wyoming big sagebrush. The uplands of this allotment were rated as PFC.

Vipond-Glendale – This allotment has been managed under a rest-rotation grazing system since the early 1980s. The IDT noted slight pedestalling, a slight reduction in annual production, an increase in Wyoming big sagebrush, and spotted knapweed along the roads in Louie Lowe Basin. Monitoring data generally indicate an increase in the frequency and canopy cover of cool-season bunchgrasses (e.g., bluebunch wheatgrass, needle and thread, Sandberg bluegrass, western wheatgrass), and no change to decreasing frequency and canopy cover of Wyoming big sagebrush. Data from one site in the Glendale pasture suggests a decline in blue grama, bluebunch wheatgrass, and Sandberg bluegrass, and an increase in needle and thread, but this site had been grazed prior to collecting the data. The uplands in this allotment appear to be improving and were rated as PFC.

Willow Creek Individual – The parcel of this allotment that lies west of Interstate 15 was dominated by blue grama, needle and thread, and pricklypear cactus and was rated as FAR-Static by the IDT. The site exhibited reduced annual production, reduced litter, and reduced reproductive capability of perennial plants and a shift in the dominance of functional/structural groups. These factors have also reduced the soils surface's resistance to erosion, as evidenced by water flow patterns and some pedestals. These conditions have likely resulted from repeated spring livestock grazing in conjunction with an adjacent State grazing lease. The parcel of this allotment that lies east of Interstate 15 was dominated by bluebunch wheatgrass and Wyoming big sagebrush. The vegetation on this site exhibited good annual production and reproductive capability, while the soils appeared to be stable. The only concerns on this site are a dump containing old appliances and a pile of nylon baling twine, and several older vehicles that appeared to be parked on BLM near the ownership boundary.

Unallotted – The unallotted parcels are primarily located along the Big Hole River and are largely unsuitable for livestock grazing. The uplands on the parcels near Maiden Rock and

Canyon Creek are dominated by bluebunch wheatgrass with some Douglas-fir and Rocky Mountain juniper, and curl-leaf mountain mahogany on rock outcrops. The soils on these sites are very rocky and erosion did not appear to be excessive. On the parcel adjacent to the Maiden Rock campground and the parcels near Trapper Creek, the vegetation is also dominated by bluebunch wheatgrass, needle and thread, and Wyoming big sagebrush. The parcels adjacent to the USFS boundary are dominated by Idaho fescue and mountain big sagebrush bordered by Douglas-fir and Rocky Mountain juniper. The uplands on these unallotted parcels were rated as PFC.

Unleased – The three unleased parcels are located near Cheery Creek. One parcel, adjacent to the Cherry Creek allotment, is about 40 acres and is gently sloping with a southeast aspect. This parcel has some bluebunch wheatgrass, but is dominated by needle and thread. This parcel is unfenced from adjacent private property and has likely been grazed as evidenced by a shift in dominance of the functional/structural groups and the presence of pedestalling. Another parcel borders the Seven Springs allotment and is located on a steep, north-facing hillside that is dominated by bluebunch wheatgrass and Wyoming big sagebrush and did not exhibit any signs of soils erosion in excess of what is expected for that site. The third parcel is about 200 acres and also borders the Seven Springs allotment. This parcel is dominated by bluebunch wheatgrass, needle and thread, and Wyoming big sagebrush and shows only slight signs of soils erosion. The upland health on these unleased parcels was rated as PFC.

Noxious Weeds and Cheatgrass Infestations

Three noxious weeds of concern, leafy spurge, spotted knapweed and houndstongue, were found in the EPW.

Leafy spurge, an aggressive noxious weed, is found on three allotments within the EPW. There is a small infestation located in the southeast section of the Lost-Willow allotment. On the Vipond-Glendale allotment, there are two small infestations. One is located under the power lines in the southeastern corner and the other is located on a section of private ground within the forest boundary. The Birch Creek allotment has five scattered infestations in the draws along the foothills south of Willow Creek. The infestations were first found in 2004 by the Back Country Horsemen doing inventory and treatment of the area during a community spray day.

All three of these leafy spurge infestations have been aggressively treated by both Beaverhead County and the BLM and in 2007 only a few scattered plants were found.

Spotted knapweed is one of the more aggressive noxious weeds in the area administered by the Dillon Field Office. These infestations are mostly small in size and are found scattered throughout the watershed, primarily along roads and trails accessible to the public.

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

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

An infestation of Russian knapweed was found on private land along Trapper creek during a local community spray day. Russian knapweed is a rhizomatous perennial plant that can reproduce by seed, root shoots or root fragments (of less than 1 inch in length). This noxious weed causes “chewing disease”, is toxic to horses, and also shows allelopathic properties by accumulating high levels of zinc in the soil surrounding the plant thus impeding the growth of more desirable species. Due to these characteristics, this invader’s potential to invade surrounding public lands is very high. Proactive detection and prevention measures should be taken to prevent Russian knapweed from spreading onto public lands.

Since 1989, BLM has been involved in cooperative control efforts with Beaverhead County and private land owners in the EPW. 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. Table 4 shows the herbicide treatments applied in the EPW during the past four years.

Table 4. Acres treated and inventoried for noxious weed infestations within the East Pioneer Watershed.

| Year | Acres Treated | Acres Inventoried |
|------|---------------|-------------------|
| 2005 | 25 | 1000 |
| 2006 | 30 | 1200 |
| 2007 | 15 | 900 |
| 2008 | 20 | 1100 |

Recommendations for Upland Health

1. Address site-specific concerns noted above, via adjustments in livestock grazing management or construction of structural range improvement projects, on the 15 allotments in which the uplands are generally healthy or improving.
2. Adjust grazing management on the Willow Creek Individual and Childs Individual SGC allotments to increase canopy cover and composition of cool-season bunchgrasses and forbs.
3. Consider incorporating the unleased parcels into the adjacent allotments, without increasing the permitted AUMs, to facilitate better management.
4. Adjust the boundary of the Seven Springs allotment.
5. Continue to work cooperatively with Beaverhead County and other agencies, landowners and partners to manage noxious weeds within the EPW.
6. Continue the existing education effort on weed identification and prevention measures with the primary education target being hunters and other recreationists.

7. Continue or increase the use of Integrated Weed Management tools to treat noxious weeds within the EPW, with spotted knapweed being the highest priority noxious weed to treat.
8. Where accessible and cost effective, treat houndstongue to prevent further spread. When a biological control for houndstongue is approved for use by the Animal and Plant Health Inspection Service (APHIS), release these insects into the larger infestations, generally along riparian areas in the EPW, to help control the spread of houndstongue.
9. Maintain intensive treatment efforts on the known leafy spurge infestations to reduce their size and vigor, eventually eradicating these infestations.
10. Explore the possibility of working cooperatively with private landowners to stop the spread of Russian knapweed in the Trapper creek drainage.

Riparian and Wetland Areas

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

Procedure to Determine Conformance with the Standard

Several complimentary monitoring and evaluation methodologies were utilized in the assessment of the riparian systems in the EPW to determine conformance with Standard # 2. Lotic and Lentic Riparian Area Management Assessment Methodologies (TR 1737 15 and 16), also known as PFC Assessment Methodologies, were used to evaluate riparian systems and wet meadows. A Guide to Managing, Restoring, and Conserving Springs in the Western United States (TR 1737-17) was used for springs. These technical references are available to the public at the Dillon Field Office or on the BLM Library webpage at <http://www.blm.gov/nstc/library/techref.htm>

Streams were inventoried utilizing the Montana Riparian Wetland Association (MRWA) method, which was modified to include measurements of channel dimensions (bankfull width, mean bankfull depth, floodprone width) and observations of bed materials. The MRWA method inventories and measures physical and vegetative characteristics. Physical measurements are utilized to tentatively classify streams at Rosgen Level II as well as to assess channel morphology and stability. Vegetative species composition, cover, vigor and/or regeneration are observed. In addition, existing Cover Board studies are re-read. The Riparian Cover Board monitoring method measures changes in woody vegetation cover. Prior to the IDT's assessment, seasonal staff re-read established Cover Board plots on three stream reaches and inventoried 14 perennial streams in the watershed using the MRWA method.

The PFC lotic assessment evaluates stream geometry, channel morphology and stability, hydrological function, riparian vegetative conditions, as well as soil erosion and deposition. Applicable portions of the lentic methodology were used to assess springs and wet meadows. During the summer and fall of 2008, the IDT completed PFC assessments. The MRWA and Cover Board monitoring data (where available) were evaluated and considered when assessing functionality.

Federal protection of wetlands and riparian systems became official policy under the authority of two Executive Orders issued in 1977. The majority of developed springs in the EPW were developed prior to the issuance of these orders, other federal laws, directives, or regulations for the management and protection of wetlands (Mitch 2007). Current management direction requires minimization of wetland loss or degradation, as well as preservation and enhancement of natural and beneficial values. This includes maintenance of hydrology. Management, restoration and conservation of springs are resource management objectives for the BLM.

The National Wetland Inventory (NWI) has not been completed for the State of Montana (FWS 2007). Wetland mapping in Southwest Montana is limited. There is no NWI coverage for the EPW. In recognition of the need for a comprehensive wetland inventory, the Montana/Dakotas BLM is working with and providing funding to Montana Natural Heritage Program to update and ground truth NWI information. Once the mapping is complete, the information will be available in digitized form. Digitized NWI information will greatly assist the BLM to quantify wetland resources. Absent this information, the BLM IDT assessed known wetland areas as well as inventoried areas likely to incorporate wetland resources.

Many of the resources in the assessment area were originally described based upon mapped information, aerial photos, and USGS topography quad maps. Ground truthing has verified that a number of the mapped reaches are dry washes, lack riparian soils or plants, and have subsequently been removed from the stream/wetland inventory. New resources were assessed and mapped in the process of assessing the watershed. After the elimination of some reaches and the addition of others, 26 reaches totaling 20.3 miles, one spring province encompassing five spring sources, and several isolated springs were assessed. As part of the EPW assessment process, the resource inventory database has been updated based upon inventories, field notes, and photographs. The riparian areas within the EPW are illustrated on the maps of East Pioneer Stream Reaches (Maps 3 & 4).

In addition to undeveloped springs, spring developments were inspected to determine flow, wetland function, infrastructure condition, and wildlife concerns.

Affected Environment

Vegetation

A comprehensive classification system of wetlands and deepwater habitats developed by the U.S. Fish and Wildlife Service (Cowardin et al., 1979) defines wetlands by plants (hydrophytes), soils (hydric soils), and frequency of flooding. The structure of the “Cowardin” wetland classification is hierarchical, progressing from *Systems* and *Subsystems*, at the most general levels, to *Classes*, *Subclasses*, and *Dominance Types*. *Systems* refer to a complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors while *Class* describes the general appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate.

Two Cowardin wetland systems, Riverine and Palustrine, are found on public lands within the EPW. In general terms the Riverine System includes all wetlands and deepwater habitats contained within a channel that have less than 30% vegetative cover. The Big Hole River is an

example of a Riverine System, as are smaller streams with little or no vegetative cover within the EPW. Since the majority of the riparian and wetland areas within the EPW have greater than 30% vegetative cover, they fall into the Palustrine System. The Palustrine System includes all non-tidal wetlands dominated by vegetation (> 30% areal coverage).

