

## 3. Subbasin Assessment–Pollutant Source Inventory

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This section discusses known sources of sediment, temperature, total dissolved gas, and metals – the pollutants of concern in this subbasin. Information on point and nonpoint sources is summarized and data gaps are identified for future research and monitoring.

### 3.1 Sources of Pollutants of Concern

While there are two point sources permitted to discharge pollutants into the Lower Clark Fork River, nonpoint sources of pollution are the major contributor to impairment in this Subbasin. Generally, pollution within the Lower Clark Fork Subbasin is related to land use and is primarily from excess sediment and high temperatures as a result of historic timber harvest, fires and associated road building on the highly unstable soils of the region.

#### **Point Sources**

There are two active National Pollutant Discharge Elimination System (NPDES) point source permits in the Subbasin, and one inactive permit. In addition, there is a general permit for construction that is applicable to areas greater than one acre in the Subbasin. Table 15 summarizes discharge limits and permit information for each location. While there are no other point sources in the Idaho portion of the Subbasin, it should be noted that upstream in Montana, there is a large Superfund site encompassing much of the Lower Clark Fork River basin and extensive metals clean-up efforts are underway.

There are several NPDES permits issued by Montana DEQ above the Idaho/Montana border. These include Butte, Deer Lodge, and Missoula wastewater treatment facilities and Smufit-Stone Container. Specific nutrient and other pollutant reduction targets are outlined in these permits.

**Table 15. NPDES permitted discharges into the Lower Clark Fork River in Idaho.**

Facility	Water body	Permit Number	Expiration Date	Permit Limits	Discharge Volume
<b>Cabinet Gorge Hatchery</b>	Lower Clark Fork River	ID0026611	Currently being administratively renewed annually	Will be covered under EPA general aquaculture permit	
<b>Cabinet Gorge Power Station</b>	Lower Clark Fork River	ID-002799-5	5-Jan-07	Biochemical Oxygen Demand (BOD5) and Total Suspended Solids (TSS) 30 mg/L or 0.3 lb/day (average monthly limit) 45 mg/L or 0.5 lb/day (average weekly limit) Fecal Coliform Bacteria 200/100 ml (average weekly limit) E. Coli Bacteria 126/100 ml (average weekly limit) 406/100 ml (daily maximum limit) Total Residual Chlorine 0.5/ mg/L (average monthly limit) 0.75 mg/L (average weekly limit) pH range shall be between 6.5-9.0 standard units	224 gallons/day
<b>Clark Fork Fish Hatchery</b>	Spring Creek	Not currently under operation			

**Nonpoint Sources**

***Sediment***

Sediment occurs naturally as a geologic process. Streams function to move sediment from source areas of high gradient and friable soil material through intermediate elevations and gradients to depositional reaches where sediment is incorporated into the flood plain or transported to larger waters and ultimately to the ocean. Land management practices have the potential to accelerate erosion or to alter depositional processes. This is when sediment becomes pollution. Sediment in excess of a stream’s ability to transport it is pollution. Sediment pollution interferes with natural processes that aquatic life depends on and it can result in increased instability of natural stream channels further accelerating erosion. Both fine sediment, and excessive bedload (or larger sediment) can be a pollutant.

Land conditions that result from silvicultural practices and roads in the area are the primary nonpoint sources of sedimentation. Timber harvest and associated road construction can intercept water flows and alter peak flows, as well as provide trigger points for mass wasting events. These altered flows and sediment delivery mechanisms influence stream function. Altering the dimension, pattern and profile of stream channels changes the transport and

deposition of sediment as well as morphology of streams and rivers. For instance, the widening of a channel can contribute to higher temperatures in the stream. To address one aspect of sediment pollution without regard to others on a watershed scale has little potential to successfully reduce sediment or improve water quality or fisheries on a meaningful scale.

Initiating an increase in erosion or change in flow pattern can have grave consequences over many years. Many of the processes that are creating excessive amounts of sediment were initiated before these relationships were understood. Today, a number of land management practices are perpetuating the problems of the past and contributing to an increasing deficit of water quality and fisheries values.

**Road densities** in a watershed are a known indicator of fisheries habitat quality. In particular, with increased road densities, bull trout populations tend to decline due to the added risk of sediment delivery and potential alternations to ground water flow and peak flows from roading that influence water temperature. Stream crossings provide added sources of sediment and can alter the channel and flow. Detailed analysis of road densities, stream crossings and road impacts on streams throughout the Lightning Creek drainage, as well as areas identified for restoration are available in PWA (2004).

**Mass wasting** is a natural process in the Lower Clark Fork Subbasin, in particular in the Lightning Creek watershed. Frequently in landslide prone areas, human activities can increase both the occurrence of landslides and the potential for these mass wasting events to deliver sediment to streams. An illustrative example of the impacts mass wasting events in logged and roaded versus unlogged terrain in the Subbasin is given in the PWA (2004). Morris Creek is a relatively undisturbed watershed, and has had several mass wasting events occur that are not linked to human activities. The structure in Morris Creek is considered more stable than its counterpart – East Fork Creek, which has had substantially more road related mass wasting events. This indicates that streams in this watershed have a certain capacity to assimilate mass movement of material; however, there is also a threshold where the system can no longer process increased amounts of material delivered to the stream, and the structure is altered, frequently causing impairment to beneficial uses.

