

### 3.0 Affected Environment

This chapter describes the environmental resources related to the issues in Chapters 1 and 2. The resources include the physical, biological, and socio-economic conditions that could be affected by the implementation of one of the alternatives.

The information in this chapter is organized into the following headings:

- 3.1 Rangelands
- 3.2 Upland Range Health
- 3.3 Riparian Health
- 3.4 Noxious Weeds
- 3.5 Coniferous Forest
- 3.6 Livestock Grazing
- 3.7 Recreation
- 3.8 Visual Resource Management
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- 3.10 Wildland Fire
- 3.11 Cultural Resources
- 3.12 Surface Water
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- 3.14 Soils
- 3.15 Air Quality
- 3.16 Economics
- 3.17 Sociology
- 3.18 Areas of Critical Environmental Concern (ACECs)

#### 3.1 Rangelands

Rangeland vegetation consists of sagebrush grasslands, grasslands, and lightly vegetated badlands. Mixed shrub communities are common in coulees and benches throughout all of these vegetation types. Common grasses and grasslike species include bluebunch wheatgrass, green needlegrass, needle and thread, western wheatgrass, prairie junegrass, blue grama, prairie sandreed, Sandberg bluegrass, and threadleaf sedge. Introduced grasses are found in some areas, either in pure stands or intermingled with native species. Crested wheatgrass is

the most prevalent introduced perennial grass in the watershed, with numerous pure or nearly pure stands in several allotments. Introduced annual grasses include cheatgrass and Japanese brome. Common shrubs include big sagebrush, silver sagebrush, saltbush spp., greasewood and rubber rabbitbrush. Other common vegetation includes prickly pear cactus and dense clubmoss. There are no known occurrences of threatened, endangered, or sensitive plants in the watershed. Appendix H lists common plants in the planning area.

#### 3.2 Upland Range Health

Allotments were assessed for upland range health during the summers of 2004 and 2005. Rangeland health is defined as the degree to which the integrity of the soil, vegetation, water and air as well as the ecological process of the rangeland system are balanced and maintained (BLM Tech. Ref. 1734-6).

Upland health was determined using existing permanent study plots. These study plots were evaluated for ecological site index, upland range health indicators, and soil surface factors. 81 of the 134 allotments are meeting the upland health standard. 53 allotments are not meeting the upland standard; current livestock management is a significant factor on 34 of these allotments. Appendix D displays a list of study results by allotment.

Drought has influenced the condition of vegetation in some areas. To separate the impacts of drought from livestock use, the evaluation team looked at fence line contrasts and similar sites under different management to discern the amount of impact caused by livestock management versus impacts of drought. Precipitation records from a nearby weather station were also reviewed.

### 3.2.1 Status of Upland Range Health

Seral stages and ecological site index scores were determined on upland sites using the NRCS ecological site index technical guides for each ecological site. This method assesses the seral stage of an ecological site and provides a scoring system. The higher the score, the higher the plant successional stage (seral stage). Changes in plant communities (known as plant succession) are characterized by different types of plant communities replacing other types of plant communities. A plant community reaches climax or Potential Natural Community (PNC) when it reaches a point that the community maintains itself and is relatively stable. Different stages of succession are called seral stages. The amount and type of disturbance, the site, and the amount of rest following disturbance often dictate the seral stage of the plant community. In prairie grassland ecosystems, areas that have prolonged disturbance with little rest have a high abundance of annual forbs and weeds, some annual grasses, and shallow rooted perennial grasses of short stature. These conditions would indicate a low seral stage. With the NRCS ecological site index system, the higher the score, the higher the seral stage.

Areas without recent disturbance or light disturbance followed by periods of rest usually reflect late seral or potential natural community. This stage is characterized by tall, deep rooted grasses, fewer forbs and weeds, and in some cases a shrub overstory. Prairie ecosystems evolved with periodic disturbance in the form of fire, grazing, hail, and drought followed by periods of favorable growing conditions. In some cases a lack of some type of disturbance over a period of decades can cause succession to reverse toward lower or early seral conditions. Conversely, prolonged disturbance without adequate rest for plant recovery can also lead to early seral conditions. Proper livestock grazing

management allows some disturbance followed by periods of rest during the growing season resulting in healthy, productive upland range sites.

On a site-specific scale, late seral or PNC conditions are associated with healthy rangelands and early (low) seral conditions are often associated with unhealthy rangelands. On a larger scale, however, a mix of seral stages provides habitat diversity. Healthy upland range sites generally maintain a high percentage of the plant community in late seral or PNC conditions, although a small percentage of the total acreage may be in early seral stages. Examples of acceptable early seral conditions would be livestock watering points, trails, prairie dog towns and areas surrounding gates and cattleguards. Seral stages are shown by allotment and transect site in appendix D.

Erosion condition class determinations (soil surface factors) were also completed to assess erosion conditions on rangelands. The method uses seven factors to assess the condition of the soil surface. Factors such as the amount of bare ground, amount of rilling, gullies or other forms of erosion are assessed and scored. These criteria are indicative of the amount of erosion that is occurring. The majority of the acreage in the planning area rated in the stable or slight erosion class category.

The BLM also uses rangeland health indicators to assess and evaluate problematic upland range sites. These indicators provide no scores, and factor the structure and function of the ecosystem rather than individual components. Rangeland health indicators are an important and effective way to communicate problems or successes to permittees and the public.

The biotic and physical indicators include:

## Biotic

- plant community diversity
- plant community structure
- photosynthesis activity
- plant status
- presence of exotic plants (weeds)
- seed production
- nutrient cycling

## Physical

- flow patterns
- soil movement by wind or water
- soil crusting and surface sealing
- soil compaction
- rills
- gullies
- amount of ground cover
- cover distribution

Rangeland health determinations were made based on upland health assessments comprised of the ecological site index, soil surface factors, and range health indicators. Grazing allotments were placed in one of three categories: meeting the upland health standard, not meeting the standard but livestock grazing is not a significant factor (or the allotment is making significant progress toward meeting the standard), and not meeting the standard. Significant progress is determined when an allotment with degraded conditions is showing a strong upward trend. Summaries of rangeland health determinations are displayed in Appendix M.

