Nixon, Miles, and Brackett Creeks on the Double D Ranch

Initial Project Assessment

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1.0 Introduction

Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), a species native to Montana, has experienced declines in abundance and distribution throughout its historic range. Seeking to reverse this trend on private lands, the Landowner Incentive Program/Yellowstone Cutthroat Trout project (LIP/YCT) assists private landowners seeking to improve habitat for Yellowstone cutthroat trout on their property. This report, or project assessment, documents preliminary evaluations for potential projects on Brackett Creek and two of its tributaries, Miles and Nixon creeks. The objectives of the project assessment are to describe relevant literature and data, describe existing conditions and potential, and provide recommendations to landowners. If landowners agree to proceed with conservation activities, Montana Fish, Wildlife & Parks' Yellowstone cutthroat trout restoration biologist will provide technical, financial, and planning assistance to implement restoration activities on these private lands.

2.0 Project Background

The Brackett Creek drainage is a major tributary watershed of the Shields River and supports pure, slightly hybridized, and potentially pure Yellowstone cutthroat trout (Figure 2-1). The Double D ranch lies in the upper portions of Brackett Creek and encompasses a small portion of Brackett Creek, the entire length of Nixon Creek, and most of Miles Creek (Figure 2-2). Land uses include livestock grazing, irrigated forage production, and timber harvest at higher elevations.

Elise Donohue, owner of the Double D Ranch, initiated the request for assistance through the LIP/YCT project. She is an active member of the Shields Valley Watershed Group (SVWG), a local group committed to conservation of Yellowstone cutthroat trout while promoting the economic and social needs and values of this rural, agricultural watershed. Her interest is to promote Yellowstone cutthroat trout conservation on her working cattle ranch, in conjunction with continuance of existing and future land uses.

Planned and recent developments on this property have relevance to conservation planning and approach. Specifically, timber harvest is slated for the headwaters of Miles Creek to reverse encroachment of Douglass fir (*Pseudotsuga menziesii*) into rangelands. Managing riparian areas and roads to handle an increase in water yield and potential for sediment delivery are important considerations. In addition, recent improvement to ranch infrastructure, namely installation of a fence along Nixon Creek, will be useful in controlling livestock access to portions of this stream.