### ***Temperature***

The primary disturbance causing stream temperatures to rise is reduced canopy cover and riparian function by silvicultural practices and in the lower stretches of some of the southern tributaries, agricultural practices.

Roads located close to streams limit stream shaping in some areas, and the widening of the channel due to changes in sediment delivery can impact the amount of temperature loading that occurs in the stream.

### ***Total Dissolved Gas (TDG)***

The courts have characterized dams as point sources for which NPDES permits will not be issued for certain parameters. Therefore, TDG is addressed through TMDL allocations, instead of through the NPDES permit process. Cabinet Gorge dam has a capacity of about 38,000 cfs, when river flows exceed this powerhouse capacity, excess flow spills, entraining gases in the water at supersaturated levels. While spill gates are operated to reduce the entrainment of gases, as flows increase and spill increases, typically during spring snow melt, TDG pollution is created. These entrained gases can remain in the water column into Lake

Pend Oreille and the Pend Oreille River, impacting habitat availability to fisheries in particular.

### ***Metals***

There are no significant known sources of metals in Lower Clark Fork subbasin in Idaho. A century of mining and smelting, tailings disposal, and other mine wastes have left the Upper Clark Fork and its tributaries severely polluted with toxic metals and other chemicals. Four Superfund sites exist in the upper Clark Fork: 1) Silver Bow Creek and the upper Clark Fork from Butte to Milltown (metals residues from mining and smelting); 2) the Montana Pole plant in Butte (creosote and pentachlorophenol from wood treatment); 3) the Anaconda smelter (smelter wastes and widespread deposition of airborne contaminants; and 4) the Milltown Reservoir, which has accumulated toxic metals from upstream sources. Since 1982, EPA, Montana DEQ, industries and other agencies have worked to investigate, prescribe and implement clean-up procedures. Most notably, in 2006, removal of contaminated sediment from the Milltown reservoir will begin, followed by removal of the dam and a long-term remediation and monitoring program (EPA 2005).

### **Pollutant Transport**

#### ***Sediment***

Delivery of large material through the system is episodic during the winter and spring months when high flows and/or rain on snow events occur. The road system frequently encroaches on the riparian areas resulting in some chronic delivery. Due to the soil characteristics of the subbasin, roads intercept water and increase the potential for mass wasting. In a 1989 study of landslides in the Lightning Creek drainage, Cacek found that more than 75% of the sediment volume of landslides reaching streams originated from roads or roads and clearcuts. Anthropogenic increases in mass wasting are very evident in the Lightning Creek drainage and are a significant source of sediment pollution through both stream alteration and direct delivery to the stream.

#### ***Temperature***

Temperature exceedances in the Lower Clark Fork River Subbasin are exclusively from nonpoint sources. Some increases in temperature can be attributed to reduced canopy cover due to fire or harvest. Alterations in stream structure, in particular, stream widening due to excessive erosion or large sediment delivery can also influence temperatures. Therefore, it is possible for temperature pollution to be related to sediment transport and deposition areas, because wider, shallower streams typically have more solar gain.

#### ***Total Dissolved Gas***

Total Dissolved Gas supersaturation caused by the entrainment of gas in the water when spill occurs at a hydroelectric facility can remain high for significant distances from one hydroelectric project to the next downstream project, absent opportunities for the water to degas (e.g., rapids or other gas releasing flow situations).

### ***Metals***

Measurable sources of metals to the Clark Fork River are thought to be entirely upstream of the Cabinet Gorge and Noxon Rapids dams. Most metals settle and bind to sediment particles, generally accumulating in the reservoirs along the Clark Fork River, including

Noxon Reservoir and Cabinet Gorge to a lesser extent. A catastrophic flood event may remobilize these bottom sediments and affect beneficial uses in downstream waters; however, at this point it is highly speculative without further study. Studies of stratification in Noxon reservoir have been conducted to determine if anoxic conditions are occurring, and this condition has not been recorded to date (Land and Water Consulting 2001). Future monitoring will occur during extreme low flow years when these conditions could occur.

### **3.2 Data Gaps**

On-going activities to improve bull trout habitat are likely to have a positive impact on water quality. It will be important to monitor the impact of these activities, in particular sediment input reductions and stream-side canopy enhancement.

#### **Point Sources**

There are only two NPDES permitted point sources of pollution, both on the Lower Clark Fork River. Because of the Lower Clark Fork River's influence on Lake Pend Oreille, it is important to continue monitoring for nutrient input from these sources. (Lake Pend Oreille nearshore areas have a TMDL and implementation plan in place for reducing nutrient inputs into the lake.)

Since both the Lower Clark Fork River and Lightning Creek are designated Special Resource Waters, no new point sources of pollution are allowed.

#### **Nonpoint Sources**

Water quality information is unavailable for some of the smaller tributaries in the area and should be collected. Given the number of temperature exceedances and on-going data collection, more analysis of background temperature conditions in the watershed may be warranted.