3.0 Historic/Reference Conditions

The purpose of this chapter is to present information on the indicators relevant to the issues and key questions developed in Chapter 2. The IDT (interdisciplinary team) was instructed to develop a reference condition or desired future, current condition and trend for each indicator.

3.1 Vegetation Dynamics

In this section the indicators developed to track the Vegetation Dynamics issue will be displayed by vegetation type. The use of vegetation types allows for an operational way to reference other documents such as the Revised Forest Plan and the Caribou National Forest Sub-Regional Assessment of Properly Functioning Condition (PFC).

Issue Indicators:
- **Structure**
- **Species Composition**
- **Disturbance Regimes**
- **Presence of Noxious Weeds**

Due to a lack of data on lands outside the National Forest boundary only lands within the National Forest boundary will be included in this and following sections **Table 3.1-1**. Also give the lack of data the riparian/water and other cover types will not be carried further.

Table 3.1-1: Acreage in each Cover type and percent of land within the National Forest boundary

Cover Type	Acres	Percent
Aspen	26,898	22%
Douglas-fir	28,279	23%
Lodgepole	18,157	15%
Mixed Conifer	13,237	11%
Mountain Brush	1,875	2%
Other	4,872	4%
Riparian/Water	666	1%
Sagebrush/Grass	30,747	25%
Grand Total	124,730	100%

Structure

At the landscape scale, a balance of age/structure classes is highly desirable. An imbalance in structural classes can put the landscape at risk and reduces its resilience to catastrophic events. *The Caribou National Forest and Surrounding Area Sub-Regional Assessment of Properly Functioning Condition* pointed out that a balance of structure classes was highly desirable (USDA 1996). The Revised Caribou N.F. Forest Plan (RFP) incorporated this idea and adopted desired future conditions (DFC) related to ranges of structure and even carried it to the point that it set goals for mature/old at the forest scale (30 to 40% for conifer and 20 to 30% for aspen). **Table 3.1-2** below describes the reference/desired condition for species composition.

Table 3.1-2: Reference/Desired Condition for Structure within BFW

Cover Type	Landscape Scale Reference/Desired Condition*	
Douglas-fir	Grass/Seedling/Sap Young/Mid Mature/Old	10-30% 30-50% 30-50%
Aspen	Grass/Seedling/Sap Young/Mid Mature/Old	20-40% 20-40% 20-40%
Lodgepole	Grass/Seedling/Sap Young/Mid Mature/Old	10-30% 30-50% 30-50%
Mixed Conifer	Grass/Seedling/Sap Young/Mid Mature/Old	0-10% 10-30% 30-40%
Sagebrush/ Grass	Balance range of structural stages • Early Seral • Mid Seral • Late Seral	 20-40% 20-40% 20-40%
Mountain Brush	Balance range of structural stages • Early Seral • Mid Seral • Late Seral	 20-40% 20-40% 20-40%

*The reference/desired structural ranges for the forested types is based on the desired structure in the FPR FEIS.
* Stands with multiple structure classes represented were included in the oldest structure class.
** The structural stages for non-forested types were determined by using cover percent. Early seral condition is when canopy closure percent is <10%, Mid seral canopy closure percent is 11-20%, and late seral canopy closure percent is >21%

Species Composition

Table 3.1-3 below describes the reference/desired condition for species composition. The ranges displayed in the table represent a reasonable range around the PFC percentages, which are shown as the average. Cover percent was used to determine species composition, and the percentages within the current condition represents the percent of acres which meets the reference/desired condition.

Table 3.1-3: Reference/Desired Condition for Composition within BFW

Cover Type	Landscape Scale Reference/Desired Condition*	
Douglas-fir	Douglas-fir Spruce/Fir	65-100% Ave >75% 0-35% Ave. <25%
Aspen	Aspen Conifer	70–100% Ave 85% 0-30% Ave. <15%
Lodgepole	Lodgepole Other Conifer	70 –100% Ave. >80% 0-30% Ave. <20%
Mixed Conifer*	Subalpine fir Douglas-fir Lodgepole Aspen	30-100% Ave. >40% 0-50%* 0-50%* 0-50%*
Sagebrush/Grass**	Sagebrush dominants historical habitat acres on Sagebrush does not dominant historical acres on	95 to 100% 0-5%
Mountain Brush***	Mosaic of brush and herbaceous understory components.	

* DFC = Reference/Desired Condition

Table 3.1-4: Percent of Cover Type 1913 and now.

Cover Type	1913	Current
Douglas-fir	14%	23%
Aspen	36%	22%
Lodgepole	14%	15%
Mixed Conifer	0%	11%
Mountain Brush	4%	2%
Other	<1%	4%
Riparian/Water	<1%	1%
Sagebrush/Grass	32%	25%

In 1913 the majority of the analysis area was mapped by vegetation type. That hard copy map was recently digitized. This table is a quick comparison of that information to the most recent vegetation typing. Although the definitions of vegetation type may have not been directly comparable, it makes an interesting comparison. The cover types that have seen the most striking changes are Aspen, which has lost acreage, and Douglas-fir which has increased. This is likely due to changes in disturbance regimes. More in Chapter 4.

Disturbance Regimes

Table 3.1-5 below describes the reference/desired condition for disturbance regimes. The data within the data below is based on Barrett's fire regime report (1991), the Caribou National Forest and Surrounding Area Sub-Regional Assessment of Properly Functioning Condition (USDA 1996), and Soda Front Analysis.

Table 3.1-5: Reference/Desired Condition for Disturbance within BFW

Cover Type	Landscape Scale Reference/Desired Condition	
Douglas-fir	Fire (G3/4) Frequency Regime	 16-66 Ave 41 yrs Non-Lethal to Mixed
	Insects Disease	Endemic Endemic
Aspen	Fire (G4) Frequency Regime	 16-97 Ave. 54 yrs Mixed to Lethal
	Insects Disease	Endemic Endemic
Lodgepole	Fire (G6/4) Frequency Regime Insects Disease	 29-97 Ave. 54 yrs Mixed to Lethal Endemic Endemic
Mixed Conifer	Fire (G6/4) Frequency Regime Insects Disease	 11-191 Ave 77 yrs Mixed to Lethal Endemic Endemic
Sagebrush/ Grass	Fire Frequency Regime	 25-76 years Lethal
Mountain Brush	Fire Frequency Regime	 25-76 years Mixed
Riparian		No Data

Noxious Weeds

Noxious weeds in the Upper Blackfoot Watershed Area were either not present or were very small isolated infestations during the early 1900's and therefore was not documented during the 1913 map exercise. Past problems were not from noxious weeds, but from undesirable vegetation, which would become established in areas such as sheep bedgrounds, where abuse had occurred. Wyethia (mulesear) and tarweed are the main undesirable species that have invaded these abused areas. Past abused areas, where these undesirable species occurred, account for less than 1 percent of the total watershed acres.

3.2 Hydrologic Processes and Water Quality

Reference Conditions

A variety of human actions have affected streams, riparian areas and watershed behavior since the early to mid 1800's. These have resulted in alterations from reference conditions relative to watershed, riparian, and stream channel state, behavior or function. No upland areas large enough to effectively represent watershed reference conditions from pre-settlement days are present in the watershed. Presumably streams and riparian areas, though dynamically changing, were mostly between a minimally proper functioning condition and Potential Natural Condition (PNC). Exceptions to this would have occurred following major disturbances or combinations of disturbances such as fire, drought, major insect/disease outbreaks, etc. when they were at least partly reset entirely or to an early seral vegetative state and may have been in "functioning at risk" condition until recovery from major disturbances had occurred. As described in the current condition, there is local variability in levels of disturbance in subwatersheds and stream channels. In general, smaller headwater stream channels in steep mountainous areas tend to be closer to a reference state. This is the case for two primary reasons. First, channels and banks in these areas tend to be composed of coarser materials which are more resistant to most disturbance impacts. Second, they are mostly in steep, narrow canyons that are grazed by sheep, which are much less likely to loiter along such stream channels than are cattle.

Agents of Change

Substantial changes from reference watershed conditions have occurred due to a variety of factors. In the early to mid 1800s, beaver were drastically reduced (by trapping) which led to abandoning and breaching of beaver dams, reducing channel/pond water and sediment storage capacity. These reductions in turn caused increased peak storm flows, flow energies and sediment in downstream areas, particularly after disturbances. Beginning about 1870, logging decreased forest cover in many of the more accessible forested tributary valley and foothill areas. Conversion of forest to range reduces infiltration, which increases storm runoff peaks and volumes. Intensive livestock grazing on open lands (increased by logging) over many years depleted soils of upper organic layers and reduced ground cover density. The organic material in these upper soil layers that existed prior to disturbance form a soil-hydrologic "sponge" which absorbs and holds rain and snowmelt longer on the land, increasing available moisture later in the year and decreasing storm runoff volume and peak flows. Reducing or eliminating these organic-rich layers increases storm runoff peaks and volumes.

Exclusion of fire, beginning in the 1910s to 1940s in mountainous areas has changed vegetation communities, which directly and indirectly changes hydrologic conditions. First, frequent low-intensity/severity burns do not reduce the organic soil-sponge nearly as much as do higher intensity/severity burns. Secondly, exclusion of fire promotes replacement of aspen by conifer or brush. Aspen produce a much thicker, more effective soil sponge than do conifer or brush, and transpire less water on an annual basis. Fire exclusion therefore also changes the annual watershed water balance, which translates to less groundwater recharge and lower summertime streamflows. Replacement of aspen by conifer within about 300 feet of streams usable by beaver adversely impacts their populations, as aspen is a major food source and critical to building their dams on larger streams. Likelihood of negative effect would also be related to the sensitivity of the channel to disturbance. Table 3.2-1 established by Rosgen (1996) is designed for livestock, but is generally applicable to other types of disturbance; the table shows streams in gravels or finer materials being more sensitive. The loss of beaver, logging, intensive grazing, and exclusion of fire all tend have the effect of increasing streamflow peaks, particularly from rainstorms. Together these vegetation changes compound the effects to the hydrologic system the result has been a change in stream, riparian and overall watershed conditions. However, no quantitative measure of the effects of these combined management actions is available.

Table 3.2-1: Summary of Stream Channel Characteristics and Sensitivity to Disturbance
(Source: Modified from D. L. Rosgen, Applied River Morphology, 1996 pg 8-9 as used in the Caribou National Forest Riparian Grazing Implementation Guide Version 1-2, 2005))

Stream Type	Stream Group	Sensitivity to Disturbance	Recovery Potential	Sediment Supply	Stream Bank Erosion Potential	Vegetation Controlling Influence
A1, A2	SG-00	Very low	Excellent	Very low	Very low	Negligible
A3	SG-01	Very high	Very poor	Very high	Very low to very high	Negligible
A4, A5	SG-02	Extreme	Very poor	Very high	Very high	Negligible
A6	SG-03	High	Poor	High	High	Negligible
B1, B2, B3	SG-04	Very low to low	Excellent	Very low to low	Very low to low	Negligible to moderate
B4, B5, B6	SG-05	Moderate	Excellent	Moderate	Low to moderate	Moderate
C1, C2	SG-06	Low	Very good	Very low to low	Low	Moderate
C3	SG-07	Moderate	Good	moderate	Moderate	Very high
C4, C5, C6	SG-08	Very high	Fair to good	High to very high	High to very high	Very high
D3, D4, D5, D6	SG-09	High to very high	Poor	High to very high	High to very high	Moderate
DA4, DA5, DA6	SG-10	Moderate	Good	Low to very low	Low to very low	Very high
E3,. E4, E5, E6	SG-11	High to very high	Good	Low to moderate	Moderate to high	Very high
F1, F2	SG-12	Low	Fair	Low to moderate	Moderate	Low
F3	SG-13	Moderate	Poor	Very high	Very high	Moderate
F4	SG-14	Extreme	Poor	Very high	Very high	Moderate
F5, F6	SG-15	Very high	Poor to fair	High to very high	Very high	Moderate
G1, G2	SG-16	Low to moderate	Fair to good	Low to moderate	Low to moderate	Low
G3, G4, G5, G6	SG-17	Very high to extreme	Very poor to poor	High to very high	High to very high	High

In the 1930's, Civilian Conservation Corps crews constructed numerous roads on public lands in the watershed, many were converted from existing livestock trails. Commonly, older roads were built on floodplains or low terraces near streams which are in many areas are composed of fine-grained materials, and so roads were usually constructed in or of these mostly fine grained native soil materials. Drainage design for these roads was usually very poor, with erosion and rutting increasing sediment delivery to nearby streams. Many road crossings of smaller tributaries were unarmored fords. Improperly designed stream crossings erode banks and deliver all the eroded sediment to the stream. Impacts are greater where streambeds and banks are composed of fine grained materials (generally gravel sized or finer). In general, roads above a threshold percent of the watershed (Furniss, 1991 cites a report giving 3.9% as a threshold) can measurably increase peak storm flow and cause other affects.

