Taylor Fork of the Gallatin River
4B Water Quality Analysis
Gallatin National Forest

October 25, 2007

Taylor Fork of the Gallatin River

Acknowledgments and Preface

This Category 4B Report and Approval Request is a result of a partnership between personnel form the Montana Department of Environmental Quality, Region 8 of USEPA, and the Northern Region of the USDA Forest Service. We are grateful to George Mathieus, Bob Bukantis, and Robert Ray, Montana Department of Environmental Quality, and Ron Steg and Bruce Zander, USEPA Region 8, who provided helpful guidance and encouragement to complete this project. We would also like to thank members of the Montana State TMDL Advisory Group who encouraged us to proceed with this report.

It is hoped that pursuing Category 4B status on appropriate watersheds in lieu of undertaking a TMDL will become more commonplace. Where used, Category 4B avoids unneeded governmental redundancy and expenditures. There is an opportunity for at least some future Forest Service watershed analyses conducted to support NEPA project planning to be documented in a manner sufficient to satisfy the requirements for Category 4B.

Table of Contents

Taylor Fork of the Gallatin River
4B Water Quality Analysis
Gallatin National Forest[1]
August 22, 2005

Introduction

The Taylor Fork watershed encompasses 63,360 acres of forest and rangeland. Approximately 1,200 acres within the Taylor Fork watershed is privately owned; the rest is part of the Gallatin National Forest. Cache Creek is a 6,500 acre sub-watershed within the Taylor Fork watershed. Both Taylor Fork (MT41H005-020, 17.4 miles) and Cache Creek (MT41H005-030, 3.9 miles) are included on the State of Montana 2004-303(d) list for having *beneficial uses partially impaired for aquatic life and cold-water fish*. (Only Cache Creek was listed as impaired on the 1996 303(d) list due to siltation.) Taylor Fork is also listed as impaired by industrial use (construction and land development). Causes for Taylor Fork listing include siltation, fish habitat degradation, suspended solids, and other habitat alterations from silviculture and land development. Cache Creek is listed due to siltation, suspended solids, and other habitat alterations from silviculture, grazing, logging roads, and agriculture. The Taylor Fork watershed is within the Montana Department of Environmental Quality's (MDEQ) Upper Gallatin Planning Area scheduled for Total Daily Maximum Load (TMDL) development in 2007.

Downstream beneficial water uses include fish and aquatic life, recreation, irrigation, stock use, public water supply, private water supply, and wildlife. Westslope Cutthroat trout, a USDA Forest Service Northern Region sensitive species and a State of Montana species of concern, occur in both Cache Creek and Taylor Fork.

Purpose

This submittal provides necessary information to allow moving Taylor Fork from Category 5, (requires the calculation of a TMDL) to Category 4B (ongoing Best Management Practices (BMPs) and ongoing restoration actions will achieve state water quality standards within a reasonable period of time). Category 4B limits resources needed to more quickly repair water quality problems with proven BMP technologies or restoration practices. If recovery is not achieved within a reasonable period of time

---

[1] USDA Forest Service Contributors include:
Gallatin National Forest - Mark Story, Forest Hydrologist; Scott Barndt, Forest Fisheries Biologist; and Henry Shovic, Forest Soil Scientist
Helena National Forest - Bo Stuart, Forest Hydrologist
USDA Forest Service, Northern Region - Jed Simon, Hydrologist; Ann Carlson, Aquatic Ecologist; and Bruce Sims, Regional Hydrologist
USDA Forest Service, Washington Office – Chris Knopp, Water Quality Program Manager.

(recovery is anticipated within the next five years in the Taylor Fork example) MDEQ retains authority to establish TMDLs.

Current EPA Guidance does not require TMDLs for all listed waters (USEPA, 2004). Some waters may be excluded from Category 5 and included in Category 4B. In order to meet the requirements to place waters into Category 4B, the states must demonstrate that *"other pollution controls required by state local or federal authority are expected to address all water pollutant combinations and attain all water quality standards within a reasonable period of time"* (see 40 CFR 130.7(b)(1)(iii).

EPA further states "*....it best serves the purposes of the Act to require the State to establish TMDLs and submit them to EPA* [Environmental Protection Agency] *for approval only where such TMDLs are needed to 'bridge the gap' between existing effluent limitations, other pollution controls and WQS* [water quality standards]" (See 50 FR 1775, January 11, 1985). For waters with other sufficient controls, EPA also states "*…establishing TMDLs would not contribute to accomplishing the goals of the Act and could draw resources from areas where there are water quality problems.*"

Overview of the Six Step 4B Process

In 2004 EPA developed a six step process for 4B documentation to meet the requirements of EPA Guidance (USEPA, 2004). Where a 303(d) listed waterbody may qualify for the 4B category, the following six steps can be taken to document the rational and provide assurances:

1. **Develop an understanding of the current water quality conditions and determine that the 303(d) listing is appropriate.**

    - Review the applicable water quality standards. If the standards are in narrative form, coordinate with the state to develop measurable, numeric interpretations of the narrative criteria.
    - Review existing data supporting the listing and any additional information since the listing was made. Provide information to MDEQ for re-evaluation if there are questions regarding listing.
    - Only consider undertaking Category 4B process when existing data and information support 303(d) listing.

2. **Identify all significant sources of pollutant(s) of concern.**

    - All potential sources of the pollutant(s) of concern should be considered.
    - Conduct a thorough watershed-scale assessment to identify all point and non-point pollution sources for sediment that are likely to be adversely affecting water quality. This assessment may be based on available information/data, field reconnaissance, remote sensing techniques, modeling, or a combination of one or more of the above.
    - Prioritize the identified sources for treatment to insure all significant sources are

addressed.

3. Identification of controls (BMPs and Restoration)

- Develop a suite of controls to specifically address the sources identified in Step 2. The ultimate goal is to ensure that source contributions are reduced to a level commensurate with attainment of the applicable water quality standards.

4. Description of the authority under which the controls are required

- Provide a description of the authority (local, state, federal) under which the suite of controls defined in Step 3 are required and will be implemented.

5. Assurances that the controls will be implemented
Assurance can be provided by the Forest Service in a number of ways, such as:

- Demonstrating that the practices are a requirement of a watershed plan.
- Identifying the BMPs as part of a Record of Decision for a categorical exclusion (CE), environmental analysis (EA), or environmental impact statement (EIS).
- Providing documentation that the controls are included in a particular Forest's budget or reasonably anticipated budget for implementation.

6. Insuring that the controls are adequately stringent to result in attainment of applicable water quality standards within a reasonable period of time.

- Documentation that the BMPs are sufficient to attain the applicable water quality standards in a reasonable period of time. To insure BMPs work, they must be monitored to evaluate their effectiveness and modified as necessary to assure compliance with state water quality standards and to provide the desired protection.

The procedures listed above are designed to provide Montana DEQ and US EPA the assurances needed to be used as a basis for moving a waterbody from the State's Category 5 section 303(d) list to Category 4B in the State's Integrated Report.

This 4B submittal is intended to expedite the recovery of impaired waters by assuring the necessary mitigations occur on the ground to ultimately achieve and maintain water quality standards. This submittal is not intended to be a substitute for a TMDL; rather, its intent is to recognize that use of BMPs coupled with the interdisciplinary planning process, identification of restoration needs, project implementation oversight, monitoring and adaptive management will result in full attainment of State water quality standards.

