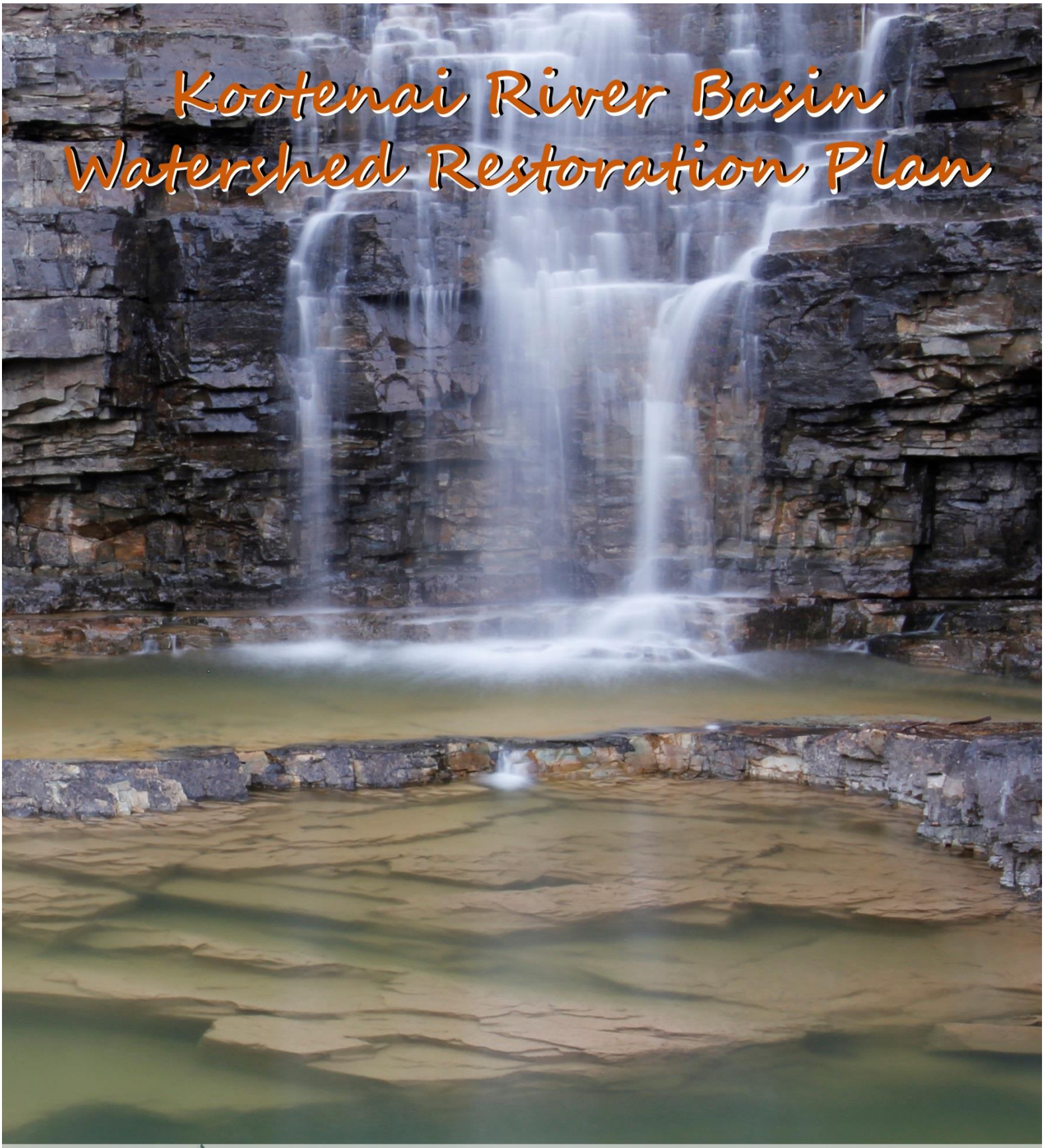
# Kootenai River Basin Watershed Restoration Plan



Kootenai River Network, Inc.

International Alliance for Water Quality and Aquatic Resources

# KOOTENAI RIVER BASIN
# WATERSHED RESTORATION PLAN

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# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES



# ATTACHMENTS

# 1.0 INTRODUCTION

The Kootenai River Network (KRN) works with the community in the Kootenai River Basin Watershed 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 Waters. Completion of the Kootenai River Basin WRP will enable KRN and other groups within the Kootenai River Basin Watershed to obtain 319 funding through Montana DEQ for the implementation of water quality improvement projects on impaired stream segments and other priority streams throughout the Kootenai River Basin Watershed.

## 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
- Plum Creek Timber Company
- Montana Department of Natural Resources and Conservation
- Natural Resources Conservation Service
- Northern Lights Electric Cooperative
- United States Army Corps of Engineers
- 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 streams (**Table 1-1** and **Figure 1-1**). TMDLs within the Kootenai River Basin were developed based on DEQ-defined TMDL Planning Areas (TPAs) as follows:

- Tobacco River TMDL Planning Area
    - Deep Creek
    - Edna Creek
    - Fortine Creek
    - Lime Creek
    - Sinclair Creek
    - Swamp Creek
    - Therriault Creek
    - Tobacco River
- Grave Creek TMDL Planning Area
    - Grave Creek
- Yaak River TMDL Planning Area
    - East Fork Yaak River
    - Lap Creek
    - Seventeenmile Creek
    - South Fork Yaak River
- Bobtail Creek TMDL Planning Area
    - Bobtail Creek
- Kootenai-Fisher TMDL Planning Area
    - Big Cherry Creek
    - Lake Creek
    - Libby Creek
    - Raven Creek
    - Snowshoe Creek
    - Stanley Creek
    - Wolf Creek

To help identify potential restoration projects on these 21 streams 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. These WRP community 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, KRN 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.

**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 | 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 |
| | Grave Creek | Grave Creek | Sediment |
| Middle Kootenai River Basin | Kootenai-Fisher | Big Cherry Creek | Cadmium, Lead, Zinc |
| | | Libby Creek | Sediment |
| | | Raven Creek | Sediment, Total Phosphorus |
| | | Snowshoe Creek | Arsenic, Cadmium, Lead, Zinc |
| | | Wolf Creek | Sediment, Temperature |
| | Bobtail Creek | Bobtail Creek | Sediment (TSS) |
| Lower Kootenai River Basin | Kootenai-Fisher | 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 |

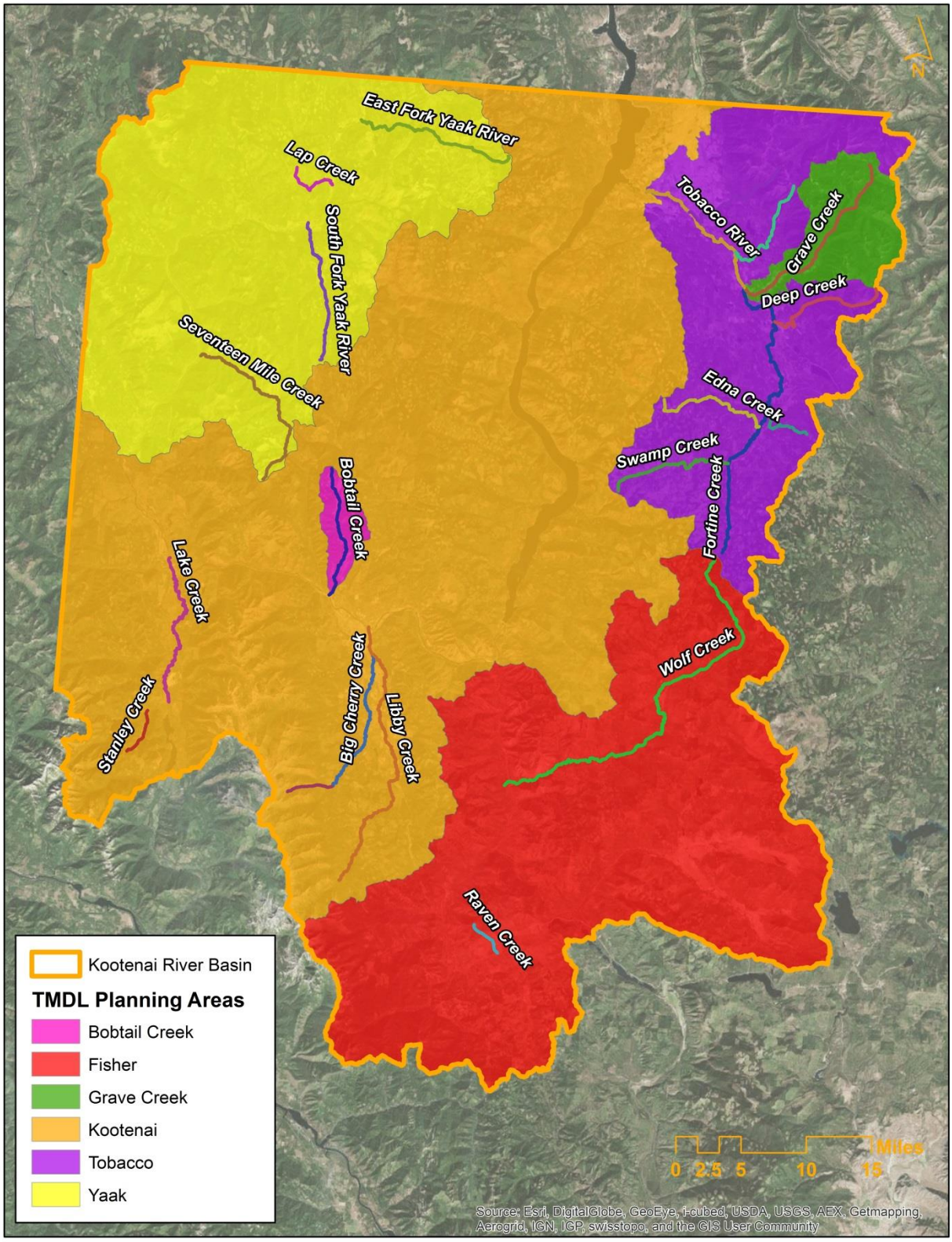


**Figure 1-1. Impaired Stream Segments in the Kootenai River Basin**

## 1.4 EPA's Nine Minimum Elements

The U.S. 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: SECTION 3

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 Watershed 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**). 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 Watershed, 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.

## 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. 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 Kootenai-Fisher TPA and the Bobtail Creek TPA, along with the mainstem of the Kootenai River and its tributary streams. Primary land-use activities within the Middle Kootenai River Watershed include forestry and agriculture. 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-Fisher TPA, along with the mainstem of the Kootenai River and its tributary streams. 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**). The US Fish and Wildlife Service has identified the Yaak River as critical bull trout habitat in the Yaak River Watershed (USFWS 2010).