From the 1940's to 1990's, more roads were constructed on Forest Service lands in the watershed for timber sales, mineral exploration and livestock use, though road and drainage design improved during this era, and by the 1990's stream crossings were all by culvert. Forest roads that were no longer needed in this time frame were closed by gates, though some are still open for motorized trail use. Off-road motorized use in the watershed grew rapidly beginning in the early to mid 1990's, most of the growth being ATV use. Up until 2002, cross-country motorized use was legal. Many foot and horse trails also began to see greatly increased motorized use during this period, with no analysis or redesign to mitigate the increased impacts from these vehicles. Gravelling of motorized trails is generally impractical and gradients on trails are not as restricted as with roads, with steeper gradients producing far greater erosion. Though ATVs have much lower tire pressures than motorcycles and trucks, most have rigid rear axles, which greatly increase soil churning and displacement. The result is that trails converted to motorized use with insufficient mitigation are prominent sources of soil erosion. A revised Travel Plan eliminating most cross-country motorized use was signed in 2003, after which a program to close unauthorized trails began. In 2006 and 2007, several unauthorized motorized trails in Diamond Creek were closed.

In the lower, wider valley reaches of Diamond Creek, Trail Creek, Lanes Cr, Angus Cr, portions of the Blackfoot River and possibly elsewhere, control or outright elimination of willows was carried out, starting in the 1950's and used herbicides such as 2,4-D. Thurow (2007) reported that segments of the upper Blackfoot River, Lanes, Diamond, and Trail creeks have been sprayed in the 1950's and 1960's by the Soil Conservation Service to eradicate willow. There is discussion that willow spraying had continued into the early 1990's and small localized eradication efforts still continue. The effects of those projects are still evident in some locations. Prior to spraying, the willows were so thick between the Allen Ranch and Trail Creek that it couldn't be fished (Whitworth 2007). Keith Benton (2007) ran cattle on the Dry Valley Allotment which included Slug Creek, Johnson Creek and Green Basin and indicated the fishing was tough because of the thick willows Allen Ranch to the Fox Ranch. That condition does not exist today.

Control of willow using fire was attempted on Forest administered land in the 1990's, but was not considered to be successful. Reduction of willow in these wide valleys dominated by finer grained soil and streambank materials contributed to bank stability problems, causing increased sediment from bank erosion and overly widened channels. Higher water temperatures also result, due to loss of willows as shading vegetation along banks and increased width, both of which increase the amount of solar energy transferred to the water. Reduction of willows was thought to increase forage by increasing the amount of sedge and grass cover, but the opposite frequently occurred as downcutting of streams occurred in some reaches, lowering the adjacent water table and reducing soil moisture, and causing sometimes drastic decreases in grass production as previously highly productive riparian soils dried out. Examples of downcutting include Diamond Creek near Campbell Creek (and many other locations), lower reach of South Stewart Creek, Upper Coyote Creek, lower Goodheart Cr, and Lonetree Cr.

Channel modification (channelization) appears to have been done on a section of the Blackfoot river immediately above the sucker trap near the Blackfoot River Road. The exact length affected, purpose or amount of change that occurred is unknown. Small sections of channel have been modified elsewhere for road crossings and sometimes portions of channels have been moved or crowded for road placement. Examples include a bend in South Stewart Creek where a bend was modified to minimize the length of culvert required at the crossing on the Diamond Creek Road just south of the Diamond Creek Campground, and crowding of Diamond creek by the same road further to the south. In general, channelization straightens and/or enlarges the channel cross-section. While this temporarily improves drainage efficiency in the area treated, over the medium to long term, it alters the sediment balance where it is done and nearly always causes side affects, some drastic, in adjacent areas. By straightening a channel, the gradient is increased, increasing the erosional power of the stream. This triggers erosion and sedimentation in the channelized reach and erosion and downcutting in the reach above as the channel begins to re-adjust to a new equilibrium with the locally increased gradient and erosional power. This frequently triggers other affects, depending on channel and flow characteristics.

Previous mining operations have left open pits and waste dumps of various sizes in piles, contoured slopes and cross-valley fills, particularly in Dry Valley. Older mining practices left shale materials with elevated levels of selenium and other elements either exposed at the surface, or with shallow cover. None of the older mines have capillary barrier covers to restrict infiltration; relict surfaces commonly form shallow slopes or have somewhat hummocky surfaces, which do not minimize infiltration of meteoric waters. Some of the mined materials have contaminants of potential concern that can dissolve into water, the chief concern being selenium, so that infiltrating waters can leach and transport these to streams.

3.3 Soil Resources

Reference Conditions

Data Sources

- Soil Survey of the Caribou National Forest, Idaho (USDA Forest Service, 1990)
- A Hierarchical Stratification of Ecosystems of the Caribou National Forest, USDA Forest Service, 1997
- Caribou National Forest and Surrounding Areas Sub-Regional Assessment for Properly Functioning Condition (PFC). 1997.
- The Effects of Forest Management on Erosion and Soil Productivity. Symposium on Soil Quality and Erosion Interaction, July 7, 1996. Soil and Water Conservation Society of

America. Keystone, Colorado. 19 p. (Elliot, W.J., D. Page-Dumroese and P.R. Robichaud. 1996)
- Erosion tank data collected throughout Caribou National Forest (J. Lott)

Data Gaps
- No quantitative, and little qualitative information on the condition of soil resources in the watershed prior to human influence.

Assumptions
- Soil conditions and erosion rates observed today on sites minimally influenced by human disturbance are similar to soil conditions and erosion rates prior to human influence.

Erosion Processes

Historic erosion processes in the Upper Blackfoot watershed were the natural movement of soil by wind, water, and gravity**.** Natural disturbances include wildfire, flooding in drainageways, insect and disease outbreaks in conifer stands, windthrow, and mass movements. These disturbances contribute to the natural soil condition and productivity. Background erosion rates were likely less than 0.25 tons per acre per year (Elliot *et al*. 1999). Measurements of background erosion rates have been taken for the last 20 years across the Caribou Zone. Three long-term erosion sites are located in the Upper Blackfoot watershed. One site is in the 1981 Rasmussen Timber Sale, on a slope of 40% with 100% ground cover, and a 20-year average erosion rate of 0.03 tons/acre/year. The other site is in Slug Creek measuring erosion from a 62% slope with 80% ground cover that is used as cattle range. Average erosion rates (20 years of data collection) have been estimated at 0.14 tons/acre/year. The third site is rangeland along the Blackfoot Narrows. This site has a slope of 50% and ground cover of 75%. Average erosion is about 0.16 tons/acre/year. Because the amount of effective ground cover measured on the sites is within the expected ranges for the vegetation types, it is assumed that these rates are likely similar to historic background rates (Lott, Erosion tank data). Non-anthropogenic disturbances that would have temporarily increased the erosion potential on certain sites would have included wildfires and periodic intense climatic events such as floods.

As people discovered and migrated to the area, anthropogenic disturbances increased, primarily road building, agriculture and mining. The history of roading, mining, agriculture, and recreation can be found in Chapters 1 and 3.

Riparian Vegetation

Riparian areas and wetlands likely had less impact from trampling and grazing before the introduction of livestock. Livestock grazing utilizes biomass that would have historically contributed to additional ground cover. Protective ground cover on rangelands may have been slightly more than currently exists. On timbered sites, excluding disturbances due to periodic wildfires, protective groundcover was likely what we see today in undisturbed sites near complete leaf/needle litter.

3.4 Fisheries and Aquatic Habitat

It was difficult to establish a date that clearly defines the separation between past and current conditions. If data existed, good separators could have been when Blackfoot Dam was constructed or when extensive phosphate mining was initiated in the watershed. However, insufficient data exists pre-dam or pre-phosphate mining. Somewhat arbitrarily, I established the separation date for the fisheries analysis to be 1990 because there appears to be a large amount of data available in the 1960's through the 1970's and then in the 1990's through today. I tried to stay true to that division between past and current conditions for the purpose of clear discussion in this document.

Issue indicators:
- **Population and Presence**
- **Channel & Habitat Disturbances**
- **Barriers**
- **Non Native Species and Disease**

An important aspect of watershed analyses is their interdisciplinary nature. I captured fisheries-related topics during interdisciplinary discussions and included them in this analysis.

Past Condition

Blackfoot River

The Blackfoot River forms at the confluence of Lanes and Diamond creeks. From there, it flows 35 miles to the Snake River. Its average flow at the Forest Service boundary was 262 cfs in 1976. The meandering channel is wide and shallow, with a low gradient of approximately 0.1%. The river channel is generally contained by low banks. Streamside vegetation is composed primarily of grass with willow and sagebrush.

Osborne Russell was the first individual of European descent to describe the Blackfoot River, while trapping beaver in the SE Idaho area from 1834-1843 (Russell 1965). He called it Blackfoot Creek. He documented a Native American village consisting of approximately 60 lodges approximately 25 miles up the Blackfoot River from its mouth (near today's Allen Ranch). Russell rode the entire length of the river and described a deep basalt canyon in the lower river that eventually became Blackfoot Reservoir in the early 1900's. He often encountered bison in the drainage. The Lander Cut-Off of the Oregon Trail crossed the Blackfoot River just upstream of the where the Blackfoot Dam currently exists. The Blackfoot River was described by Tomas Hayes (Jack Kunz's grandfather) as a "fisherman's paradise" prior to the construction of Blackfoot Dam (Kunz 2007).

In 1909, the 49 feet high Blackfoot Dam was constructed approximately 17 miles upstream from the mouth of the river. The Army Corps of Engineers constructed the dam, now operated by the Fort Hall Irrigation District of the Bureau of Indian Affairs (Fischer 2002). The reservoir is used as a flood control structure, helping to protect the City of Blackfoot and other properties downstream from flood events (U.S. Army Corps of Engineers 1998). It stores water for irrigation and releases it in a controlled fashion during the summer (Drewes 1987). The reservoir has a surface area of 20,007 acres and a storage capacity of 509 million cubic meters (Thurow 1980). The large storage capacity of Blackfoot Reservoir is 1.5 times the average annual flow of the river, allowing for more consistent downstream flows in low snowmelt runoff years and the dryer summer months and facilitating the use of water by irrigators, the primary water use in the watershed (NRCS 2007). The reservoir has been stocked heavily through the decades with several species of fish, including fertile and sterile rainbow trout, Bear Lake Bonneville cutthroat trout, coho salmon, Henry's Lake Yellowstone cutthroat trout x rainbow hybrids, and cutthroat trout x steelhead hybrids (IDFG 2008).