The Forest Service respectfully requests that Montana DEQ and US EPA approve this submittal and move Taylor Fork and Cache Creek from Category 5 to Category 4B. Montana DEQ retains the authority to place the waterbody into Category 5 and require a TMDL at their discretion. This submittal is organized to address the issues required in

EPA's 2004 guidance to the states (EPA, 2004).

Six Step Taylor Fork and Cache Creek Category 4B Analysis

1. Develop an understanding of the current water quality conditions and determine that the 303(d) listing is appropriate.

Applicable Water Quality Standards

Both Cache Creek and Taylor Fork are classified as B-1 waters and the 303(d) listed causes of impairment include the pollutants, siltation and suspended solids. Waters classified B-1 are to be maintained suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

Sediment (i.e., coarse and fine bed sediment), siltation, and suspended solids are addressed via the narrative criteria identified in Table 1. The relevant narrative criteria do not allow for harmful or other undesirable conditions related to increases above naturally occurring levels or from discharges to state surface waters. This is interpreted to mean that water quality goals should strive toward a reference condition that reflects a water body's greatest potential for water quality given current and historic land use activities where all reasonable land, soil, and water conservation practices have been applied.

Table 1. Applicable narrative standards for sediment related pollutants.

Rule(s)	*Standard*
17.30.623(2)	*No person may violate the following specific water quality standards for waters classified B-2, B-3, and C-3.*
17.30.623(2)(f)	*No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except a permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.*
17.30.637(1)	*State surface waters must be free from substances attributable to municipal, industrial, agricultural practices or other discharges that will:*
17.30.637(1)(a)	*Settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines.*
17.30.637(1)(d)	*Create concentrations or combinations of materials that are toxic or harmful to human, animal, plant, or aquatic life.*
	The maximum allowable increase above naturally occurring turbidity is: 0 NTU for A-closed; 5 NTU for A-1, B-1, and C-1; 10 NTU for B-2, C-2, and C-3.
17.30.602(17)	*Naturally occurring" means conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied.*
17.30.602(21)	*Reasonable land, soil, and water conservation practices" means methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after pollution-producing activities.*

Since the applicable sediment criteria in Montana are narrative, measurable indicators specific to Taylor Fork and Cache Creek will be used to assess compliance with water quality standards. **A suite of indicators are proposed as measures for compliance subsequent to implementation of the controls proposed in Section 3.** These indicators, from the USFS R1 Aquatic Ecological Unit Inventory (Draft AEUI, 2005) include 4 parameters using physical attribute protocols (PIBO, 2004) for both Cache Creek and Taylor Fork. The indicators include stream bed material size, pool tail fines, bank stability, and pool habitat survey and residual pool depth. These results will be compared against PIBO minimally managed data sets for response reaches of similar size, climate, and geology to determine the relative condition of Taylor Fork and Cache Creek. Macro invertebrate populations will be measured in the same response reaches. This analysis will be helpful for MDEQ in determining the appropriate narrative standard for this and other streams. In addition fish population abundance will be measured in 5 randomly located samples to compare to sampling done in 1991, 1996, and 2003. These comparisons will provide evidence as to the status through time of resident fish populations, the stream's beneficial use. In addition to monitoring indicators, sediment modeling will be periodically updated in both Taylor Fork and Cache Creek to insure continued compliance with Gallatin NF sediment guidelines.

Historic Land Use Information

A review of literature at Montana Department of Environmental Quality was done for the Taylor Fork drainage. Historical land uses in the Taylor Fork drainage included livestock grazing, logging and mining. Very limited gold exploration and mining occurred intermittently from about 1880 to 1945. Sediment from past and ongoing land management activities was formally documented in the mid to late 1970s (Montana Department of Health, Water Quality Bureau, 1975 and *Blue Ribbons of the Big Sky Country APO,* 1977).

Timber harvest and extensive railroad tie cutting occurred in Taylor Fork between 1868 and 1906 (Ireland 1993). An area of channel instability found below an old splash dam still remains today, as evidenced by shallow braided channels. Much of the channel instability in this section was caused by record high flows in 1972 (Snyder et al. 1978). Since 1906 small-scale logging has occurred on National Forest lands. Historic extensive clearcutting of private lands within the drainage ended in 1976. Mass wasting and road slumps were observed on Burlington Northern Railroad properties (ibid. 1978). Some harvesting on private land occurred in 2000 and 2001 just before it was exchanged and became part of the Gallatin National Forest in 2002. Needed restoration work, due to this timber harvest and the high flows of 1978, was completed by the Forest in 2003 and 2004. The unstable section of Taylor Fork and the private land mass wasting and road slumps have largely recovered (Mark Story, Forest Hydrologist, 2005 personal observation).

Cattle grazing began around 1890. In 1920 sheep were introduced in Cache Creek and Carrot Basin. The numbers of livestock were probably above carrying capacity until they were reduced to more appropriate numbers in 1971. The present Cache-Eldridge

Allotment was created at that time and the area was converted back to cattle. The University Allotment which included the Buck Creek area and headwater areas of Cache Creek, Taylor Creek, and Eldridge Creek allotment was grazed by 900 to 1100 sheep from the 1940s until it was vacated in the 1980s (Trish Hoffman, Hegben Ranger District, Cache-Eldridge and University Allotment files #2710).

Water Quality and Fishery Information

Fish species found within the Taylor Fork watershed included Westslope cutthroat trout, rainbow, brown, mountain whitefish and mottled sculpin. Westslope cutthroats persist in the higher elevation headwater reaches of the Taylor Fork, though the lower reaches were stocked from 1928 to 1980 with rainbow trout. Competition with exotic species such as brown trout and rainbow trout seems to have negatively influenced the presence of cutthroat in the lower reaches. The Cache Creek cutthroat trout population is not pure, as the introduced Yellowstone and rainbow trout have hybridized with the native cutthroat. However, Cache Creek still supports a game fish population (Barndt, Gallatin National Forest Fisheries Data, 2004, Bowersox 1998 and Ireland 1993).

Wapiti Creek and Cache Creek are major tributaries of the Taylor Fork. Wapiti Creek is relatively pristine, while upper reaches of Cache Creek had extensive grazing. Upper Cache creek has the potential to provide important fish rearing habitat. However, in a two year study, livestock trampling of redds was common during incubation which resulted in high mortality (Bowersox, 1998 and Barndt, Gallatin NF Fisheries Data 2004). In addition, high concentrations of stream surface fines <2mm in size, has been related to reduced egg-to-fry survival (Ireland 1993 and Bowersox, 1998). The effects of fine sediment accumulation on egg-to-fry survival of cutthroat inhabiting the upper reaches of Cache Creek are apparent, as survival to emergence was low, 1.5 to 5.4% (Bowersox, 1998). Predicted emergence success was also low (12.5%), but greater than observed. Sources of reduced spawning success include sedimentation, trampling by livestock, redd dewatering, barriers to upstream migration, shallow spawning gravels and elevated inter-gravel temperatures. Fry survival in Cache Creek was 21-26%. This percentage is typical of a moderately to highly sedimented stream bed (Bowersox 1998 and Magee 1993).

Perplexing questions remain regarding overall fishery health within Cache Creek and the Taylor Fork watersheds. Fish counts show that Westslope cutthroat trout populations in Cache Creek are at densities of 22-33 fish per 100 square meters (Barndt, Gallatin NF Fisheries Data 2004). These densities are among the highest reported for this subspecies throughout their range despite low egg to fry survival. Conversely, the main stem of Taylor Fork contains low densities of rainbow and cutthroat trout (<1 fish/100 square meters), even though habitat conditions appear better than many nearby reaches of streams with much higher fish densities. For comparison other nearby streams have higher densities; Cottonwood Creek has a measured density of 7 fish per 100 square meters, while Hyalite Creek was measured at 22 fish per 100 square meters (Ireland, 1993 and Barndt-Gallatin NF Fisheries data, 1994).

