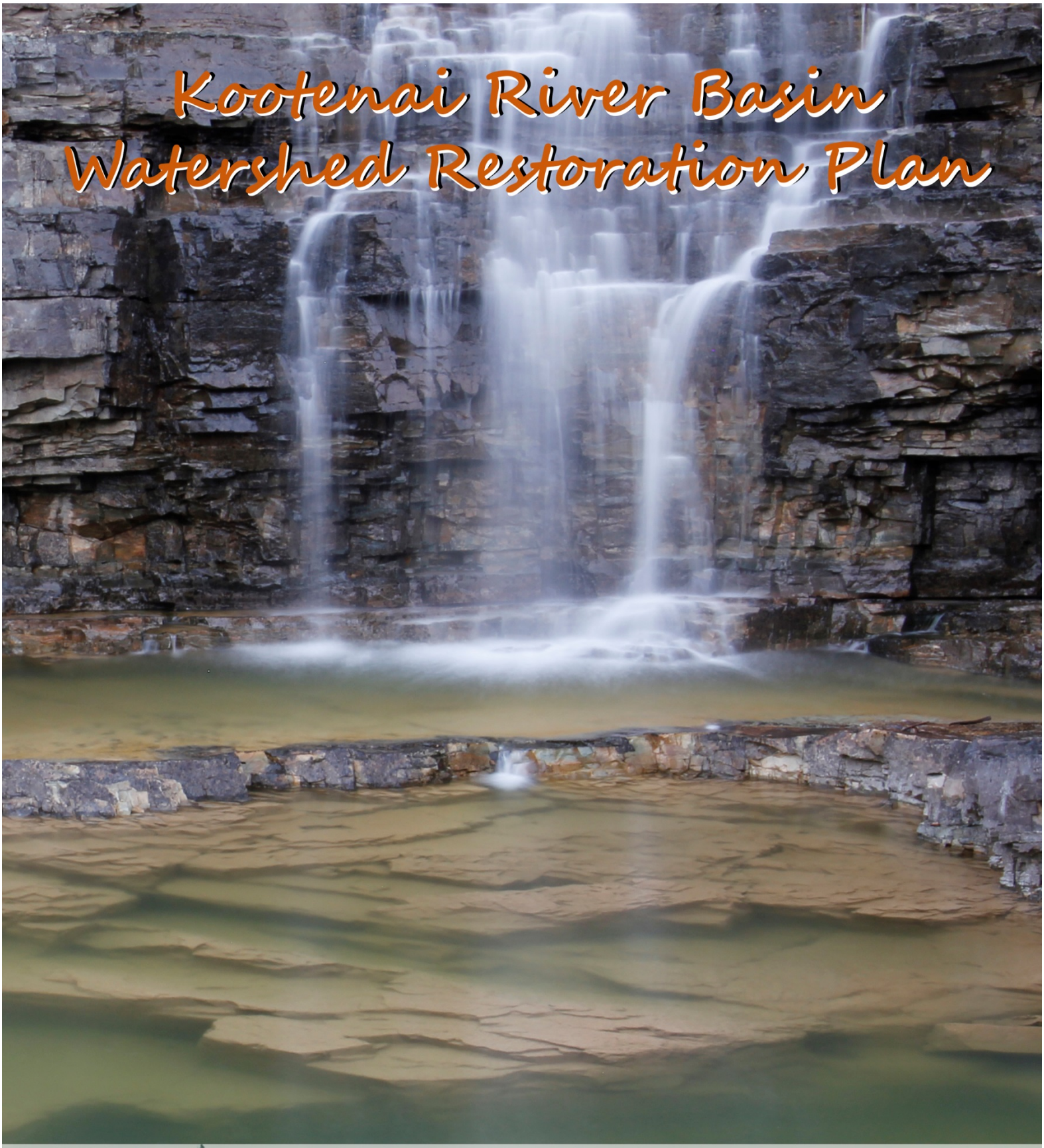
Kootenai River Basin Watershed Restoration Plan



Kootenai River Network, Inc.

International Alliance for Water Quality and Aquatic Resources

KOOTENAI RIVER BASIN
WATERSHED RESTORATION PLAN

by
Jeff Dunn, Watershed Hydrologist
Karen Filipovich, Outreach Consultant
Gary Ingman, Water Resources Scientist
Zac Collins, GIS Analyst

prepared by
RESPEC
3810 Valley Commons Drive, Suite 4
Bozeman, Montana 59718

prepared for
Kootenai River Network
PO Box 491
Libby, Montana 59923

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Cover Photo: Kootenai Falls Photographer: Jeff Dunn

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1.0 INTRODUCTION

The Kootenai River Network (KRN) works with the community in the Kootenai River Basin to develop and implement stream and wetland improvement projects that address identified water quality impairments. The goal of these projects is to improve water quality so the addressed streams are no longer considered impaired by the Montana Department of Environmental Quality (DEQ). The goal of the Kootenai River Basin Watershed Restoration Plan (WRP) is to provide a blueprint for KRN to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's list of impaired waterbodies. Completion of the Kootenai River Basin WRP will enable KRN and other groups within the Kootenai River Basin to obtain 319 funding through Montana DEQ for the implementation of water quality improvement projects on impaired stream segments. In addition to the impaired waterbodies in the Kootenai River Basin, numerous other streams are identified as priorities for restoration and conservation activities to ensure that these streams remain off Montana's list of impaired waterbodies. These streams are identified as "priority" streams throughout this watershed restoration plan.

1.1 KOOTENAI RIVER NETWORK MISSION STATEMENT

The Kootenai River Network is a 501(c)(3) non-profit organization that accomplishes its goals through grants and contributions from collaborators. The group formed in 1991 in response to citizens' concerns of threatened or deteriorating water quality and aquatic resources in the Kootenai River Basin. The primary purpose of the KRN is to foster communication and implement collaborative processes among private and public interests in the watershed. These cooperative programs lead to improved resource management practices and the restoration of water quality and aquatic resources in the basin. The KRN seeks to empower local citizens and groups from two states, one province, two countries and affected tribal nations to collaborate in natural resource management in the basin.

1.2 KOOTENAI RIVER BASIN PLANNING PARTNERS

Kootenai River Network planning partners within the Kootenai River Basin include:

- Hecla Mining
- Kootenai National Forest
- Lincoln County Conservation District
- Montana Department of Natural Resources and Conservation
- Montana Fish, Wildlife and Parks
- Natural Resources Conservation Service
- Northern Lights Electric Cooperative
- Plum Creek Timber Company
- United States Army Corps of Engineers
- United States Fish and Wildlife Service
- Yaak Valley Forest Council

1.3 IMPAIRED STREAM SEGMENTS

The Kootenai River Basin WRP provides a framework for implementing water-quality improvements for 37 total maximum daily loads (TMDLs) covering sediment, nutrient, metals and temperature pollutants on 21 stream segments in the Kootenai River Basin (**Table 1-1** and **Figure 1-1**). In addition, several streams are considered impaired due to habitat concerns, which are often linked to an existing pollutant impairment and which would be eligible for 319 funding. TMDLs within the Kootenai River Basin were developed based on DEQ-defined TMDL planning areas (TPAs) as follows:

- Bobtail Creek TMDL Planning Area
    - Bobtail Creek

- Fisher TMDL Planning Area
    - Raven Creek
    - Wolf Creek

- Grave Creek TMDL Planning Area
    - Grave Creek

- Kootenai TMDL Planning Area
    - Big Cherry Creek
    - Lake Creek
    - Libby Creek
    - Snowshoe Creek
    - Stanley Creek

- Tobacco River TMDL Planning Area
    - Deep Creek
    - Edna Creek
    - Fortine Creek
    - Lime Creek
    - Sinclair Creek
    - Swamp Creek
    - Therriault Creek
    - Tobacco River

- Yaak River TMDL Planning Area
    - East Fork Yaak River
    - Lap Creek
    - Seventeenmile Creek
    - South Fork Yaak River

Table 1-1. Impaired Stream Segments in the Kootenai River Basin

Kootenai River Sub-Basin	TMDL Planning Area	Stream Segment	Pollutant (s)
Upper Kootenai River Basin	Grave Creek	Grave Creek	Sediment
	Tobacco River	Deep Creek	Sediment
		Edna Creek	Sediment
		Fortine Creek	Sediment, Temperature
		Lime Creek	Sediment, Total Phosphorus, Total Nitrogen
		Sinclair Creek	Sediment
		Swamp Creek	Sediment
		Therriault Creek	Sediment
		Tobacco River	Sediment
Middle Kootenai River Basin	Bobtail Creek	Bobtail Creek	Sediment, Turbidity
	Fisher	Raven Creek	Sediment, Total Phosphorus
		Wolf Creek	Sediment, Temperature
	Kootenai	Big Cherry Creek	Cadmium, Lead, Zinc
		Libby Creek, lower segment	Sediment
		Snowshoe Creek	Arsenic, Cadmium, Lead, Zinc
Lower Kootenai River Basin	Kootenai	Lake Creek	Sediment, Nitrate+Nitrite, Copper, Lead
		Stanley Creek	Nitrate+Nitrite, Copper, Lead, Zinc
Yaak River	Yaak	East Fork Yaak River	Nitrate+Nitrite
		Lap Creek	Sediment
		Seventeenmile Creek	Sediment
		South Fork Yaak River	Sediment

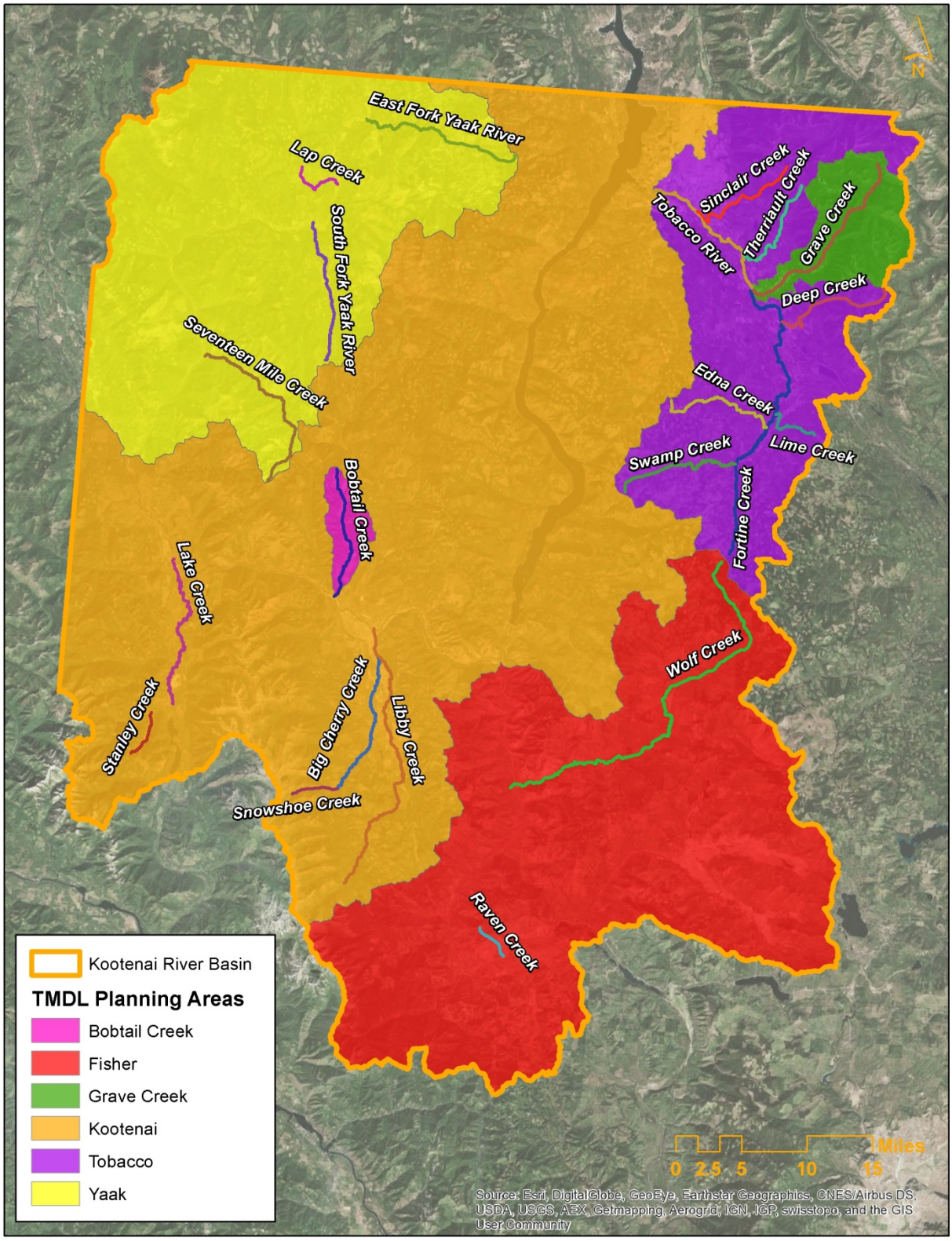

Figure 1-1. Impaired Stream Segments in the Kootenai River Basin

1.4 COMMUNITY AND STAKEHOLDER MEETINGS

To help identify potential restoration projects to address the TMDLs on the 21 impaired stream segments and their tributaries, KRN held a series of community meetings with the theme of "Community-Based Stream Improvement" in March of 2015 in the communities of Libby, Troy and Eureka (**Table 1-2**). The WRP community meetings were advertised on the KRN website and through local media outlets and were attended by 29 participants. These meetings allowed the public an opportunity to provide input on potential stream and wetland restoration projects within the watershed that would lead to improved water quality. In addition, the KRN provided an opportunity for community members to submit suggestions through an electronic survey and 14 total responses were received. The KRN also met with each of its Kootenai River Basin planning partners to get specific input and guidance regarding the goals of individual stakeholders within the basin. During the community and stakeholder meetings, numerous other streams were identified as priorities for restoration and conservation activities to ensure that these streams remain off Montana's list of impaired waterbodies. These streams are identified as "priority" streams throughout this watershed restoration plan.

Table 1-2. Community Meeting Participant List

Euraka, March 23	
Attendee	**Affiliation**
Becky Lihme	Lincoln County Conservation District
Buck Schermerhorn	Town of Eureka
Davis Flanger	landowner
Jim Dunnigan	Montana Fish, Wildlife and Parks
Josh Letcher	landowner
Karl Kassler	landowner
Kirk Sullivan	Natural Resources Conservation Service
Mark Peterson	landowner
Mike Cole	Lincoln County Commissioner
Scott Mattheis	landowner
Troy, March 25	
Attendee	**Affiliation**
Eric Trum	Montana Department of Environmental Quality
Jim Dunnigan	Montana Fish, Wildlife and Parks
Jim Johnson	landowner
Pat McLeod	landowner
Paul Lammers	Troy Mine
Peter Leusch	Yaak Valley Forest Council
Ron Brown	landowner
Sherri Garcia	landowner
Libby, March 26	
Attendee	**Affiliation**
Brian Sugden	Plum Creek
Clyde Carpenter	landowner
Don Crawford	Supervisor, Lincoln County Conservation District
Dwight Bergeron	Montana Fish, Wildlife and Parks
Eileen Carney	landowner
Eric Trum	Montana Department of Environmental Quality
Greg Hoffman	US Army Corps of Engineers
Jim Dunnigan	Montana Fish, Wildlife and Parks
Laura Klein	landowner
Mark Peck	Lincoln County Commissioner
Terry Prongua	landowner

1.5 EPA's Nine Minimum Elements

The US Environmental Protection Agency (EPA) has developed the following minimum elements that all WRPs must address to be accepted by Montana DEQ for the 319 program. The Kootenai River Basin WRP addresses each of these elements in the following sections:

1. Identification of causes of impairment: SECTION 4

2. An estimate of the load reductions expected from management measures: SECTION 4

3. A description of the nonpoint source management measures that need to be implemented to achieve load reductions: SECTIONS 3, 4 and 5

4. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that may be relied upon to implement this plan: SECTION 5 and SECTION 8

5. An information and education component to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that are to be implemented: SECTION 7

6. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious: SECTION 5

7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented: SECTION 5

8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards: SECTION 6

9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established: SECTION 6

2.0 KOOTENAI RIVER BASIN SUB-WATERSHEDS

The Kootenai River Basin covers approximately 3,679 square miles, which the KRN and watershed stakeholders divide into four sub-watersheds: Upper Kootenai River watershed, Middle Kootenai watershed, Lower Kootenai watershed, and the Yaak River watershed (**Figure 2-1** and **Table 2-1**). Varying land ownership and land use patterns, along with varying stream types and conditions between these four sub-basins, provide an opportunity for KRN and watershed stakeholders to implement restoration measures that address the concerns of individual stakeholder groups, the unique stream conditions across the Kootenai River Basin, and the pollutants of concern identified by Montana DEQ. Water quality restoration activities aim to improve the beneficial uses of Kootenai River Basin streams with a particular emphasis on improving the cold water fisheries and aquatic life beneficial uses.

Table 2-1. Kootenai River Basin Watershed Areas

Watershed	Area (Square Miles)	Area (Acres)
Upper Kootenai	1,228	785,853
Middle Kootenai	1,430	914,967
Lower Kootenai	405	259,136
Yaak River	617	394,752
Total	**3,679**	**2,354,708**

2.1 UPPER KOOTENAI RIVER WATERSHED

The Upper Kootenai River watershed extends downstream from the Canadian border to Libby Dam and includes the Tobacco River TMDL Planning Area (TPA) and the Grave Creek TPA in the Tobacco River watershed, along with the streams flowing into Lake Koocanusa upstream of Libby Dam and the town of Eureka. Primary land-use activities within the Upper Kootenai River watershed include forestry and agriculture. Within the Upper Kootenai River watershed, priority native fish species include bull trout and westslope cutthroat trout (**Figure 2-2** and **Attachment A**). The US Fish and Wildlife Service has identified Blue Sky Creek, Clarence Creek, Grave Creek, Tobacco River, and the Wigwam River as critical bull trout habitat in the Upper Kootenai River watershed (USFWS 2010).

2.2 MIDDLE KOOTENAI RIVER WATERSHED

The Middle Kootenai River watershed extends from Libby Dam downstream to Kootenai Falls and includes streams in the Bobtail Creek TPA, Fisher TPA, and Kootenai TPA, along with the mainstem of the Kootenai River and its tributary streams and the town of Libby. Primary land-use activities within the Middle Kootenai River watershed consist of forestry and agriculture, including grazing and hay meadows, along with a legacy of mining activities and proposed mines. Within the Middle Kootenai River watershed, priority native fish species include bull trout, westslope cutthroat trout, and Columbia Basin redband trout (**Figure 2-2** and **Attachment B**). The US Fish and Wildlife Service has identified Bear Creek, East Fork Pipe Creek, Fisher River, Kootenai River, Libby Creek, Pipe Creek, Quartz Creek, West Fisher Creek, and West Fork Quartz Creek as critical bull trout habitat in the Middle Kootenai River watershed (USFWS 2010).

2.3 LOWER KOOTENAI RIVER WATERSHED

The Lower Kootenai River watershed extends from Kootenai Falls downstream to the Montana border and includes the Lake Creek watershed and the Stanley Creek watershed in the Kootenai TPA, along with the mainstem of the Kootenai River and its tributary streams and the town of Troy. Within the Lower Kootenai watershed, Montana's headwater portions of streams flowing into the Kootenai River in Idaho are also included in this watershed restoration plan. Primary land-use activities within the Lower Kootenai River watershed include forestry and mining. Within the Lower Kootenai River watershed, priority native fish species include bull trout, westslope cutthroat trout, and Columbia Basin redband trout, along with white sturgeon in the Kootenai River mainstem (**Figure 2-2** and **Attachment C**). The US Fish and Wildlife Service has identified Callahan Creek, Keeler Creek, Kootenai River, Lake Creek, North Callahan Creek, North Fork Keeler Creek, O'Brien Creek, South Callahan Creek, and South Fork Keeler Creek as critical bull trout habitat in the Lower Kootenai River watershed (USFWS 2010).

2.4 YAAK RIVER WATERSHED

The Yaak River Watershed aligns with the Yaak River TPA and includes the East Fork Yaak River TPA. Forestry is the primary land-use activity within the Yaak River watershed. Within the Yaak River watershed, priority native fish species include bull trout, westslope cutthroat trout, and Columbia Basin redband trout (**Figure 2-2** and **Attachment D**). To the northwest of the Yaak River watershed, tributaries of the Moiye River were not included as part of the Kootenai River Basin watershed restoration plan.

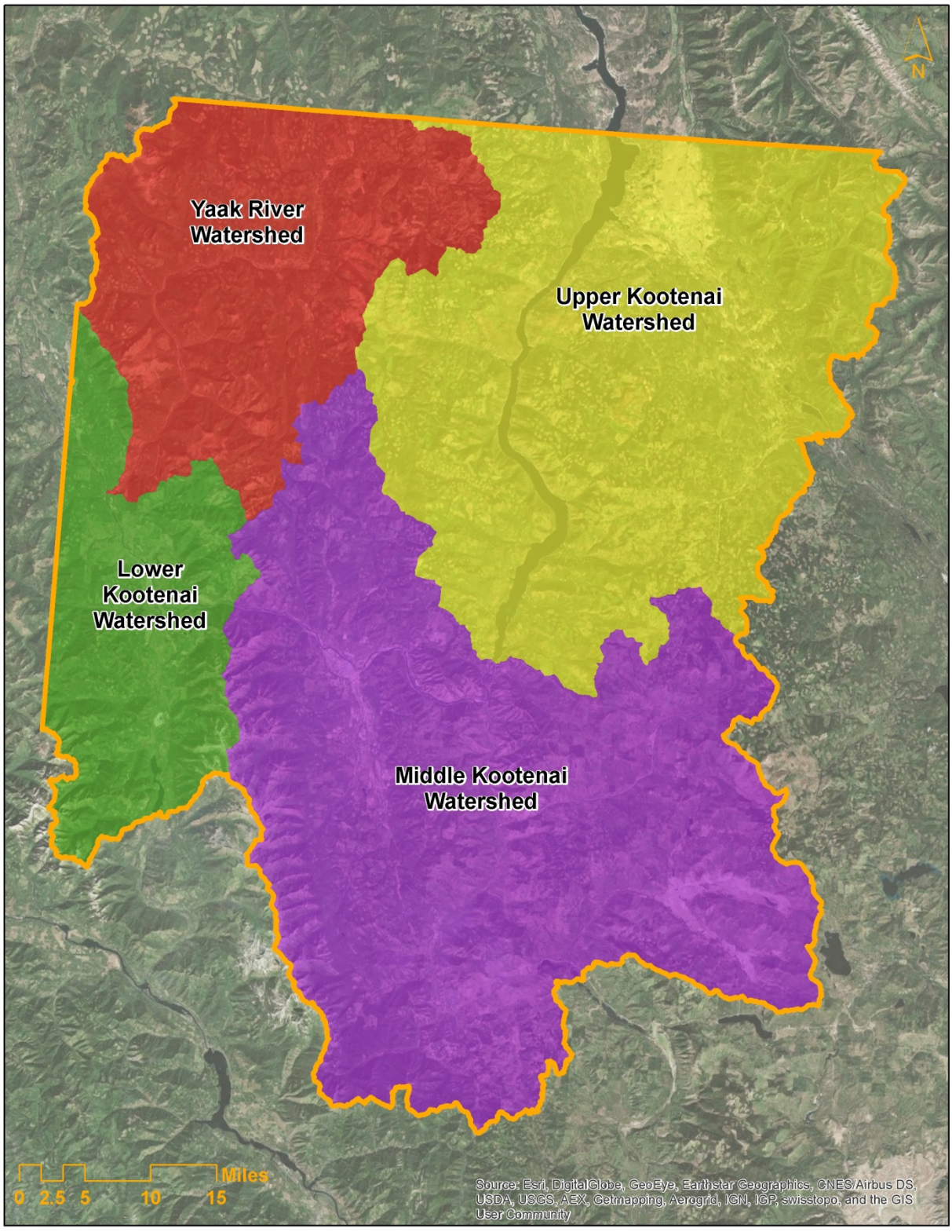

Figure 2-1. Kootenai River Basin Sub-watersheds

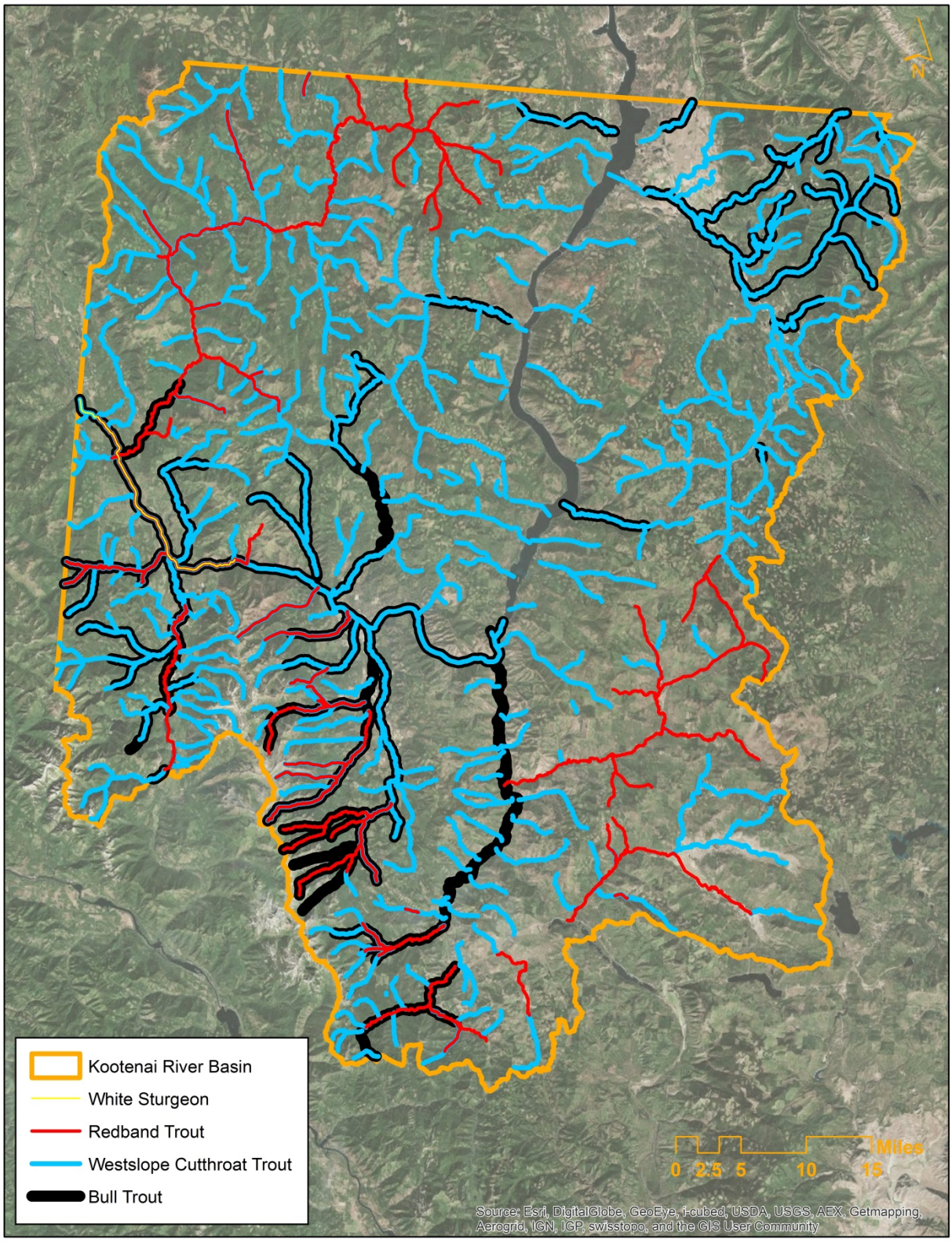

Figure 2-2. Kootenai River Basin Native Fish Distribution

3.0 RESTORATION ACTIVITIES AND BEST MANAGEMENT PRACTICES

Non-point source management measures, best management practices (BMPs), and restoration projects will be need to be implemented to reduce pollutant loads to the impaired stream segments and their tributary streams in the Kootenai River Basin. Potential projects include: riparian buffer enhancement, streambank bioengineering and revegetation, wetland restoration, unpaved road improvements, traction sand management, residential and urban BMPs, forestry BMPs, agricultural BMPs, stormwater BMPs, on-site subsurface wastewater treatment system upgrades, and abandoned mine reclamation. These practices are intended to reduce pollutant loads to impaired streams so that water quality improves to the point where the impaired streams are removed from Montana's list of impaired waterbodies. In addition, conserving native fish species and preventing the spread of aquatic invasive species are high priorities within the Kootenai River Basin. For projects on national forest lands, the environmental analysis required under the National Environmental Policy Act (NEPA) will be followed, including public involvement. All projects on private lands will be conducted in partnership with willing landowners.

3.1 RIPARIAN BUFFER ENHANCEMENT

Riparian buffer enhancement involves the creation and widening of the amount and density of naturally occurring streamside vegetation, which helps naturally stabilize streambanks, provides a filter to capture sediment and nutrients in runoff from upland areas, and improves the utilization of nutrients that would otherwise leach below the root zone and contaminate groundwater. Riparian buffer enhancement can be achieved by actively replanting the floodplain, enacting grazing management strategies that limit the amount of time that livestock have access to the riparian zone, or a combination of both. Riparian plantings include willow stakes, willow transplants, and containerized riparian vegetation, including cedars that historically occurred along the margins of many streams in the Kootenai River Basin. Grazing management strategies can include riparian fencing, off-stream water development, water gaps, and management of the timing of grazing. This suite of grazing management strategies can be implemented by interested streamside landowners to enhance their operations with support from state and federal agencies. In areas with timber harvest, Montana's Streamside Management Zone (SMZ) regulations specify the riparian buffer widths necessary to protect streams from increased sediment and nutrient inputs. In urban and suburban settings, riparian buffer enhancement can reduce the input of lawn fertilizer and stormwater runoff. While it takes time for riparian vegetation to become established, enhancement of riparian buffers can greatly reduce the input of sediment and nutrients into impaired stream segments, while also providing increased shading that can lead to decreased water temperatures.

3.2 STREAMBANK BIOENGINEERING AND REVEGETATION

Streambank bioengineering techniques stabilize eroding streambanks through streambank and floodplain revegetation, thereby reducing sediment inputs and restoring natural channel migration rates. Streambank bioengineering is appropriate when the cause of erosion is linked to a lack of riparian vegetation since this vegetation historically would provide root structure to hold banks, provide surface roughness to the floodplain during high flows, and provide a source of large woody debris, which further influences channel forming processes. Over time, erosion due to a lack of riparian vegetation can lead to further degradation of the stream channel through aggradation and channel widening or downcutting and limited floodplain access. The restoration of degraded streambanks using bioengineered techniques

designed to eliminate the sediment load from bank erosion in the short-term is preferred over techniques such as riprap that confine the channel and prevent future channel migration. Streambank bioengineering is typically accompanied by the creation of a vegetated riparian buffer on the floodplain, which is intended to provide long-term stability as the channel continues to migrate. Through the re-establishment of riparian vegetation, bioengineered streambanks are designed to erode naturally, allowing for natural rates of lateral channel migration and restoration of natural sediment transport processes. Streambank bioengineering techniques include the use of woody material, biodegradable coir fabric, gravel, cobbles, soil and willows, which are layered to produce a stable bank that will quickly develop riparian vegetation. This BMP will generally require consultation with a professional to determine the causes of erosion and the potential effectiveness of this approach to address those causes.