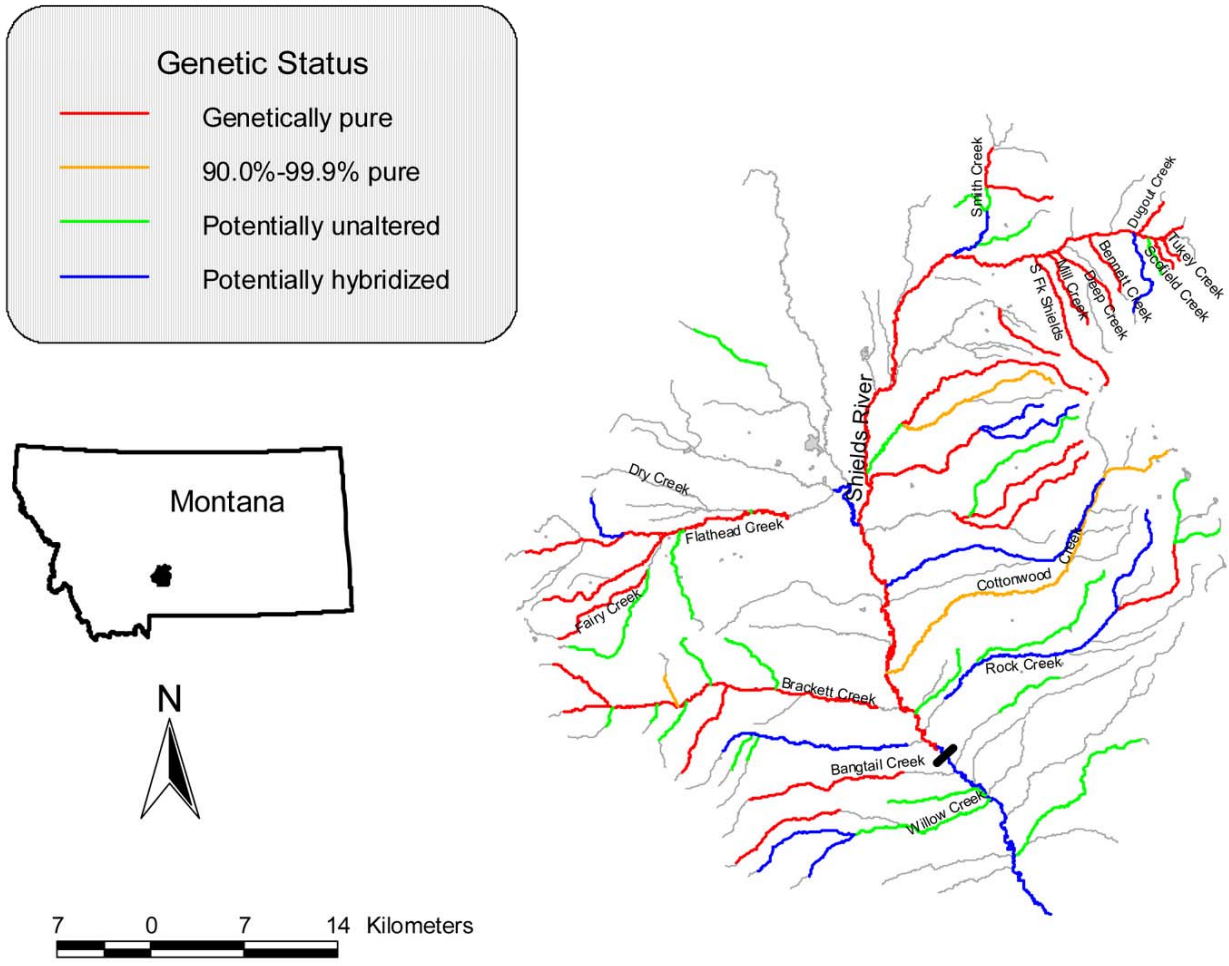

Figure 2-1: Map of the Shields River watershed showing distribution of Yellowstone cutthroat trout.

