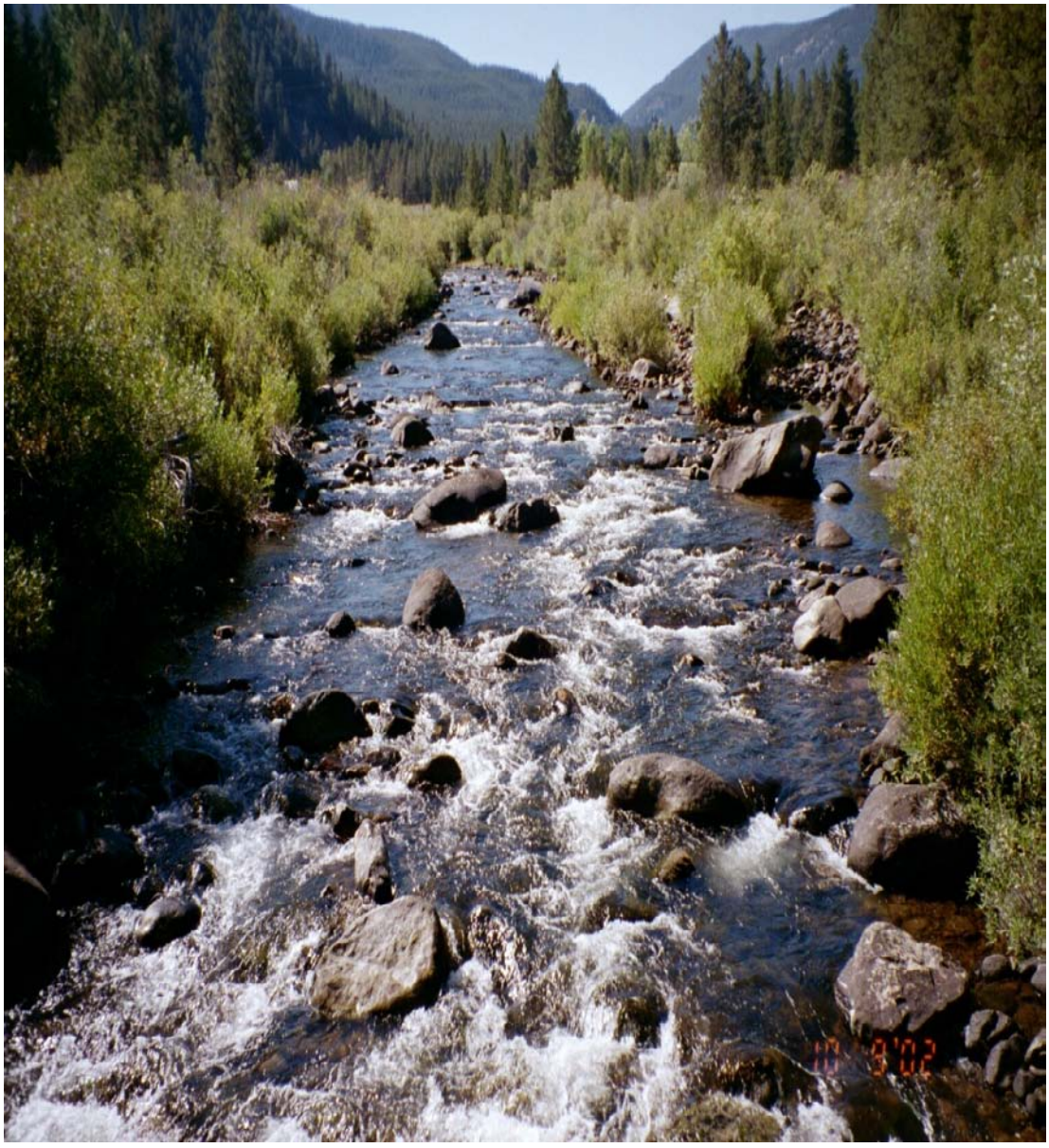
Lower Wise River
Stream Corridor Assessment

Final Report



Lower Wise River near the Flying Cloud Bridge

September 2003

Lower Wise River Stream Corridor Assessment

Final Report

Prepared for the Big Hole Watershed Committee

September 2003

Compiled By

USDA Natural Resources Conservation Service
Montana Department of Natural Resources and Conservation

AKNOWLEDGEMENTS

The following people gave time and effort in the planning and implementation of this comprehensive stream corridor assessment. The Big Hole Watershed Committee (BHWC) is to be commended for their investment of time and interest in providing leadership and project direction.

- Jennifer Dwyer, BHWC Coordinator 994-0251 jendwyer@montana.net
- Dave Martin, DNRC-CARDD 444-4253 damartin@state.mt.us
- Liz Jones, Landowner, BHWC 832-3219
- Charlie Hester, USFS District Ranger 832-3178 chester@fs.fed.us
- Art Christianson, Conservation District, BHWC 683-2519
- Scott Lentz, USFS Fisheries Biologist 689-3243 slentz@fs.fed.us
- Dick Oswald, FWP Fisheries Biologist 683-9310 fishwpdillon@mcn.net
- Pete Benjefield, USFS Hydrologist
- Warren Kellogg, NRCS Watershed Specialist 444-4490 wkellogg@state.mt.us
- Darrin Kron, DEQ 444-4765 dkron@state.mt.us
- Dan McGuire, Private Contractor-Entomologist

CONTRIBUTORS

The following individuals provided technical leadership to the assessment efforts and compiled field observations and sample analysis interpretations to produce the final Lower Wise River Report.

- Jennifer Dwyer, BHWC Coordinator
- Warren Kellogg, NRCS Watershed Specialist
- David Martin, DNRC-CARDD
- Daniel McGuire, Private Contractor – Aquatic Biologist

Introduction

The purpose of the Big Hole Watershed Committee (BHWC) is to seek understanding of the Big Hole River and agreement among individuals and groups with diverse viewpoints on water use and management in the Big Hole watershed. The BHWC was established in 1995. The BHWC was formed in response to local ranchers requesting assistance from the State of Montana for developing a coordinated effort to address the resource issues of the Big Hole River. Specific issues facing the community at that time included: drought conditions, a declining fluvial Arctic Grayling population, and water quality and quantity concerns.

The committee is composed of 22 official members who represent diverse interests including: ranching, utilities, local government, sportsmen, conservationists, tourism, and outfitters. In addition to the official members, local, state, and federal agencies participate in the watershed committee as technical advisors. The BHWC is a consensus driven, multi-stakeholder entity, which works closely with the Big Hole River Foundation (a nonprofit, conservation organization), state and federal agencies, and other organizations on watershed restoration and management plans. The BHWC functions as an open forum for watershed issue discussions, a resource for assisting private landowners with management decisions, a clearing house for water resource information, a liaison between management agencies and the public, and a catalyst for voluntary conservation and enhancement efforts.