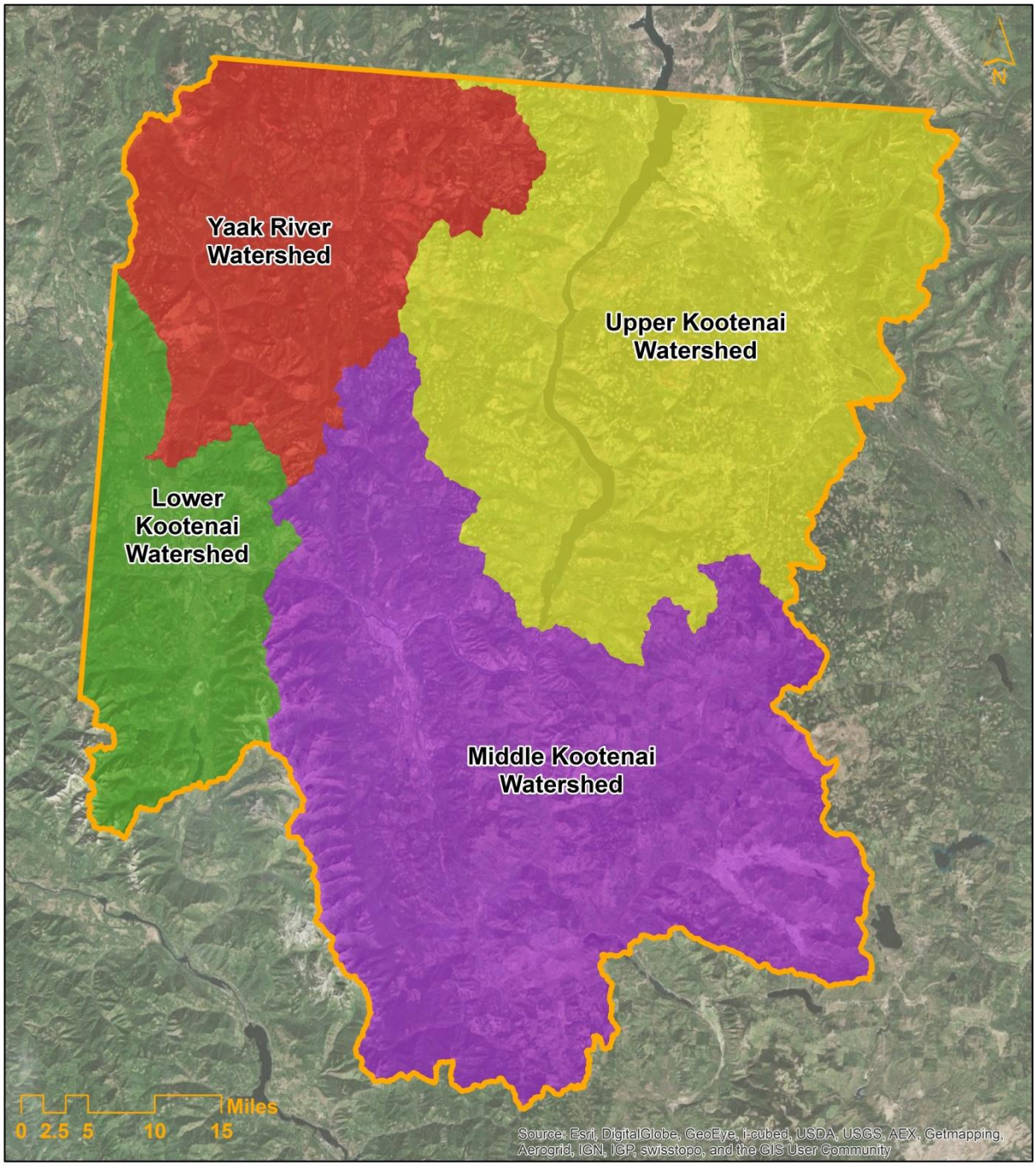


**Figure 2-1. Kootenai River Basin Sub-watersheds**

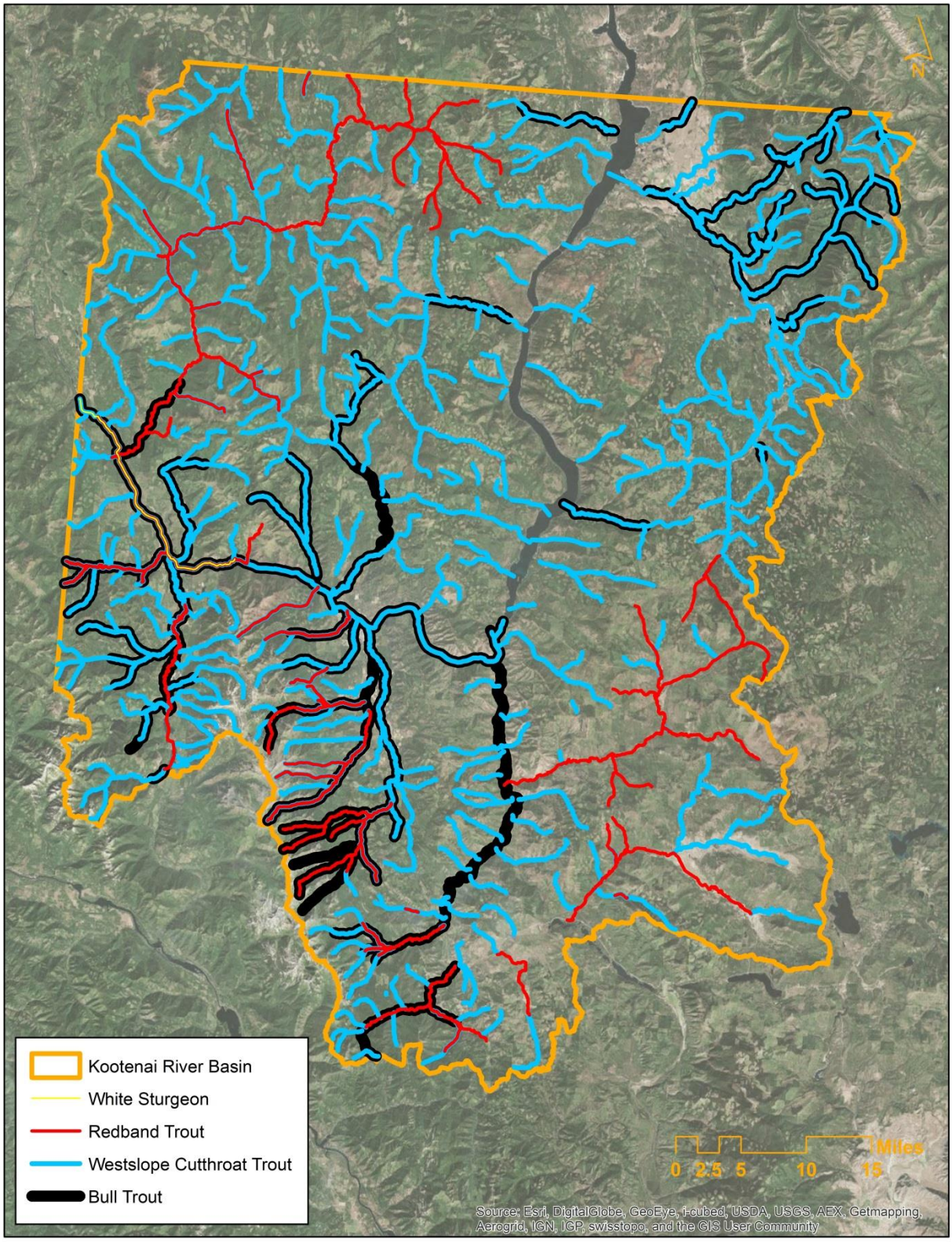


**Figure 2-2. Kootenai River Basin Native Fish Distribution**

# 3.0 Restoration Activities and Best Management Practices

Non-point source management measures, Best Management Practices (BMPs), and restoration projects will be implemented to reduce pollutant loads to the impaired stream segments and their tributary streams in the Kootenai River Basin Watershed. Potential projects include: streambank stabilization and revegetation, riparian buffer enhancement, 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. In addition, conserving native fish species and preventing the spread of aquatic invasive species are high priorities within the Kootenai River Basin.

## 3.1 Streambank Stabilization and Revegetation

Streambank bioengineering techniques reduce sediment inputs from eroding streambanks and restore natural channel migration rates through streambank revegetation. Bioengineered streambanks are designed to eliminate the sediment load from bank erosion in the short-term. Over the long-term, 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. 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.

## 3.2 Riparian Buffer Enhancement

Riparian buffer enhancement involves the creation and widening of the riparian buffer, which helps naturally stabilize streambanks, provides a filter for the runoff of sediment and nutrients from upland areas, and improves the utilization of nutrients which would otherwise leach below the root zone and contaminate groundwater. Riparian buffer enhancement can be achieved by actively replanting the floodplain or enacting grazing management strategies that limit the amount of time that livestock have access to the riparian zone. Riparian plantings include willow stakes, willow transplants, and containerized riparian vegetation. Grazing management strategies can include fencing, off-stream water development, water gaps, and management of the timing of grazing. In urban and suburban settings, riparian buffer enhancement can reduce the input of lawn fertilizer and stormwater runoff. The 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.

## 3.3 Wetland Restoration

Wetland conservation and restoration benefits water quality through filtering pollutants from surface water and groundwater. Wetland conservation involves protecting existing wetland resources during land development activities, while wetland restoration involves the active replanting of degraded wetlands with native wetland species. Wetland plantings can utilize locally available sod mats and transplanted native 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.

## 3.4 Unpaved Road Improvements

Sediment loads from unpaved roads can be reduced by creating rolling dips or water bars, adding gravel, paving the road, enhancing vegetative filter strips, installing ditch relief culverts, or replacing culverts. Three-sided arch culverts, where the natural stream bottom is retained, allow for improved fish passage and more complex aquatic habitat. The hydrology of the contributing area should also be considered when determining the necessary culvert size. Following these principals will help improve the stream system, increase fish habitat, and reduce potential sediment loads from failed culverts. Proper management of unpaved roads by eliminating preferential flow pathways can greatly reduce sediment loading from this source.

## 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. 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.

## 3.6 Residential and Urban Best Management Practices

Residential and urban BMPs can help reduce the input of sediment and nutrients to impaired stream segments and include the following projects:

- Capturing stormwater runoff from impervious surfaces
- Employing proper pet waste management in yards and open spaces
- Employing proper lawn fertilizer application and mowing practices
- 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 include the following projects:

- 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 and include the following projects:

- 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 and include the following projects:

- 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 help reduce the input of nutrients to impaired stream segments and include the following projects:

- 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 filling open mine shafts, processing and burying 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.

## 3.12 Native Fish Species Conservation

Native fish species within the Kootenai River Basin include bull trout, westslope cutthroat trout, Columbia River redband trout and white sturgeon (**Table 3-1**). Bull trout are listed under the Endangered Species Act as threatened, while the white sturgeon is considered endangered. Westslope cutthroat trout and Columbia River redband trout are considered species of concern by the state of Montana. Native fish require clean cool water free from excess sediment. Best Management Practices and restoration activities that reduce sediment loads to streams and improve riparian shading will benefit native fish populations.

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

| Species | Status |
|---|---|
| White Sturgeon | Endangered |
| Bull Trout | Threatened |
| Westslope Cutthroat Trout | Montana Species of Concern |
| Columbia River Redband Trout | Montana Species of Concern |

## 3.13 Aquatic Invasive Species Prevention and Control

While no aquatic invasive species are currently identified in the Kootenai River Basin, Eurasian watermilfoil, curly leaf pondweed and flowering rush have been documented in the adjacent lower Clark Fork River. In addition, Didymo, 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 maintaining clean equipment and water craft when moving between water bodies.