The pattern of fish densities has remained consistent for over a decade (Ireland 1993 and Barndt, Gallatin NF Fisheries Data 2004). This may reflect a consistent relationship to the local landscape as there are other relatively pristine streams with similar low densities. For example, the upper Gallatin River in Yellowstone National Park has similar or lower fish densities (<0.3 fish per 100 square meters) despite having what appears to be very high quality habitat (personal communication with Dan Mahoney, Yellowstone National Park). This pattern is evident in the upper reaches of Cougar Creek, Duck Creek, and the South Fork of the Madison River, which are all similar in size and habitat configuration to the Taylor Fork and drain roughly the same geographic area (Gallatin National Forest Fisheries Data, 2004 and personal communication with Tim Weiss, Montana Fish, Wildlife and Parks).

In summary, the DEQ determined that historic land uses, high levels of fine sediment <2mm in Cache Creek, and low fish numbers within the main stem of Taylor Fork together provided sufficient evidence that led to the listing of water bodies within the Taylor Fork watershed as impaired on the State of Montana's 303(d) list.

CDM, a consulting company under contract to US EPA, compiled a summary of historical water quality information for Taylor Fork, Cache Creek, and 4 other streams in the Upper Gallatin River watershed in 2005. Suspended sediment concentrations in spring runoff were collected by Gallatin NF personnel and are shown in Table 2 (updated from CDM, 2004).

Table 2. Spring Runoff (April through July) in Taylor Creek 0.5 above the mouth.

		Suspended Sediment Concentration (mg/L)			Discharge (cfs)		
Year	n	Minimum	Maximum	Average	Minimum	Maximum	Average
1982	38	21	765	252	251	1370	684
1983	80	15.3	825	265	158	751	382
1984	78	62	1560	465	109	971	345
2004	12	4.5	188	62	27	425	190
2005	14	15	557	111	2776	493	223

The data indicate that Taylor Fork has significant suspended sediment concentrations and yield with the higher suspended sediment concentrations in the 1982-1984 period due to higher stream flow energy. Reductions in timber harvesting, road mileage, and livestock grazing as well as lower stream flows have all contributed to reduced sediment yields in Taylor Fork.

The Pfankuch (1975) channel stability rating system was used in 1994 and again in 2003 to evaluate channel stability in Taylor Fork (Table 3). The Pfankuch rating system rates 4 items in the upper stream banks, 5 in the lower stream banks, and 6 items in the stream bottom for a numerical rating of stream stability. Higher numbers indicate less stability. Gallatin Forest Plan standards allow only a 20 point increase in channel stability above natural (baseline). Natural ratings in Taylor Fork are generally only "fair" due to the erodibility of the soils and sediment. The C4 section below Cache Creek has moderately high width depth ratio, high sinuosity, predominantly gravel substrate, and

1% gradient. C4 channel types are very susceptible to both lateral and vertical stability reduction from direct channel disturbance and change in flow and sediment regimen of the upstream watershed (Rosgen, 1996). This channel section is recovering from historical logging and grazing impacts. Further improvement is anticipated with implementation of the revised Cache-Eldridge grazing allotment plan which will eliminate livestock grazing in Cache Creek and reduce livestock grazing in Taylor Fork

Table 3. Taylor Creek Channel Stability Ratings

Location	Year	Rosgen Stream Type	Pfankuch channel stability rating	Estimated Natural Channel Stability rating
above Cache Creek	1994	C3	90 "fair"	-
0.5 mile above mouth	1994	C3	109 "fair"	-
above Cache Creek	2003	C3	96 "fair"	93 "fair"
below Cache Creek	2003	C4	109 "fair"	90 "fair"

Water quality monitoring in Cache Creek in 1976-1977, 2004,and 2005 (Table 4) also document high suspended sediment concentrations in this predominantly Cretaceous sediment dominated watershed. Reductions in sediment concentrations between 1976-1977 are likely due to less discharge in 2004, stream channel restoration work in Cache Creek, and a reduction in livestock grazing.

Table 4. Spring Runoff (April through July) in Cache Creek near mouth.

Year	n	Suspended Sediment Concentration (mg/L)			Discharge (cfs)		
		Minimum	Maximum	Average	Minimum	Maximum	Average
1976-77	13	6.3	444	94.1	1.8	54	15.2
2004	12	2.8	112	35.1	2.7	12	7.6
2005	14	10.3	248	48	3.6	28	11.9

Pfankuch (1975) channel stability ratings for Cache Creek in 2003 (Table 5) documented several sections of Cache Creek tributaries in exceedances of the Gallatin Forest Plan standards of 20 point increase in channel stability above natural. These sections are in the process of recovering and are expected to recover to natural stability conditions with implementation of the revised Cache-Eldridge grazing allotment plan which will eliminate livestock grazing in Cache Creek.

Table 5. Cache Creek Channel Stability Ratings – 2003

Location	Rosgen Stream Type	Pfankuch channel stability rating	Estimated Natural Channel Stability rating
South Fork Cache Creek	F4	120 "poor"	92 "fair"
East Fork South Fork Cache Creek	E4	98 "fair"	74 "good"
Lower East Fork South Fork Cache Creek	E4	96 "fair"	92 "fair"
Lower South Fork Cache Creek	E4, some F4 & C4	101 "fair"	84 "fair"
Mainstem Cache Creek	F4	105 " fair"	92 "fair"

McNeill core samples were collected in cutthroat trout redds Cache Creek and nearby Wapiti Creek in 1992 (Magee et.al., 1996; Bowersox, 1998). Cache Creek was considered to be a "high disturbance" subwatershed and Wapiti Creek to be "undisturbed" and useful as a reference stream. The Wapiti Creek samples were collected in the upper watershed above grazing or other land management activities. The Cache Creek samples were collected in grazed areas. Both Cache Creek and Wapiti Creek are at the higher end of % fines in the stream substrate and comparable to other watersheds on the Gallatin NF with Cretaceous sediments.

Table 6. Substrate Sampling in Redds in Cache Creek 1992-1995.

Creek	Method	# of Redds sampled	Fines < 6.35mm	Fines < 0.85mm	Reference
Cache Creek 1992	McNeil Core	21	44.6%	21.6%	Magee 1996
Cache Creek 1994	Freeze Core	13	35.4 %	17.6%	Bowersox 1998
Cache Creek 1995	Freeze Core	23	31.7%	18.6%	Bowersox 1998
Wapiti Creek 1992	McNeil Core	15	42.6%	17.1%	Magee 1996

2. Identify all significant sources of pollutant(s) of concern.

Taylor Fork and Cache Creek are listed as impaired for sediment on Montana's 303(d) list. An extensive assessment has been conducted to identify current sediment sources, which are highlighted in yellow (see Figure 1 below). The assessment was conducted for actively managed parts of the Taylor Fork drainage focusing on roads, timber sales, and grazing allotments. Methods used were field reconnaissance, photos of management and source areas, geomorphic measurements of potential source areas in grazing allotments, and water quality monitoring in 2004 and 2005 in both Taylor Fork and Wapiti Creek. Extensive discussion and coordination with Hegben Lake District personnel and Gallatin NF timber personnel in timber, range, fisheries, and road and trails on existing resource conditions and potential future management activities were also used in the assessment. Source categories in the assessment were focused on sediment from construction, land development, and silviculture (Taylor Fork), and on agriculture, grazing, logging roads/maintenance, and silviculture (Cache Creek). Recent BMP restoration work is shown in red. Some un-surfaced roads (shown in yellow on the map below) that currently contribute sediment will remain open. These roads will be graveled and their drainage improved to minimize road surface erosion and flow concentration as part of the Taylor Fork Road Resurfacing and Gravel Pit Project.