Three classes of the Palustrine System are found in the EPW: Emergent Wetlands, dominated by emergent herbaceous vegetation; Scrub-Shrub Wetlands, dominated by shrubs or small trees; and Forested Wetlands, dominated by trees over 20 feet tall. The sedge habitat types observed dispersed throughout Big Hole tributaries (519 & 535) are examples of Emergent Wetlands. The narrowleaf cottonwood/red-osier dogwood habitat types along Brownes Creek and Canyon Creek are examples of Forested Wetlands and the Geyer willow/beaked sedge habitat type found on reach 524 of Trapper Creek provides an excellent example of a Scrub Shrub wetland. The riparian vegetative types for each stream reach are presented in Table 5.

Soils

Hydric soils are a small component of the landscape. Like riparian areas and wetlands, they play an important role in ecological processes. Hydric soils are those soils that are affected by prolonged exposure to water. They are most often associated with soils that are poorly drained or very poorly drained. Hydric soils are commonly found in depressions and drainageways. They are also found in floodplains, springs, wet meadows and marshes. Hydric soils are found in < 1% of the EPW.

Streams

The majority of the streams in the assessment area originate on the east facing slopes of the Pioneer Mountains and drain to the Big Hole River. The main streams/creeks from north to south are Canyon, Trapper, Cherry, Browns, Lost, Willow, and Birch Creeks.

There are approximately 20 miles of streams (lotic) and 57 acres of wetland (lentic) habitat on public lands administered by BLM in the EPW.

Developed Springs

According to the Range Improvement Project database there are 14 developed springs in the watershed: six in the South Seven Springs allotment, four in the Lost-Willow allotment, three in the Vipond-Glendale allotment, and one in the Seven Springs allotment. In order to improve information regarding location, habitats and conditions associated with these resources, the IDT inventoried most of these springs during the 2008 field season.

Findings, Analysis and Recommendations

The IDT concluded that riparian conditions along 18 of 26 assessed stream reaches in the EPW, flowing 15.4 miles, are in proper functioning condition (PFC). One stream reach, flowing 0.5 miles, is functional at risk (FAR) with an upward trend. The riparian condition on 7 reaches, flowing 4.4 miles, is FAR with a downward or static trend. Table 5 summarizes the functional status of all the assessed stream reaches in the EPW.

Table 5. Riparian (lotic) resources in the East Pioneer Watershed.

| Stream Name | Allotment | BLM Reach ID | Vegetative Type | Functional Rating and Trend | Miles |
|--------------------------|-----------------------|--------------|---|-----------------------------|-------|
| Big Hole River | Unallotted | 508 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 1.07 |
| Big Hole River | Unallotted | 509 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.75 |
| Big Hole River | Unallotted | 510 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.39 |
| Big Hole River | Unallotted | 511 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 1.29 |
| Big Hole River | Vipond-Glendale | 512 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 2.25 |
| Big Hole River | Seven Springs | 518 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 1.15 |
| Big Hole River | Childs Individual SGC | 521 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.29 |
| Big Hole River tributary | South Seven Springs | 519 | Narrowleaf Cottonwood /Red-Osier Dogwood | FAR | 1.01 |
| Big Hole River tributary | South Seven Springs | 535 | Nebraska Sedge | FAR | 0.11 |
| Birch Creek tributary | Childs Individual SGC | 523 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.48 |
| Brownes Creek | South Seven Springs | 500 | Narrowleaf Cottonwood /Red-Osier Dogwood | FAR | 0.89 |
| Brownes Creek | South Seven Springs | 501 | Rocky Mountain Juniper /Red-Osier Dogwood | PFC | 1.78 |
| Brownes Creek | South Seven Springs | 502 | Quaking aspen /Red-Osier Dogwood | FAR | 0.44 |

| Stream Name | Allotment | BLM Reach ID | Vegetative Type | Functional Rating and Trend | Miles |
|-------------------------|-----------------------|--------------|---|-----------------------------|-------|
| Brownes Creek | South Seven Springs | 540 | Rocky Mountain Juniper /Red-Osier Dogwood | FAR | 0.93 |
| Canyon Creek | Unallotted | 503 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.87 |
| Cherry Creek | Cherry Creek | 504 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.50 |
| Cherry Creek | Cherry Creek | 526 | Narrowleaf Cottonwood /Red-Osier Dogwood | PFC | 0.50 |
| Lost Creek | Twin-Adam | 505 | Quaking Aspen /Red-Osier Dogwood | FAR-up | 0.48 |
| Lost Creek | Twin-Adam | 541 | Quaking Aspen /Red-Osier Dogwood | PFC | 0.52 |
| Trapper Creek | Vipond-Glendale | 524 | Geyer Willow /Beaked sedge | PFC | 0.09 |
| Trapper Creek tributary | Vipond-Glendale | 513 | Rocky Mountain Juniper /Red-Osier Dogwood | PFC | 0.63 |
| Trapper Creek tributary | Vipond-Glendale | 516 | Geyer Willow /Beaked Sedge | PFC | 0.40 |
| Trapper Creek tributary | Vipond-Glendale | 517 | Douglas-fir/Red-Osier Dogwood | FAR | 0.41 |
| Trapper Creek tributary | Vipond-Glendale | 525 | Quaking Aspen /Red-Osier dogwood | FAR | 0.60 |
| Willow Creek | Lost-Willow | 507 | Quaking Aspen /Red-Osier Dogwood | PFC | 2.1 |
| Willow Creek | Childs Individual SGC | 522 | Narrowleaf cottonwood /Red-Osier Dogwood | PFC | 0.36 |

Springs

Most of the springs within the assessment area have been developed for livestock and are discussed separately. Reach 515, originally shown in GIS as a tributary of Trapper Creek is a spring and short spring brook. It was found to be functioning properly.

There is a 57-acre spring province (506), which includes the five western springs, shown as Seven Springs, on the Earls Gulch Quadrangle. The province is dominated by quaking aspen, which exhibit signs of infestation/infection and are described in more detail in the biodiversity section. Spring sources are very noticeable due to the presence of water birch. Condition within this province varied depending on proximity of the springs to the watering trough. Livestock are impacting the springs and spring brooks both physically (soil compaction and channel alteration) and vegetatively (reduced sedge composition). The province was rated FAR static.

Streams

The IDT observed various riparian health concerns on specific EPW reaches including: alteration of stream morphology (channel shape and gradient) with resultant over-widening, loss of access to floodplains, and bank down cutting. Impacts to vegetation included some loss of species diversity and composition, reduced vegetative cover, limited species recruitment and regeneration, reduced structural diversity and decreased vigor of streamside vegetation. Increasing juniper cover is adversely affecting deciduous riparian habitat on some streams in the EPW assessment area. Reach specific findings are described below and additional data is available at the Dillon Field Office.

Big Hole River (508, 509, 510, 511, 512, 518, & 521) – The Big Hole River is listed by Montana DEQ as a water quality limited river on their Clean Water Act Information Center (CWAIC) website. A description of the impairments from the CWAIC site is found in the water quality section. Since the river is a reflection of upstream processes and flows, a short description follows. The Big Hole receives flood flows in the spring prior to irrigation season; therefore channel forming processes are functioning. There are no major dams on the Big Hole; however there is a small diversion dam that is used to support the Butte water supply. Diversion practices, which involve operating heavy equipment within the channel, impact the channel itself.

The focus of the IDT evaluation is assessment of impacts to the Big Hole from BLM authorized uses. These uses include grazing and recreation. Recreational use in areas accessible to the public is impacting localized areas. In areas adjacent to the river the IDT found evidence of human waste and trash left by recreationists. Livestock do not have access to the river for the majority of miles of shoreline. The large size of the bed materials seems to be a further deterrent to livestock. Notwithstanding the problems associated with irrigation withdrawals and other irrigation practices, the Big Hole Reaches were rated as PFC.

Big Hole tributaries (519, 523, & 535) – Reach 519 flows through the South Seven Springs allotment. This reach was the cause of some concern in years past and in the mid 1980's gully plugs were installed in an effort to control erosion. The use of gully plugs would not be a first choice today, but they appear to have halted downcutting in the location where they were installed. Concerns identified by the IDT include the presence of an abandoned vehicle, channel overwidening, downcutting below the wet meadow, crossings and decadence within the willows. Reach 535 is located downstream of Alkali Spring. This reach originates as a seepy slump, forms a channel and then grades into isolated seeps. It has been impacted by livestock and soil compaction has led to drying and a reduction in water holding capacity. Reach 523 appears to originate as return flows on private land. These flows move across State Land before entering

the Child's Individual Allotment. This reach has altered potential and was rated PFC for the section above the road. The reach passes through a culvert under Highway 91 and continues a short distance before entering a slough. The portion in the slough is connected to the Big Hole River and is likewise PFC.

Brownes Creek (500, 501, 502, & 540) – Brownes Creek leaves the Forest and enters public land as it flows through the South Seven Springs Allotment. The upstream reach, 501, was determined to be PFC. The next reach downstream, reach 540, is more heavily impacted. The junipers are increasing, aspen are dying, and recruitment is diminished. The stream begins to incise impacting channel morphology, sinuosity and other channel characteristics. Reach 500 and 502 similarly are impacted. In some sections, headcutting was observed, while in other sections, excessive sedimentation indicates the stream is losing its ability to transport sediment. These reaches were determined to be FAR.

Canyon Creek (503) – Canyon Creek, like the Big Hole River, is listed on the CWAIC website as water quality limited. Unlike the Big Hole, Canyon Creek has not been assessed for Sufficient Credible Data. The watershed has been mined, as evidenced by tailings/waste rock piles and road cuts adjacent to the stream. The IDT PFC assessment focused on the stream and stream channel. The reach was diverse in terms of stream channel characteristics and vegetation. Much of the diversity has been enhanced by beaver activity. In spite of the historic mining activity, the IDT found the reach to be functioning properly. Beaver activity has played a role in stabilizing sediment generated from mining. Spotted knapweed infestation along the road and in the riparian zone was a resource concern noted by the IDT.

Cherry Creek (504 & 526) – Cherry Creek in the Cherry Creek allotment is a perennial stream. The portions managed by BLM originate at the USFS boundary in section 7 and end at a patent. Another portion originates at the eastern boundary of the patent and terminates on private land in section 8. These reaches were assessed as one reach. Aspen, cottonwood, willow, dogwood, alder and river birch are all found in the riparian zone in all age classes. Cherry Creek was rated as PFC. Some concerns noted by the IDT include sediment from the Cherry Creek Road, which parallels the creek, some knapweed along the road, Canada thistle and henbane were along the creek, and encroachment of Rocky Mountain juniper.

Trapper Creek and tributaries (513, 516, 517, 524 & 525) – A few short reaches on the mainstem of Trapper Creek are located on public land. Trapper Creek Road parallels Trapper Creek, at times occupying the floodplain. Sediment from the road is making its way into Trapper Creek. The IDT found that reach 524 has recently been fenced in with private land. There are five tributaries to Trapper Creek in the Vipond-Glendale allotment. Condition on these tributaries ranged from PFC to FAR. As discussed above, reach 515, was found to be dry except for a spring and spring brook located at the upstream point adjacent to the private boundary. On reaches that were rated as FAR, use by wildlife and livestock ungulate use were contributing factors.