# 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. Ideas for potential 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 documents 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 in the Tobacco River TPA include Deep Creek, Edna Creek, Fortine Creek, Lime Creek, Sinclair Creek, Swamp Creek, Therriault Creek, and the Tobacco River (**Figure 4-1**).

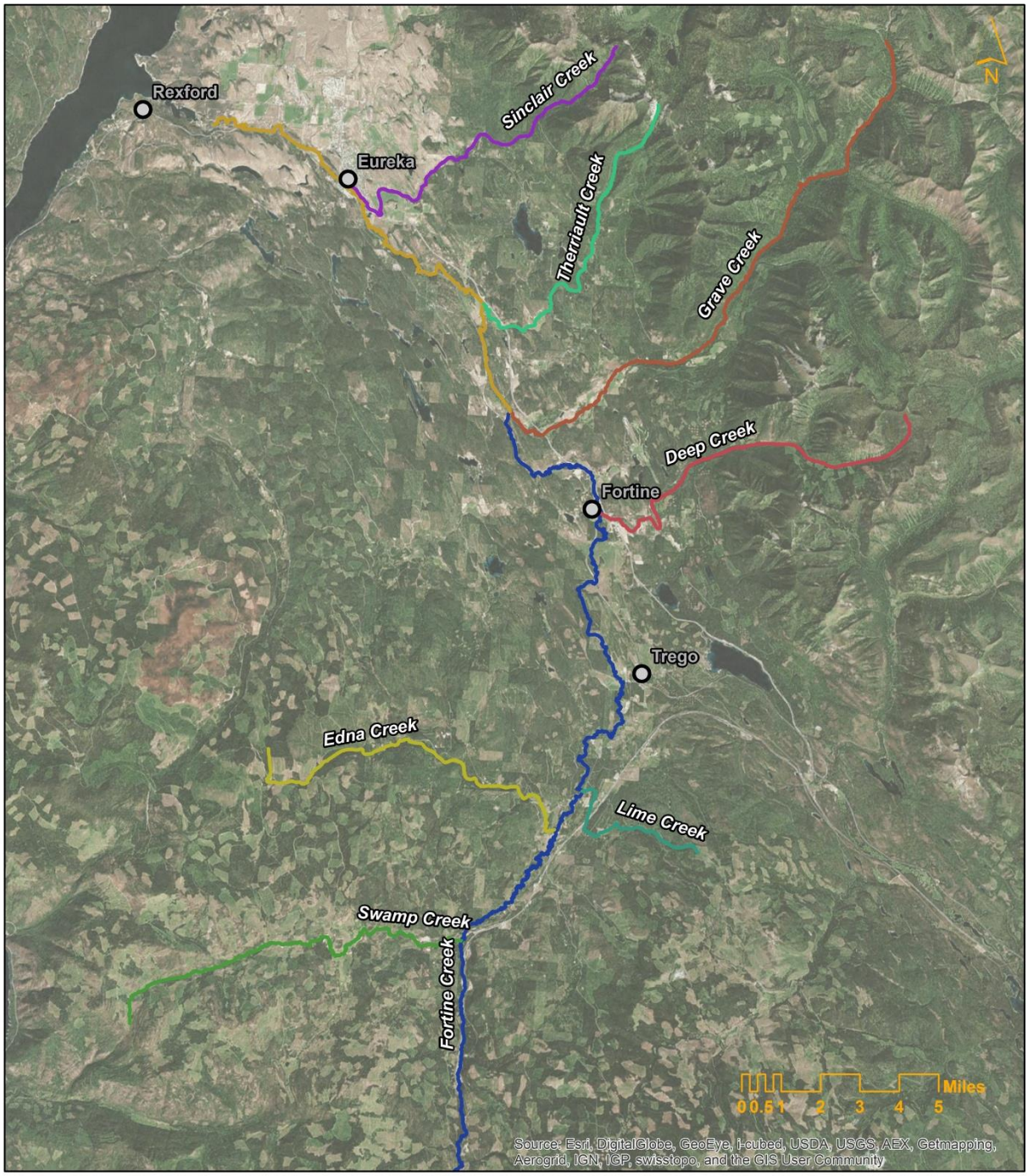


**Figure 4-1. Upper Kootenai Watershed Impaired Stream Segments**

### 4.1.1 Deep Creek

Deep Creek has a TMDL for sediment completed in 2011 (**Table 4-1**). 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 conducts streamflow monitoring and collects total suspended solids (TSS) data annually in Deep Creek and performed temperature monitoring in 2009, 2011 and 2012 and stream surveys in 2011.

**Table 4-1. Deep Creek Restoration Strategies**

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

Riparian fencing 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 stabilization, revegetation, and riparian buffer enhancement, particularly 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 assessment (DEQ 2011). Data collected in 2008 near the confluence with Fortine Creek indicate a lack of riparian vegetation and dense reed canary grass and suggests historic channelization (DEQ 2011). The US Forest Service conducts streamflow monitoring and collects TSS data annually in Edna Creek and performed temperature monitoring in 2009, 2011 and 2012 and stream surveys in 2009.

**Table 4-2. Edna Creek Restoration Strategies**

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

Restoration actions to reduce sediment loading Edna Creek include:

- Streambank stabilization, revegetation, and riparian buffer enhancement, particularly near the mouth
- Reduce the amount of reed canary grass in riparian areas
- Unpaved road improvements, including culvert replacements
- Reduce road densities
- 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**). 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. In addition, the US Forest Service conducts streamflow monitoring and collects TSS data annually in Fortine Creek and 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. The Swamp-Fortine Grazing Allotment is partially within the Fortine Creek watershed.

**Table 4-3. Fortine Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Fortine Creek, headwaters to mouth (Grave Creek) | Sediment | 9% | Streambank Stabilization 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 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
- Address stream water temperatures, particularly upstream of Deep Creek and in lower Fortine Creek
- 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 stabilization 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 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 Grey 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 | FSRD 3500 culvert replacement in 2015 | Sediment |

### 4.1.4 Grave Creek

Grave Creek has a TMDL for sediment completed in 2005 (**Table 4-6**). Prior to 2005, restoration efforts in Grave Creek have 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, which was replaced and fish screens were installed. 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). In addition to stream channel restoration projects in lower Grave Creek, the US Forest Service resurfaced seven miles of the Grave Creek Road in 2010 and replaced the Blue Sky Trail Bridge. The 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.

**Table 4-6. Grave Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Grave Creek, Foundation Creek to mouth (Fortine Creek) | Sediment | 60% | Streambank Stabilization 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 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, are the main restoration activities for Grave Creek identified during community and stakeholder meetings (**Table 4-7**).

**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 stabilization, revegetation, meander reactivation, and riparian buffer enhancement in lower Grave Creek
- Address areas of mass wasting 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 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 in Blue Sky Creek and Stahl Creek. For Williams Creek, improvements could be made to reduce sediment loads and improve conditions for trail users at reclaimed stream crossings (**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 | FSRD 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**). 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 | Project Types / Treatments |
|---|---|---|---|
| Lime Creek, headwaters to mouth (Fortine Creek) | Sediment | 10% | Streambank Stabilization 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 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
- Focus nutrient reduction efforts near the mouth and on the lower part of the Trego Grazing Allotment
- Unpaved road improvements, including culvert replacements
- Streambank stabilization 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). Sinclair Creek has a high resource value based on the occasional use by juvenile bull trout for extended rearing (DEQ 2011).

**Table 4-10. Sinclair Creek Restoration Strategies**

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

Restoration actions to reduce sediment loading to Sinclair Creek include:

- Replace culvert on 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 stabilization 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**). Human sources of sediment to Swamp Creek identified during this 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 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. The Swamp-Fortine Grazing Allotment is partially within the Swamp Creek watershed.

**Table 4-11. Swamp Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Swamp Creek, headwaters to mouth (Fortine Creek) | Sediment | 12% | Streambank Stabilization 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:

- Address channelization and a lack of riparian vegetation within channelized reach located approximately 3.5 miles upstream from the mouth and at the confluence with Lake Creek, including 0.35 miles of channelization that completely lacks riparian vegetation, while 0.5 miles upstream of the channelized section is over-widened with extensive gravel deposits
- 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
- Streambank stabilization and revegetation
- Riparian buffer enhancement

### 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). 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 and 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).

**Table 4-12. Therriault Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Therriault Creek, headwaters to mouth (Tobacco River) | Sediment | 16% | Streambank Stabilization 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 stabilization and revegetation
- Riparian buffer enhancement

#### *4.1.8.1 Therriault Creek 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 are 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**). Human sources of sediment to the Tobacco River identified during the TMDL assessment include roads/transportation, channel modifications, historic log drives, riparian vegetation removal, and permitted point sources (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). The US Forest Service performed temperature monitoring in the upper Tobacco River in 2012.

**Table 4-14. Tobacco River Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Tobacco River, confluence of Grave Creek & Fortine Creek to mouth (Lake Koocanusa) | Sediment | 11% | Streambank Stabilization 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 floodplain permitting 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 stabilization, riparian vegetation plantings and channel restoration. This site includes the “rails-to-trails” trail system that extends from Eureka to Rexburg. 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 stabilization measures during high water events.

**Table 4-15. Tobacco River Priority Projects**

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| Tobacco River | Streambank stabilization and riparian restoration upstream of Eureka | Sediment |
| | Streambank stabilization and riparian restoration downstream of Eureka | Sediment |
| | Floodplain permitting | 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 stabilization and revegetation
- Riparian buffer enhancement
- Unpaved road improvements, including culvert replacements

### *4.1.9.1 Tobacco River 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**). 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 | Excess water from flooded fields flows 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 |

## 4.2 MIDDLE KOOTENAI RIVER WATERSHED

The Middle Kootenai River Watershed extends from Libby Dam downstream to Kootenai Falls and includes streams in the Kootenai-Fisher TPA and the Bobtail Creek TPA, along with the mainstem of the Kootenai River and its tributary streams. Impaired streams in the Kootenai-Fisher TPA include Big Cherry Creek, Lake Creek, Libby Creek, Snowshoe Creek, Stanley Creek, and Wolf Creek (**Figure 4-2**).