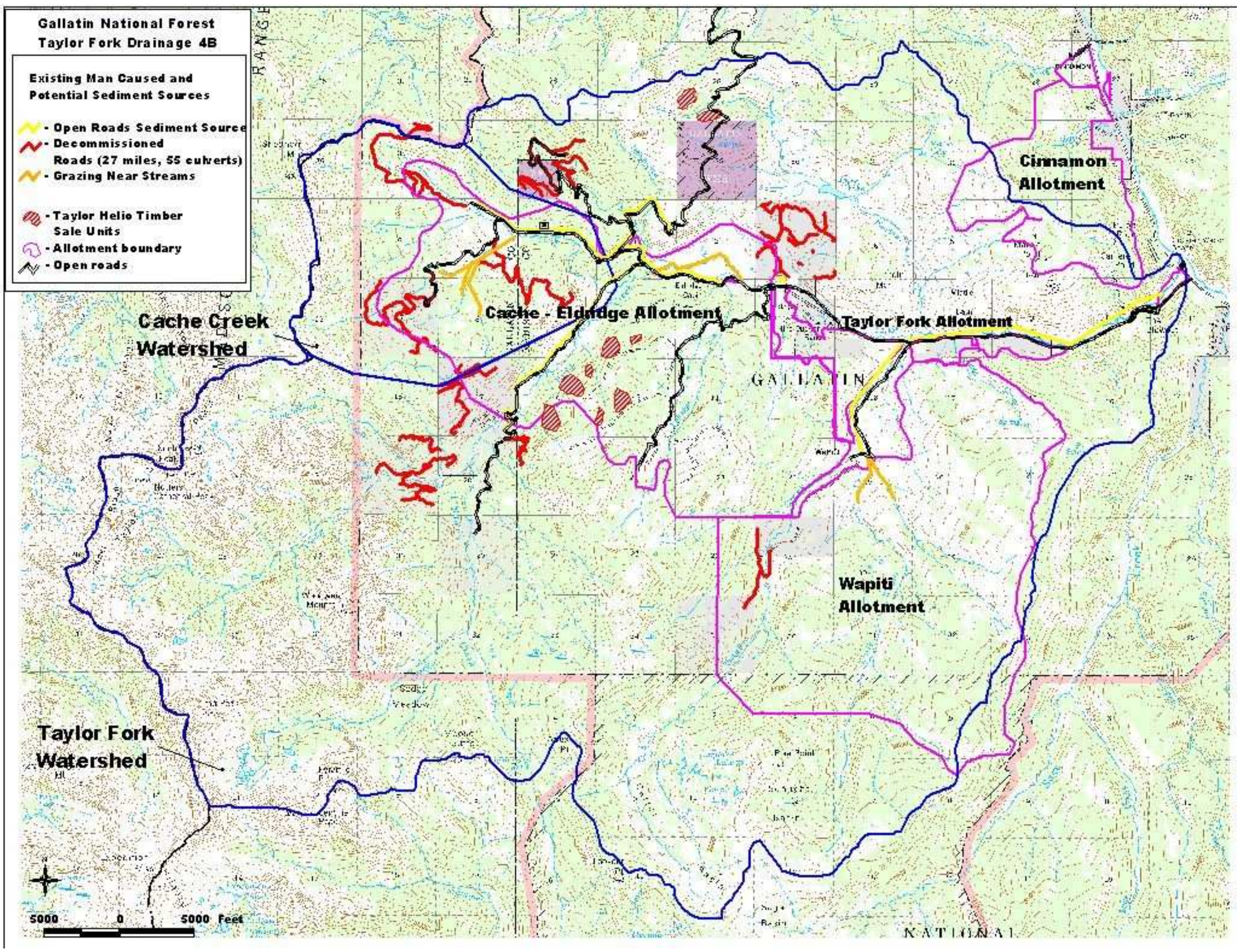

Figure 1. Taylor Fork Watershed (63,360 acres) with watershed boundaries, sediment sources, management activities, and completed restoration.

Anticipated Timber Management

No commercial timber sales are currently planned for the Taylor Fork drainage. Approximately 38 acres of fuels treatment are planned on National Forest land next to the 9 Quarter Circle Ranch as well as 4 acres adjacent to the Cover Wagon Ranch in the Taylor Fork Fuels Reduction project (USFS, 2006a) which are not expected to add additional sediment sources. A limited amount of post and pole harvesting in the Taylor Fork drainage is expected to continue by private landowners around their property. About 40 – 50 cords of firewood cutting is permitted in the drainage each year. None of this small-scale harvest activity will require road construction and any associated sediment produced by these actions would be negligible. As mentioned in the Historical Land Use Information section, historical timber harvest on a small scale occurred in the Taylor Fork watershed between 1868 and 1976 when private land harvesting ended, except for private land harvesting in 2000/2001 before the sections became part of the Gallatin NF in 2002. Needed restoration work on historical timber harvesting areas (primarily road obliteration and removing culverts) was completed in 2003, 2004, 2005, and 2007. The unstable section of Taylor Fork and the private land mass wasting and road slumps have largely recovered (Mark Story personal observation). All timber sale units in Cache Creek now have protective ground cover and timber sale access roads have been decommissioned. Residual water yield increases in Taylor Fork as a result of timber harvest are calculated to be only 0.1% over natural.

Grazing

The three grazing allotments within the Taylor Fork watershed are well drained, with limited areas of wetlands[2]. However, in Cache Creek grazing has adversely impacted several areas of Riverine wetlands along perennial stream channels and springs, in a few Palustrine wetlands in wet meadows, and in forested wet areas. A section of Little Wapiti Creek near the allotment boundary has concentrated grazing and eroding steam banks (Figure 1). No other active sediment sources were identified in the Taylor Fork allotment (Story, 2005). Though the Cinnamon Creek allotment incorporates a small portion of the Taylor Fork watershed, grazing by cattle from this allotment within the watershed is minimal.

<u>Cache-Eldridge Allotment</u>

The Cache-Eldridge Allotment was approved in 2006 (USFS- Gallatin NF, 2006b) which eliminate the Cache Pasture and excluded livestock grazing from Cache Creek. The changes proposed under all of the alternatives are designed to improve stream conditions and are a normal component of BMP upgrades. Some of these sections in 2003, particularly the East Fork of Cache Creek and the South Fork of the East Fork had destabilized streambanks from livestock grazing and bank trampling that acted as sediment sources during high streamflow periods. These sections were not been grazed by livestock in 2004 and 2005 and were be closed to livestock grazing in the Cache-Eldridge AMP revision in 2006.

Photo 1. Impacted riverine wetland in the Cache-Eldridge Allotment, with streambank trampling and a relatively wide shallow channel. Fish numbers are 26/100 square meters within this reach and the % of fine sediment <2mm is 21%, which represents a fair condition. This rating is based on based on a combination of values found in scientific literature (Reiser and Bjornn, 1979) and professional judgement**.**

<u>Wapiti Grazing Allotment</u>
The Wapiti Grazing Allotment revision National Environmental Policy Act (NEPA) planning will be completed in fiscal year 2008. An initial evaluation of riparian-grazing interactions found very limited grazing impacts and relatively stable stream channel conditions (see photo 2). A section of Little Wapiti Creek near the allotment boundary in Section 25 has concentrated grazing in about ½ square mile area adjacent to the allotment boundary which will be addressed in the Wapiti allotment management plan (AMP) revision. This segment is shown on the Taylor Fork watershed and project map (Figure 1). The following photo shows a proper functioning healthy stream reach in the Little Wapiti Pasture of the Wapiti Grazing Allotment.