3.3 WETLAND RESTORATION

Wetlands provide a variety of ecosystem functions including groundwater recharge, flood attenuation, flow regulation, pollutant removal, and wildlife habitat. Wetland conservation and restoration benefits water quality through filtering pollutants, such as sediment and nutrients, from surface water and groundwater. Wetland conservation involves protecting existing wetland resources during land development activities, while wetland restoration activities include replanting degraded wetlands with native wetland species, plugging drained wetlands, restoring excavated wetlands, and restoring groundwater recharge. Wetland plantings can utilize locally available sod mats and transplanted native willow and shrubs. Wetland conservation and restoration activities can greatly reduce the input of sediment and nutrients into impaired stream segments, while also providing additional water storage that can improve baseflows and decrease stream water temperatures. The Montana Natural Heritage Program's Wetland and Riparian Mapping Center provides tools for mapping current and historic wetland and riparian areas (http://mtnhp.org/wetlands/default.asp), while additional geographic data for wetlands can be found in the Montana State Library's Geographic Information Clearinghouse (http://geoinfo.msl.mt.gov/home/msdi/wetlands).

3.4 UNPAVED ROAD IMPROVEMENTS

Sediment loads from unpaved roads are one of the primary controllable anthropogenic sources of sediment to impaired streams in the Kootenai River Basin due to the extensive network of forest roads. Sediment loads from unpaved road erosion can be reduced through adding gravel or paving, and by reducing road runoff distances through use of drain dips or water bars, and by installing ditch relief culverts. Sediment delivery to streams can be reduced by ensuring road drainage is routed through filtration zones, and not directly delivered to streams. Proper management of unpaved roads by eliminating sediment flow pathways can greatly reduce sediment loading from this source. For both paved and unpaved forest roads, adding arch culverts, where the natural stream bottom is retained, will allow for improved fish passage and more complex aquatic habitat. When replacing culverts, it is recommended that newly installed culverts be able to pass a 100-year flood event to reduce the potential for sediment loads from failed culverts. Additional unpaved road treatments include road storage and decommissioning, which requires transportation analysis and environmental analysis under NEPA for National Forest System Roads (NFSR).

3.5 Traction Sand Management

Traction sand management involves cleaning up traction sand applied to icy roads during the winter before it is washed into a stream during snowmelt or rain events. This should generally occur in March, April, and early May, prior to spring runoff, but can also be conducted as conditions permit during mid-winter. Traction sand can be actively removed from the roadway, shoulders, and borrow ditches, as well as from in-between guardrails by loading the material into trucks and hauling it to a designated stockpile location (MDT 2013). Sediment basins can also be constructed to capture traction sand before it enters the stream channel, while vegetated filter strips can help prevent the overland transport of traction sand into an adjacent stream channel. Proper management of traction sand can greatly reduce the sediment load from this source and is generally the responsibility of local road maintenance departments and the Montana Department of Transportation.

3.6 Residential and Urban Best Management Practices

Residential and urban BMPs that help reduce the input of sediment and nutrients to impaired stream segments can be implemented by streamside landowners and local governments.

- Capturing stormwater runoff from impervious surfaces
- Employing proper pet waste management in yards and open spaces
- Employing proper lawn fertilizer application and mowing practices
- Limiting the use of pesticides and other chemicals
- Creating enhanced riparian buffers
- Regularly maintaining individual septic systems

3.7 Agricultural Best Management Practices

Agricultural BMPs can help reduce the input of sediment and nutrients to impaired stream segments and can be implemented by streamside landowners. Assistance in implementing agricultural BMPs is available from state and federal agencies and detailed descriptions of agricultural BMPs can be found in the NRCS Electronic Field Office Technical Guide (https://efotg.sc.egov.usda.gov/). Agricultural BMPs may include:

- Improving grazing management with fencing
- Developing off-stream water sources
- Developing water gaps and hardened stream crossings
- Improving irrigation water management
- Creating enhanced riparian buffers
- Practicing rotational grazing
- Employing proper manure management

3.8 Forestry Best Management Practices

Forestry BMPs can help reduce the input of sediment and nutrients to impaired stream segments. Detailed descriptions of forestry BMPs for Montana can be found in the Montana Forestry BMP

Illustrated Guide (http://dnrc.mt.gov/divisions/forestry/forestry-assistance/forest-practices/best-management-practices-bmp-2). Forestry BMPs may include:

- Timely maintenance of erosion control practices on unpaved roads
- Creating enhanced riparian buffers
- Properly sizing culverts and replacing undersized culverts
- Adhering to Montana's Streamside Management Zone (SMZ) rule

3.9 Stormwater Best Management Practices

Stormwater BMPs can help reduce the input of sediment and nutrients to impaired stream segments. More information regarding stormwater BMPs can be found at the Montana DEQ website (http://www.deq.mt.gov/wqinfo/MPDES/StormwaterConstruction.mcpx). Stormwater BMPs may include:

- Developing bioretention treatment areas and media filters
- Creating enhanced riparian buffers
- Creating wetland areas throughout the urban and suburban environment

3.10 On-site Subsurface Wastewater Treatment System Upgrades

On-site subsurface wastewater treatment upgrades can be implemented by streamside landowners to help reduce the input of nutrients to impaired stream segments. BMPs may include:

- Regularly maintaining individual septic systems
- Connecting individual septic systems to a centralized wastewater treatment system
- Installing type II (advanced wastewater treatment) septic systems in new developments

3.11 Abandoned Mine Reclamation

Abandoned and inactive hard rock mines are potential ongoing sources of metals impairments to streams. Abandoned mine-related metals sources can include metals-laden acid mine drainage from mine adits and seeps, groundwater seepage, mill tailings and waste rock dumps located in proximity to streams and drainageways, and floodplain deposits of mine and mill tailings. In general, Kootenai River Basin streams are very sensitive to heavy metals impacts to resident aquatic life because of low levels of water hardness. The toxicity of many heavy metals, such as cadmium, copper, lead, and zinc, is directly related to water hardness, with toxicity thresholds being much lower for soft water streams like those found in the Kootenai River Basin. Abandoned mine cleanup may include plugging open mine shafts, processing and storing wastes in a manner that protects the environment and subsequent uses of the land, and restoring water quality through source cleanup and treatment of acid mine drainage. Due to the high cost of abandoned mine cleanup and the associated liability of remediation, abandoned mine cleanup in Montana is overseen by the Montana DEQ Abandoned Mine Land Program, which has identified the Snowshoe Mine, Big Cherry Creek Mill Site, and King Mine in the Kootenai River Basin as priority abandoned mines. While reclamation has occurred at the Snowshoe Mine and Big Cherry Creek Mill Site, ongoing water quality issues remain.

3.12 NATIVE FISH SPECIES CONSERVATION

Several sensitive native fish species inhabit the Kootenai River Basin including bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Oncorhynchus clarkii lewisi*), Columbia River redband trout (*Oncorhynchus mykiss gairdneri*) and white sturgeon (*Acipenser transmontanus*). Within the Kootenai River Basin, native fish conservation is guided by the Kootenai Forest Plan, Plum Creek Native Fish Habitat Conservation Plan and Bonneville Power sub-basin plans. Bull trout are listed under the Endangered Species Act as threatened and white sturgeon are listed as endangered. Westslope cutthroat trout and Columbia River redband trout are considered species of concern by the state of Montana (**Table 3-1**). These native fish are adapted to rivers with cool, well-oxygenated water, and generally river systems with low sediment and nutrient concentrations. Therefore, BMPs and restoration activities that reduce sediment loading and increase riparian shading (to reduce water temperatures and provide instream cover) would likely benefit these native fish populations.

Table 3-1. Status of Native Fish Species in the Kootenai River Basin

Species	Status	Stream Miles Inhabited
White Sturgeon	Endangered	21
Bull Trout	Threatened	464
Westslope Cutthroat Trout	Montana Species of Concern	1,570
Columbia River Redband Trout	Montana Species of Concern	426

As with many other river systems in the western United States, the introduction of nonnative fish species into the Kootenai River Basin has had a detrimental effect on the sensitive native fish populations. Of particular concern in the Kootenai River Basin are the introduction of brook trout (*Salvelinus fontinalis*), lake trout (*Salvelinus namaycush*), brown trout (*Salmo trutta*), and northern pike (*Esox lucius*). Brook trout are well adapted to cold, nutrient-poor, headwater portions of river systems. In the Kootenai River Basin, brook trout therefore likely compete directly with juvenile and resident westslope cutthroat trout, bull trout, and redband trout for food, cover, and space in the critical spawning and rearing habitats. In addition, brook trout can hybridize with bull trout which alters the genetic integrity of the stock and may reduce overall fitness of those hybridized individuals and ultimately reduce persistence of the population. Lake trout are piscivorous fish that generally inhabit lakes and deep slow-water pools of large rivers. In the Kootenai River Basin, lake trout compete with native bull trout and white sturgeon for food, cover, and space in those habitats and prey upon smaller native fish. Brown trout life histories are similar to the other native trout species but brown trout tend to be more tolerant of warmer temperatures, metal contaminants, and higher nutrient and sediment concentrations. Therefore, introduced brown trout likely compete with the native trout species throughout the Kootenai River Basin, but brown trout may have a particularly strong negative effect on the native trout where water quality is impaired. Northern pike are highly predatory fish that generally inhabit secondary channels of river systems and littoral areas of lakes which are primary rearing habitats for juvenile trout. Therefore, pike likely constrain native trout populations primarily through predation of juveniles.

Following introduction, nonnative fish populations tend to expand beyond original translocation sites (i.e., “invade”). One strategy to limit the negative effects of these invasions is to maintain or install fish movement barriers to isolate portions of a watershed that may be inhabited by native species but not yet by nonnatives. Headwater streams often have impassable culverts or natural barriers such as cascades or waterfalls which function as fish movement barriers and isolate portions of a stream from

upstream invasion by nonnative species such as brook trout. Maintaining these culverts (or other barriers) at strategic locations may be desirable to protect native fish populations. Additionally, in some situations it may be desirable to install fish movement barriers to inhibit further invasion by nonnative species. However, this "protection by isolation" strategy may not be appropriate in all situations (see Peterson et al., 2008) and decreased watershed connectivity may be detrimental for bull trout populations (Rieman and McIntyre, 1993; Rieman and Allendorf, 2001). Thus, Montana Fish, Wildlife and Parks, US Forest Service, and US Fish and Wildlife Service biologists should be consulted regarding any projects involving fish passage.

3.13 AQUATIC INVASIVE SPECIES PREVENTION AND CONTROL

While no aquatic invasive species are currently identified in the Kootenai River Basin, Eurasian watermilfoil (*Myriophyllum spicatum*), curly leaf pondweed (*Potamogeton crispus*) and flowering rush (*Butomus umbellatus*) have been documented in the adjacent lower Clark Fork River. In addition, didymo (*Didymosphenia geminata*), which is a native periphyton species, has proliferated within Kootenai River Basin streams recently. The recent proliferation of didymo, commonly called "rock snot", is thought to be due to nutrient imbalance in the water, though research is ongoing. Actions to control aquatic invasive species include cleaning equipment and water craft when moving between water bodies by rinsing equipment and water craft with clean water and allowing time to completely air dry. Within the Kootenai River Basin, Montana Fish, Wildlife and Parks operates Watercraft Inspection Stations at Troy and Eureka to inform the public of the threat of aquatic invasive species and to physically inspect watercraft for aquatic invasive species. Additional information regarding Montana Fish, Wildlife and Parks aquatic invasive species efforts can be found at: http://fwp.mt.gov/fishAndWildlife/species/ais/.

4.0 RESTORATION PROJECTS FOR IMPAIRED STREAM SEGMENTS

Non-point source management measures and potential restoration projects that will address the causes of water quality impairment on individual stream segments and their tributaries in the Kootenai River Basin are discussed in the following sections, while water quality improvement project prioritization is presented in Section 5. In addition, numerous other streams in the Kootenai River Basin were identified as priorities for restoration and conservation activities to ensure that these streams remain off Montana's list of impaired waterbodies. To implement projects on national forest lands, the environmental analysis required under National Environmental Policy Act (NEPA) will be followed, including public involvement. All projects on private lands will be conducted in partnership with willing landowners. Ideas for potential water quality improvement projects received from the public during the WRP community meetings are included in this discussion along with input from watershed stakeholders that include the land management agencies and large private landowners. Additional information is derived from the various TMDL documents, including the necessary percent reduction in pollutant loading required to meet Montana's water quality standards. The following TMDL documents address streams within the Kootenai River Basin:

- Tobacco Planning Area Nutrient and Temperature TMDLs and Water Quality Improvement Plan (DEQ 2014a)
    - Fortine Creek and Lime Creek

- Kootenai-Fisher Project Area Metals, Nutrients, Sediment, and Temperature TMDLs and Water Quality Improvement Plan (DEQ 2014b)
    - Big Cherry Creek, Lake Creek, Libby Creek, Raven Creek, Snowshoe Creek, Stanley Creek and Wolf Creek

- Final – East Fork Yaak River Nutrient Total Maximum Daily Loads (DEQ 2014c)
    - East Fork Yaak River

- Tobacco Planning Area Sediment TMDLs and Framework Water Quality Improvement Plan (DEQ 2011)
    - Deep Creek, Edna Creek, Fortine Creek, Lime Creek, Sinclair Creek, Swamp Creek, Therriault Creek, and the Tobacco River

- Yaak River Watershed Sediment Total Maximum Daily Loads (DEQ 2008)
    - Lap Creek, Seventeenmile Creek, and the South Fork Yaak River

- Grave Creek Watershed Water Quality and Habitat Restoration Plan and Sediment Total Maximum Daily Loads (DEQ 2005a)
    - Grave Creek

- Water Quality Restoration Plan and Total Maximum Daily Load (TMDL) for the Bobtail Creek Watershed (DEQ 2005b)
    - Bobtail Creek

These TMDL documents contain detailed information and are available from the Montana DEQ online at: http://www.deq.mt.gov/wqinfo/TMDL/finalReports.mcpx.

4.1 UPPER KOOTENAI RIVER WATERSHED

The Upper Kootenai River watershed extends downstream from the Canadian border to Libby Dam and includes the Tobacco River TPA and the Grave Creek TPA in the Tobacco River watershed, along with the streams flowing into Lake Koocanusa upstream of Libby Dam. Impaired streams with TMDLs in the Tobacco River TPA include Deep Creek, Edna Creek, Fortine Creek, Lime Creek, Sinclair Creek, Swamp Creek, Therriault Creek, and the Tobacco River, while Grave Creek also has a TMDL (**Figure 4-1**).

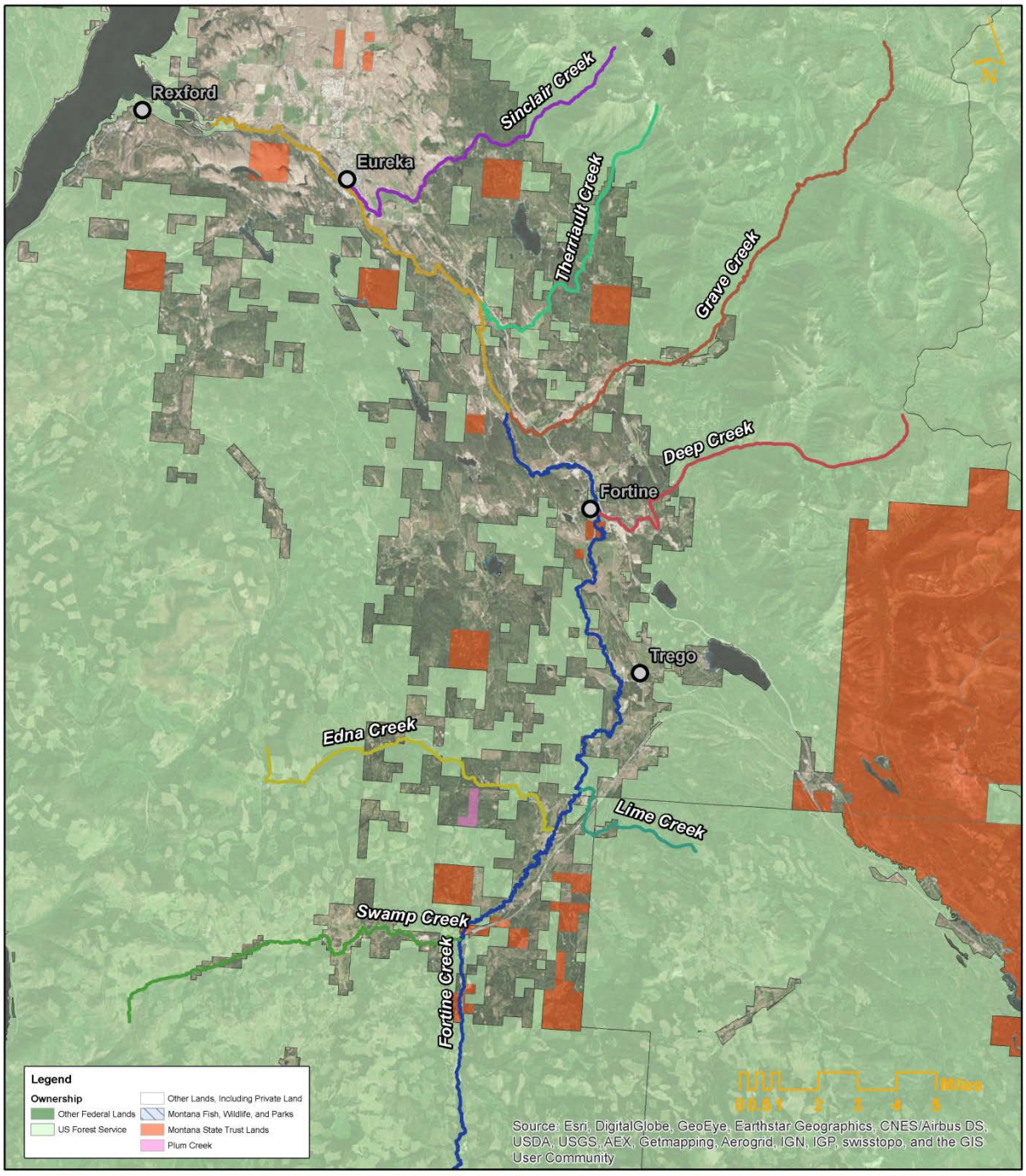

Figure 4-1. Upper Kootenai Watershed Impaired Stream Segments

4.1.1 Deep Creek

Deep Creek has a TMDL for sediment completed in 2011 (**Table 4-1**). In addition, Deep Creek is also considered impaired due to alteration in streamside vegetative cover and excess algal growth. Human sources of sediment to Deep Creek identified in the TMDL assessment include roads/transportation, grazing, cropping, silviculture and "other", which refers to channel obstructions from historic mining (DEQ 2011). The US Forest Service manages the upper portion of the Deep Creek watershed and conducts streamflow monitoring and collects total suspended solids (TSS) data annually in Deep Creek. The US Forest Service also performed temperature monitoring in 2009, 2011 and 2012 and stream surveys in 2011. Monitoring conducted by the US Forest Service will help identify changes in sediment loading and in-stream habitat within Deep Creek. To improve water quality in Deep Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from agricultural areas with an emphasis on managing grazing in riparian zones (DEQ 2011).

Table 4-1. Deep Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Deep Creek, headwaters to mouth (Fortine Creek)	Sediment	14%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs

Riparian fencing and grazing management was the main restoration activity for Deep Creek identified during community and stakeholder meetings, which would help reduce sediment loading to the stream. Additional actions to reduce sediment loading to Deep Creek include:

- Streambank bioengineering, revegetation, and riparian buffer enhancement, particularly on private land near the mouth
- Unpaved road improvements, including culvert replacements
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer

4.1.2 Edna Creek

Edna Creek has a TMDL for sediment completed in 2011 (**Table 4-2**). Human sources of sediment to Edna Creek identified in the TMDL assessment include roads/transportation, riparian clearing, and hay production (DEQ 2011). In addition, the TMDL document indicates many Forestry BMPs were observed during the 2008 field assessment conducted by Montana DEQ, including water bars at road crossings, appropriate streamside management zones in logged areas, and a new culvert (DEQ 2011). Data collected in 2008 on private land near the confluence with Fortine Creek indicate a lack of native riparian vegetation and dense reed canary grass in an area that appears to have been channelized historically (DEQ 2011). The US Forest Service manages a patchwork of land along Edna Creek and conducts streamflow monitoring and collects TSS data annually in Edna Creek. In addition, the US Forest Service performed temperature monitoring in 2009, 2011 and 2012 and stream surveys in 2009. This

monitoring will help identify changes in sediment loading and in-stream habitat within Edna Creek. To improve water quality in Edna Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from upland sources (DEQ 2011).

Table 4-2. Edna Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Edna Creek, headwaters to mouth (Fortine Creek)	Sediment	8%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs

Restoration actions to reduce sediment loading to Edna Creek include:

- Streambank bioengineering, revegetation, and riparian buffer enhancement, particularly on private land near the mouth
- Unpaved road improvements, including culvert replacements, and reduce road densities on national forest lands
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer

4.1.3 Fortine Creek

Fortine Creek has a TMDL for sediment completed in 2011 and a TMDL for temperature completed in 2014 (**Table 4-3**). In addition, Fortine Creek is also considered impaired due to alteration in streamside vegetative cover, excess algal growth, and low flow alterations. Human sources of sediment to Fortine Creek identified during the TMDL assessment include roads/transportation, grazing, and hay production (DEQ 2011). A lack of riparian shading due to overgrazing, timber harvest, and encroachment by the transportation network are considered the main factors leading to increased waters temperatures in Fortine Creek (DEQ 2014a). Data collected in 2012 found the warmest temperatures in Fortine Creek were upstream of the confluence with Deep Creek and in lower Fortine Creek. Swamp Creek was the warmest of the two sampled tributaries, with the other tributary being Deep Creek. While the US Forest Service manages land in the upper Fortine Creek watershed and the headwaters of tributary streams, including the Swamp-Fortine Grazing Allotment, much of the land along the mainstem of Fortine Creek is privately owned. The US Forest Service conducts streamflow monitoring and collects TSS data annually in Fortine Creek. The US Forest Service also performed temperature monitoring in 2010, 2011 and 2012 and stream surveys in 2009 in middle/lower Fortine Creek and in 2010 in upper Fortine Creek. This monitoring will help identify changes in sediment loading, in-stream habitat, and water temperatures within Fortine Creek. To improve water quality in Fortine Creek, the TMDL documents emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from upland sources, while implementing riparian buffer enhancements to improve streamside shading will help reduce stream temperatures (DEQ 2011, DEQ 2014a).

Table 4-3. Fortine Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Fortine Creek, headwaters to mouth (Grave Creek)	Sediment	9%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs
	Temperature	7% / 10%*	Stream Channel Restoration to address Channel Overwidening
			Riparian Buffer Enhancement
			Forestry BMPs
			Agricultural BMPs
			Irrigation Infrastructure Improvements

* 7% for existing conditions (2012) and 10% for low flow existing conditions

Riparian fencing and grazing management was the main restoration activity identified for Fortine Creek during community and stakeholder meetings, with priority areas identified downstream from the Trego School and between Bratten Road and Fortine Road (**Table 4-4**).

Table 4-4. Fortine Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Fortine Creek	Riparian fencing extending downstream from Trego school	Sediment, Temperature
	Riparian fencing between Bratten and Fortine roads	Sediment, Temperature

Restoration actions to reduce sediment and temperature loading to Fortine Creek include:

- Channel restoration in over-widened areas, particularly near Swamp Creek and Trego
- Riparian enhancement projects that increase the amount of effective shade along the stream channel
- Unpaved road improvements, including culvert replacements
- Restoration of entrenched channel conditions
- Streambank bioengineering and revegetation
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Irrigation water management, infrastructure improvements, and irrigation network mapping

4.1.3.1 Fortine Creek Priority Tributaries

Priority tributaries to Fortine Creek identified during community and stakeholder meetings include Meadow Creek and Gray Creek (Grand Creek tributary). Within Meadow Creek, improvements could be

made to road grading practices, while in Gray Creek, a culvert replacement is planned for Forest Service Road 3500 in 2015 (**Table 4-5**). These actions address sediment loading to Fortine Creek.

Table 4-5. Fortine Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Meadow Creek	Address road grading sediment source	Sediment
Gray Creek	NFSR 3500 culvert replacement in 2015	Sediment

4.1.4 Grave Creek

Grave Creek has a TMDL for sediment completed in 2005 (**Table 4-6**). In addition, Grave Creek is also considered impaired due to alteration in streamside vegetative cover and flow regime alterations. Numerous restoration activities have been undertaken along Grave Creek to improve bull trout habitat since Grave Creek, and its tributaries Blue Sky Creek and Clarence Creek, are considered critical bull trout habitat by the US Fish and Wildlife Service (USFWS 2010). Prior to 2005, restoration efforts in Grave Creek focused on an approximately 2.5 mile section of river upstream of the Hwy 93 crossing and downstream of the Glen Lake Irrigation District (GLID) diversion structure. Between 2001 and 2004, 8,200 feet of channel was restored through a demonstration phase and the completion of Phases 1 and 2. Restoration actions included channel reconstruction, streambank stabilization, grade control, addition of fish habitat features, and improved floodplain connectivity (Geum 2008). In 2005 and 2006, supplemental vegetative treatments were added to Phases 1 and 2, including vegetated soils lifts, containerized shrub plantings, and enhancement of the constructed floodplains with swale features and the placement of large woody debris (Geum 2008). In addition, a design has been developed for Phase 3 that entails an additional 5,900 feet of channel. Once Phase 3 is complete, the remaining restoration priority in lower Grave Creek is the reach just downstream of the Highway 93 crossing (Rox Rogers, US Fish and Wildlife Service, personal communication, 2009).

The US Forest Service manages the upper Grave Creek watershed downstream past the Glen Lake Irrigation Diversion. In 2010, the US Forest Service resurfaced seven miles of the Grave Creek Road and replaced the Blue Sky Trail Bridge. The US Forest Service also replaced and upgraded a culvert on Drip Creek. The US Forest Service conducts streamflow monitoring and collects TSS data annually in Grave Creek and performed temperature monitoring in 2012 in the mainstem of Grave Creek and in several tributaries. Stream surveys were performed by the US Forest Service in 2001 in Grave Creek and in several tributary streams and PIBO monitoring was conducted on Grave Creek in 2003, 2008 and 2013. Data collected by the US Forest Service will help identify changes in sediment loading, in-stream habitat, and streamflow within Grave Creek. To improve water quality in Grave Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and areas of mass wasting (DEQ 2005).

Table 4-6. Grave Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Grave Creek, Foundation Creek to mouth (Fortine Creek)	Sediment	60%	Streambank Bioengineering and Revegetation
			Stabilize Areas of Mass Wasting
			Forestry BMPs
			Agricultural BMPs

Restoration between the two bridges and at the confluence with Fortine Creek, along with adding fish screens to prevent bull trout from entering the ditch network and lining 27 miles of the GLID irrigation ditch to help maintain streamflows and water temperatures in Grave Creek, were the main restoration activities for Grave Creek identified during community and stakeholder meetings (**Table 4-7**). To ensure that ditch lining doesn't impact downstream water users, additional analysis should be conducted to document groundwater-surface water interactions resulting from ditch loss prior to undertaking any ditch lining projects.

Table 4-7. Grave Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Grave Creek	Stream restoration between bridges and at confluence	Sediment
	Ditch lining of 27 miles of GLID ditch to help increase stream flows in Grave Creek	N/A
	Fish screens to prevent bull trout from entering ditch network	N/A

Restoration actions to reduce sediment loading to Grave Creek include:

- Streambank bioengineering, revegetation, and riparian buffer enhancement in lower Grave Creek
- Address areas of mass wasting resulting from historic road building and timber harvest along Grave Creek (upper/middle), Williams Creek, Clarence Creek, Stahl Creek, South Fork Stahl Creek, Blue Sky Creek and Foundation Creek
- Unpaved road improvements, including culvert replacements
- Develop grazing management plans for interested landowners

4.1.4.1 Grave Creek Priority Tributaries

Priority tributaries to Grave Creek identified during community and stakeholder meetings include Blue Sky Creek, Williams Creek, and Stahl Creek (South Fork Clarence Creek tributary). The opportunity for culvert replacement or removal has been identified by the US Forest Service in Blue Sky Creek and Stahl Creek. For Williams Creek, recreational trail intersections at reclaimed stream crossings could be improved to reduce sediment loads and improve conditions for trail users (**Table 4-8**). These actions address sediment loading to Grave Creek.

Table 4-8. Grave Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Blue Sky Creek	Culvert replacement or removal	Sediment
Williams Creek	Improve crossings where culverts were removed	Sediment
Stahl Creek	NFSR 7021 culvert replacement	Sediment

4.1.5 Lime Creek

Lime Creek has a TMDL for sediment completed in 2011 and TMDLs for total phosphorus and total nitrogen completed in 2014 (**Table 4-9**). In addition, Lime Creek is also considered impaired due to alteration in streamside vegetative cover and excess algal growth. Human sources of sediment to Lime Creek identified during the TMDL assessment include roads/transportation, grazing, and riparian

vegetation removal (DEQ 2011). Sources of total phosphorus and total nitrogen identified during the TMDL assessment include grazing and residential development (DEQ 2014a). However, no exceedences of the total phosphorus target were observed from samples collected between 2003 and 2013 and no reduction in total phosphorus is currently required. The entire stream is underlain by limestone geology which heavily influences the geomorphology of the stream (DEQ 2011). Most of the watershed is part of the Trego Grazing Allotment on the Kootenai National Forest.

Table 4-9. Lime Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Lime Creek, headwaters to mouth (Fortine Creek)	Sediment	10%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs
	Total Phosphorus	0%	Riparian Buffer Enhancement
			Forestry BMPs
			Agricultural BMPs
	Total Nitrogen	70%	Riparian Buffer Enhancement
			Forestry BMPs
			Agricultural BMPs

Riparian fencing and grazing management within the Trego Grazing Allotment was the main restoration activity identified for Lime Creek during community and stakeholder meetings. Restoration actions to reduce sediment and nutrient loading to Lime Creek include:

- Address livestock access at the one main crossing on the Trego Grazing Allotment on national forest lands
- Focus nutrient reduction efforts near the mouth and on the lower part of the Trego Grazing Allotment
- Unpaved road improvements, including culvert replacements
- Streambank bioengineering and revegetation
- Riparian buffer enhancement
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer

In addition, further water quality and biological monitoring under various flow conditions would be beneficial to help refine nutrient impairment causes and sources.

4.1.6 Sinclair Creek

The lower 7.9 miles of Sinclair Creek has a TMDL for sediment completed in 2011 (**Table 4-10**). Human sources of sediment to Sinclair Creek identified during the TMDL assessment include roads/transportation, grazing, and construction (DEQ 2011). The US Forest Service manages the forested headwaters of Sinclair Creek, while the valley bottom is mostly privately owned. Sinclair Creek has a high resource value based on the occasional use by juvenile bull trout for extended rearing (DEQ 2011). To improve water quality in Sinclair Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from agricultural areas (DEQ 2011).