### 3.3 Riparian Health

Riparian areas are defined as the green zones associated with lakes, reservoirs, estuaries, potholes, springs, bogs, wet meadows, and streams (ephemeral, intermittent, or perennial). Greasewood and silver sagebrush are common in alluvial flats in or near riparian areas. Snowberry, chokecherry, hawthorne, rose, buffaloberry,

and gooseberry are commonly found in coulees and woody draws. The riparian zone occurs between the upland zone and the aquatic zone. Riparian areas are characterized by water tables at or near the soil surface, and by vegetation requiring high water tables. A universally accepted definition satisfactory to all users has not yet been developed because the definition depends on the objectives and the field of interest. However, scientists generally agree that riparian areas are characterized by one or more of the following features: 1) *wetland hydrology*, the driving force creating all riparian areas, 2) *hydric soils*, an indicator of the absence of oxygen, and 3) *hydrophytic vegetation*, an indicator reflecting riparian site conditions.

Generally, riparian areas are among the most resilient ecosystems. Depending on condition and potential, they usually respond more quickly than drier upland ranges to changes in management (USDI, 1997).

Livestock grazing management in riparian areas is one of the most pervasive issues facing rangeland managers. In this watershed a typical pasture has as its water source one of the major streams listed in the Surface Water section below. The riparian area associated with these streams occupies less than 10% of the total area in the pasture but provides a disproportionate amount of the use because of a lack of other water sources, shade, accessibility, and palatable, productive forage.

Riparian area management is also one of the most complex issues for rangeland managers because:

- Most riparian acreage is privately controlled or intermingled with other ownerships
- Riparian areas are often the primary, and sometimes the only, watering place for livestock
- Public use of riparian areas is increasing

- Other resource values are concentrated in and dependent on those areas
- Grazing affects a number of resources and uses, both on-site and off-site
- The value of properly functioning riparian systems is not widely understood
- Traditional management practices are often inadequate and difficult to change

Because of these complexities, the involvement and cooperation of private landowners, ranchers, recreationists, other watershed users, and many different disciplines is critical to the success of riparian area management programs.

Most of the riparian areas in the planning area were assessed for health. The health score was then used to determine if changes were needed in the existing grazing systems. Riparian health ratings consist of three categories; proper functioning condition (PFC), functioning at risk (FAR), and non-functioning (NF). PFC is described as functioning properly when:

- Adequate vegetation, landform, or woody debris is present to dissipate stream energy
- Vegetation captures sediment thereby improving water quality
- Vegetation captures sediment aiding in floodplain development
- Flood-water retention and ground water recharge are adequate
- Root masses stabilize streambanks against cutting actions
- Diverse ponding and channel characteristics are developed to provide fish habitat, waterfowl breeding areas, and other uses
- Greater biodiversity is supported

FAR are areas that are functional but an existing soil, water, or vegetation attribute makes them susceptible to degradation. NF are riparian areas that clearly are not

providing vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of certain physical attributes such as a floodplain where one should be are indicators of non-functioning conditions.

The health of streams within the Petrolia Watershed planning area was assessed using the Montana Riparian and Wetland Association (MRWA) Lotic Wetland Health Assessment for Streams and Small Rivers. A total of 54 miles were assessed. 14.3 miles scored PFC, and 7.1 miles were FAR with an upward trend. Riparian areas that are FAR with an upward trend do not require corrective action. 12.2 miles scored FAR with a static trend, and 20.4 miles were NF. Probable causes for the riparian degradation were livestock, weeds, natural erosion, flow alteration, and hydromodification. Riparian areas that were FAR or NF because of causes that are within BLM's management capabilities such as weeds or livestock grazing require corrective actions.

### 3.4 Noxious Weeds

Noxious weeds are a serious threat to the State of Montana and the Petrolia Watershed planning area. Infestations of noxious weeds are present throughout the watershed, with higher concentrations along the major drainages and their tributaries, including Ford's Creek, Box Elder Creek, Pike Creek, Buffalo Creek, Duck Creek, and the Musselshell River.

Montana noxious weeds are categorized according to the following criteria:

- *Category 1* noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria include awareness and education, containment, and suppression of

existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

- Canada Thistle (*Cirsium arvense*)
- Field Bindweed (*Convolvulus arvensis*)
- Whitetop or Hoary Cress (*Cardaria draba*)
- Leafy Spurge (*Euphorbia esula*)
- Russian Knapweed (*Centaurea repens*)
- Spotted Knapweed (*Centaurea maculosa*)
- Diffuse Knapweed (*Centaurea diffusa*)
- Dalmatian Toadflax (*Linaria dalmatica*)
- St. Johnswort (*Hypericum perforatum*)
- Sulfur (Erect) Cinquefoil (*Potentilla recta*)
- Common tansy (*Tanacetum vulgare*)
- Ox-eye Daisy (*Chrysanthemum leucanthemum* L)
- Houndstongue (*Cynoglossum officinale* L.)
- Yellow toadflax (*Linaria vulgaris*)

- **Category 2** noxious weeds have recently been introduced to the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread, rendering lands unfit for beneficial uses. Management criteria includes awareness and education, monitoring and containment of known infestations, and eradication where possible.