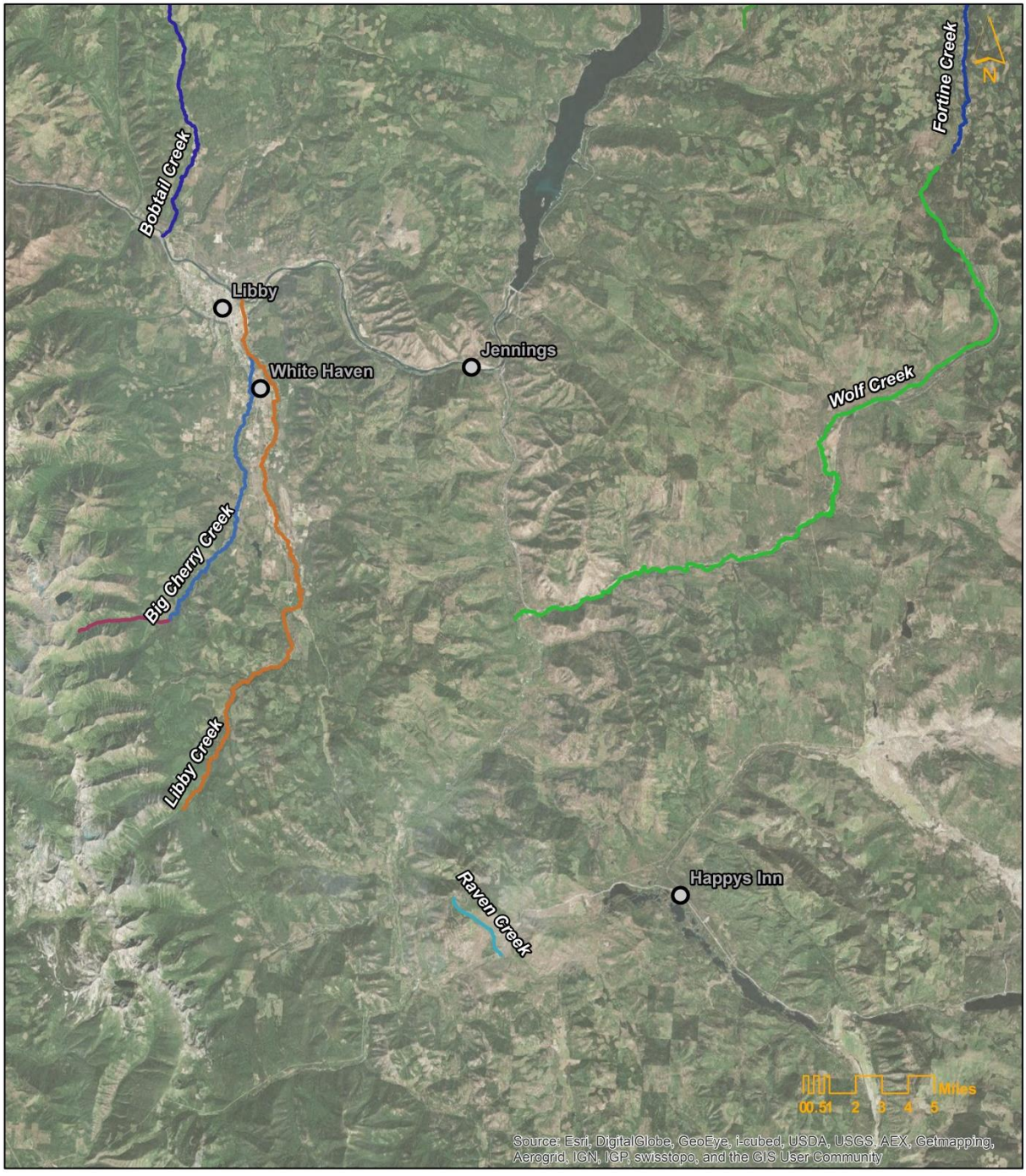


**Figure 4-2. Middle Kootenai River Watershed Impaired Stream Segments**

### 4.2.1 Big Cherry Creek

Big Cherry Creek has TMDLs for Cadmium, Lead, and Zinc completed in 2014 (**Table 4-18**). For Big Cherry Creek, monitoring results 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 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 significant source of metals loading to Big Cherry Creek below its confluence, primarily from the Snowshoe Mine which was reclaimed in 2012. Other potentially smaller scale source areas of metals include the Copper Reward, Seattle, Silver Tip, and Fairbault abandoned mines in the headwaters of Big Cherry Creek. Additional contributing source areas include the Leigh Creek, Big Sky, and Missouri abandoned mines located 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 with limited water quality benefits.

**Table 4-18. Big Cherry Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | | 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 upgrade 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 | FSRD 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:

- Address metals loading from the Big Cherry Creek Mill Site
- Evaluate the effectiveness of the Snowshoe Creek Mine cleanup post-2012 when remediation was completed
- Examine feasibility of cleanup of the remaining in-stream, streambank and floodplain tailings deposits in Snowshoe Creek

#### *4.2.1.1 Big Cherry Creek 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 | FSRD 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 (**Table 4-21**). 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. These rain-on-snow events are thought to be the main source of channel instability and excessive sediment loading to Bobtail Creek. The rain-on-snow events led to Bobtail Creek jumping its banks and flowing down a skid road built for timber harvest 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. 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). In addition, Plum Creek has corrected fish passage barriers and decommission 0.5 miles of road.

**Table 4-21. Bobtail Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Bobtail Creek, headwaters to mouth (Kootenai River) | Sediment (TSS) | 95% | Streambank Stabilization 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:

- Unpaved road improvements, including culvert replacements
- Streambank stabilization and revegetation
- Riparian buffer enhancement

### 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**). A long history of land management activities, including the removal of near-stream vegetation, has resulted in channel over-widening in lower 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).

**Table 4-23. Libby Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Libby Creek, Highway 2 bridge to mouth (Kootenai River) | Sediment | 27% | Streambank Stabilization 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 Libby Creek identified by watershed stakeholders include assisting private landowners with stream crossings and addressing 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 crossings | Sediment |
| | Address failing haul road on DNRC property | Sediment |

Restoration actions to reduce sediment loading to Libby Creek include:

- Channel restoration, streambank stabilization and revegetation along the mainstem of Libby Creek, including re-establishment of natural cedar forests on the floodplain
- Channel restoration along lower 2,000 feet of Libby Creek that was historically channelized
- 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 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 to reduce sediment loading. In addition, the upper segment of Libby Creek upstream of Highway 2 is a priority watershed for the Kootenai National Forest (DEQ 2014b).

### 4.2.4 Raven Creek

Raven Creek has a TMDL for sediment and total phosphorus completed in 2014 (**Table 4-25**). 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 Timber Company 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 | Project Types / Treatments |
|---|---|---|---|
| Raven Creek, headwaters to mouth (Pleasant Valley Fisher River) | Sediment | 12% | Streambank Stabilization and Revegetation |
| | | | Riparian Buffer Enhancement |
| | | | Unpaved Road Improvements |
| | | | Forestry BMPs |
| | Total Phosphorus | 2% | Streambank Stabilization 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 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 TMDL's for arsenic, cadmium, lead and zinc completed in 2014 (**Table 4-26**). 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 Kootenai 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. 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 | | 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 remediation 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**). 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. 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).

**Table 4-27. Wolf Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| Wolf Creek, headwaters to mouth (Fisher River) | Sediment | 29% | Streambank Stabilization and Revegetation |
| | | | Riparian Buffer Enhancement |
| | | | Unpaved Road Improvements |

**Table 4-27. Wolf Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | Project Types / Treatments |
|---|---|---|---|
| | | | 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, which exhibit similar land uses, environmental conditions, and restoration opportunities as follows (**Table 4-28** and **Figure 4-3**):

1. Lower Wolf Creek – This reach extends from the confluence of Wolf Creek with the Fisher River (River Mile, RM 0) upstream 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. 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.

5. Fairview – A short one mile reach that is on US Forest Service Property (RM 21.9 – 22.9). It has an historic ranger station on it and has been fenced to livestock grazing for many years. Some reaches are near their physical potential, but some segments have restoration potential.

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 long reach are variable, with segments that have the potential for conifer restoration activity.

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.

To address sediment and temperature load allocations along Wolf Creek, forest land managers (US Forest Service, Plum Creek, 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 action 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 bioengineer 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.

**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. |
| 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. |
| 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. |
| 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. |
| 31 | | | | |
| 32 | | | | |
| 33 | | | | |
| 34 | | | | |
| 35 | | | | |
| 36 | | | | |
| 37 | | | | |
| 38 | | | | |

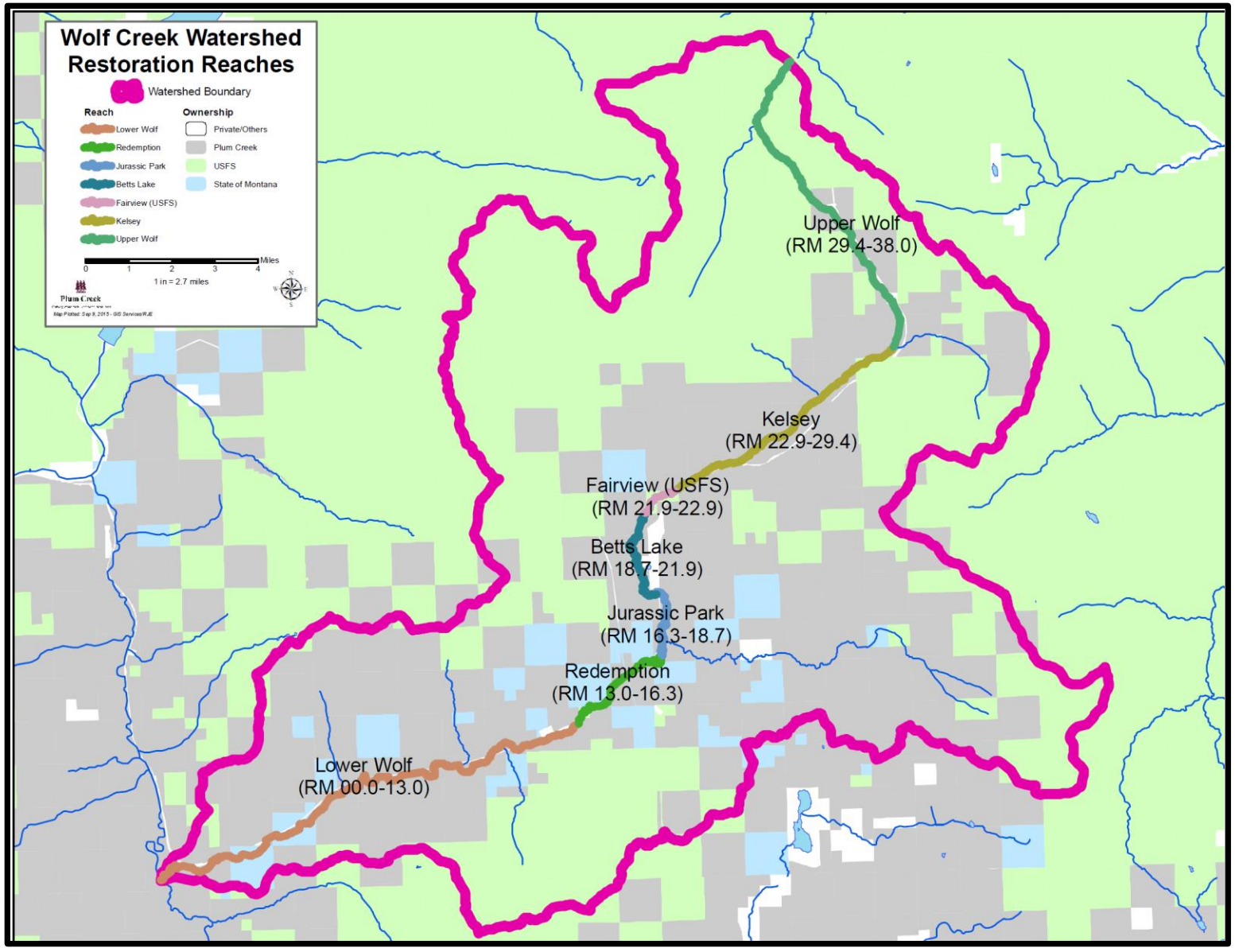


**Figure 4-3. Wolf Creek Restoration Reaches**

### *4.2.6.1 Wolf Creek 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 |

## 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. Priority projects types include riparian revegetation, streambank stabilization, channel restoration, culvert and bridge replacements, road storage and decommissioning, and beaver relocation (**Table 4-30**). 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) construct three engineered log jams at the mouth of Dunn Creek, and 3) streambank stabilization at the mouth of Dunn Creek using rock with a launchable toe (Greg Hoffman, US Army Corps of Engineers, personal communication, 2015).