In 1983, IDFG began stocking Bonneville cutthroat trout from Bear Lake in Blackfoot Reservoir. These fish were reared for one year in the Grace Hatchery prior to release as five-inch fingerlings. Bear Lake cutthroat trout were treated with morpholine at the hatchery prior to release and were planted in the Little Blackfoot River at its mouth. The stream also was treated with morpholine to attract fish at the time of spawning. This planting location and morpholine treatment was an attempt to maintain the separate strains of cutthroat trout. Egg survival from Bear Lake cutthroat trout spawners captured in the Little Blackfoot River was poor (IDFG 2007).

The Blackfoot River had also been stocked with a variety of fish species for decades, including Bear Lake Bonneville cutthroat trout and rainbow trout (IDFG 2008).

The large-spotted variety of Yellowstone cutthroat trout are the native trout in the Blackfoot River system. The Blackfoot River system was historically a high quality fisheries for large trout. Anglers who fished the Blackfoot River and Reservoir prior to the 1960's reported catching numerous 5 lb trout with larger trout ranging to 10 lb. Residents also reported that spawning-sized trout averaged nearly 5 lbs (Thurow 1980).

There are potentially 3 life history patterns of Yellowstone cutthroat trout exhibited in the Blackfoot Watershed; resident, fluvial, and adfluvial. Resident fish stay in tributaries of the river throughout their life. Fluvial fish migrate up the river to spawn in the upper river and tributaries, and those fish that exhibit an adfluvial life history pattern use Blackfoot Reservoir for most of their lives, returning upstream to the river or tributaries to spawn and rear. These life history patterns are apparently not rigid and some placticity has been documented. Mature trout (ranging in size from 8.6 to 23.2 inches, with most exceeding 15.8 inches) migrate from the Blackfoot Reservoir and ascend the Blackfoot River during March, April, and May. A majority of these trout enter the upper valley tributaries and spawn in May and June. A smaller percentage spawn in the main Blackfoot River. Following spawning, spawned trout return to the river (June and July) (Thurow 1980). Fish movement within the Blackfoot system also has an apparent random aspect. Some adults move readily between connected tributaries. For instance a cutthroat trout tagged in Sheep Creek in 1978 was recaptured in Diamond Creek (Thurow 1980).

Young-of-the-year cutthroat begin to emerge in upper Blackfoot tributaries in July and continue through November. While some young-of-the-year migrate downstream during the fall of their initial year, most of the juveniles rear for 1 to 2 years in tributaries where they were spawned, eventually returning to the river and the tributary. Juvenile cutthroat migrate down the Blackfoot River in the fall to deep water areas of the river and reservoir. Thurow (1980) observed hatchery rainbow trout and naturally reproduced rainbow trout also ascending the river, but stated most of them spawned in the lower 3 miles of the river.

In 1961, Blackfoot Reservoir and sections of the Blackfoot River and tributaries (Angus, Dry, Slug, and Trail creeks) were chemically treated to eradicate non-game fish. IDFG personnel believed the large population of non-game species, such as carp, chub, and suckers, were contributing to the decline in the sport fisheries. Prior to the treatment, public meetings were held in Soda Springs and Pocatello and most of the 150 people who attended supported the treatment. However, a petition was presented that voiced concern over the protection of the cutthroat trout found in the Blackfoot River system. They recognized the good growth of these fish and believed they gained their large size by preying upon other fish. Spawning populations of native cutthroat trout were severely depleted immediately after treatment. The spawning run of Yellowstone cutthroat trout were severely impacted in 1962 and 1963. The reintroduction of rainbow trout to the reservoir began in 1962. Within 3 years of the treatment, non-game species comprised a majority of the fish biomass in the reservoir. Since 1961, there has been a decline in boat angler success and in the size of trout harvested. More than three times the cutthroat trout spawners were observed in 1959 than in 1979-1980 (Thurow 1980).

In the 1960s and 1970s, there has been extensive stocking of cutthroat and rainbow trout in the drainage. Cutthroat trout sources included Henrys Lake and stocking destinations included Blackfoot Reservoir and River, and Angus, Diamond, Lanes, Sheep, and Spring creeks. The majority of the cutthroat stocked in the Blackfoot River system were reared at the Grace Hatchery on Whiskey Creek. Both Henrys Lake and Wyoming fine-spotted variety cutthroat trout were produced at the Grace Hatchery. Several stocks of rainbow trout were planted in the Blackfoot River system, including Soap Lake, Washington, White Trout Farm of Logan, Caribou Trout Farm of Soda Springs, and the IDFG hatcheries at American Falls, Hagerman, and Hayspur. Both spring-spawning and fall-spawning races of rainbow trout have been introduced (Thurow 1980).

In the 1970’s the upper Blackfoot River was extensively used as a sport fishery. During the summer of 1971, 610 angler hours were documented, resulting in a catch of 18 rainbow trout and 252 cutthroat trout. The cutthroat trout averaged 11.2 inches and ranged from 7 to 20 inches in length. The Blackfoot River upstream of its confluence of Angus Creek supported twice the number of cutthroat trout than below Angus Creek. Average cutthroat trout length was also larger in the upper river segment (Platts and Primbs 1976).

In 1971, the Blackfoot Reservoir was treated extensively with Fintrol in an attempt to control carp (Heimer 1972). In February, Heimer treated the bay of Blackfoot Reservoir where the Little Blackfoot River entered. In July, 5 miles of shoreline were treated by boat and plane. Gill nets set overnight in Blackfoot Reservoir primarily caught suckers and chub, with low numbers of rainbow and cutthroat trout caught. A creel census in 1971 indicated rainbow trout dominated the creel (275), followed by cutthroat trout (97), then coho salmon (5). IDFG operated an upstream migrant trap in the river in the 1970’s and had difficulties keeping the trap operational during the spring flows of 1971. Apparently, they used the trap to catch suckers and remove them from the river. In 1969 and 1970, they removed 109,900 and 82,800 suckers respectively. In 1971, they removed 595 suckers. Electrofishing tributaries to the Blackfoot River in 1971 primarily produced small cutthroat trout, with some suckers, sculpin, dace, and shiners (Heimer 1972).

Platts and Martin (1978) performed a hydrochemical analysis on Angus, Diamond, and Kendall creeks and the Blackfoot River to determine mining activity impacts upon water quality. Heavy metal concentrations in the streams studied were generally quite low. However, in aquatic systems, lead, zinc, copper, and cadmium are highly synergistic and can result in a combined toxicity greater than their individual concentrations. Since all of those metals were present at detectable levels in the Blackfoot drainage, increases in any of those metals could result in toxicity to fish. At the time of the analysis, no single parameter posed a risk of degrading fish health, either in water chemistry or fish tissue.

A comprehensive study of the Blackfoot River Watershed was conducted by the Department of Fish and Game 1978-1980 (Thurow 1980). Although the river system was described as supporting a large population of native cutthroat trout dependant upon the upper river a tributaries for spawning and rearing habitat, their surveys indicated the tributaries support 3 times fewer spawners than they did in 1959. Important spawning tributaries in the late 1970's were Bacon, Browns Canyon, Campbell, Daves, Diamond, Dry, Kendall, Sheep, Spring, Stewart, and Timothy creeks. Spawning generally occurred where the streams exhibited suitable spawning substrate. Chemical analysis of the Blackfoot River and its tributaries indicated high productivity, producing rapid growth rates. Thurow (1980) documented significant fish kills in the upper and lower Allen Ranch diversions and recommended screening those ditches. Angler use of the river and its tributaries, particularly Diamond Creek, were determined to be high. The Blackfoot River and Diamond, Lanes, and Sheep creeks were classified as Class I streams (highest valued fishery resources) in Idaho. The upper Blackfoot River fishery had an estimated value of nearly $160,000 annually, with most creel dominated by native cutthroat trout.

Blackfoot Reservoir supported a large community of nongame species in the late 1970's, including Utah chubs, Utah suckers, carp, and rainbow trout, which comprise a majority of the fish biomass (Thurow 1980). Rainbow and cutthroat trout in the reservoir were described as omnivorous, mostly eating zooplankton (primarily Daphnia), Diptera (chironomid larvae and pupae) and forage fish. Blackfoot Reservoir is a shallow, wind-mixed reservoir with a short flow-through time. The reservoir is eutrophic, as reflected by chlorophyll A concentrations and levels of dissolved nutrients. The dominant algae, *Aphanizomenon flos-aquae*, exhibited intense blooms. The reservoir substrate was primarily fine silt. Chironomids were very prevalent in the sediments. Macrozooplankton were predominantly *Cyclops* sp. and *Daphnia* sp. The zooplankton community reflected the productivity of the reservoir, as 63 organisms/liter were sampled in July. In the reservoir, rainbow trout dominated the fisheries. The hatchery rainbow trout caught averaged 16.1 inches in length, while the native cutthroat trout averaged 16.4 inches in length. While catch and release was common in the river and its tributaries, reservoir anglers released few of the fish they caught. The Blackfoot Reservoir fisheries were valued at more than $1.1 million annually. Historical creel records indicated numerous large trout were caught in the Blackfoot River system prior to 1960. Since then, the incidence of large trout in creel has declined.

Platts and Andrews (1980) sampled aquatic macroinvertebrates in the Blackfoot River and its tributaries, including Angus, Diamond, and Kendall creeks and documented 11 insect orders and 80 taxa. The orders Ephemeroptera, Diptera, and Plecoptera were most prevalent. The diversity and orders of macroinvertebrates in these streams were indicative of appropriate habitat conditions where they were sampled.

Platts and Primbs (1976) conducted a fisheries habitat survey of the upper Blackfoot River and stated that previous mining and logging activities in the watershed were not evident during their survey of the river upstream of the reservoir, but livestock grazing had created moderate stress on the riparian area.

The Blackfoot River and reservoir produced trophy-size YCT which migrate up the river to spawn in tributary streams. The Blackfoot River above the reservoir provides habitat for YCT, carp, rainbow trout, sucker, dace, redside shiner, sculpin, brook trout and chub. Channel substrate was composed primarily of fine sediment and gravel. Submerged aquatic vegetation covered approximately 30% of the stream bottom which provided cover and habitat for fish and their food sources. Streamside vegetation along the river consisted primarily of grasses that were used heavily by livestock (50-70% in August). The river banks appeared vertical with little observable undercutting (Platts and Partridge 1980).

In 1988, IDFG developed a spreadsheet that described the fish communities in all the tributaries of the Blackfoot River. While at the time, Johnson, Coyote, Timber, Bacon, Browns, Chippy, Lander, Spring, Kendall, Timothy, and Cabin creeks had only native YCT in the salmonid community, non-native brook trout occurred with YCT in most of the other streams. In Trail and Olson creeks, brook trout had completely replaced YCT. Brook trout were also documented in Diamond and Slug creeks. The brook trout observed in the surveys conducted in the 1970's and 1980's were generally smaller than the cutthroat trout collected in the same streams.

Heimer (1983) checked creel on Blackfoot Reservoir June 9, 1982 (Opening Day). He checked 271 anglers. They fished for a total of 1,344 hours and caught 49 naturally reproduced rainbow trout, 534 hatchery rainbow trout, 117 wild cutthroat trout, and 91 hatchery cutthroat trout.

Irrigation diversions were documented as a concern early on, as they blocked fish migration and entrained migrating fish in their associated ditches. The Allen Ranch Diversion, located on the Blackfoot River upstream of the mouth of Slug Creek and a diversion located near Browns Canyon on Lanes Creek were particularly a concern (Culpin 1963). The Allen Ranch diversion was surveyed on July 1959, when the canal was closed and drying. Ten adult cutthroat trout, ranging in size between 18 and 22 inches in length, were found dead in the canal. Another 100 cutthroat trout were collected with a electroshocker in isolated remnant pools in the drying canal. More then 100 other fish were missed during the salvage effort and died in the canal (Culpin 1963).

Thurow (2007) reported that segments of the upper Blackfoot River, Lanes, Diamond, and Trail creeks have been sprayed in the 1960's and 1970's by the Soil Conservation Service to eradicate willow. The effects of those projects are still evident in some locations. Kuntz (2007) observed a definite loss of shade in the streams that were sprayed at that time. Prior to spraying, the willows were so thick between the Allen Ranch and Trail Creek that it couldn't be fished (Whitworth 2007). That condition does not exist today.