Photo 2. Little Wapiti Creek, Wapiti Allotment. Note the healthy riparian vegetation and stable banks. This stream is a Rosgen (1996) C3b channel type with a good channel stability rating and in proper functioning condition. (August, 04).

Taylor Fork and Cinnamon Allotments

Two other grazing allotments shown in Figure 1 are in or near Taylor Creek. The Taylor Fork allotment is a small 896 acre horse allotment between the Cache-Eldridge and Wapiti allotments. The permittee is the 9 Quarter Circle Ranch who use the allotment for horses associated with their guest ranch operation. The allotment is managed with a 5 pasture rest rotation system from 6/15 to 10/15. The Decision Notice for the Taylor Fork Allotment was finalized on 7/2/99. The allotment does not border Taylor Creek and is not considered a source area for pollutants.

The Cinnamon Allotment incorporates a small portion of the Taylor Fork watershed. Any grazing impacts by cattle from this allotment are minimal.

Taylor Helio Timber Sale

This 153 acre timber sale was authorized with the Taylor Fork Timber Sale and Road Restoration Project EIS (10/2000), but subsequently reduced in size from the preferred alternative. The sale consisted of 6 tractor units (52 acres) and 8 helicopter units (101 acres) with 4,000 ccf under contract (about 1.8 million board feet). About 0.3 miles of specified road were constructed to access the tractor units. All harvesting was completed on 12/04 and site preparation, grapple pile cleanup, and all other Taylor Helio contract work was finished by 8/05 when the timber sale contract terminated. Some of the Helicopter unit landings were sold as a separate firewood contract which will be completed by 10/05. Photos of the Taylor Helio Timber Sale are shown in Appendix 3.

Roads

The R1/R4 sediment modeling indicates that roads are the primary anthropogenic sediment source to Taylor Fork. Within the last 5 years, 27 miles of roads have been decommissioned in the Taylor Fork and Cache Creek watersheds. A total of 79 culverts have been removed. These decommissioned roads are a combination of roads constructed for timber sales and on formerly private lands acquired by the Forest Service. Decommissioning has consisted of re-contouring, ripping, draining, or seeding. Several older timber sales roads, which have not been used for 20-30 years, are now re-vegetated and the culverts removed. The Taylor Fork watershed has approximately 55 miles of existing roads on both National Forest and private lands (road density of 0.56 miles per square mile) which are estimated to contribute approximately 247 tons of sediment per year (annual average). All roads planned to be decommissioned in Taylor Fork and Cache Creek are now accomplished with the completion of the 2007 rehabilitation work in Deadhorse Creek.

The most significant road related sources of sediment are the un-surfaced roads in the upper ends of the Taylor Fork and the Cache Creek watersheds. The Cretaceous sediment geology found in this area is not well suited for un-surfaced, native material roads, because it is easily eroded.

Photo 3. **Cache Creek Road Identified for Gravel Surfacing in 2006.**

Private land development

Private land development in the Taylor Fork watershed includes a residence and outbuildings in T9S R3E S8, Nine Quarter Circle Ranch and outbuildings in T9S R4E S7 & T9S R3E S12, and the Eldridge Cabin in T9S R4E S11. In September 2004, 27 cabins in T9S R3E S1 were removed after acquisition of the land by the Gallatin

National Forest. Access roads to the Section 1 cabins were decommissioned (re-contoured and hydro-mulched or ripped, drained, and seeded) in July/August of 2005.

Photo 4 . Re-contoured road in T9S R3E S1. Treatment consisted of pulling fill slopes and packing back in the road prism to cover the cut slopes. Topsoil was placed on the surface as much as possible. The re-contoured road prisms were then seeded and hydro-mulched. The upper left part of the picture is a road segment to a former cabin which was ripped, drained, and seeded (Photo taken on 7/27/05).

Natural Sources of Sediment

Cretaceous sediments found extensively in the Taylor Fork watershed are the primary source of sediment in the drainage. The western two-thirds of the Taylor Fork watershed and virtually the entire Cache Creek drainage have Cretaceous sediment parent material. During snowmelt runoff and particularly from high intensity rain events the Cretaceous sediments, which are high in clay content, can turn Taylor Fork and even the entire Gallatin River turbid for a few hours. The highest concentration of Cretaceous sediments occurs in Cement Creek where over 300 acres of "badlands" are present. These have little vegetative cover and are comprised of Meade Peak (Albino) Shale. This area erodes easily and yields large amounts of fine sediments as a result of active rill and gully cutting. Salts, iron, phosphate, and selenium are found in these fine sediments. While these contributions may adversely impact aquatic biota, they are naturally occurring, so no treatments are planned to reduce sediment yield from this area.

Photo 5. Lower Taylor Fork Cretaceous sediments.

3. Identification of Controls

Many erosion control practices were developed by the USDA Forest Service early in its history. In 1909 the Forest Service, in a cooperative project with the U.S. Weather Bureau, began studying the effects of timber removal on water yield experiments at Wagon Wheel Gap Watershed in Colorado (Williams, 2000). Over time other experimental watersheds were established around the country to test the effects of management practices on watershed response. By the 1950’s the scientific foundations for the field of “watershed management” had been established (Colman, 1953). These efforts, which continue to the present day, have resulted in sets of practices now collectively referred to as Best Management Practices or BMPs. The purpose of many BMPs is to prevent water quality degradation from occurring as a result of ongoing management activities**.** Implementation of BMPs (may include needed restoration measures) activities are the primary means that will achieve state water quality standards and comply with the Clean Water Act (CWA) (USEPA, SAM-32 as amended, 1987).

The BMPs to be applied are located in Forest Service Handbook (FSH) 2509.22 – Soil and Water Conservation Practices Handbook, R-1/R-4 as amended, 05/88. The practices identified are also shared with USDA Forest Service Regions 3, 5, and 6 with only minor variations. Additional practices may be developed on a case-by-case basis when standard practices are not deemed adequate for needed protection. Site specific prescriptions are developed through discussion as part of the interdisciplinary planning process. Adopting appropriate logging, grazing, road building strategies, needed restoration and timing of management actions are designed to ensure that BMPs will be effective. A qualified Timber Sale Administrator oversees all timber harvest and a qualified contracting officer, representative or inspector supervises road building. Breeches in contract requirements often result in withholding payment until appropriate measures are taken. Repeated breeches may disqualify a contractor from bidding on future projects.

Restoration actions to correct man-caused, non-point sources within project areas have become a common component of many management decisions. Needed restoration actions become Forest priorities when cumulative effects analysis conducted as part of the National Environmental Policy Act (NEPA) planning process includes the measures in order to meet water quality objectives. In order to qualify for Category 4B, funding to accomplish restoration should be within anticipated budget limits. Watershed restoration measures are overseen by hydrologist, soil scientist, and fishery biologists or by hydrology or engineering technicians working under their direction.