**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 stabilization and road relocation | Sediment |
| Pipe Creek | Streambank stabilization at MP15.5 | Sediment |
| | FSRD 471 bridge replacement | Sediment |
| | FSRD 336 convert to trail | Sediment |
| | Loon Lake FSRD 471 culvert replacement | Sediment |
| | Road storage/decommissioning | Sediment |
| | Address failing dike constructed in 1956 | Sediment |
| | Beaver relocation | N/A |
| Quartz Creek | FSRD 600 culvert replacement | Sediment |
| | Beaver relocation | N/A |
| Hennesey Creek | FSRD 332 culvert replacement | Sediment |
| Flower Creek | Streambank stabilization | Sediment |
| South Fork Flower Creek | FSRD 128 and FSRD 4729 culvert outlet rocks | Sediment |
| Fisher River | Meander reconnection and stream restoration | Sediment |

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

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| Silver Bow Creek | FSRD 148 culvert replacement | Sediment |
| Silver Butte Creek | FSRD 148 culvert replacement on tributaries | Sediment |
| Baree Creek | FSRD 148 culvert replacement | Sediment |
| Iron Meadow Creek | FSRD 148 culvert replacement | Sediment |
| Porcupine Creek | FSRD 148 culvert replacement | Sediment |
| Crystal Creek | FSRD 6734 culvert replacement | Sediment |
| Miller Creek | Large woody debris (LWD) placement | N/A |
| Smoke Creek | FSRD 763 bridge replacement | Sediment |
| Cow Creek | FSRD 763 bridge replacement | Sediment |
| West Fisher Creek | Streambank stabilization and road relocation | Sediment |
| Lake Creek | FSRD 231 bridge replacement | Sediment |
| Trail Creek | FSRD 231 bridge replacement | Sediment |

## 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-Fisher TPA, along with the mainstem of the Kootenai River and its tributary streams (**Figure 4-4**).

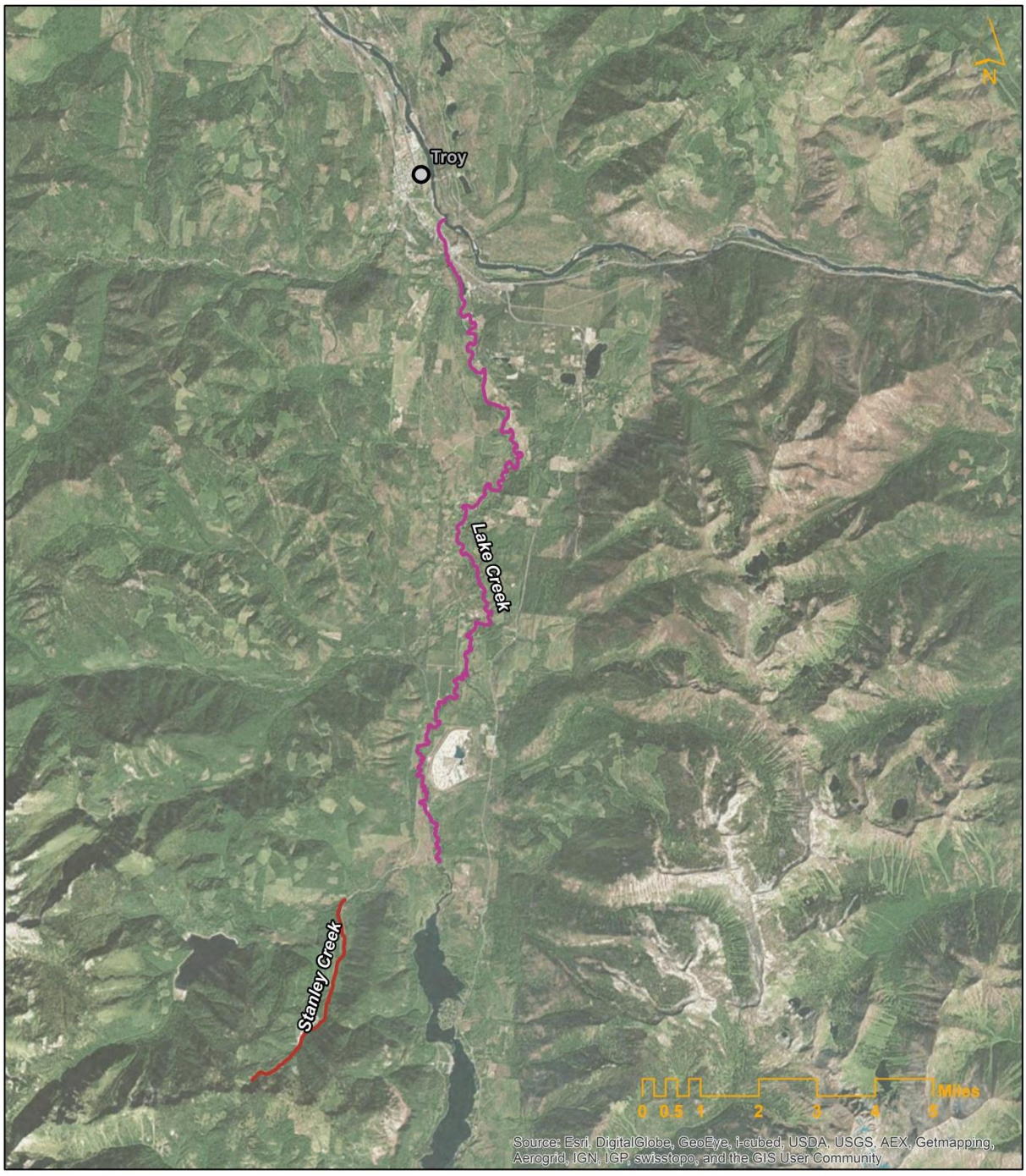


**Figure 4-4. Lower Kootenai Watershed Impaired Stream Segments**

### 4.3.1 Lake Creek

Lake Creek has TMDLs for sediment, nitrate+nitrite, copper, and lead completed in 2014 (**Table 4-31**). 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 nutrient impairments, the nitrate+nitrite TMDL load reductions for Lake Creek focus on the area downstream of the Troy Mine tailings impoundment near the confluence with Twin Creek where nitrate+nitrite concentrations are highest (DEQ 2014b). For metals impairments, the primary sources of metals to Lake Creek cited in the TMDL document include the Troy Mine tailings impoundment adjacent to Lake Creek, contributions from historic mines in tributaries to Lake Creek, and historic and active mining in the Stanley Creek watershed (DEQ 2014b). The highest concentrations of metals in Lake Creek are observed downstream of the tailings ponds during high flow events and are thought to be the result of entrainment of metals contaminated sediments (DEQ 2014b). Past operation of the Troy Mine in the Stanley Creek drainage represents an important source of past and present metals loading to Lake Creek. In addition, a high density of historic mining activity was identified in the North Fork Keeler Creek Watershed, including the Grouse Mountain, Silver Strike, Little Spokane, Silver King, Cabinet Queen Prospect, Hiawatha, Universal, Iron Mask, Bimetallic/Black Horse, and Last Chance mines. Copper Creek is another Lake Creek tributary watershed that has had historic mining activity, including the Giant Sunrise, Crescent Tunnel, Liberty Metals, American Eagle, Montana Morning, and Lost Cause mines.

**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 Stabilization and Revegetation |
| | | | | Riparian Buffer Enhancement |
| | | | | Unpaved Road Improvements |
| | | | | Stabilize Areas of Mass Wasting |
| | | | | Forestry BMPs |
| | Nitrate + Nitrite | 28% | | Closed and Abandoned Mine Reclamation |
| | | | | Forestry BMPs |
| | Copper | 88% | 20% | Abandoned Mine Reclamation |
| | 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 (**Table 4-32**).

**Table 4-32. Lake Creek Priority Projects**

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| Lake Creek | Streambank stabilization, revegetation and riparian buffer enhancement along mainstem | Sediment, Nutrients |
| | Baseline survey to map streambank erosion and riparian conditions | Sediment, Nutrients |

**Table 4-32. Lake Creek Priority Projects**

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| | 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 |
| | Address Troy mine tailings impoundment metals sources and loading mechanisms | Metals |
| | Address Troy mine tailings spill impacts on in-stream sediments | Metals, Sediment |
| | Address nitrate+nitrite loading from Troy Mine tailings impoundment | Nutrients |
| | Address nitrate+nitrite loading from the Stanley Creek Watershed and the Ross Creek watershed | Nutrients |

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 when it is redone
- Unpaved road improvements, including culvert replacements
- Riparian buffer enhancement along Lake Creek where historic timber lands are being converted to residential development
- Obtain conservation easements on large, undivided agricultural lands along Lake Creek

Restoration actions to reduce metals loading to Lake Creek include

- Mine adit and mill site reclamation at the Troy Mine
- Address Troy Mine tailings impoundment related metals sources and loading mechanisms
- Address Troy Mine tailings spill, fillslope slump, and waste rock-related residual metals sources impacts on in-stream sediments in Stanley Creek and Lake Creek

Restoration actions to reduce nutrients loading to Lake Creek include:

- Address nitrate+nitrite loading from the Troy Mine tailings impoundment
- Address nitrate+nitrite loading from the Stanley Creek Watershed and the Ross Creek Watershed

In addition, the TMDL document recommends that additional source assessment monitoring should be conducted to: 1) determine the groundwater flow path and extent of the nitrate load from the Troy Mine tailings impoundment to Lake Creek, (2) determine the nitrate contribution from any other localized sources, and (3) determine the natural background levels of nitrate in localized groundwater (DEQ 2014b).

#### *4.3.1.1 Lake Creek Tributaries*

Priority tributaries to Lake Creek identified during community and stakeholder meetings include Ross Creek, Madge Creek (Camp Creek tributary), Keeler Creek, North Fork Keeler Creek, West Fork Keeler Creek, Cheer Creek, Benning Creek (West Fork Keeler Creek tributary), Halverson Creek (Keeler Creek tributary), and Cliff Creek (Halverson Creek tributary) (**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.