Willow Creek (507 & 522) – There are two reaches of Willow Creek in the EPW. Reach 507 flows between the Birch Creek and Lost-Willow allotments. This reach was identified as a reference reach some years ago and was selected by MTDEQ as a reference reach more recently.

Not surprisingly, the IDT found this reach to be functioning properly. The reach is largely inaccessible to livestock, as it is located in an area with very steep slopes. The habitat type is cottonwood/dogwood. Willow Creek (522) joins the Big Hole River in the Childs Individual SGC allotment and was also rated as PFC.

Developed Springs

Historically, the sole purpose for spring developments was to provide water for livestock. In many instances the spring source was not fenced or protected from degradation by ungulates, resulting in altered hydrological function and diminished resource values. In other cases, livestock exclosures around spring sources were minimal. Construction techniques typically altered hydrology and diminished resource values. Some spring structures have fallen into disrepair and fences have become dysfunctional. Well managed springs have the potential to support rare plants, macroinvertebrates, insects, fish, springsnails, amphibians and migratory birds as well as to provide water for wildlife and livestock.

According to the Range Improvement Project database there are 14 developed springs in the watershed: six in the South Seven Springs allotment, four in the Lost-Willow allotment, three in the Vipond-Glendale allotment, and one in the Seven Springs allotment. In order to improve information regarding location, habitats and conditions associated with these resources, the IDT inventoried most of these springs during the 2008 field season.

Lost-Willow – Kambich, Loose Nut, McGinnis, and McVee Springs are located within the Lost-Willow allotment. Kambich, McVee and McGinnis were developed in 1956. Loose Nut Spring was first developed in 1955 and was redeveloped in 1985. The IDT visited Loose Nut Spring. The head box was dry and the troughs were dysfunctional. Loose Nut Spring is located in a draw and two undeveloped springs are located a few hundred yards south. Both of these springs were PFC with excellent flows. Kambich, McGinnis, and McVee springs were not visited during the 2008 season.

Seven Springs – Louis Spring, developed in 1965, appears to be a redevelopment. A remnant wooden trough occurs near the 60's vintage infrastructure. This spring development has fallen into disrepair and is not functioning. The spring source has excellent flow and the riparian vegetation and hydrology are intact. Whiplash willow is present in the bottom of the draw, while basin big sagebrush and basin wildrye are located on a bench adjacent to the spring brook.

South Seven Springs – All six springs in the South Seven Springs allotment were inspected. Greasewood Spring has fallen into disrepair. The wetland was altered when the spring was developed. Alkali Spring is flowing well, but needs some work. Originally there were two tandem troughs. Water is only making it to the first trough, which is out of level and is spilling over. The overflow is maintaining hydrology to the nearby wetland, where the vegetation is vigorous. Cherry Hill Spring has dried up and the infrastructure has never been removed. Alkali, Greasewood, and Cherry Hill Spring were constructed in the mid 1960s, but no exclosures were constructed at that time. In the mid 1980s, Cherry Hill Spring Number 2 and Seven Springs East were constructed, and the Seven Springs Spring Source appears to have been reconstructed. While exclosures were built at these springs, they are minimal in size and

inadequate to protect the wetland vegetation and hydrology. All three springs have excellent flow, but the stock tanks are leaking and require maintenance or replacement.

Vipond-Glendale – While there are three developments in this allotment, only two are located on public land. Trapper Spring, is constructed on private land and provides water to stock tanks, which are located on public land. Lelow Basin Spring No. 2 was found to be functioning; however the troughs are in poor condition. Butcher Spring will be evaluated in spring of 2009.

Noxious Weed Infestations

Dense infestations of houndstongue were found along both Willow and Lost Creeks. These infestations are so intermingled with the willows and other riparian forbs and shrubs that control will be difficult without impacting non-target vegetation.

A few isolated infestations of common tansy, a perennial that reproduces by creeping roots and seeds and is toxic to both humans and animals, were found in areas close to the Big Hole River. These infestations were probably the result of downstream spread from larger infestations found along irrigation ditches in the Divide area.

Recommendations for Riparian Health

1. Authorized livestock grazing is contributing to unacceptable riparian habitat conditions in South Seven Springs, and Vipond-Glendale Allotments. In accordance with BLM regulations, new allotment management plans (AMPs) addressing grazing management in these allotments will be evaluated in an EA. Changes in timing, duration, frequency and/or intensity of grazing will be considered. Additional rest and/or deferment may be incorporated into grazing plans in these allotments. Salting locations, herding, and/or applicable range improvement projects should be examined to determine how these tools can be used to mitigate riparian issues.
2. Explore opportunities to develop a riparian pasture within the Grose pasture to facilitate improvement of resource conditions and reduction livestock impacts within the Seven Springs Spring Province.
3. Coordinate with Forest Service on road maintenance and possible BMPs to reduce sediment input from the Cherry Creek Road.
4. Explore juniper reduction treatments along Brownes Creek (540), to reduce competition between juniper and deciduous species, and work with road maintenance staff to reduce sediment input during road maintenance.
5. Work with the Big Hole Watershed Committee and Beaverhead County to reduce sediment inputs from road maintenance along Trapper Creek.
6. Expand exclosures around spring developments to incorporate the spring source and a portion of the spring brook where existing exclosures are not providing adequate protection and replace deteriorated stock tanks.
7. Redevelop Alkali Spring while maintaining the wetland vegetation and hydrology.
8. Remove the infrastructure associated with Cherry Hill Spring.
9. Enlarge the exclosure at Cherry Hill Spring Number 2.
10. Redevelop Greasewood Spring and restore the wetland area.
11. Remove the deteriorated infrastructure at Louis Spring.

12. Replace the troughs and enlarge the exclosures at Seven Springs East and Seven Springs Spring Source.
13. Evaluate Butcher, Kambich, McGinnis, and McVee Springs during the spring, 2009 and determine if any actions are needed to properly manage these springs. If they are dry they will be abandoned and the infrastructure removed. If the spring source is being impacted, exclosures, or larger exclosures, will be recommended and proper maintenance will be required.
14. Where accessible and cost effective, treat houndstongue to prevent further spread. When a biological control for houndstongue is approved for use by the Animal and Plant Health Inspection Service (APHIS), release these insects into the larger infestations, generally along riparian areas, in the EPW to help control the spread of houndstongue
15. Target the few small isolated infestations of common tansy for eradication by using Early Detection, Rapid Response (EDRR) techniques, such as educating landowners about common tansy, to help prevent new infestations from becoming established.

Water Quality

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

Procedure to Determine Conformance with the Standard

The Federal Water Pollution Control Act, subsequently referred to as the Clean Water Act, as amended, and the Montana Constitution provide guidance to the Bureau of Land Management in Montana with respect to Western Montana Standard #3. The Act was amended in 1987 to address Nonpoint Source Pollution. Congress was careful to respect the authority of States to manage water. The Montana Constitution declares all surface, underground, flood and atmospheric waters within the boundaries of the state are the property of the State.

The BLM does not make Beneficial Use Determinations (BUD), which is a State responsibility. The BLM does share their findings to assist Montana DEQ in making BUDs. Montana DEQ is responsible for making decisions regarding water quality and is in the process of assessing the condition of streams, establishing reference sites, and developing water quality restoration plans. Montana DEQ has not typically assessed headwater streams, since headwater streams were not generally nominated for 303d listing.

Montana DEQ has found that 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.

The Montana Department of Environmental Quality, Water Quality Planning Bureau, Watershed Protection Section provides guidance on assessing water quality in relation to NPS. Montana DEQ recognizes PFC as a qualitative method of assessing the condition of riparian-wetland areas. Montana DEQ believes PFC can be an effective tool for riparian assessment and

evaluation of the impacts of grazing management on riparian health. Montana's NPS Agricultural Strategy for Pasture and Range Lands supports the Bureau of Land Management's use of PFC for monitoring.

The Montana/Dakotas Bureau of Land Management has a Memorandum of Understanding (MOU) with the State of Montana, which describes how the parties will cooperate to meet the objectives of the Clean Water Act. The MOU clarifies that Montana DEQ shall not be limited in their authority to carry out their legal responsibilities for management and regulation of water quality. The BLM agrees to share stream assessment data, identify and update the State with respect to nonpoint pollution sources and to implement best management practices.

Uplands, wetlands, riparian areas, and streams are evaluated for condition. Condition is related to nonpoint source pollution. Uplands in poor condition are probable sources of sediment. Wetlands in poor condition are unlikely to filter sediment. Streams in poor condition are likely sources of channel erosion. Uplands are evaluated for land cover condition (i.e., ability of plants, rocks, and litter to protect soil from erosion and promote infiltration (i.e. reducing runoff).

Wetlands are evaluated to determine the condition and capability of wetlands to filter and infiltrate inflows. Stream morphology, streambank condition, channel width and depth, and bed materials are evaluated. Streams are classified using a combination of channel measurements and observations as well as field guides. Classifying streams provides useful information for assessing stream function, channel erosion and sediment relations.

The BLM understands that non-point source pollution needs to be addressed for waters of the State regardless of whether they are or are not meeting water quality standards and that non-degradation rules apply to waters that are meeting state water quality standards. Recognizing that Montana DEQ will not likely evaluate or list headwater streams, the BLM shares watershed assessment findings with Montana DEQ.

Affected Environment

The majority of the streams in the assessment area originate on the east facing slopes of the Pioneer Mountains and drain to the Big Hole River. As described above the main streams/creeks from north to south are Canyon, Trapper, Cherry, Brownes, Lost, Willow, and Birch Creeks.

The Big Hole River, Birch Creek, Canyon Creek, Lost Creek, Sassman Gulch, Trapper Creek, and Willow Creek are listed as water quality impaired streams. Seven Springs Creek is also listed, however Montana DEQ's Summary Report reveals that Seven Springs Creek is ephemeral, which is supported by field visits by BLM personnel. Severe erosion and gullyng in Seven Springs Creek was addressed in the mid 1980s by the installation of gully plugs. A field visit in 2008 revealed that the treatment was successful in halting the development of gullyng and in trapping sediment.

Montana DEQ has four reference sites in southwest Montana. Two of these reference sites are located within the EPW assessment area, on Willow Creek. One site is on USFS and the other is located on reach 507, which is on BLM-administered land.

Findings, Analysis and Recommendations

Montana DEQ publishes a Water Quality Report (MWQR) every two years. The 2008 Water Quality Report will become available in 2009. Therefore, information in this section is based upon the 2006 Water Quality Report. Beneficial uses include agriculture, aquatic life, cold water fishery, drinking water, industrial, and primary contact recreation. The following table lists level-of-use support as fully supporting, partially supporting, or not supporting. Also included are probable sources and probable causes of impairment. Note: Canyon Creek, Sassman Gulch and Willow Creek are on the 303d list, but have not been assessed using the Sufficient Credible Data protocol.