Lanes Creek

Platts (1975) described Lanes Creek as a stream that provides major spawning habitat for cutthroat trout from the Blackfoot River system. The stream is inhabited by Yellowstone cutthroat trout and sculpin. During a survey, Platts documented livestock impacts to the Lanes Creek riparian area. During the springs of 1979 and 1980, runoff waters breached a retaining pond and sediment-laden water flowed into Lanes Creek (Thurow 1980).

A diversion near the mouth of Browns Canyon was surveyed by IDFG in July 1959. Three dead adult cutthroat trout ranging in length from 18 to 21 inches were found in the dewatered canal. More cutthroat trout were documented when the isolated remnant pools in the canal were shocked (Culpin 1963).

Lanes Creek was stocked with Yellowstone cutthroat trout fry from 1969 to 1975 (IDFG 2008).

Sheep Creek
On 24 May 1957, 61 spawning cutthroat trout ranging from 4 to 15 lbs were harvested illegally from Sheep Creek. The large fish were likely spawning in the stream at the time.

A small irrigation diversion on Sheep Creek, located ¼ mile below the county road, was operated during the summer until water was too low to withdraw from the stream. It is unclear if this diversion posed a threat to fish (Culpin 1963).

Grover (1984) documented spawning Yellowstone cutthroat trout in Sheep Creek during a spawning ground survey. He also noted sheep grazing impacts on the South Fork of Sheep Creek.

Daves Creek
Daves Creek was described by Platts (1975) as a small stream with some juvenile Yellowstone cutthroat trout observed. It was severely impacted by livestock use during his visit. The population density of Yellowstone cutthroat trout in the stream was low at 30 per mile.

Olsen Creek
Platts (1975) described Olsen Creek as providing habitat for Yellowstone cutthroat trout and brook trout. Brook trout dominated the salmonid community. The stream was dominated by beaver and fish readily used the beaver ponds as habitat.

Lander Creek
In 1985, BLM sampled the Lander Creek fish populations using a backpack electroshocker on BLM land and documented YCT as the only salmonid. They also collected speckled dace and commented on dense willow cover (BLM 1985).

Corrailsen Creek
Corrailsen Creek is a tributary to Lanes Creek. It provided habitat for a Yellowstone cutthroat trout population at low densities (Platts 1975).

Browns Canyon
Platts (1975) described Browns Canyon as a small stream that had some intermittent segments. Roads within the drainage were contributing sediment to the stream. Cutthroat trout occurred in the stream.

Grover, (1984) documented eroding stream banks in Browns Canyon and recommended a stabilization project. It is unclear if it has been implemented to date.

In 1985, BLM sampled the Browns Canyon fish populations using a backpack electroshocker on BLM land and collected a high number of YCT. One sculpin that appeared to be a mottled sculpin was also collected (BLM 1985).

IDFG has stocked Browns Canyon in the past. In 1970, 1971, and 1978, Yellowstone cutthroat trout fry and fingerlings were stocked and in 1968, Yellowstone cutthroat x rainbow trout hybrid fry were stocked (IDFG 2008).

Bacon Creek

Platts (1975) described Bacon Creek as a small stream with juvenile cutthroat trout present, particularly in the lower watershed. It is likely a nursery stream for the larger migratory Yellowstone cutthroat trout. There are also resident life history fish present in the stream. Grover (1984) documented several spawning Yellowstone cutthroat trout in Bacon Creek.

Diamond Creek

Diamond Creek joins Lanes Creek to form the Blackfoot River. Cutthroat trout, brook trout, sculpin, dace, redside shiner, and sucker occur in Diamond Creek. This stream is the primary tributary of the Blackfoot River for spawning and rearing of cutthroat trout (Platts and Martin 1978). During the summer, portions of Diamond Creek typically dry due to subsurface flows (Platts and Partridge 1980).

Diamond Creek was described by Platts (1975) as supporting large-spotted Yellowstone cutthroat trout, brook trout, whitefish, and sculpin populations. The stream was dominated by Yellowstone cutthroat trout, both resident and migratory life history patterns. Brook trout were scattered throughout the drainage, but were primarily in the headwaters. Cutthroat trout population density was 400 per mile and brook trout population density was 60 per mile. Platts attributed impacts to habitat quality within the drainage to livestock grazing impacts.

The abundance or gravel and cobble in the substrate of Diamond Creek provided suitable spawning habitat for YCT. Riparian vegetation along Diamond Creek consisted of grasses and willow. At the time of the survey in August, livestock had left the grasses grazed low to the ground (Platts and Partridge 1980). Grazing and past willow eradication efforts have led to some stream bank instability (Thurow 1980).

Platts et al. (1980) documented cattle grazing caused impacts upon stream banks in Diamond Creek. They also noted irrigation diversions in lower Diamond Creek often cause portions of the stream to dry in the summer and fall.

Thurow (1980) documented brook trout in Diamond, Slug, Spring, Timothy, and Trail creeks. In most cases, the species were more common in the headwater area of these streams.

In the fall of 1984, tree revetments were placed along the stream banks of a 6 mile reach of Diamond Creek and interplanted with willow cuttings. Monitoring over 4 years after the project indicated that approximately 80% of the planted willows survived. Trout populations had increased in the treated segments to 200% of pre-project numbers (Burton et al. 1989 and Schill and Heimer 1988).

In 1985, a Forest and IDFG team electroshocked Diamond Creek near the mouth of Timber Creek and primarily collected YCT, but collected one brook trout (BLM 1985)

Diamond Creek was electrofished by IDFG in late August 1988 to continue the effectiveness monitoring of the 1984 placement of conifer rip-rap, but the data were not readily available (Schill and Heimer 1988).

Thurow (2007) reported that segments of Diamond Creek had been channelized in the past. Stream channelization has been done in the past by irrigators in an attempt to deliver more water downstream. It has also been done to drain wetlands for agricultural purposes. However, such practices have the potential to cause significant stream bed and bank erosion and sedimentation and effectively simplifies valuable aquatic habitat. It also lowers the associated water table.

Diamond Creek has a long history of fish stocking that includes Yellowstone cutthroat trout and brook trout fry (IDFG 2008).

Spring Creek

Spring Creek flows into the Blackfoot River downstream of the confluence of Lanes and Diamond creeks. Spring Creek is a major spawning stream for resident and migratory populations of brook trout (Thurow 1980). While portions of the brook trout that occur in Diamond Creek remain to spawn there, others migrate down Diamond Creek, enter the Blackfoot River and ascend Spring Creek to spawn.

In 1978, Thurow (1979) installed a fish weir in Spring Creek and captured trout ascending the stream and migrating down the stream. He estimated 864 cutthroat trout entered Spring Creek to spawn that year. Hey also documented brook trout entering the stream. It is interesting to note that 3 of the 39 brook trout captured in the Spring Creek weir in 1978 were recaptured from previous tagging in Diamond Creek.

Grover (1984) indicated Spring Creek provided spawning habitat for the most adult Yellowstone cutthroat trout that he observed during his 1984 spawning survey.

Timothy Creek

Timothy Creek was stocked with Yellowstone cutthroat trout fry from 1968 to 1971 (IDFG 2008).

Timothy Creek was described by Platts (1975) as small and, in some reaches, ephemeral. It provided habitat for Yellowstone cutthroat trout. Grover (1984) documented several spawning Yellowstone cutthroat trout in Timothy Creek.

Cabin Creek

Cabin Creek was described by Platts (1975) as habitat for both resident and migratory Yellowstone cutthroat trout. He expressed concern about the future viability of this stream due to impending mine plans for the drainage.

Coyote Creek
Platts (1975) described Coyote Creek as a small stream that rears cutthroat trout. During the 1970's Platts reported it was impacted by livestock grazing.

Bear Creek
Platts (1975) described Bear Canyon as a small stream that provided a minor fishery and contributed cutthroat trout to the Blackfoot system. Platts reported it was impacted by livestock use. Bear Creek was stocked by IDFG with cutthroat trout fry in 1967, 1969, and 1970.

Timber Creek
Grover (1984) documented high Yellowstone cutthroat trout spawner numbers in Timber Creek, second only to Spring Creek. In the fall of 1984, Grover (1984) implemented a KV project in Timber Creek that included removing loose wood from the stream. This was probably one of the last wood removal project that involved the removal of large wood from the stream. It was believed that wood impaired the ability of fish to navigate upstream. Interestingly, though, the project also included the addition of wood structures to the stream. Typical early stream structures (single log structures) were used, likely to create pools.

Stewart Canyon Creek
Grover (1984) documented Yellowstone cutthroat trout spawning in Stewart Creek during a spring redd survey.

Hornet Creek
Platts (1975) described Hornet Creek as an ephemeral stream containing a low density population of resident Yellowstone cutthroat trout.

Campbell Creek
Campbell Creek was described as an ephemeral stream by Platts (1975). He determined the stream had limited fisheries values since no fish were observed in the stream during his surveys.

Kendall Creek
Platts (1975) described Kendall Creek as a high gradient stream with lack of good pools. Habitat was better in lower Kendall Creek, on private land, where the stream gradient decreased.

Kendall Creek has a 6% gradient with a maximum linear distance of approximately 2.75 miles. Although the stream provided minor spawning habitat for cutthroat trout, they were documented using the stream for spawning and early rearing (Platts and Primbs 1976). Kendall Creek once drained directly into Diamond Creek but has been diverted into Spring Creek. Platts and Martin (1978) considered the stream important spawning habitat for Yellowstone cutthroat trout, although optimum habitat was limited. Platts and Primbs (1976) documented low densities (26 per mile) of Yellowstone cutthroat trout in Kendall Creek.

Kendall Creek has been periodically stocked in the past. In 1969-1972, the stream was stocked with an unspecified subspecies of cutthroat trout fry and in 1995 eyed cutthroat trout eggs were planted (IDFG 2008).

Mill Canyon (East Mill) Creek
Platts (1975) described Mill Creek as a small stream that provided habitat for Yellowstone cutthroat trout. The stream was impacted from livestock use.

When waste dumps and settling basins were installed in the headwaters of Mill Creek, concern was expressed about their potential failure (Thurow 1980). During an interdisciplinary planning process regarding a phosphate dump site proposed by Becker Industries for the upper watershed of Mill and Kendall creeks, Forest Service Zone Fisheries Biologist Dave Hanson (Hanson 1979) and District Wildlife Biologist Gene Waldrip (Waldrip 1979) prepared letters to the files expressing their concern regarding the process and the environmental impacts of the proposal. Apparently, there were no alternatives to the proposal being analyzed, although they expressed there were viable alternatives. They stated the mining company felt no other alternative was cost effective, so no others were analyzed. The biologists expressed their concern the proposed dump site would have significant impacts upon the fisheries and wildlife in Mill Creek. Construction on the site in Mill Canyon started in November 1979.

Grover et al. (1980) proposed a monitoring plan to determine how the Becker dump site was affecting the stream and to help develop potential mitigation measures. The monitoring consisted of water quality and aquatic macroinvertebrate studies. No records of the results of the monitoring were found.

Angus Creek
Angus Creek is a small, low gradient stream influenced by beaver activity. Approximately 87% of the stream provided pool habitat in 1976. The stream substrate was dominated by sand and silt. A mining company had constructed a small reservoir in upper Angus Creek for a settling pond and for road surface sprinkling. A standing crop of freshwater shrimp made the pond very productive in the 1970’s. The pond was stocked with Yellowstone cutthroat trout that grew rapidly (Platts and Primbs 1976). The pond was stocked several times between 1973 and 1983. From 1973 to 1978, it was stocked with rainbow trout fry and in 1983, it was stocked with rainbow trout catchables (IDFG 2008).