**Table 4-33. Lake Creek Priority Tributaries**

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| Ross Creek | Mine south adit and road reclamation | Metals |
| Madge Creek | Road storage/decommissioning (2.7 miles, 9 crossings) | Sediment |
| Keeler Creek | FSRD 473 relocation (dependent on suitable location) | Sediment |
| | FSRD 473 repave above MP 9 | Sediment |
| | Assess bull trout spawning/rearing habitat restoration potential | N/A |
| North Fork Keeler Creek | Acquire conservation easements along bull trout spawning reaches | 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 | | |

## 4.3.2 Stanley Creek

Stanley Creek has TMDLs for copper, lead, zinc, and nitrate+nitrite (**Table 4-34**). For metals, the recently closed 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). Monitoring conducted to facilitate the development of the TMDL indicates that the highest metals concentrations occurred during periods of high flow, suggesting that metals are bound to in-stream metals-laden sediment deposits that are mobilized during high flow events. Sources of these sediments include: 1) an unvegetated waste rock dump in the headwaters of Stanley Creek, 2) 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, and 3) several tailings pipeline ruptures that spilled large volumes of tailings into Stanley Creek and one of its tributaries. These tailings deposits 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 – the Daniel Lee Lode Mine and the Blue Bird Mine – that may be

additional sources of metals in Stanley Creek, though these may represent more diffuse metals source areas that could be difficult and expensive to address.

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**). Primary sources of nitrate+nitrite loading to Stanley Creek identified in the TMDL document include mining and timber harvest (DEQ 2014b). Nitrate+nitrite nitrogen is a by-product of explosives used during mining and is thought to enter Stanley Creek through fractures in the bedrock within the mine (DEQ 2014b). Stanley Creek receives most of its flow from Fairway Creek and is usually intermittent upstream of the confluence with Fairway Creek during the summer months (DEQ 2014b). Fairway Creek, which originates from Spar Springs, is another potential source of nitrate+nitrite loading to Stanley Creek.

**Table 4-34. Stanley Creek Restoration Strategies**

| Stream Segment | Pollutant | Percent Reduction | | 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 | | Closed and Abandoned Mine Reclamation<br>Forestry BMPs |
| | Copper | 0% | 68% | Closed and Abandoned Mine Reclamation |
| | Lead | 0% | 39% | |
| | Zinc | 0% | 84% | |

Focus areas for water quality improvement identified by watershed stakeholders include removal of mine tailings from Stanley Creek, replacement of the double culvert on Stanley Creek on the mine access road, and traction sand BMPs on the mine access road, particularly at stream crossings (**Table 4-35**). In addition, upgrading the existing series of multiple culverts where Camp Creek flows under the mine access road with a bridge would reduce the risk of future sediment inputs due to culvert failure.

**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 |

Restoration actions to reduce metals loading to Stanley Creek include:

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

Restoration actions to reduce nutrient loading to Stanley Creek include:

- Investigate source control opportunities for reducing nitrate concentrations in mine adit and mill process water
- 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. For O'Brien Creek, restoration priorities identified by the Kootenai National Forest include addressing the high amount of fine sediment in spawning gravels and fencing, livestock access, and streambank revegetation.

## 4.4 YAAK RIVER WATERSHED

The Yaak River Watershed aligns with the Yaak River TPA. Impaired stream segments within the Yaak River Watershed include the East Fork Yaak River, Lap Creek, Seventeenmile Creek, and the South Fork Yaak River (**Figure 4-5**).

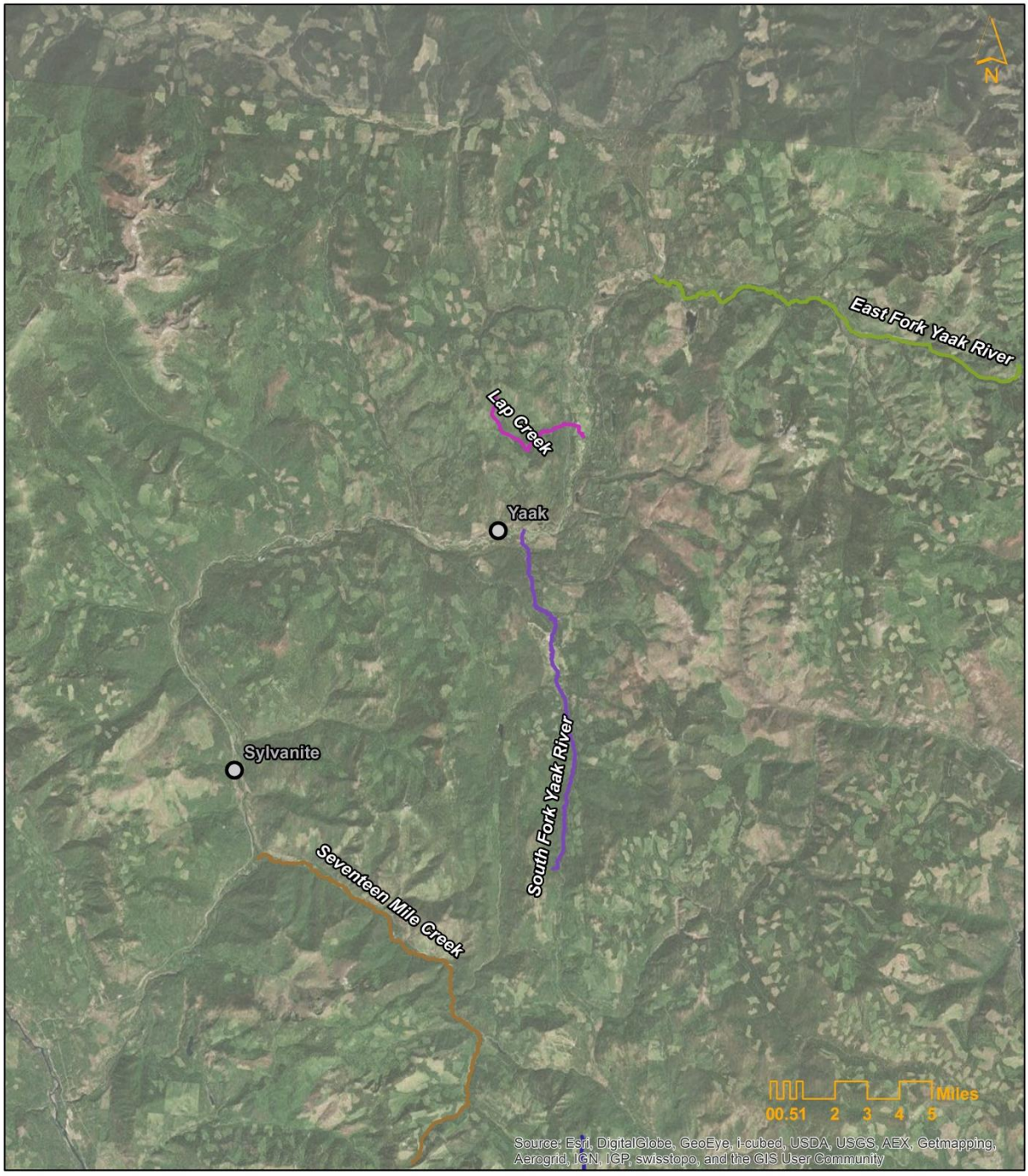


**Figure 4-5. Yaak River Watershed Impaired Stream Segments**

### 4.4.1 East Fork Yaak River

The East Fork Yaak River has a TMDL for nitrate+nitrite completed in 2014 (**Table 4-36**). 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). 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 | 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). A Sediment Source Survey conducted by the Yaak Headwaters Restoration Partnership (YHRP) in 2006 at 22 stream crossings found that all but one site, 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 | 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 fish passage barriers, along with road removal and stream crossing restoration on Forest Road 92 (**Table 4-38**). 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 | FSRD 5882B and FSRD 5882C replace or remove WCT fish barrier culverts | Sediment |
| | FSRD 92 road removal and stream crossing restoration | 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 | 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, road removal and 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 | FSRD 4681E culvert removals | Sediment |
| | FSRD 471 treat 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 |
| | FSRD 600 road removal and stream crossing restoration | Sediment |
| | Beaver relocation | N/A |

### *4.4.3.1 Seventeenmile Creek 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 | Replace Big Foot Creek culvert with a bridge | Sediment |
| | Road storage/decommissioning | |
| | FSRD 600 road removal and stream crossing restoration | Sediment |
| Lost Fork Creek | Culvert removals | Sediment |
| | Road storage/decommissioning | Sediment |
| | FSRD 4653D and FSRD 6164 road removal and stream crossing restoration | Sediment |
| Hemlock Creek | Culvert removals | Sediment |
| Mule Creek | Road storage/decommissioning | Sediment |
| | FSRD 6127 culvert replacement to reduce risk of failure | 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**). 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 identified 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 | 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, road removal and 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 | FSRD 472 pave bridge approaches | Sediment |
| | FSRD 878 and FSRD 6838 road storage/decommissioning - SE Clay Mountain | Sediment |
| | Replace or remove WCT fish barrier culverts | Sediment |
| | Road storage/decommissioning | Sediment |
| | FSRD 68 road removal and stream crossing restoration | Sediment |
| | traction sand BMPs at bridge crossings | Sediment |

### *4.4.4.1 South Fork Yaak River 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.

**Table 4-44. South Fork Yaak River Priority Tributaries**

| Stream | Project / Activity | Pollutant Addressed |
|---|---|---|
| Smoot Creek | FSRD 68 road removal and stream crossing restoration | Sediment |
| Zulu Creek | FSRD 6079 fish barrier culvert replacement | Sediment |
| | FSRD 68 road removal and stream crossing restoration | Sediment |
| | FSRD 6079A on Zulu Creek tributary | Sediment |
| Kelsey Creek | FSRD 6065B culvert replacement | Sediment |
| | construct overflow channel on FSRD 6713 (stored) | Sediment |
| | FSRD 68 road removal and stream crossing restoration | Sediment |
| Clay Creek | Install culvert and drain dip on FSRD 6114D | Sediment |
| | Remove/eliminate brook trout from Renee Lake (private land) | Sediment |
| Fowler Creek | FSRD 746 culvert replacement (brook trout above and below) | Sediment |
| Hartman Creek | FSRD 6065B culvert replacement to reduce risk of failure | Sediment |
| Yodkin Creek | FSRD 6062 fish barrier culvert replacement | Sediment |
| Dutch Creek | Fish barrier culverts 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 |
| Koo Koo Boyd Creek | FSRD 92 road removal and stream crossing restoration | Sediment |
| West Fork Yaak River | FSRD 3388A culvert replacement to reduce risk of failure | Sediment |
| Bunker Hill Creek | FSRD 746 road removal and stream crossing restoration | Sediment |
| Turner Creek | FSRD 6072 road removal and stream crossing restoration | Sediment |
| Lang Creek | FSRD 593 and FSRD 6084A road removal and stream crossing restoration | Sediment |
| Beetle Creek | FSRD 338 road removal and stream crossing restoration | Sediment |
| Hensley Creek | FSRD 5874 road removal and stream crossing restoration | Sediment |
| Whitetail Creek | FSRD 508 and 6886 road removal and stream crossing restoration | Sediment |
| North Creek | FSRD 5924C culvert replacement to reduce risk of failure | Sediment |
| Large Creek | FSRD 435 road removal and stream crossing restoration | Sediment |
| | FSRD 7483 culvert replacement to reduce risk of failure | Sediment |
| Runt Creek | FSRD 435 road removal and stream crossing restoration | Sediment |
| Meadow Creek | FSRD 5977 culvert replacement to reduce risk of failure | Sediment |
| South Fork Meadow Creek | FSRD 524 and FSRD 5971A road removal and stream crossing restoration | Sediment |
| Red Top Creek | FSRD 393 culvert replacement to reduce risk of failure | Sediment |
| Grizzly Creek | FSRD 472 road removal and stream crossing restoration | Sediment |
| Arbo Creek | FSRD 176 road removal and stream crossing restoration | Sediment |
| Kilbrennan Creek | Beaver relocation | N/A |