The BHWC will: seek to sustain the rural quality of life in the Big Hole Watershed; promote economic activities that are compatible with the environmental amenities of the watershed; protect and/or enhance the natural resources in the watershed; and protect and respect existing water rights.

The BHWC is committed to:

- Involving all interests that are willing to seek practical solutions that benefit all interests;
- Promoting a common understanding among individuals and groups with diverse viewpoints;
- Fostering the ability of local individuals and groups to create effective solutions to local problems; and
- Seeking long-term solutions based on sound information.

The BHWC identified the Wise River as a watershed of high importance. Liz Jones, of the Jones (Raferty J) Ranch, which comprises the major private landholder in the Lower Wise River basin, expressed concerns and questions about the Pattengail Creek tributary. The Wise River is also listed as impaired on the 2000 Montana DEQ 303(d) list.

The objectives of the resource inventories sponsored by the BHWC reflect the overall purpose of the consensus-based organization. The goals of the Lower Wise River inventory include:

- Summarizing land use and management histories for all ownerships.
- Collecting baseline data on the Lower Wise River and its major tributaries (Pattengail, Lacy, Elkhorn, and Jacobson).
- Helping local residents learn more about the Lower Wise River system and methods of assessing current conditions.
- Promoting information exchange between private landowners and public land managers.
- Summarizing baseline data in the context of historical and current management.
- Using baseline data on existing conditions as a basis for developing restoration and management options to improve conditions.

- Using baseline data on existing conditions and final summary report as a basis for developing a TMDL plan for the basin in coordination with DEQ.

A meeting was held on February 14, 2002 with Liz Jones, Charlie Hester, Art Christianson, Dave Martin, Pete Benjefeild, Kris Berg, and Jennifer Dwyer. The attendees agreed on the objectives of the project and expressed interest in working together on a Wise River Assessment in 2002. Discussion included 1) developing a list of landowners; 2) discussing existing information; 3) identifying significant tributaries; 4) identifying landownership, allotments, resource concerns, and historic management (old dam site); 5) scheduling; 6) products and objectives; and 7) responsibilities of participants.

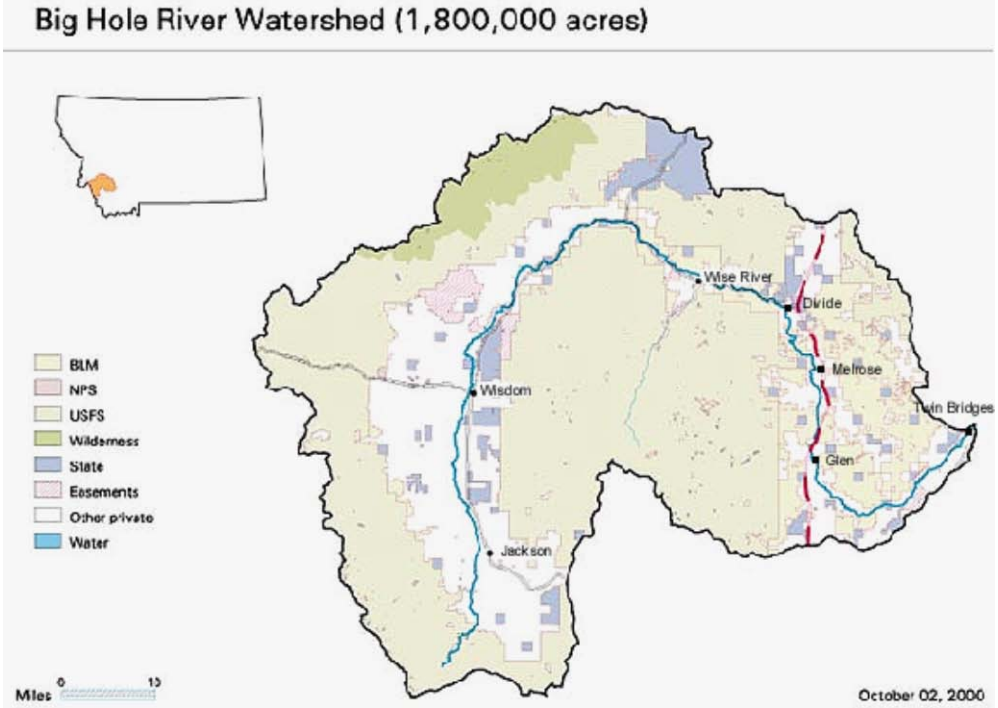
The fieldwork for the lower Wise River assessment was completed from September 9-11, 2002 with participation from Liz Jones (landowner), Charlie Hester (USFS), David Martin (DNRC), Jennifer Dwyer (BHWC), and Warren Kellogg (NRCS).

Background Information

General Watershed Description

The Big Hole basin (HUC 10020004) is located high on the continental divide in southwestern Montana. The Big Hole River drains a 2,800 square mile (1.8 M acres) intermontane basin (Marvin 2000). The 150-mile, un-dammed river is classified as a blue ribbon trout fishery and provides a high recreation value for angler, boaters, tourists, and residents. The semiarid watershed is home to less than two thousand people, sparsely populating 7 small communities (each hosting no more than 200 residents), and the surrounding rural areas. The town of Wisdom (located in the upper basin) is 6,058 feet above sea level and averages 88 frost-free days, 73 days below 32°F and 48 days below 0°F (Mainzhausen 1997). The Big Hole watershed is a relatively pristine and undeveloped watershed. The local economy is based on agriculture and dominated by cattle and hay production. Land management in the basin is dominated by ranching, agriculture, and recreational tourism. Irrigation practices vary throughout the basin. The upper basin is flood irrigated normally producing a single crop of hay each year due to the short growing season. The lower basin has a mix of flood and sprinkler (wheel lines) irrigation systems and generally produces two cuttings of hay each year. In addition to hay production, cattle pasture on the lower fields and on USFS grazing permits.

The Wise River is a major tributary to the Big Hole River, and drains the central portion of the Pioneer Mountains. The Wise River watershed consists of approximately 594,000 acres. Land ownership is approximately: Private 14%; USFS 76%; BLM 7%; State 3%; and FW&P <1%. Private lands dominate the lower valley floor upstream from the town of Wise River while the remainder of the watershed is predominately public lands. See Appendix A – Land Ownership map for the Wise River Drainage.



Wise River is a major tributary to the Big Hole and is located in the lower half of the watershed approximately 60 miles upstream from the confluence.

History

The Big Hole has a rich history of residents and visitors. The Shoshone Indians called the upper Big Hole valley "The Land of Big Snows". Captain Lewis named the river "Wisdom River" after the cardinal virtues of President Jefferson: Philosophy, Philanthropy, and Wisdom. Early trappers and settlers referred to valleys as "holes" of which the Big Hole is derived (Mainzhausen 1997).