Angus Creek is a small, spring-fed, low gradient stream flowing primarily through valley bottoms. Approximately 10% of its length is in a steep V-shaped canyon with a moderate stream gradient. Angus Creek drains approximately 14 square miles. Riparian vegetation is composed of grass, willow, and sagebrush. YCT were concentrated in the reach from the narrows upstream (Platts and Partridge 1980).

In 1970, Bill Platts, Zone Fisheries Biologist for the Forest, initiated a multi-year survey of Angus Creek that included physical habitat, water chemistry, and biotic surveys. The work was in coordination with Idaho Department of Environmental Quality. Platts and Hopson (1970) reported Angus Creek to provide spawning and rearing habitat for YCT and rainbow trout, both resident and migratory life history patterns. During the establishment of their survey transects, they documented pollution impacts from the existing mining operation. Snowmelt and rain runoff carried deposited engine oil and sediment from the mine site into Angus Creek. Platts and Rountree (1973) also documented these conditions. There was no indication that mine surface runoff plan measures were implemented. Recommendations included the implementation of a mine drainage and pollution abatement plan.

In 1973, Forest Service fisheries biologists, in cooperation with Idaho Department of Environmental Quality, conducted an inventory of the physical habitat, water chemistry, and aquatic biota of Angus Creek to monitor the effects of mining and provide data to managers that were considering additional mining activities. They described the stream as naturally having a stream substrate dominated by sand and silt due to low gradient and abundant beaver dams. The stream substrate composition was 63% fines, 24% gravel, 7% rubble, and 6% boulder in 1970. It was described as a small stream averaging 9 feet in width and 10 inches in depth at the time of the survey. Quality pools were frequent. Stream bank cover and stability were excellent. However, in lower Angus Creek, there was extensive cattle-caused stream channel damage. At the time of the survey, Angus Creek supported a high density population of YCT. On the Forest, Angus Creek was dominated by YCT. Downstream, on private land, it was dominated by dace, sucker, redside shiner, and sculpin, although YCT also were found. Angus Creek averaged 1,200 YCT per mile, which is a high population density. The stream was high in nitrogen, nitrate, phosphorous, alkalinity, and hardness, making it a nutrient-rich system. Turbidity was not high except when snowmelt runoff waters entered Angus Creek from the areas disturbed from mining. Aquatic macroinvertebrate sampling indicated high community diversity in lower Angus Creek but less diversity as sampling progressed near the stream reach impacted by sediment runoff from the mine. In their conclusions, Platts and Rountree (1973) described the stream as highly productive and a contributor to the overall Blackfoot River and Reservoir fisheries. However, based on past mining impacts, they predicted that the stream would be badly degraded or destroyed if mining continued.

Platts and Partridge (1980) studied Angus Creek and determined substrate particle size distributions were affected by the low channel gradient and high percentage of pools in the stream. The unconsolidated parent material forming the stream valley resulted in a stream substrate high in fine sediment. The stream substrate with the lowest percentage of fine sediment was the downstream reach near the mouth of the stream. Increased water flows and lack of beaver dams flushed much of the fine sediment deposited in this reach downstream into the river (Platts and Partridge 1980). Stream banks were vegetated with grasses and willows and were considered stable due to their vegetation condition. Streamside vegetation use by livestock on Angus Creek was described as relatively low during the summer months except in lower Angus Creek. In lower Angus Creek, there was moderate to severe bank erosion due to livestock impacts. This was likely exacerbated by past attempts to eradicate willows with 2, 4-D (Platts and Partridge 1980).

Platts and Primbs (1976) described the Angus Creek fisheries as excellent, with a high density of Yellowstone cutthroat trout of 1200/mile. It was occupied by both resident and migratory life history patterns of cutthroat. Considered a nursery stream, the average size of cutthroat trout in Angus Creek was only 4.5 inches. From the reservoir in its headwaters to the Angus Creek narrows, the stream was dominated by cutthroat trout. Sculpin were also present. Downstream of the Narrows, on private land, Angus Creek is dominated by nongame fish such as dace, sucker, redside shiner, and sculpin, although cutthroat trout were also present. Platts et al. (1980) documented one brook trout in Angus Creek, approximately half way up the stream. No other brook trout has ever been observed in the stream.

The upper 800 yards of the stream is barren of fish, except for a 1.5 acre reservoir constructed near the headwaters for a sediment catchment and store water for road sprinkling. The reservoir, in the mid-1970's, produced excellent surviving and growing fish. Primarily dace, redside shiner, and sculpin use Angus Creek from the Narrows downstream (Platts and Martin 1978). The Idaho State University fish specimen collection has a northern leatherside that was collected in Angus Creek.

Mill Creek

There are 2 Mill Creeks in the Blackfoot River Watershed. This Mill Creek flows from the southern end of the Wooley Range and drains into the Blackfoot River. The total stream length of Mill Creek is approximately 1.2 miles and its gradient is 12%, providing little habitat for Yellowstone cutthroat trout except in the lower reach. Platts and Primbs (1976) documented moderate alterations to the stream from mining and livestock grazing. They documented a large mining waste dump in the headwaters that appeared to be a major source of sedimentation. In June 1979, Forest Mineral Branch Chief Sonny O'Neal sent a letter to the Conda Corporation, operators of the mine in Mill Creek, expressing his concern about the Mill Creek dump site. The surface of the dump appeared to be slump prone and there was substantial flow of water from the dump. Conda was requested to find another dump site and improve the existing dump site (O'Neal 1979).

Fish habitat is limited in Mill Creek. Upper Mill Creek had no fish and lower Mill Creek was sparsely populated (Platts and Primbs 1976).

Platts (1975) described Mill Creek as a very small stream that had received livestock damage and accelerated sediment delivery from past mining operations.

In the fall of 1983, the Mill Creek settling pond failed, causing extensive damage to the stream. The canyon bottom was covered with a layer of waste shales, old beaver ponds were filled with sediment, riparian vegetation was covered, and high turbidity was evident in the stream and the Blackfoot River following each fall rainstorm (Grover 1984).

Fish stocking occurred regularly in Mill Creek from 1969. Except for one stocking of 1,000 brook trout fry in 1971, Mill Creek has been stocked with cutthroat trout fry throughout the 1970's. In the 1990's, stocking was changed to sterile rainbow trout catchables (IDFG 2008).

Trail Creek

Trail Creek was described by Platts (1975) as a small, ephemeral stream that supported a small population of Yellowstone cutthroat trout.

Slug Creek

Historically, upper Slug Creek supported a large population of Yellowstone cutthroat trout (Kunz 2007). Slug Creek was dominated by brook trout. The upper segment was in a beaver dam complex and the lower segment was a low gradient channel flowing through private land. Dace and sculpin were numerous in the lower segment of the stream (Platts 1975).

Dry Valley Creek
Platts (1975) described Dry Canyon as a small ephemeral streams with limited fisheries values. However, Mariah and Associates collected cutthroat trout, rainbow trout, brook trout, sucker, shiner, dace and sculpin in the stream during their 1989 survey. Cutthroat trout were in low frequency (Rich 1999). Culpin (1961) described Dry Valley Creek as having abundant suitable spawning habitat and habitat was not considered a limiting factor. Surveys of Dry Valley Creek by Mariah and Associates in the early 1990's, described the stream substrate as limiting its habitat value to Yellowstone cutthroat trout. It was dominated by fine substrate particles for most of the stream length. The low diversity of aquatic macroinvertebrates reflected the fine substrate size. Rich (1999) reported the water temperatures in lower Dry Valley Creek and the Blackfoot River near the confluence with Dry Valley Creek far exceeded upper optimal ranges for Yellowstone cutthroat trout spawning and rearing in 1998.

Dry Creek was stocked with Yellowstone cutthroat trout fry through most of the 1970's (IDFG 2008).

Maybe Creek
Historically, Maybe Creek supported a population of Yellowstone cutthroat trout (Kunz 2007).

Johnson Creek
Historically, Johnson Creek supported a population of Yellowstone cutthroat trout (2007).

3.5 Wildlife and Rare Plants

Habitat & Populations

Reference Condition

Pre-settlement population or even presence within the watershed is unknown for many wildlife and rare plant species. A description of the required habitat for specific species is used as the desired habitat conditions.

Canada lynx (*Lynx canadensis*) occupied southeast Idaho. There are five verified records of lynx taken in Caribou County in 1947 and two from Bonneville County in 1955. Six lynx were taken in the Snake River Plain, in areas where forest types occupied by lynx are absent or very fragmented in extent. Two lynx have been recorded as taken in Bear Lake County and there are additional anecdotal accounts of lynx in the valley. Verified records of lynx in Wyoming after 1920 are rare. A lynx was collected in 1940 at Hoback Rim in northwestern Sublett County and another in 1949 near Afton, Lincoln County. A lynx was trapped in Cache County, Utah in 1991. (Ruggiero and others 1999, 226, 230-231). These areas surround the Blackfoot River Watershed so it can be assumed that lynx would have been found here periodically and probably associated with cyclic population increases in their northern home ranges. No lynx were found during the forest wide lynx survey (USFS 2001). Recent analysis of vegetation in the Southern Boreal

Forests has concluded that the Soda Springs and the Montpelier Ranger Districts of the Caribou NF (including this watershed) provided linkage habitat for between suitable lynx habitat in the Greater Yellowstone area and Ashley NF (USFS 2007 NRLA).

Townsend's (Western) big-eared bat (*Corynorhinus townsendii*) historical abundance or distribution of this species is not known. An artificial cave was created in the Enoch Valley Phosphate Mine in 1996 (Idaho Statesman 1996). Any mine closures without providing access has negated this increase of additional habitat.

Gray wolf (*Canis lupus*) occurred historically in the northern Rocky Mountains, including mountainous portions of Wyoming, Montana, and Idaho. The drastic reduction in the distribution and abundance of this species in North America was directly related to human activities, particularly extensive predator control efforts by private, State, and Federal agencies. The natural history of wolves and their ecological role was poorly understood during the period of their eradication in the conterminous United States. As with other large predators, wolves were considered a nuisance and threat to humans. (USDI 1994)

Wolverine (*Gulo gulo*) Wolverines were extirpated from the lower 48 by about 1920. Although some recovery has occurred, it may have happened during a window of opportunity between historic causes of extirpation (unregulated fur-trapping, broadcast of poison baits for predators) and new threats to their reproductive and survival rates in Greater Yellowstone (dramatic increases in human population densities, habitat loss and fragmentation, increasing road densities, traffic volumes, and levels of snowmobile recreation in the backcountry) (WSC 2007).

Bald eagle (*Haliaeetus leucocephalus*) The first major decline in the bald eagle population probably began in the mid to late 1800s due to shooting for feathers and trophies, carrion treated with poisons, loss of forests providing nesting habitat, and the use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds. The bald eagle was removed from the T&E list in 2007. The greatest threat is disturbance (USFWS 2007).

Northern goshawk (*Accipiter gentilis*) Pre-settlement population is unknown.

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) population levels were higher and suitable habitat was more abundant in the pre-settlement period.

Greater sage-grouse (*Centrocercus urophasianus*) are still relatively common in the core of its range, but range has contracted significantly. Threats: loss, fragmentation and degradation of sagebrush habitat (NatureServe 2004).

Great gray owl (*Strix nebulosa*) Pre-settlement presence is unknown. It is expected that their populations coincide with mature stands of lodgepole pine with broken tops nest to small openings.

Flammulated owl (*Otus flammeolus*) populations in the past are not known but may follow the fluctuations of snags in mature aspen or Douglas-fir. Currently conifers are out competing replacing aspen.

Boreal owl (*Aegolius funereus*) Pre-settlement presence is unknown but probably fluctuates with the amount of snags with cavities in mature forests at higher elevations.

Three-toed woodpecker (*Picoides tridactylus*) populations fluctuate with tree mortality. Pre-settlement presence is unknown but corresponded with tree mortality.