# 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 Waters. 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
  - Provides significant educational and outreach opportunities and/or has high visibility

- **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

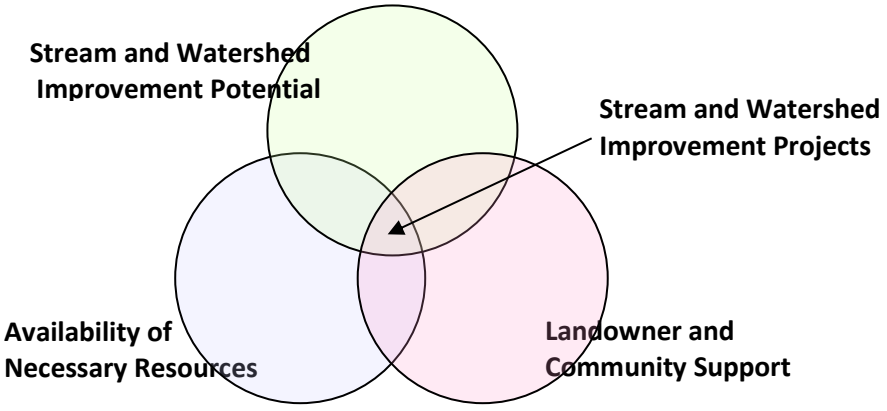


**Figure 5-1. Watershed Restoration Project Implementation Prioritization**

## 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. **Tables 5-1** through **5-4** present a schedule for the implementation of restoration projects that KRN has identified as important for meeting the goal of improving water quality on impaired stream segments. 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.

### 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 stabilization, riparian vegetation plantings and channel restoration. Restoration planning for this reach of the Tobacco River extends back to 2002 with restoration recommendations including streambank stabilization 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 Grey Creek by the US Forest Service. In the mid-term, stream at wetland at the site of the old mill site 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 Redband Trout conservation through improved habitat connectivity. 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.

## 5.2 TECHNICAL PARTNERS

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

- **Agricultural Community**
  - Glen Lake Irrigation District and other Irrigation ditch operators
  - Agricultural producers
  - Farm Bureau
- **Businesses**
  - 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

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

| Stream | Project / Activity | Pollutant Addressed | Technical Needs | Cost Estimate | Timeframe |
|---|---|---|---|---|---|
| **2-Year Timeframe** | | | | | |
| Gray Creek | FSRD 3500 culvert replacement in 2015 | Sediment | Engineering, hydrology, permitting, construction | Low | 2 years |
| Tobacco River | Streambank stabilization and riparian restoration downstream of Eureka | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 2 years |
| Indian Creek | Riparian fencing | Sediment | Revegetation planning, landowner education and outreach | Medium | 2 years |
| **5-Year Timeframe** | | | | | |
| Deep Creek | Riparian fencing | Sediment | Revegetation planning, landowner education and outreach | Medium | 5 years |
| Fortine Creek | Riparian fencing extending downstream from Trego school | Sediment, Temperature | Revegetation planning, landowner education and outreach | Medium | 5 years |
| Fortine Creek | Riparian fencing between Bratten and Fortine roads | Sediment, Temperature | Revegetation planning, landowner education and outreach | Medium | 5 years |
| Meadow Creek | Address road grading sediment source | Sediment | Operator education and outreach | Low | 5 years |
| Blue Sky Creek | culvert replacement or removal | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Williams Creek | improve crossings where culverts were removed | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Stahl Creek | FSRD 7021 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Lime Creek | Riparian fencing within the Trego Grazing Allotment | Sediment, Nutrients | Revegetation planning, landowner education and outreach | Medium | 5 years |
| Mud Creek | Replace undersized culverts | Sediment | Engineering, hydrology, construction | Low | 5 years |
| Mud Creek | Riparian fencing | Sediment | 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 | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 5 years |
| Tobacco River | Floodplain permitting | N/A | Landowner education and outreach | Low | 5 years |
| Ksanka Creek | Channel restoration and reconnection to Tobacco River | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 5 years |
| North Fork Bristow Creek | Fish passage | N/A | Engineering, hydrology, permitting, construction | Medium | 5 years |
| Sinclair Creek | Remove debris/trash from channel near the mouth | Sediment | Restoration planning, landowner education and outreach | Low | 5 years |
| **10-Year Timeframe** | | | | | |
| Grave Creek | Stream restoration between bridges and at confluence | Sediment | 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 | Engineering, hydrology, permitting, construction, monitoring | High | 10 years |
| Grave Creek | Fish screens to prevent bull trout from entering ditch network | N/A | Engineering, hydrology, permitting, construction, monitoring | Medium | 10 years |
| Grave Creek | Streambank stabilization, revegetation, meander reactivation, and riparian buffer in enhancement in lower reaches | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Sinclair Creek | Remove culvert on Sinclair Creek near the mouth | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Tobacco River | Streambank stabilization and riparian restoration upstream of Eureka | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Phillips Creek | Riparian fencing | Sediment | Revegetation planning, landowner education and outreach | Medium | 10 years |
| Young Creek | Riparian fencing | Sediment | Revegetation planning, landowner education and outreach | Medium | 10 years |
| Dodge Creek | Excess water from flooded fields flows into Dodge Creek | Sediment | Landowner education and outreach | Medium | 10 years |
| Pinkham Creek | Riparian fencing | Sediment | Revegetation planning, landowner education and outreach | Medium | 10 years |
| Fivemile Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Cripple Horse Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| **20-Year Timeframe** | | | | | |
| Deep Creek | Streambank stabilization, revegetation, and riparian buffer in enhancement near the mouth | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring, landowner education and outreach | High | 20 years |
| Edna Creek | Streambank stabilization, revegetation, and riparian buffer in enhancement near the mouth | Sediment | 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 | 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 | Restoration planning, landowner education and outreach | High | 20 years |
| Grave Creek | Address areas of mass wasting throughout watershed | Sediment | Engineering, hydrology, permitting, construction | High | 20 years |
| Sinclair Creek | Address channel incisement downstream of the first Highway 93 crossing | Sediment | 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 | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Swamp Creek | Restore channel at series of check dams installed in 1992 | Sediment | 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 | 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 | Technical Needs | Cost Estimate | Timeframe |
|---|---|---|---|---|---|
| **2-Year Timeframe** | | | | | |
| Raven Creek | Conduct pilot test of large wood additions in Section 35 | Sediment, Nutrients | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 2 years |
| Wolf Creek | Grazing practice permit adherence on the Big Meadows Grazing Allotment, including maintaining existing exclosures and developing new exclosures | Sediment, Temperature | Range management, hydrology, monitoring | Low | 2 years |
| **5-Year Timeframe** | | | | | |
| Big Cherry Creek | FSRD 6205B culvert replacement or removal | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Bobtail Creek | Riparian fencing along Bobtail Creek and Bull Creek | Sediment | 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 | 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 | Engineering, hydrology, permitting, construction | Low | 5 years |
| Wolf Creek | Culvert upgrades in Wolf Creek tributary watersheds | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Weigel Creek | Culvert removal | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Calx Creek | Culvert upgrade | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Tamarack Creek | Culvert upgrade | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Pipe Creek | Loon Lake FSRD 471 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Pipe Creek | Beaver relocation | N/A | Restoration planning, hydrology, wetland ecology | Low | 5 years |
| Quartz Creek | FSRD 600 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Quartz Creek | Beaver relocation | N/A | Restoration planning, hydrology, wetland ecology | Low | 5 years |
| Hennesey Creek | FSRD 332 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| South Fork Flower Creek | FSRD 128 and FSRD 4729 culvert outlet rocks | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Silver Bow Creek | FSRD 148 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Silver Butte Creek | FSRD 148 culvert replacement on tributaries | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Baree Creek | FSRD 148 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Iron Meadow Creek | FSRD 148 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Porcupine Creek | FSRD 148 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| Crystal Creek | FSRD 6734 culvert replacement | Sediment | Engineering, hydrology, permitting, construction | Low | 5 years |
| **10-Year Timeframe** | | | | | |
| Granite Creek | FSRD 4791 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Granite Creek | Assist private landowners | N/A | 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 | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Libby Creek | Assist private landowners with crossings | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Ramsey Creek | Removal of FSRD 4781 bridge | Sediment | 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 | Revegetation planning, landowner education and outreach | Medium | 10 years |
| Wolf Creek | Streambank stabilization, with focus on Betts Lake Reach and Kelsey Reach | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Dunn Creek | Streambank stabilization and road relocation | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Pipe Creek | Streambank stabilization at MP15.5 | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 10 years |
| Pipe Creek | FSRD 471 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Pipe Creek | FSRD 336 convert to trail | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Pipe Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Pipe Creek | Address failing dike constructed in 1956 | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 10 years |
| Flower Creek | Streambank stabilization | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 10 years |
| Miller Creek | Large woody debris (LWD) placement | N/A | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 10 years |
| Smoke Creek | FSRD 763 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Cow Creek | FSRD 763 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| West Fisher Creek | Streambank stabilization and road relocation | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 10 years |
| Lake Creek | FSRD 231 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| Trail Creek | FSRD 231 bridge replacement | Sediment | Engineering, hydrology, permitting, construction | Medium | 10 years |
| **20-Year Timeframe** | | | | | |
| Big Cherry Creek | Address failing haul road on DNRC property | Sediment | Engineering, hydrology, permitting, construction | High | 20 years |
| Big Cherry Creek | Address metals loading from Big Cherry Mill site | Metals | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Libby Creek | Address failing haul road on DNRC property | Sediment | Engineering, hydrology, permitting, construction | High | 20 years |
| Libby Creek | Remove remaining paved portions of abandoned haul roads that parallel both sides of the channel | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Libby Creek | Stream channel restoration, streambank stabilization and revegetation, including the re-establishment of natural cedar floodplain forests | Sediment | 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 | 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 | Engineering, hydrology, permitting, construction | High | 20 years |
| Wolf Creek | Check dam removal, riprap encapsulation and revegetation | Sediment, Temperature | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Kootenai River | Restore riparian functionality and large wood debris dynamics | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Fisher River | Meander reconnection and stream restoration | Sediment | 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 | Technical Needs | Cost Estimate | Timeframe |
|---|---|---|---|---|---|
| **2-Year Timeframe** | | | | | |
| Lake Creek | Baseline survey to map streambank erosion and riparian conditions | Sediment, Nutrients | Hydrology, wetland ecology, monitoring | Medium | 2 years |
| Lake Creek | Stabilize sloughing hillslope/streambank upstream of the Chase Cutoff road crossing | Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | Medium | 2 years |
| **5-Year Timeframe** | | | | | |
| Lake Creek | Education and outreach regarding riparian buffers | Sediment, Nutrients | Landowner education and outreach | Low | 5 years |
| Lake Creek | Mine adit, mill site, and road reclamation at the Troy Mine | Metals, Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 5 years |
| Ross Creek | Mine south adit and road reclamation | Metals | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 5 years |
| Stanley Creek | Mine adit, mill site, and road reclamation at the Troy Mine | Metals, Sediment | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 5 years |
| Stanley Creek | Implement BMPs during mill site reclamation | Metals, Sediment | Engineering, hydrology, permitting, construction, monitoring | Low | 5 years |
| O'Brien Creek | Riparian fencing | Sediment | 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 | Engineering, hydrology, fisheries biology | Medium | 10 years |
| Lake Creek | Address Troy mine tailings impoundment metals sources and loading mechanisms | Metals | Engineering, hydrology, monitoring | Medium | 10 years |
| Lake Creek | Address Troy mine tailings spill impacts on in-stream sediments | Metals, Sediment | Engineering, hydrology, monitoring | Medium | 10 years |
| Lake Creek | Address nitrate+nitrite loading from Troy Mine tailings impoundment | Nutrients | Engineering, hydrology, monitoring | Medium | 10 years |
| Lake Creek | Address nitrate+nitrite loading from the Stanley Creek Watershed and the Ross Creek watershed | Nutrients | Engineering, hydrology, monitoring | Medium | 10 years |
| Madge Creek | Road storage/decommissioning (2.7 miles, 9 crossings) | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Keeler Creek | FSRD 473 relocation (dependent on suitable location) | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Keeler Creek | FSRD 473 repave above MP 9 | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Keeler Creek | Assess bull trout spawning/rearing habitat restoration potential | N/A | Engineering, hydrology | Medium | 10 years |
| Cheer Creek | Road storage/decommissioning (17.2 miles, 30 crossings, 12 mass wasting sites) | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Halverson Creek | | | | | |
| Cliff Creek | | | | | |
| West Fork Keeler Creek | Road storage/decommissioning (16.3 miles, 38 crossings, 11 mass wasting sites) | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Benning Creek | | | | | |
| Stanley Creek | Investigate source control opportunities for reducing nitrate concentrations in mine adit and mill process water | Nutrients | Engineering, hydrology, construction | Medium | 10 years |
| Stanley Creek | Investigate natural background conditions and sources of nitrate+nitrite loading in the Stanley Creek and Fairway Creek drainages | Nutrients | Engineering, hydrology, construction | Medium | 10 years |
| **20-Year Timeframe** | | | | | |
| Lake Creek | Streambank stabilization, revegetation and riparian buffer enhancement along mainstem | Sediment, Nutrients | Engineering, hydrology, wetland ecology, permitting, construction, monitoring | High | 20 years |
| Lake Creek | Obtain conservation easements along mainstem | Sediment, Nutrients | Restoration planning, real-estate transactions | High | 20 years |
| North Fork Keeler Creek | Acquire conservation easements along bull trout spawning reaches | Sediment, Nutrients | 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 | Technical Needs | Cost Estimate | Timeframe |
|---|---|---|---|---|---|
| **2-Year Timeframe** | | | | | |
| Yaak River | Assessment of habitat improvement needs along mainstem of Yaak River | Sediment | Hydrology, wetland ecology, monitoring | Medium | 2 years |
| Yaak River | Bank erosion assessment and restoration prioritization along mainstem of Yaak River | Sediment | Hydrology, wetland ecology, monitoring | Medium | 2 years |
| Yaak River | Reed canarygrass mapping | N/A | Hydrology, wetland ecology, monitoring | Medium | 2 years |
| **5-Year Timeframe** | | | | | |
| Lap Creek | FSRD 5882B and FSRD 5882C replace or remove WCT fish barrier culverts | Sediment | Engineering, hydrology, construction | Low | 5 years |
| Seventeenmile Creek | Pave approaches to County Road 176 bridge | Sediment | Engineering, hydrology, construction | Low | 5 years |
| Seventeenmile Creek | Remove culvert from washing out on upper Seventeenmile | Sediment | Engineering, hydrology, construction | Low | 5 years |
| Seventeenmile Creek | Beaver relocation | N/A | Restoration planning, hydrology, wetland ecology | Low | 5 years |
| South Fork Yaak River | traction sand BMPs at bridge crossings | Sediment | Operator education and outreach | Low | 5 years |
| Kelsey Creek | construct overflow channel on FSRD 6713 (stored) | Sediment | Engineering, hydrology, permitting, construction, monitoring | Low | 5 years |
| Kilbrennan Creek | Beaver relocation | N/A | Restoration planning, hydrology, wetland ecology | Low | 5 years |
| **10-Year Timeframe** | | | | | |
| Lap Creek | FSRD 92 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Seventeenmile Creek | FSRD 4681E culvert removals | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Seventeenmile Creek | FSRD 471 treat or decommission middle segment | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Seventeenmile Creek | Road storage/decommissioning in upper watershed | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Seventeenmile Creek | FSRD 600 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Big Foot Creek | Replace Big Foot Creek culvert with a bridge | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Big Foot Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Big Foot Creek | FSRD 600 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Lost Fork Creek | Culvert removals | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Lost Fork Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Lost Fork Creek | FSRD 4653D and FSRD 6164 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Hemlock Creek | Culvert removals | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Mule Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Mule Creek | FSRD 6127 culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Conn Creek | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| South Fork Yaak River | FSRD 472 pave bridge approaches | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| South Fork Yaak River | FSRD 878 and FSRD 6838 road storage/decommissioning - SE Clay Mountain | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| South Fork Yaak River | Replace or remove WCT fish barrier culverts | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| South Fork Yaak River | Road storage/decommissioning | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| South Fork Yaak River | FSRD 68 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Smoot Creek | FSRD 68 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Zulu Creek | FSRD 6079 fish barrier culvert replacement | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Zulu Creek | FSRD 68 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Zulu Creek | FSRD 6079A on Zulu Creek tributary | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Kelsey Creek | FSRD 6065B culvert replacement | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Kelsey Creek | FSRD 68 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Clay Creek | Install culvert and drain dip on FSRD 6114D | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Clay Creek | Remove/eliminate brook trout from Renee Lake (private land) | Sediment | Engineering, hydrology, fisheries biologist, permitting, construction, monitoring | Medium | 10 years |
| Fowler Creek | FSRD 746 culvert replacement (brook trout above and below) | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Hartman Creek | FSRD 6065B culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Yodkin Creek | FSRD 6062 fish barrier culvert replacement | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Dutch Creek | Fish barrier culverts in WCT watershed | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Koo Koo Boyd Creek | FSRD 92 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| West Fork Yaak River | FSRD 3388A culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Bunker Hill Creek | FSRD 746 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Turner Creek | FSRD 6072 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Lang Creek | FSRD 593 and FSRD 6084A road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Beetle Creek | FSRD 338 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Hensley Creek | FSRD 5874 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Whitetail Creek | FSRD 508 and 6886 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| North Creek | FSRD 5924C culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Large Creek | FSRD 435 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Large Creek | FSRD 7483 culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Runt Creek | FSRD 435 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Meadow Creek | FSRD 5977 culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| South Fork Meadow Creek | FSRD 524 and FSRD 5971A road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Red Top Creek | FSRD 393 culvert replacement to reduce risk of failure | Sediment | Engineering, hydrology, construction | Low | 10 years |
| Grizzly Creek | FSRD 472 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |
| Arbo Creek | FSRD 176 road removal and stream crossing restoration | Sediment | Engineering, hydrology, construction | Medium | 10 years |