- Dyers Woad (*Isatis tinctoria*)
- Purple Loosestrife or Lythrum (*Lythrum salicaria*, *L. virgatum*, and any hybrid crosses thereof).
- Tansy Ragwort (*Senecio jacobea* L)
- Meadow Hawkweed Complex (*Hieracium pratense*, *H. floribundum*, *H. piloselloides*)
- Orange Hawkweed (*Hieracium aurantiacum* L.)
- Tall Buttercup (*Ranunculus acris* L)
- Tamarisk [Saltcedar] (*Tamarix* spp.)
- Perennial pepperweed (*Lepidium latifolium*)

- **Category 3** noxious weeds have not been detected in the state or may be found only in small, scattered, localized

infestations. Management criteria includes awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

- Yellow Starthistle (*Centaurea solstitialis*)
- Common Crupina (*Crupina vulgaris*)
- Rush Skeletonweed (*Chondrilla juncea*)
- Eurasian watermilfoil (*Myriophyllum spicatum*) Yellow flag iris (*Iris pseudacoru*)

Several weed species have been identified within the planning area; the largest areas of infestation are occupied by:

- Leafy spurge
- Canada thistle
- Spotted knapweed
- Russian knapweed
- Whitetop (Hoary cress)
- Houndstongue

The BLM has been actively involved in an integrated weed control program within the planning area for several years. Weed infestations have grown appreciably during the past two decades. Biological control of leafy spurge shows promise on large, dense stands which have proven very difficult to control using chemical alone. Established insect populations are monitored, collected, and dispersed by BLM personnel and permittees. Spotted knapweed and Canada thistle biological control agents have been released on a limited basis within the planning area. Effective biological control agents are currently not available for Russian knapweed, whitetop, or houndstongue.

Noxious weed species of concern which have recently been identified within the watershed are:

- Salt cedar
- Black henbane
- Sulfur cinquefoil

Salt cedar is an extremely invasive noxious weed presently expanding along the Musselshell River. Dense stands of salt cedar can deplete groundwater aquifers and dewater perennial watercourses. A mature salt cedar plant can transpire up to 300 gallons of water during a hot summer day.

### **3.5 Coniferous Forest**

Forested vegetation types include ponderosa pine and ponderosa pine/Douglas-fir. Both vegetation types are common in the Petrolia watershed. Ponderosa pine is common on south slopes and ridges and the ponderosa pine/Douglas fir type is common on steep north facing slopes. Forested areas are generally patchy and disconnected because of the broken topography.

Conifer densities have been increasing in many forested areas. Pine seedlings and saplings are expanding into rangeland areas on forest margins. Heavy stand densities cause competition among conifers, with associated declines in forest health and decreased productivity of understory vegetation such as grasses, forbs, and shrubs. Drought has exacerbated the condition. Understory conifers contribute to fuel loadings that create a continuous fuel bed from the ground to the canopy. Wildland fire can be severe in these areas.

The encroachment of ponderosa pine into open parks reduces biodiversity, crowds out sagebrush/grassland habitat and creates an increase threat of severe fires due to an increase in the continuity of fuels.

### **3.6 Livestock Grazing**

A total of 134 grazing allotments permitted to 76 permittees are included in the watershed. The majority of permits authorize cattle grazing only; exceptions are sheep and horse grazing on 3 allotments.

Total permitted use in the planning area is 34,153 AUMs. Appendix K displays the allotment information.

### **3.7 Recreation**

The Petrolia watershed is located within the Judith Recreation Management Area (RMA MT060-07).

This extensive recreation management area (RMA) allows for dispersed and unstructured recreational activities on public land in the planning area. Recreation opportunities include hunting, wildlife photography, wildlife viewing, sightseeing, and some pleasure driving where public land access is available. The majority of use occurs during the summer and the fall hunting season.

Hunting opportunities and access for the general public in the planning area are very good. Outfitters provide deer and elk hunting trips to clientele from their ranch headquarters on a day-use basis in the planning area.

Currently, the BLM authorizes three Special Recreation Permits (SRPs) for commercial outfitting operations on public land in the planning area. SRPs are issued to outfitters with a valid State of Montana outfitter license and are authorized at the discretion of the LFO manager.

Additionally, a number of dispersed campsites along the travel routes are used by hunters. These campsites are used most weekends, and sometimes for several weeks by different parties of hunters from September through November. A fee is not required for the general public, but camping is limited to 14 days. Camps must be moved at least five miles following the 14-day limit.

Outfitters pay an annual fee of 3% of their adjusted gross revenue (minimum \$80) for the privilege of utilizing the public land in

their commercial hunting business. They are required to pay an additional \$160 if they are approved for a camp on public land.

### **3.8 Visual Resource Management (VRM)**

Public land within the planning area has been assigned a Visual Resource Management (VRM) class based on a process that utilizes scenic quality and sensitivity to changes in the landscape based upon the distance zone from which a project or proposal would be seen by the casual observer. This is accomplished by incorporating the four primary elements found in the environment: form, line, color, and texture, into a proposed project. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

The four VRM classes are numbered I to IV (Visual Resource Management Program, Bureau of Land Management, 1980); the lower the number the more sensitive and scenic the area. Each class has a management objective that prescribes the level of acceptable change in the landscape. Approximately 40% of the public lands in the Petrolia watershed (60,249) are Class III, and 60% (90,372 acres) are Class IV. The Class III rating allows for moderate contrasts to the environment, but they should be subordinate to the existing landscape. For Class IV lands, the level of contrast to the landscape from authorized projects could be evident, but should be moderated by using the basic elements of form, line, texture, and color.

### **3.9 Wildlife Resources**

The variety of upland and riparian vegetation within the watershed provides habitat for a diverse wildlife population. In a relatively small area, the habitat may include deciduous tree stands with other associated riparian species, mixed coniferous forest, sagebrush steppe and agricultural land. Over 50 mammals, 200 species of birds and 20 species of amphibians and reptiles inhabit these areas. The Musselshell River can be a valuable fishery in years of adequate moisture and perennial flows.

#### **3.9.1 Mammals**

The most significant mammals are elk, mule deer, and the special status black-tailed prairie dog. Several water obligate species are also very common on or near the Musselshell River; beaver have become prevalent due in part to low fur values. Mountain lions and coyotes are well adapted to the breaks and populations are well established. Smaller predators such as foxes, skunks and raccoons are relatively abundant in some areas of the watershed. The hoary bat, big brown bat, little brown bat, long-eared bat, long-legged bat, and Townsend's big-eared bat may occur in the area.