Animal Damage Management has been an ongoing activity for many years. The Animal Damage Control Act (March 2, 1931) provided broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds. On December 19, 1985 Congress transferred the Animal Damage Control (ADC) program from the U.S. Department of the Interior's U.S. Fish and Wildlife Service to U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), it was renamed Wildlife Services in August 1997.

Dead and Down Material, Snag / Cavity Nesting Habitat has been lost along roads due to campfires and firewood cutting. In the early to mid-1980s there were epidemic levels of mountain pine beetle; in the early to mid-1990s there were localized epidemics of Douglas-fir beetle and in the mid-1990s Subalpine Fir complex (complex of borers, drought and disease) was present at higher levels. Past timber harvest has generally focused on these areas, but only about 20-30 percent of the harvest has been of dead or dying trees.

Amphibians: Western boreal toad (*Bufo boreas*) and Northern leopard frog (*Rana pipiens*) habitat would have been found in ponds, lakes, reservoirs, and slow-moving rivers and streams including beaver ponds.

Big Game (elk & mule deer) & Winter Range – The elk population in Diamond Creek Zone has increased dramatically from early historical records. Undoubtedly, the unregulated harvest of the late 1800s and early 1900s maintained at or reduced populations to relatively low levels. An aerial survey of Unit 76 during February 1952 resulted in 193 elk observed with a total population estimate of 230. The mule deer population has fluctuated widely since the mid-1800s. Early accounts by trappers through the area suggested that deer were seen but were less numerous than buffalo, bighorn sheep, and elk. Deer numbers probably declined through the early 1900s, possibly due to unregulated harvest. By 1920, observations of deer were quite rare. Between 1920 and the early 1970s, deer numbers increased dramatically, interrupted briefly by significant winter mortality. Following a significant decline in numbers beginning in 1972, numbers again increased until the late 1980s. The population level attained during this second peak probably did not reach that attained during the 1950s - early 1970s. Although both livestock and elk numbers within Diamond Creek Zone are high, there appears to be little concern by livestock operators for competition for grass. However, localized concerns do exist for livestock (primarily sheep) over-utilization of ridge-tops used by wintering elk. During the mid-1900s, Unit 76 supported a high population of mule deer with relatively few elk. Important mule deer wintering areas included Brown's Canyon to Yellowjacket Creek, east of Henry, Stump Creek, Crow Creek, and the Soda Front from Wood Canyon to Dingle [some of these areas are outside of the watershed]. Today, these winter ranges are predominately occupied by elk. It is unknown whether habitat changes and/or competition (resource or social intolerance) have led to this change. However, there appear to be areas with suitable deer winter range vegetation that are only occupied by elk. Extensive populations of wintering mule deer are not expected to occur with current distribution and numbers of elk in this zone. (IDFG 2007d).

Landbirds have been impacted by a loss of winter and summer habitats and contaminations. Following close on the heels of the Lacey Act and the Weeks-McLean Law, the framers of the **Migratory Bird Treaty Act** (MBTA) were determined to put an end to the commercial trade in birds and their feathers that, by the early years of the 20th century, had wreaked havoc on the populations of many native bird species. The MBTA decreed that all migratory birds and their parts (including eggs, nests, and feathers) were fully protected. The MBTA is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle). **Executive Order 13186** instructs Federal Land agencies on their responsibilities to further implement the MBTA.

Idaho Sedge (*Carex idahoa*) historical abundance and distribution is unknown.

Beaver (*Castor canadensis*) – Early exploration of western North America was largely due to the search for beavers by trappers. Size estimates of the pre-European beaver population in North America were 60-400 million animals or the equivalent of 10-60 animals per mile of stream and river. Trapping nearly eliminated the beaver population and the subsequent quantity and quality of riparian habitat declined. Data specific to the watershed is not available.

American White Pelican (*Pelecanus erythrorhynchos*) populations have increase in the last 15 years. Estimates from a 1993 survey indicated 150-175 nests at Minidoka NWR and 80-100 nests at Blackfoot Reservoir (Groves et al. 1997). There were an estimated 550 nests at Minidoka and 800 nests at Blackfoot Reservoir in 2001 (King and Anderson 2005). Many as pelican populations are recovering from years of low numbers due to DDT, disease, and disturbance and destruction of colonies. (IDFG 2007e)

Designated Wildlife Areas

Idaho Birding Trails began in August 2006 with a 135 page book and a web site. It is a relative new wildlife initiative and ties into the Wildlife Viewing areas. Like Alabama, Kansas, Florida, Montana, Wisconsin and more, Idaho now promotes nature-based tourism opportunities in the form of premier birding spots throughout the state. The Idaho Birding Trail was developed by the Idaho Department of Fish and Game's nongame program with other state, federal, and private partners to promote opportunities for rural economic growth in the form of providing amenities to travelers who are birding, and to promote the conservation of bird and wildlife habitat to maintain the quality of life for Idahoans.

Four years in the making, the statewide trail is a network of sites and side–trips that provide the best viewing opportunities to see birds in Idaho. With 175 sites and about 2,000 miles of trail, the birding trail represents a collection of bird watching hotspots, diverse habitats, and a glimpse of Idaho's rich natural heritage. And 22 sites are designated as Blue Ribbon sites— "the best of the best" bird viewing opportunities in Idaho. The trail is a series of self-guided, auto-driven tours, lasting anywhere from an afternoon outing to a week-long expedition. Most sites are easily accessible and are connected by no more than a 30 minute drive. Along the way, the birders will be guided to the best places to see large concentrations of birds, high species diversity, or unique places of high habitat quality and their associated birds.

Much of the trail leaves the freeways and highways behind, and wanders deep into Idaho's rural communities and along backcountry byways. As a result, it has the potential to bring significant economic benefit to places that are well off the beaten track. Birders spend considerable amounts of money when they travel—on gas, food, motels, optics, books and outdoor clothing. In addition to providing outstanding recreational opportunities, education and an increased awareness of the state's important wildlife resources, the trail also has the potential to boost local economies through a previously untapped tourism industry.

A state house resolution in 2006 recognized the Idaho Birding Trail as the official state birding trail; this means the Department of Commerce and Labor's Division of Tourism can promote the trail.

A key part of the birding trail project has been the production of a 135 page guidebook with directions, descriptions and maps of every site on the trail. The guidebook was developed by Fish and Game in collaboration with local birders and other state and federal partners. (Sallabanks 2006 per.com.)

Diamond Creek / Elk Valley Marsh **Wildlife Viewing Area** is site number 65 of 94 areas identified in the first Idaho Wildlife Viewing Guide (Carpenter 1990). Wildlife Viewing Areas began in the late 1980s.

Blackfoot Wildlife Management Area (WMA) was established to provide public access, to improve cutthroat trout habitat and provide diverse upland and riparian communities for game and non-game wildlife species. The WMA was purchased by the Conservation Fund in 1995 from the Stocking family. The Idaho Department of Fish and Game in turn purchased the 1,720-acre ranch from the Conservation Fund. Idaho Department of Fish and Game also holds a lease from the Idaho Department of Lands on an adjacent 640 acre parcel, and manages a 40 acre parcel owned by the USDI Bureau of Land Management. The Blackfoot River meanders through the WMA, providing an excellent opportunity for cutthroat trout fishing.

Blackfoot Reservoir Important Bird Area (*Identified)* is one off 55 Important Bird Area in Idaho. Idaho's Important Bird Areas (IBA) Program was launched in 1996 as a partnership between Idaho Partners in Flight and the Idaho Audubon Council. Since 1997, the IBA Technical Committee has encouraged and reviewed nominations for potential IBAs. To date, 55 sites have been officially recognized as Important Bird Areas in Idaho, representing 3.8 million acres of public and private wetland and upland habitat throughout the state. The monitoring phase of the Idaho IBA program is underway, with monitoring at several IBAs being conducted either by biologists responsible for the management of the area, or by volunteers. These monitoring efforts, which are intended to collect basic information about the IBAs, will create an inventory of bird species present at each site, at a minimum, and will likely lead to further investigations.

The Nongame and Endangered Wildlife Program of the Idaho Department of Fish and Game, where the IBA Program is now housed, has recently initiated a coordinated all-bird monitoring program, the Idaho Bird Inventory and Survey (IBIS), that will initiate more extensive monitoring at all wetland IBAs and select upland IBAs across the state. Under the IBIS program, monitoring was initiated at five wetland IBAs in 2004, with 20 more being added in 2005. In addition, proponents are being sought to work toward conservation and stewardship of IBAs. These individuals and organizations will be champions for bird conservation at particular sites and will work cooperatively with each site's land manager or landowner. (IDFG 2006a)

Livestock exposure to selenium

In mid-December 1996, the Soda Springs Ranger District of the Caribou-Targhee National Forest was notified by the Idaho Department of Environmental Quality (IDEQ) that a Mr. Fred Anderson, a rancher operating in Caribou County, Idaho, had reported that six of his horses were suffering from selenium (Se) poisoning. Mr. Anderson's private property included a pasture adjacent to Maybe Creek, downstream from the South Maybe Canyon Mine Cross Valley Fill. Waste rock from phosphate mining operations at this site had been stored in this large embankment beginning in 1977 and continuing through 1983. Tissue and blood samples were taken from the horses and selenium toxicosis was diagnosed by toxicology experts at the University of Idaho, Moscow. Five of the six horses were later euthanized due to the effects of selenium toxicosis. The poisoning is believed to have resulted from the consumption of pasture plants over an extended period of time. Pasture plants are known to accumulate varying amounts of selenium. Since 1997, over 600 sheep have died from the results of confirmed or suspected selenium toxicity in or near the Blackfoot watershed. See livestock section. (USDA-FS 1997)

3.6 Human Uses

Road Development

Historically, access to the watershed was provided by foot and horse trails. These provided access to and across the forest for hunting and trapping for Native Americans and early trappers. Many of these trail corridors were later developed into roads to provide primary access for ranching, timber harvesting and mineral development. (See Appendix B Road Analysis) Following are some of the road improvements including mineral and timber projects that required improved access.

Primary Access

The Blackfoot River/Upper Valley Road, #50095, and the Chippy Creek Road, #51203, provide access to the upper portion of the watershed. These roads are well maintained and have seen improved drainage and surfacing by Caribou County in recent years. The section of the Blackfoot River Road across the forest thru the Blackfoot Narrows was transferred to Caribou County in 1990.

The Slug Creek Road, #51095, provides access to the watershed form the south. This road is well maintained and was most recently improved in 1991 including widening and resurfacing. The sections across National Forest lands were transferred to both Caribou and Bear Lake Counties in 1991.

The Trail Canyon Road #50124 and the Wood Canyon Road #50125 provide access to the watershed from the west. These roads are also well maintained and have had improvements to drainage and surfacing. The sections of these roads across the forest were transferred to the Caribou County in 1990 (Trail Canyon) and 1994 (Wood Canyon).

The Diamond Creek Road, #51102, was upgraded in the early 60's to provide access for timber. This included the construction of 5 bridges across Diamond Creek. The Diamond Creek Road up to the intersection with Smokey Canyon (Timber Creek) Road, #50110, was transferred to Caribou County in 1990. The section north of Smokey Canyon Road was resurfaced with crushed aggregate and the section south of the Smokey Canyon Road was improved and graveled in the early 90's.

Mineral Access

To provide access the Maybe Canyon Mine, the Dry Valley Road, #50601, was relocated and improved in the 1980's. It is well maintained and is under special use permit, but is open to the public. Local haul roads within the mine were also constructed with the majority of these local roads closed to the public. A railroad line was also constructed up the valley during this time to allow for shipping phosphate ore from a load out facility below the mine.

To provide improved access for the Mountain Fuel Mine, the Dry Valley Road #50601 and railroad line were extended up to the head of the valley to access the mine in the mid 1990's. The Slug-Dry Road, #50387, connecting upper Dry Valley to Slug Creek was also relocated and upgraded at this time.