Since settlement, economic enterprises and associated land management activities have changed but continue to be tied to natural resources. Early settlers were attracted to the Big Hole for mining opportunities. Current metal contamination concerns are linked to historic mining activities. The Wise River drainage has gone through extensive remediation efforts (USFS) in the upper reaches to address past mining impacts.

A dam was built and operated by the Montana Power Company on Pattengail Creek in 1901. The dam was abandoned by the power company and local ranchers used the reservoir for irrigation until 1927 when floodwaters overtopped and washed out the dam (DNRC 1983). Impacts of the washed out dam are still evident in the lower reaches of Pattengail Creek and the confluence of Wise River.

Hydrology

Spring snowmelt brings large quantities of water into the valleys beginning in April (Phillip 1999). Peak flows are received mid-May to mid-June. The more recent flood events took place in 1976 and 1964. Discharge rapidly declines in July when precipitation is considerably less and most of the seasonal snowpack has melted. Between August and March, the major component of streamflow is derived from ground water. The mean annual discharge of the river at the Melrose gaging station is about 1,100 cfs, or 826,000 acre-feet per year (Marvin 2000 - Shields and others, 1999).

In an undammed system, hydrology is directly linked to climate. The Pioneer Mountain landscape has had relatively stable conditions in the past 300 years giving relatively stable conditions and a period of equilibrium across the landscape (USFS 1998). Changes in stream types are unlikely to be a result of climatic changes given the relative stability of our precipitation and temperature in the recent past (USFS 1998).

USGS 06024590 Wise River near Wise River MT

Beaverhead County, Montana
Hydrologic Unit Code 10020004
Latitude 45°42'49", Longitude 113°01'28" NAD27
Drainage area 214.00 square miles
Gage datum 6,112.52 feet above sea level NGVD29

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1972										54.9	48.6	36.5
1973	33.9	33.2	32.1	38.1	267	282	92.0	43.5	42.9	42.5	46.4	40.0
1974	34.9	35.1	37.6	79.0	446	1,326	224	73.5	52.2	42.0	35.6	35.6
1975	34.8	32.2	30.1	32.8	135	1,229	777	192	103	111	88.2	72.6
1976	60.8	53.7	48.3	115	1,178	1,139	315	135	124	90.1	64.6	53.9
1977	47.5	39.0	40.2	99.6	226	411	109	65.9	71.8	68.4	51.5	50.3
1978	43.9	38.7	52.1	143	491	1,116	361	129	132	96.7	65.6	56.7
1979	51.7	52.6	45.6	86.7	678	699	160	80.8	51.8	45.3	36.2	36.5
1980	33.2	34.6	33.1	138	731	790	218	77.9	86.1	63.4	56.2	47.2
1981	38.4	37.1	38.0	104	606	959	243	78.3	52.0	52.2	42.5	38.5
1982	35.3	32.8	37.4	57.3	446	1,041	366	95.2	65.2	71.8	48.7	45.3
1983	41.0	37.9	39.5	57.9	402	849	363	124	87.3	81.0	64.3	36.3
1984	43.9	39.8	40.0	75.4	493	1,001	326	120	79.4	62.0	53.1	45.6
1985	40.6	35.6	37.9	123	504	319	67.6	71.1	76.8			
Mean of monthly streamflows	41.5	38.6	39.4	88.4	508	859	279	98.9	78.8	67.8	54.0	45.8

Land Use

Past land use activities were based on hard rock mining and livestock grazing. Mining activities are limited today and are reserved to small-scale efforts by individuals or families. Historic large-scale mining activities have left the basin with water quality and stream morphology concerns (Phillips 1999). Remediation efforts have addressed the largest mining concerns in the Elkhorn Creek area; however some reclamation work remains to be completed.

Very little timber harvesting or road building has taken place in the watershed. Because of the steep topography and dense timber stands in the uplands, the majority of the upper watershed is not suitable for livestock grazing. Much of the USFS managed lands have been designated roadless areas.

Current land management activities are dominated by cattle ranching, hay production (grass hay), and grazing. Most irrigation occurs in the lower valley beginning in mid to late May and continuing through early fall. The vast majority of land ownership throughout the Wise River drainage is involved in some type of agricultural enterprise whether a full-scale ranching operation on the lower end or USFS grazing allotments throughout the middle and upper reaches. The Jones' ranch is the primary landowner in the Wise River drainage and is also a lessee on USFS lands.

Today, the basin supports multiple uses including: travel and tourism, fishing, recreation, livestock grazing, fish and wildlife habitat, and small-scale mining (Crystal Park is located in the upper watershed where amateur geologists and rock-hounds dig for quartz crystals). Visitors can tour Coolidge Ghost Town as they travel up the Scenic Byway through the Wise River watershed from the town of Wise River to Highway 278 south of Jackson. These various land uses have brought different management concerns including; weed infestations, off-road vehicle use, grazing and browse impacts on riparian zones, and mine reclamation. See Appendix B – Land Use map for the Wise River Drainage.

Geology/Soils

The mountains surrounding the Big Hole drainage are predominantly composed of Proterozoic and Cretaceous sedimentary and igneous rocks (Ruppel and others, 1983). In the valleys of the upper basin, thin (less than150 ft.) Quaternary glacial till, outwash, and alluvial deposits overlie Tertiary sandstones and siltstones. The thickness of the Tertiary fill in the upper basin is as much as 16,000 feet (Hanneman and Nichols, 1981).

The Tertiary and Quaternary sedimentary deposits are the most important hydrogeologic units within the study area and provide the most reliable supply of ground water. The Tertiary rocks are exposed mostly along the flanks of the mountains and primarily consist of semi-indurated sandstone and sandy siltstone. Subordinate cross-bedded channel deposits of pebble and cobble conglomerate are composed of locally derived quartzite, granitic, and volcanic rock fragments in a sand matrix (Hanneman and Nichols, 1981).

Quaternary deposits in the basin include glacial tills, glacial outwash, and alluvium. The tills are predominantly found around the eastern flank of the Beaverhead Mountains and the southeastern flank of the Anaconda Range. These deposits consist of a combination of ice-transported, locally-derived, angular boulders and cobbles, sand, silt, and clay. Glacial outwash, deposited by melt waters, is present in the central part of the upper basin and along the lower half of the Wise River valley and underlies many of the hay meadows in these areas. The outwash deposits consist of well-sorted lenses of cobbles, gravel, and sand with a small fraction of silt and clay.