The black-tailed prairie dog was ruled to be warranted for listing but precluded by the USFWS in February of 2000. After a thorough review of the species they were removed from the candidate list in August 2004. The known prairie dog towns in the planning area have been mapped for reference purposes (Map M5). All or portions of 20 prairie dog towns have been documented on 1,042 acres of public land within the watershed. Each of the 20 prairie dog towns has some potential for expansion. Grazing permittees and interested members of the public have reported the expansion of several towns. The largest town in the watershed

encompasses the majority of the South Pasture Allotment 05142. A small town in the West Winnett Allotment 15023 is adjacent to the Winnett airport. Control efforts on the airport property provide vacant burrows which are readily occupied by dogs from the West Winnett town. Because of the limited size of the dog towns in the planning area, the opportunity for black-footed ferret occupation is minimal. These dog towns provide opportunity for species such as burrowing owls, ferruginous hawks, and mountain plovers that are known to be associated with dog towns. Prairie dog towns provide an island of unique habitat that attracts a large number of predator species, particularly coyotes and badgers.

The Petrolia Watershed lies within elk and deer hunting districts 410, 411, 412, 530, and 701. Elk numbers have increased following the initial introduction into the Missouri Breaks in the 1950s. In recent years local landowners and permittees have indicated that elk numbers are too high and discourage any further increase in the elk population. MT FWP conducted a thorough elk count in the spring of 2004, concluding that the elk population in hunting district 410 has grown to over 3,600. During the 2004 and 2005 hunting seasons the number of cow elk tags increased substantially in district 410. MT FWP is proposing cow hunting on a general tag in district 411 during the 2006 season in an attempt to reduce elk numbers closer to objective levels. The BLM's objectives are to provide suitable habitat for the appropriate number of elk identified for each hunting district. Elk habitation is not exclusive to public land within the watershed. The primary elk use areas in this watershed are the Pike Creek Hills in district 411, Musselshell Breaks south of Highway 200 in Districts 701 and 530, and winter range east of Black Butte in district 412.

The mule deer population is currently at an appropriate level. An eight year population

increase has followed a very low 1996 mule deer count. Several factors have contributed to this recent population increase. The mule deer population drop in the mid 1990's was primarily caused by poor production of forbs and browse in consecutive years (1994 and 1995) as a result of low rainfall during the growing season. Cold temperatures and deep snow in 1996 and corresponding high predator numbers also contributed to the population drop. Preferred browse species in some areas of the watershed are either decadent or being over utilized by wildlife or livestock. During the winter of 2003 and 2004, a severe weather period after Christmas caused a varied amount of mule deer mortality in Petroleum County. Habitat characteristics of broken topography, cover, and browse availability make the watershed a very productive mule deer area. The entire Petrolia Watershed planning area is considered valuable mule deer habitat. MT FWP has issued 100 district 410 mule deer doe tags in 2006. This will be the first year mule deer does have been harvested in district 410 since 1995.

Whitetail deer and pronghorn antelope are also major components of the wildlife community within the planning area. Whitetail deer inhabit the riparian areas along the Musselshell River, McDonald and Flatwillow Creeks and periodically move into the adjacent BLM uplands.

Antelope occupy habitat throughout the watershed. Hunting districts 420, 480, 481, 530 and 701 are all represented in the planning area. Antelope numbers have recovered very well following a period of high mortality during the winter of 2003 and 2004. The majority of the antelope habitat in this watershed is in districts 420 and 481. MT FWP proposes increasing the number of either-sex and doe/fawn tags for both districts during the 2006 hunting season.



### 3.9.2 Birds

The bald eagle is currently on the threatened species list. The mountain plover was proposed for listing as threatened in 1999 but withdrawn in 2003. The peregrine falcon was removed from the endangered list in 1999. Both the mountain plover and peregrine falcon are currently considered special status species. The current BLM sensitive species list includes Bairds sparrow, burrowing owl, ferruginous hawk, Swainson's hawk, and sage grouse.

Tree nesting raptors including Swainson's hawk, red-tailed hawk and great-horned owl are known to be present in cottonwood stands and isolated conifers in the planning area. Ground nesting raptors including ferruginous hawks, burrowing owls and northern harriers are also present. Burrowing owls and ferruginous hawks have been documented taking advantage of the prey opportunities provided by prairie dog towns.

Four species of upland game birds are present in the planning area; Hungarian partridge, sharp-tailed grouse, sage grouse and ring-necked pheasant. Partridge are commonly associated with private cropland; sharp-tails are primarily located in the heads of brushy coulees and grasslands. Sharp-tail numbers have dropped during recent dry growing seasons, but 2006 was a successful nesting year. Pheasants are primarily found near farmland but also occupy well vegetated riparian areas.

Sage grouse are present in most of the Petrolia Watershed area except the timbered areas and prairie grasslands devoid of sagebrush. Forty-six active sage grouse strutting grounds (leks) are located on or near public land within the boundaries of the planning area. Twenty-three active leks are found in MT FWP Region 4 War Horse sub-unit, 16 in the Yellow Water sub-unit and 7 in the Region 5 portion of Petroleum County south of Highway 200 and east of Highway 244. The area

encompassed by the Petrolia Watershed Plan contains one of the densest concentrations of sage grouse leks in the state of MT. Some of these grouse leks demonstrate stable attendance numbers each spring, though a few have dropped in attendance in recent years. Several land management factors could be contributing to diminishing lek attendance in the area. Intermingled private land in the traditional grouse areas has been actively cultivated in recent years. Several hundred acres of sagebrush habitat were cultivated in 2004 and 2005. Livestock grazing can be a detriment to sage grouse nesting success. Grazing must be managed to provide adequate herbaceous nesting cover under the sagebrush overstory in some portions of the grazing allotment. Some parcels of public land contain predominant or continuous stands of crested wheatgrass persisting from the Bankhead-Jones Land Utilization era. Many of these crested wheatgrass dominated lands exhibit little reinvasion of the native sagebrush community and comprise a monoculture with limited sage grouse value.