Table 4-10. Sinclair Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Sinclair Creek, confluence of un-named tributary, Lat -114.945 Long 48.908 to mouth (Tobacco River)	Sediment	25%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Agricultural BMPs

Restoration actions to reduce sediment loading to Sinclair Creek include:

- Replace culvert on Highway 93 crossing of Sinclair Creek near the mouth
- Remove debris (tires, metal, coolers, garbage) from within stream channel near the mouth
- Address channel incisement downstream of the first Highway 93 crossing
- Address issues arising from flood event in June of 2006, including channel migration, bank erosion, downcutting, and loss of floodplain connectivity
- Streambank bioengineering and revegetation
- Riparian buffer enhancement
- Unpaved road improvements, including culvert replacements
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer

4.1.7 Swamp Creek

Swamp Creek has a TMDL for sediment completed in 2011 (**Table 4-11**). In addition, Swamp Creek is also considered impaired for alteration in streamside vegetative cover and low flow alterations. Human sources of sediment to Swamp Creek identified during the TMDL assessment include roads/transportation, silviculture, channel modifications, and removal of riparian vegetation (DEQ 2011). Specifically, the TMDL document cites a channelized area that lacks riparian vegetation located approximately 3.5 miles upstream from the mouth as a primary source of sediment (DEQ 2011). The US Forest Service manages the majority of the Swamp Creek watershed, though approximately half of the overall stream length is located on private lands. The Swamp-Fortine Grazing Allotment is partially within the Swamp Creek watershed. The US Forest Service performed a stream survey in 2009 along Swamp Creek and PIBO monitoring has been conducted in 2001, 2006 and 2011, with two sites assessed in 2011. In addition, temperature data was collected by the US Forest Service in 2009. Data collection efforts conducted by the US Forest Service will help identify changes in sediment loading and in-stream

habitat within Swamp Creek. To improve water quality in Swamp Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from upland sources (DEQ 2011).

Table 4-11. Swamp Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Swamp Creek, headwaters to mouth (Fortine Creek)	Sediment	12%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Stream Channel Restoration
			Forestry BMPs
			Agricultural BMPs

Restoration actions to reduce sediment loading to Swamp Creek include:

- Riparian buffer enhancement, streambank bioengineering and revegetation, and stream channel restoration within channelized reach located approximately 3.5 miles upstream from the mouth and at the confluence with Lake Creek
- Address bedload deposition, channel aggradation and fish passage issues resulting from a series of check dams near monitoring reach SWP5-1 installed in 1992
- Stream channel restoration focusing on increasing pool frequency and size, large woody debris frequency, and reducing fine sediment accumulations as identified in the Swamp Creek Draft Environmental Impact Statement (USFS 1998)
- Unpaved road improvements, including culvert replacements

4.1.8 Therriault Creek

Therriault Creek has a TMDL for sediment completed in 2011 (**Table 4-12**). Human sources of sediment to Therriault Creek identified during the TMDL assessment include roads/transportation, historic silviculture and grazing, and channel modification (DEQ 2011).The US Forest Service manages the uppermost headwaters of Therriault Creek, while the remaining portion of the watershed is mostly privately owned. In 2004 and 2005, channel restoration was completed along a 9,500-foot reach of Therriault Creek to reduce sediment inputs and improve fish habitat. Supplemental riparian plantings were added in 2007 (Geum 2007). While this project reduced sediment loads to Therriault Creek, the TMDL document indicates that roads, residential development, and cropland remain controllable sediment sources (DEQ 2011). To improve water quality in Therriault Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from agricultural areas (DEQ 2011).

Table 4-12. Therriault Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Therriault Creek, headwaters to mouth (Tobacco River)	Sediment	16%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs

Restoration actions to reduce sediment loading to Therriault Creek include:

- Replace undersized culvert at THR14-1 approximately 2.5 miles upstream from the mouth
- Unpaved road improvements, including culvert replacements
- Streambank bioengineering and revegetation
- Riparian buffer enhancement in agricultural areas

4.1.8.1 Therriault Creek Priority Tributaries

Mud Creek was identified as a priority tributary to Therriault Creek during community and stakeholder meetings and riparian fencing was recommended to help improve grazing management along Mud Creek (**Table 4-13**). In addition, stream channel and wetland restoration at the site of the old mill site on Mud Creek just upstream of Highway 93 is a priority.

Table 4-13. Therriault Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Mud Creek	Riparian fencing	Sediment
	Stream channel and wetland restoration at the site of the old mill site just upstream of Highway 93	Sediment

4.1.9 Tobacco River

The Tobacco River has a TMDL for sediment completed in 2011 (**Table 4-14**). In addition, the Tobacco River is also considered impaired for physical substrate habitat alterations. While the US Forest Service manages the headwater portions of many Tobacco River tributaries, valley bottom lands along the Tobacco River are mostly privately owned. Human sources of sediment to the Tobacco River identified during the TMDL assessment include roads/transportation, channel modifications, historic log drives, and riparian vegetation removal (DEQ 2011). Excessive sediment inputs from tributaries, removal of riparian vegetation, and channel confinement due to transportation networks are cited in the TMDL document as causes of channel entrenchment, streambank erosion, and a reduction in sediment transport capacity (DEQ 2011). To improve water quality in the Tobacco River, the TMDL document emphasizes reducing sediment inputs from unpaved roads, human caused streambank erosion, and erosion from agricultural areas (DEQ 2011).

Table 4-14. Tobacco River Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Tobacco River, confluence of Grave Creek & Fortine Creek to mouth (Lake Koocanusa)	Sediment	11%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs

Addressing streambank erosion upstream and downstream of the town of Eureka was the primary restoration activity identified during community and stakeholder meetings, along with an emphasis on more strictly regulating floodplain development along the Tobacco River (**Table 4-15**). Specific projects include restoration of a 5,200-foot section of river downstream of Eureka that includes streambank bioengineering, riparian vegetation plantings and channel restoration. This site includes the "rails-to-trails" trail system that extends from Eureka to Rexford. Upstream of the town of Eureka, solutions to the ongoing streambank erosion along the river walk trail system are desired to reduce the need for emergency streambank bioengineering measures during high water events.

Table 4-15. Tobacco River Priority Projects

Stream	Project / Activity	Pollutant Addressed
Tobacco River	Streambank bioengineering and riparian restoration upstream of Eureka	Sediment
	Streambank bioengineering and riparian restoration downstream of Eureka	Sediment
	Regulating floodplain development	N/A

Restoration actions to reduce sediment loading to the Tobacco River include:

- Address bank erosion, channel entrenchment and sediment transport capacity resulting from historic log drives
- Streambank bioengineering and revegetation
- Riparian buffer enhancement
- Unpaved road improvements, including culvert replacements

4.1.9.1 Tobacco River Priority Tributaries

Priority tributaries to the Tobacco River identified during community and stakeholder meetings include Ksanka Creek and Indian Creek. Ksanka Creek once connected to the Tobacco River, but is now intercepted by a ditch and no longer reaches the river. Improvements to Indian Creek involve riparian fencing to facilitate improved grazing management (**Table 4-16**).

Table 4-16. Tobacco River Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Ksanka Creek	Channel restoration and reconnection to Tobacco River	Sediment
Indian Creek	Riparian fencing	Sediment

4.1.10 Other Priority Streams within the Upper Kootenai River Watershed

Other priority streams within the Upper Kootenai River watershed identified during the community and stakeholder meetings include Phillips Creek, Young Creek, Dodge Creek, Pinkham Creek, Fivemile Creek, North Fork Bristow Creek, and Cripple Horse Creek (**Table 4-17** and **Figure 4-2**). Cripple Horse Creek is considered impaired due low flow alterations and physical substrate habitat alterations. Projects focused on riparian fencing, fish passage, road storage and decommissioning, and irrigation water management are priorities in the Upper Kootenai River watershed.

Table 4-17. Other Priority Streams in the Upper Kootenai River Watershed

Stream	Project / Activity	Pollutant Addressed
Phillips Creek	Riparian fencing	Sediment
Young Creek	Riparian fencing	Sediment
Dodge Creek	Address excess water from flooded fields flowing into Dodge Creek	Sediment
Pinkham Creek	Riparian fencing	Sediment
Fivemile Creek	Road storage/decommissioning	Sediment
North Fork Bristow Creek	Fish passage	N/A
Cripple Horse Creek	Road storage/decommissioning	Sediment

4.1.11 Lake Koocanusa

Lake Koocanusa, which provides habitat for bull trout and westslope cutthroat trout, is considered impaired due to selenium and flow regime alterations. Selenium in Lake Koocanusa resulting from historic and present-day coal mining within the Elk River and Fording River watersheds in Canada is an emerging concern, along with increased nitrate loading associated with explosive residues from coal mining. The U.S. Army Corps of Engineers, U.S. Geological Survey, EPA, and Montana DEQ are currently conducting studies to assess ecosystem impacts on aquatic and fish communities and to establish a water quality criterion to protect aquatic resources in Lake Koocanusa. Recently conducted modeling indicates that annual selenium loads increased from 2,600 kg in 1992 to over 13,000 kg in 2012, though additional study is needed to refine the results of this modeling effort (Naftz et al. 2014).

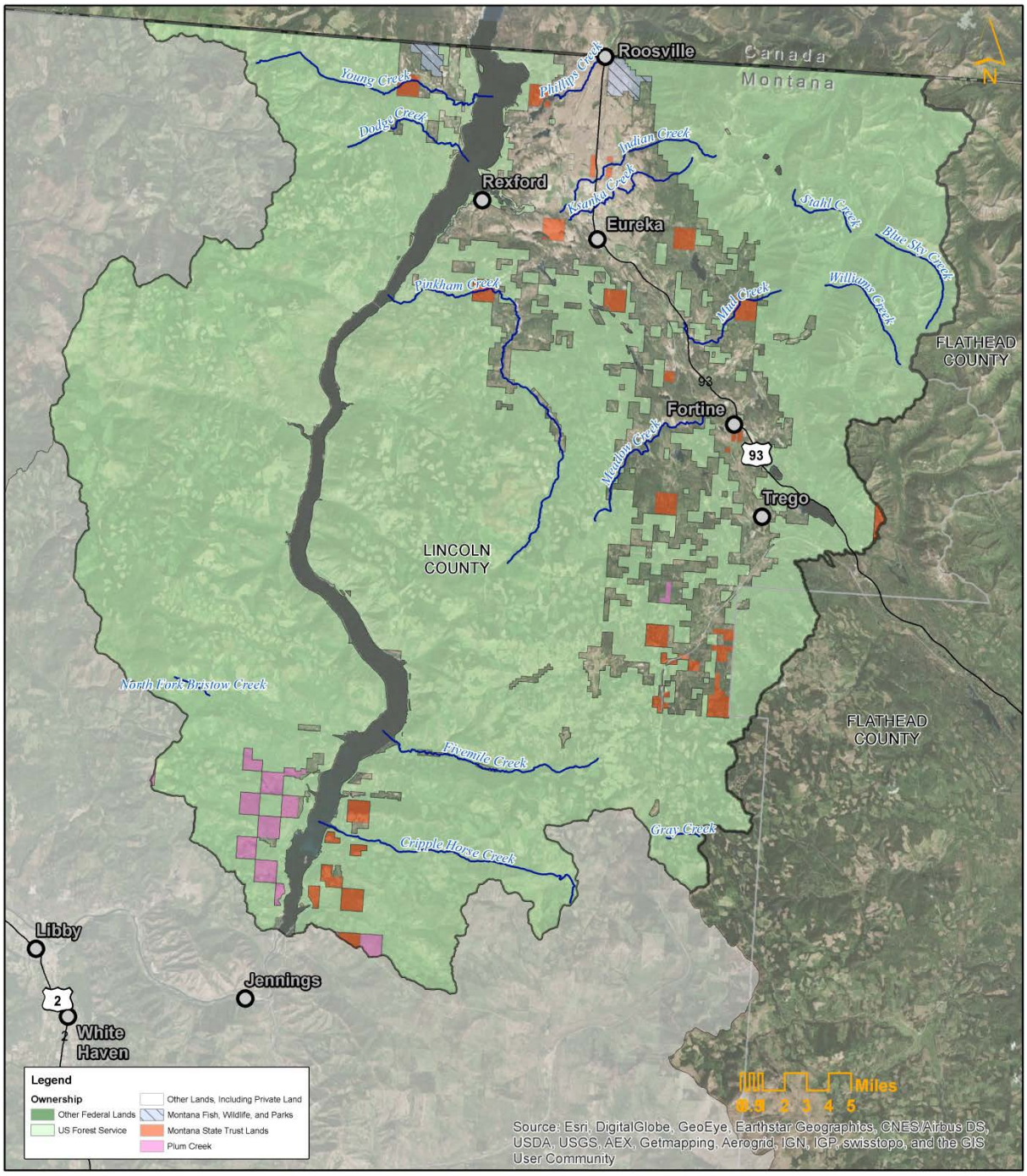

Figure 4-2. Stakeholder Identified Priority Streams in the Upper Kootenai Watershed

4.2 MIDDLE KOOTENAI RIVER WATERSHED

The Middle Kootenai River watershed extends from Libby Dam downstream to Kootenai Falls and includes streams in the Bobtail Creek TPA, Fisher TPA, and Kootenai TPA, along with the mainstem of the Kootenai River and its tributary streams. Impaired streams with TMDLs in the Fisher TPA include Wolf Creek and Raven Creek. Impaired streams in the Kootenai TPA with TMDLs include Big Cherry Creek, Lake Creek, Libby Creek, Snowshoe Creek, and Stanley Creek, while Bobtail Creek also has a TMDL (**Figure 4-3**).

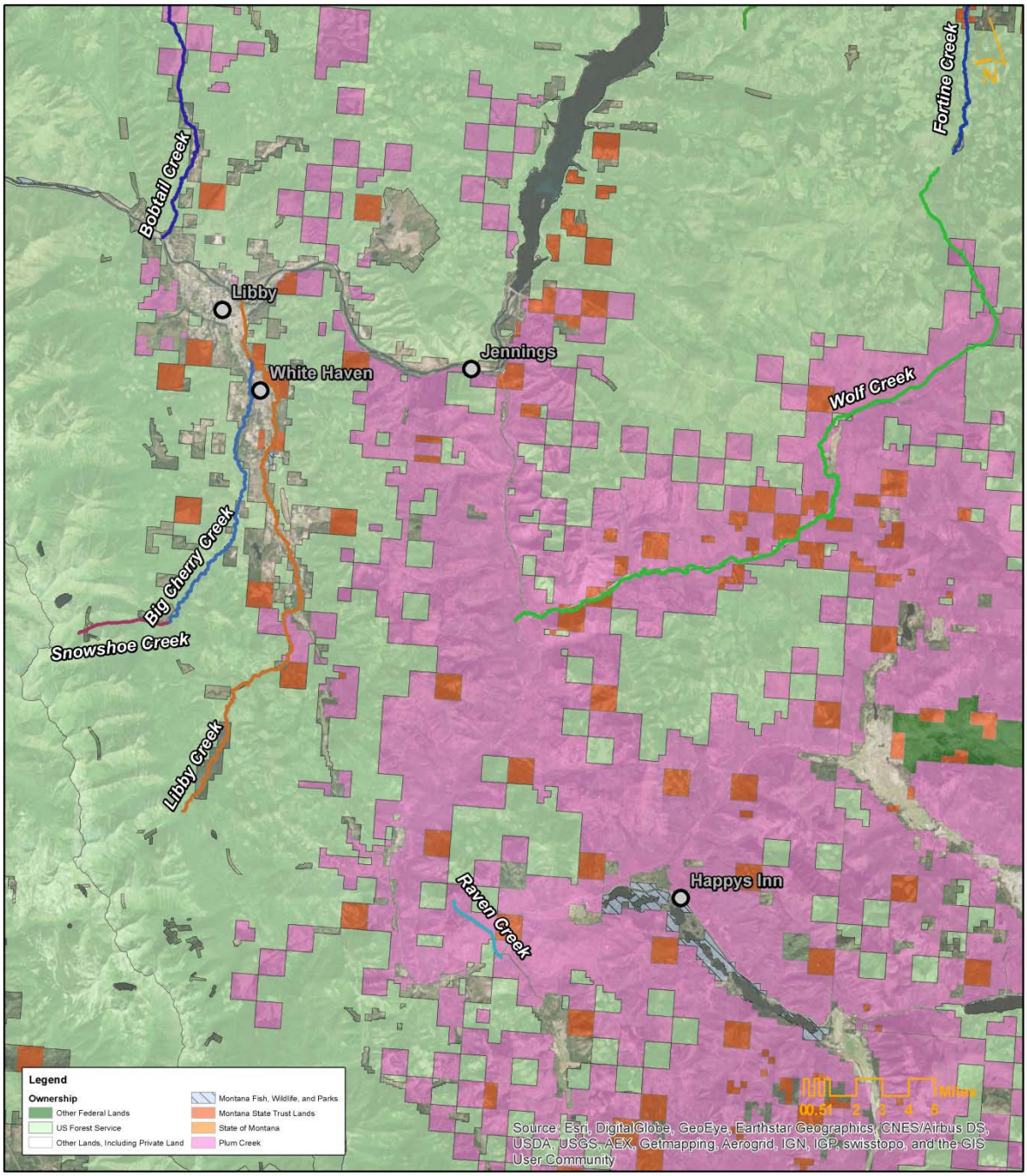

Figure 4-3. Middle Kootenai River Watershed Impaired Stream Segments

4.2.1 Big Cherry Creek

Big Cherry Creek has TMDLs for cadmium, lead, and zinc completed in 2014 (**Table 4-18**). In addition, Big Cherry Creek is also considered impaired for alteration in streamside vegetative cover and physical substrate habitat alterations. The upper portion of the Big Cherry Creek watershed is managed by the US Forest Service, while the lower portion is mostly privately owned. For Big Cherry Creek, monitoring data suggest mainly high flow metals loading concerns for lead and zinc (i.e., largely nonpoint sediment associated sources), and a combination of high and low flow metals loading concerns for cadmium (a combination of localized and diffuse sources). The Big Cherry Creek Mill Site is identified in the TMDL document as the major source of metals in the Big Cherry Creek watershed and includes an estimated 4,540 cubic yards of tailings located within close proximity to the creek that have been reclaimed and are mostly revegetated (DEQ 2014b). In addition, Snowshoe Creek (see Section 4.1.2 below) is a potentially significant source of metals loading to Big Cherry Creek below its confluence, primarily from the Snowshoe Mine which was reclaimed in 2012. While both of these mine sites have been reclaimed, water quality improvements have not yet been documented. Other potentially smaller scale source areas of metals include abandoned mines in the headwaters of Big Cherry Creek and abandoned mines in the Leigh Creek watershed, which is a tributary to Big Cherry Creek entering downstream of the confluence with Snowshoe Creek. These other abandoned mines may represent more diffuse metals source areas that could be difficult and expensive to address.

Table 4-18. Big Cherry Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL		Project Types / Treatments
		High Flow	Low Flow	
Big Cherry Creek, Snowshoe Creek to mouth (Libby Creek)	Cadmium	87%	86%	Abandoned Mine Reclamation
	Lead	87%	0%	
	Zinc	38%	6%	

Areas for water quality improvements along Big Cherry Creek identified during the WRP community and stakeholder meetings focus on sediment sources and include (**Table 4-19**):

- Forest Road 6205B culvert replacement or removal
- Removal of concrete slabs from old haul road on DNRC property

Table 4-19. Big Cherry Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Big Cherry Creek	NFSR 6205B culvert replacement or removal	Sediment
	Address failing haul road on DNRC property	Sediment

Restoration actions to reduce metals loading to the Big Cherry Creek include:

- Evaluate the effectiveness of the Big Cherry Creek Mill Site cleanup
- Evaluate the effectiveness of the Snowshoe Creek Mine cleanup post-2012 when reclamation was completed

4.2.1.1 Big Cherry Creek Priority Tributaries

Granite Creek was identified as a priority tributary to Big Cherry Creek during community and stakeholder meetings. Restoration actions for Granite Creek include Forest Road 4791 bridge replacement and assistance for private landowners living along the stream (**Table 4-20**).

Table 4-20. Big Cherry Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Granite Creek	NFSR 4791 bridge replacement	Sediment
	Assist private landowners	N/A

4.2.2 Bobtail Creek

Bobtail Creek has a TMDL for total suspended solids (TSS) that was completed in 2005 and is considered impaired due to sediment, turbidity and flow regime alterations (**Table 4-21**). Much of the Bobtail Creek watershed is managed by the US Forest Service, with a portion owned by Plum Creek Timber, and private lands within the valley bottom along the stream. Sources of sediment impairments to Bobtail Creek include forest and agricultural practices (DEQ 2005). In addition, two rain-on-snow events in November 1990 and April 1991 caused a major channel shift and washout of a number of culverts on private land along Bobtail Creek. The rain-on-snow events led to Bobtail Creek jumping its banks and flowing down a skid road built for timber harvest on non-industrial private land in the late 1980's. More recent floods continue to erode this unstable reach, leading to extensive channel aggradation downstream. Since the completion of the TMDL, the Libby Ranger District hydrology program has restored or decommissioned 18 miles of road and removed 31 culverts in the Bobtail Creek watershed and continues to monitor stream flow, TSS, macroinvertebrates, and stream substrate in Bobtail Creek, which will help identify changes in sediment loading, in-stream habitat, and streamflow within Bobtail Creek. In addition, stream restoration activities have been completed on several private properties and on national forest lands, including along Bull Creek. Since the completion of the TMDL, Plum Creek Timber has upgraded all forest roads for which they are responsible to improved BMP standards as described in the Native Fish Habitat Conservation Plan (NFHCP) (Plum Creek 2000). Plum Creek has also corrected fish passage barriers and decommissioned 0.5 miles of road. Thus, extensive restoration activities have been completed in the Bobtail Creek watershed since the completion of the TMDL in 2005.

Table 4-21. Bobtail Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Bobtail Creek, headwaters to mouth (Kootenai River)	Sediment (TSS)	95%	Streambank Bioengineering and Revegetation
			Unpaved Road Improvements

Focus areas for water quality improvement identified by watershed stakeholders include riparian fencing, channel restoration, and culvert upgrades (**Table 4-22**).

Table 4-22. Bobtail Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Bobtail Creek	Riparian fencing along Bobtail Creek and Bull Creek	Sediment
	Implement channel restoration work where needed, including unstable reaches in Sections 29, 30, and 32 (T32N, R31W)	Sediment
	Address fish passage barrier on cost-share road in upper Bobtail Creek (Section 18)	Sediment

Restoration actions to reduce sediment loading to the Bobtail Creek include:

- Implement unpaved road improvements on cost-share road in upper Bobtail Creek
- Streambank bioengineering and revegetation on private lands

4.2.3 Libby Creek, Lower Segment

The lower segment of Libby Creek extending downstream from the Highway 2 crossing has a TMDL for sediment completed in 2014 (**Table 4-23**). In addition, the lower segment of Libby Creek is also considered impaired due to physical substrate habitat alterations. Upstream of Highway 2, the upper segment of Libby Creek is considered impaired due to alteration in streamside vegetative cover and physical substrate habitat alterations. Libby Creek is also considered to be critical bull trout habitat by the US Fish and Wildlife Service (USFWS 2010). Much of the Libby Creek watershed is managed by the US Forest Service, while the valley bottom along the lower segment of Libby Creek is mostly privately owned. A long history of land management activities, including the removal of near-stream vegetation, has resulted in channel over-widening in the lower segment of Libby Creek with course sediment supply exceeding the transport capacity leading to channel aggradation and streambank erosion (DEQ 2014b). The mobile streambed and unstable channel inhibit the full support of fish and aquatic life (DEQ 2014b). To improve water quality in the lower segment of Libby Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads and human caused streambank erosion (DEQ 2014b).

Table 4-23. Libby Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Libby Creek, Highway 2 bridge to mouth (Kootenai River)	Sediment	27%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Stabilize Areas of Mass Wasting
			Stream Channel Restoration to Address Channel Instability

Focus areas for water quality improvement in the lower segment of Libby Creek identified by watershed stakeholders include assisting landowners with maintaining private stream crossings over Libby Creek and removing the paved portions of the failing haul road on Montana Department of Natural Resources and Conservation (DNRC) property, along with other opportunities on DNRC lands (**Table 4-24**). These actions address sediment impairments.

Table 4-24. Libby Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Libby Creek	Assist private landowners with maintaining stream crossings	Sediment
	Address failing haul road on DNRC property	Sediment

Restoration actions to reduce sediment loading to Libby Creek include:

- Channel restoration, streambank bioengineering and revegetation along the mainstem of Libby Creek, including re-establishment of natural cedar forests on the floodplain
- Channel restoration along the lower 2,000 feet of Libby Creek that was historically channelized
- Replace undersized bridge at Highway 2 crossing
- Remove remaining paved portions of abandoned haul roads that parallel both sides of Libby Creek
- Unpaved road improvements, including culvert replacements

4.2.3.1 Libby Creek Priority Tributaries

Ramsey Creek, which is a tributary to the upper segment of Libby Creek, was identified as a priority tributary to Libby Creek during community and stakeholder meetings. On Ramsey Creek, the removal of the Forest Road 4781 bridge is a priority.

4.2.4 Raven Creek

Raven Creek has a TMDL for sediment and total phosphorus completed in 2014 (**Table 4-25**). In addition, Raven Creek is also considered impaired for alteration in streamside vegetative cover. Raven Creek is a small watershed and Plum Creek Timber Company owns the majority of the land. In 1984, the Houghton Fire burned approximately 88% of the Raven Creek watershed, followed by salvage timber harvest conducted by Champion International. In 1996, Plum Creek planted ponderosa pine seedlings within 100 feet of the stream on each side where sufficient natural recovery was lacking. In addition, Plum Creek has upgraded all roads to improved BMP standards as described in Plum Creek's Native Fish Habitat Conservation Plan (NFHCP) (Plum Creek 2000). According to the TMDL document, recent data and field observations indicate current management practices are facilitating the recovery of Raven Creek (DEQ 2014b). Future land management activities within the Raven Creek watershed will be guided by the NFHCP and the recently revised Kootenai National Forest Plan.

Table 4-25. Raven Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Raven Creek, headwaters to mouth (Pleasant	Sediment	12%	Streambank Bioengineering and Revegetation

Table 4-25. Raven Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Valley Fisher River)			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
	Total Phosphorus	2%	Streambank Bioengineering and Revegetation
			Unpaved Road Improvements
			Forestry BMPs

Restoration actions to reduce sediment loading to Raven Creek include:

- Upgrade stream crossing in the NE1/4, NE1/4, Section 2 (T26N, R29W) on road along the Bonneville Power Administration (BPA) powerline corridor and on US Forest Service land
- Conduct a pilot test project of large wood additions to Raven Creek in Section 35 on Plum Creek lands with the objective of encouraging sediment trapping and channel aggradation in segments of the stream that have experienced loss of large wood and channel incision

4.2.5 Snowshoe Creek

Snowshoe Creek has TMDLs for arsenic, cadmium, lead and zinc completed in 2014 (**Table 4-26**). In addition, Snowshoe Creek is also considered impaired for alteration in streamside vegetative cover. Monitoring results for Snowshoe Creek show a combination of high and low flow metals loading concerns for cadmium, lead and zinc (i.e., a combination of localized and diffuse sources), and a low flow metals loading concern for arsenic (localized sources, potentially including groundwater inputs). The Snowshoe Mine and Mill Site are the primary anthropogenic sources of metals to Snowshoe Creek (DEQ 2014b). Reclamation activities were conducted between 2007 and 2012 to clean up the mine and mill site on national forest lands. The most recent in-stream monitoring data are from the summer of 2012 and may not reflect the maximum benefits of the 2007-2012 cleanup activities at the Snowshoe Creek Mine and Mill. In addition, mine tailings remain within the streambed at diffuse locations along Snowshoe Creek downstream of the reclamation activities. Other smaller potential contributing metals sources in the Snowshoe Creek watershed include the abandoned underground lode mines of the Texas Ranger and St. Paul mines, though these may represent more diffuse metals source areas that could be difficult and expensive to address.

Table 4-26. Snowshoe Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL		Project Types / Treatments
		High Flow	Low Flow	
Snowshoe Creek, Cabinet Wilderness boundary to mouth (Big Cherry Creek)	Arsenic	0%	23%	Abandoned Mine Reclamation
	Cadmium	97%	98%	
	Lead	98%	94%	
	Zinc	84%	91%	

Restoration actions to reduce metals loading to Snowshoe Creek include:

- Examine feasibility of cleanup of the remaining in-stream, streambank and floodplain tailings deposits in Snowshoe Creek at diffuse locations downstream of the reclaimed Snowshoe Creek Mine and Mill Site
- Evaluate the effectiveness of the Snowshoe Creek mine cleanup post-2012, when reclamation was completed, to confirm the need for additional downstream controls

4.2.6 Wolf Creek

Wolf Creek has TMDLs for sediment and temperature completed in 2014 (**Table 4-27**). In addition, Wolf Creek is also considered impaired for alteration in streamside vegetative cover. Construction related to the relocation of the Great Northern Railroad in the mid-to-late 1960's led to channelization, a loss of riparian vegetation, and streambank erosion along Wolf Creek, particularly between the confluence with Little Wolf Creek and the mouth (DEQ 2014b). Additional human sources of sediment to Wolf Creek include grazing, timber harvest and forest roads, while the railroad, road network, present and historic agricultural activities, and timber harvest are potential sources of increased stream temperatures (DEQ 2014b). Restoration activities that reduce streambank erosion, improve riparian conditions, and reduce sediment inputs from forest roads would lead to a reduction in sediment loading to Wolf Creek, while restoration of channel length and floodplain connectivity would benefit in-stream habitat. Re-establishment of riparian overstory is considered the primary mechanism for reducing stream temperatures in Wolf Creek according to the TMDL document, which indicates that, in most instances, current land management practices are meeting the intent of the temperature load allocations (DEQ 2014b). To improve water quality in the Wolf Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads and human caused streambank erosion, while implementing riparian buffer enhancements to improve streamside shading will help reduce stream temperatures (DEQ 2014b).

Table 4-27. Wolf Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Wolf Creek, headwaters to mouth (Fisher River)	Sediment	29%	Streambank Bioengineering and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Forestry BMPs
			Agricultural BMPs
	Temperature	12%	Riparian Buffer Enhancement
			Forestry BMPs
			Agricultural BMPs

Wolf Creek experiences significant streambank erosion in some reaches, which comprises the majority of watershed erosion. Some of this erosion appears to be a result of stream down-cutting, possibly in response to loss of beaver in the system, a reduction in large wood, and a loss of channel length accompanying channelization during the construction of the railroad. Historic removal of more deeply-rooted vegetation in the near-bank area through past timber harvest and livestock grazing may also be

contributing factors to streambank erosion rates. Ongoing factors influencing streambank erosion include hoof damage to streambanks and animal trailing along streambanks. While this restoration plan addresses what are thought to be these causal factors, the underlying historic channel incision will be a significant underlying factor limiting the rate of recovery in some locations.