Fisheries

The Big Hole is famed for its blue ribbon fishery. The sport fishery brings anglers from around the world and supports a growing recreation industry in the region. The Big Hole supports a variety of cold-water fish species including sculpins, suckers, white fish, grayling, and trout. The upper basin supports the last self-sustaining population of fluvial Arctic grayling in the Lower 48 states. The upper basin also has a strong population of Brook trout. Rainbow trout were introduced in 1910 and Brown trout were introduced in the lower river in the 1930's (Mainzhausen 1997).

The fluvial Arctic grayling were once distributed in the Missouri River system and are now only found in the Big Hole. The grayling were petitioned for an endangered species listing in 1991 and found

warranted but precluded. The decline of the grayling is complex and is attributed to a variety of factors including: dewatering, loss of juveniles in irrigation ditches, high temperatures, predation, competition, and introduced species (grayling workgroup 1995). Currently the population is under an inter-agency recovery plan that seeks to maintain and improve the Big Hole population and re-establish populations throughout the upper Missouri.

The Westslope cutthroat trout is a native trout whose historical range has significantly diminished over the last 100 years. The hybridization of Westslope Cutthroat trout with genetically similar species (i.e. Rainbow trout and Yellowstone Cutthroat trout) threatens the extinction of Westslope Cutthroat trout. The "Wise River Westslope Cutthroat Populations" map (USFS) is located in Appendix C. Where Brook trout are present in the same stream section as Westslope Cutthroat trout, the competitive advantage afforded to Brook trout, will lead to lower Westslope population densities. The Brook trout's slow advance up the Wise River tributaries is a major concern.

Wildlife

Wildlife resources are abundant in the Big Hole and attest to good habitat conditions and limited development pressures. Elk, deer, a large moose population, black bear, cougars, lynx, bighorn sheep, and mountain goats are found throughout the basin. Hunting and guiding are growing activities and have expanded the local fall economy.

Assessment Methodology

Standard sampling methods were selected to characterize the water chemistry, aquatic insect community, and the riparian/physical nature of selected reaches and tributaries in the Wise River watershed. Resource observations were made based upon existing resource information, professional experience, and interviews with local landowners and agency representatives.

Liz Jones, Wise River rancher, taking a stream channel measurement

Water Chemistry Sampling: Methodology and Sites

Samples were collected and preserved using methods specified in Montana DEQ's Standard Operating and Procedures Manual, and analyzed by Energy Laboratories, Inc. Parameters analyzed were nutrients, total recoverable metals, dissolved metals, inorganics, total suspended solids (TSS), and total dissolved solids (TDS).

Additional water quality measurements were taken using a U-10 Horiba field meter at the same sample sites and additional field sites to obtain pH, specific conductance, and water temperature.

Water chemistry samples were collected on September 11, 2002 at three sites on the Wise River mainstem and two sites on tributaries. The map on the previous page shows the relative locations of these sample sites.

Aquatic Macroinvertebrates

In August 2002, a private contractor (Daniel McGuire) completed an initial survey of aquatic macroinvertebrates in the Wise River. Four monitoring sites were established. At each site, one traveling kick sample was collected and habitat was visually evaluated. All field sampling and laboratory/data analysis followed the Montana DEQ Rapid Bioassessment Protocols.

The four aquatic macroinvertebrate sampling sites were:

1. Above the Mono Creek Campground
2. Below the Lacy Creek confluence
3. Below the Pattengail Creek confluence
4. Mouth of the Wise River

Riparian Health/Physical Channel Conditions: Methodology and Reaches

The riparian and physical condition of the stream corridor was visually appraised by assessing functional condition (USDA Natural Resources Conservation Service 2000) at five reaches on Pattengail Creek and the lower Wise River. This standard assessment procedure was used to evaluate channel condition, hydrologic alterations, streambank stability, and riparian health. Each reach was evaluated with respect to its ecological potential and capability. A numerical rating is given to each reach that would place the reach into a Sustainable, At Risk, or Not Sustainable category. Full details on the NRCS Riparian Assessment methodology and worksheets are included in Appendix D.

In the observation section of this report, the Rosgen stream classification system is used in the discussion. A chart that illustrates the various stream types is included in Appendix E. Each column on the chart has a separate channel type (i.e. A, B, C, etc.) based on channel entrenchment, width/depth ratio, sinuosity, and channel slope. Each row on the chart is a channel bed material size (i.e. 1 – bedrock, 2-boulders, 3-cobbles, etc.). Together, they are used to classify a stream type such as C4 which would be a slightly entrenched channel, channel slope less than 4%, with a gravel bottom.

Sustainable: 85-100% Stream and associated riparian area have certain expected attributes (i.e., floodplain access, adequate riparian vegetation, stable channel characteristics) in place and fluvial processes (i.e., energy dissipation, sediment trapping) are working as they should be.

At Risk: 50-75% Most of the attributes and fluvial processes are in place and working. There may be lacking certain attributes and processes necessary for long-term stability and function of the reach.

Not Sustainable: Less than 50% Stream and riparian area are clearly lacking adequate vegetation, stable channel characteristics, etc., that will not allow energy dissipation, sediment trapping, bank building, or any of the other fluvial processes expected for long-term stability.

All sites were GPS located and photographed.

Observations

Water Chemistry Analysis

The water chemistry samples and field readings are a synoptic only. The sample analysis and field measurements reflect the water quality for only that instance in time. Water quality may change significantly over time and during different flow events. The relative concentrations between samples have more relevance in regards to this assessment.

Jennifer Dwyer, Big Hole Watershed Coordinator, taking a field measurement using a Horiba water meter.

Field Measurements:
PH: The field readings showed PH values with a narrow range of 7 to 8. These values are common for these types of streams.

Specific Conductivity (SC): SC values (index of dissolved solids) were low which is typical for most foothill and mountain streams in Montana. The SC measurements varied from 50 mmhos/cm to 120 mmhos/cm.

Both the PH and Specific Conductivity values generally increased as you moved downstream. This is normally expected. Field readings in the tributaries were similar to the Wise River mainstem with the exception of Lacy Creek (PH: 6.5 and SC: 240 mmhos/cm).

Water Temperature can be dependent upon a number of factors: ambient air temperature, time of year, riparian shading, dewatering, etc. When measuring water temperature (September 11, 2002), we found a range of values from 9° C to 16° C. The values tended to get higher as you moved downstream and as

ambient air temperatures rose. Tributaries typically had water temperatures similar to that in the Wise River mainstem. The exception was Pattengail Creek. It was slightly warmer than the Wise River by 2-3°C. This may caused by unshaded, slow moving water upstream of the old MPC dam.

Laboratory Analysis: All water chemistry samples exhibited low concentrations for all parameters (metals and nutrients) at all sampling sites. On a relative scale, there tended to be higher concentrations of nutrients in the tributaries sampled (Pattengail and Lacy Creeks) and the lower reaches of the Wise River, but still the concentrations were low and well within Montana DEQ standards. Lab analysis sheets are included in Appendix F.