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

## 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 streams. 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 stabilization; 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:**

- Complete at least one restoration project before January 1, 2018.
- Work with stakeholders and partners to begin developing at least one restoration project every year.
- Maintain a database identifying potential projects and completed projects and obtain stakeholder updates to the database on an annual basis.
- Develop new grazing management plan for the Big Meadows Grazing Allotment.
- 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.

**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.

**Long-term milestones:**

- Document temperature reductions in Wolf Creek.
- Document increased bull-tout numbers in priority streams.
- Document increased streamflows in Grave Creek downstream of the Glen Lake Irrigation Diversion.
- Improve stream connectivity through culvert upgrades and/or removal.

# 6.0 MONITORING

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. Several entities within the Kootenai River Basin Watershed 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 & Parks. 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 to also guide future restoration activities. Once projects have been implemented, effectiveness monitoring will be performed and pollutant load reductions will be evaluated.

## 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 surveys and PACFISH/INFISH Biological Opinion (PIBO) monitoring are conducted periodically (**Table 6-1**). Within the Libby Ranger District, the Forest Service monitors stream flow, TSS, macroinvertebrates, and stream substrate in Bobtail Creek.

**Table 6-1. Kootenai National Forest Rexford-Fortine Ranger District Monitoring of Impaired Streams**

| Stream | 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 |

## 6.2 PLUM CREEK MONITORING

Plum Creek monitoring is conducted in accordance the Native Fish Habitat Conservation Plan (NFHCP) (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 benefits of treatments 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 with the Yaak River watershed, including monitoring the entire mainstem of the Yaak River to evaluate streambank erosion and stream habitat conditions.

## 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 Watershed.

## 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 Snowshoe Creek Mine cleanup post-2012, when remediation was completed
- Conduct a baseline survey of Lake Creek to identify streambank erosion and riparian conditions
- Determine the groundwater flow path and extent of the nitrate load from the Troy Mine tailings impoundment to Lake Creek
- 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 channel restoration work
- Perform an assessment of streambank erosion and habitat improvement needs along the mainstem of the Yaak River
- Investigate source control opportunities for reducing nitrate concentrations in mine adit and mill process water within the Stanley Creek watershed
- 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 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 6-2**, with a more broad set of criteria to evaluate the effectiveness of various project types and restoration treatments presented in **Table 6-3**.

**Table 6-2. 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 |
| Temperature | Riparian greenline assessment, stream temperature monitoring |

**Table 6-3. Criteria to Evaluate the Effectiveness of Various Project Types and Restoration Treatments**

| Project Types / Treatments | Evaluation Criteria |
|---|---|
| Streambank Stabilization and Revegetation | Length of Eroding Bank Stabilized and Revegetated |
| 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 |
| 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 Watershed 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 and partnership 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
- Continuing to use KRN as a clearinghouse and center for all partners to communicate
- The WRP is 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 significant sections of land along impaired streams. 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 communities 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
- Keep 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 in the Kootenai River Basin. Streambank stabilization measures 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.

# 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 |
| **Montana Fish, Wildlife & Parks** | **Future Fisheries Improvement Program** | Financial, technical | Restore rivers, streams, and lakes. Improve and restore wild fish habitats | | | | | | | X | X |
| **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 | | | | | |

**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 |
| **FEDERAL** | | | | | | | | | | | |
| **Natural Resources Conservation Service** | **Environmental Quality Incentive Program (EQIP)** | Financial, technical | Implement conservation practices or activities like conservation planning | | | | | | | X | |
| | **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 | | | | |
| **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 |
| | **North American Wetlands Conservation Act Program** | Financial | Variety of wetland conservation projects | | | | | X | | X | 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 | |

# 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 & 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 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 stabilization, 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

The goal of the Kootenai River Basin WRP is to provide 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 Waters. 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. 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 Waters.

## 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 goals. 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*