For the Wooley Valley Mine, a railroad line was constructed up to the east side of Wooley Ridge. Local haul roads were constructed up the west face of Wooley Ridge and within the mine on top of Wooley Ridge. A conveyer system was constructed to drop the phosphate ore down off of the ridge to the railroad loading facility at the end of the railroad line. These roads were closed to the public.

For the Rasmussen Mine, a haul road, #51330, was constructed in the 1990's from the Wooley Valley railroad loading facility, over Wooley Ridge north of the existing Wooley Valley haul road, then across Rasmussen Valley , and up to Rasmussen Ridge leases. Following the construction of this new haul road, the old conveyer system was removed and portions of the associated access road were decommissioned and recontoured. Local haul roads to access the south, central, and north mine panels were constructed. When the central mine panel was developed the section of the haul road up NoName Creek was relocated to the north and the old alignment was closed and partially recontoured. These roads are closed to the public.

To transport phosphate ore from the Smokey Canyon Mine east of the watershed, a slurry line was constructed across the watershed in mid 80's. This slurry line followed the Smokey Canyon Road down to the Diamond Creek Road, crossed Diamond Creek and then followed the Stewart Canyon Road, #50134, and crossed Dry Ridge. It then crosses Dry Valley and follows the Lone Tree

Road, #50198 , then across private land and crossing another section of the forest along Trail Canyon before terminating at Conda. The Timber Creek Road was upgraded during this effort.

For the Dairy Syncline leases, temporary exploration roads were constructed of off the existing road system and then reclaimed.

Timber Access

To access the timber base in the watershed several collector and local road systems were developed or improved. Many of the local timber access roads were for short term access and were closed following sale activities. Following is a listing of timber sales from 1980. New or improved collector roads are noted.

81 Dave's Creek TS – Construction of the Dave's Creek Road, #50192.
82 Wood Canyon TS
83 Trail Hollow TS
83 Flat Valley TS – Realignment/Reconstruction of the Flat Valley Road, #50107.
85 Mountain Fuel Settlement Sale
86 Angus Creek TS – Construction of the Angus Creek Road, #50346.
86 Big Basin TS - Construction of the Harrington Peak, #51238, and Meadow Creek, #51241, Roads
87 Dave's Creek TS
88 Mosquito TS
88 Diamond Bench TS – Construction of the Diamond Bench Road, #51255.
90 Diamond Flat TS – Reconstruction and surfacing of the southern end of the Flat Valley Road #50107
91 Upper Fossil TS – Relocation/Reconstruction of the Big Basin Road, #51251.
92 Huckleberry TS – Reconstruction of the Green Basin Road, #50187.
93 Pole Canyon TS
95 South Fork TS
97 Stewart TS
98 Campbell Canyon TS
04 Olsen Creek TS
08 Aspen Range TS (proposed) – Realignment of the Sulphur Creek (Johnson Creek) Road #50126

Phosphate Mining

Between 1906 and 2004, 11 phosphate mines have operated within the UBRW (Map 4 Appendix A), covering an estimated total 7600 acres of disturbance (Appendix D-Mining Data). The mines within the Upper Blackfoot River Watershed boundaries are:

- Ballard Mine was mined from 1952 to 1969 and is located in T. 7 S., R. 42-43 E. According to the Site Investigation Work Plan, March 2004, "Ballard Mine was originally leased to the J.R. Simplot Company in December of 1948 under lease BL-055875. Simplot never developed the lease and on May 23, 1951, the Simplot Company assigned the lease to the Monsanto Chemical Company. A second Ballard Mine lease, lease I-05723, was issued to Monsanto in July 1955 to include additional phosphate ore deposits. Ballard Mine leases were developed and operated by Monsanto from 1951 to their relinquishment back to the BLM in April 1984." The mine consists of approximately 191 acres of pit mining, 317 acres of waste rock piles, and 96 acres were used as service areas for the mine, totaling disturbed 604 acres within the two leases. Ballard Mine is located north of the Blackfoot River and is located within the drainages of Long Valley Creek, Wooley Valley Creek and the Blackfoot River. Long Valley Creek leads to the Little Blackfoot River which empties into the northeast corner of the Blackfoot Reservoir. Wooley Valley Creek discharges into the Blackfoot River southeast of Ballard Mine, which drains into the Blackfoot Reservoir. At present, the mine has six open pits and six waste rock piles. Typically, middle waste shales comprise the outer dump surfaces. The Ballard mine is on private land within the project area. (MWH, 2008).

- Central and South Rasmussen Ridge Mines are located in T. 06 S., R. 43 E., Sections 15, 22, 23, 25 and 26 on Federal Lease I-04375 which is comprised of 600 acres, all on Forest Service System lands. Mining began at South Rasmussen Ridge Mine in 1990 and continued through 1998 with 257 acres disturbed and reclaimed. Mining continued into Central Rasmussen Ridge Mine in 1998 through 2004 with a total of 230.8 acres disturbed. The mine site consists of two pits, two external waste rock dumps and a mine shop and office area. The combined mine area is located on the drainage divide between the Angus Creek and Sheep Creek watersheds. Surface water originating from springs and runoff from the southeastern portion of the mines discharges into the west fork of Sheep Creek which flows southeastward into Sheep Creek. Sheep Creek then flows southeastward to Lanes Creek which is a tributary to the Blackfoot River. Surface water from the central portion of the mine and the southwestern portion of the mine discharges into No Name Creek which then flows into Angus Creek. Water in the upper portions of No Name Creek near the mine is present year-round, but becomes a losing reach further downstream where the creek crosses the Wells Formation and all flow is lost to the subsurface. There are several wetlands areas within and adjacent to the mining areas. (Ecology and Environment, 2000c; BLM, 2003).
- Champ Mine is located in T. 09 S., R. 44 E. township, on Federal Lease I-04979, and is all on US Forest Service System lands. Mining and reclamation operations were conducted from 1982 through 1986. The Champ Mine includes the north and south pits, the east and west dumps and the Dry Valley haul road. Estimates of acreage disturbance include 154.3 acres of dumps, 112.4 acres of pits, and 17.4 acres of collateral disturbance including the haul road. Streams within the mine area include Goodheart Creek, Dry Canyon Creek, Slug Creek. Upper Goodheart Creek originates from springs in the northern portion of the mine and flows about 0.75 mile where it converges with Goodheart Creek. Both reaches are intermittent to their confluence, whereupon Goodheart Creek flows perennially until it reaches Slug Creek. Slug Creek flows intermittently and perennially, depending upon the reaches, until it enters the Blackfoot River. Dry Canyon Creek flows intermittently until it converges with Slug Creek. There are wetland areas within the mine area along the banks of Goodheart Creek, Dry Canyon Creek, Slug Creek and the Blackfoot River. (Ecology and Environment, 2000a).
- The Conda Mine (partially within the project area) was mined from 1906 to 1984 and is contained within T. 08 S., R. 42 E., 43 E., and T. 09 S., R 43 E. townships. Mining

activities at Conda mine began in 1906 with locating a total of 23 placer claims that were later acquired and patented by the Southern California Orange Grove Fertilizer Company. Anaconda Copper Mining Company conducted both underground and surface mining from ~1920-1959, followed by surface mining by the J. R. Simplot from ~ 1960-1984. During the period from 1920 to 1959, the Conda town site, a mill, and an eight-mile rail line to Soda Springs were created. Underground mining ceased in 1956 but surface mining continued through 1984 on the patented lands and under Federal Phosphate lease I-04494 issued in 1954, and I-015523 issued in 1965. The mined area within the project area is on private and BLM land (Lee, 2000).

- Dry Valley Mine Panels A and B was mined from 1992-2002 on Federal Leases I-015097 and I-014184 and a private mineral lease contained within T. 07 S., R. 44 E and T. 08 S., R 44 E. townships. A railroad spur into the mine area and a tipple were constructed in 1991. A mine-office complex was completed and occupied in 1992. Mining in Panel A began in 1992 and was completed in 1994. Mining in Panel B began in 1994 and was completed in 2000. Mine features include two backfilled pits and four waste rock dumps. In order to maximize ore recovery, mining occurs below the water table, which requires pit dewatering. The majority of the mine is on private land with a small section of BLM land. Streams within the mine area are Chicken Creek and Dry Valley Creek. Dry Valley Creek, which is approximately 10.4 miles long, is fed by Lonetree Springs, Maybe Creek and Chicken Creek and is intermittent. Dry Valley Creek dries up in the middle reaches after snowmelt, but the upper and lower reaches run throughout the year. Chicken Creek is approximately 2400 ft. long, and dries up yearly after snowmelt. Reclamation on both panels consisted of a sparse cover of topsoil, with a thick layer of chert sandwiched between the run-of-mine waste rock and topsoil over the more southern end of Panel B (BLM, 1991).
- Dry Valley Mine Panels C and D is located in T. 08 S., R. 44 E. on a combination of Federal, State, and private land. Federal Leases include I-01484 and I-011866 which cover 480 acres. State Leases include 3823R and 7961 which cover 480 acres. Private leases include ML769 and ML762 lease which cover 240 acres. The combination of all leases totals 1200 acres (Agrium, 2007). Mining began in June 2005 and continues at the current time. Similar to Dry Valley Panels A and B, in order to maximize ore recovery, mining occurs below the water table which requires pit dewatering. According to the Mine and Reclamation Plan, final features at the mine will include one backfilled pit, one partially backfilled pit, and three waste rock dumps. Facilities at the mine are the same as those for Dry Valley Panels A and B. The mine areas (including Panels A and B) are located entirely in Lower Dry Valley. Water resources in Lower Dry Valley recharge the hydrologic system in Slug Creek Valley. Major streams in the vicinity of the mine include Dry Valley Creek and Slug Creek, both of which drain into the Blackfoot River. Dry Valley Creek originates at Lonetree Spring and drains northwest to the Blackfoot River, the confluence of which is approximately 4 miles downstream of the mine pits. Dry Valley Creek is intermittent with some perennial sections. Tributary to Dry Valley Creek are Maybe Creek, Chicken Creek, Quonset Hut Creek, Young Ranch Creek, Stewart North Creek, and Stewart South Creek. With the exception of Maybe Creek, all of these flow year-round in the lower reaches and are on the west side of Dry Valley Creek. (Maxim Technologies, 2000).