Table 6: Montana DEQ 303-d listed streams within the East Pioneers Watershed

| Name | Beneficial Uses | Probable Sources of Impairment | Probable Causes of Impairment |
|--|---|---|---|
| BIG HOLE (LOWER) RIVER, Divide Creek to Jefferson River | Agricultural ¹ , aquatic life ³ , cold water fishery ³ , drinking water ³ , industrial ¹ , primary contact recreation ² | Acid mine drainage, dam construction, impacts from abandoned mine lands, grazing in riparian or shoreline zones, habitat modification, highways, roads bridges infrastructure, streambank modifications, destabilization. | Temperature, cadmium, copper, lead, zinc, low flow alterations, physical substrate habitat alterations, |
| BIRCH CREEK Headwaters to FS Boundary | Agricultural ¹ , aquatic life ² , cold water fishery ² , drinking water ¹ , industrial ¹ , primary contact recreation ¹ | Agriculture, grazing, in riparian or shoreline areas, streambank modifications/ destabilization, | Alteration in streamside or littoral vegetative covers, low flow alterations, physical substrate habitat alterations, sedimentation/ siltation. |
| BIRCH CREEK FS Boundary to mouth | Agricultural ¹ , aquatic life ² , cold water fishery ² , drinking water ¹ , industrial ¹ , primary contact recreation ¹ | Channelization, dam or impoundment, impacts from hydrostructure flow regulation/modification, | Alteration in streamside or littoral vegetative covers, low flow alterations, physical substrate habitat alterations, other anthropogenic substrate alterations |
| LOST CREEK | Agricultural ² , aquatic life ² , cold water fishery ² , drinking water ³ , industrial ¹ , primary contact recreation ¹ | Rangeland grazing. | Arsenic, nitrogen, phosphorous, alteration in streamside or littoral vegetative covers, sedimentation/ siltation. |
| SASSMAN GULCH | Agricultural ¹ , aquatic life ² , cold water fishery ² , drinking water ¹ , industrial ¹ , primary contact recreation ¹ | Impacts from abandoned mine lands | Arsenic |

| Name | Beneficial Uses | Probable Sources of Impairment | Probable Causes of Impairment |
|---|---|---|--|
| TRAPPER CREEK | Agricultural ¹ , aquatic life ³ , cold water fishery ³ , drinking water ³ , industrial ¹ , primary contact recreation ² | Acid mine drainage, impacts from abandoned mines, mine tailings, impacts from hydrostructure flow regulation/modification, irrigated crop production, channelization, highways, roads, bridges, infrastructure, , | Copper, lead, zinc, alteration in streamside or littoral vegetative covers, low flow alterations, physical substrate habitat alterations |
| ¹ Fully Supporting, ² Partially Supporting, ³ Not Supporting | | | |

Section 319 of the Clean Water Act addresses non-point source pollution through the application of Best Management Practices (BMPs). Allotment Management Plans (AMPs) are recognized as BMPs to the extent that they address nonpoint source pollution (EPA 2003). 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 Best Management Practices for livestock grazing that meet or exceed those approved by the State of Montana in order to maintain, restore or enhance water quality.”

Nonpoint Source Pollution from Uplands

As discussed previously there are 17 allotments in the assessment area. Two allotments, Childs Individual and Willow Creek Individual rated FAR static with respect to uplands. Both allotments had excessive amounts of blue grama. The prominence of blue grama would likely indicate reduced infiltration and increased runoff. There were also localized areas within the Seven Springs allotment which showed signs of excessive overland erosion.

Nonpoint Source Pollution associated with Streams and Riparian Areas

Big Hole River – There are approximately seven miles of shoreline in Federal ownership on the right bank (south and west) of the Big Hole River in the EPW assessment area. Livestock access to the riparian area is limited in many areas due to the topography. The streambed materials along many of these reaches are cobble and boulders, further deterring use by livestock. Livestock activity on public land did not appear to be causing nonpoint source pollution. Several areas are accessible to and are used by the public. Human waste and trash were observed in some of these areas. Noxious weeds are also a concern in public access areas.

For additional information, refer to the upland and riparian health sections for PFC determinations and for indications as to whether these resources are contributing to water quality impairment. Field observations for other streams are found in the riparian section of this document

Recommendations for Water Quality

Many of the recommendations under the previous Upland and Riparian Health sections would also improve water quality.

1. Continue working with Montana DEQ and local Watershed Committees in the development and implementation of water quality restoration plans.
2. Continue to implement Best Management Practices to address NPS pollution.
3. Continue to share Watershed Assessment findings with DEQ.
4. Revise AMPs to mitigate riparian and upland resource concerns. In addressing these concerns, nonpoint source pollution will be addressed. (Specific allotments are noted in the Upland and Riparian Health sections.)
5. Address issues of human waste and noxious weeds along the Big Hole River

Air Quality

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

Procedure to Determine Conformance with the Standard

The Environmental Protection Agency (EPA) has delegated the authority to implement the provisions of the Clean Air Act to the State of Montana. Determination of compliance with air quality standards is the responsibility of the State of Montana. Air quality is in attainment or is not in attainment. Montana DEQ identifies non-attainment areas. Conformance with the standard is determined by researching DEQ air quality information sources (non-attainment areas). Smoke from wildland fire and prescribed fire results in temporary violation of air quality standards. In the case of wildfire, sources may be several states distant (e.g., California, Oregon, Washington). 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, with which the Bureau of Land Management is actively involved, and by developing the Montana/Idaho Smoke Management Program.

The Clean Air Act of 1990 as amended (42 U.S.C. 7401 et seq) and Executive Order 12088 requires 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.

Affected Environment

The EPW is located within the Montana/Idaho Airshed Management Area. The closest population at risk in the vicinity is Dillon, Montana. The U.S. Census Bureau’s 2007 estimate of Dillon's population is 4,106, with a population estimate of 8,804 for all of Beaverhead County, most of the latter living within a few miles of Dillon.

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

The 1998 Interim Air Quality Policy for Wildland and Prescribed Fires requires states to develop smoke management plans. The Montana/Idaho Airshed Group developed the Montana/Idaho

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

Findings, Analysis and Recommendations

Air quality issues in the planning area center mainly around 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. Concerns regarding human health revolve around smoke from wildland and prescribed fire.

For the major part of the year the Air Quality Standard is met throughout southwest Montana including the East Pioneers Watershed assessment area, but can become an issue during wildfire season. However, generally all of southwest Montana meets or exceeds all National Ambient Air Quality Standards.

Recommendation for Air Quality

1. Continue to develop and 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, condition of available habitat, and forest health to determine the condition/function of biodiversity. The wildlife habitat niches expected are: grasslands (short and mid grasses),

bare ground, small streams, rivers, riparian/wetlands, sagebrush steppe, conifer forests, aspen and cottonwood stands, and various mixes of these components.

Affected Environment

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 2001c). Providing habitat for special status plant and animal species is key to meeting the biodiversity standard. Table 7 lists the special status species that occur within the EPW during all or part of the year.

Table 7. Special status species occurring within the East Pioneer Watershed

| Animal Species | Current Management Status | Occurrence: Resident (R) Transient (T) | Preferred habitat |
|---|---|--|---|
| Gray Wolf (<i>Canis lupus</i>) | Proposed threatened in experimental areas | T | All |
| Bald Eagle (<i>Haliaeetus leucocephalus</i>) | Sensitive | R | Riparian/wetland |
| Brewer’s Sparrow (<i>Spizella breweri</i>) | Sensitive | R | Sagebrush shrubland |
| Burrowing Owl (<i>Athene cunicularia</i>) | Sensitive | T | Sagebrush shrubland /grassland |
| Ferruginous Hawk (<i>Buteo regalis</i>) | Sensitive | R | Sagebrush shrubland |
| Golden Eagle (<i>Aquila chrysaetos</i>) | Sensitive | R | Riparian/wetland Sagebrush shrubland |
| Great Basin pocket mouse (<i>Perognathus parvus</i>) | Sensitive | R | Sagebrush shrubland |
| Great Gray Owl (<i>Strix nebulosa</i>) | Sensitive | T | Forest |
| Loggerhead Shrike (<i>Lanius ludovicianus</i>) | Sensitive | R | Sagebrush shrubland |
| Northern Goshawk (<i>Accipiter gentilis</i>) | Sensitive | R | Forest |
| Sage thrasher (<i>Oreoscoptes montanus</i>) | Sensitive | R | Sagebrush shrubland |
| Sage Grouse (<i>Centrocercus urophasianus</i>) | Sensitive | R | Sagebrush shrubland |
| Sage Sparrow (<i>Amphispiza belli</i>) | Sensitive | R | Sagebrush shrubland |
| Swainsons Hawk (<i>Buteo swainsoni</i>) | Sensitive | R | Riparian/wetland Sagebrush shrubland |
| Pygmy Rabbit (<i>Brachylagus idahoensis</i>) | Sensitive | R | Sagebrush shrubland |
| Prebles Shrew (<i>Sorex preblei</i>) | Sensitive | R | Sagebrush shrubland |

| Animal Species | Current Management Status | Occurrence: Resident (R) Transient (T) | Preferred habitat |
|--|----------------------------------|---|---|
| Westslope cutthroat trout (<i>Oncorhynchus clarki lewisi</i>) | Sensitive | R | Streams |
| Arctic grayling (<i>Thymallus arcticus</i>) | Sensitive | R | Streams |
| Plant Species | Current Management Status | Known from BLM lands? | Habitat |
| Red Sage | Sensitive | YES | Saline or alkaline soil in valleys and foothills |
| Lemhi Beardtongue | Sensitive | NO | Sagebrush steppe and open coniferous forests |
| Low Northern–Rockcress | Sensitive | NO | Vernally moist, calcareous soil in the alpine zone |
| Sapphire Rockcress | Sensitive | NO | Moderate to steep slopes with warm aspects |
| Beautiful Bladderpod | Sensitive | NO | Open mountain mahogany or limber pine woodlands |
| Wind River Draba | Sensitive | NO | Scree and shifting talus of slopes near or above treeline |

The gray wolf is the only species in the EPW that is listed under the Endangered Species Act (ESA). In 2008 the gray wolf was delisted, but a court ruling relisted the species later the same year. Wolves were reintroduced to Yellowstone National Park in 1995. Wolves within the reintroduction area, but not within a national park or national wildlife refuge, are considered “proposed threatened”, rather than endangered, under the ESA for Section 7 consultation purposes. Wolves in the EPW are considered non-essential experimental populations since they are outside of the primary recovery zone. No resident packs have been documented in the EPW, but wolves moving through the area have been sighted. Conflicts between wolves and livestock are an issue as gray wolf occurrence outside of primary recovery zones increase. There have been wolf-livestock problems in the Fleecer Mountain area, Highlands, and west Pioneer Mountains. Offending wolves are usually dispatched.

Bald eagles have recently been delisted from the ESA and are currently managed as a BLM sensitive species. Bald eagles are still protected under the Bald and Golden Eagle Protection Act. The nearest known nest to the EPW is further east down the Big Hole River near Notch Bottom. Winter concentrations of bald eagles occur along the Big Hole River and in areas where prey is available. Cooperative interagency monitoring is occurring through the Montana Bald Eagle Management Plan. Ferruginous hawks, golden eagles, and Swainson’s hawks are common throughout the EPW.

Burrowing owls have been seen south of Birch Creek out on the grassland flats (pers. comm. Fager, 2008). No sightings on BLM administered lands in the EPW have been reported. Burrowing owls prefer open grasslands or agricultural land and nest and roost in underground burrows or crevices.