The cottonwood, box elder, and ash habitats along the Musselshell River provide nesting and brooding habitat for dozens of neo-tropical migrant species during the summer. Mourning doves are abundant in the tree stands along the river. The deciduous trees along the river's edge are unique in this area of predominant prairie grasslands and coniferous forested coulees and ridges; they provide valuable habitat for most bird species on the river. This deciduous forest habitat type is very limited within the watershed; only five small parcels of public land border the Musselshell River. Isolated small stands of large cottonwoods occur on public land along Pike Creek.

Bald eagle and peregrine falcon occurrence in the watershed is uncommon and most probable during seasonal migration. Active eagle nests have not been identified on this portion of the Musselshell River. Mature cottonwood nest trees are limited; mortality

is high due to several years of below average water flows in the lower Musselshell River. Fish availability for eagle foraging is also limited by the low river flows. Potential cliff nest sites for peregrine falcons are not available in the planning area. Peregrine forage opportunity is limited to a few small areas of waterfowl production on the larger stock reservoirs.

The home range of the mountain plover includes the short grass prairie from northern Montana to southern New Mexico. Breeding pairs have been documented on prairie dog towns 10 to 15 miles north of the planning area. Mountain plovers have not been documented in the planning area but potential habitat does exist for the species. The mountain plover may be considered a disturbed-prairie species preferring arid flats with very short grass and a high proportion of bare ground. Prairie dog towns and a few acres of short grass dominated sites within the watershed provide potential habitat for the mountain plover.

### **3.9.3 Fish**

The lower Musselshell River was a substantial fishery in the past. In recent years, however, the lower portion of the river is dry throughout much of the year. Generally, a few pools remain large enough to sustain catfish, carp and some minnows. Historically, sauger and walleye run up the river from Fort Peck Reservoir during periods of flowing water. The reservoir is presently so low that the fish cannot negotiate the Musselshell delta even during periods of flow. Sauger were identified as a Montana Species of Special Concern in 2000. Other sensitive species have not been identified in this portion of the Musselshell River. There is potential, though not verified through surveys, for the sensitive Northern redbelly x finescale dace hybrid to exist within the river. Opportunity for significant BLM fisheries management on the Musselshell River is extremely limited due to the small amount of public

land adjacent to this section of the river and the unreliable water flow.

Fish also inhabit several prairie streams throughout the watershed. Fish were recently sampled by MT FWP in Yellow water Creek, Flatwillow Creek, Box Elder Creek, Pike Creek, Akins Coulee, Shale Coulee and South Fork Bear Creek. Species found in these streams included fathead minnows, sand shiner, green sunfish, northern redbelly dace, lake chub, white sucker and mountain sucker.

MT FWP has actively stocked large mouth bass in South Fork Dry Blood and Payola reservoirs for several years. The JVP RMP identified the recreation and fisheries potential of these two reservoirs.

### **3.9.4 Amphibians and Reptiles**

The tiger salamander is the only salamander occurring in the planning area. The woodhouse toad, western chorus frog, Great Plains toad, plains spadefoot, and possibly the northern leopard frog all occur in the area. Populations of the northern leopard frog appear to be in a sharp decline in Western MT (west of the continental divide), creating concern. Snakes found in the area include the western rattlesnake, racer, bull snake, and two species of garter snake. The short-horned lizard, spiny softshell turtle, and painted turtle are also known to be present in the planning area.

BLM sensitive species amphibians and reptiles include:

- Great Plains toad
- plains spadefoot
- northern leopard frog
- spiny softshell turtle
- greater short-horned lizard

### **3.10 Wildland Fire**

The wildland fire history in the planning area, from 1980 to 2004, indicates Federal

agencies have responded to 33 fires which burned an estimated 2,175 acres. The average number of fires per year was 1.4 and the average fire size was 66 acres.

Lightning is the primary cause of wildland fires accounting for approximately 98% of all fire starts within the project area. Other historical causes of fire starts include agricultural equipment, debris burning and recreation (hunting).

**Petrolia Watershed Fire History:**

**Table 3.1 Federally Reported fires from 1980 to 2004**

| Fire Size Class | No. of Fires | Total Acres  | Min. Acres | Max. Acres | Avg. Acres | First Occurrence | Last Occurrence |
|-----------------|--------------|--------------|------------|------------|------------|------------------|-----------------|
| A               | 9            | .5           | 0.0        | .1         | .1         | 1983             | 2004            |
| B               | 12           | 24.5         | .5         | 5.0        | 2.0        | 1980             | 2004            |
| C               | 5            | 250.0        | 15.0       | 75.0       | 50.0       | 1987             | 1997            |
| D               | 4            | 600.0        | 120.0      | 210.0      | 150.0      | 1996             | 2004            |
| E               | 3            | 1300.0       | 300.0      | 600.0      | 433.3      | 1983             | 2003            |
| <b>Total</b>    | <b>33</b>    | <b>2,175</b> |            |            |            |                  |                 |

**Table 3.2 Large Fire Information – 1980 to 2004**

| Agency | Unit ID | Yr   | Fire No. | Fire Name        | Fire Size Class | Controlled Acres | Discovery date | Control Date |
|--------|---------|------|----------|------------------|-----------------|------------------|----------------|--------------|
| BLM    | MTLED   | 1983 | 2733     | Jurdie           | E               | 600              | 830814         | 830814       |
| BLM    | MTLED   | 1994 | H592     | Kelly Site       | E               | 400              | 940911         | 940911       |
| BLM    | MTLED   | 1996 | H437     | Lake Creek       | D               | 210              | 960814         | 960814       |
| BLM    | MTLED   | 2001 | HC40     | Grass Range      | D               | 120              | 010901         | 010901       |
| BLM    | MTLED   | 2002 | HC40     | East Grass Range | D               | 120              | 020307         | 020310       |
| BLM    | MTLED   | 2003 | H520     | Bilkner          | E               | 300              | 030806         | 030806       |
| BLM    | MTLED   | 2004 | A9SA     | HWY 91 Co        | D               | 150              | 040731         | 040731       |

**Table 3.3 Other Statistics**

|      |                           |
|------|---------------------------|
| 65.9 | Average Fire Size (acres) |
| 3.0  | Median Fire Size (acres)  |
| 33.0 | Number of Fires           |
| 24.0 | Number of Years           |
| 1.4  | Average Fires per Year    |

**3.11 Cultural Resources**

The BLM broadly defines cultural resources as any traditional lifeway belief or cultural property. Cultural properties are defined as distinct evidence in areas of past human occupation, activity, and use. Traditional lifeway beliefs are defined as traditional value systems of religious beliefs, cultural practices, or social exchange that are not closely and tangibly defined or identified with definite locations (JVP, 1992).