To meet the sediment load reduction, the focus for Wolf Creek is on reducing sediment loads from streambank erosion, while the focus for reducing temperature loading is on increasing riparian shading and narrowing the stream channel in over-widened areas. For restoration planning, Wolf Creek has been divided into seven restoration reaches as follows (**Table 4-28** and **Figure 4-4**):

1. Lower Wolf Creek – This reach extends from the confluence of Wolf Creek with the Fisher River (River Mile, RM 0) to just upstream of where the Syrup-Redemption Road crosses over Wolf Creek (RM 13.0). Riparian conditions are generally good in this reach, but the stream is confined in numerous locations by the railroad and the paved Wolf Creek road. Within the reaches where the channel was re-located, rock grade control structures were placed in the channel to limit channel incision.

2. Redemption – This reach goes from RM 13.0 upstream to just below where Little Wolf Creek flows into Wolf Creek (RM 16.3). There is significant confinement by the railroad in places, and some historic harvest practices with limited conifer regeneration. Much of this reach is also accessible to cattle, though the confinement limits access and impacts to a large extent.

3. Jurassic Park – This reach continues about 2 miles upstream to below Wolf Prairie (RM 18.7). This reach is fenced to livestock, and contains a willow community that is considered near its natural potential, though it lacks a multi-story riparian vegetation community and is single species dominated. In the TMDL development, this reach was considered an internal reference. Much of this reach is fenced out from livestock grazing.

4. Betts Lake – This reach extends from RM 18.7 upstream to the US Forest Service Fairview Parcel at RM 21.9. This reach is bordered by Wolf Prairie and includes adjacent private ranch land. Through much of this reach, Wolf Creek is bordered by natural shrub and wet meadow communities. The most significant eroding streambanks are in this reach. Cattle have access to most of the stream length in this reach. This reach contains opportunities for riparian vegetation enhancement and large woody debris placement.

5. Fairview – A short one mile reach that is on US Forest Service land (RM 21.9 – 22.9). It has an historic ranger station on it and has been fenced to livestock grazing for many years. Some segments are near their physical potential, but some segments have restoration potential. This reach lacks large woody debris and there is minimal potential for large woody debris recruitment. This reach also currently lacks a diverse riparian vegetation community.

6. Kelsey – This reach is very long and extends from RM 22.9 upstream to the Brush Creek confluence with Wolf Creek at RM 29.4. Conditions along this reach are variable, with segments that have the potential for conifer restoration activity and large woody debris placement.

7. Upper Wolf – This reach is above Kelsey and extends all the way to the top of the stream near RM 38. This reach is generally near its natural physical potential, with only isolated restoration opportunities.

Table 4-28. Wolf Creek Restoration Reaches

River Mile	Reach Name	Reach Description	Existing Condition and Land Uses	Proposed Restoration Actions
1	Lower Wolf Reach	From the confluence with the Fisher River (RM 0) upstream to the Syrup-Redemption road bridge over Wolf Creek at approximately RM 13.0.	Railroad and Paved Wolf Creek Road are primary issues. Riparian conditions generally good and improving with natural regrowth following railroad relocation in early 1970s. No grazing in lower watershed.	1) Maintain existing riparian conditions through current practices; 2) Evaluate impacts of Wolf Creek grade control structures on stream channel dynamics and temperature; 3) Look for conifer restoration opportunities along rail corridor in relocated reaches.
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14	Redemption	From the Syrup-Redemption road bridge over Wolf Creek (~RM 13) upstream to the Jurassic Park exclosure (near Little Wolf confluence) at approximately RM 16.3	Grazing, railroad, and historic forestry impacts. Reduced shrubs and conifers in reach.	Improved grazing management, and conifer/shrub restoration.
15				
16				
17	Jurassic Park	From RM 16.3 (Little Wolf Confluence) upstream to approximately RM 18.7.	US Forest Service parcel that is fully fenced. No grazing, except occassional trespass.	Conditions generally good. Conifer restoration opps.
18				
19	Betts Lake Reach	From RM 18.7 upstream to the US Forest Service Fairview parcel at RM 21.9	Grazing, and perhaps some historic forestry impacts. Reduced shrubs and conifers in reach, and significant sloughing stream banks.	Improved grazing management, conifer/shrub restoration, and evaluate mechanical restoration of priority sloughing banks. LWD placement opportunities to diversify riparian component.
20				
21				
22				
23	Fair-view	US Forest Service parcel between RM 21.9 and 22.9	US Forest Service parcel that is fully fenced. No grazing, except occassional trespass.	Conditions generally good. Conifer restoration opps. LWD placement opportunities to diversify riparian component.
24	Kelsey Reach	From Fairview Parcel (RM 21.9) and below Brush Creek confluence (RM 29.4)	Historic forestry impacts in some locations, and significant grazing. Reduced shrubs and conifers in reach, and moderate sloughing stream banks.	Improved grazing management, conifer/shrub restoration, and evaluate mechanical restoration of priority sloughing banks. LWD placement opportunities to diversify riparian component.
25				
26				
27				
28				
29				
30	Upper Wolf Reach	From Brush Creek confluence (RM 29.4) upstream to the headwaters ~RM 38	Conditions generally near natural physical potential, and very light grazing impacts. Roads are generally away from stream.	Few restoration actions identified. Evaluate riparian and channel restoration actions where rock placed near west/south portal during railroad relocation. LWD placement opportunities to diversify riparian component.
31				
32				
33				
34				
35				
36				
37				
38				

To address sediment and temperature load allocations along Wolf Creek, forest land managers (US Forest Service, Plum Creek, and Montana DNRC) will work through the existing grazing cooperative to promote improved range management with the common leaseholder, with special focus on the mainstem. This will include development of a professionally-prepared Range Management Plan prior to the 2016 grazing season. The outcome of this effort is expected to include improved rotation through defined pastures, periodic rest, improved off-channel water source development, increased monitoring, and perhaps targeted fencing to address specific "hot spots".

Specific grazing management actions to reduce sediment and temperature loads to Wolf Creek include:

1. In the Betts Lake reach, the Lincoln County Conservation District and NRCS will seek to work with landowners on improved stream management where other private lands border the stream.

2. Maintain existing cattle fence exclosures in the drainage. This will largely be done by the grazing leaseholder with oversight by forest landowners. These fenced exclosures include:
    a. Jurassic Park exclosure on mainstem Wolf Creek above Little Wolf confluence (RM 16.0 – 18.6).
    b. Fairview exclosure on mainstem Wolf Creek (RM 21.9 - 22.9).
    c. Plum Creek NFHCP research exclosure on mainstem Wolf Creek (RM25.5 – 25.7).
    d. Other tributary and wetland exclosures, including Dry Forks, North Syrup, Brush, and Kavalla.
    e. Maintain effective cattle fencing along the BNSF rail corridor, including gates. This is important to prevent livestock loss and to restrict cattle access to Wolf Creek in some reaches.

3. Consider new fenced cattle exclosures in the drainage. Priorities for consideration would include site-specific "hot spot" locations in the following reaches:
    a. Betts Lake Reach along mainstem Wolf: RM 18.6 – 21.9 (above Jurassic Park and below Fairview).
    b. Redemption Reach along mainstem Wolf: RM 12.9 – 16.0 (above Syrup-Redemption Bridge and below Jurassic Park).

Specific to water temperature, the following restoration actions will be taken:

1. Conifer and/or shrub restoration will be undertaken along Wolf Creek to improve shading for the benefit of reduced water temperature. There are some significant segments of Wolf Creek that are at or near their natural shade potential, which could be conifers or shrubs. However, there are other segments where existing shade is a departure from the natural physical potential. To this end, the following restoration actions will be undertaken:
    a. Conifers and/or shrub restoration actions should be undertaken along Wolf Creek. Initially this will take the form of pilot efforts to determine the most successful approaches before being scaled-up to longer reaches. Additionally, priority will be given to treatments on the south side of Wolf Creek that should have greater shading benefit. Specific priority reaches include:
        i. Redemption Reach
        ii. Fairview Reach
        iii. Kelsey Reach
    b. Explore opportunities for conifer restoration opportunities on BNSF land near south portal area where tunnel material was wasted in the floodplain.

c. Examine impacts associated with railway relocation on stream channel morphology and water temperature. Of particular focus will be grade control structures installed on relocated segments of Wolf Creek.

Specific to sediment, the following restoration actions will be taken:

1. Where road sediment reduction opportunities exist, forest landowners will prioritize these for corrective action. Known issues include:
    a. Culvert upgrades on USFS roads tributary to Wolf Creek, including culverts in Weigel Creek, Calx Creek, and Tamarack Creek.

2. Streambank Erosion – Explore options for streambank bioengineering of priority streambanks. Priority reaches include Betts Lake, and to a lesser extent, Kelsey.

3. Beaver Management – Explore options to promote beaver populations in the watershed to increase groundwater and surface water storage to help maintain instream flow during the dry months.

4.2.6.1 Wolf Creek Priority Tributaries

Priority tributaries to Wolf Creek identified during community and stakeholder meetings include Weigel Creek, Calx Creek and Tamarack Creek (Calx Creek tributary). Culvert removal is a priority for Weigel Creek, while culvert upgrades are a priority for Calx Creek and Tamarack Creek (**Table 4-29**). These actions address sediment impairments.

Table 4-29. Wolf Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Weigel Creek	Culvert removal	Sediment
Calx Creek	Culvert upgrade	Sediment
Tamarack Creek	Culvert upgrade	Sediment

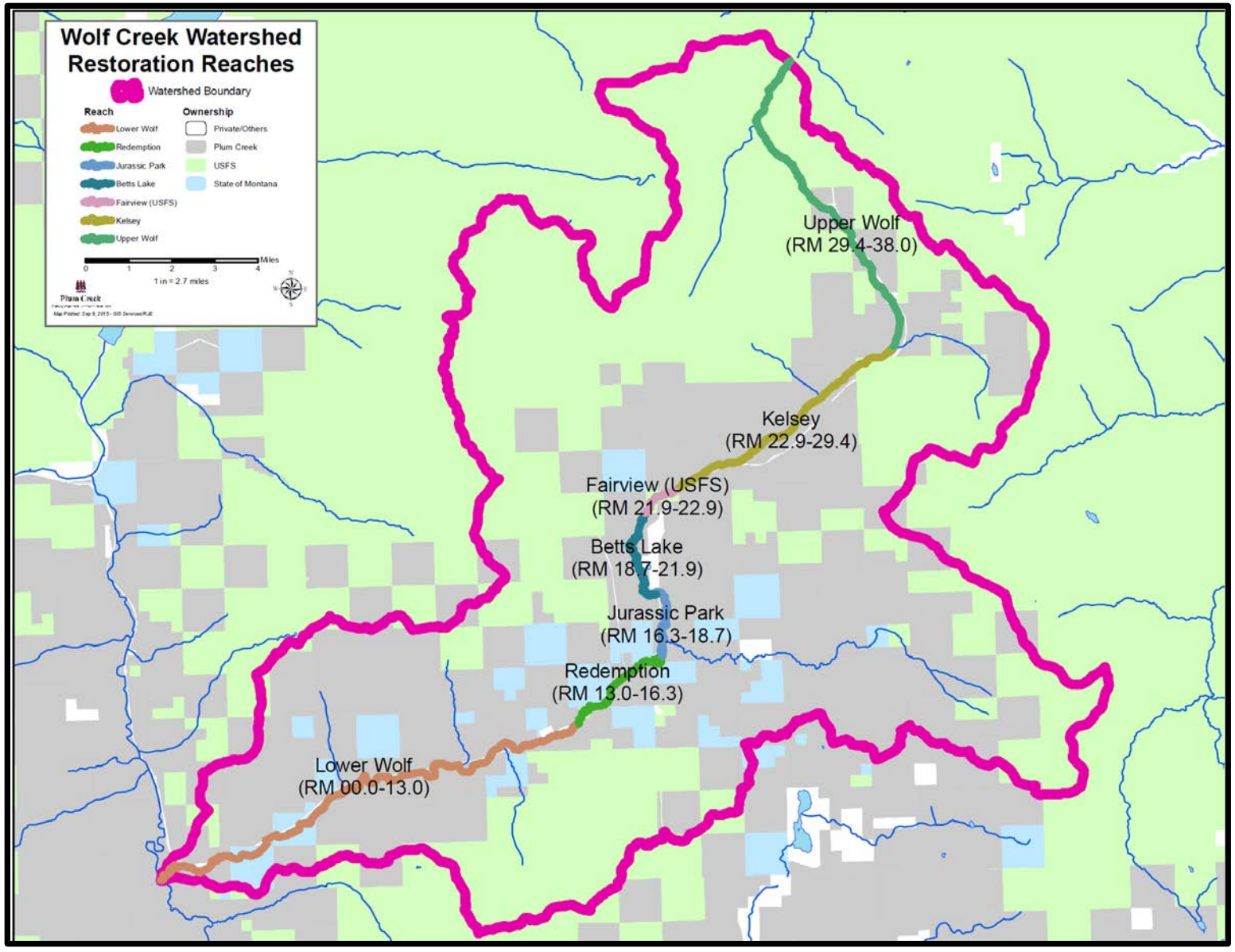

Figure 4-4. Wolf Creek Restoration Reaches

4.2.7 Other Priority Streams within the Middle Kootenai River Watershed

Numerous other streams are prioritized by watershed stakeholders in the Middle Kootenai River watershed, with many of the projects addressing sediment loading to streams from unpaved roads and restoration of natural channel processes (**Figure 4-5**). Priority project types include riparian revegetation, streambank bioengineering, channel restoration, culvert and bridge replacements, road storage and decommissioning, and beaver relocation (**Table 4-30**). For the US Forest Service, a priority project involves Dunn Creek, for which the Kootenai National Forest has developed a conceptual restoration strategy to reduce sediment and improve natural channel dynamics. Potential projects within the Dunn Creek watershed include streambank bioengineering and active channel restoration at several sites, along with road relocation and stream crossing upgrades (Kootenai National Forest 2013). In addition, several projects are planned by the US Corps of Engineers on the Kootenai River mainstem starting in September 2015, including: 1) add a boulder field to increase habitat complexity downstream of Libby Dam, 2) three engineered log jams at the mouth of Dunn Creek, and 3) streambank bioengineering at the mouth of Dunn Creek (Greg Hoffman, US Army Corps of Engineers, personal communication, 2015). Within the Middle Kootenai River watershed, the Fisher River is considered impaired due to high flow regime, while the Kootenai River is considered impaired due to flow alterations and both are considered to be critical bull trout habitat (USFWS 2010).

Table 4-30. Other Priority Streams in the Middle Kootenai River Watershed

Stream	Project / Activity	Pollutant Addressed
Kootenai River	Restore riparian functionality and large wood debris dynamics	Sediment
Dunn Creek	Streambank bioengineering and road relocation	Sediment
Pipe Creek	Streambank bioengineering at MP15.5	Sediment
	NFSR 471 bridge replacement	Sediment
	NFSR 336 convert to trail	Sediment
	Loon Lake NFSR 471 culvert replacement	Sediment
	Road storage/decommissioning	Sediment
	Address failing dike constructed in 1956	Sediment
	Beaver relocation	N/A
Quartz Creek	NFSR 600 culvert replacement	Sediment
	Beaver relocation	N/A
Hennesey Creek	NFSR 332 culvert replacement	Sediment
Flower Creek	Streambank bioengineering	Sediment
South Fork Flower Cr	NFSR 128 and NFSR 4729 culvert outlet rocks	Sediment
Fisher River	Meander reconnection and stream restoration	Sediment
Silver Bow Creek	NFSR 148 culvert replacement	Sediment
Silver Butte Creek	NFSR 148 culvert replacement on tributaries	Sediment
Baree Creek	NFSR 148 culvert replacement	Sediment
Iron Meadow Creek	NFSR 148 culvert replacement	Sediment
Porcupine Creek	NFSR 148 culvert replacement	Sediment
Crystal Creek	NFSR 6734 culvert replacement	Sediment
Miller Creek	Large woody debris (LWD) placement	N/A
Smoke Creek	NFSR 763 bridge replacement	Sediment
Cow Creek	NFSR 763 bridge replacement	Sediment
West Fisher Creek	Streambank bioengineering and road relocation	Sediment
Lake Creek	NFSR 231 bridge replacement	Sediment
Trail Creek	NFSR 231 bridge replacement	Sediment

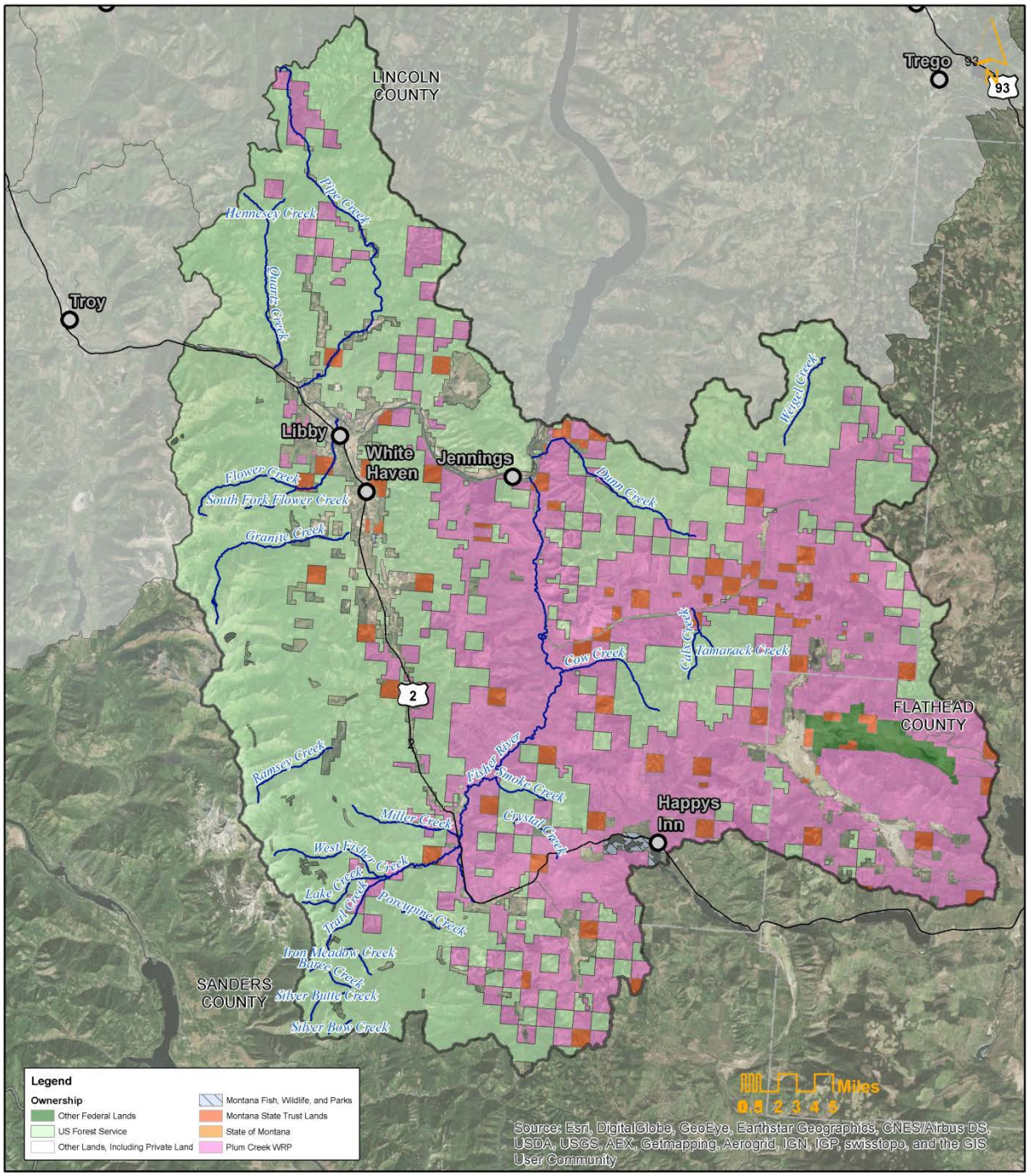

Figure 4-5. Stakeholder Identified Priority Streams in the Middle Kootenai Watershed

4.3 LOWER KOOTENAI RIVER WATERSHED

The Lower Kootenai River watershed extends from Kootenai Falls downstream to the Montana border and includes the Lake Creek watershed and the Stanley Creek watershed within the Kootenai TPA, along with the mainstem of the Kootenai River and its tributary streams (**Figure 4-6**). Within The Lower Kootenai River watershed, there are TMDLs for Lake Creek and Stanley Creek.

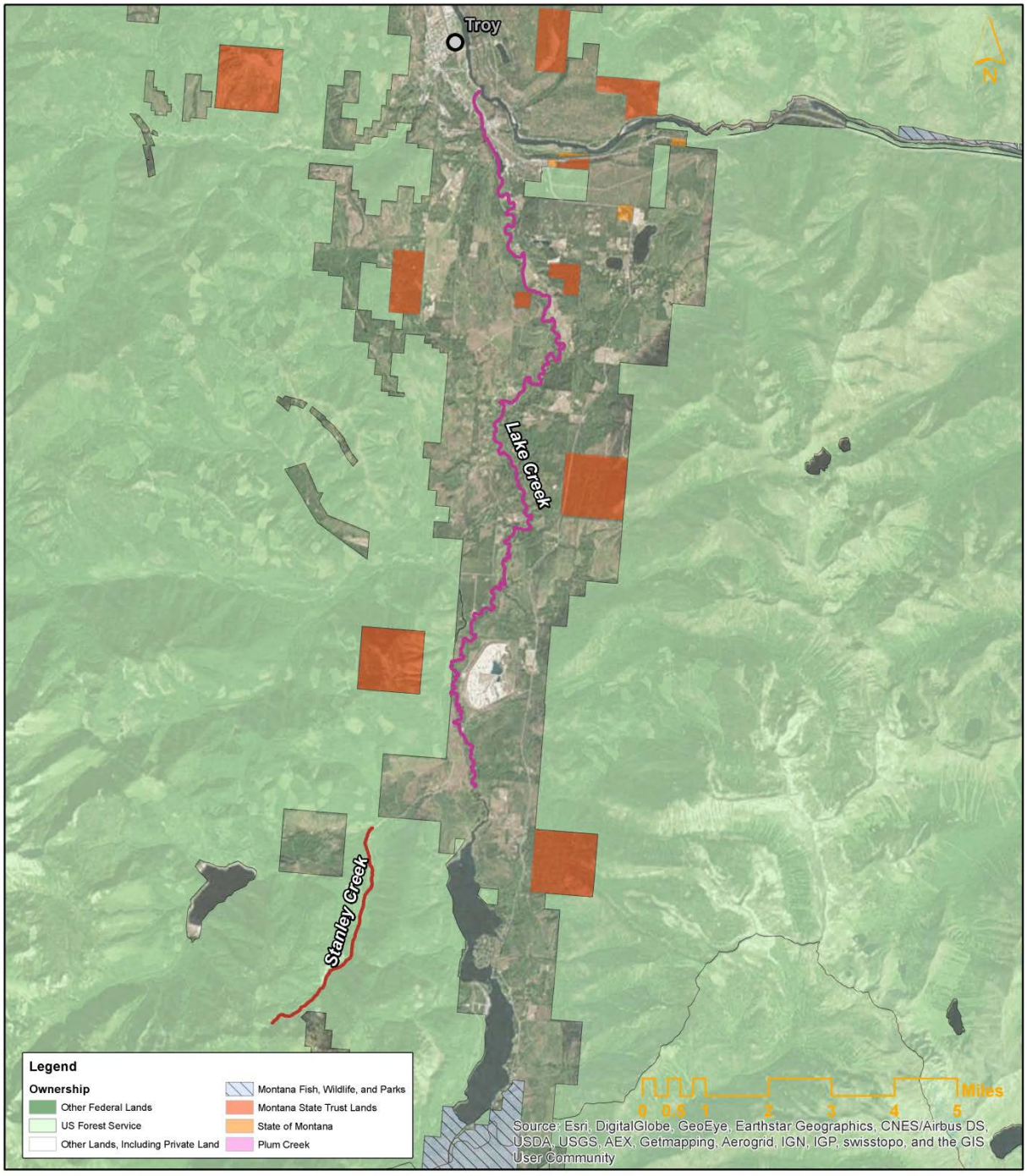

Figure 4-6. Lower Kootenai Watershed Impaired Stream Segments

4.3.1 Lake Creek

Lake Creek has TMDLs for sediment, nitrate+nitrite, copper, and lead completed in 2014 (**Table 4-31**). The US Forest Service manages much of the Lake Creek watershed, though the valley bottom is mostly in private ownership, which includes the Troy Mine. In late 2012 following completion of an EIS, the US Forest Service and Montana DEQ approved the Record of Decision (ROD) for a modification to the Troy Mine Plan of Operations which updated the required Reclamation Plan. The ROD specifies detailed reclamation activities for Troy Mine facilities that, although the details of this plan are not yet finalized, will likely result in long term reductions of pollutant loading to the Lake Creek Watershed (including Stanley Creek).

Sediment sources to Lake Creek include inputs from eroding streambanks, which are comprised of fine grained glacial-till, glacial outwash and lacustrine material, along with contributions from unpaved roads in tributary watersheds (DEQ 2014b). For Lake Creek, the TMDL document emphasizes reducing sediment inputs from unpaved roads and human caused streambank erosion (DEQ 2014b).

Nitrate+nitrite sources within the Lake Creek Watershed include residual nitrate+nitrite sources associated with the mining operations and the use of explosives to extract mineral ores, the natural or background sources, rural residential development, and timber management within the watershed. With the discontinued operation of the Troy Mine, nitrate+nitrite sources associated with mining operations should be reduced over time since the use of explosives will no longer occur. This reduction will most likely occur within the Stanley Creek Watershed (see Section 4.3.2 below). Fairway Creek (a tributary to Stanley Creek) also contributes to the overall nitrate+nitrite levels within the watershed of which the exact source is not known. The remaining most effective treatable sources of nitrate+nitrite within the Lake Creek watershed are control of nutrients associated with rural residential development and timber harvest. Treatments of these sources will require an effective education and outreach program to educate landowners within the watershed about proper septic system maintenance and the continuing application of effective Forestry BMPs associated timber harvest activities.

During TMDL development, the highest observed concentrations of metals within Lake Creek were measured during relatively high stream discharge events, and are therefore likely associated with metals in the stream sediments. Additional sources of metals impairment within the Lake Creek Watershed may include contributions from historic mining activity (especially the North Fork Keeler Creek and the Copper Creek watersheds) and recent mining in the Stanley Creek watershed (DEQ 2014b). Past and recent operation of the Troy Mine in the Stanley Creek drainage has been a source of metals loading to Lake Creek. The contribution of historic mines in Lake Creek tributaries to current levels of metals in Lake Creek is unknown and should be further investigated through expanded water quality monitoring. Low flow adit discharges were noted at abandoned mines in the North Fork Keeler Creek and Copper Creek watersheds (MBMG 1999).

As restoration projects are implemented to reduce pollutant loads to Lake Creek, it should be noted that this watershed restoration plan does not have regulatory or enforcement authority over any entity and that implementation of treatments to address non-point sources of pollution are voluntary.

Table 4-31. Lake Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction		Project Types / Treatments
		High Flow	Low Flow	
Lake Creek, Bull Lake outlet to mouth (Kootenai River)	Sediment	14%		Streambank Bioengineering and Revegetation
				Riparian Buffer Enhancement
				Unpaved Road Improvements
				Stabilize Areas of Mass Wasting
				Forestry BMPs
	Nitrate + Nitrite	28%		On-site Subsurface Wastewater Treatment System Upgrades
				Forestry BMPs
				Education and Outreach to encourage landowners to voluntarily comply with nutrient reduction efforts
	Copper	88%	20%	Abandoned Mine Reclamation and associated continued water quality monitoring
	Lead	93%	0%	

Input collected during public meetings, stakeholder interviews, and from the TMDL document recommends the following water quality restoration actions to address sediment, metals, and nutrient impairments to Lake Creek as listed in **Table 4-32**.

Table 4-32. Lake Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Lake Creek	Streambank bioengineering, revegetation and riparian buffer enhancement along mainstem	Sediment, Nutrients
	Baseline survey to map streambank erosion and riparian conditions	Sediment, Nutrients
	Stabilize sloughing hillslope/streambank upstream of the Chase Cutoff road crossing	Sediment
	Assess fish distribution and State Highway/County road culvert barriers on Falls Creek, Porcupine Creek, Twin Creek, Camp Creek, Dry Creek, Crowell Creek, Iron Creek, and Copper Creek	N/A
	Education and outreach regarding riparian buffers	Sediment, Nutrients
	Obtain conservation easements along mainstem	Sediment, Nutrients
	Mine adit, mill site, and road reclamation at the Troy Mine	Metals, Sediment
	Investigate the efficacy of the past and current sediment sampling throughout the watershed with respect to quantifying metals concentrations and identifying locations of concern. Continue to monitor water quality, and include sampling of stream sediments to assess metal content.	Metals, Sediment

Restoration actions to reduce sediment loading to Lake Creek include:

- Conduct baseline survey of Lake Creek to map streambank erosion and riparian conditions
- Address sediment inputs from streambank erosion along Lake Creek, where the banks are comprised of fine-grained glacial till, glacial outwash, and lacustrine material
- Stabilize sloughing hillslope/streambank upstream of the Chase Cutoff road crossing
- Replace culverts on tributaries along county roads and Highway 56 to provide or prevent fish passage as determined by fisheries specialists
- Continued application of BMPs to unpaved roads, including culvert replacements
- Riparian buffer enhancement along Lake Creek where historic timber lands are being converted to rural residential development
- Seek to obtain conservation easements on private land along Lake Creek and its tributaries

Restoration actions to reduce metals loading to Lake Creek include

- Mine facility reclamation at the Troy Mine
- Investigate the efficacy of using sediment sampling to identify locations within the watershed with elevated sediment metal concentrations. This technique should also be accompanied with continued water quality monitoring within the watershed to determine trends.

Restoration actions to reduce nutrient loading to Lake Creek include:

- Over time, nitrate+nitrite concentrations in Lake Creek are expected to dissipate since nitrate-containing explosives will no longer be used due to the Troy Mine closure. Most of these reductions within the Lake Creek watershed will likely occur in the Stanley Creek drainage (see description in Section 4.3.2).
- Conduct education outreach to landowners along Lake Creek to change practices to reduce nutrient loading and identify septic improvement projects through outreach efforts.