The Brewer's sparrow, sage thrasher, and sage sparrow utilize sagebrush habitats. The Prebles shrew predominates in arid and semi-arid grass and sagebrush habitats. The Great Basin pocket mouse utilizes sagebrush and grassland habitats, typically with sandy soils. Loggerhead shrike, northern goshawk, and great gray owl habitat consists of mature forests with clearings such as bogs, meadows, and wetlands for foraging. The loggerhead shrike also utilizes open pastures and prairies.

The westslope cutthroat trout (WCT) was historically widespread throughout streams in southwestern Montana. Genetically pure populations of WCT are currently known to occupy less than 3% of their historic range in southwest Montana due to competition with non-native eastern brook trout (*Salvelinus fontinalis*), hybridization with rainbow trout (*Oncorhynchus mykiss*) and Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), and habitat degradation. The WCT in Montana is currently listed as a special status species by the State, the Forest Service, and the BLM.

Cherry Creek is currently the only known WCT stream on BLM-administered land in the assessment area. Genetic testing of WCT in Cherry Creek indicated a 99-100% genetically pure population. A non-native population of eastern brook trout in this stream poses a serious threat to the long term persistence of this population.

The Big Hole River supports the last self-sustaining population of strictly fluvial Arctic grayling in the lower 48 states. Fluvial Arctic grayling is a Montana Species of Special Concern. The current distribution of this species represents only 5% of its historic range. Recent population surveys have found historic low numbers in traditional survey reaches for this population. Most of the Arctic grayling occupy the upper Big Hole River, with some in Big Hole River reaches within the EPW.

Other special status species are discussed under the appropriate habitat type below.

Sagebrush Habitats and Sagebrush Dependent Species

Sagebrush and grassland cover types comprise 93% of the BLM administered lands in the EPW. The sagebrush species in the watershed are Wyoming big sagebrush, mountain big sagebrush, basin big sagebrush, and three tip sagebrush. The variety of sagebrush provides vital winter habitat for sage grouse, pronghorn antelope, and mule deer. Although no pygmy rabbit sign was found during the field assessments, the EPW has potential pygmy rabbit habitat. As a sagebrush-obligate species, the pygmy rabbit depends on sagebrush for year-round habitat.

The BLM administered lands in the EPW provide year-round sage grouse habitat. Sagebrush is an important habitat component for sage grouse. It comprises nearly 100% of sage grouse winter diets and provides thermal, hiding, and nesting cover. There are two historic leks in the watershed, but an active lek has not been located. Finding an active lek in the area would enhance understanding of important sage grouse breeding habitat. When suitable habitat exists, sage grouse usually nest within two miles of a lek. Broods require a high protein diet of forbs and insects, usually found in riparian habitats. The *Management Plan and Conservation Strategies for Sage Grouse in Montana* is used as a guideline for sagebrush habitat management.

Generalist or Widespread Species

The EPW lies within portions of Montana hunting districts (HD) 331 and 340 for deer and elk, HD 310 and 341 for antelope, HD 340 for bighorn sheep (currently closed), and HD 324 for moose. Elk numbers in the EPW are slightly reduced and below elk objectives. Antelope populations have increased in HD 310 and mule deer have increased in HD 331 (pers. comm. Fager, 2008). Table 8 lists the season of use for habitats used by primary game species.

Table 8. Primary game species and habitat use within the East Pioneer Watershed.

| Species | Forested | Sagebrush-Grassland | Riparian |
|--|----------|---------------------|----------|
| Antelope | | Y | |
| Bighorn sheep | | Y | |
| Black bear | Y | | |
| Mountain lion | Y | | |
| Elk | S,C | W,C | Y |
| Moose | Y | Y | Y |
| Mule deer | S,C | W,C | W |
| White-tailed deer | | S | Y |
| Dusky grouse | Y | | Y |
| Ruffed grouse | Y | | Y |
| Sage grouse | S | Y | B |
| Hungarian partridge | | Y | |
| Merriams turkey | | | Y |
| Y=yearlong, W=winter, S=summer, C=calving/fawning, B=breeding/brooding | | | |

The EPW provides important winter range for elk. Elk winter range in the EPW extends around the Pioneer Mountains in the lower elevation foothills. Louie Lowe Basin, Brownes Gulch, south of Rock Creek, and south of Willow Creek through Dutchman Basin is key elk winter habitat in the EPW. Winter habitat use is influenced by weather, hunting pressure, and snow depths. Elk calving also depends on the weather and snow depths in the area. Although calving usually does not occur lower on BLM administered lands, elk may calve in the higher sagebrush basins such as upper Brownes Gulch, upper Louie Lowe Basin, and below Twin Adams Mountain (pers. comm. Fager, 2008).

Pronghorn antelope utilize sagebrush habitats year-round in the EPW, however after May and June, a greater number of antelope move onto irrigated fields. Some antelope remain in the watershed through winter, while others migrate to the Fleecer Mountain Wildlife Management Area for the winter. BLM lands in the EPW are crucial mule deer winter range, especially the area between Rock Creek and Cherry Creek (pers. comm. Fager, 2008).

Merriams turkeys were transplants into the Twin Bridges area in the 1960's through a private release. The turkeys quickly colonized the Big Hole River, with populations expanding and contracting ever since. In this area they are typically associated with cottonwood stands along riparian areas. Recently, mild winters and some subsidy from cereal grain crops and grain hay has led to an increase in the population. Turkeys are not common on BLM administered land due to the lack of stable food and roosting trees (pers. comm. Fager, 2008).

Portions of the EPW provide habitat for the Highlands bighorn sheep population. Summering rams have been located as far west as Sheriff and Lion Mountains and as far south as the Birch Creek drainage in the East Pioneers, although these sightings are rare and do not indicate that these are commonly used areas (MFWP 2007). Prior to the die-off that occurred in the winter of 1994-1995, the herd had more than 400 individuals, then dropped to less than 100 individuals when the herd suffered a pneumonia epizootic combined with lungworm (Boccardori, 2008). Several transplants have occurred between 1967 and 2008. The population of about 50-60 bighorn sheep was augmented in January, 2008 with 65 bighorn sheep from the Sun River herd. Since this augmentation, the population has experienced a recent small-scale die-off (pers. comm. Boccardori, 2008). Due to the low number of sheep, hunting district 340 remains closed. No problems with disease transmission between bighorn sheep and domestic sheep on private land have occurred. The BLM and Forest Service in the Highlands and East Pioneer Mountains do not have active or retired sheep allotments (MFWP 2007).

Black bears were observed in Louie Lowe Basin during field assessments in 2008.

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

Riparian, Aquatic, and Wetland Habitat and Associated Species

Less than 1% of BLM-administered lands in the EPW contains riparian habitat. Several larger creek drainages flow through the EPW including Canyon Creek, Trapper Creek, Cherry Creek, Lost Creek, Brownes Gulch, and Willow Creek. Riparian vegetation found along these reaches includes cottonwood, aspen, dogwood, willow, alder, rose, currant, and river birch. Riparian areas provide important habitat for moose, elk, beaver, songbirds, and sage grouse. Riparian, aquatic, and wetland habitat offers habitat diversity in the otherwise sagebrush-grassland habitat and are crucial water sources for wildlife. Succulent forbs, largely found in riparian areas, are a key component of sage grouse brood diets. Wildlife and livestock concentrate in riparian habitat, as it provides green vegetation later into the summer and fall, resulting in a disproportionate amount of use in these areas. For at least some portion of their annual life cycle, about 75% of all wildlife species in this area utilize riparian habitat.

Riparian woodlands support the highest diversity of landbird species of all habitats. Riparian corridors are crucial to several northern-breeding Neotropical migrants and breeding or wintering species, even though they may not carry water year-round (Rich et al., 2004). The Partners in Flight Bird Conservation Plan for Montana lists 141 bird species for priority status in five habitat groups. The objective of this plan is “to focus on restoring healthy ecosystems that will sustain productive and complete bird communities” (Montana Partners in Flight, 2000). Most species are summer residents that use habitats ranging from lower elevation wetlands to high elevation forests for breeding and raising young. Some species are migratory, but small populations may stay yearlong depending on seasonal conditions. The U.S. Fish and Wildlife Service has a list of 28 “Birds of Conservation Concern” for the Rocky Mountain Region, many of which depend on riparian habitat for all or part of their lifecycle. The EPW potentially has 14 of the 28 species on this list.

Aspen is present, though not extensive, in many of the drainages and spring areas within the watershed. Upper Brownes Creek supports extensive aspen in the riparian corridor that is successfully regenerating and growing past browse height. Mature Rocky Mountain juniper is present in the drainage and increases in density further downstream. The South Seven Springs allotment contains a complex of aspen clones. Aerial photography from 2001 compared to 2008 observations shows a decrease in the health of these stands. Evidence of poplar borer activity in some aspen stands was noted by the IDT. The larvae of this insect bore into the stems, roots and branches causing the tree to weaken and break. Fungi often enter through the galleries and woodpecker holes, contributing to the tree's death. Control of this insect is to remove brood trees and heavily injured trees, or prescribe a treatment to regenerate a completely new aspen stand (Ostry et al. 1989).

Within the EPW there are 5 perennial streams on public land that support cold water fisheries. Common sport fish species in the area are brook trout, rainbow trout, brown trout (*Salmo trutta*), westslope cutthroat trout, Yellowstone cutthroat trout, and rainbow x cutthroat hybrids (*O. Mykiss x clarki lewisi*). Non-native species were introduced into the area in the early 1900's or earlier. Westslope cutthroat trout, Arctic grayling, mottled sculpin (*Cottus bairdi*), slimy sculpin (*Cottus cognatus*), longnose dace (*Rhinichthys cataractae*), burbot (*Lota lota*), white sucker (*Catostomus commersoni*), longnose sucker (*Catostomus catostomus*), and mountain whitefish (*Prosopium williamsoni*) are native fish species found within the watershed.

The Big Hole River is an internationally known blue ribbon trout fishery and supports one of the most popular cold water sport fisheries in the state, with over 40,000 angler-use days recorded for 2005. Most use occurs in the middle reaches of the drainage. Other streams that support fisheries include Canyon, Cherry, Trapper, and Willow Creeks. Recreational fishing on these creeks is limited due to the small size of the streams. Table 9 lists the fish species present, the issues effecting fisheries habitat, and the habitat conditions for each fishery.