Aquatic Macroinvertebrate Analysis

For each of the four samples, there were a number of selected bioassessment metrics and scoring criteria used in the analysis. All four sites supported a diverse and abundant assemblage of aquatic macroinvertebrates. Biointegrity scores ranged from 76% to 90% with all four sites classified as nonimpaired. Scores greater than 75% are classified as nonimpaired. Specific details on sample site locations, metrics, assemblage data, and conclusions are included in the full report located in Appendix G (McGuire, 2003).

Riparian Health/Physical Channel Conditions

Three reaches of the Lower Wise River and two reaches on Pattengail Creek were assessed using the detailed field notes and NRCS Riparian Assessment Worksheet. The Riparian Assessment field worksheets are located in Appendix H.

- ***Upper Wise River**: Headwaters to the Wyman Creek Confluence*

This part of the watershed is almost exclusively USFS managed lands with some small private in-holdings. This assessment did not include any designated reaches in this part of the watershed since the USFS had already completed comprehensive characterization of several of the streams in the 1990s.

The majority of the stream channels in the upper watershed are well functioning. The headwater streams are typically steep, rocky A and B channels, entrenched in narrow valley bottoms. There are some reaches, however, that flow through low gradient, willow bottoms that may be more vulnerable to more land use impacts.

WR 1A - Wise River mainstem located downstream from where Jacobsen Creek and Mono Creek join to form the Wise River.

Much of the upper watershed is characterized by erosive, granitic-based soils. There have been high sediment loads generated from roads, hard rock mining (Elkhorn Creek), livestock grazing, and bank trampling (OEA Associates, 1994). Some of the low-gradient willow bottoms along the upper Wise River are sediment depositional areas. The river channel has responded to the influx of upstream sediment with large point bar development, active bank erosion, and rapid channel migration. Channel incisement was also observed along some of these headwater reaches.

The USFS is aware of the sediment issue and has been actively mitigating some of the major sediment sources. The USFS has the Jacobsen Creek subwatershed listed as a High Restoration Priority watershed and the Wyman Creek subwatershed as an Extreme Restoration Priority watershed (USFS, Big Hole Subbasin Restoration Plan, March 2001). Specific restoration priorities have been identified on Elkhorn Creek (mining), Little Joe Creek (recreational trails or stock impacts), Rabbia Creek (recreational trails or stock impacts), and Crozier Creek (cattle damage to stream beds or banks).

- ***Middle Wise River****: Wyman Creek to Pattengail Creek*

The middle portion of the watershed is mostly USFS managed lands, with small private in-holdings along the Wise River. These private in-holdings are located immediately downstream from the Gold Creek confluence. This assessment did not include the middle reaches of the Wise River.

Most of the major tributaries enter the Wise River from the east (Gold, Boulder, Fourth of July, Elk, and Moose Creeks). All of these streams have been rated to be good condition by the USFS with the exception of Elk Creek. In the last 10 years, Elk Creek has begun to show signs of bank alteration due to livestock impacts. Boulder Creek is stable, but there is a large meadow below the headwaters that has been a sediment depositional area for past mining activities in the headwaters (USFS unpublished stream data, 2003).

Lacy Creek is the only major tributary entering the Wise River from the west. USFS has rated the upper reaches of Lacy Creek (upstream from Bobcat Creek) as being stable and well functioning. The section of Lacy Creek between Bobcat Creek and the Wise River has been affected by livestock grazing and bank trampling. Bank erosion potential is high and channel stability has been rated fair. Much of this section is dry during the latter part of the summer for unknown reasons. Stream improvement projects on the middle and lower reaches of Lacy Creek are being considered by the USFS.

Lacy Creek upstream from the Wise River (Site LC-1).
This photo is looking downstream from the Lacy Creek Road Bridge.

The middle reaches of the Wise River is similar to the previous description given for the upper reaches of the Wise River. The lower-gradient willow bottoms tend to serve as depositional areas and occasionally show the effect of upstream sediment loads. Riparian vegetation along the channel and in the floodplain is in good condition overall (OEA Associates, 1994).

- ***Pattengail Creek Subwatershed***

Pattengail Creek is a major tributary that enters the Wise River from the west. The mouth of Pattengail Creek is located about 12 miles upstream from where the Wise Rive joins the Big Hole River.

This assessment included only the lower reaches of Pattengail Creek from Lews Creek down to the Wise River. It also included a short section of middle Lambrecht Creek, tributary to Pattengail Creek, at Jerked Prairie (private in-holding).

Reach PC-1 This reach extends for approximately two miles upstream from the old MPC dam site. Reach PC-1 scored **77%** on the Riparian Assessment Worksheet.

PC1 - Pattengail Creek looking upstream from the
old Montana Power Company dam.

In 1901, the Montana Power Company (MPC) built a dam at a natural constriction of the lower Pattengail Creek valley slightly less than a mile upstream from where Pattengail Creek enters the Wise River. After several years of use, the dam was breached and the company abandoned it. Local ranchers then filled the cut in the dam and used the reservoir to store water for irrigation. In 1927, the dam was overtopped by floodwaters, which washed out the west side of the dam. Severe damage was caused to property downstream. The reservoir covered about 400 acres and extended upstream for nearly two miles.

Reach PC-1 is the reach of Pattengail Creek that was inundated by the old reservoir. Pattengail Creek is a slow moving, meandering stream in this reach. It sits in a glaciated valley bottom that has been leveled by old glacial lakebed deposits.

Channel:

- The channel along this reach is an E5 channel type transitioning into a C4 channel as you move upstream where the valley gets narrower and steeper. For an illustration of major channel types, please refer to the Appendix (Rosgen, 1996). These channel types are slightly entrenched with gravel and silt channel substrates. High flow events readily access the adjacent floodplain.
- There are indications of a high sediment load expressed by the presence of steep point bars and mid-channel gravel bars. Short sections of active bank erosion are often associated with these depositional features. Overall, the channel appears to be able to transport the sediment load effectively through the system.
- Riffles are short and pools are often long and deep. One section measured had a pool/riffle ratio of 4:1.
- Algae and macrophytes were common on the bottom substrate (30%-70% channel bottom coverage).

Riparian:

- The valley bottom is included in an USFS grazing allotment. Livestock use is typically restricted to the valley bottom due to the steep valley landscape and low forage production off the valley bottom. The grazing allotment plan includes a deferred or rotation grazing system using three pastures from June through October.