Early peoples in the study area were mobile hunters and gatherers throughout and up until the historic period. The following brief overview explains changes through time as summarized by other archaeologists (Frison 1978; Ruebelmann 1983).

The Early Prehistoric period (roughly 10,000 – 5,700 B.C.) is characterized by a tool assemblage consisting of large, lanceolate and/or fluted spear points, and multipurpose tools made of stone or ivory. Subsistence strategies specialized in hunting megafauna but smaller game and plant foods were utilized as well. Typical site types include kill and butchering sites, open air camp sites, and limited activity sites.

The Middle Prehistoric period (roughly 5,000 B.C. – A.D. 400), is characterized by a shift in tool types from thrusting spears with lanceolate spear heads to spear throwers and darts with diagnostic spear points. Groundstone tools also begin to show up in the assemblages. Subsistence strategies shift from more specialized hunting of megafauna to a broader spectrum strategy which becomes focused on bison by the end of this period. Plant procurement and use also occurs. Evidence of storage in the form of storage pits begins to show up during this period as do large cooking pits. Site types typical of this period include kill and butcher sites, camp sites, and rock shelters. Stone circle sites are rare in this area.

The Late Prehistoric period (roughly A.D. 500 – 1800), is characterized by a technological shift from spear throwers and darts to bow and arrows. Tool assemblages consist of small side, corner, or tri-notched points. Some ceramics become evident in the record in limited number on the Northwest Plains at this time. Grooved mauls, bone fleshers, and shell beads are common. Subsistence strategies continue to focus on bison procurement. Large communal bison kill/jump sites, rock shelters, wind breaks, and caves are the site types typically found in this area. Stone circle sites are rarer compared to northern areas.

During the historic period, settlers by the thousands came into the area to live on homesteads. Germans and Scandinavians came from the Midwest, as did eastern European immigrants like Bohemians and Yugoslavs (JVP, 1992).

Cultural sites can be considered significant for several reasons; some because information about the past can be learned through methodical study of the sites, while other sites communicate a sense of a particular time period they represent in history. Finally, sites can be considered to be important because of the current use or values associated with the location.

An important consideration for management actions in this area is preserving the values of the cultural properties contained within. In order to preserve the integrity of a cultural property, it is sometimes necessary to preserve the location in which the cultural property is found. This is an important consideration when the management actions have the potential to affect the location of a cultural property, thus affecting the overall integrity of the cultural property.

The cultural resource site database maintained by the Montana State Historic Preservation Office was reviewed on February 1, 2006. A printout from the database was compared to the Petrolia

Watershed area which shows land status. A total of 273 cultural sites have been documented within the planning area. 115 of those sites are on land administered by the BLM, of which 68 are prehistoric, 30 are historic, and 17 have both historic and prehistoric components.

The prehistoric sites include lithic scatter sites, fire hearths/roasting pits, rock cairns, buffalo jumps, rock shelters, stone circles, and petroglyphs.

The historic sites relate to homesteading, early agriculture, railroad, military, transportation, and townbuilding in Winnett.

Two sites on BLM surface within the planning area have been determined to be eligible for the National Register of Historic Places, 53 sites are unevaluated, 22 have unresolved status, and 38 have been determined ineligible for listing in the National Register.

Most of the documented sites are associated with Two Crow land exchanges. A total of 257 cultural resource inventories have been documented in the planning area. Most were completed for projects that took place on BLM land, but many were also done for state projects. A complete listing of known sites and inventories conducted within the Petrolia Watershed between 1977 and 2005 can be found in the project file.

### **3.12 Surface Water**

The Musselshell River is the major river in the Petrolia planning area. Significant intermittent and perennial streams within the planning area include Box Elder Creek, Flatwillow Creek, Pike Creek, Snoose Creek, Yellow Water Creek, Elk Creek, McDonald Creek, Fords Creek, Buffalo Creek, and Duck Creek. All other water courses in the watershed are ephemeral, flowing only in response to snow melt or intense summer storms. None of the

streams in the watershed are potable without treatment but all are suitable for livestock and wildlife.

Hydrologic conditions within the planning area are influenced by soil and vegetation conditions, road networks, diversions, impoundments, and stream channel modifications.

In the type of lands administered by the BLM in the planning area, runoff is generated by precipitation on the watershed. Contribution of ground water to runoff, especially from adjacent watersheds, is usually negligible, however, several small springs do occur in the planning area.

Soil and vegetation conditions within the planning area may have a small influence on runoff. Agriculture and livestock grazing has led to a change in plant cover that has significantly reduced soil-moisture storage. The altered infiltration and evapotranspiration rates have resulted in an increase in the timing and peak of runoff. Although the annual water yield is more than likely larger than historic conditions, effluent flows throughout the latter summer have probably decreased in the major drainage bottoms.

Hydrologic impacts from the road network in the planning area are small and mostly site specific. Areas of concentrated/routed flow and erosion do exist. On a watershed scale the road segments on BLM land are not causing hydrologic problems.