Table 9. Fisheries within the East Pioneer Watershed.

| Fishery | Fish Species Present | Habitat Conditions and Issues Effecting Fish Habitat |
|----------------|--|---|
| Canyon Creek | Rainbow, brown, and brook trout; mottled sculpin; rainbow x WCT hybrids | Habitat conditions are good with a diversity of woody plant species and channel characteristics. Issues affecting fish habitat are sediment from mining and road cuts in the uplands. |
| Big Hole River | Arctic grayling; rainbow, brown, and brook trout; mountain whitefish; burbot; white and longnose sucker; mottled and slimy sculpin; longnose dace; redbelt shiner. | Habitat conditions are very good on the assessed portions of the river. Fish habitat is seasonally affected by reduced flows related to irrigation resulting in high water temperatures. |
| Trapper Creek | Brook, rainbow, and brown trout; rainbow x WCT hybrids, mottled sculpin | Fish habitat is in good condition. The reaches on BLM have thick vegetative cover and are largely inaccessible to livestock. The road paralleling the creek is contributing sediment. Some tributaries to Trapper Creek are impacted by ungulate use. |
| Willow Creek | Brook and rainbow trout, mottled sculpin, rainbow x WCT hybrids, Yellowstone cutthroat trout | Habitat conditions are very good. The reach is largely inaccessible to livestock with steep slopes and dense vegetation. It was identified as a reference reach by DEQ. |

| Fishery | Fish Species Present | Habitat Conditions and Issues Effecting Fish Habitat |
|--------------|--------------------------|--|
| Cherry Creek | WCT 99-100%, brook trout | Habitat conditions are good with diverse vegetative cover. The reach is not in desired future condition for fish habitat due to the sediment contributed from the road that parallels the creek. |

Forest and Woodland Habitat and Associated Species

Forest habitats comprise approximately 46% of all ownerships, and approximately two percent of BLM-administered lands within the EPW. Low elevation forest/woodlands contain Douglas-fir, limber pine, mountain mahogany, and Rocky Mountain juniper. Conifer expansion into openings and sagebrush/grasslands is evident across much of the east face of the Pioneer Mountains.

Douglas-fir and juniper are the most common tree species found on BLM administered land within the EPW due to elevation and precipitation zone. Other tree species that require more moisture are primarily found higher in the large expanse of forest habitat on adjacent Forest Service land in the Pioneer Mountains. This habitat provides important thermal and hiding cover for wildlife. Forests in the Pioneer Mountains provide habitat for a large variety of species including dusky grouse, ruffed grouse, northern goshawk, black bear, bobcat, and wolverine. 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.

Findings, Analysis, and Recommendations

Special Status Species

Red sage is only known from five locations in Montana, but it is locally common at lower elevations in the South Seven Springs allotment. Red sage may be vulnerable to impacts associated with cattle grazing, but the current rest-rotation grazing management on this allotment appears to be compatible with maintaining the population within the EPW. Reducing spring grazing and incorporating periodic rest on adjacent habitat may allow for population expansion.

Beautiful bladderpod, low northern–rockcress, sapphire rockcress, and Wind River draba are all found on Forest Service lands within the EPW. These species typically occupy habitats at higher elevation or on steep slopes that aren’t subject to any immediate anthropogenic threats. Noxious weed encroachment, herbicide application or mining activities could pose future threats.

Lemhi beardtongue is only known from Forest Service lands within the EPW but suitable habitat is present on BLM lands within the analysis area. Lemhi beardtongue may be vulnerable to impacts associated with cattle grazing, road maintenance and fire suppression.

Idaho fleabane and Mojave brickellbush are known from sparsely-vegetated rocky or gravelly slopes and ridges on public land just east of the EPW boundary. Habitat capable of supporting Ute ladies'-tresses and mealy primrose is present along the Big Hole River south of Melrose.

These special status plants may be discovered in the EPW when botanical surveys are completed in conjunction with proposed projects requiring surface disturbance.

Sagebrush Habitats and Sagebrush Dependent Species

Although no active sage grouse leks are known to exist in the EPW, sage grouse utilize this watershed and it is important to properly manage their associated habitat. Throughout the west sage grouse habitat has been lost to agricultural conversion, urban growth and development, livestock grazing, and wildfire. Previous petitions for listing sage grouse under the ESA emphasize the need for region-wide assessments addressing habitat conditions and population stability. This emphasizes the importance of maintaining the integrity of mid- to late-seral sagebrush habitats on public lands, not only for sage grouse but for all sagebrush obligate species. Overall, throughout the watershed, sagebrush habitat requirements are being met. The exceptions to this are herbaceous cover for nesting habitat and brood rearing within the Willow Creek Individual and Childs Individual SGC allotments. However, the site potential for sagebrush in these allotments is probably minimal. Efforts to locate leks in this area could be emphasized in order to gain valuable information about breeding and nesting habitat in the EPW. Conifer expansion has the potential to reduce existing sagebrush habitat where growing conditions are suitable for seedling establishment and reproduction, such as Louie Lowe Basin.

Generalist or Widespread Species

Willow Creek Individual and Childs Individual SGC allotments are lacking in providing habitat for biodiversity for wildlife. Herbaceous diversity was lacking with blue grama as the dominant species. In 1982, Childs Individual SGC (T5S R9W Sec. 3) was seeded to crested wheatgrass and still lacks herbaceous biodiversity. In this area, and in the allotment, sagebrush is typically found on hillsides and in swales. In an area adjacent to the allotment, green and rubber rabbitbrush is scattered throughout the grassland with blue grama, bluebunch wheatgrass, winterfat, broom snakeweed, Indian ricegrass, bottlebrush squirreltail, and needle-and-thread. With a low mat of blue grama dominating the allotment, resting the pasture may only lead to healthier blue grama, with little room for other native grasses to reestablish. However, there are sparse and scattered remnants of needle-and-thread, Sandberg bluegrass, broom snakeweed, and rabbitbrush in the allotment. It is difficult to determine whether resting the allotment would allow those species to spread. Mechanical treatment, dormant season use, and/or seeding most likely would be most successful in reestablishing native grasses. This is a small allotment and the pros and cons of implementing such a project would need to be evaluated.

Net-wire and barbed-wire fences that are no longer in use represent an entanglement hazard, especially for antelope, deer, and elk and moose calves. Barbed wire fences with more than four wires, wires spaced too closely, or wires higher than 40-inches or lower than 16-inches hinder wildlife movement between pastures. Fences for modification, removal, or rebuilding have been identified in the Childs Individual SGC, Smith Individual SGC, Peck SGC, Sisterson, and South Seven Springs allotments.

Dependable water is a limiting factor in several of the EPW allotments. This limits wildlife use during certain times of the year and requires them to travel greater distances for water. There are few dependable springs and creeks, and livestock water may only be available when livestock are present. Existing wildlife guzzlers in similar habitats within the DFO have proven to provide

adequate water for wildlife throughout the year and use by big game species, as well as sage grouse and small mammals, has been documented. Spring developments are an important water source for wildlife, but can be fatal when escape ramps for birds and small mammals are not installed in them. Some spring developments were found to be in disrepair and some stock tanks lack escape ramps. Specific information is available above under the Riparian Health section.

Riparian, Aquatic, and Wetland Habitat and Associated Species

Generally, fish habitat was in good condition on streams within the EPW. Some fish habitat is being impacted by the addition of sediment from the roads paralleling the streams and historic mining sites. Noxious weeds are also moving into some of the areas. If weeds continue to increase, the loss of native plant cover could lead to bank destabilization and further sediment contribution to the streams.

Impacts to WCT come from riparian impacts, habitat fragmentation, and non-native species competition. Within the assessment area, the greatest current threat to native WCT is the threat of extirpation through competition and predation from non-native eastern brook trout and hybridization with non-native rainbow trout. This has resulted in the remaining WCT population being restricted to limited habitat in one drainage.

The occurrence of Rocky Mountain juniper within the riparian area of Upper Brownes Creek has the potential to expand which could alter hydrologic characteristics, and thus the conditions necessary to support aspen. In the South Seven Springs allotment, recent drought, lack of disturbance, and insect damage has caused more than half of some aspen clones to die.

Forest and Woodland Habitat and Associated Species

Forest Insects

Western spruce budworm activity is present in the EPW, and defoliation caused by budworm is most evident on Douglas-fir trees. While budworm does not usually cause direct tree mortality, it will predispose trees to attacks by other insects or diseases. Budworms grow more vigorously in stressed trees, and budworm populations can increase dramatically during drought conditions. Prolonged budworm epidemics cause reduced diameter and height growth (Bulaon and Sturdevant, 2006). Western spruce budworm is favored by dry summer conditions and mild winters, and has the greatest impact on trees that are stressed from dense stocking and/or drought conditions (Kamps et al., 2008).

Limber pine is being affected and killed by mountain pine beetle and/or white pine blister rust. Mountain pine beetle is affecting and killing large areas of lodgepole pine in the west part of the EPW, on Forest Service managed land, but this tree species is generally not present on BLM-administered lands within this assessment area.

Historical Fire Regimes

Fire exclusion, caused primarily by fire suppression and the removal of fine fuels by livestock grazing in the area since the 1860's, has changed the structure, density, and plant species composition within the lower grassland and the upland communities.

The valley bottoms and foothills of the Pioneer Mountains historically experienced a much different fire regime than the nearby mountains. Grass and sagebrush fuels produce fast moving fires that generally consume most of the vegetation that the fire moves through. However, fuel characteristics, natural fire barriers, and recently burned land cause fires in the lower elevation fire regime to burn in a mosaic pattern. This pattern yields multiple age classes and varying densities of vegetation across the landscape. Fires that burned through deciduous woody vegetation, such as aspen clones and willow, also stimulated these disturbance adapted species to resprout and produce a new age class.

Douglas-fir colonization in Louie Lowe Basin has been identified in recent years as a resource concern on BLM, Forest Service and State managed land. The existing seed source and growing conditions will allow much of the sagebrush habitat in this area to convert to Douglas-fir forest without treatment or a wildfire.

In fire adapted ecosystems, recurrent fire is the dominant disturbance that affects vegetation patterns. One method to describe this disturbance is by using historical fire regimes (Table 10). The fire regime concept is used to characterize the personality of a fire in a given vegetation type, how often it visits the landscape, the type of pattern created, and the ecological effects. The historical fire regimes for the watershed are arranged based on fire severity and fire frequency.

Table 10: Historical fire regimes for BLM-administered lands within the East Pioneer Watershed.

| Historical Fire Regime | Severity (% Overstory Replacement) | Fire Interval (Years) | BLM Acres | % of BLM Forested | Representative Ecosystem |
|--|------------------------------------|-----------------------|-----------|-------------------|--|
| NL – non-lethal | low - <20% | 10 to 25 | 69 | 11% | Dry pine, conifer encroachment and juniper forests |
| MS1 – mixed severity, short interval | low - 20-30% | 20 to 40 | 201 | 33% | Lower elevation conifer forests |
| MS2 – mixed severity, long interval | mod - 30-80% | 40 to 120 | 117 | 19% | Shrublands, mixed conifer forests |
| MS3 – mixed severity, variable interval | variable - 10-90% | 45 to 275 | 0 | 0% | Higher elevation conifer forests |
| SR1 – stand replacement, short interval | high - >80% | 95 to 180 | 217 | 36% | Certain lodgepole pine, dry Douglas-fir forests |
| SR2 – stand replacement, long interval | high - >80% | 200 to 325 | 0 | 0% | High elevation whitebark pine, spruce-fir |
| SR3 – stand replacement, nonforest | high - >80% | <35 | 25,436 | | Grasslands, many shrub communities |
| * The acreage calculation for each historical fire regime is based on the hydrologic unit scale. Acreage discrepancies occur through calculations made in GIS. | | | | | |

Current Condition Classes

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

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

The FRCC classifications for the EPW based on the coarse-scale data are presented in Table 11. The data presented is the most current available and is valuable information to aid managers in estimating actual ground conditions. However, due to the limits of satellite-based imagery the coarse-scale estimates presented in Table 11 may differ from site-specific assessments made by members of the IDT. For example, the coarse-scale assessments obtained through satellite imagery do not take into account finer scale factors influencing condition class such as recent insect and/or disease outbreak, individual stand structure and associated biodiversity issues.