Taylor Helio Timber Sale

The Taylor Helio Timber Sale has no known sediment source areas. Tractor units were harvested in 2003 and removed about 1,112 of the 4,000 ccf under contract. The remainder of the tractor units were completed in 2004. Skid trails were designated to minimize the amount of soil disturbed, and the actions carefully monitored. Examination of the tractor harvesting and roadwork to date indicates that very minimal erosion occurred as a result of this timber sale. Access to all sale units was done from existing roads without any road grader blading. These roads had extensive vegetative cover; further blading would have increased the potential for erosion. Therefore, any additional road related erosion was very minimal.

Helicopter harvest was also completed in 2004. This harvest produced no deliverable sediment to any drainage, as the units were on upper slopes and no ground skidding was necessary. Helicopter log landings were de-compacted and seeded to reduce the probability of erosion from these sites. No additional roads were constructed to access the helicopter units (Story 2003 and 2004). Photos of Taylor Helio TS controls are shown in Appendix 3.

Cache Eldridge Grazing Allotment

The updated Cache-Eldridge AMP was approved in 2006 (USFS – Gallatin NF, 2006b). The revised allotment management plan eliminates grazing on the Cache Pasture, thereby removing cattle as a source of sediment production and habitat alteration in Cache Creek. The elimination of livestock grazing in Cache Creek will largely remove the remaining land use caused sediment source in Cache Creek since all closed roads in the drainage have been decommissioned, historical timber sale units have recovered, and the remaining public access road (Road 135) will be graveled (Record of Decision signed in 2002).

Roads

The Taylor Fork watershed in 1996 before road decommissioning started had approximately 82 miles of roads (road density of 0.82 miles per square mile). During

2003 and 2004 approximately 15 miles of the roads were closed and decommissioned (rip, drain, seed and/or culverts removed). An additional 12 miles were decommissioned in 2005 and 3 miles in 2007. Currently Taylor Fork has 55 miles of road. This decreases the density to 0.56 miles/square mile. The most significant remaining road sediment sources are the upper ends of the Taylor Fork and Cache Creek roads, which are open roads built on native surface material (primarily Cretaceous sediments). These roads have been approved for gravel surfacing and surface drainage augmentation (Taylor Fork Road Surfacing and Gravel Pit Project, EA, 2002; Decision Notice 2/2003). This project completion is scheduled for 2008, depending on funding availability. Modeling results estimate that sediment production from roads will have been reduced from about 356 to 243 tons per year, a 67% decrease.

Sediment modeling (Table 7) indicates that the road obliteration work, which was completed in 2007 has decreased Taylor Fork road sediment from 356 tons/year in 1995 to 247 tons in 2008 (9.7% over natural for the Taylor Fork drainage). Completion of the Upper Taylor Fork and Cache Creek road gravelling project, tentatively scheduled in 2008 will reduce sediment yields by an additional estimated 4 tons/year to 243 tons/year (to 9.5% over natural). The 9.7% over natural sediment occurs primarily from the main Taylor Fork road system (Forest Roads 134, Taylor Fork Road, Road 2522 in Wapiti Creek Watershed, and Road 135 in Cache Creek Watershed).

Private land development

Most of the private land located within the boundaries of the Gallatin National Forest was recently acquired and added to the National Forest (The 320 Ranch- Taylor Fork Land Acquisition and Related Land Use Actions EA 2/2002 and Decision Notice 4/2002). A total of 3,247 acres were acquired including sections 1, 7, 17, 19, 20, and 35 in T9S R3E. In the Taylor Fork drainage 1,120 acres remain in private ownership, primarily associated with the Trapper Creek cabin and 9 Quarter Circle Ranch. In T9S R3E S1 all but 2 of the 29 cabins were removed in August and September 2004 and the access roads were decommissioned during the 2005 field season. To demonstrate the effectiveness of the proposed control measures, sediment yields were estimated with the R1R4 model for the Taylor Fork watershed for current 2005 conditions and when all BMPs are in place. Modeling results estimate that sediment production from these previously private land roads will have been reduced from 19.8 to 4.0 tons per year, a 79.8% decrease. The private land road sediment estimates are included in the table below. Total private land development sediment is now quite limited due mainly to the remaining private land access roads.

Table 7. Total Estimated Sediment Loading

Activity	Historic (1996) sediment yields tons/year	Current (2008) Sediment yield tons/year	Sediment yields after BMP's are implemented - tons/year	% Sediment Load Reduction from 1995
Roads	356	247	243	32%
Timber harvest	31	1	0	100%
Grazing	34	0.2	0	100%
Mining	0	0	0	0%
Land development	10	1	1	90%
Natural sources	2574	2574	2574	0%
Total	2995	2823.2	2818	6.6%
% over natural	16.4	9.7	9.5	

4. Description of the authority under which the controls are required

- The principal Laws and Regulations governing the USDA Forest Service are summarized in Appendix 1. Preventative BMPs are incorporated into project design before being implemented. Restorative actions are often prescribed to improve existing conditions. They may be implemented during a single season or in several seasons, depending on the length of implementation and/or availability of funding. The signature of a line officer (a District Ranger, Forest Supervisor, or Regional Forester) on a publicly reviewed Record of Decision is the assurance that the restoration will be accomplished.

- A Memorandum of Understanding with the State of Montana requires the use of approved Best Management Practices (R1-R4 Soil and Water Conservation Practices) appropriate for the ground disturbing practices being implemented.

The Records of Decision (RODs) listed below are signed by the appropriate USDA Forest Service officer and either have been or will soon be implemented. These actions address the water quality restoration needs of the Taylor Fork Watershed.

Roads

- Hebgen Lake Ranger District 2000 Record of Decision, Taylor Fork Timber Sale and Road Restoration, Gallatin National Forest, Bozeman, Montana. This ROD authorized the Taylor Helio TS and most of the road decommissioning projects in Taylor Fork.

- Hebgen Lake Ranger District 2002 Record of Decision, Upper Taylor Fork Road Surfacing and Gravel Pit Project, Gallatin National Forest, Bozeman, Montana. This ROD authorizes the road gravelling and drainage improvements mentioned in the document. Most of this work has not been done but is scheduled for 2006 and 2007.

- Hebgen Lake Ranger District 2002 Decision Notice and Finding of No Significant Impact, 320 Ranch - Taylor Fork Land Acquisition and Related Land Use Actions. This ROD was prepared to authorize much of the land acquisition in Taylor Fork and specifically authorized the road de-commission work in Section 1.

Grazing

- Hebgen Lake Ranger District. 2005, The Cache Creek Allotment Management Plan. This plan and associated ROD will address remaining significant impacts of grazing on water quality, primarily by eliminating livestock grazing in Cache Creek.

5. Assurances that the controls will be implemented

The RODs are the assurance of commitment on the part of the Gallatin National Forest to complete the needed restoration work and sufficiently restore water quality to support beneficial uses of the Taylor Fork drainage. These documents represent significant staff time, alternative development, public comment, and response to issues raised by the public and modifications to comments.

All BMPs and associated restoration work for the Taylor Helio timber sale are completed. All of the remaining road decommissioning work has also been completed. Work on the Cache Eldridge Grazing Allotment Management Plan (AMP) will be finalized in FY 2005. All but 2 of the 29 formally private cabins have been removed (T9S R3E S1). Records of Decision are signed for the remaining road surfacing work which will be completed in 2006 or 2007.

6. Document how the control measures are applicable to the impairment in question and can reasonably be expected to reduce pollutant loadings and ultimately attain WQSs when fully implemented.

- This documentation will rely on the appropriate combination of approaches, based on best professional judgment, simple predictive analyses, scientific literature, monitoring, and/or cause and effect modeling.