- The riparian plant community along the creek and floodplain varies in density. The E5 channel tends to have a low to moderate density of woody species while the upper C4 channel tends to have a higher plant density and better age diversity.
- Part of this reach had burned about 25 years ago.
- Some willows along the creek and on the floodplain exhibit heavy browse from wildlife (moose) and livestock. Wildlife impacts appear to be greater than livestock. Heavy browsing of shrubs is having adverse impacts on some sections of riparian health and channel stability.
- The only access into this reach is via an ATV trail that follows along the north side of the valley. There are occasional impacts on the riparian zone where the established ATV trail passes through the riparian zone, or more importantly, where an ATV user has driven off the designated trail. Trailing, rutting, and compaction along the creek and the edges of the valley are common.
- Noxious Weeds: Canada Thistle observed in the floodplain and adjacent to the ATV trails.

Reach PC-4 This reach extends for about 1 mile from the old MPC dam downstream to where Pattengail Creek enters the Wise River. Reach PC-4 scored **62%** on the Stream Assessment Worksheet.

PC4 - Pattengail Creek located upstream from the Scenic Byway bridge crossing near the confluence with the Wise River.

Channel:

- The channel below the MPC dam fill clearly shows evidence of the dam washout that occurred 75 years ago. Immediately below the old dam fill, there sits a large deposit of large rocks that covers the channel. Downstream from this deposit, the stream channel has been scoured out. The channel is slow, wide, and deep (channel type: modified E5). Much of the channel bottom was covered with macrophytes.
- As you move downstream toward the mouth, the channel gradient becomes steeper with short sections of mid-channel gravel deposition and channel braiding more evident (channel types: B3, C4, and D4). This reach continues to be slowly adjusting to the bedload that was generated by the dam washout, although the channel has become mostly stable with a few isolated sections of active bank erosion. Much of the remaining sediment deposition from the washout is too large for the stream to move and will likely remain in place.
- This reach has a limited floodplain. Where there is a floodplain (right bank-looking downstream), severe overland scour caused by the surge from the dam washout is still evident. Vegetation has

slowly colonized the floodplain over time. Since most of the topsoil had been washed away with only subsoil/rocks remaining, the plant community continues to exhibit low density and vigor.

Riparian:

- The riparian plant community is typically a narrow band of willow and alder (< 20 feet wide) along the channel's edge. Coniferous forest (Lodgepole Pine and/or Douglas Fir) dominates the uplands.
- Browse use on riparian shrubs varies from low use on the lower end of the reach to heavy use closer to the washed-out dam. Browse is primarily attributed to wildlife.
- Noxious weeds: Varying degrees of Oxeye Daisy infestations were found along the creek channel and adjacent floodplain.

Reach LT-1 Lambrecht Creek at Jerked Prairie. Lambrecht Creek is a tributary that enters Pattengail Creek from the south about 4 miles upstream from the Wise River. Jerked Prairie is a private in-holding located approximately 2 miles upstream from where Lambrecht Creek enters Pattengail Creek. A Riparian Assessment Worksheet was not filled out for this reach.

Lambrecht Creek at Jerked Prairie

Channel:

- The channel that flows through Jerked Prairie is a low gradient, E5 channel type. The channel is in excellent condition. Width/depth ratio is 3 to 5. This channel type is especially sensitive to heavy grazing pressure and requires careful livestock management.
- The channel downstream from this reach is currently in a USFS grazing allotment. It also is in good condition, but the width/depth ratio of the channel is greater with some bank shear from livestock trampling noted.

Riparian:

- The privately-owned reach of stream is currently not being grazed. It separates two USFS grazing allotments.
- The riparian plant community is primarily made up of sedges and grasses. The total lack of woody species may be a response to historic wildlife and livestock grazing pressure and a naturally high water table that naturally precludes the establishment of willows.

- ***Lower Wise River***

The assessment completed on the Lower Wise River is defined by the reach beginning at the mouth of Pattengail Creek extending downstream to the Wise River confluence with the Big Hole River. This reach is approximately 12 miles long. The majority of the stream corridor and lower Wise River valley bottom is privately owned. The uplands and tributaries are primarily USFS managed lands. Land use on the private lands is grazing lands and irrigated hay production.

Reach WR-1 Wise River Mainstem - Flying Cloud Ranch Bridge. This reach is located approximately 1.3 miles downstream of where Pattengail Creek enters the Wise River. There is an old gage station about ½ mile downstream. Reach WR-1 scored a **90%** rating on the Stream Assessment Worksheet.

WR1 - Wise River mainstem looking downstream from the Flying Cloud Ranch Bridge.

Channel:

- The Wise River channel, immediately downstream from the mouth of Pattengail Creek, still has large rock debris remaining from the Pattengail dam wash-out in 1927. Large cobbles and boulders are in and adjacent to the active channel. This channel is a high gradient, stable B3 channel type that has high-water access to its floodplain.
- The Flying Cloud Bridge serves as a minor restriction to the floodplain. The bridge's west abutment encroaches about 10 feet into the channel. Some terrace erosion is occurring immediately downstream from the bridge due to high water scour.

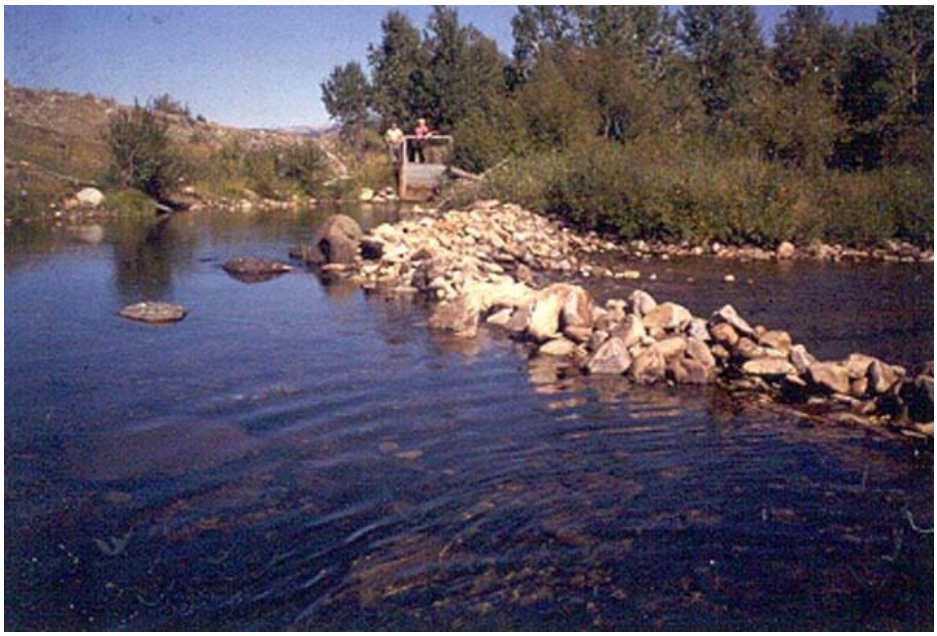
Riparian:

- The riparian plant community is dominated by willows with scattered Black Cottonwood overstory. The plant community shows excellent age diversity. Smooth brome and timothy grasses are common understory plants.
- Browse on the woody species was estimated to be about 25%, mostly wildlife use. There is little use of this reach by domestic livestock.
- There are scattered Oxeye Daisy infestations throughout the floodplain.