The largest hydrologic alterations within the assessment area are from flow diversion, impoundments, and stream channel modifications, which occur throughout the planning area on private and BLM lands. A large percentage of the watershed's annual yield is stored; stockwater reservoir density is greater than one per square mile. Diversions reroute water from many streams into large irrigation reservoirs such as Wild Horse Lake, War Horse Lake, and Petrolia Reservoir. Stream channel

modifications such as spreader dikes influence surface water quality, quantity, and timing.

Flatwillow Creek and Musselshell River are listed as water quality impaired by the Montana Department of Environmental Quality in the 303(d) list (MDEQ 2004). Yellow Water Creek, Snoose Creek, McDonald Creek, Box Elder Creek, and North Willow Creek are listed in water quality category 3, which means that there were insufficient data to assess any use.

Table 3.4 Impaired Streams and Probable Sources According to MDEQ

| Stream Segment   | Beneficial Use Support Status  | Probable Causes   | Probable Sources   |
|--|--|---|--|
| Flatwillow Creek (Highway 87 bridge to the mouth (Musselshell River))      | Aquatic Life Support (partial) Primary Contact-Recreation (partial) Warm Water Fishery (partial) | Bank erosion<br>Flow alteration<br>Mercury<br>Metals<br>Nutrients<br>Other habitat alterations<br>Siltation | Agriculture<br>Crop-related Sources<br>Grazing related sources<br>Hydromodification<br>Flow<br>Regulation/Modification<br>Habitat Modification<br>Removal of Riparian Vegetation |
| Musselshell River (from HUC boundary SW of Roundup to Fort Peck Reservoir) | Aquatic Life Support (partial) Primary Contact-Recreation (fully) Warm Water Fishery (partial)   | Flow alteration<br>Other habitat alterations<br>Riparian degradation  | Agriculture<br>Hydromodification<br>Channelization<br>Flow<br>regulation/modification<br>Habitat Modification<br>Bank or Shoreline Modification/Destabilization                  |

The BLM is committed to the objectives of the Federal Clean Water Act to restore and maintain the chemical, physical and biological integrity of the nation's waters. Federal agencies are obliged to meet state water quality standards that protect beneficial uses of lakes, rivers, streams and wetlands.

The 303(d) segment of Flatwillow Creek is on private land; however, the portions of

tributary streams on public land were investigated for potential contributing pollutants, particularly for siltation and other habitat alterations. Pike Creek, where the BLM is a significant land holder, is a direct tributary of Flatwillow Creek. Out of a total of 9.8 miles of stream channel on BLM land, 6.9 miles or 70% were in non-functioning condition during the 2005 riparian inventory. The remaining miles were Functioning at Risk, which may be contributing pollutants, such as sediment, to Flatwillow Creek.

The segment of the Musselshell River in the Petrolia planning area is listed on the 303(d) list by MDEQ for flow alteration, other habitat alterations, and riparian degradation. 3.3 miles of the Musselshell River are on public land within the Petrolia Watershed. 1.3 miles were found to be in Proper Functioning Condition, and 2.0 miles were Functioning at Risk due to weeds during the 2005 riparian inventory.

The remaining BLM streams are tributaries to Box Elder Creek or Yellow Water Reservoir before eventually reaching Flatwillow Creek or the Musselshell River.

With the exception of two allotments, most of the Petrolia planning area falls within the Flatwillow/Box Elder and Upper/Middle Musselshell subbasins, which do not have completed Total Maximum Daily Loads (TMDL) or Water Quality Restoration Plans (WQRP). Prior to the adoption of a water quality restoration/TMDL plan, the BLM, through a memorandum of understanding (MOU) with MDEQ, agrees to use "reasonable land, soil and water conservation practices" to prevent harm to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

### **3.13 Ground Water**

Shallow ground water, less than 500 feet below the surface, is available in the alluvial valleys in the planning area. The

predominant constituents in this water are sodium, calcium, bicarbonate, and sulfate. Most wells produce water which meets EPA standards for drinking, livestock, and irrigation. However, sodium and sulfate concentrations may be above standards for aesthetic quality, which means that the water may have an odd taste, odor, or color. Developing and transporting water from shallow wells is generally not an economically feasible option to solve the shortage of reliable water sources on public lands for livestock/wildlife.

Deeper ground water, greater than 500 feet below the surface, can be found in several formations such as the Eagle sandstone, First Cat Creek sandstone, and the Kootenai Formation (Second and Third Cat Creek). Deep wells are often under artesian pressure; however, water quality is extremely variable. Sodium, bicarbonate, and sulfate concentrations in the Eagle may be several thousand mg/L and suitable only for livestock use. On the other hand, total dissolved solids in the Third Cat Creek Formation are generally low enough for domestic or livestock use.

### **3.14 Soils**

Soils within the watershed developed primarily from sedimentary rock (shales, siltstone, and sandstone) of Lower and Upper Cretaceous age, and from lesser amounts of slope and recent alluvium. Soil patterns are complex and vary in physical and chemical properties, productivity, and erodibility. Soluble salts and sodium are present in most soils of the area. Vegetation composition and production are affected where soils have high concentrations of salts.

Most of the gently sloping to steep uplands and escarpments are comprised of either clayey soils weathered from fissile shales or sandy soils weathered from sandstone. These sedimentary soils are usually vulnerable to degradation and highly erosive

because of extreme physical properties such as high clay content, slow permeability, very high surface runoff, relatively shallow to moderate depth (less than 40 inches) to bedrock, droughty, and sparse vegetative ground cover. Active geologic erosion is observed on these landscapes. Erosion can be accelerated by surface disturbance, especially on steep and very steep slopes when the protective vegetative cover is removed. Predominant soils include the Abor, Amherst, Bascovy, Blackhall, Cabbart, Delpoint, Dilts, Julin, Neldore, Orinoco, Twilight, Volborg, and Yawdim series. Associated ecological sites include: Shallow clay, Coarse clay, Clayey, Sandy, Shallow, and Silty, 11 to 14 inch precipitation (Ppt.) zone, sedimentary plains, central.