- Post treatment monitoring, assessing BMPs and restoration measures, coupled with R-1 AEUI monitoring using Pacfish/Infish protocols will provide evidence of effectiveness. Should treatments not prove effective, additional treatments would be prescribed and implemented.

Monitoring, Adaptive Management, Beneficial Use Compliance

To assure that the controls will result in attainment of water quality standards, onsite BMPs and restoration treatments were qualitatively evaluated and photographed to show compliance with the intent of the interdisciplinary planning teams (Appendix 2 and 3). The USFS, 2005 Draft R-1 AEUI protocols (tiered to the Pacfish/Infish Biological Opinion Protocols) will be used to evaluate the physical and biological conditions (Effectiveness Monitoring for Streams and Riparian Areas within the Upper Columbia River Basin. 2002). Response reaches will be identified and quantitative measurements made near the mouths of both Cache Creek and Taylor Creek. Protocols (PIBO, 2004) for both Cache Creek and Taylor Fork include sampling stream bed material size, pool tail fines, bank stability, and pool habitat survey, residual pool depth, and macro invertebrates. These measurements will be compared against the same measurements made at randomly selected locations within western Montana and Northern Idaho (R-1 AEUI, 2004).

In addition, fish population abundance (the Taylor Fork beneficial use) will be measured periodically and compared against sampling done between 1991 and 1996 and again in 2003. Evaluations of Taylor Fork and Cache Creek will consist of 5 randomly located samples taken during applicable evaluation periods (as compared to the control data). If the average value falls within the 80% confidence interval around the mean values for the control reaches, then the stream will be considered healthy.

Qualitative evaluation of BMPs and restoration implementation indicated that little additional actions are needed to address all significant sources of man caused pollutant (Story 2004; 1995, 1993). If subsequent quantitative monitoring indicates physical channel conditions or fish populations are below what would be considered appropriate levels, additional investigation can be initiated and additional treatments prescribed.

Concluding Remarks

The Taylor Fork stream system will continue to produce large amounts of natural sediment from Cretaceous sediment sources during snowmelt and storm flow events. Existing management decisions and implementation of BMPs have or soon will address all known significant management caused sources of erosion. In spite of the relatively high amounts of natural suspended sediment, it is anticipated that all designated water quality uses can be fully supported within five years as a result of ongoing restoration.

Implementation of management decisions and BMPs described above is expected to be adequate to fully protect the beneficial uses listed as partially supported in the 303(d) listing for Cache Creek (aquatic life support and cold water fishery – trout) and for Taylor Fork (aquatic life support and cold water fishery – trout and industrial). The elimination of grazing from Cache Creek in the Cache – Eldridge C&H allotment revision, continued recovery and natural reforestation of historical harvesting units, gravelling of the main Cache Creek road, and de-commissioning of all spur roads in the Cache Creek watershed will correct existing drainage problems and virtually eliminate human-caused sources of sediment.

Taylor Fork improvements in the Cache Creek C&H allotment and revision of the Wapiti C&H allotment will maintain channel stability and riparian vegetation impacts well within Gallatin NF riparian utilization and stream bank trampling guidelines. The Taylor Fork Helio Sale completion is the last timber harvest planned in the drainage for the foreseeable future. Several small fuel reduction projects associated with the Healthy Forests Initiative are being evaluated for Taylor Fork. All of these projects are on low sediment risk areas and no new roads are planned, although some limited commercial thinning/harvest may be utilized. The acquisition of private lands and subsequent removal of 27 of the 29 private land cabins in T9S R3E S1 and associated road decommissioning have largely eliminated construction and land development as probable sediment sources. The remaining cabin and access roads drain into internal basins and are not hydrologically connected to the Taylor Fork. Road density within the watershed is now at 0.56 miles/square mile (a relatively low density) and higher use open roads either are surfaced or are planned to be surfaced.

It is the professional opinion of the undersigned that the water quality will improve to within the range of natural variability and the beneficial uses of Taylor Fork will reflect this condition.

/s/ Mark Story, Forest Hydrologist, MS Watershed Management

/s/ Scott Barndt, Forest Fisheries Biologist, MS Fisheries Biology

/s/ Henry Shovic, Forest Soil Scientist, PhD Geography

The Taylor Fork 4B report is respectfully submitted to the Montana DEQ for reclassification of Taylor Fork and Cache Creek 303(d) listed segments from Category 5 to Category 4B.

References

Blue Ribbons of the Big Sky Country APO. 1974. A study in stream reach inventory and channel stability evaluation for Blue Ribbon APO study area October 19, 1977.

Bowersox, A.L. 1998. Effects of fine sediment accumulation on egg-to-fry survival of cutthroat inhabiting a highly sedimented headwater stream.

Barndt, Scott., Forest Fisheries Biologist, Gallatin National Forest. December, 2004. Personal communication with Mark Story.

CDM, 2005. Upper Gallatin Total Maximum Daily Load Planning Area. Phase 1 TMDL Status Report. Report to USEPA Contract # 68-C-02-109. CDM and Cadmus Group, Helena, MT.

Colman, E.A. 1953. Vegetation and Watershed Management. The Roland Press Company, New York. 412 pgs.

Ireland, S.C. 1993. Seasonal distribution and habitat of westslope cutthroat trout in sediment-rich basin in Montana. M.S. Thesis 66p.

Magee, J. P. 1996. A basin approach to characterizing spawning and fry rearing habitats for westslope cutthroat trout in a sediment-rich basin, Montana. M.S. thesis 89 pgs.

Pfankuch, D.J., 1975. Stream Reach Inventory and Channel Stability Evaluation. USFS/USDA, Lolo NF, Missoula, Montana.

Reiser, D.W. and T.C. Bjornn. 1979. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America, Habitat Requirements of Anadromous Salmonids. GTR PNW-96.

Rosgen,Dave. 1996. Applied River Morphology, Printed Media Companies, Minneapolis, Minnesota. Chapt. 8.

Snyder et al. 1978. Modeling forest water quality of the upper Gallatin-Madison watersheds using the benchmark system. Unpublished manuscript. Cited in Ireland, 1992.

Story, M. T. 1995, 1993. Water quality monitoring summary; Gallatin National Forest.

Story, Mark T. 2003 and 2004. Timber Sale Monitoring Reports, Helio Timber Sale.

USEPA. 1987. Memorandum from Carl F. Myers, Nonpoint Source Controls and Water Quality Standards, (SAM-32). Updates earlier policy issued November 1978.

USEPA. 2004. Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) for the Clean Water Act; Office of Wetlands, Oceans, and Watersheds.

USEPA. 2004. Expediting Clean Water Planning and Implementation on National Forest Lands Using the TMDL and Other Approaches. US EPA; RegionVIII, Office of Ecosystems Protection and Remediation.

USDA Forest Service. 2002. Effectiveness Monitoring for Streams and Riparian Areas within the Upper Columbia River Basin. USDA Forest Service Fish and Aquatic Ecology Unit, Logan, Utah. http://www.fs.fed.us/biology/fishecology/emp/intex.html

USDA Forest Service – Gallatin NF, 2006a. Taylor Fork Fuels Reduction Project DN and FONSI. Bozeman, Montana.

USDA Forest Service – Gallatin NF, 2006b. Cache-Eldridge Allotment Plan Update. Bozeman, Montana.

PIBO, 2004. Effectiveness Monitoring for Streams and Riparian Areas. Sampling Protocol for Integrator Reaches Stream Channel Parameters. Multi-federal Agency Monitoring Program, Logan, Utah.