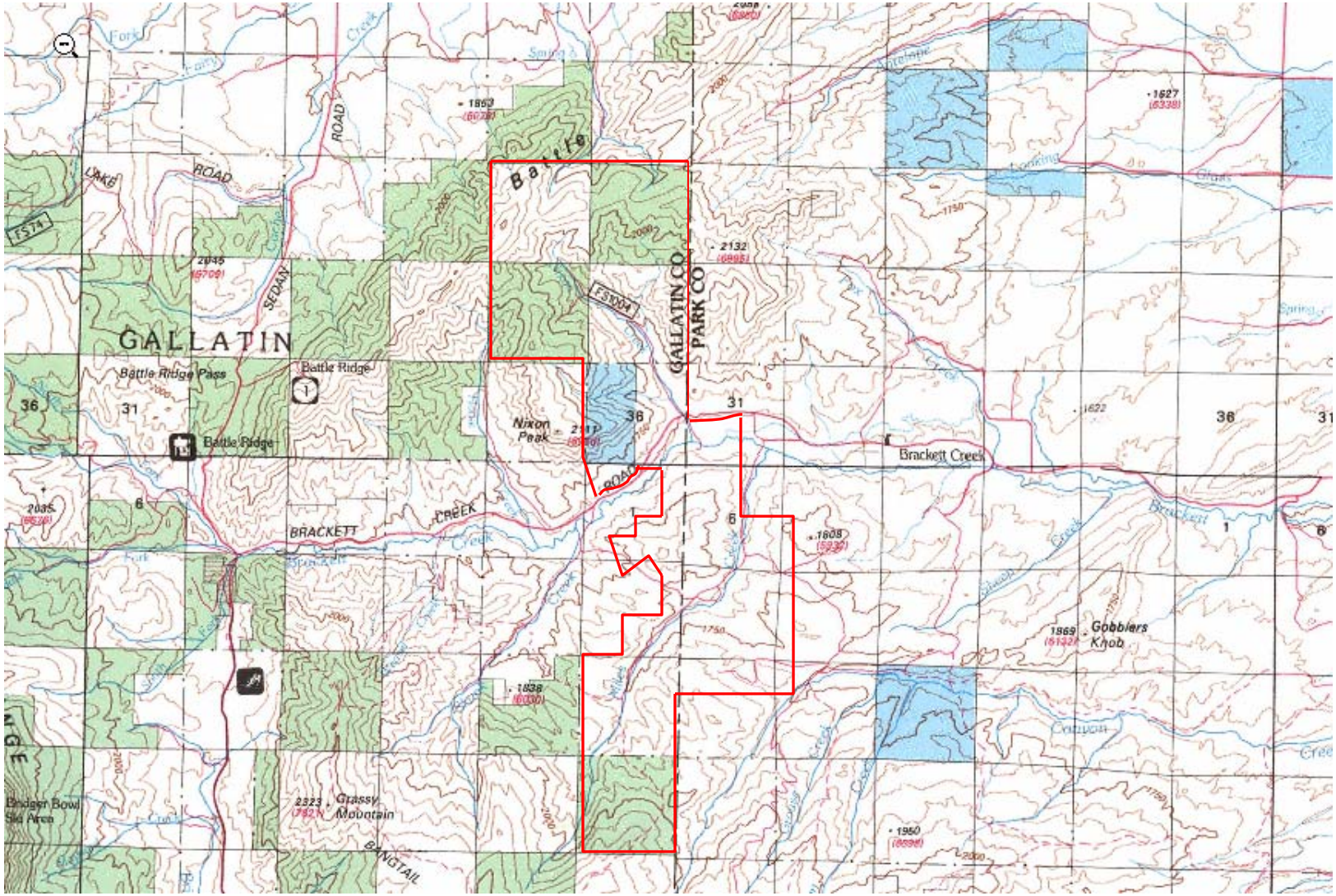

Figure 2-2: Map of the Double D Ranch. Approximate boundaries of deeded and leased lands are in red.

3.0 Fisheries Data Review

Pertinent information for the Brackett Creek watershed comes from a variety of sources, including fish sampling reports and genetic evaluations. In addition, Brackett Creek has been the subject of considerable restoration efforts, and the associated reports and grant applications characterize existing conditions and limiting factors occurring along portions of this stream. Another source of information is a draft conservation strategy for Yellowstone cutthroat trout in the Shields River watershed. The developing plan emphasizes connectivity, reducing entrainment in irrigation ditches, and improving and restoring habitat quality. These components of the draft plan informed the approach to field evaluations and development of recommendations.

Fisheries data are available for Brackett Creek and Miles Creek. Native fishes present in Brackett Creek include Yellowstone cutthroat trout, mountain whitefish (*Prosopium williamsoni*), lake chub (*Couesius plumbeus*), longnose dace (*Rhinichthys cataractae*), and mottled sculpin (*Cottus bairdi*) (Carson 2005, Confluence 2002, Shepard 2004). Introduced species include rainbow trout (*O. mykiss*), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontanalis*). Each of the non-natives presents a threat to the persistence of Yellowstone cutthroat trout in streams where they co-exist. Rainbow trout hybridize with Yellowstone cutthroat trout, which is the greatest overall cause for their decline (Kruse and Hubert 2000). Brook trout and brown trout tend to displace Yellowstone cutthroat trout when they co-occur through competition and predation.

No habitat evaluations were available for this portion of Brackett Creek; however, information from now restored reaches near the mouth allow inference on the types of limiting factors that have occurred on this stream. In the early 2000s, considerable habitat restoration efforts addressed habitat degradation on the Lazy S Ranch located close to the mouth of Brackett Creek. Funded partially under MFWP's Future Fisheries Improvement Program (FFIP), the grant application for this project described extensive bank erosion, channelization of a considerable length of stream, and an irrigation diversion that was a likely barrier to fish movement (Confluence 2001). Cursory evaluations of the remainder of Brackett Creek suggest riparian degradation and resultant bank erosion occurs along other portions of Brackett Creek to varying extents.