Reach WR-2 Wise River mainstem at the Company Ditch headgate and check structure. The Company Ditch is the largest irrigation ditch in the watershed. The check structure and headgate, located on the west side of the river on a side channel, consists of old wood cribbing, brush, and large rocks. The water is checked up over 3 feet during low flows. The landowner has expressed interest in replacing this check structure with a more efficient and stream friendly structure. A riparian worksheet was not filled out for this reach.

Company Ditch Headgate – Wise River flows from right to left.

Reach WR-3 Wise River mainstem at the Truman Ditch headgate and gravel check dike. The Truman Ditch headgate is located on the west side of the river. The gravel check dike, built by hand on an annual basis, extends across the main channel. The dike checks the water up 2 to 3 feet. At least part of the check dike needs to be rebuilt every summer following high water flows. The channel above the check dike has very high width/depth ratio.



Site WR-3 – Truman Ditch Headgate and Rock Check Structure.

The WR-2 and WR-3 reaches are typically used by livestock during the fall and winter, and occasionally in the spring. This part of the river is often used for winter feeding.

Noxious Weeds: Canada Thistle, Oxeye Daisy, and Spotted Knapweed infestations are common along these reaches. There is an active effort to control these weeds by the landowner.

Reach WR-4 Wise River mainstem 1,200 feet upstream from the Swamp Creek confluence and approximately 2 miles upstream from the town of Wise River. Reach WR-4 scored an **85%** rating on the Stream Assessment Worksheet.

WR 4 - Wise River mainstem upstream from the mouth of Swamp Creek.

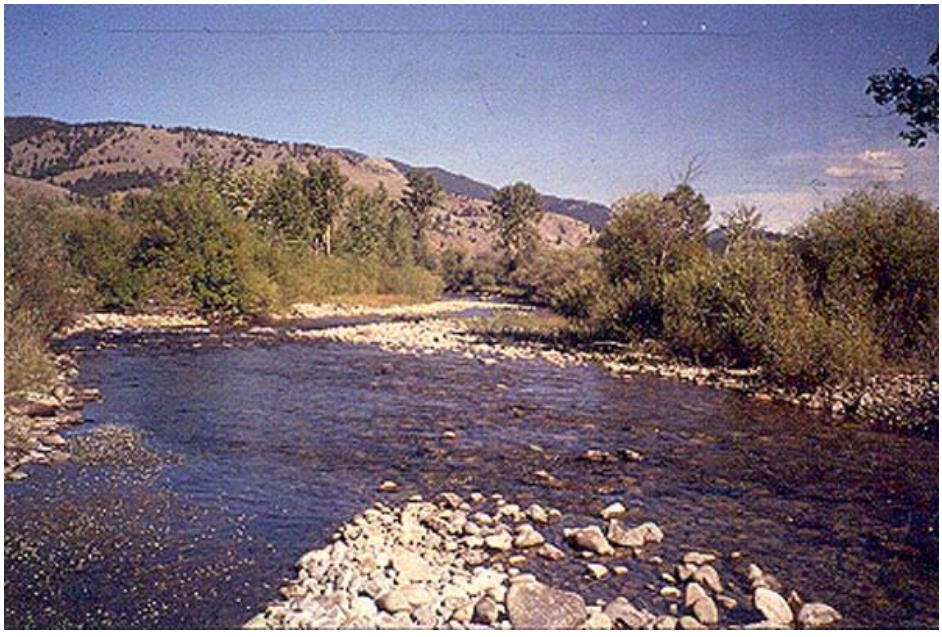
Channel:

- This channel is a transitional B3/C3 channel type. There is active bank erosion on a few sections of channel that contributes significant amounts of bedload to the river.
- This is a depositional reach with a channel width/depth ratio that varies from 25 to 35. The reach is characterized by a few, short pools and long, continuous riffles. It is predominantly a single channel with an occasional high-water side channel.
- The floodplain is readily accessible, averaging 800-1000 feet wide.
- There is less surface flow in the channel by approximately 60% as compared to the upstream flows at Flying Cloud Ranch Bridge (Reach WR-1). This reduction in flow is attributed to subsurface flow conditions due to channel aggradation and water diversions from two irrigation headgates upstream between Reaches WR-1 and WR-4.

Riparian:

- The riparian plant community consists primarily of willows, alders, and juniper with scattered Black Cottonwood overstory. There is excellent age diversity. Sedges, Kentucky bluegrass, smooth brome, and timothy are common understory plants.
- Young willow plants show signs of heavy browse, probably from both wildlife and livestock.
- Noxious weed infestations along this reach include Oxeye Daisy and Spotted Knapweed.

Reach WR-5 Wise River mainstem downstream from the town of Wise River and near the confluence with the Big Hole River. Reach WR-5 scored an **80%** rating on the Stream Assessment Worksheet.



WR 5 - Wise River mainstem looking upstream from where it joins the Big Hole River.

Channel:

- This channel has depositional features (braiding, mid-channel bars, and large gravel point bars) upstream of the confluence with the Big Hole River. This is primarily due to the backwater effect from the Big Hole River during high flow events. Short sections of active bank erosion are associated with these depositional features. These channel features are not unusual where a smaller tributary enters a large stream. Despite some channel braiding, most of this reach is a single-channel, C4 channel type that readily accesses a wide floodplain (1200 feet wide).

- Several springs discharge into the river throughout this reach augmenting the river's flow. Wise River surface flows entering the Big Hole River are slightly higher than surface flow at Site WR-4.

Riparian:

- The riparian zone consists primarily of a dense willow community with excellent age diversity. There are scattered Black Cottonwood trees throughout the riparian zone and floodplain. Smooth brome understory is common.
- Noxious weed infestations: Canada thistle, Bull Thistle, and Oxeye Daisy are scattered throughout the floodplain.
- This reach does not have any apparent livestock grazing. Young woody plants do show signs of moderate to heavy browse, probably from wildlife.

Planning Considerations

Pattengail Creek (Lower Reaches)

- **ATV Recreational Impacts:**

Mitigate ATV impacts within the Pattengail Creek stream corridor and valley bottom.