USDA Forest Service. 2005. Draft R-1 Aquatic Ecosystem Unit Inventory (AEUI).

USDA Forest Service. 1988. FSH 2509.22 – Soil and Water Conservation Practices Handbook as amended.

Montana Dept. of Health, Water Quality Bureau. 1975. Water pollution Gallatin County, Montana – Chemical/physical data.

Williams, Gerald W. 2000. The USDA Forest Service-The First Century. USDA Forest Service, Washington, DC. 154 pgs.

Appendix 1 – Description of the authority under which the controls are required.

Provide a description of the authorities under which the Forest Service can require the application of the site-specific BMPs.

The Organic Administration Act of June 4, 1897 provides the legal basis for creation of National Forests. It stated: "No national forest shall be established, except to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States…" The Secretary of Agriculture, under the authority granted in the Organic Act of 1897 (16 U.S.C. 474), has delegated to the Chief of the Forest Service the authority to identify, define, administer, and manage National Forest System lands and resources.

In the Multiple Use-Sustained Yield Act of June 12, 1960, Congress again affirmed the application of sustainability to the broad range of resources over which the Forest Service has responsibility. The Act confirms the Forest Service's authority to manage the national forests and grasslands "for outdoor recreation, range, timber, watershed, and wildlife and fish" (16 U.S.C. Sec. 528), and does so without limiting the Forest Service's broad discretion in determining the appropriate resource emphasis levels of use of the lands of each national forest and grassland.

Congress enacted the National Environmental Policy Act (NEPA) of January 1, 1970 (42 U.S.C. 4321 et seq.), so that decisions by public officials are based on an understanding of environmental consequences, and agencies take actions that protect, restore, and enhance the environment. Under NEPA, all Forest Service proposals for major federal actions significantly affecting the quality of the human environment must include detailed statements of the environmental effects and alternatives to proposals (42. U.S.C. 4332 ©).

The National Forest Management Act (NFMA) of October 22, 1976 (16 U.S.C. 1600) requires the Forest Service to manage its lands according to land and resource management plans that provide for multiple-uses and sustained-yield in accordance with the Multiple Use Sustained Yield Act. NFMA requires integrated consideration of physical, biological, economic and other sciences.

These Acts in concert have provided the legal framework by which the USDA Forest Service conducts land management. In particular, NEPA and NFMA have served to greatly improve the analysis, integration of resource values, public discussion and quality of land management decisions. Project Records of Decision are signed by appropriate line officers only after compliance with NEPA and NFMA.

Federal Water Pollution Control Act (Clean Water Act) is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. The Clean Water Act delegates authority to the States with EPA oversight. Clean Water Act and Federal Facilities & Activities are subject to all federal, state, interstate and local requirements, administrative authority and sanctions respecting the control and abatement of water pollution to the same extent as any nongovernmental entity. Federal land management activities should be consistent with State Nonpoint Source Programs and accommodate the concerns of the States regarding consistency (Section 319(k). The head of each Executive agency is responsible for ensuring all necessary actions are taken (EO 12088).

The Clean Water Act defines nonpoint sources as those derived from the general landscape rather than a discrete discharge point. States must prepare reports and propose management plans for the control of nonpoint sources on a watershed by watershed basis. Grants are available to assist with this effort.

Section 303 (d) directs the States to establish water quality standards and to identify waters that do not meet water quality standards. Sections 303(d), 304(b) and EPA guidance directs the states to place all waters into one of five categories. Total Maximum Daily Loads (TMDLs) are to be developed for these waters listed in Category 5.

Section 208 states that all agencies responsible for carrying out any portion of a state water quality control plan must be designated as a water quality management agency.

Appendix 2. Qualitative Documentation that the Controls are Adequate

1) Adequacy of control implementation and effectiveness to achieve state water quality standards.

The effectiveness of the BMPs implemented on the Gallatin NF has been proven throughout Montana, on State, private, and Federal lands (Montana DNRC 2000, 2002). Across-the-board application of practices that meet or exceed BMP requirements have improved from 78% application in 1990, to a 96% application rate in 2002. For Federal land in 2002, adequate protection was rated at 89% for all evaluated practices. In particular, Federal land departures in SMZ rules decreased from seven in 2000, to zero departures in 2002. The Gallatin NF has had an active BMP implementation program since 1989 with 13 timber sales audited with inter-disciplinary teams including industry and interest group members. Very few BMP departures in timber harvesting operations have been documented. Several BMP departures were noted in road drainage issues, mainly in1989 and in the early 1990’s (Story 1997, Story 2003).

Conclusions drawn from the 2002 Audit (all ownerships) clearly show that BMPs were correctly applied and appeared effective in the protection of soil and water resources. The results also indicate that BMPs are being implemented at a very high rate.

Appendix 3 - Examples of BMPs used within Taylor Fork and Cache Creek.

Photo 6. The East Fork of Cache Creek Road was decommissioned in 2002. The culverts were removed, slopes laid back, and the area seeded. The site is completely recovered and the road tread does not have any rill erosion evident.

Photo 7. East Fork FK Cache Ck Road. The road surface was ripped, seeded, and drained. Logs were placed on cutbank slope to catch sediment and stabilize the slope.

Photo 8. East Fork Cache Creek Cache Ck Road. Seeded and Stabilized Road. This road section is typical of most of the decommissioned road segments in Cache Creek. Note lodgepole regeneration in historical timber harvest unit in the distance. Both the road and timber harvest unit in this area are no longer sediment sources to Cache Creek.

Timber harvest in the Taylor Helio Sale is completed, and provides good evidence of the effectiveness of the BMPs implemented. All of the tractor units are completed and the work accepted by the Timber Sale Administrator. Helicopter units were completed in December 2004. All sale closure activities (site preparation, grapple pile cleanup, and landing pile burn and top soiling) were completed by 8/05 when the sale contract terminated. Photo 9 was taken in Unit 113 which was harvested in the fall of 2002. The unit has been closed and accepted. There is no evidence of overland movement of sediment.

Photo 9. Taylor Helio Unit # 113 (2004) two years post harvest.

The skid trail in Photo 10 was slashed after the unit was completed. Skid trail rehabilitation was implemented throughout the Taylor Helio Sale with similar results of no soil displacement.

Photo 10. Slashed Skid Trail in Taylor Helio Sale. The skid trail was ripped, seeded, then slashed. The treatment is designed to eliminate erosion potential and protect soils.

Photo 10. North Fork of Deadhorse Creek 50 feet below Unit 113 of the Taylor Fork Helio Sale. There is no evidence of sediment entering the channel, indicating that the BMPs were effective.

Photos 11 and 12 Decommissioned Roads - Both of these photos were taken in 8/05 in T9S R3E S1 in the rehabilitation of lands acquired by the Gallatin NF. The upper photo is a re-contoured road section after hydro-mulching. The lower photo is a ripped, drained, and seeded road segment to a former cabin site (removed in 9/04). Re-contouring was done with a small excavator for road segments with large cut and fill slopes. The rip, drain, and seed treatment was used on road segments with small enough of cut and fill slopes to be restored with a dozer.

Photo 13. Decommissioning - This photo in T9S R3E S1 was taken on 7/27/05. A culvert was removed and stream banks restored to pre-road channel geometry. The area was then seeded and hydro mulched. Revegetation response is expected to be robust. The treatment is designed to eliminate the road as sediment source and avoid a long term potential sediment source if the culvert fails. The road decommissioning work on Gallatin NF lands during 2002-2005 has removed 55 culverts in the Taylor Fork watershed.