Genetic evaluations of Yellowstone cutthroat trout in Brackett Creek found evidence of introgression or hybridization with rainbow trout (Cook 2002). Specifically, one of the 19 fish tested showed rainbow trout alleles typical of an F1 generation. In other words, this fish was likely the result of the pairing of a pure Yellowstone cutthroat trout with a pure rainbow trout.

Investigations on Miles Creek included fish sampling, genetic testing, and habitat assessments (Shepard 2004). Two species, Yellowstone cutthroat trout and mottled sculpin, were present, and genetic testing of the Yellowstone cutthroat trout found no evidence of introgression with rainbow trout (Cook 2002). Habitat conditions rated as good; however, elevated fine sediment may have been due to a combination of natural sources and past land use practices.

4.0 Site Visit

4.1 Nixon Creek

Nixon Creek occupies the northern portion of the Double D Ranch and flows south until its confluence with Brackett Creek near Brackett Creek Road (Figure 2-2). The lower end of Nixon Creek has a relatively narrow and deep, meandering channel that is consistent with Rosgen's E channel classification (Rosgen 1996), although the channel appears to be transitioning to a C channel locally (Figure 4-1). Sedges and grasses are the dominant vegetation type; however, several decadent willows are also present. Eroding banks, although not extensive, occur along many of the outside meander bends and are a source of fine sediment to Nixon Creek and ultimately Brackett Creek.

Fish habitat in this lower reach of Nixon Creek is limited mostly due to a lack of pools. Nixon Creek has a relatively uniform bed, comprised mostly of runs. In contrast, pool habitat increases in higher reaches concomitant with a greater density of riparian shrubs (Figure 4-2). These observations suggest increasing shrub cover should be a conservation goal for Nixon Creek.

Figure 4-1: Lower reach of Nixon Creek north of Brackett Creek Road.

Figure 4-2: Denser shrub cover along higher elevations of Nixon Creek, which contributes to improved instream habitat, bank stability, and shading.

Road crossings are another feature along Nixon Creek with potential to limit Yellowstone cutthroat trout in Nixon Creek by blocking fish passage. These culverts tend to have a steep approach and be placed on a slope, which may present passage barriers (Figure 4-3). Evaluating all road crossings using FishXing (Love and Firor 2001) will be useful in determining potential fish passage and developing solutions.

Figure 4-3: First road crossing on Nixon Creek.

4.2 Miles Creek

Miles Creek flows to the north from its headwaters in the Bangtail Mountains, until its confluence with Brackett Creek. Miles Creek is less topographically confined than Nixon Creek, and has substantially more flood prone width for much of its length on the Double D Ranch. It flows mostly through rangeland, although its headwaters are forested.

Similar to Nixon Creek, sparse shrub cover and localized areas of eroding banks are notable features on Miles Creek (Figure 4-4 and Figure 4-5). Grasses and sedges dominate the riparian zone; while riparian shrubs tend to be widely spaced, mature plants. Little recruitment or reproduction of shrubs was observable. In several locations, Miles Creek is cutting into its terrace, which is a source of fine sediment.

Figure 4-4: Bank erosion on Miles Creek.

Figure 4-5: View of Miles Creek showing graminoid dominated riparian zone, scattered shrubs, and eroding terrace. The meander is at risk of being cutoff.

As timber harvest will occur within the headwaters of Miles Creek in the near future, special consideration was given to the road paralleling Miles Creek for much of its length. The road has a native surface and is well maintained. For the most part, sufficient distance and a break in slope will limit delivery of sediment to Miles Creek. The exception lies in the southernmost portion of the Double D Ranch where the road is

closest to Miles Creek. Implementation of road best management practices that limit sediment delivery should accompany timber harvest along this portion of Miles Creek.

One road crossing occurs over Miles Creek and the associated culvert may present a barrier to fish movement at some flows (Figure 4-6). The culvert is slightly perched, and the resulting drop will be more pronounced at lower stream flows. Evaluating this and all road crossings in the basin is consistent with the Shields Yellowstone cutthroat trout conservation strategy and will inform decision making in terms of promoting fish movement throughout the basin.