- Enoch Valley Mine was mined from 1989-2003, is located in T. 06 S., R. 43 E. township and consists of three Federal Leases (I-015122, I-011683, I-015033) and two State of Idaho leases. The mine area includes 55 acres of private land, 838 acres of State land, and 582 acres of US Forest Service system lands. Streams in the mine area include W. Fork Rasmussen Creek and E. Fork Rasmussen Creek which drain into Rasmussen Creek, which then drains into Angus Creek and ultimately into the Blackfoot River, and No Name Creek which drains into Angus Creek. Most reclaimed areas have been covered with topsoil with the exception of areas reclaimed prior to 1993 in the most southern and northern portions of the mine. (MWH, 2008; MWH, 2004).
- Lanes Creek Mine is located in Section 4, T. 07 S., R. 44 E. on private land under a private leasehold. Mining began in 1978 and mining was suspended in late 1988 or early 1989. As of 2000, the mine is not abandoned or reclaimed. (Lee, 2000).
- Mountain Fuel Mine is located in T. 09. S, R. 44 E. township, on Federal Lease I-012989. Preparation for opening the mine began in late 1966 with roughing in access roads, clearing vegetation and stripping of overburden. But mining did not start until 1985 and was completed by 1993. Mountain Fuel mine consists of five pits, six waste rock dumps, haul roads, a tipple, a railroad spur and office and maintenance buildings. Estimates of disturbed acreage include 314.8 acres of waste rock dumps, 280.5 acres of pits, and 186.2 acres of collateral disturbance including haul roads. The mine is on US Forest Service lands. Streams in the mine area include Dry Canyon Creek and Dry Basin Creek which are tributaries to Slug Creek, which in turn is tributary to the Blackfoot River. There are wetlands communities along the main drainages in the mine area. (Ecology and Environment, Inc., 2000b).
- North Maybe Mine is primarily on U.S. Forest Service lands on Federal Leases I-04 and I-8289, sections 17, 20, 21, 28, 33, and 34 in T. 08 S., R. 44 E., and sections 3, 4, 12, 14 and 15 in T. 08 S, R. 44 E. Portions of the mine area are on Special Use Permits SSC21 and SSC23, and a small portion of the mine area is on private and State lands. Mining was conducted by underground mining in 1951, sporadic surface operations from 1964-1971, continuously from 1972-1984, idle from 1984-1993, with the final ore removed in 1993. Approximately 612 acres were disturbed by mining operations and the current configuration consists of a 2.5 mile-long pit surrounded by 12 waste rock dumps. Shop and office facilities were located on private land and most of these facilities have been removed. Waste rock dumps were constructed without selective handling, which would indicate run-of-mine waste rock throughout the dumps up to and including the surface materials. Streams within the mine area include Mill Creek, Spring Creek, Kendall Creek, Diamond Creek, Lanes Creek and the Blackfoot River. Mill Creek flows into Spring Creek which then joins the Blackfoot River. Kendall Creek flows to Diamond Creek which joins with Lanes Creek to form the Blackfoot River. There is also an ephemeral stream which flows out of the base of Big Draw Dump, and a small spring that surfaces near the canyon floor, flows to the south into Maybe Canyon, and flows towards Maybe Creek.(HWS, 2008)
- North Rasmussen Ridge Mine is located on Federal Leases I-94375 and I-07619. Two hundred acres of Lease I-07619 are on Forest Service lands and the remaining 240 acres of the lease are on State land. Additionally, a portion of State Lease E-07957 was acquired as part of the mine site. The 2001 N. Rasmussen Ridge Supplemental Mine and Reclamation Plan estimated a total of 170 acres of disturbance on Forest Service lands with 135 of those

acres reclaimed and 98 acres of disturbance on State land with 61 acres reclaimed. Mining at N. Rasmussen Ridge Mine began in 2004, and was suspended in December 2005 when the mining company moved their operations to another mine site. Mining operations resumed at N. Rasmussen Ridge Mine in the fall of 2008 (Agrium, 2008). Surface water drainages in the vicinity of the mine include No Name Creek, Reese Canyon Creek, and Sheep Creek. No Name Creek and Sheep Creek flow southeast to Angus Creek and Lanes Creek which are tributaries to the Blackfoot River. Reese Canyon Creek flows northwest and is tributary to the Little Blackfoot River. Both the Blackfoot River and the Little Blackfoot River discharge into the Blackfoot Reservoir (Agrium, 2001).

- South Maybe Mine is primarily located on National Forest System lands. The mine is covered by Federal Mineral Lease (I-04) and is located in Sections 10, 14, and 15 of T. 08 S., R. 44 E., Boise Meridian. Part of the waste rock dump, located off lease in Section 11, T. 08 S., R. 44 E., is covered by a Special Use Permit. Shop, office, ore handling facilities, and 2 ponds were located on private land. Open pit mining was conducted from 1976 to 1983. Mine features that remain on site include the mine pit, which is about 2 miles long and has a maximum width of 600 feet wide, the waste rock dump, and the two ponds. The waste rock dump is a cross valley fill (CVF) comprised of approximately 29 million cubic yards of run-of-mine waste that was disposed without selective placement. The cross valley fill is partly located partly off-lease on Special Use Permit No. 4068-4 (TRC, 2007). This CVF covers 120 acres (not corrected for slope.) Maybe Creek flows through the CVF via a French drain that was installed prior to placement of waste. Several springs were buried under the CVF. Water from the largest of these springs is piped to the toe of the dump. Streams on the mine site include Maybe Creek, its tributary the North Fork of Maybe Creek, and a spring-fed tributary to the North Fork of Maybe Creek. Maybe Creek flows down Maybe Canyon and into Dry Valley where it joins Dry Valley Creek east of the Dry Valley Mine. The confluence of Dry Valley Creek with the Blackfoot River is about 3 miles from where Maybe Creek joins Dry Valley Creek. (TRC,1997; TRC, 1999).
- South Rasmussen Mine is currently being mined on a State Lease (I-7958) and a Federal Lease (I-23658) with associated activities on Forest Service Special Use Permit SSC2. The mine area is included in Sections 25, 26, and 36 in T. 06 S., R. 44 E., and Section 31 in T. 06 S., R. 43 E townships. The State Lease includes 640 acres and there are 160.72 acres on Federal Lease I-23658 on Forest Service System lands. Rasmussen Ridge is in the Angus Creek and Sheep Creek drainages. The nearest perennial stream is Angus Creek approximately 0.5 mile west of the mine pit. Sheep Creek is located approximately 1 mile east of the mine pit. (Monsanto, 2007).
- Wooley Valley Mine is located on Federal Leases I-04775, I-04373, I-97, I-015040, and I-04374 in Sections 32 and 33, T. 06 S., R. 43 E., and Section 19, T. 07 S., R. 44 E., and Sections 3, 10, 11, 13, 14, 24, and 25, T. 07 S., R. 43 E. townships. Also included in the mine site area are Forest Service Special Use Permits 4092.01 (SSC 12 and SSC 11), 4020-02, and the historical BLM Phosphate Use Permit I-7062. The mining areas, referred to as Unit 1 (I-04775), Unit 3 (I-04373, I-000097, I-015040), Unit 4 (I-004374), and associated facilities, are located primarily on Forest Service lands (75%), with approximately 20% on private lands and approximately 5% on BLM lands. Experimental mining and site development occurred between 1955 and 1967, and production mining occurred approximately between 1966 and 1994. Surface water bodies in the vicinity of the mine include Angus Creek, the Angus Creek Reservoir, Mill Canyon, the Blackfoot River, and

unnamed drainages tributary to the Blackfoot River and Angus Creek. Angus Creek is perennial and flows to the northwest through Little Long Valley, bends northeast and then flows southeast through the Rasmussen Valley until its confluence with the Blackfoot River. Unit 4 waste rock dump is drained by unnamed intermittent streams that flow south and southeast to the Blackfoot River. Other intermittent unnamed drainages transport surface water to the north from the dump located in the northern portion of the mine. The Angus Reservoir, located in the central eastern portion of the mine area, forms the headwaters of Angus Creek. (Ecology and Environment, Inc. 2000d).

In 1996, several livestock deaths were associated with excessive selenium uptake near waste rock piles at different phosphate mine sites. In 2000, mining companies, federal and state agencies and the Shoshone Bannock Tribes entered into an Administrative Order on Consent (AOC) to investigate and address human health and ecological risks related to historical mining practices in southeastern Idaho. The AOC designated the Idaho Department of Environmental Quality (IDEQ) as the lead agency tasked with conducting a regional or area wide investigation into impacts associated with historical phosphate mining. In 2002, the IDEQ published the Final Area Wide Human Health and Ecological Risk Assessment (AWHHERA), Selenium Project, Southeast Idaho Phosphate Mining Resource Area. The major conclusions of the AWHHERA are quoted below:

- There is a low probability of significant human health effects in the region based on current conditions, existing exposure pathways, and observed concentrations of chemicals. Potentially significant human health risks are indicated only in the case of subsistence use of resources in a limited number of highly impacted areas identified during previous area wide investigations. Based on regional observations, subsistence level use by human receptors is considered highly unlikely.
- There is a low probability of population level impacts to regional wildlife based on current conditions and the low percentage of impacted zones in comparison to unaffected surrounding habitat.
- There is a high probability of subpopulation and/or individual effects occurring for ecological receptors residing in the vicinity of highly impacted areas.
- There is a potential for risks to aquatic and riparian ecological receptors residing in highly impacted areas as indicated by significant exceedances of conservative benchmarks for surface water, sediment and fish tissue concentrations.
- The contaminants of concern (COC) for future site-specific activities have been identified as cadmium, chromium, copper, nickel, selenium, vanadium and zinc. Selenium and cadmium are considered to be the primary hazard drivers on a regional basis.

The AWHHERA included evaluation of soils, sediment, surface water, and vegetation, but did not include evaluation of ground water.

In order to assess the potential risks associated with highly impacted areas, site-specific investigations at individual mines were initiated in 2002. There are currently five historic mines within the Blackfoot River Watershed conducting site investigations into impacts related to mining activities: Enoch Valley Mine, Ballard Mine, Conda Mine, North Maybe Mine, and South Maybe Mine. The investigations are being conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.

Other Minerals Resources

From a geologic standpoint, reference conditions become rather meaningless and will not be discussed further. Some collecting of invertebrate fossils has undoubtedly occurred in the watershed, but since such small disturbances have occurred, in generally unknown locations, a characterization of the activity cannot be accurately developed.

The non-phosphate related mineral disturbances in the watershed are very small. The three oil/gas exploratory well sites (only one on NFS lands) were reclaimed 25-55 years ago, with no (or very little) current impact. There are only three active gravel sites, one is technically outside the watershed, one is not on NFS lands, and the other has very limited development potential at this time. There are no developed sites for landscaping rocks at present within the analysis area.

Livestock Grazing

Grazing by ungulates in the Upper Blackfoot Watershed probably first occurred when Indians hunted and camped in the area with their horses. Grazing by domestic cattle and sheep first occurred in the late 1800’s.

Early settlers herded their livestock to this area as soon as snow left and allowed them to follow the receding snowline to higher elevations. Early managers in the Forest Service recognized problems created by past levels of grazing and initiated corrective actions. Grazing seasons were gradually shortened as range-readiness data was collected. Grazing use by domestic livestock has been greatly reduced in the Upper Blackfoot Watershed since the 1940’s. This reduction was a result of reducing livestock numbers and season of use in the 1940’s, and by eliminating “common use grazing” in the 1960’s. Grazing use within the watershed has been reduced by more than 60 percent over the past 100 years.

To help improve rangeland condition and to better manage livestock within the area management systems were implemented in the early 1960’s. Many of the Allotment Management Plans implemented rest-rotation systems. These systems required the use of a full-time herder to regulate the movement of livestock during the grazing season. Having a herder to move the sheep helped reduce problems of sheep bedding in the same location night after night. The allotment management plans of the 1960’s sheep limited to bedding in a single area for a maximum of three nights.

The developing of alternative water sources has proved effective in eliminating or reducing heavy grazing use in the riparian areas, and making it possible for livestock to use areas that were not grazed in the past.

Currently there are 14 sheep allotments and three cattle allotments on Forest Service administered land within the Upper Blackfoot Watershed. Several of the sheep allotments encompass acreage within other watersheds other than the Blackfoot.

Rasmussen Valley Allotment was an excellent allotment in the past. Currently active mining has removed one complete unit from grazing use. On a good forage year the cattle can manage adequately on the remaining units. In 2007 the cattle came on about two weeks late and were required to leave early also to prevent excessive use.

The Diamond Creek Allotment is a good allotment, but there are major conflicts between recreationists and livestock grazing. The allotment is long and narrow, running along Diamond Creek. The majority of the places where people like to camp are the same places where the cattle like to shade up.

Monitoring data indicates that current grazing management is meeting, or satisfactorily moving toward objectives in the Forest Plan. As long as the direction in the Forest Plan and the AOI's are adhered to, proper grazing levels will be used, and the desired ecological conditions will be achieved or maintained.

If the problems concerning inadequate forage (due to mining) in Rasmussen Valley and the conflicts between recreation and grazing in Diamond Creek could be resolved then grazing conditions are close to desirable conditions and could be maintained as such.

Recreation

Recreation historic levels were low and since much of the recreational activities started to blossom in the late 1980's and 1990's the recreational activities within the watershed will be discussed in Chapter 4-Current Conditions.