4.3.1.1 Bull Trout Population Enhancements

Within the Lake Creek watershed, the US Fish and Wildlife service considers Lake Creek, Keeler Creek, North Fork Keeler Creek, and South Fork Keeler Creek to be critical bull trout habitat and restoration and conservation of bull trout spawning sites in the Keeler Creek watershed is a stakeholder priority (USFWS 2010). Bull trout embryos, alevins, and juveniles are closely associated with stream bottom substrates in headwater streams (Rieman and McIntyre, 1993) and adults select spawning sites in stream areas with large gradients of shallow groundwater and surface water exchange (Baxter and Hauer, 2000). Increased sediment loading to headwater streams could therefore discourage adult bull trout from spawning if sedimentation inhibits hyporheic exchange. In addition, excess sediment may reduce interstitial spaces in coarse substrates thereby reducing oxygen and nutrients for embryos and alevins and reducing space and cover for juveniles. Restoration actions which will minimize sediment loading to Lake Creek and Keeler Creek would be particularly beneficial for bull trout populations in those systems. Survival of juvenile bull trout appears to be negatively affected by channel instability and by large variability in bed load movements (Rieman and McIntyre, 1993). Thus, the projects in Lake and Keeler creeks which will stabilize the stream channel, and increase riparian growth and buffer areas will likely improve juvenile

bull trout survival. Finally, bull trout are also strongly associated with low water temperatures. Optimum rearing temperatures of approximately 7-8°C and temperatures >15°C limit bull trout distribution overall (Rieman and McIntyre, 1993). All projects which reduce water temperatures will therefore improve bull trout habitat. In addition, bull trout are highly sensitive to metals and reduced metal concentrations in the streams would benefit these populations as well.

4.3.1.2 Lake Creek Priority Tributaries

Priority tributaries to Lake Creek identified during community and stakeholder meetings include Ross Creek, Camp and Madge creeks, and Keeler Creek (including North Fork Keeler, South Fork Keeler, and West Fork Keeler), Benning Creek, Halverson Creek, Cheer Creek, and Cliff Creek (**Table 4-33**). Road relocation, storage and decommissioning is a main priority for Lake Creek tributaries, along with protecting bull trout spawning sites in Keeler Creek and the North Fork Keeler Creek. In addition, upgrading the existing series of multiple culverts on Forest Road 4626 where it crosses Camp Creek with a bridge would reduce the risk of future sediment inputs due to culvert failure. Within the Lake Creek watershed, Keeler Creek is considered impaired due to low flow alterations and physical substrate alterations, while Dry Creek is considered impaired due to flow regime alterations and physical substrate alterations.

Table 4-33. Lake Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Camp Creek	Replace series of multiple culverts on NFSR 4626 crossing	Sediment
Camp Creek and Madge Creek	Road storage/decommissioning (2.7 miles, 9 crossings)	Sediment
Keeler Creek	NFSR 473 relocation (dependent on suitable location)	Sediment
	NFSR 473 repave above MP 9	Sediment
	Assess bull trout spawning/rearing habitat restoration potential	N/A
North Fork Keeler Creek	Investigate conservation easement potential with private landowners	Sediment, Nutrients
Cheer Creek	Road storage/decommissioning (17.2 miles, 30 crossings, 12 mass wasting sites)	Sediment
Halverson Creek		
Cliff Creek		
West Fork Keeler Creek	Road storage/decommissioning (16.3 miles, 38 crossings, 11 mass wasting sites)	Sediment
Benning Creek		
Iron Creek	Work with private landowners and Lincoln County to upgrade culverts on stream crossing and improve riparian management	Sediment, Nutrients

4.3.2 Stanley Creek

Stanley Creek has TMDLs for copper, lead, zinc, and nitrate+nitrite (**Table 4-34**). For metals, the Troy Mine and other abandoned historic mining operations were cited in the TMDL document as the major metals sources in the Stanley Creek watershed (DEQ 2014b). The US Forest Service manages the majority of the Stanley Creek watershed, though there is some private land as well. In late 2012 following completion of an EIS, the US Forest Service and Montana DEQ approved the Record of

Decision (ROD) for a modification to the Troy Mine Plan of Operations which updated the required Reclamation Plan. The ROD specifies detailed reclamation activities for Troy Mine facilities that, although the details of this plan are not yet finalized, will likely result in long term reductions of metals within the Stanley Creek watershed.

Monitoring conducted to facilitate the development of the metals TMDL indicates that the highest metals concentrations occurred during periods of high flow, suggesting that metals are bound to sediment deposits that are mobilized during high flow events. Sources of these sediments include: 1) a 1996 slump and debris avalanche at the mine fillslope that deposited large amounts of sediment throughout the length of Stanley Creek and possibly Lake Creek, 2) two tailings pipeline ruptures that spilled tailings into Stanley Creek and one of its tributaries, and 3) an unvegetated waste rock dump in the headwaters of Stanley Creek. Sediment deposits from these events remain visible as a cohesive layer of silt in slower waters areas of Stanley Creek (DEQ 2014b). There are also two abandoned underground lode mines within the Stanley creek watershed that should be assessed to quantify the contribution of each to the metal impairment within the watershed.

For nutrients, nitrate+nitrite nitrogen concentrations in Stanley Creek are higher in the upstream reaches and noticeably decrease at the mouth (DEQ 2014b) (**Table 4-34**). Based on the known elevated levels of NO_3+NO_2 in mine water due to blasting and the existence of fractured bedrock in upper Stanley Creek loading via groundwater from the mine void appears to be the dominant human source of NO_3+NO_2 to Stanley Creek above its confluence with Fairway Creek. Limited sampling data of headwater tributaries of Stanley Creek validate this conclusion, but also indicate natural background concentrations may be contributing to the observed nitrate exceedances (DEQ 2104b). Blasting operations ceased with the initiation of the closure of the Troy Mine in February 2015 and consequently the mine will not be a source of nitrates to Stanley Creek in the future.

Fairway Creek is the major tributary to Stanley Creek, with an average measured flow of 66 cfs (Troy Mine Data, 1985-2009). Although upper Stanley Creek tends to have higher and more frequent spikes in nitrate concentrations, Fairway Creek also has high nitrate values at times. Stanley Creek receives most of its flow from Fairway Creek and is usually intermittent upstream of the confluence during summer months (DEQ 2014b). As a result, Fairway Creek's input dominates the nitrate load downstream of its confluence with Stanley Creek (DEQ 2014b). It is unlikely that the Troy Mine has an impact on Fairway Creek nitrate concentrations, as there are no known fractures or faults draining from the Troy Mine vicinity to Fairway Creek (Wayne Jepson, Montana DEQ, personal communication 11/20/2013). The only other known potential anthropogenic nitrate source in Fairway Creek is timber harvest. It is possible that there are unknown human sources in Fairway Creek, or that the Fairway Creek watershed has a naturally high nitrate load. Future monitoring is recommended in this watershed to better define sources (DEQ 2014b).

As restoration projects are implemented to reduce pollutant loads to Stanley Creek, it should be noted that this watershed restoration plan does not have regulatory or enforcement authority over any entity and that implementation of treatments to address non-point sources of pollution are voluntary.

Table 4-34. Stanley Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL		Project Types / Treatments
		High Flow	Low Flow	
Stanley Creek, headwaters to mouth (Lake Creek)	Nitrate + Nitrite	86% upstream of Fairway Creek and 50% downstream of Fairway Creek		Troy Mine Reclamation and associated continued water quality monitoring
				Forestry BMPs
	Copper	0%	68%	Troy Mine Reclamation
	Lead	0%	39%	
	Zinc	0%	84%	

In addition to those proposed activities listed in **Table 4-34**, several additional activities were identified during the watershed stakeholder interviews and meetings. These included: removal of mine tailings from Stanley Creek, replacement of the double culvert located where Forest Road 4626 crosses Stanley Creek, and traction sand BMPs on Forest Road 4626, particularly at stream crossings (**Table 4-35**).

Table 4-35. Stanley Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Stanley Creek	Mine adit, mill site, and road reclamation at the Troy Mine	Metals, Sediment
	Implement BMPs during mill site reclamation	Metals, Sediment
	Replace double culvert at NFSR 4626 and apply traction sand BMPs on this road	Sediment

Restoration actions to reduce metals loading to Stanley Creek include:

- Stabilize and vegetate mine fillslope/waste rock area to curtail continued sediment and metals loading

Restoration actions to identify and reduce nutrient loading to Stanley Creek include:

- Additional water quality monitoring to determine natural background concentrations and sources of nitrate+nitrite nitrogen in the Stanley Creek and Fairway Creek watersheds

4.3.3 Other Priority Streams within the Lower Kootenai River Watershed

Other priority streams within the Lower Kootenai River watershed identified during community and stakeholder meetings include O'Brien Creek and Callahan Creek, along with the mainstem of the Kootenai River (**Figure 4-7**). The Kootenai River is considered impaired due to flow regime alterations and temperature between Libby Dam and the Yaak River. For O'Brien Creek, restoration priorities

identified by the Kootenai National Forest include addressing fine sediment in spawning gravels and fencing, livestock access, and streambank revegetation. The US Fish and Wildlife Service have identified Callahan Creek, O'Brien Creek and the Kootenai River, along with both North Callahan Creek and South Callahan Creek, as critical bull trout habitat (USFWS 2010).

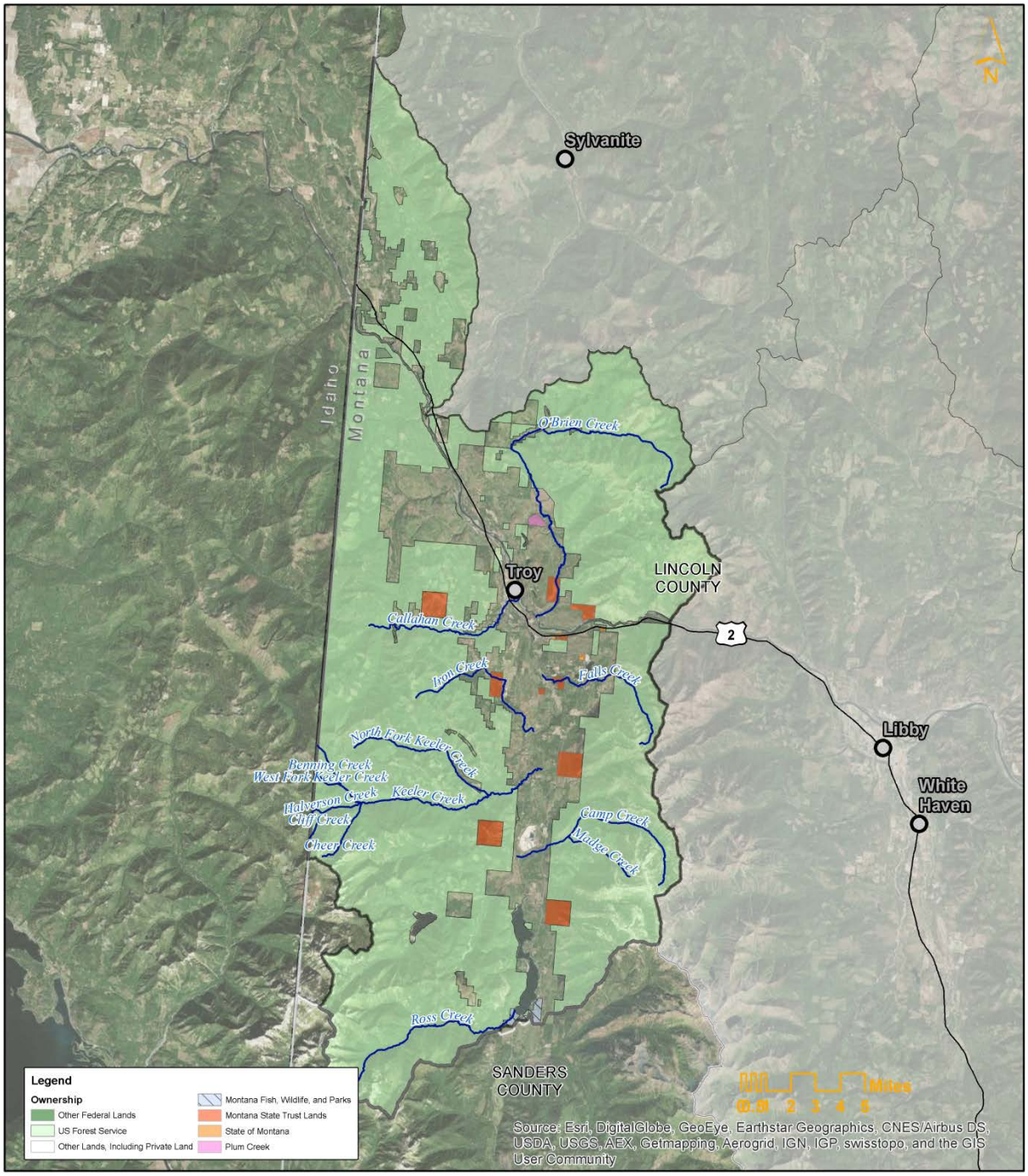

Figure 4-7. Stakeholder Identified Priority Streams in the Upper Kootenai Watershed

4.4 YAAK RIVER WATERSHED

The Yaak River watershed aligns with the Yaak River TPA. Impaired stream segments with TMDLs within the Yaak River watershed include the East Fork Yaak River, Lap Creek, Seventeenmile Creek, and the South Fork Yaak River (**Figure 4-8**).

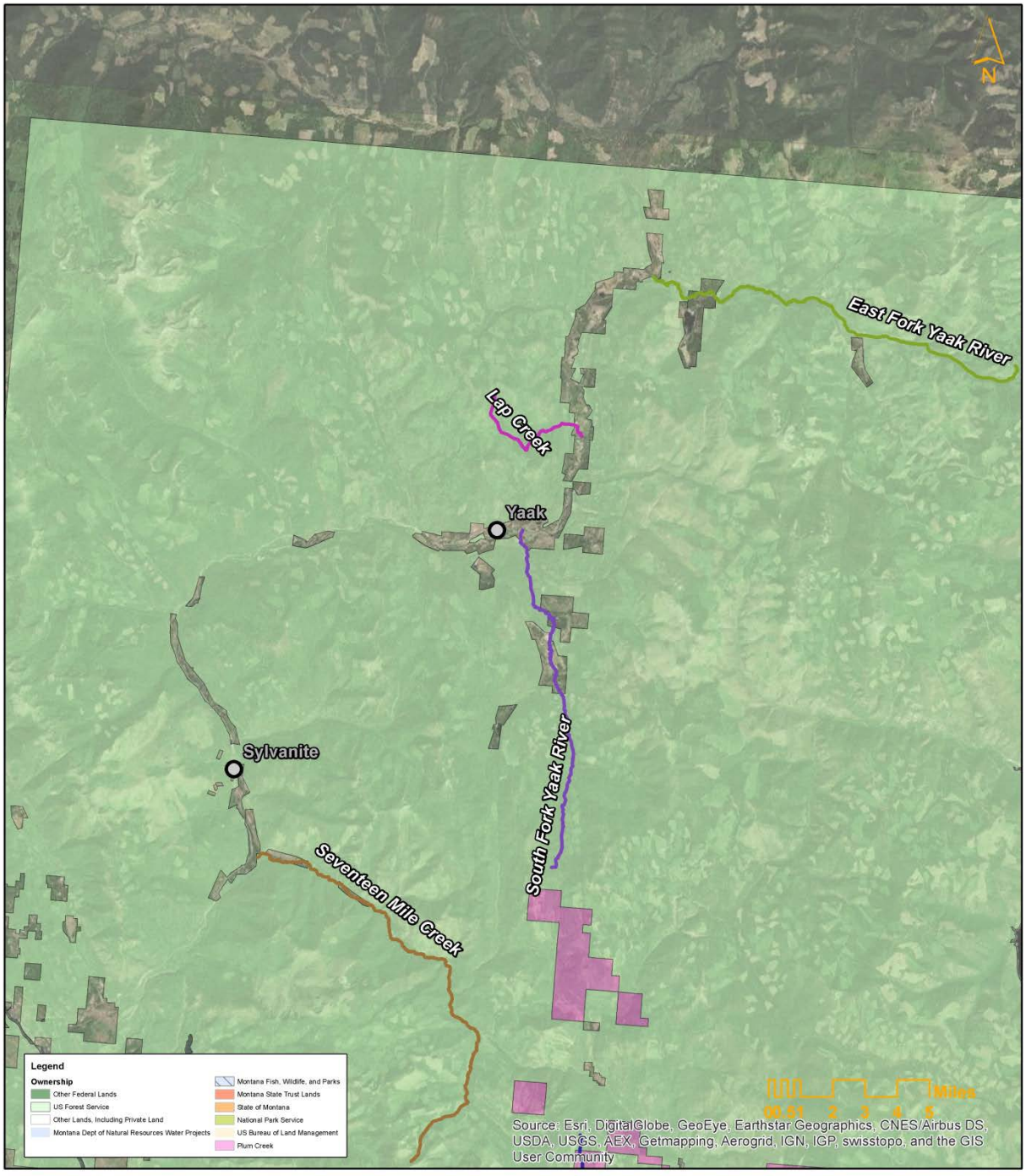

Figure 4-8. Yaak River Watershed Impaired Stream Segments

4.4.1 East Fork Yaak River

The East Fork Yaak River has a TMDL for nitrate+nitrite completed in 2014 (**Table 4-36**). The US Forest Service manages the majority of the East Fork Yaak River watershed, though there is some private land along the river as well. None of the water samples collected between 2003 and 2013 exceeded the nitrate+nitrite target value, though biometric criteria were exceeded downstream of Basin Creek (DEQ 2014c). Therefore, there is no load reduction required by the TMDL. However, additional water column and biological sampling is recommended near the mouth, springs and groundwater to help refine the impairment causes and sources (DEQ 2014c).

Table 4-36. East Fork Yaak River Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
East Fork Yaak River, headwaters to mouth (Yaak River)	Nitrate + Nitrite	0%	No load reduction required, but additional monitoring is recommended

4.4.2 Lap Creek

Lap Creek has a TMDL for sediment completed in 2008 (**Table 4-37**). In the Lap Creek watershed, nearly all roads have been closed in the Grizzly Bear Core Management Area (GCMA) since the early 1990's (DEQ 2008). The US Forest Service manages the majority of the Lap Creek watershed, though there is some private land in the valley bottom near the mouth. A Sediment Source Survey conducted by the Yaak Headwaters Restoration Partnership (YHRP) in 2006 at 22 stream crossings found that all but one crossing (where Lap Creek crosses the main Yaak River road) had been closed to motorized use. In addition, the YHRP walked the entire stream and no streambank or hillslope erosion sites were observed. The TMDL calls for a small reduction in sediment loading, which can most likely be achieved by addressing the remaining sediment issues arising from the historic road network.

Table 4-37. Lap Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Lap Creek, headwaters to mouth (Yaak River)	Sediment	2.0%	Unpaved Road Improvements

Focus areas to address sediment impairments in Lap Creek identified by watershed stakeholders include removal or replacement of culverts on Forest Road 5882B and 5882C that are undersized culverts at risk of washing out and also fish passage barriers (**Table 4-38**). A fish passage barrier culvert on Forest Road 92, which is the main road up the Yaak, isolates the westslope cutthroat trout population in Lap Creek. Focus areas to address sediment impairments in Lap Creek identified in the TMDL document also emphasize unpaved road improvements, including culvert replacements (DEQ 2008).

Table 4-38. Lap Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Lap Creek	NFSR 5882B and NFSR 5882C replace or remove WCT fish barrier culverts	Sediment

4.4.3 Seventeenmile Creek

Seventeenmile Creek has a TMDL for sediment completed in 2008 (**Table 4-39**). The US Forest Service manages the entire watershed with the exception of 330 acres of private land along the lower section of Seventeenmile Creek. In the Seventeenmile Creek Watershed, many roads have been closed in the Grizzly Bear Core Management Area (GCMA) (DEQ 2008). A Sediment Source Survey was conducted by the Yaak Headwaters Restoration Partnership (YHRP) in 2005 and 2006 at over 130 stream crossings. In addition, the YHRP walked the entire stream and identified three natural hillslope failure sites in the lower watershed (DEQ 2008). For Seventeenmile Creek, the TMDL was prepared due to elevated surface fines on the streambed (DEQ 2008).

Table 4-39. Seventeenmile Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
Seventeenmile Creek, headwaters to mouth (Yaak River)	Sediment	2.6%	Unpaved Road Improvements

Focus areas to address sediment impairments in Seventeenmile Creek identified by watershed stakeholders include removal or replacement of culverts that are fish passage barriers, road storage and decommissioning, stream crossing restoration, and the re-introduction of beaver (**Table 4-40**). Focus areas to address sediment impairments in Seventeenmile Creek identified in the TMDL document also emphasize unpaved road improvements, including culvert replacements (DEQ 2008).

Table 4-40. Seventeenmile Creek Priority Projects

Stream	Project / Activity	Pollutant Addressed
Seventeenmile Creek	NFSR 4681E culvert removals	Sediment
	NFSR 4654E culvert removals	Sediment
	NFSR 471 apply BMPs or decommission middle segment	Sediment
	Pave approaches to County Road 176 bridge	Sediment
	Remove culvert from washing out on upper Seventeenmile	Sediment
	Road storage/decommissioning in upper watershed	Sediment
	Apply BMPs on NFSR 600 road	Sediment
	Beaver relocation	N/A

4.4.3.1 Seventeenmile Creek Priority Tributaries

Priority tributaries to Seventeenmile Creek identified during community and stakeholder meetings include Big Foot Creek, Lost Fork Creek, Hemlock Creek, Mule Creek, and Conn Creek (**Table 4-41**). Culvert removal or replacement are priorities in the Seventeenmile Creek watershed to benefit native fish species, while road storage and decommissioning is a priority to reduce sediment loading.

Table 4-41. Seventeenmile Creek Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Big Foot Creek	Road storage/decommissioning	Sediment
	Apply BMPs on NFSR 600	Sediment
Lost Fork Creek	Road storage/decommissioning	Sediment
Hemlock Creek	Road storage/decommissioning	Sediment
Mule Creek	Road storage/decommissioning, including NFSR 6127	Sediment
Conn Creek	Road storage/decommissioning	Sediment

4.4.4 South Fork Yaak River

The South Fork Yaak River has a TMDL for sediment completed in 2008 (**Table 4-42**). The US Forest Service manages the majority of the land in the South Fork Yaak River watershed, though there is some private land along the river as well. In the South Fork Yaak River watershed, many roads have been closed in the Grizzly Bear Core Management Area (GCMA) and considerable BMP activity and road decommissioning work has recently been accomplished (DEQ 2008). A Sediment Source Survey was conducted by the Yaak Headwaters Restoration Partnership (YHRP) in 2004 at 118 stream crossings. In addition, the YHRP walked the entire stream and identified six natural hillslope failure sites in the lower watershed (DEQ 2008). For the South Fork Yaak River, the TMDL was prepared due to elevated surface fines on the streambed (DEQ 2008).

Table 4-42. South Fork Yaak River Restoration Strategies

Stream Segment	Pollutant	Percent Reduction to meet TMDL	Project Types / Treatments
South Fork Yaak River, headwaters to mouth (Yaak River)	Sediment	1.9%	Unpaved Road Improvements

Focus areas to address sediment impairments in South Fork Yaak River identified by watershed stakeholders include removal or replacement of culverts that are fish passage barriers, road storage and decommissioning, stream crossing restoration, paving bridge approaches, and traction sand BMPs at bridge crossings (**Table 4-43**). Focus areas to address sediment impairments in South Fork Yaak River identified in the TMDL document also emphasize unpaved road improvements, including culvert replacements (DEQ 2008).

Table 4-43. South Fork Yaak River Priority Projects

Stream	Project / Activity	Pollutant Addressed
South Fork Yaak River	NFSR 472 pave bridge approaches	Sediment
	NFSR 878 and NFSR 6838 road storage/decommissioning - SE Clay Mountain	Sediment
	Replace or remove WCT fish barrier culverts	Sediment
	Road storage/decommissioning	Sediment
	Evaluate stream culverts for replacement on NFSR 68	Sediment
	Traction sand BMPs at bridge crossings	Sediment

4.4.4.1 South Fork Yaak River Priority Tributaries

Priority tributaries to the South Fork Yaak River identified during community and stakeholder meetings include Smoot Creek, Zulu Creek, Kelsey Creek, Clay Creek, Fowler Creek, Hartman Creek (Fowler Creek tributary), Yodkin Creek (Beaver Creek tributary), and Dutch Creek (Clay Creek tributary) (**Table 4-44**). Culvert removal or replacement are priorities in the South Fork Yaak River watershed to reduce sediment loads from potential culvert failures and to benefit native fish species. However, some culverts are barriers and prevent brook trout from migrating into westslope cutthroat trout habitat and may be desirable.

Table 4-44. South Fork Yaak River Priority Tributaries

Stream	Project / Activity	Pollutant Addressed
Zulu Creek	NFSR 6079 fish barrier culvert replacement	Sediment
	NFSR 6079A on Zulu Creek tributary	Sediment
Kelsey Creek	NFSR 6065B culvert replacement to reduce risk of failure	Sediment
	Construct overflow channel on NFSR 6713 (stored)	Sediment
Clay Creek	Install culvert and drain dip on NFSR 6114D	Sediment
Fowler Creek	NFSR 746 culvert replacement (brook trout above and below)	Sediment
Yodkin Creek	NFSR 6062 fish barrier culvert replacement in WCT watershed	Sediment
Dutch Creek	Fish barrier culvert replacements in WCT watershed	Sediment

4.4.5 Other Priority Streams within the Yaak River Watershed

Numerous other streams are prioritized by watershed stakeholders in the Yaak River watershed, with many of the projects addressing fish passage barriers through culvert removal or replacement and reducing sediment inputs from unpaved forest roads (**Table 4-45** and **Figure 4-9**). In addition, an assessment of streambank erosion and habitat improvement needs along the mainstem of the Yaak River is a priority. The Yaak Valley Forest Council hosts an online database (http://mapinception.com/yahk/) of stream crossings and native fish species distribution within the Yaak River watershed as part of the Yaak Headwaters Restoration Partnership. This database has detailed information regarding stream crossings in the Yaak River watershed, including strategies to restore and enhance fish habitat.

Table 4-45. Other Priority Streams in the Yaak River Watershed

Stream	Project / Activity	Pollutant Addressed
Yaak River	Assessment of habitat improvement needs along mainstem of Yaak River	Sediment
	Bank erosion assessment and restoration prioritization along mainstem of Yaak River	Sediment
	Reed canarygrass mapping	N/A
West Fork Yaak River	NFSR 3388A culvert replacement to reduce risk of failure	Sediment
Bunker Hill Creek	Fish barrier culvert replacements in WCT watershed	Sediment
Turner Creek	Remove or replace culvert to allow fish passage	Sediment
Lang Creek	NFSR 593 and NFSR 6084A culvert replacement for fish passage in brook trout watershed	Sediment
Beetle Creek	NFSR 338 culvert replacement	Sediment
Hensley Creek	NFSR 5874 culvert replacement for fish passage	Sediment
North Creek	NFSR 5924C culvert replacement to reduce risk of failure	Sediment
Large Creek	NFSR 435 culvert replacement for fish passage	Sediment
	NFSR 7483 road storage with culvert removal	Sediment
Runt Creek	NFSR 435 culvert replacement for fish passage	Sediment
Meadow Creek	NFSR 524 culvert removal to prevent failure	Sediment
South Fork Meadow Creek	NFSR 524 culvert replacement for fish passage (2 sites) and NFSR 5971A culvert removal and road storage	Sediment
Red Top Creek	NFSR 393 culvert replacement to reduce risk of failure	Sediment
Grizzly Creek	NFSR 472 culvert replacement for fish passage	Sediment
Arbo Creek	NFSR 176 culvert replacement	Sediment
Kilbrennan Creek	County Road 176 culvert replacement	Sediment
	Beaver relocation	N/A

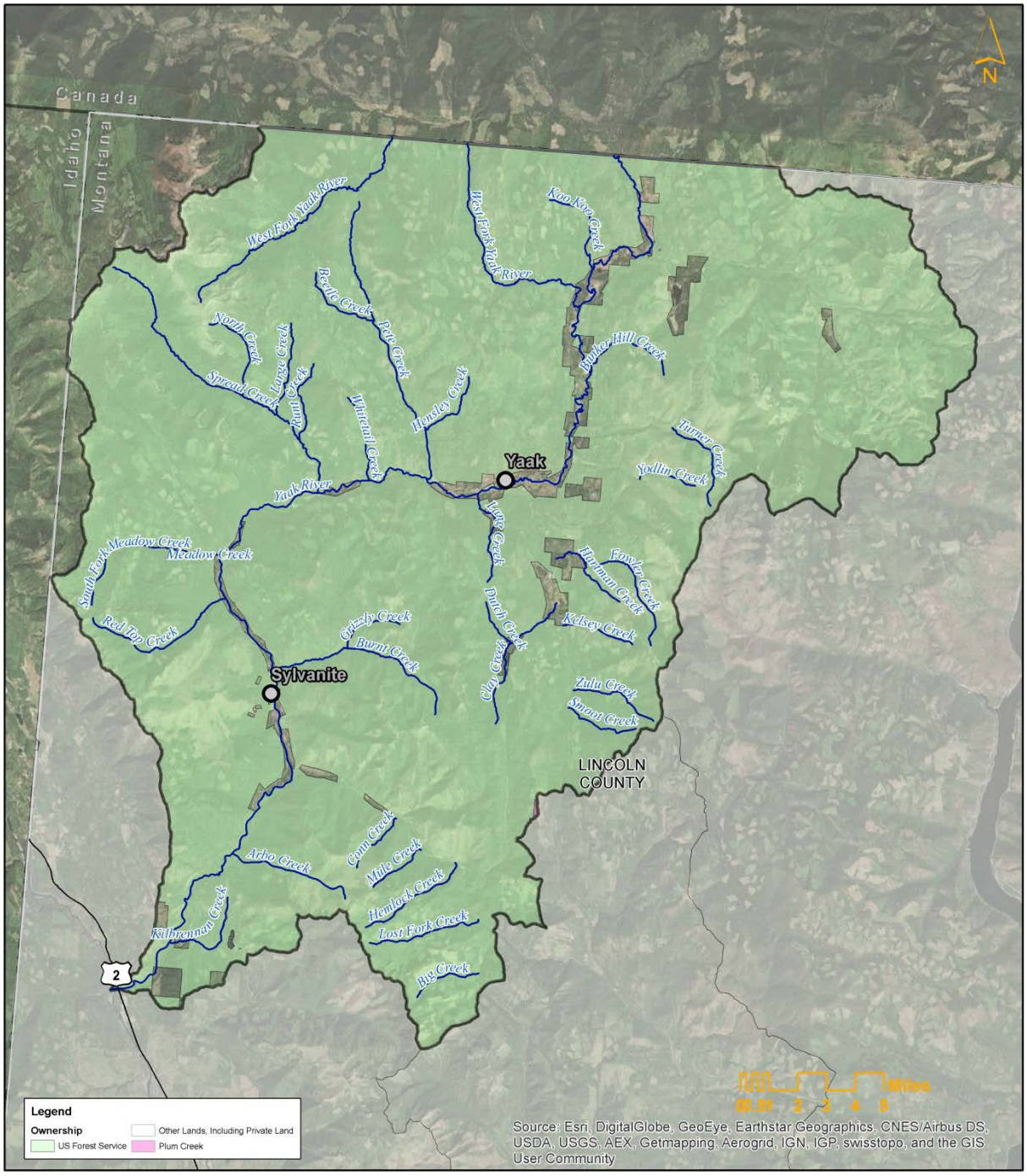

Figure 4-9. Stakeholder Identified Priority Streams in the Yaak River Watershed

5.0 PROJECT PRIORITIZATION AND IMPLEMENTATION

KRN will facilitate the development of projects proposed in this plan in conjunction with partner organizations that are working toward the same goal of water quality improvement in the Kootenai River Basin and removal of impaired stream segments from Montana's list of impaired waterbodies. In aggregate, implementation of priority projects in **Tables 5-1** through **5-4** will provide a significant first step toward improving water quality in the Kootenai River Basin. For each potential improvement project, successful implementation depends on: 1) stream and watershed improvement potential, 2) landowner and community support and 3) availability of necessary resources, as depicted in **Figure 5-1.** Criteria for prioritizing projects include:

- **Stream and Watershed Improvement Potential**
    - Project will improve identified water quality impairments
    - Project will address other watershed restoration priorities such as fisheries, economic use, or recreation
    - Project has a high prospect for success
    - Project clusters that appear likely to improve water quality enough to delist a stream
    - Project can be replicated
    - Project provides educational and outreach opportunities and/or has high visibility
    - Project outcome will inform future decisions and activities

- **Landowner and Community Support**
    - Landowner interest
    - Partners are in place and ready to work
    - Project addresses socio-economic concerns, such as infrastructure safety or access
    - Project promotes community values for streams and wetlands

- **Availability of Necessary Resources**
    - Funding source or sources can be identified
    - Project specifications developed or clear path to development
    - Technical resources available

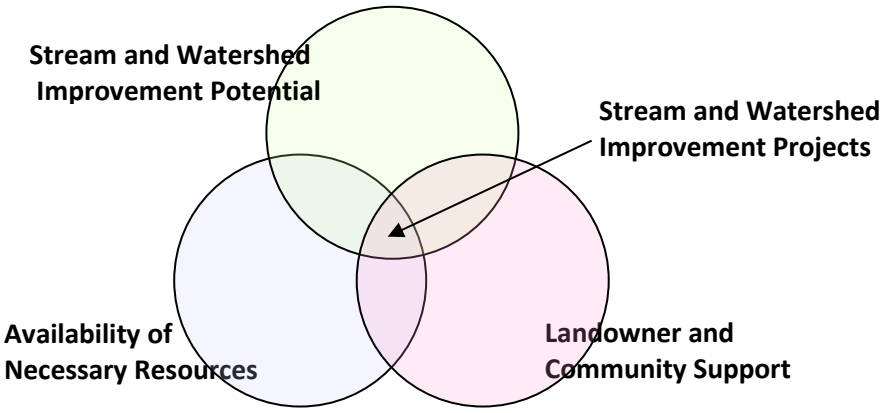

Figure 5-1. Watershed Restoration Project Implementation Prioritization

5.1 PRIORITY PROJECTS AND IMPLEMENTATION SCHEDULE

Due to limited capacity and resources, KRN, in coordination with its partners, expects to implement a portion of these projects in the 2-, 5-, 10- and 20-year timeframe, extending from 2016 through 2036. To evaluate progress, KRN will maintain the project database developed during the WRP process and will update it with information regarding completed projects, project outcomes, and newly identified projects in collaboration with its watershed partners. **Tables 5-1** through **5-4** present a schedule for the implementation of restoration projects for each of the four Kootenai River Basin sub-watersheds that KRN and its partners have identified as important for meeting the goal of improving water quality on impaired stream segments. Implementation of these projects will provide a significant step towards improving water quality in impaired streams so that they fully support all beneficial uses. Project development will depend on the three components identified in **Figure 5-1**, including stream and watershed improvement potential, landowner and community support, and availability of necessary resources. Thus, additional projects will be added and timeframes will be adjusted using an adaptive management approach as projects with landowner and community support are identified and funding is secured. In addition, the projects in **Tables 5-1** through **5-4** mark a starting point for watershed restoration planning. It is anticipated that each successfully implemented project will facilitate further water quality improvements as successful projects are replicated and partnerships develop.