Figure 4-6: Culvert under the road crossing on Miles Creek.

4.3 Brackett Creek

A relatively short segment of Brackett Creek flows through the Double D Ranch (Figure 2-2). This reach is an unconfined Rosgen C channel flowing along some of the ranch's infrastructure including corrals and barns. A cottonwood gallery forest is a dominant vegetative feature of this reach.

Although this reach of Brackett Creek approaches corrals and barns, a fence controls animal access resulting in well-vegetated and stable banks. An exception is a 50-ft length of eroding bank immediately upstream of an irrigation diversion (Figure 4-7). Stabilizing this bank through methods described in the next section is recommended to reduce sediment loading to Brackett Creek and improve bank line habitat for fish.

Figure 4-7: Eroding bank upstream of irrigation diversion on Brackett Creek.

An irrigation diversion lies on the Double D Ranch just above where Brackett Creek leaves the property. Although on the ranch, this ditch serves another downstream irrigator. A concrete diversion dam facilitates delivery of water to the head gate (Figure 4-8), and is potentially a barrier to fish movement. In addition, entrainment of fish is likely through this head gate.

Figure 4-8: Irrigation diversion dam on Brackett Creek on the Double D Ranch.

5.0 Conclusions and Recommendations

The Double D Ranch presents numerous opportunities to conserve Yellowstone cutthroat trout, and is an appropriate candidate for assistance through the LIP/YCT program. Conservation objectives include increasing cover of riparian shrubs, stabilizing eroding banks, eliminating passage barriers, and reducing entrainment of fish into an irrigation ditch. Other considerations involve preventing degradation associated with proposed logging in the Miles Creek drainage by proactive application of best management practices. The following is a conceptual approach that describes relevant actions and additional data needs required to guide the ultimate plan.

Increasing shrub cover along Nixon and Miles creeks will have a host of benefits affecting habitat and water quality. Two general approaches are applicable on the Double D Ranch. First is the use of conservation plantings where rooted stock is planted in reaches with low shrub cover. Funding is available through a variety of sources for this kind of conservation action. Moreover, this activity has potential to generate considerable in-kind match, as volunteer labor can assist in harvest and planting of willows. The Natural Resources Conservation Service's (NRCS's) Environmental Quality Incentives Program (EQIP) is currently seeking such projects to fund.

Managing livestock along stream margins, and implementing agricultural best management practices to limit their impact on vegetation and banks, is the second set of actions to increase shrub cover along these streams. The NRCS and DNRC have developed a list of agricultural BMPs with potential applicability to ranching operations

such as the Double D Ranch (Table 5-1). Similar to conservation plantings, EQIP funds these types of projects. The recommendation is to develop site-specific grazing management plans in conjunction with the NRCS that protects vegetation and stream banks, while meeting the livestock's forage consumption and water requirements. Of course, the plan must also be compatible with the producer's operation and ability to implement the strategy.

Table 5-1: Grazing BMPs to promote riparian health and function (DNRC 1999 and NRCS 2001)

BMP and Management Techniques
Create riparian buffer exclosures through fencing.
Design a grazing management plan and determine the intensity, frequency, duration, and season of grazing to promote desirable plant communities and productivity of key forage species.
Maintain adequate vegetative cover to prevent accelerated soil erosion, protect stream banks, and filter sediments. Set target grazing use levels to maintain both herbaceous and woody plants. No grazing unit should be grazed for more than half the growing season of key species.
Ensure adequate residual vegetative cover and re-growth and rest periods. Periodically rest or defer riparian pastures during the critical growth period of plant species.
Distribute livestock to promote dispersion and decomposition of manure and to prevent the delivery of manure to water sources.
Establish riparian buffer strips of sufficient width and plant composition to filter and take up nutrients and sediment from concentrated animal feeding operations.
Alternate a location's season of use from year to year. Early spring use can cause trampling and compaction damage when soils and stream banks are wet. If possible, develop riparian pastures to be managed as a separate unit through fencing.
Provide off-site high quality water sources.
Periodically rotate feed and mineral sites.
Place salt and minerals in uplands, away from water sources (ideally ¼ mile from water to encourage upland grazing).
Keep salt in troughs and locate salt and minerals in areas where soils are less susceptible to wind or water erosion.
Monitor livestock forage use and adjust strategy accordingly.
Create hardened stream crossings.
Encourage the growth of woody species (willow, alder, etc.) along the stream bank, which will limit animal access to the stream and provide root support to the bank.