- Isolated impacts from ATVs include the rutting and sedimentation where ATV trails cross wet areas or waterway channels. These crossings should be armoured and/or redesigned to reduce impacts.
- ATVs can serve as a significant conveyance of noxious weed seeds. Information/education efforts should be initiated to better inform local ATV clubs and users on what can be done to minimize weed seed distribution by ATV use.
- The US Forest Service currently has an ATV ranger who patrols these ATV trails during the summer. This effort should continue and be expanded if possible; perhaps through a cooperative program with local ATV clubs and other concerned volunteer groups.

- **Noxious Weeds Control:**

Expand the existing cooperative weed control effort into the Pattengail Creek drainage using an integrated management approach (weed pulls, controlled grazing, herbicides, and biological control – insects).

- Oxeye Daisy should be a target noxious weed in this drainage. Infestations are not so widespread that there may be an opportunity to eradicate Oxeye Daisy infestations in this drainage.

- **Upper Pattengail Creek Assessment:**

Expand the stream corridor assessment to include the upper reaches and major tributaries of Pattengail Creek.

- An expanded assessment would focus on identifying and characterizing significant sources of sediment as natural and/or human-induced sources. Restoration alternatives to reduce the sediment load to Pattengail Creek would be recommended, if and where appropriate.

- **Long-Term Stream Corridor Monitoring:**

Set up permanent monitoring transects along Pattengail and Lambrecht Creeks to document long-term trend in riparian health and channel condition.

- Monitoring parameters would include: riparian/browse transects, channel cross-sections, pebble counts, and photopoints. Monitoring data could be a basis for management decisions regarding wildlife population numbers, livestock use, and ATV access.

Lower Wise River (Pattengail Creek to the Big Hole River)

- **Irrigation Infrastructure Replacement:**

Replace major irrigation check structures on the lower Wise River mainstem.

- Priority check structures provide irrigation water to the Company Ditch and the Truman Ditch. The design of the replacement structures should consider low-cost alternatives. There is an opportunity to take advantage of the abundance of large rock in the near vicinity that could easily be incorporated into the construction of the check structures. The structure design should be fully compatible with natural stream function (narrowing of the channel) and fish passage while still meeting the irrigation water needs of the landowner(s).

- **Noxious Weed Control:**

Continue the successful cooperative weed project that is currently on-going in the lower Wise River watershed. The cooperative efforts of the USFS (Wise River District), Beaverhead County, Big Hole Watershed Committee, and landowners have served as a model to other watersheds in Montana.

- **Long-Term Stream Corridor Monitoring:**

Establish permanent monitoring sites along the Wise River mainstem to determine long-term trends in riparian health and channel conditions.

  - Monitoring parameters would be similar to those recommended for Pattengail and Lambrecht Creeks. A long-term monitoring on the lower Wise River would be an important tool for landowners and managers to have when making management decisions that affect long-term forage production and stream corridor health.

- **Grazing Management Improvements:**

Most of the riparian zone along the Wise River mainstem is in good condition. There are, however, sections of the river corridor that are experiencing various levels of impact from livestock grazing and bank trampling. The following river and riparian management alternatives should be considered for the reaches of river that have livestock grazing:

  - Relocate corrals, winter feeding areas, and calving facilities outside the floodplain, if possible.
  - Maintain or implement grazing improvement practices along the Wise River stream corridor. Priority reach for stream corridor improvement is upstream from Highway 43. There are proven, cost-effective practices for managing riparian areas: off-stream livestock water developments, cross fencing, and special management riparian pastures.
  - Establish a riparian monitoring plan to record management progress and long-term riparian health trends.

- **Lacy Creek Assessment:**

Expand stream corridor assessment efforts into Lacy Creek.

  - This resource assessment would focus on a comprehensive evaluation of ATV trail impacts, gravel extraction effects, and livestock/wildlife grazing impacts on the stream corridor integrity and health.

References

Department of Natural Resources and Conservation. 1981. “Water Storage in the Big Hole; A Recommendation”. Department of Natural Resources and Conservation in response to HB 824.

Department of Natural Resources and Conservation. 1983. “Prefeasibility Report for the Pattengail Dam, Beaverhead County, Montana”. Department of Natural Resources and Conservation in response to HB 709.

Gammons, Christopher H, Ridenour, Rebecca, Wenz, Adam. 2001. “Diurnal and Longitudinal Variations in Water Quality on the Big Hole River and Tributaries During the Drought of August 2000”. Montana Bureau of Mines and Geology Open-file Report 424.

Keigley, Richard B., Frisina, Michael R. 1998. “Browse Evaluation By Analysis Of Growth Form. Volume 1 Methods for Evaluating Condition and Trend”. Montana Fish, Wildlife & Parks. Helena, MT.

Mainzhausen, Karin, Stephenson, Troy. 1997. “Big Hole River Research Project”. MT Tech Student Project, Big Hole River Foundation.

Marvin, Richard K., Voeller, Terry L. 2000. “Hydrology of the Big Hole Basin and an Assessment of the Effects of Irrigation on the Hydrologic Budget”. Montana Bureau of Mines and Geology Open-file Report 417.

McGuire, Daniel L. September 2003. “Wise River Macroinvertebrate Survey, August, 2002”

Montana Fluvial Arctic Grayling Workgroup. 1995. “Montana Fluvial Arctic Grayling Restoration Plan”. Montana Fish, Wildlife & Parks. Helena, MT.

Phillip, Abbie. 1999. “A Chemical Survey of Irrigation and Return Flow Waters in the Big Hole River Basin of Southwest Montana”. MT Tech Thesis, Butte, MT.

Ridenour, Rebecca. 2001. “A Seasonal and Spatial Chemical Study of the Big Hole River, Southwest Montana”. MT Tech Thesis, Butte, MT.

Rosgen, Dave. 1996. “Applied River Morphology” Page 5-5.

USDA - Natural Resources Conservation Service. July 2000. “Riparian Assessment Method”. Bozeman, MT.

US Forest Service. 1998. “Pioneer Landscape Analysis. Hydrology, Fisheries, Riparian, Grazing Sections”. USFS Report. Dillon, MT.

US Forest Service. March 20, 2001. “Big Hole Subbasin Restoration Plan”.

US Forest Service. Unpublished Data. 2003.

US Geological Service. “USGS 06024590 Wise River near Wise River MT”.

Appendices

A…….Land Ownership Map in the Wise River Drainage

B…….Land Use Map in the Wise River Drainage

C…….Wise River Westslope Cutthroat Populations Map

D…….NRCS Riparian Assessment Methodology and Worksheet

E…….Major Stream Types (Rosgen Classification) Chart

F…….Laboratory Analytical Reports (October, 2002)

G…….Wise River Macroinvertebrate Report (September, 2003)

H…….Wise River Riparian Assessment Worksheets (September, 2002)