5.1.1 Upper Kootenai River Watershed

As a first step toward improving water quality in the Kootenai River Basin, KRN's project partners at the Lincoln Conservation District plan to pursue a restoration project on the Tobacco River for which preliminary engineering designs have been developed with funding support from Montana DNRC (**Table 5-1**). The Tobacco River has been identified by the US Fish and Wildlife Service as critical habitat for bull trout and reducing sediment loading from streambank erosion through improving riparian conditions is recommended in the TMDL document (DEQ 2011). This sediment reduction project includes restoration of a 5,200-foot section of river downstream of Eureka that includes streambank bioengineering, riparian vegetation plantings and channel restoration. Restoration planning for this reach of the Tobacco River extends back to 2002 with restoration recommendations including streambank bioengineering and riparian enhancements (Dunn 2002). In the near-term, additional water quality improvement priority projects in the Upper Kootenai River watershed include a riparian fencing project being conducted by NRCS in Indian Creek and a culvert replacement project being conducted on Gray Creek by the US Forest

Service. In the mid-term, stream and wetland restoration at the site of the old mill on Mud Creek just upstream of Highway 93 is a priority.

5.1.2 Middle Kootenai River Watershed

For the Middle Kootenai River watershed, projects on Raven Creek and Wolf Creek are priorities in the near-term (**Table 5-2**). For Raven Creek, a pilot project to add large woody debris to encourage sediment trapping and channel aggradation in segments of the stream that have experienced loss of large wood and channel incision is a priority. For Wolf Creek, a Range Management Plan will be prepared prior to the 2016 grazing season which will include improved rotation through defined pastures, periodic rest, improved off-channel water source development, and increased monitoring, along with improving existing exclosures and identifying potential sites for new exclosures. Within the mid-term, several projects within the Dunn Creek watershed, including streambank bioengineering and active channel restoration at several sites, along with road relocation and stream crossing upgrades, are priorities to reduce sediment and improve natural channel dynamics. In addition, several projects are planned by the US Corps of Engineers on the Kootenai River mainstem starting in September 2015 to increase habitat complexity and reduce sediment loads from eroding streambanks downstream of Libby Dam.

5.1.3 Lower Kootenai River Watershed

Priority projects in the Lower Kootenai River watershed emphasize bull trout conservation and habitat improvements within the Lake Creek watershed and tributaries to the Kootenai River, with a specific focus on protecting bull trout spawning sites in Keeler Creek and the North Fork Keeler Creek. For Lake Creek, performing a baseline survey to map streambank erosion and riparian conditions is a priority in the near-term, along with stabilizing sloughing hillslope/streambank upstream of the Chase Cutoff road crossing (**Table 5-3**). Ensuring all water quality restoration measures are implemented during actions conducted to close the Troy Mine is also a priority in the near-term.

5.1.4 Yaak River Watershed

Priority projects in the Yaak River watershed emphasize native westslope cutthroat trout and Columbia Basin redband trout conservation through improved habitat connectivity (**Table 5-4**). Culvert upgrades and/or removal to improve fish passage are priorities throughout the Yaak River watershed. In addition, performing an assessment of streambank erosion and habitat improvement needs along the mainstem of the Yaak River is a priority and is currently underway, with analysis expected to be completed in 2016. Over the next five years, working with private landowners to address streambank erosion along the mainstem of the Yaak River and its tributaries is a priority.

Table 5-1. Upper Kootenai River Watershed Priority Projects and Implementation Schedule

Stream	Project / Activity	Pollutant Addressed	Prioritizing Partner (s)	Technical Needs	Cost Estimate	Timeframe
2-Year Timeframe						
Gray Creek	NFSR 3500 culvert replacement in 2015	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	2 years
Tobacco River	Streambank bioengineering and riparian restoration downstream of Eureka	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	2 years
Indian Creek	Riparian fencing	Sediment	NRCS, CD	Revegetation planning, landowner education and outreach	Medium	2 years
5-Year Timeframe						
Sinclair Creek	Remove debris/trash from channel near the mouth	Sediment	NRCS, CD	Restoration planning, landowner education and outreach	Low	5 years
Deep Creek	Riparian fencing and grazing management	Sediment	NRCS, CD, USFS	Revegetation planning, landowner education and outreach	Medium	5 years
Fortine Creek	Riparian fencing and grazing management extending downstream from Trego school	Sediment, Temperature	NRCS, CD, USFS	Revegetation planning, landowner education and outreach	Medium	5 years
Fortine Creek	Riparian fencing and grazing management between Bratten and Fortine roads	Sediment, Temperature	NRCS, CD, USFS	Revegetation planning, landowner education and outreach	Medium	5 years
Meadow Creek	Address road grading sediment source	Sediment	NRCS, CD	Operator education and outreach	Low	5 years
Blue Sky Creek	Culvert replacement or removal	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Williams Creek	Improve crossings where culverts were removed	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Stahl Creek	NFSR 7021 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Lime Creek	Riparian fencing and grazing within the Trego Grazing Allotment	Sediment, Total Phosphorus, Total Nitrogen	NRCS, CD, USFS	Revegetation planning, landowner education and outreach	Medium	5 years
Therriault Creek	Replace undersized culverts	Sediment	NRCS, CD, FWP	Engineering, hydrology, construction	Low	5 years
Mud Creek	Riparian fencing	Sediment	NRCS, CD	Revegetation planning, landowner education and outreach	Medium	5 years
Mud Creek	Stream channel and wetland restoration at the site of the old mill site just upstream of Highway 93	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	5 years
Tobacco River	Regulating floodplain development	N/A	CD	Landowner education and outreach	Low	5 years
Ksanka Creek	Channel restoration and reconnection to Tobacco River	Sediment	CD, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	5 years
North Fork Bristow Creek	Fish passage	N/A	USFS	Engineering, hydrology, permitting, construction	Medium	5 years
10-Year Timeframe						
Grave Creek	Stream restoration between bridges and at confluence	Sediment	NRCS, CD, USFS, FWP	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Grave Creek	Ditch lining of 27 miles of GLID ditch to help increase stream flows in Grave Creek	N/A	NRCS, CD, USFS, FWP	Engineering, hydrology, permitting, construction, monitoring	High	10 years
Grave Creek	Fish screens to prevent bull trout from entering ditch network	N/A	NRCS, CD, USFS, FWP	Engineering, hydrology, permitting, construction, monitoring	Medium	10 years
Grave Creek	Streambank bioengineering, revegetation, and riparian buffer in enhancement in lower reaches	Sediment	NRCS, CD, USFS, FWP	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Sinclair Creek	Replace culvert on Highway 93 crossing of Sinclair Creek near the mouth	Sediment	NRCS, CD	Engineering, hydrology, permitting, construction	Medium	10 years
Tobacco River	Streambank bioengineering and riparian restoration upstream of Eureka	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Phillips Creek	Riparian fencing	Sediment	NRCS, CD	Revegetation planning, landowner education and outreach	Medium	10 years
Young Creek	Riparian fencing	Sediment	NRCS, CD, FWP	Revegetation planning, landowner education and outreach	Medium	10 years
Dodge Creek	Address excess water from flooded fields flowing into Dodge Creek	Sediment	NRCS, CD	Landowner education and outreach	Medium	10 years
Pinkham Creek	Riparian fencing	Sediment	NRCS, CD	Revegetation planning, landowner education and outreach	Medium	10 years
Fivemile Creek	Road storage/decommissioning	Sediment	USFS	Engineering, hydrology, construction	Medium	10 years
Cripple Horse Creek	Road storage/decommissioning	Sediment	USFS	Engineering, hydrology, construction	Medium	10 years
20-Year Timeframe						
Deep Creek	Streambank bioengineering, revegetation, and riparian buffer in enhancement on private land near the mouth	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring, landowner education and outreach	High	20 years
Edna Creek	Streambank bioengineering, revegetation, and riparian buffer in enhancement on private land near the mouth	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring, landowner education and outreach	High	20 years
Fortine Creek	Channel restoration in over-widened areas near Swamp Creek and Trego	Sediment, Temperature	NRCS, CD, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Fortine Creek	Reduce water temperatures in lower Fortine Creek and upstream of the confluence with Deep Creek	Temperature	NRCS, CD, USFS	Restoration planning, landowner education and outreach	High	20 years
Grave Creek	Address areas of mass wasting throughout watershed	Sediment	USFS	Engineering, hydrology, permitting, construction	High	20 years
Sinclair Creek	Address channel incisement downstream of the first Highway 93 crossing	Sediment	NRCS, CD	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Swamp Creek	Address channelization, channel over-widening, and a lack of riparian vegetation at the confluence with Lake Creek	Sediment	NRCS, CD, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Swamp Creek	Restore channel at series of check dams installed in 1992	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Swamp Creek	Implement stream channel restoration activities identified in the Swamp Creek Draft EIS	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years

High = $300K-$1Million; Medium = $100K-$299K; Low = $1K-$99K

Table 5-2. Middle Kootenai River Watershed Priority Projects and Implementation Schedule

Stream	Project / Activity	Pollutant Addressed	Prioritizing Partner (s)	Technical Needs	Cost Estimate	Timeframe
2-Year Timeframe						
Raven Creek	Conduct pilot test of large wood additions in Section 35	Sediment, Nutrients	Plum Creek, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Low	2 years
Wolf Creek	Grazing practice permit adherence on the Big Meadows Grazing Allotment, including maintaining existing exclosures and developing new exclosures	Sediment, Temperature	Plum Creek, USFS	Range management, hydrology, monitoring	Low	2 years
5-Year Timeframe						
Big Cherry Creek	NFSR 6205B culvert replacement or removal	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Bobtail Creek	Riparian fencing along Bobtail Creek and Bull Creek	Sediment	Plum Creek, USFS	Revegetation planning, landowner education and outreach	Medium	5 years
Bobtail Creek	Address fish passage barrier on cost-share road in upper Bobtail Creek (Section 18)	Sediment	Plum Creek, USFS	Revegetation planning, landowner education and outreach	Low	5 years
Raven Creek	Upgrade stream crossing along Bonneville Power Administration powerline corridor in Section 2	Sediment, Nutrients	Plum Creek, USFS	Engineering, hydrology, permitting, construction	Low	5 years
Wolf Creek	Culvert upgrades in Wolf Creek tributary watersheds	Sediment	Plum Creek, USFS	Engineering, hydrology, permitting, construction	Low	5 years
Weigel Creek	Culvert removal	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Calx Creek	Culvert upgrade	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Tamarack Creek	Culvert upgrade	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Pipe Creek	Loon Lake NFSR 471 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Pipe Creek	Beaver relocation	N/A	USFS	Restoration planning, hydrology, wetland ecology	Low	5 years
Quartz Creek	NFSR 600 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Quartz Creek	Beaver relocation	N/A	USFS	Restoration planning, hydrology, wetland ecology	Low	5 years
Hennesey Creek	NFSR 332 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
South Fork Flower Creek	NFSR 128 and NFSR 4729 culvert outlet rocks	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Silver Bow Creek	NFSR 148 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Silver Butte Creek	NFSR 148 culvert replacement on tributaries	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Baree Creek	NFSR 148 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Iron Meadow Creek	NFSR 148 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Porcupine Creek	NFSR 148 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
Crystal Creek	NFSR 6734 culvert replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Low	5 years
10-Year Timeframe						
Granite Creek	NFSR 4791 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Granite Creek	Assist private landowners	N/A	NRCS, CD	Landowner education and outreach	Low	10 years
Bobtail Creek	Implement channel restoration work where needed, including unstable reaches in Sections 29, 30, and 32 (T32N, R31W)	Sediment	Plum Creek, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Libby Creek	Assist private landowners with crossings	Sediment	CD	Engineering, hydrology, permitting, construction	Medium	10 years
Ramsey Creek	Removal of NFSR 4781 bridge	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Wolf Creek	Riparian vegetation planting, including conifers and shrubs, with a focus along the south bank of Wolf Creek in Redemption Reach, Fairview Reach, and Kelsey Reach	Sediment, Temperature	Plum Creek, USFS	Revegetation planning, landowner education and outreach	Medium	10 years
Wolf Creek	Streambank bioengineering, with focus on Betts Lake Reach and Kelsey Reach	Sediment	Plum Creek, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Dunn Creek	Streambank bioengineering and road relocation	Sediment	Plum Creek, USFS, FWP	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Pipe Creek	Streambank bioengineering at MP15.5	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium	10 years
Pipe Creek	NFSR 471 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Pipe Creek	NFSR 336 convert to trail	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Pipe Creek	Road storage/decommissioning	Sediment	USFS	Engineering, hydrology, construction	Medium	10 years
Pipe Creek	Address failing dike constructed in 1956	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium	10 years
Flower Creek	Streambank bioengineering	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium	10 years
Miller Creek	Large woody debris (LWD) placement	N/A	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium	10 years
Smoke Creek	NFSR 763 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Cow Creek	NFSR 763 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
West Fisher Creek	Streambank bioengineering and road relocation	Sediment	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	10 years
Lake Creek	NFSR 231 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
Trail Creek	NFSR 231 bridge replacement	Sediment	USFS	Engineering, hydrology, permitting, construction	Medium	10 years
20-Year Timeframe						
Big Cherry Creek	Address failing haul road on DNRC property	Sediment	FWP, DNRC	Engineering, hydrology, permitting, construction	High	20 years
Big Cherry Creek	Address metals loading from Big Cherry Mill site	Metals	USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Libby Creek	Address failing haul road on DNRC property	Sediment	FWP, DNRC	Engineering, hydrology, permitting, construction	High	20 years
Libby Creek	Replace undersized bridge at Highway 2 crossing	Sediment	MDT, FWP	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Libby Creek	Remove remaining paved portions of abandoned haul roads that parallel both sides of the channel	Sediment	FWP, DNRC	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Libby Creek	Stream channel restoration, streambank bioengineering and revegetation, including the re-establishment of natural cedar floodplain forests	Sediment	FWP, CD, NRCS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Libby Creek	Channel restoration along lower 2,000 feet of Libby Creek that was historically channelized	Sediment	FWP, CD, NRCS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Snowshoe Creek	Address in-stream tailings deposits at diffuse locations downstream of the reclaimed Snowshoe Mine and Mill site	Metals	USFS	Engineering, hydrology, permitting, construction	High	20 years
Wolf Creek	Check dam removal, riprap encapsulation and revegetation	Sediment, Temperature	Plum Creek, USFS	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Kootenai River	Restore riparian functionality and large wood debris dynamics	Sediment	FWP, USACE	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Fisher River	Meander reconnection and stream restoration	Sediment	USFS, FWP	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years

High = $300K-$1Million; Medium = $100K-$299K; Low = $1K-$99K

Table 5-3. Lower Kootenai River Watershed Priority Projects and Implementation Schedule

Stream	Project / Activity	Pollutant Addressed	Prioritizing Partner (s)	Technical Needs	Cost Estimate	Timeframe
2-Year Timeframe						
Lake Creek	Baseline survey to map streambank erosion and riparian conditions	Sediment, Nutrients	USFS, FWP, Northern Lights, Hecla	Hydrology, wetland ecology, monitoring	Medium	2 years
Lake Creek	Stabilize sloughing hillslope/streambank upstream of the Chase Cutoff road crossing	Sediment	USFS, FWP, Northern Lights, Hecla	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium	2 years
5-Year Timeframe						
Lake Creek	Education and outreach regarding riparian buffers	Sediment, Nutrients	USFS, FWP, Northern Lights, Hecla	Landowner education and outreach	Low	5 years
Stanley Creek	Mine adit, mill site, and road reclamation at the Troy Mine	Metals, Sediment	USFS, Hecla	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	5 years
Stanley Creek	Implement BMPs during Troy Mine reclamation	Metals, Sediment	USFS, Hecla	Engineering, hydrology, permitting, construction, monitoring	Low	5 years
O'Brien Creek	Riparian fencing	Sediment	USFS	Revegetation planning, landowner education and outreach	Medium	5 years
10-Year Timeframe						
Lake Creek	Assess fish distribution and State Highway/County road culvert barriers on Falls Creek, Porcupine Creek, Twin Creek, Camp Creek, Dry Creek, Crowell Creek, Iron Creek, and Copper Creek	N/A	USFS, FWP, Northern Lights	Engineering, hydrology, fisheries biology	Medium	10 years
Lake Creek	Continue to monitor water quality within the watershed in association with previous mining tailings spills, and investigate the efficacy of sediment sampling throughout the watershed to quantify metal concentrations and identify locations of concern	Metals, Sediment	USFS, FWP, Hecla	Engineering, hydrology, monitoring	Medium	10 years
Camp Creek	Replace series of multiple culverts on NFSR 4626 crossing	Sediment	USFS, FWP, Hecla	Engineering, hydrology, permitting, construction	Medium	10 years
Camp Creek and Madge Creek	Road storage/decommissioning (2.7 miles, 9 crossings)	Sediment	USFS	Engineering, hydrology, construction	Medium	10 years
Keeler Creek	NFSR 473 relocation (dependent on suitable location)	Sediment	USFS, FWP, Northern Lights	Engineering, hydrology, construction	Medium	10 years
Keeler Creek	NFSR 473 repave above MP 9	Sediment	USFS, FWP, Northern Lights	Engineering, hydrology, construction	Medium	10 years
Keeler Creek	Assess bull trout spawning/rearing habitat restoration potential	N/A	USFS, FWP, Northern Lights	Engineering, hydrology	Medium	10 years
Cheer Creek Halverson Creek Cliff Creek	Road storage/decommissioning (17.2 miles, 30 crossings, 12 mass wasting sites)	Sediment	USFS, FWP, Northern Lights	Engineering, hydrology, construction	Medium	10 years
West Fork Keeler Creek Benning Creek	Road storage/decommissioning (16.3 miles, 38 crossings, 11 mass wasting sites)	Sediment	USFS, FWP, Northern Lights	Engineering, hydrology, construction	Medium	10 years
Iron Creek	Work with private landowners and Lincoln County to upgrade culverts on stream crossing and improve riparian management	Sediment, Nutrients	USFS	Landowner education and outreach	Medium	10 years
Stanley Creek	Replace double culvert at NFSR 4626 and apply traction sand BMPs on this road	Sediment	USFS, Hecla	Engineering, hydrology, permitting, construction	Medium	10 years
Stanley Creek	Investigate natural background conditions and sources of nitgrate+nitrite loading in the Stanley Creek and Fairway Creek drainages	Nutrients	USFS, Hecla	Engineering, hydrology, construction	Medium	10 years
20-Year Timeframe						
Lake Creek	Streambank bioengineering, revegetation and riparian buffer enhancement along mainstem	Sediment, Nutrients	USFS, FWP, Northern Lights, Hecla	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	20 years
Lake Creek	Obtain conservation easements along mainstem	Sediment, Nutrients	USFS, FWP, Northern Lights, Hecla	Restoration planning, real-estate transactions	High	20 years
North Fork Keeler Creek	Investigate conservation easement potential with private landowners	Sediment, Nutrients	USFS, FWP, Northern Lights	Restoration planning, real-estate transactions	High	20 years

High = $300K-$1Million; Medium = $100K-$299K; Low = $1K-$99K

Table 5-4. Yaak River Watershed Priority Projects and Implementation Schedule

Stream	Project / Activity	Pollutant Addressed	Prioritizing Partner (s)	Technical Needs	Cost Estimate	Timeframe
2-Year Timeframe						
Yaak River	Assessment of habitat improvement needs along mainstem of Yaak River	Sediment	USFS, YVFC	Hydrology, wetland ecology, monitoring	Medium	2 years
Yaak River	Bank erosion assessment and restoration prioritization along mainstem of Yaak River	Sediment	USFS, YVFC	Hydrology, wetland ecology, monitoring	Medium	2 years
Yaak River	Reed canarygrass mapping	N/A	USFS, YVFC	Hydrology, wetland ecology, monitoring	Medium	2 years
5-Year Timeframe						
Lap Creek	NFSR 5882B and NFSR 5882C replace or remove WCT fish barrier culverts	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	5 years
Seventeenmile Creek	Pave approaches to County Road 176 bridge	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	5 years
Seventeenmile Creek	Remove culvert from washing out on upper Seventeenmile	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	5 years
Seventeenmile Creek	Beaver relocation	N/A	USFS, YVFC	Restoration planning, hydrology, wetland ecology	Low	5 years
South Fork Yaak River	Traction sand BMPs at bridge crossings	Sediment	USFS, YVFC	Operator education and outreach	Low	5 years
Kelsey Creek	Construct overflow channel on NFSR 6713 (stored)	Sediment	USFS, YVFC	Engineering, hydrology, permitting, construction, monitoring	Low	5 years
Yaak River	Work with private landowners to address streambank erosion along the mainstem and tributaries	Sediment	USFS, YVFC	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High	5 years
Kilbrennan Creek	Beaver relocation	N/A	USFS, YVFC	Restoration planning, hydrology, wetland ecology	Low	5 years
10-Year Timeframe						
Seventeenmile Creek	NFSR 4681E culvert removals	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Seventeenmile Creek	NFSR 4654E culvert removals	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Seventeenmile Creek	NFSR 471 apply BMPs or decommission middle segment	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Seventeenmile Creek	Road storage/decommissioning in upper watershed	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Seventeenmile Creek	Apply BMPs on NFSR 600 road	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Big Foot Creek	Road storage/decommissioning	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Big Foot Creek	Apply BMPs on NFSR 600	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Lost Fork Creek	Road storage/decommissioning	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Hemlock Creek	Road storage/decommissioning	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Mule Creek	Road storage/decommissioning, including NFSR 6127	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Conn Creek	Road storage/decommissioning	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
South Fork Yaak River	NFSR 472 pave bridge approaches	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
South Fork Yaak River	NFSR 878 and NFSR 6838 road storage/decommissioning - SE Clay Mountain	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
South Fork Yaak River	Replace or remove WCT fish barrier culverts	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
South Fork Yaak River	Road storage/decommissioning	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
South Fork Yaak River	Evaluate stream culverts for replacement on NFSR 68	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Zulu Creek	NFSR 6079 fish barrier culvert replacement	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Zulu Creek	NFSR 6079A on Zulu Creek tributary	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Kelsey Creek	NFSR 6065B culvert replacement to reduce risk of failure	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Clay Creek	Install culvert and drain dip on NFSR 6114D	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Fowler Creek	NFSR 746 culvert replacement (brook trout above and below)	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Yodkin Creek	NFSR 6062 fish barrier culvert replacement in WCT watershed	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Dutch Creek	Fish barrier culvert replacements in WCT watershed	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
West Fork Yaak River	NFSR 3388A culvert replacement to reduce risk of failure	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Bunker Hill Creek	Fish barrier culvert replacements in WCT watershed	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Turner Creek	Remove or replace culvert to allow fish passage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Lang Creek	NFSR 593 and NFSR 6084A culvert replacement for fish passage in brook trout watershed	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Beetle Creek	NFSR 338 culvert replacement	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Hensley Creek	NFSR 5874 culvert replacement for fish passage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
North Creek	NFSR 5924C culvert replacement to reduce risk of failure	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Large Creek	NFSR 435 culvert replacement for fish passage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Large Creek	NFSR 7483 road storage with culvert removal	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Runt Creek	NFSR 435 culvert replacement for fish passage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Meadow Creek	NFSR 524 culvert removal to prevent failure	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
South Fork Meadow Creek	NFSR 524 culvert replacement for fish passage (2 sites) and NFSR 5971A culvert removal and road storage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Red Top Creek	NFSR 393 culvert replacement to reduce risk of failure	Sediment	USFS, YVFC	Engineering, hydrology, construction	Low	10 years
Grizzly Creek	NFSR 472 culvert replacement for fish passage	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Arbo Creek	NFSR 176 culvert replacement	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years
Kilbrennan Creek	County Road 176 culvert replacement	Sediment	USFS, YVFC	Engineering, hydrology, construction	Medium	10 years

High = $300K-$1Million; Medium = $100K-$299K; Low = $1K-$99K

5.2 TECHNICAL PARTNERS

KRN works with many partners throughout the Kootenai River Basin, including:

- **Agricultural Community**
  - Glen Lake Irrigation District (GLID) and other Irrigation ditch operators
  - Agricultural producers
  - Farm Bureau

- **Businesses**
  - Eureka Rural Development Partners
  - Hecla Mining Company
  - Northern Lights, Inc. – Bull Trout Technical Working Committee
  - Plum Creek Timber Company
  - Commercial and retail businesses
  - Developers and building associations
  - Industrial and manufacturing businesses
  - Recreational businesses

- **City and County Governments**
  - Town of Eureka
  - City of Libby
  - City of Troy
  - Lincoln County

- **Lincoln Conservation District**

- **State and Federal Governmental agencies**
  - Montana Department of Environmental Quality
  - Montana Department of Fish, Wildlife and Parks
  - Montana Department of Natural Resources and Conservation
  - Montana Bureau of Mines and Geology
  - Natural Resource Conservation Service
  - United States Army Corps of Engineers
  - United States Environmental Protection Agency
  - United States Fish and Wildlife Service
  - United States Forest Service

- **Nonprofit groups and collaborations focused on conservation and natural resources**
  - Yaak Valley Forest Council
  - Trout Unlimited

5.3 MILESTONES

The goal of the Kootenai River Basin WRP is to provide a blueprint for KRN and its project partners to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's list of impaired waterbodies. Depending on the type of project, measures of success include improved stream connectivity; number of culverts removed; acres of wetland created/restored; length of streambank restored; increases in riparian shading; decreased water temperature; improved stream function; reduced sedimentation; and improved fish passage. Milestones measuring implementation of nonpoint-source management projects include:

Short-term milestones:

- KRN and project partners will implement at least one large-scale restoration project before January 1, 2018.
- KRN will work with stakeholders and partners to begin developing at least one restoration project every year based on project priorities identified in **Tables 5-1** through **5-4**.
- KRN will maintain a database identifying potential projects and completed projects and obtain stakeholder updates to the database on an annual basis.
- Plum Creek and US Forest Service will develop new a grazing management plan for the Big Meadows Grazing Allotment.
- KRN will hold at least one outreach event each year to inform the community of recently completed projects and/or projects underway, as well as the availability of KRN's assistance and 319 funds and other funding sources to implement restoration projects in the Kootenai River Basin watershed.
- KRN and project partners will develop genetic sampling plan to determine fish distribution in the Yaak River.

Mid-term milestones:

- Perform 27 miles of ditch lining along the Glen Lake Irrigation Diversion.
- Ensure successful completion of all water quality related restoration activities during the Troy Mine closure.
- Develop a comprehensive restoration strategy for the mainstem of the Kootenai River.
- Secure at least one conservation easement along Keeler Creek to protect the stream corridor within bull trout spawning reaches.
- Expand the online database of stream crossings and native fish species distribution in the Yaak River developed by the Yaak Valley Forest Council to cover the entire Kootenai River Basin.
- Within the Yaak River watershed, implement genetic sampling and presence/absence surveys, determine which culvert barriers should be maintained, and identify opportunities for brook trout elimination and/or westslope cutthroat trout and Columbia Basin redband trout reintroduction.

Long-term milestones:

- Temperature reductions in Wolf Creek.
- Increased bull trout numbers in critical bull trout habitat (**Figure 5-2**).
- Increased streamflows in Grave Creek downstream of the Glen Lake Irrigation Diversion.
- Improve stream connectivity through culvert upgrades and/or removal.