Options to stabilize eroding banks vary with severity of the bank erosion and the potential for natural recovery. Some banks may heal with reduced pressure from livestock grazing, in conjunction with conservation plantings. Alternatively, some banks may benefit from mechanical stabilization such as is displayed in Figure 5-1. This "soft" approach to bank stabilization capitalizes on the stabilizing function of riparian vegetation, along with a stable bank geometry. Concomitant with this approach should be a livestock grazing strategy that protects recovery banks and allows for establishment of healthy riparian vegetation.

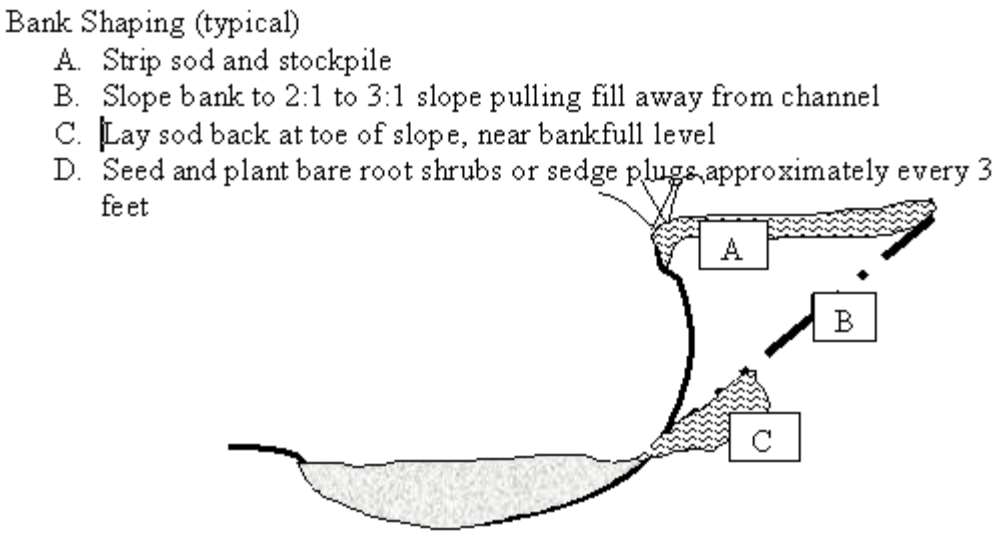

Figure 5-1: Conceptual approach to stabilizing vertical eroding banks.

Mechanical bank stabilization on select banks is an appropriate approach on Miles Creek given proposed logging in the basin and the resulting increase in water yield, which will put pressure existing, unstable banks. In addition, the eroding bank on the left bank of Brackett Creek immediately upstream of the head gate may also be an appropriate candidate for mechanical restoration. A detailed inventory of existing eroding banks, including their dimensions and erodibility, would facilitate planning, cost estimation, and grant preparation. Eroding banks would be prioritized based on the amount of sediment delivered and potential to heal through a passive restoration approach. This type of planning assistance is within the responsibilities of the LIP/YCT biologist.

Managing the amount of timber harvested is another approach to addressing the increase in water yield associated with tree removal. Several forestry practices models are available to estimate the effect of varying levels of harvest on water yield. The LIP/YCT biologist will work with timber company personnel to reduce risks to Yellowstone cutthroat trout in Miles Creek relating to increased water yield and an altered hydrograph.

Proposed logging in the Miles Creek drainage has potential to increase sediment loading from roads. The State of Washington developed a list of road BMPs to limit sediment delivery to streams (Table 5-2). As the timber company will likely be responsible for road maintenance, the LIP/YCT biologist will confer with company representatives in development of an approach to avoid sediment delivery from the haul road.