Table 11. Fire regime condition class for BLM-administered lands within the East Pioneer Watershed.

| Condition Class (CC) | Description | BLM Acres* | % of BLM | Example of Typical Management |
|----------------------|--|------------|----------|---|
| 1 | Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Fires burning in CC1 lands pose little risk to the ecosystem and have positive effects to biodiversity, soil productivity, and hydrologic processes. | 452 | 2% | Historical fire regime is replicated through periodic application of prescribed fire or through fire use. |

| Condition Class (CC) | Description | BLM Acres* | % of BLM | Example of Typical Management |
|--|--|--|----------|--|
| 2 | Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased) resulting in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Wildland fires burning in CC2 lands can have moderately negative impacts to species composition, soil conditions, and hydrologic processes. | 25,506 (NOTE: Actual forested cover in this condition class is approx. 70 acres. The remainder is sagebrush/grassland.) | 98% | Moderate levels of restoration treatments are required, such as a combination of prescribed fire with mechanical/hand treatment. |
| 3 | Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Wildland fires burning in CC3 lands may eliminate desired ecosystem components, exacerbate the spread of unwanted non-native species, and result in dramatically different ecological effects compared to reference conditions. | 81 | <1% | High levels of restoration treatments, such as mechanical treatments, are required before fire can be used to restore desired ecosystem function. Intensive efforts, which may include seeding, herbicide application, biomass removal, and other types of rehabilitation, are required for CC3 lands. |
| *The acreage calculation for each condition class is based on the hydrologic unit scale. Acreage discrepancies occur through calculations made in GIS. | | | | |

Current conditions are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, grazing, introduction, and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Lavery and Williams 2000). Based on the coarse-scale FRCC analysis, site-specific FRCC assessments, and historic photos of the area, the lower to mid elevation forested portions of the EPW are slightly to moderately departed from natural (historic) conditions.

Recommendations for Biodiversity

1. Revise livestock management in Willow Creek Individual and Childs Individual SGC allotments to enhance herbaceous cover and biodiversity. (See Upland Health section for more specific recommendations).

2. Modify old net-wire fence, dilapidated fence, and fences with improper wire spacing to meet wildlife-friendly specifications in accordance with BLM Manual/Handbook H-1741-1 and ensure that new fences are built to BLM specifications. Remove any unnecessary fences and work with private landowners to improve BLM-private boundary fences to meet BLM specifications.
3. Continue to check and maintain wildlife escape ramps in all stock tanks in the watershed. Wildlife escape ramps were installed during the fall 2008 in all tanks where a need was identified during the assessment.
4. Coordinate with FWP to fly the EPW to locate active sage grouse lek(s).
5. Consider installing wildlife guzzlers in the Birch Creek, Lost-Willow, and/or Twin Adams allotments.
6. Consider implementing a mechanical and/or seeding project in the Childs Individual SGC allotment to enhance biodiversity.
7. Improve riparian habitat by revising livestock grazing, constructing riparian exclosures, and/or moving or installing stock tanks away from water sources to keep livestock out of riparian areas. (See Riparian Health section for more specific recommendations).
8. Analyze the use of mechanical treatments and/or prescribed fire to improve the health and regeneration of aspen stands, particularly in the South Seven Springs Allotment.
9. Analyze the use of mechanical treatments and/or prescribed fire to reduce fuel loading and maintain grassland/sagebrush plant communities in areas affected by Douglas-fir colonization.
10. Coordinate with MT FWP and adjacent private landowners on placement of a fish passage barrier and non-native fish removal in the Cherry Creek drainage.

Abandoned Mine Lands

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.

Affected Environment

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.

Vipond/Quartz Hill Mining District

Environmental Issues

There are no known environmental issues in the Vipond/Quartz Hill Mining District on BLM lands.

Hazardous Mine Openings

In 1990, the company who had been mining phosphate at Maiden Rock closed all accessible open mine features, as part of their reclamation, and relinquished their phosphate leases. This closure was approved by the BLM and Forest Service, and the bond was released. However, due to the steep terrain, the steep dipping geometry of the ore body, and the mining methods used, numerous open mine features remain open or have opened up in the last twenty years. The BLM is currently evaluating potential closure methods for the numerous HMO sites at Maiden Rock.

Lost Creek Mining District

Environmental Issues

In 1986, the Montana Department of Health and Environmental Science sampled the Glen Mill site tailings material and well water. Samples showed elevated arsenic (As), barium (Ba), and chromium (Cr) in the tailings (from the mineralization); however, no contamination was found in the ground water. In 1990, due to complaints about the blowing tailings, the BLM revegetated approximately 12 acres of the impoundments to prevent further wind erosion of the tailings. In 1993 Pioneer Technical Services was contracted by the BLM to conduct a hazardous materials inventory of the site. Indications of petroleum hydrocarbons were found in borings of the tailings material. In 1997, the Montana Bureau of Mines and Geology (MBMG) sampled groundwater well MW4, no contamination was detected. In 2006, a Plan of Operation was submitted by Apex Abrasives to reprocess the mill tails for garnet. At this time, the MBMG examined the site and identified pine and tall oil in the tailings. These are the most likely source of the petroleum product identified in the 1993 assessment. Pine and tall oil were used as flotation agents in processing tungsten. Pine and/or tall oils may be encountered in the tailings during reprocessing. These oils do not present serious environmental problems, and could be either left in place or removed to an existing concrete slab for treatment such as aeration. If pine oil contaminated water is encountered, it may also be treated by circulation through an activated carbon column, although this treatment may not be necessary. If these oils are encountered while reprocessing the tailings, they will be handled as permitted by the BLM and DEQ in the Apex Abrasives Application for an Operating Permit EA, 2006.

Hazardous Mine Openings

There are no known open abandoned mines in this area.

Water Quality as Related to Mining

Review of available water quality data from the Clean Water Act Information Center (MTDEQ 2006) indicates that the Big Hole River, from south of Divide to the confluence of the Jefferson River, north of Twin Bridges, contains copper (Cu), lead (Pb), and cadmium (Cd). It suggests that these metals are from acid mine drainage (ARD), a product of decaying sulfides which acidifies the water and leaches metals from mineralized material into the environment. Review of the tributaries to the Big Hole in the same reach reveals that streams are either not evaluated or have impacts that are not associated with mining. The exception is Camp Creek, which has elevated arsenic (As), the source of which is thought to be mining related. To clearly determine the source of these metals, field review of active and historic mining is required. To date, field work to evaluate abandoned mines has been conducted on the east side of the Big Hole, in the Camp Creek and Soap Gulch areas. Active mining is limited to reprocessing tailings at the Glen Mill site. However, a literature and aerial photo review of BLM lands in the East Pioneers have not revealed any known mines of significant size, or containing such adverse geochemistry, as to be a likely source for metals in the Big Hole River. Most of the mine sites reviewed on BLM lands east of the Big Hole are generally small, dry, and are located a significant distance from a stream. Therefore, any mineralized material that may have been transported from the mine has not traveled a significant distance. Conducting field reviews of the drainages to ensure there are no metals being mobilized from mining sources of on BLM lands will be done in future programs.

Findings, Analysis and Recommendations

AML Recommendations

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 south of Dillon at Ermont and at 31 isolated open mines with safety issues throughout the DFO area.

The suggested order of priority for AML work in the EPW is as follows:

1. Complete the field evaluation of HMOs in the Maiden Rock District and execute site closures as appropriate.
2. Conduct the AML field assessments of BLM lands in each mining district of the East Pioneers.
3. Inspect and sample the principal drainages (Canyon Creek, Trapper Creek, Cherry Creek, Browns Gulch, Rock Creek Lost Creek, Willow Creek and Birch Creek) for sources of metals in water.

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.

Interdisciplinary Team Composition

Core IDT members for the EPW Assessment include:

Brian Thrift, Rangeland Management Specialist – IDT Leader
Aly Piwowar, Forester
Kipper Blotkamp, Fuels Specialist
Katie Benzel, Wildlife Biologist
Stephen Armiger, Hydrologist – Riparian Coordinator
Pat Fosse, Supervisory Natural Resource Specialist

Support IDT members include:

Paul Hutchinson, Fisheries Biologist
Michael Mooney, Weeds Specialist
Emily Guiberson, Forester
Kelly Bockting, Wildlife Biologist
Jason Strahl, Archaeologist
George Johnson, Fuels Specialist
Laurie Blinn, GIS Specialist
Rick Waldrup, Outdoor Recreation Planner
Brian Hockett, Rangeland Management Specialist – Special Status Plants
Bob Gunderson, Geologist
Joan Gabelman, Geologist – AML
Corey Meier, Soil Scientist

Other specialists involved:

Tim Bozorth, Dillon Field Manager
Vicki Van Sickle, Wildlife Technician
Carina Rosterolla, Wildlife Technician
Laura Cerruti, Wildlife Technician
Steve Lubinski, Range Technician
Kelly Urresti, Range Technician
Jordan Wells, Range Technician
Mary Koerner, Range Technician

Other agency staff consulted or involved:

Reyer Rens, Rangeland Management Specialist, US Forest Service
Kevin Greenwood, Rangeland Management Specialist, US Forest Service
Diane Hutton, Fire Management Officer, US Forest Service
Gary Berger, Soil Scientist, Natural Resources Conservation Service
Dick Oswald, Fisheries Biologist, Montana Department of Fish, Wildlife and Parks
Craig Fager, Game Biologist, Montana Department of Fish, Wildlife and Parks
Vana Boccadori, Game Biologist, Montana Department of Fish, Wildlife and Parks
Chuck Barrone, Forester, Montana Department of Natural Resources and Conservation
Chuck Maddox, Land Use Specialist, Montana Department of Natural Resources and Conservation

GLOSSARY OF TERMS

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).

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 ration: 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.

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.

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)

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

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.

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.