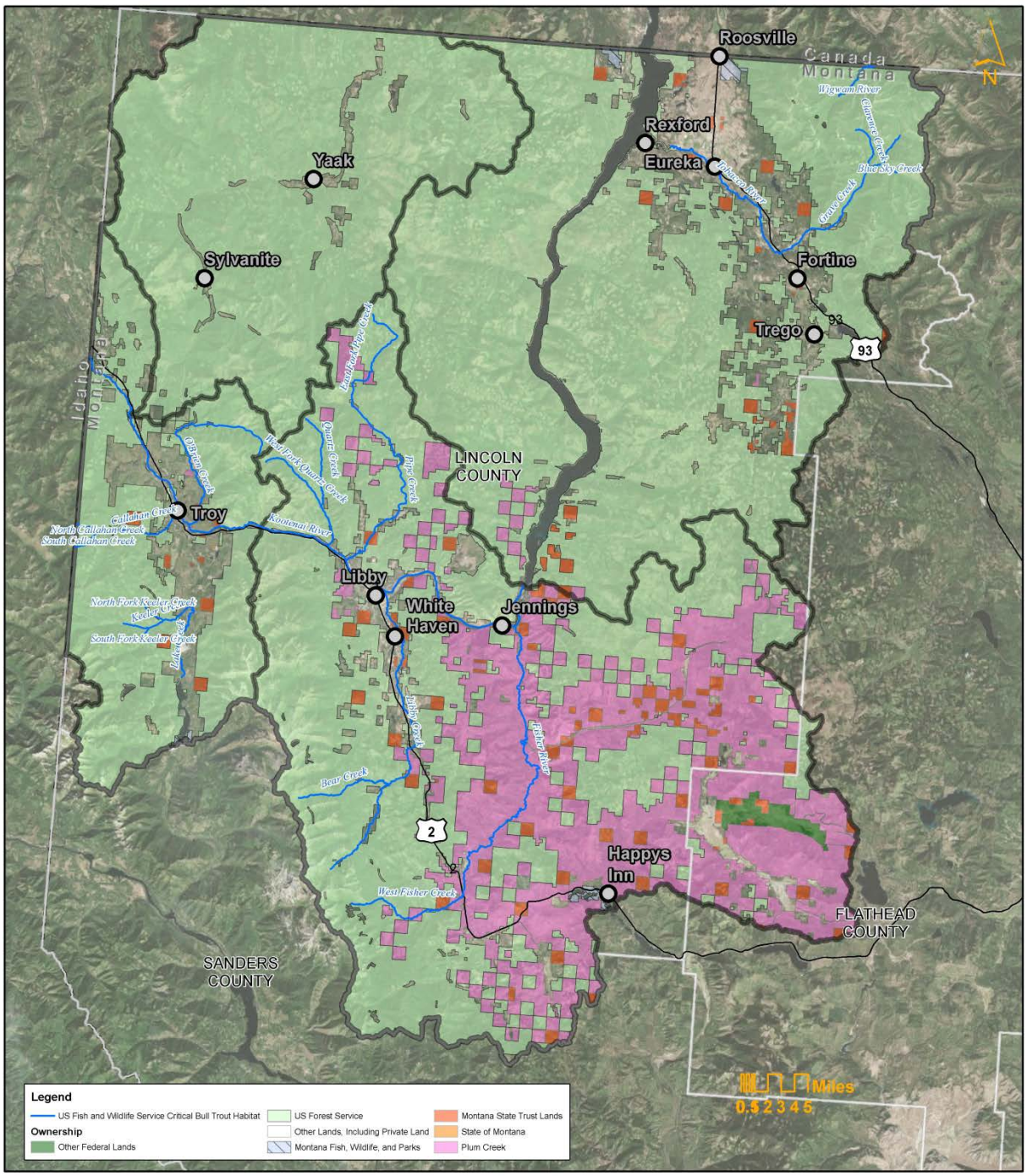

Figure 5-2. US Fish and Wildlife Service Critical Bull Trout Habitat

6.0 MONITORING

Monitoring of watershed restoration requires tracking of activities that have been conducted as well as the effects of those activities. KRN has developed a project tracking tool based on the project database in **Tables 5-1** through **5-4** in order to ensure that activities are being completed. Monitoring of water quality and in-stream habitat is necessary to ensure that activities are having the desired effects (e.g., decreased sediment and improved riparian conditions). Monitoring data will be used to estimate pollutant load reductions, which will help identify where substantial progress is being made toward attaining water quality goals and to inform future decisions and activities. Several entities within the Kootenai River Basin conduct water quality related monitoring activities, including the Kootenai National Forest, Plum Creek Timber Company, Yaak Valley Forest Council, Troy Mine, and Montana Fish, Wildlife and Parks. This monitoring data will help identify changes in pollutant loading and in-stream habitat within affected streams and will help document water quality improvements over time. In addition to this ongoing monitoring, specific monitoring actions were identified during the TMDL process and during the WRP stakeholder meetings to help refine the causes and sources of impairment and guide future restoration activities. Once projects have been implemented, effectiveness monitoring will be performed and pollutant load reductions will be evaluated. Once key stakeholders have determined that significant progress toward implementation of all reasonable land, soil, and water conservation practices has been made, they will work with Montana DEQ to re-evaluate the impairment status and TMDLs.

6.1 KOOTENAI NATIONAL FOREST MONITORING

The Kootenai National Forest conducts extensive monitoring throughout the Kootenai River Basin watershed. Within the Rexford-Fortine Ranger District, streamflow and total suspended solids (TSS) are monitored annually on several impaired streams, while stream habitat surveys and PACFISH/INFISH Biological Opinion (PIBO) monitoring are conducted periodically and provide long-term data on stream habitat conditions that can be used to evaluate sediment impairments (**Table 6-1**). Within the Libby Ranger District, the US Forest Service monitors stream flow, TSS, macroinvertebrates, and stream substrate in Bobtail Creek, Fisher River, Flattial Creek, Himes Creek, Pipe Creek, Wolf Creek (**Table 6-2**). Within the Three Rivers Ranger District, annual monitoring is conducted on Keeler Creek and Burnt Creek (**Table 6-3**).

Table 6-1. US Forest Service Rexford-Fortine Ranger District Monitoring of Impaired Stream Segments

Stream Segment	Streamflow Monitoring	TSS Monitoring	Stream Surveys	PIBO Monitoring
Deep Creek	Annually	Annually	Periodically	
Edna Creek	Annually	Annually	Periodically	
Fortine Creek	Annually	Annually	Periodically	
Grave Creek	Annually	Annually	Periodically	Periodically
Lime Creek			Periodically	
Sinclair Creek			Periodically	
Swamp Creek			Periodically	Periodically

Table 6-2. US Forest Service Libby Ranger District Monitoring

Stream Segment	Streamflow Monitoring	TSS Monitoring	Stream Surveys	Temperature Monitoring
Bobtail Creek	Annually	Annually	Periodically	
Fisher River at Raven	Annually	Annually	Periodically	Annually
Flattail Creek	Annually	Annually	Periodically	Annually
Himes Creek	Annually	Annually	Periodically	Annually
Pipe Creek	Annually	Annually	Periodically	Annually
Wolf Creek at Fairview	Annually	Annually	Periodically	Annually

Table 6-3. US Forest Service Three Rivers Ranger District Monitoring

Stream Segment	Streamflow Monitoring	TSS Monitoring	PIBO Monitoring
Keeler Creek	Annually	Annually	Periodically
Burnt Creek	Annually	Annually	Periodically

6.2 Plum Creek Monitoring

Plum Creek monitoring is conducted in accordance with the Native Fish Habitat Conservation Plan (NFHCP) and the results are reported to the US Fish and Wildlife Service every five years (Plum Creek 2000). Within the Wolf Creek watershed, Plum Creek monitoring for the Big Meadows Grazing Allotment includes semi-annual field visits with the grazing cooperative members to evaluate ongoing management of the lease, along with physical and biological monitoring of grazing impacts at two Plum Creek sites in the Kelsey Reach. Future monitoring efforts in the Wolf Creek watershed include developing a strategy to monitor stream temperatures in Wolf Creek to evaluate restoration activities over time and expanding the grazing leaseholder monitoring sites along Wolf Creek to include additional sites in the Kelsey, Betts Lake, and Redemption reaches.

6.3 Yaak Valley Forest Council Monitoring

The Yaak Valley Forest Council has ongoing monitoring planned within the Yaak River watershed, including monitoring the entire mainstem of the Yaak River to evaluate streambank erosion and stream habitat conditions which is currently underway. In addition, the Yaak Valley Forest Council monitors stream temperatures at 18 locations in the Yaak River watershed to identify and document stream temperatures changes over the long term.

6.4 Troy Mine Monitoring

The Troy Mine conducts annual monitoring at several sites on Stanley Creek and Lake Creek.

6.5 Montana Fish, Wildlife & Parks Monitoring

Montana Fish, Wildlife & Parks conducts extensive monitoring of fish populations throughout the Kootenai River Basin.

6.6 MONITORING TO REFINE IMPAIRMENT CAUSES AND SOURCES

Specific monitoring actions were identified during the TMDL process and during the WRP stakeholder meetings to help refine the causes and sources of impairment, including:

- Perform additional water quality and biological monitoring under various flow conditions to help refine nutrient impairment causes and sources in Lime Creek
- Perform additional total phosphorus monitoring in Raven Creek
- Perform a more detailed inventory of existing riparian conditions along Wolf Creek to refine riparian buffer estimates
- Evaluate the effectiveness of the Big Cherry Creek Mill Site reclamation
- Evaluate the effectiveness of the Snowshoe Creek Mine cleanup post-2012, when reclamation was completed
- Conduct a baseline survey of Lake Creek to identify streambank erosion and riparian conditions
- Determine the natural background levels of nitrate in groundwater in the upper Lake Creek watershed, including an investigation of sources of nitrate+nitrite loading within the Fairway Creek and Stanley Creek watersheds
- Perform additional water column and biological sampling in the East Fork Yaak River near the mouth, springs and groundwater

In addition, monitoring actions were identified during the during the WRP stakeholder meetings to help guide future restoration activities, including:

- Perform an assessment of Keeler Creek to identify potential sites for in-stream habitat and channel restoration work
- Perform an assessment of streambank erosion and habitat improvement needs along the mainstem of the Yaak River
- Develop a comprehensive restoration strategy for the mainstem of the Kootenai River

6.7 EFFECTIVENESS MONITORING FOR 319 FUNDED PROJECTS

Monitoring of 319 funded projects will be conducted to help evaluate the effectiveness of specific practices and projects. Monitoring will focus on the specific pollutants for which the project is intended to address and will include water quality and habitat targets as measures for the long-term success of a project. Monitoring criteria will be based on Montana's water quality standards and the water quality targets presented in the various TMDL documents, which are established to specify satisfactory conditions to ensure protection and/or recovery of beneficial uses of waterbodies. As noted in the Tobacco Planning Area Nutrient and Temperature TMDLs and Water Quality Improvement Plan, it is presumed by Montana DEQ that meeting all water quality and habitat targets will achieve the water quality goals for each impaired waterbody (DEQ 2014a). Monitoring techniques for nutrients, metals, sediment and temperature are presented in **Table 6-4**, with a more broad set of criteria to evaluate the effectiveness of various project types and restoration treatments presented in **Table 6-5**.

Table 6-4. Monitoring Techniques for Nutrients, Metals, Sediment, and Temperature

Pollutant Type	Monitoring Technique
Nutrients	Water samples and stream discharge measurements
Metals	Water samples and stream discharge measurements
Sediment	Riffle pebble counts, riffle and pool tail-out 49-point grid toss measurements, channel cross-sections, residual pool depths, pool and large woody debris frequency, streambank erosion assessments, riparian greenline assessments, macroinvertebrate indices; PIBO data
Temperature	Riparian greenline assessment, stream temperature monitoring

Table 6-5. Criteria to Evaluate the Effectiveness of Various Project Types and Restoration Treatments

Project Types / Treatments	Evaluation Criteria
Streambank Bioengineering and Revegetation	Length of Eroding Bank Stabilized and Revegetated, Increased Floodplain Access
Riparian Buffer Enhancement	Length of Channel with Improved Riparian Conditions, Increased Riparian Vegetation Densities
Unpaved Road Improvements	Documentation of Sites Addressed and the Techniques Applied; WEPP Modeling Results
Traction Sand Management	Documentation of Sites Addressed and the Techniques Applied
Stormwater Management	Documentation of Sites Addressed and the Techniques Applied
Residential and Urban BMPs	Documentation of Sites Addressed and the Techniques Applied
Agricultural BMPs	Documentation of Sites Addressed and the Techniques Applied
Forestry BMPs	Documentation of Sites Addressed and the Techniques Applied
Subsurface Wastewater Treatment	Education and Outreach Conducted, Number of Residences added to the Sewer System
Irrigation Water Management	Education and Outreach Conducted, Documentation of Improved In-stream Flows
Abandoned and Closed Mine Reclamation	Documentation of Sites Addressed and the Techniques Applied

6.8 Evaluating Pollutant Load Reductions

Pollutant load reductions will be evaluated using DEQ-approved methodologies for the specific pollutant of concern, with the recently prepared *Load Reduction Estimate Guide – A Guide for Estimating Pollutant Load Reductions Achieved through Implementation of Best Management Practices* (DEQ 2014d) providing the foundation for calculating load reductions. When appropriate, the same methods and models will be used to evaluate progress toward the goal of improved water quality and achievement of the required percent reductions that were used during the development of the TMDL. Pollutant load reduction calculations will help KRN and DEQ determine whether or not load reductions are being achieved over time and document where substantial progress is being made toward attaining water-quality standards.

7.0 EDUCATION AND OUTREACH STRATEGY

The KRN works with community partners to identify and prioritize projects that are the most appropriate for the Kootenai River Basin. The Kootenai River Basin WRP has been developed with input from three community meetings, responses to an online survey, and stakeholder interviews with 46 people representing a broad variety of organizations.

7.1 BROAD COMMUNITY ENGAGEMENT

The KRN works to engage a broad spectrum of watershed citizens. The Kootenai River Basin is a vast and diverse area with logging, mining, agriculture, and recreation forming the basis of economic activity in the region. During development of the WRP, KRN's outreach activities included:

- Community meetings in March 2015 in Eureka, Troy and Libby, focused on watershed restoration
- Stakeholder interviews in March and April 2015, focused on watershed restoration
- Partner meetings and work on joint restoration projects
- Web site with information on KRN, the watershed and the WRP process

Community and partner engagement is critical to successful implementation of the WRP. The Kootenai River Basin is very large geographically and approaches that enhance ongoing communication between project partners and further engagement to implement projects are critical for successful improvements to water quality.

7.2 TARGETED EDUCATION STRATEGY

Input received during the WRP development process helped identify several opportunities for education and outreach. Developing and implementing effective stream improvement projects will often require the support of one or multiple landowners. In the Kootenai River Basin, three major types of outreach efforts were identified as important: 1) major stakeholder outreach and coordination, 2) private landowner outreach and education, and 3) outreach and education with the public.

7.2.1 Major Stakeholder Outreach and Coordination

The Kootenai River Basin is made up of many partners working toward to goal of water quality improvements. These partners include public land managers, private companies, nonprofit organizations, natural resource agencies, and other interested individuals and organizations. Part of KRN's mission is to provide a mechanism for communication between these partners. A variety of strategies are employed to help enhance communication and coordination on projects. The methods proposed by major stakeholders are:

- Stakeholder meetings to share information about current priorities and projects
- Continued use of KRN as a clearinghouse and center for all partners to communicate
- Use of WRP as a living document that will be updated as projects are completed and new projects are identified

7.2.2 Private Landowner Education and Outreach

In many of the priority areas identified, private landowners own sections of land along impaired streams, particularly along the valley bottoms. Several restoration projects have been completed on private land in the Kootenai River Basin, and future restoration in several areas will depend on private landowner action. Education and outreach strategy for landowners and citizens in the watershed include:

- Site visits and discussion with streamside private landowners to help identify areas where landowner and watershed restoration concerns could be addressed
- Posting information on the KRN website and using its email lists to share information
- Offering educational and informational opportunities as opportunities arise
- Ensuring projects are visible to increase public interest and knowledge in restoration

7.2.3 Education and Outreach with the Public

The KRN will lead the ongoing effort to engage all landowners, businesses and visitors in the Kootenai River Basin to promote greater understanding of the issues and to offer information about the options and benefits of stream restoration. Strategies include:

- Posting watershed restoration and project information on the KRN and partner web sites and newsletters to enhance the community's ability to see progress and to understand the issues
- Working with local newspapers, radio shows, and other media outlets to highlight projects and issues of interest to citizenry throughout the watershed
- Offer periodic educational tours and workshops for those interested in water resources and watershed restoration
- Signage, such as those KRN has already put up in specific locations describing the purpose of restoration activities
- Keeping the message clear and consistent so the public can learn more and engage in watershed restoration

7.3 FLOODPLAIN MANAGEMENT

Floodplain management is an integral component for the long-term conservation of water resources within the Kootenai River Basin and ongoing education and outreach will help build community support for floodplain protections and support the role of the county floodplain coordinator. Streambank stabilization measures using rock riprap aimed at protecting property along one reach of river often lead to accelerated streambank erosion for downstream property owners. Properly managing existing uses and future development within the floodplain to minimize the use of channel armoring techniques and groundwater withdrawals will help maintain the natural benefits provided by floodplain ecosystems. Landowner education and outreach is a key component to managing floodplains, particularly as land-use patterns change and new landowners acquire floodplain property. Managing floodplain development also reduces the potential for catastrophic flood events, while maintaining functional floodplains provides natural areas for groundwater recharge.

7.4 AQUATIC INVASIVE SPECIES

Preventing the spread of these aquatic invasive species depends on all water users and recreationalists following the guidelines in Montana Fish, Wildlife & Parks "Clean, Dry, Inspect" program. In addition, preventing the movement of live animals from one water body to another is of critical importance that involves both public education and citizen involvement.

8.0 POTENTIAL FUNDING SOURCES

KRN will investigate funding options appropriate for each specific project. Several potential funding sources are highlighted in **Table 8-1**.

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
LOCAL											
Lincoln Conservation District	**N/A**	Technical	Liaisons between landowners and government agencies, in-kind administrative and technical assistance, program coordination/partnering	X							
STATE											
Montana Department of Environmental Quality	**Nonpoint Source Implementation Grants - 319 Program**	Financial, technical	Non-point source pollution reduction							X	X
	Drinking Water State Revolving Fund (DWSRF) Loan Program	Financial Loan	Drinking water projects which achieve or maintain compliance with the Federal Safe Drinking Water Act						X		
	Volunteer Monitoring Laboratory Analysis Assistance	Financial	Support voluntary water quality monitoring efforts		X						
	Water Pollution Control State Revolving Fund (WPCSRF)	Financial Loan	Wastewater or nonpoint source pollution projects							X	
Montana Fish, Wildlife & Parks	**Future Fisheries Improvement Program**	Financial, technical	Restore rivers, streams, and lakes. Improve and restore wild fish habitats							X	X

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
Montana Department of Natural Resources and Conservation	**Reclamation and Development Grants Program (RDG)**	Financial	Serve the public interest and the State of Montana. Develop natural resources and promote and protect Montana's total environment and the general health, safety, welfare, and public resources of Montana's citizens and communities						X		
	Renewable Resource Grant and Loan Program (RRGL)	Financial	Fund conservation, management, development and preservation of Montana's renewable resources						X		
	Conservation District Technical Assistance	Financial	To provide technical assistance to necessary to get projects on the ground	X							
	Conservation Districts Grant Program (223 Grants)	Financial	Conservation activities sponsored by a conservation district			X					
	Conservation District Administrative Grant	Financial	Providing funding for conservation districts that do not enough funding							X	
	Conservation Education Mini-Grant Program	Financial	Provide funding for student and adult education focused on water, weeds, and natural resources		X						
	Aquatic Invasive Species Grant	Financial	Prevention and control of aquatic invasive species (AIS)				X				
	Arbor Day Grant	Financial	Purchase and Planting of one or more trees		X						

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
	Irrigation Development Grant	Financial	Increase irrigation efficiency through water conservation, expand or sustain irrigated acreage, etc			X					
	Range Improvement Loan	Financial Loan	Provide funding for fencing, seeding, stock water development						X		
	Watershed Management Grant	Financial	Watershed related planning and management activities			X					
	Forestry Program Development Grant	Financial	Conduct tree inventories, develop an Urban Forest Management Plan			X					
	Landscape Restoration Grant	Financial	Implement watershed-level forest based projects and activities						X		X
	Montana Tree City of the Year	Financial	Recognize communities that demonstrate excellence with forestry		X						
	Western States Wildland Urban Interface Grant	Financial	National Fire Plan funds to mitigate risk from wildland fire with the Wildland Urban Interface						X		X
	Hazardous Fuel Reduction Grant	Financial	Hazardous fuel reduction on private lands to protect communities adjacent of National Forest System Lands					X			
FEDERAL											
Natural Resources Conservation Service	**Environmental Quality Incentive Program (EQIP)**	Financial, technical	Implement conservation practices or activities like conservation planning							X	

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
	Wetland Reserve Easement Program	Financial, technical	Restore, protect and enhanced enrolled wetlands							X	
	Conservation Stewardship Program (CSP)	Financial, technical	Help agricultural producers maintain and improve existing conservation systems and adopt additional conservation activities				X				
	Emergency Watershed Program (EWP)	Financial	Responds to emergencies created by Natural Disasters							X	X
	Agricultural Land Easement Program	Financial, technical	Purchasing easements that protect agricultural use and conservation							X	X
	Regional Conservation Partnership Program (RCCP)	Financial	Promotes coordination between NRCS and its partners to deliver conservation assistance							X	X
	Conservation Innovation Grant (CIG)	Financial	To stimulate development and adoption of innovative conservation approaches and technologies							X	X
U.S. Environmental Protection Agency	**Targeted Watershed Grants Program**	Financial	Aquatic, wetland, riparian and upland habitat improvement and protection							X	X
	Wetland Program Development Grants	Financial, technical	Promote research/studies to prevent/eliminate water pollution						X	X	X
U.S. Fish and Wildlife Service	**Partners for Fish and Wildlife**	Financial, technical	Habitat restoration to benefit federal trust species, conservation programs, and various fish and wildlife restoration projects							X	X

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
	North American Wetlands Conservation Act Program	Financial	Variety of wetland conservation projects					X		X	X
U.S. Forest Service	**General Appropriations and Stewardship Projects**	Financial, technical	Implement road BMPs, storage, decommissioning, and culvert replacement on National Forest System Roads							X	
PRIVATE OR NON-PROFIT ORGANIZATIONS											
Trout Unlimited	**Watershed Restoration**	Financial	Erosion control, fish habitat, structures, willow and other riparian plantings							X	
	Habitat Protection and Enhancement Fund	Financial	Improve water quality, riparian protection, enhance stream flows and watershed health, protect important trout habitat							X	
Soil and Water Conservation Districts of Montana	**Mini Grant Program**	Financial	Improve nonpoint source-related water quality through education and outreach		X						X
National Fish and Wildlife Foundation	**NFWF Grant**	Financial	Funding for projects that sustain, restore, and enhance our nation's fish and wildlife habitats							X	X
Yaak Valley Forest Council	**Yaak Headwaters Restoration Partnership**	Financial, in-kind	Watershed inventories, assessments, restoration and effectiveness monitoring; public education					X		X	

9.0 PERMITTING REQUIREMENTS

KRN and its project partners will ensure that appropriate permits will be obtained prior to the implementation of any project. These permits may include:

Montana Natural Streambed and Land Preservation Act ("The 310 Law")

- Administered by local Conservation District with input from Montana Fish, Wildlife and Parks (FWP); SPA 124 Permit is required in lieu of a 310 permit for projects proposed by a public entity

County Floodplain Development Permit

- Required for projects within FEMA-designated floodplains/floodways

Short-term Water Quality Standard for Turbidity (318 Authorization)

- Administered by Montana Department of Environmental Quality; permit may be waived by FWP during their review of a project

Federal Clean Water Act (Section 404 Authorization)

- Administered by the U.S. Army Corps of Engineers; authorizes placement of fill material below the ordinary high water mark

Montana 401 Certification

- Montana DEQ can review and approve, condition, or deny all Federal permits or licenses that might result in a discharge to State waters, including wetlands to ensure the activity will comply with state water quality standard

Montana Stream Mitigation Procedure (U.S. Army Corps of Engineers)

- Compensatory mitigation to ensure minimal individual and cumulative adverse impacts to aquatic resources
- Part of an overall sequence in project evaluation that dictates avoidance of impacts first, followed by minimization of impacts, and then compensation for remaining impacts
- Mitigation for impacts typically consists of natural revegetation, bioengineered bank bioengineering, natural buffers, aquatic habitat improvements, floodplain re-connection, weed removal/management, fencing, and allowing for natural channel migration
- Based on a system of debits and credits that are applied to each project to determine if, and to what extent, mitigation will be required
- Magnitude: Individual projects > 300 feet in length typically require mitigation; cumulative projects > 1,000 feet in length increases debit responsibility
- Location: Mitigation activities can occur on-site, off-stream, or outside of watershed

- Timing: Mitigation activities can occur prior to the impacts, concurrent with the impacts, or after the impacts

Montana Department of Natural Resources and Conservation

- Water rights

10.0 PROGRESS EVALUATION AND ADAPTIVE MANAGEMENT

10.1 PROGRESS EVALUATION

This document provides an outline of the current needs and objectives of watershed partners. It will serve as the starting point for initiating necessary restoration, management, and collaborative outreach opportunities by providing a blueprint for KRN and its watershed partners to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's list of impaired waterbodies. To evaluate progress, KRN will maintain the project tracking database developed during the WRP process and will update it with information regarding completed projects, project outcomes, and newly identified projects in collaboration with its watershed partners. As work progresses to implement this WRP, it is expected that new needs and opportunities will arise. Every five years, KRN will update the Kootenai River Basin WRP to account for projects completed and to guide future activities as impaired streams are restored and removed from DEQ's list of impaired waterbodies.

10.2 ADAPTIVE MANAGEMENT

Adaptive management is a systematic approach for improving resource management by learning from management outcomes. As water quality improvement projects are implemented by KRN and its partners throughout the Kootenai River Basin, the success of individual projects will be evaluated and lessons learned will be documented. Monitoring the impact of projects on water quality will be a key component of the adaptive management approach and will facilitate the ongoing assessment of progress toward meeting water quality standards. Restoration project tracking using the project database in **Tables 5-1** through **5-4** will ensure that activities are having the desired effects of improving water quality and provide KRN with information to evaluate what is improving and why. Every five years, KRN will update the Kootenai River Basin WRP to account for projects completed and to guide future activities as impaired streams are restored and removed from DEQ's list of impaired waterbodies. This adaptive management approach will allow for flexible decision making based on the success of individual projects and ensure that long-term project planning is based on effective strategies for improving water quality.

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Attachment A

Upper Kootenai Subwatershed Native Fish Distribution

Species	Stream	Subbasin
Bull Trout	Big Creek	Upper Kootenai
Bull Trout	Big Therriault Lake Outlet	Upper Kootenai
Bull Trout	*Blue Sky Creek*	*Upper Kootenai*
Bull Trout	Bluebird Creek	Upper Kootenai
Bull Trout	*Clarence Creek*	*Upper Kootenai*
Bull Trout	Deep Creek	Upper Kootenai
Bull Trout	Fivemile Creek	Upper Kootenai
Bull Trout	Glen L Ditch	Upper Kootenai
Bull Trout	*Grave Creek*	*Upper Kootenai*
Bull Trout	Jim Creek	Upper Kootenai
Bull Trout	Lewis Creek	Upper Kootenai
Bull Trout	Little Therriault Lake Outlet	Upper Kootenai
Bull Trout	Phillips Creek	Upper Kootenai
Bull Trout	Rich Creek	Upper Kootenai
Bull Trout	Sinclair Creek	Upper Kootenai
Bull Trout	Stahl Creek	Upper Kootenai
Bull Trout	Therriault Creek	Upper Kootenai
Bull Trout	*Tobacco River*	*Upper Kootenai*
Bull Trout	Weasel Creek	Upper Kootenai
Bull Trout	*Wigwam River*	*Upper Kootenai*
Bull Trout	Williams Creek	Upper Kootenai
Bull Trout	Young Creek	Upper Kootenai

Italics denote USFWS identified critical habitat

TMDL Streams
Priority Tributaries to TMDL Streams
Other Stakeholder Priority Streams