Soils developed from slope alluvium on alluvial fans and stream terraces consist of the Absher, Creed, Ethridge, Evanston, Gerdrum, Marvan, Teigen, Vanda, and Yamac, series. These soils tend to be saline and sodic within 30 inches. Permeability is slow to very slow; therefore, water tends to run off or puddle and evaporate. These soils have chemical properties which limit seed germination, vegetative composition, and production. Poor soil aeration is also a problem. Associated ecological sites include: Clayey, Clay pan, Dense clay, and Silty, 11 to 14 inch Ppt. zone, sedimentary plains, central.

Alluvial soils on nearly level to undulating slopes along floodplains and stream terraces consist of the Glendive, Havre, and Harlem series. These soils are important because of their high vegetative production potential. Soil properties are variable and can differ over short distances. These soils range from sandy to clayey, poorly drained to well-drained, and slightly to moderately erosive. Associated ecological site: Overflow, 11 to 14 inch Ppt. zone, sedimentary plains, central.

Areas of steep or very steep (>20% slope), barren or nearly barren land are dissected

by many drainage channels and have exposures of consolidated sedimentary beds of shale and sandstone.

Complete descriptions for the listed soil series and ecological sites are available on the internet at:

<http://soils.usda.gov/technical/classification/osd/index.html> (soil series) and <http://efotg.nrcs.usda.gov/treemenuFS.aspx?Fips=30071&MenuName=menuMT.zip> (ecological sites). Included in the series descriptions are taxonomy, horizon descriptions, range of characteristics and other pertinent information.

### 3.15 Air Quality

Air quality in the Petrolia planning area is generally considered good to excellent most of the year, meeting air quality standards set forth by the National Clean Air Act (U.S. Congress, 1967, amended 1972, 1977). All of the lands within and adjacent to the planning area are in a Class II airshed as designated by the 1977 Clean Air Act.

A planning and management process, "Prevention of Significant Deterioration" (PSD), was introduced as part of the 1977 Amendment to the Clean Air Act. These PSD requirements set limits for increases in ambient pollution levels and established a system for preconstruction review of new, major pollution sources. Three PSD classes have been established. Class I allows very small increases in pollution; Class II allows somewhat larger increases; and Class III allows the air quality to deteriorate considerably. In general, Class I is designed for pristine areas where almost any deterioration would be significant. Class II allows for moderate, well-controlled growth and Class III allows pollutant levels to increase considerably (JVP).

The high and low pressure weather systems that move through central MT strongly influence local climates and occasionally affect air quality within the planning area.

These weather patterns may affect the air quality by moving suspended pollutants into the local airshed. During the summer and winter months, atmospheric conditions tend to be more stable, reducing particulate dispersal which may negatively affect air quality. Spring and fall typically have atmospheric conditions that favor smoke/particulate dispersal.

Major air pollutants include dust generated by naturally dry, windy conditions, smoke from wildland fires, and smoke and dust created by agricultural operations. Minor pollutants could include farm machinery exhaust, crop harvest dust, recreational vehicle and equipment exhaust, and road maintenance operations.

Topography within the watershed consists of flat to rolling uplands broken with steep drainages characteristic of breaks along tributaries to the Musselshell River. Inversions may develop and trap suspended particulate matter for longer durations within these drainages.

### **3.16 Economics**

The planning area is situated within Petroleum and Fergus Counties in central Montana. Agriculture is the major industry. Recreation and associated services are also major contributors to the overall economy in the region.

Public land comprises 151,202 acres within the planning area, approximately 4% of the total acreage of Fergus and Petroleum counties combined.

Within the Petrolia Watershed area, 76 permittees graze livestock on public land administered by the BLM. All of the permittees have cow-calf operations; some engage in supplemental farming and/or sheep operations. A total of 34,153 AUMs are permitted in 134 allotments.

### **3.17 Sociology**

Petroleum County is a sparsely settled county located in central Montana adjacent to the Musselshell and Missouri Rivers. The 2000 population of Petroleum County was 493, a 5% decrease since 1990. (U.S. Bureau of Census). The population density was .3 persons per square mile. Winnett is the county seat and main population center with approximately 183 residents.

Fergus County had a 2004 population of 11,539, a 3% decrease since 1990 (U.S. Bureau of Census). Lewistown, which is the county seat and main population center of Fergus County, had a 2004 population of 6,116.

Local residents and other public land users exhibit attitudes and values typical of a rural farm/ranch oriented society in the western United States. Residents value the rural character of the area, wide-open spaces, naturalness and solitude. Positive aspects of the area include the independence and industriousness of the local people, lack of urban problems, relaxed pace and personal freedom. Residents have a strong sense of heritage.

Agricultural enterprises are predominately family operations with a long history in the area. Many of these ranches have grazing leases on state lands that are intermingled with private and public land. Changes currently affecting these ranches include increasing recreation in the area and implementation of standards and guidelines by the BLM.

### **3.18 Areas of Critical Environmental Concern (ACECs)**

The watershed/planning area contains one ACEC, the Acid Shale-Pine Forest. This ACEC consists of two separate units - the War Horse unit containing 817 acres, and the Briggs Coulee unit which contains 1,646 acres. These public lands were designated



an ACEC in 1992, via the JVP RMP as a means of protecting the endemic plant community unique to the area and the fragile watershed.

The Acid Shale Pine Forest ACEC is characterized by slow growing ponderosa pine trees with almost bare shale beneath the trees and limited creeping juniper and grass understory between the trees. These plant communities are unique to the acid shale landscapes and for the most part, isolated and of limited range and extent. The soils in this ACEC are clayey, very fragile and subject to water and wind erosion. The landscapes are generally rolling to very steep with active rill and gully erosion.

The JVP RMP implemented the following management prescriptions in this ACEC. Off-road vehicle use is limited to designated roads and trails; forest product disposal is not allowed unless necessary for stand preservation; the ACEC is open to mineral entry; the ACEC is subject to intensive wildfire suppression.

The Briggs Coulee unit is about 7 miles northeast of Grass Range and the War Horse unit lies about 11 miles northeast of Grass Range.