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

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

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

| Common Name | Scientific Name | USDA Symbol |
|-----------------------------|--|--------------------|
| Alfalfa | <i>Medicago sativa</i> | MESA |
| Alkali Sacaton | <i>Sporobolus airoides</i> | SPAI |
| Alpine Forget-me-not | <i>Eritrichium spp.</i> | ERITR |
| Baltic Rush | <i>Juncus arcticus ssp. littoralis</i> | JUARL |
| Basin Big Sagebrush | <i>Artemisia tridentata ssp. tridentata</i> | ARTRT |
| Basin Wildrye | <i>Leymus cinereus</i> | LECI4 |
| Beaked Sedge | <i>Carex utriculata</i> | CAUT |
| Bearded wheatgrass | <i>Elymus trachycaulus ssp. trachycaulus</i> | ELTRT |
| Beautiful Bladderpod | <i>Lesquerella pulchella</i> | LEPU15 |
| Bebb Willow | <i>Salix bebbiana</i> | SABE2 |
| Bitterroot | <i>Lewisia rediviva</i> | LERE7 |
| Black cottonwood | <i>Populus balsamifera ssp. trichocarpa</i> | POBAT |
| Black Henbane | <i>Hyoscyamus nigar</i> | HYNI |
| Black Sagebrush | <i>Artemisia nova</i> | ARNO4 |
| Blue Flax | <i>Linum perenne</i> | LIPE2 |
| Blue Grama | <i>Bouteloua gracilis</i> | BOGR2 |
| Blue Wildrye | <i>Elymus glaucus</i> | ELGL |
| Bluebunch Wheatgrass | <i>Pseudoroegneria spicata</i> | PSSP6 |
| Bluejoint Reedgrass | <i>Calamagrostis canadensis</i> | CACA4 |
| Booth's Willow | <i>Salix boothii</i> | SABO2 |
| Bottlebrush Squirreltail | <i>Elymus elymoides</i> | ELEL5 |
| Broom Snakeweed | <i>Gutierrezia sarothrae</i> | GUSA2 |
| Bull Thistle | <i>Cirsium vulgare</i> | CIVU |
| Canada Thistle | <i>Cirsium arvense</i> | CIAR4 |
| Cheatgrass | <i>Bromus tectorum</i> | BRTE |
| Clustered Field Sedge | <i>Carex praegracilis</i> | CAPR5 |
| Common Cattail | <i>Typha latifolia</i> | TYLA |
| Common Dandelion | <i>Taraxacum officinale</i> | TAOF |
| Common Juniper | <i>Juniperus communis</i> | JUCO6 |
| Common Mullein | <i>Verbascum thapsus</i> | VETH |
| Common Tansy | <i>Tanacetum vulgare</i> | TAVU |
| Common Yarrow | <i>Achillea millefolium</i> | ACMI2 |
| Contracted Ricegrass | <i>Achnatherum contractum</i> | ACCO22 |
| Coyote Willow | <i>Salix exigua</i> | SAEX |
| Creeping Juniper | <i>Juniperus horizontalis</i> | JUHO2 |
| Curl-leaf Mountain Mahogany | <i>Cercoarpus ledifolius</i> | CELE3 |
| Currant | <i>Ribes spp.</i> | RIBES |
| Cutleaf daisy | <i>Erigeron compositus</i> | ERCO4 |
| Deathcamas | <i>Zigadenus spp.</i> | ZIGAD |
| Diffuse knapweed | <i>Centaurea diffusa</i> | CEDI3 |
| Douglas-fir | <i>Pseudotsuga menziesii</i> | PSME |
| Dyer's woad | <i>Isatis tinctoria</i> | ISTI |
| Engelmann Spruce | <i>Picea engelmannii</i> | PIEN |
| Field Scabiosa | <i>Knautia arvensis</i> | KNAR |
| Foxtail Barley | <i>Hordeum jubatum</i> | HOJU |
| Fringed Sagewort | <i>Artemisia frigida</i> | ARFR4 |
| Geyer Willow | <i>Salix geyeriana</i> | SAGE2 |
| Greasewood | <i>Sarcobatus vermiculatus</i> | SAVE4 |
| Green Needlegrass | <i>Nassella viridula</i> | NAVI4 |
| Green Rabbitbrush | <i>Chrysothamnus vividiflorus</i> | CHVI8 |
| Grey Horsebrush | <i>Tetradymia canescens</i> | TECA2 |
| Hangingpod Milkvetch | <i>Astragalus atropubescens</i> | ASAT2 |

| Common Name | Scientific Name | USDA Symbol |
|---------------------------|--|--------------------|
| Heartleaf Arnica | <i>Arnica cordifolia</i> | ARCO9 |
| Houndstongue | <i>Cynoglossum officinale</i> | CYOF |
| Idaho Fescue | <i>Festuca idahoensis</i> | FEID |
| Idaho Fleabane | <i>Erigeron asperugineus</i> | ERAS |
| Idaho Sedge | <i>Carex idaho</i> | CAID |
| Indian Ricegrass | <i>Achnatherum hymenoides</i> | ACHY |
| Kentucky Bluegrass | <i>Poa pratensis</i> | POPR |
| Kinnikinnick | <i>Arctostaphylos uva-ursi</i> | ARUV |
| Leafy Spurge | <i>Euphorbia esula</i> | EUES |
| Lemhi Beardtongue | <i>Penstemon lemhiensis</i> | PELE8 |
| Lewis Flax | <i>Linum lewisii</i> | LILE3 |
| Limber Pine | <i>Pinus flexilis</i> | PIFL2 |
| Lodgepole Pine | <i>Pinus contorta</i> | PICO |
| Low Northern–Rockcress | <i>Neotorularia humilis</i> | NEHU2 |
| Low Sagebrush | <i>Artemisia arbuscula ssp. arbuscula</i> | ARARA |
| Lupine | <i>Lupinus spp.</i> | LUPIN |
| Meadow Barley | <i>Hordeum brachyantherum</i> | HORR2 |
| Meadow Barley | <i>Hordeum brachyantherum</i> | HORR2 |
| Mealy Primrose | <i>Primula incana</i> | PRIN |
| Montana Sweet Pea | <i>Thermopsis montana</i> | THMO6 |
| Mountain Big Sagebrush | <i>Artemisia tridentata ssp. vaseyana</i> | ARTRV |
| Mountain Brome | <i>Bromus carinatus</i> | BRCA5 |
| Mountain Snowberry | <i>Symphoricarpos oreophilus</i> | SYOR2 |
| Musk Thistle | <i>Carduus nutans</i> | CANU4 |
| Narrowleaf Cottonwood | <i>Populus angustifolia</i> | POAN3 |
| Nebraska Sedge | <i>Carex nebrascensis</i> | CANE2 |
| Needle & Thread | <i>Hesperostipa comata</i> | HECO26 |
| Nodding Brome | <i>Bromus anomalus</i> | BRAN |
| Owl-clover | <i>Orthocarpus spp.</i> | ORTHO |
| Phlox | <i>Phlox spp.</i> | PHLOX |
| Pinegrass | <i>Calamagrostis rubescens</i> | CARU |
| Plains Pricklypear | <i>Opuntia polyacantha</i> | OPPO |
| Plains Reedgrass | <i>Calamagrostis montanensis</i> | CAMO |
| Planeleaf Willow | <i>Salix planifolia</i> | SAPL2 |
| Prairie Junegrass | <i>Koeleria macrantha</i> | KOMA |
| Prairie smoke | <i>Geum triflorum</i> | GETR |
| Purple Reedgrass | <i>Calamagrostis purpurascens</i> | CAPU |
| Pussy-toes | <i>Antennaria spp.</i> | ANTEN |
| Quaking Aspen | <i>Populus tremuloides</i> | POTR5 |
| Red Sage | <i>Bassia americana (Kochia americana)</i> | BAAM4 |
| Red-oiser Dogwood | <i>Cornus sericea ssp. sericea</i> | COSES |
| Rocky Mountain Butterweed | <i>Packera streptanthifolia</i> | PAST10 |
| Rocky Mountain Dandelion | <i>Taraxacum eriophorum</i> | TAER2 |
| Rocky Mountain Iris | <i>Iris missouriensis</i> | IRMI |
| Rocky Mountain Juniper | <i>Juniperus scopulorum</i> | JUSC2 |
| Rough Fescue | <i>Festuca campestris</i> | FECA4 |
| Rubber Rabbitbrush | <i>Ericameria nauseosa</i> | ERNA10 |
| Rush | <i>Juncus spp.</i> | JUNCU |
| Russian Knapweed | <i>Acroptilon repens</i> | CENRE |
| Russian Thistle | <i>Salsola kali</i> | SAKA |
| Sandberg Bluegrass | <i>Poa secunda</i> | POSE |
| Sandwort | <i>Arenaria spp.</i> | ARENA |

| Common Name | Scientific Name | USDA Symbol |
|--------------------------|---|--------------------|
| Sapphire Rockcress | <i>Arabis fecunda</i> | ARFE6 |
| Scarlet Globe-mallow | <i>Sphaeralcea coccinea</i> | SPCO |
| Sedge | <i>Carex spp.</i> | CAREX |
| Shy Wallflower | <i>Erysimum inconspicuum</i> | ERIN7 |
| Short-fruited Willow | <i>Salix brachycarpa</i> | SABR |
| Shrubby Cinquefoil | <i>Dasiphora fruticosa ssp. floribunda</i> | DAFRF |
| Silver Sagebrush | <i>Artemisia cana</i> | ARCA13 |
| Slender Cinquefoil | <i>Potentilla gracilis</i> | POGR9 |
| Slender Sedge | <i>Carex lasiocarpa</i> | CALA11 |
| Slender Thelypody | <i>Thelypodium sagittatum ssp. sagittatum</i> | THSAS |
| Slender Wheatgrass | <i>Elymus trachycaulus</i> | ELTR7 |
| Smooth Brome | <i>Bromus inermis</i> | BRIN2 |
| Spike Fescue | <i>Leucopoa kingii</i> | LEKI2 |
| Spotted Knapweed | <i>Centaurea stoebe ssp. micranthos</i> | CESTM |
| Spruce | <i>Picea spp.</i> | PICEA |
| Stemless Mock Goldenweed | <i>Stenotus acaulis</i> | STAC |
| Sticky Geranium | <i>Geranium viscosissimum</i> | GEVI2 |
| Stiffleaf Penstemon | <i>Penstemon aridus</i> | PEAR2 |
| Subalpine Fir | <i>Abies lasiocarpa</i> | ABLA |
| Sweetscented Bedstraw | <i>Galium triflorum</i> | GATR3 |
| Thick-spike Wheatgrass | <i>Elymus lanceolatus</i> | ELLA3 |
| Three-tip Sagebrush | <i>Artemisia tripartita</i> | ARTR4 |
| Timothy | <i>Phleum pratense</i> | PHPR3 |
| Tufted Hairgrass | <i>Deschampsia cespitosa</i> | DECE18 |
| Ute Ladies' Tresses | <i>Spiranthes dilivialis</i> | SPDI6 |
| Water Birch | <i>Betula occidentalis</i> | BEOC2 |
| Water Sedge | <i>Carex aquatilis</i> | CAAQ |
| Western Fescue | <i>Festuca occidentalis</i> | FEOC |
| Western Meadow-rue | <i>Thalictrum occidentale</i> | THOC |
| Western Wheatgrass | <i>Pascopyrum smithii</i> | PASM |
| Western Yarrow | <i>Achillea millefolium var. occidentalis</i> | ACMIO |
| Wheeler's bluegrass | <i>Poa wheeleri</i> | POWH2 |
| Whiplash Willow | <i>Salix lucida ssp. lasiandra</i> | SALUL |
| White Clover | <i>Trifolium repens</i> | TRRE3 |
| White Sagebrush | <i>Artemisia ludoviciana</i> | ARLU |
| White Spruce | <i>Picea glauca</i> | PIGL |
| Whitebark Pine | <i>Pinus albicaulis</i> | PIAL |
| Wind River Draba | <i>Draba ventosa</i> | DRVE |
| Winterfat | <i>Krascheninnikovia lanata</i> | KRLA2 |
| Wolf's Willow | <i>Salix wolfii</i> | SAWO |
| Wyoming Big Sagebrush | <i>Artemisia tridentata ssp. wyomingensis</i> | ARTRW8 |
| Yellow Sweetclover | <i>Melilotus officinalis</i> | MEOF |
| Yellow Willow | <i>Salix lutea</i> | SALU2 |