Species	Stream	Subbasin
Westslope Cutthroat Trout	Barron Creek	Upper Kootenai
Westslope Cutthroat Trout	Basin Creek	Upper Kootenai
Westslope Cutthroat Trout	Beaver Creek	Upper Kootenai
Westslope Cutthroat Trout	Big Creek	Upper Kootenai
Westslope Cutthroat Trout	Big Therriault Lake Outlet	Upper Kootenai
Westslope Cutthroat Trout	Blue Sky Creek	Upper Kootenai
Westslope Cutthroat Trout	Bluebird Creek	Upper Kootenai
Westslope Cutthroat Trout	Boulder Creek	Upper Kootenai
Westslope Cutthroat Trout	Brimstone Creek	Upper Kootenai
Westslope Cutthroat Trout	Bristow Creek	Upper Kootenai
Westslope Cutthroat Trout	Burro Creek	Upper Kootenai
Westslope Cutthroat Trout	Camp Creek	Upper Kootenai
Westslope Cutthroat Trout	Canyon Creek	Upper Kootenai
Westslope Cutthroat Trout	Cayuse Creek	Upper Kootenai
Westslope Cutthroat Trout	Cedar Creek	Upper Kootenai
Westslope Cutthroat Trout	Clarence Creek	Upper Kootenai
Westslope Cutthroat Trout	Cliff Creek	Upper Kootenai
Westslope Cutthroat Trout	Copeland Creek	Upper Kootenai
Westslope Cutthroat Trout	Cripple Creek	Upper Kootenai
Westslope Cutthroat Trout	Cripple Horse Creek	Upper Kootenai
Westslope Cutthroat Trout	Davis Creek	Upper Kootenai
Westslope Cutthroat Trout	Deep Creek	Upper Kootenai
Westslope Cutthroat Trout	DeRozier Creek	Upper Kootenai
Westslope Cutthroat Trout	Dickey Creek	Upper Kootenai
Westslope Cutthroat Trout	Divide Creek	Upper Kootenai
Westslope Cutthroat Trout	Dodge Creek	Upper Kootenai
Westslope Cutthroat Trout	Drop Creek	Upper Kootenai
Westslope Cutthroat Trout	Dudley Creek	Upper Kootenai
Westslope Cutthroat Trout	East Branch South Fork Big Creek	Upper Kootenai
Westslope Cutthroat Trout	East Fork Lookout Creek	Upper Kootenai
Westslope Cutthroat Trout	Edna Creek	Upper Kootenai
Westslope Cutthroat Trout	Fivemile Creek	Upper Kootenai
Westslope Cutthroat Trout	Flat Creek	Upper Kootenai
Westslope Cutthroat Trout	Fortine Creek	Upper Kootenai
Westslope Cutthroat Trout	Foundation Creek	Upper Kootenai
Westslope Cutthroat Trout	Glen Creek	Upper Kootenai
Westslope Cutthroat Trout	Glen L Ditch	Upper Kootenai
Westslope Cutthroat Trout	Gold Creek	Upper Kootenai
Westslope Cutthroat Trout	Good Creek	Upper Kootenai
Westslope Cutthroat Trout	Grand Creek	Upper Kootenai
Westslope Cutthroat Trout	Grave Creek	Upper Kootenai
Westslope Cutthroat Trout	Griffith Creek	Upper Kootenai
Westslope Cutthroat Trout	Hamilton Creek	Upper Kootenai
Westslope Cutthroat Trout	Hickey Creek	Upper Kootenai
Westslope Cutthroat Trout	Indian Creek	Upper Kootenai
Westslope Cutthroat Trout	Ivor Creek	Upper Kootenai
Westslope Cutthroat Trout	Jackson Creek	Upper Kootenai
Westslope Cutthroat Trout	Jim Creek	Upper Kootenai
Westslope Cutthroat Trout	Kootenai River	Upper Kootenai
Westslope Cutthroat Trout	Kopsi Creek	Upper Kootenai
Westslope Cutthroat Trout	Ksanka Creek	Upper Kootenai
Westslope Cutthroat Trout	Lake Creek	Upper Kootenai
Westslope Cutthroat Trout	Laughing Water Creek	Upper Kootenai
Westslope Cutthroat Trout	Lewis Creek	Upper Kootenai
Westslope Cutthroat Trout	Lime Creek	Upper Kootenai
Westslope Cutthroat Trout	Lion Creek	Upper Kootenai
Westslope Cutthroat Trout	Little North Fork	Upper Kootenai
Westslope Cutthroat Trout	Little Therriault Lake Outlet	Upper Kootenai
Westslope Cutthroat Trout	Lookout Creek	Upper Kootenai
Westslope Cutthroat Trout	Magnesia Creek	Upper Kootenai
Westslope Cutthroat Trout	McGuire Creek	Upper Kootenai
Westslope Cutthroat Trout	Meadow Creek	Upper Kootenai
Westslope Cutthroat Trout	Mesler Creek	Upper Kootenai
Westslope Cutthroat Trout	Middle Fork Dodge Creek	Upper Kootenai
Westslope Cutthroat Trout	Middle Fork Parsnip Creek	Upper Kootenai
Westslope Cutthroat Trout	Mud Creek	Upper Kootenai
Westslope Cutthroat Trout	Murphy Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Big Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Bristow Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Deep Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Dodge Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Jackson Creek	Upper Kootenai
Westslope Cutthroat Trout	North Fork Parsnip Creek	Upper Kootenai
Westslope Cutthroat Trout	Otter Creek	Upper Kootenai
Westslope Cutthroat Trout	Parsnip Creek	Upper Kootenai
Westslope Cutthroat Trout	Phillips Creek	Upper Kootenai
Westslope Cutthroat Trout	Pinkham Creek	Upper Kootenai
Westslope Cutthroat Trout	Pony Creek	Upper Kootenai
Westslope Cutthroat Trout	Poverty Creek	Upper Kootenai
Westslope Cutthroat Trout	Rich Creek	Upper Kootenai
Westslope Cutthroat Trout	Rich Creek	Upper Kootenai
Westslope Cutthroat Trout	Roberts Creek	Upper Kootenai
Westslope Cutthroat Trout	Sherman Creek	Upper Kootenai
Westslope Cutthroat Trout	Sinclair Creek	Upper Kootenai
Westslope Cutthroat Trout	Snowslide Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Big Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Bristow Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Cripple Horse Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Dodge Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Fivemile Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Jackson Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Sullivan Creek	Upper Kootenai
Westslope Cutthroat Trout	South Fork Young Creek	Upper Kootenai
Westslope Cutthroat Trout	Stahl Creek	Upper Kootenai
Westslope Cutthroat Trout	Steep Creek	Upper Kootenai
Westslope Cutthroat Trout	Sterling Creek	Upper Kootenai
Westslope Cutthroat Trout	Stewart Creek	Upper Kootenai
Westslope Cutthroat Trout	Sullivan Creek	Upper Kootenai
Westslope Cutthroat Trout	Summit Creek	Upper Kootenai
Westslope Cutthroat Trout	Sutton Creek	Upper Kootenai
Westslope Cutthroat Trout	Swamp Creek	Upper Kootenai
Westslope Cutthroat Trout	Tenmile Creek	Upper Kootenai
Westslope Cutthroat Trout	Therriault Creek	Upper Kootenai
Westslope Cutthroat Trout	Tobacco River	Upper Kootenai
Westslope Cutthroat Trout	Twin Meadows Creek	Upper Kootenai
Westslope Cutthroat Trout	Unnamed	Upper Kootenai
Westslope Cutthroat Trout	Unnamed Trib to Jim Creek	Upper Kootenai
Westslope Cutthroat Trout	Wam Creek	Upper Kootenai
Westslope Cutthroat Trout	Warland Creek	Upper Kootenai
Westslope Cutthroat Trout	Weasel Creek	Upper Kootenai
Westslope Cutthroat Trout	West Branch South Fork Big Creek	Upper Kootenai
Westslope Cutthroat Trout	White Creek	Upper Kootenai
Westslope Cutthroat Trout	Wigwam River	Upper Kootenai
Westslope Cutthroat Trout	Williams Creek	Upper Kootenai
Westslope Cutthroat Trout	Wolverine Creek	Upper Kootenai
Westslope Cutthroat Trout	Young Creek	Upper Kootenai

Source: Fish Distribution for Montana Streams GIS data layer compiled and maintained by Montana Fish, Wildlife & Parks, accessed 7/28/15

Attachment B

Middle Kootenai Subwatershed Native Fish Distribution

Species	Stream	Subbasin
Bull Trout	Alexander Creek	Middle Kootenai
Bull Trout	*Bear Creek*	*Middle Kootenai*
Bull Trout	Big Cherry Creek	Middle Kootenai
Bull Trout	Cable Creek	Middle Kootenai
Bull Trout	East Fisher Creek	Middle Kootenai
Bull Trout	*East Fork Pipe Creek*	*Middle Kootenai*
Bull Trout	*Fisher River*	*Middle Kootenai*
Bull Trout	Flower Creek	Middle Kootenai
Bull Trout	Granite Creek	Middle Kootenai
Bull Trout	Hoodoo Creek	Middle Kootenai
Bull Trout	*Kootenai River*	*Middle Kootenai*
Bull Trout	Lake Creek	Middle Kootenai
Bull Trout	*Libby Creek*	*Middle Kootenai*
Bull Trout	Little Cherry Creek	Middle Kootenai
Bull Trout	Midas Creek	Middle Kootenai
Bull Trout	Parmenter Creek	Middle Kootenai
Bull Trout	*Pipe Creek*	*Middle Kootenai*
Bull Trout	Poorman Creek	Middle Kootenai
Bull Trout	*Quartz Creek*	*Middle Kootenai*
Bull Trout	Ramsey Creek	Middle Kootenai
Bull Trout	Silver Butte Fisher River	Middle Kootenai
Bull Trout	Trail Creek	Middle Kootenai
Bull Trout	*West Fisher Creek*	*Middle Kootenai*
Bull Trout	*West Fork Quartz Creek*	*Middle Kootenai*

Italics denote USFWS identified critical habitat

TMDL Streams
Priority Tributaries to TMDL Streams
Other Stakeholder Priority Streams

Species	Stream	Subbasin
Westslope Cutthroat Trout	Alder Creek	Middle Kootenai
Westslope Cutthroat Trout	Alexander Creek	Middle Kootenai
Westslope Cutthroat Trout	Baree Creek	Middle Kootenai
Westslope Cutthroat Trout	Barnum Creek	Middle Kootenai
Westslope Cutthroat Trout	Bear Creek	Middle Kootenai
Westslope Cutthroat Trout	Bear Springs Creek	Middle Kootenai
Westslope Cutthroat Trout	Bearfite Creek	Middle Kootenai
Westslope Cutthroat Trout	Beulah Creek	Middle Kootenai
Westslope Cutthroat Trout	Big Cherry Creek	Middle Kootenai
Westslope Cutthroat Trout	Blue Creek	Middle Kootenai
Westslope Cutthroat Trout	Bob C Creek	Middle Kootenai
Westslope Cutthroat Trout	Bobtail Creek	Middle Kootenai
Westslope Cutthroat Trout	Bramlet Creek	Middle Kootenai
Westslope Cutthroat Trout	Brulee Creek	Middle Kootenai
Westslope Cutthroat Trout	Brush Creek	Middle Kootenai
Westslope Cutthroat Trout	Bull Creek	Middle Kootenai
Westslope Cutthroat Trout	Carney Creek	Middle Kootenai
Westslope Cutthroat Trout	Cedar Creek	Middle Kootenai
Westslope Cutthroat Trout	Chief Creek	Middle Kootenai
Westslope Cutthroat Trout	China Creek	Middle Kootenai
Westslope Cutthroat Trout	Cody Creek	Middle Kootenai
Westslope Cutthroat Trout	Colonite Creek	Middle Kootenai
Westslope Cutthroat Trout	Coniff Creek	Middle Kootenai
Westslope Cutthroat Trout	Contact Creek	Middle Kootenai
Westslope Cutthroat Trout	Cow Creek	Middle Kootenai
Westslope Cutthroat Trout	Crazyman Creek	Middle Kootenai
Westslope Cutthroat Trout	Crystal Creek	Middle Kootenai
Westslope Cutthroat Trout	Dahl Lk Outlet	Middle Kootenai
Westslope Cutthroat Trout	Deep Creek	Middle Kootenai
Westslope Cutthroat Trout	Detgen Creek	Middle Kootenai
Westslope Cutthroat Trout	Doak Creek	Middle Kootenai
Westslope Cutthroat Trout	Doe Creek	Middle Kootenai
Westslope Cutthroat Trout	Dunn Creek	Middle Kootenai
Westslope Cutthroat Trout	East Fisher Creek	Middle Kootenai
Westslope Cutthroat Trout	East Fork Pipe Creek	Middle Kootenai
Westslope Cutthroat Trout	Elliot Creek	Middle Kootenai
Westslope Cutthroat Trout	Fawn Creek	Middle Kootenai
Westslope Cutthroat Trout	Fleetwood Creek	Middle Kootenai
Westslope Cutthroat Trout	Flower Creek	Middle Kootenai
Westslope Cutthroat Trout	Fourth of July Creek	Middle Kootenai
Westslope Cutthroat Trout	Getner Creek	Middle Kootenai
Westslope Cutthroat Trout	Granite Creek	Middle Kootenai
Westslope Cutthroat Trout	Harris Creek	Middle Kootenai
Westslope Cutthroat Trout	Himes Creek	Middle Kootenai
Westslope Cutthroat Trout	Hoodoo Creek	Middle Kootenai
Westslope Cutthroat Trout	Horse Creek	Middle Kootenai
Westslope Cutthroat Trout	Houghton Creek	Middle Kootenai
Westslope Cutthroat Trout	Howard Creek	Middle Kootenai
Westslope Cutthroat Trout	Iron Meadow Creek	Middle Kootenai
Westslope Cutthroat Trout	Island Creek	Middle Kootenai
Westslope Cutthroat Trout	Kelsey Creek	Middle Kootenai
Westslope Cutthroat Trout	Kootenai River	Middle Kootenai
Westslope Cutthroat Trout	Lake Creek	Middle Kootenai
Westslope Cutthroat Trout	Leigh Creek	Middle Kootenai
Westslope Cutthroat Trout	Libby Creek	Middle Kootenai
Westslope Cutthroat Trout	Little Wolf Creek	Middle Kootenai
Westslope Cutthroat Trout	Loon Lake Outlet	Middle Kootenai
Westslope Cutthroat Trout	Lost Creek	Middle Kootenai
Westslope Cutthroat Trout	Marl Creek	Middle Kootenai
Westslope Cutthroat Trout	McGinnis Creek	Middle Kootenai
Westslope Cutthroat Trout	McKillop Creek	Middle Kootenai
Westslope Cutthroat Trout	Midas Creek	Middle Kootenai
Westslope Cutthroat Trout	Miller Creek	Middle Kootenai
Westslope Cutthroat Trout	No Creek	Middle Kootenai
Westslope Cutthroat Trout	Noisy Creek	Middle Kootenai
Westslope Cutthroat Trout	North Fork Miller Creek	Middle Kootenai
Westslope Cutthroat Trout	North Fork Silver Butte Creek	Middle Kootenai
Westslope Cutthroat Trout	Olson Creek	Middle Kootenai
Westslope Cutthroat Trout	Owl Creek	Middle Kootenai
Westslope Cutthroat Trout	Parmenter Creek	Middle Kootenai
Westslope Cutthroat Trout	Pecolet Creek	Middle Kootenai
Westslope Cutthroat Trout	Peoples Creek	Middle Kootenai
Westslope Cutthroat Trout	Pipe Creek	Middle Kootenai
Westslope Cutthroat Trout	Pleasant Valley Creek	Middle Kootenai
Westslope Cutthroat Trout	Porcupine Creek	Middle Kootenai
Westslope Cutthroat Trout	Prospect Creek	Middle Kootenai
Westslope Cutthroat Trout	Quartz Creek	Middle Kootenai
Westslope Cutthroat Trout	Rainy Creek	Middle Kootenai
Westslope Cutthroat Trout	Raritan Creek	Middle Kootenai
Westslope Cutthroat Trout	Raven Creek	Middle Kootenai
Westslope Cutthroat Trout	Rice Creek	Middle Kootenai
Westslope Cutthroat Trout	Richards Creek	Middle Kootenai
Westslope Cutthroat Trout	Schrieber Creek	Middle Kootenai
Westslope Cutthroat Trout	Sedlak Creek	Middle Kootenai
Westslope Cutthroat Trout	Shafer Creek	Middle Kootenai
Westslope Cutthroat Trout	Shaughnessy Creek	Middle Kootenai
Westslope Cutthroat Trout	Silver Bow Creek	Middle Kootenai
Westslope Cutthroat Trout	Silver Butte Creek	Middle Kootenai
Westslope Cutthroat Trout	Silver Butte Fisher River	Middle Kootenai
Westslope Cutthroat Trout	Smearl Creek	Middle Kootenai
Westslope Cutthroat Trout	Smoke Creek	Middle Kootenai
Westslope Cutthroat Trout	Snell Creek	Middle Kootenai
Westslope Cutthroat Trout	Snow Creek	Middle Kootenai
Westslope Cutthroat Trout	Snowshoe Creek	Middle Kootenai
Westslope Cutthroat Trout	South Fork Flower Creek	Middle Kootenai
Westslope Cutthroat Trout	South Fork Parmenter Creek	Middle Kootenai
Westslope Cutthroat Trout	Squaw Creek	Middle Kootenai
Westslope Cutthroat Trout	Standard Creek	Middle Kootenai
Westslope Cutthroat Trout	Swamp Creek	Middle Kootenai
Westslope Cutthroat Trout	Tepee Creek	Middle Kootenai
Westslope Cutthroat Trout	Threemile Creek	Middle Kootenai
Westslope Cutthroat Trout	Trail Creek	Middle Kootenai
Westslope Cutthroat Trout	Trapper Creek	Middle Kootenai
Westslope Cutthroat Trout	Trib to Dunn Creek RM 8.1	Middle Kootenai
Westslope Cutthroat Trout	Unnamed	Middle Kootenai
Westslope Cutthroat Trout	Vian Creek	Middle Kootenai
Westslope Cutthroat Trout	Wabuno Creek	Middle Kootenai
Westslope Cutthroat Trout	Waloven Creek	Middle Kootenai
Westslope Cutthroat Trout	Weasel Creek	Middle Kootenai
Westslope Cutthroat Trout	Weigel Creek	Middle Kootenai
Westslope Cutthroat Trout	West Dry Fork Creek	Middle Kootenai
Westslope Cutthroat Trout	West Fisher Creek	Middle Kootenai
Westslope Cutthroat Trout	West Fork Granite Creek	Middle Kootenai
Westslope Cutthroat Trout	West Fork Quartz Creek	Middle Kootenai
Westslope Cutthroat Trout	Wyoma Creek	Middle Kootenai

Species	Stream	Subbasin
Columbia Basin Redband Trout	Barnum Creek	Middle Kootenai
Columbia Basin Redband Trout	Bear Creek	Middle Kootenai
Columbia Basin Redband Trout	Big Cherry Creek	Middle Kootenai
Columbia Basin Redband Trout	Brush Creek	Middle Kootenai
Columbia Basin Redband Trout	Cable Creek	Middle Kootenai
Columbia Basin Redband Trout	Calx Creek	Middle Kootenai
Columbia Basin Redband Trout	Cedar Creek	Middle Kootenai
Columbia Basin Redband Trout	China Creek	Middle Kootenai
Columbia Basin Redband Trout	Deer Creek	Middle Kootenai
Columbia Basin Redband Trout	Dry Fork Creek	Middle Kootenai
Columbia Basin Redband Trout	East Fisher Creek	Middle Kootenai
Columbia Basin Redband Trout	Granite Creek	Middle Kootenai
Columbia Basin Redband Trout	Himes Creek	Middle Kootenai
Columbia Basin Redband Trout	Horse Creek	Middle Kootenai
Columbia Basin Redband Trout	Kootenai River	Middle Kootenai
Columbia Basin Redband Trout	Lake Creek	Middle Kootenai
Columbia Basin Redband Trout	Leigh Creek	Middle Kootenai
Columbia Basin Redband Trout	Libby Creek	Middle Kootenai
Columbia Basin Redband Trout	Little Cherry Creek	Middle Kootenai
Columbia Basin Redband Trout	Little Wolf Creek	Middle Kootenai
Columbia Basin Redband Trout	Marl Creek	Middle Kootenai
Columbia Basin Redband Trout	McGinnis Creek	Middle Kootenai
Columbia Basin Redband Trout	Midas Creek	Middle Kootenai
Columbia Basin Redband Trout	Miller Creek	Middle Kootenai
Columbia Basin Redband Trout	Parmenter Creek	Middle Kootenai
Columbia Basin Redband Trout	Pleasant Valley Fisher River	Middle Kootenai
Columbia Basin Redband Trout	Ramsey Creek	Middle Kootenai
Columbia Basin Redband Trout	Shaughnessy Creek	Middle Kootenai
Columbia Basin Redband Trout	Silver Butte Fisher River	Middle Kootenai
Columbia Basin Redband Trout	Smearl Creek	Middle Kootenai
Columbia Basin Redband Trout	South Fork Flower Creek	Middle Kootenai
Columbia Basin Redband Trout	Standard Creek	Middle Kootenai
Columbia Basin Redband Trout	Syrup Creek	Middle Kootenai
Columbia Basin Redband Trout	Tamarack Creek	Middle Kootenai
Columbia Basin Redband Trout	Trail Creek	Middle Kootenai
Columbia Basin Redband Trout	Weigel Creek	Middle Kootenai
Columbia Basin Redband Trout	West Fisher Creek	Middle Kootenai
Columbia Basin Redband Trout	Wolf Creek	Middle Kootenai

Source: Fish Distribution for Montana Streams GIS data layer compiled and maintained by Montana Fish, Wildlife & Parks, accessed 7/28/15

Attachment C

Lower Kootenai Subwatershed Native Fish Distribution

Species	Stream	Subbasin
Bull Trout	Callahan Cr, S Branch	Lower Kootenai
Bull Trout	*Callahan Creek*	*Lower Kootenai*
Bull Trout	Camp Creek	Lower Kootenai
Bull Trout	Goat Creek	Lower Kootenai
Bull Trout	*Keeler Creek*	Lower Kootenai
Bull Trout	*Kootenai River*	*Lower Kootenai*
Bull Trout	*Lake Creek*	*Lower Kootenai*
Bull Trout	*North Callahan Creek*	*Lower Kootenai*
Bull Trout	*North Fork Keeler Creek*	*Lower Kootenai*
Bull Trout	*O'Brien Creek*	*Lower Kootenai*
Bull Trout	Ross Creek	Lower Kootenai
Bull Trout	*South Callahan Creek*	*Lower Kootenai*
Bull Trout	*South Fork Keeler Creek*	*Lower Kootenai*
Bull Trout	Stanley Creek	Lower Kootenai

Italics denote USFWS identified critical habitat

TMDL Streams
Priority Tributaries to TMDL Streams
Other Stakeholder Priority Streams

Species	Stream	Subbasin
Westslope Cutthroat Trout	Brush Creek	Lower Kootenai
Westslope Cutthroat Trout	Cabin Creek	Lower Kootenai
Westslope Cutthroat Trout	Callahan Cr, S Branch	Lower Kootenai
Westslope Cutthroat Trout	Callahan Creek	Lower Kootenai
Westslope Cutthroat Trout	Camp Creek	Lower Kootenai
Westslope Cutthroat Trout	Cheer Creek	Lower Kootenai
Westslope Cutthroat Trout	China Creek	Lower Kootenai
Westslope Cutthroat Trout	Cliff Creek	Lower Kootenai
Westslope Cutthroat Trout	Copper Creek	Lower Kootenai
Westslope Cutthroat Trout	Crowell Creek	Lower Kootenai
Westslope Cutthroat Trout	Dry Creek	Lower Kootenai
Westslope Cutthroat Trout	Fairway Creek	Lower Kootenai
Westslope Cutthroat Trout	Falls Creek	Lower Kootenai
Westslope Cutthroat Trout	Felix Creek	Lower Kootenai
Westslope Cutthroat Trout	Goat Creek	Lower Kootenai
Westslope Cutthroat Trout	Gordon Creek	Lower Kootenai
Westslope Cutthroat Trout	Hale Creek	Lower Kootenai
Westslope Cutthroat Trout	Halverson Creek	Lower Kootenai
Westslope Cutthroat Trout	Hidden Creek	Lower Kootenai
Westslope Cutthroat Trout	Idamont Creek	Lower Kootenai
Westslope Cutthroat Trout	Iron Creek	Lower Kootenai
Westslope Cutthroat Trout	July Creek	Lower Kootenai
Westslope Cutthroat Trout	Keeler Creek	Lower Kootenai
Westslope Cutthroat Trout	Kool Creek	Lower Kootenai
Westslope Cutthroat Trout	Kootenai River	Lower Kootenai
Westslope Cutthroat Trout	Lake Creek	Lower Kootenai
Westslope Cutthroat Trout	Logan Creek	Lower Kootenai
Westslope Cutthroat Trout	Lynx Creek	Lower Kootenai
Westslope Cutthroat Trout	Madge Creek	Lower Kootenai
Westslope Cutthroat Trout	Noggle Creek	Lower Kootenai
Westslope Cutthroat Trout	North Callahan Creek	Lower Kootenai
Westslope Cutthroat Trout	North Fork Keeler Creek	Lower Kootenai
Westslope Cutthroat Trout	North Fork O'Brien Creek	Lower Kootenai
Westslope Cutthroat Trout	North Fork Ross Creek	Lower Kootenai
Westslope Cutthroat Trout	O'Brien Creek	Lower Kootenai
Westslope Cutthroat Trout	Payne Creek	Lower Kootenai
Westslope Cutthroat Trout	Pine Creek	Lower Kootenai
Westslope Cutthroat Trout	Porcupine Creek	Lower Kootenai
Westslope Cutthroat Trout	Rabbit Creek	Lower Kootenai
Westslope Cutthroat Trout	Rocky Creek	Lower Kootenai
Westslope Cutthroat Trout	Ross Creek	Lower Kootenai
Westslope Cutthroat Trout	Ruby Creek	Lower Kootenai
Westslope Cutthroat Trout	South Callahan Creek	Lower Kootenai
Westslope Cutthroat Trout	South Fork Keeler Creek	Lower Kootenai
Westslope Cutthroat Trout	South Fork Ross Creek	Lower Kootenai
Westslope Cutthroat Trout	Spring Creek	Lower Kootenai
Westslope Cutthroat Trout	Stanley Creek	Lower Kootenai
Westslope Cutthroat Trout	Star Creek	Lower Kootenai
Westslope Cutthroat Trout	Studebaker Draw	Lower Kootenai
Westslope Cutthroat Trout	Surprise Draw	Lower Kootenai
Westslope Cutthroat Trout	Swanson Creek	Lower Kootenai
Westslope Cutthroat Trout	Thicket Creek	Lower Kootenai
Westslope Cutthroat Trout	Threemile Creek	Lower Kootenai
Westslope Cutthroat Trout	Twin Creek	Lower Kootenai
Westslope Cutthroat Trout	Unnamed	Lower Kootenai
Westslope Cutthroat Trout	Upham Creek	Lower Kootenai
Westslope Cutthroat Trout	West Fork Keeler Creek	Lower Kootenai

Species	Stream	Subbasin
Columbia Basin Redband Trout	Callahan Cr, S Branch	Lower Kootenai
Columbia Basin Redband Trout	Callahan Creek	Lower Kootenai
Columbia Basin Redband Trout	China Creek	Lower Kootenai
Columbia Basin Redband Trout	Kootenai River	Lower Kootenai
Columbia Basin Redband Trout	Lake Creek	Lower Kootenai
Columbia Basin Redband Trout	North Callahan Creek	Lower Kootenai
Columbia Basin Redband Trout	South Callahan Creek	Lower Kootenai
Columbia Basin Redband Trout	Star Creek	Lower Kootenai

Source: Fish Distribution for Montana Streams GIS data layer compiled and maintained by Montana Fish, Wildlife & Parks, accessed 7/28/15

Attachment D

Yaak River Subwatershed Native Fish Distribution

Species	Stream	Subbasin
Bull Trout	Yaak River	Yaak

TMDL Streams
Priority Tributaries to TMDL Streams
Other Stakeholder Priority Streams

Species	Stream	Subbasin
Westslope Cutthroat Trout	Arbo Creek	Yaak
Westslope Cutthroat Trout	Beaver Creek	Yaak
Westslope Cutthroat Trout	Beetle Creek	Yaak
Westslope Cutthroat Trout	Big Creek (Big Foot Creek)	Yaak
Westslope Cutthroat Trout	Boyd Creek (Koo Koo Boyd Creek)	Yaak
Westslope Cutthroat Trout	Bridle Creek	Yaak
Westslope Cutthroat Trout	Browning Creek	Yaak
Westslope Cutthroat Trout	Bunker Hill Creek	Yaak
Westslope Cutthroat Trout	Burnt Creek	Yaak
Westslope Cutthroat Trout	Clay Creek	Yaak
Westslope Cutthroat Trout	Conn Creek	Yaak
Westslope Cutthroat Trout	Cool Creek	Yaak
Westslope Cutthroat Trout	Crum Gulch	Yaak
Westslope Cutthroat Trout	Cyclone Creek	Yaak
Westslope Cutthroat Trout	Davis Creek	Yaak
Westslope Cutthroat Trout	Dutch Creek	Yaak
Westslope Cutthroat Trout	Fast Creek	Yaak
Westslope Cutthroat Trout	Feeder Creek	Yaak
Westslope Cutthroat Trout	Flattail Creek	Yaak
Westslope Cutthroat Trout	Forest Creek	Yaak
Westslope Cutthroat Trout	Fourth of July Creek	Yaak
Westslope Cutthroat Trout	Fowler Creek	Yaak
Westslope Cutthroat Trout	French Creek	Yaak
Westslope Cutthroat Trout	Garver Creek	Yaak
Westslope Cutthroat Trout	Grizzly Creek	Yaak
Westslope Cutthroat Trout	Grush Gulch	Yaak
Westslope Cutthroat Trout	Hartman Creek	Yaak
Westslope Cutthroat Trout	Hellroaring Creek	Yaak
Westslope Cutthroat Trout	Hemlock Creek	Yaak
Westslope Cutthroat Trout	Hensley Creek	Yaak
Westslope Cutthroat Trout	Hidden Creek	Yaak
Westslope Cutthroat Trout	Hudson Creek	Yaak
Westslope Cutthroat Trout	Independence Creek	Yaak
Westslope Cutthroat Trout	Jungle Creek	Yaak
Westslope Cutthroat Trout	Kelsey Creek	Yaak
Westslope Cutthroat Trout	Koo Koo Creek	Yaak
Westslope Cutthroat Trout	Lang Creek	Yaak
Westslope Cutthroat Trout	Lap Creek	Yaak
Westslope Cutthroat Trout	Large Creek	Yaak
Westslope Cutthroat Trout	Lime Creek	Yaak
Westslope Cutthroat Trout	Little Creek	Yaak
Westslope Cutthroat Trout	Lost Fork Creek	Yaak
Westslope Cutthroat Trout	Mule Creek	Yaak
Westslope Cutthroat Trout	North Creek	Yaak
Westslope Cutthroat Trout	North Fork Meadow Creek	Yaak
Westslope Cutthroat Trout	North Fork Seventeenmile Creek	Yaak
Westslope Cutthroat Trout	Pete Creek	Yaak
Westslope Cutthroat Trout	Pheasant Creek	Yaak
Westslope Cutthroat Trout	Red Top Creek	Yaak
Westslope Cutthroat Trout	Runt Creek	Yaak
Westslope Cutthroat Trout	Seventeenmile Creek	Yaak
Westslope Cutthroat Trout	Shine Creek	Yaak
Westslope Cutthroat Trout	Slim Creek	Yaak
Westslope Cutthroat Trout	Smoot Creek	Yaak
Westslope Cutthroat Trout	South Fork Meadow Creek	Yaak
Westslope Cutthroat Trout	South Fork Yaak River	Yaak
Westslope Cutthroat Trout	Spread Creek	Yaak
Westslope Cutthroat Trout	Turner Creek	Yaak
Westslope Cutthroat Trout	Unnamed	Yaak
Westslope Cutthroat Trout	Vinal Creek	Yaak
Westslope Cutthroat Trout	Wampoo Creek	Yaak
Westslope Cutthroat Trout	West Fork Yaak River	Yaak
Westslope Cutthroat Trout	Whitetail Creek	Yaak
Westslope Cutthroat Trout	Windy Creek	Yaak
Westslope Cutthroat Trout	Winkum Creek	Yaak
Westslope Cutthroat Trout	Yaak River	Yaak
Westslope Cutthroat Trout	Yodlin Creek (Yodkin Creek)	Yaak
Westslope Cutthroat Trout	Zulu Creek	Yaak

Species	Stream	Subbasin
Columbia Basin Redband Trout	Arbo Creek	Yaak
Columbia Basin Redband Trout	Basin Creek	Yaak
Columbia Basin Redband Trout	Blacktail Creek	Yaak
Columbia Basin Redband Trout	Boyd Creek (Koo Koo Boyd Creek)	Yaak
Columbia Basin Redband Trout	Burnt Creek	Yaak
Columbia Basin Redband Trout	Caribou Creek	Yaak
Columbia Basin Redband Trout	East Fork Basin Creek	Yaak
Columbia Basin Redband Trout	East Fork Yaak River	Yaak
Columbia Basin Redband Trout	Hellroaring Creek	Yaak
Columbia Basin Redband Trout	Kilbrennan Creek	Yaak
Columbia Basin Redband Trout	Meadow Creek	Yaak
Columbia Basin Redband Trout	North Fork Seventeenmile Creek	Yaak
Columbia Basin Redband Trout	Pete Creek	Yaak
Columbia Basin Redband Trout	Porcupine Creek	Yaak
Columbia Basin Redband Trout	Seventeenmile Creek	Yaak
Columbia Basin Redband Trout	Solo Joe Creek	Yaak
Columbia Basin Redband Trout	West Fork Basin Creek	Yaak
Columbia Basin Redband Trout	Yaak River	Yaak

Source: Fish Distribution for Montana Streams GIS data layer compiled and maintained by Montana Fish, Wildlife & Parks, accessed 7/28/15