Table 5-2: Best management practices to reduce sediment delivery to streams from forest roads (Dube et al. 2004).

Category of BMP	*Treatment*
Road tread surfacing BMPs	Apply gravel
	Apply asphalt
	Vegetate road (allow passive or reseed)
	Dust/oil surface
	Grading to smooth the surface, reduce ruts, and clean ditches
Cut slope cover BMPs	Apply hydromulch to cut slope
	Apply straw to cut slope
	Apply straw + net to cut slope
	Apply erosion mat
Segment length/delivery BMPs	Install drivable dip that drains water from the road tread and ditch by creating an out sloped dip across the road prism.
	Install a cross drain culvert that diverts all ditch water across
	Install water bars on gated or abandoned roads
	Belt diverters/surface water deflectors
	Install a specially constructed ditch line with two parallel ditches separated by a berm
	Install a bypass ditch that prevents ditch water from flowing into the stream at a stream crossing
	Place a berm on the outside should of the road to divert tread runoff away from the fill slope or a stream
	Remove berm on out sloped road to allow road tread runoff to disperse over a stable, non-stream adjacent fill slope
	Remove berm on a crowned road to allow road tread runoff to disperse over a stable, non-stream adjacent fill slope
Sediment trapping BMPs	Protect drainage structure with riprap
	Install settling basins that trap sediment and reduce delivery to waterways
	Install silt fences/hay bales at outfall or ditch line
	Vegetate or rock line ditch, which reduces erosion of the ditch and also slows water, allowing sediment to be deposited
	Install filter windrow at culvert outfall to trap eroded sediment
	Install curbs and splash guards on bridges to reduce the amount of sediment-laden water splashing off the bridge and into the stream as traffic crosses the bridge
Whole road BMPs	Decommission roads with associated restoration such as revegetating the road prism, pulling drainage structures,

The irrigation diversion on the Double D Ranch has an unknown potential to entrain fish from Brackett Creek. In addition, the diversion dam presents a possible barrier to fish movement. Further investigation is warranted to evaluate the risks to fish associated with these structures. Solutions to preventing or reducing entrainment include staggering the shut down of irrigation diversion over the course of several days or installing a fish screen. Several options are available to modify the diversion dam to allow passage, such as construction of a fish ladder. Although these structures lie on the Double D Ranch, they supply water to a downstream water use, whose interest in such activities is currently unknown.

Several road crossings have potential to restrict fish movement through this portion of the watershed. The draft conservation strategy for Yellowstone cutthroat trout in this basin calls for an inventory of all road crossings and evaluation of fish passage potential. Future data collection on Nixon and Miles creeks should include such analysis on their road crossings.

The draft conservation strategy lists several information gaps that limit the understanding of life history strategy, habitat use, and movements in the basin. Fisheries investigations such as redd counts and population estimates will contribute considerably to efforts to conserve Yellowstone cutthroat trout in Brackett Creek and its tributaries. Moreover, collecting baseline data will allow evaluation of the response of fish communities to restoration activities, which will inform future conservation projects in the basin.

In summary, proposed restoration and data collection activities for streams on the Double D Ranch are as follows:

- Develop and implement a grazing management strategy for Miles and Nixon creeks that protects banks and promotes health and function of riparian vegetation while meeting forage needs;
- Conduct an inventory of eroding banks to develop a cost effective approach to increasing bank stability and reducing sediment delivery;
- Increase riparian shrub cover through conservation plantings;
- Work with timber company on development of a road management plan that will prevent delivery of sediment from forest roads;
- Work with timber company on a harvest plan that will not alter water yield to the extent that it has an adverse effect on channel stability or late season flows;
- Evaluate irrigation infrastructure to determine rates of entrainment and potential to block fish passage;
- Inventory road crossings to identify barriers to fish movement; and
- Conduct baseline fisheries investigation to evaluate response following implementation of restoration activities.

6.0 Literature Cited

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