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A PRELIMINARY ANALYSIS FOR MONTANA TROUT UNLIMITED OF BASELINE AQUATIC AND WATER QUALITY MONITORING AS PRESENTED IN APPENDICES B AND G OF TINTINA RESOURCES' DECEMBER 15, 2015, MINE PERMIT APPLICATION SUBMITTED TO MONTANA'S DEPARTMENT OF ENVIRONMENTAL QUALITY

OVERVIEW

These documents fail to even mention, let alone discuss, the importance of Sheep Creek as a spawning and rearing stream for trout from the Smith and Missouri Rivers. Furthermore, the present monitoring plans would not properly assess the impacts to fish and other aquatic life should a large release of sediment/mine tailings or toxic mine water occur during or after the mine's operation. These impacts could potentially affect the total length of Sheep Creek and the Smith River downstream of the confluence. In the mine permit application, there are only two surface water and four aquatic monitoring stations proposed for Sheep Creek, with the furthest downstream "impact" station only about a mile downstream of the mine site. That leaves about 16 miles of Sheep Creek between the mine and the Smith River, as well as the Smith River, unmonitored and without any aquatic or water quality baseline data.

Sheep Creek is the largest free-flowing tributary in the Smith River Basin, with a watershed area similar in size to the North and South Forks of the Smith River, and nearly twice the area of Tenderfoot Creek. The Aquatic Resources report (Appendix G) fails to mention or discuss the presence of an unusually high proportion of large (300mm to 450mm or 12" to18") brown trout that were captured within the study reaches on Sheep Creek during the autumn of 2014 (which is spawning season for this species). This omission demonstrates a lack of understanding about the importance of Sheep Creek as a source of recruitment of juvenile brown trout for the Smith and the Missouri Rivers. Both of these rivers are world-class recreational trout fisheries, with the Smith being one of the most sought-after trout fishing experiences in the Northern Rockies. Angling pressure is low and big trout are abundant within this unique 40-mile river canyon.

REPORT DEFICIENCIES

The relatively short length of Sheep Creek that was evaluated in Appendices B and G is a major deficiency in these reports. There are also problems with lack of information, confusing statements and insufficient methods, particularly pertaining to the fish and fish habitat evaluations. These deficiencies are described as follows:

The description of watershed areas on pages 6-7 of Appendix G is confusing or erroneous. For example, the area of Sheep Creek is given as 151 sq. km. (58 sq. mi.), while on page 1-8 of the Water Resources report (Appendix B), it is given as 194 sq. mi. Furthermore, the watershed area of Little Sheep Creek is given as 50 sq. km., which would equate to about one-third

(50/151) of Sheep Creek's total watershed area, while in fact this small drainage occupies maybe about 1/30 of the total watershed. Data on these pages also suggest that the Tenderfoot Creek watershed is nearly equal in area to that of Sheep Creek, but a casual look at a topographic map shows that it is really only slightly more than one half the area of Sheep Creek's watershed.

The stream discharge information presented on pages 6 and 7 is also meaningless or not useable and brings up another data deficiency – no stream discharge rate or water current velocity measurements were taken during the aquatic surveys. The range of estimated stream discharge rates for the aquatic sampling episodes given on page 7 were apparently taken on dates when water samples were collected, instead of on the days when the aquatic monitoring occurred. According to the report, the stream discharge rate for Tenderfoot Creek was estimated by using stream flow rates from two USGS stream gauging stations located on the Smith River "above and below the Tenderfoot." However, these two Smith River gauges are actually above and below Sheep Creek, not Tenderfoot Creek. As well, the Tenderfoot reference aquatic monitoring stations are located halfway up the drainage, not at the mouth, where the inaccurate discharge rate was estimated.

The bioassessment protocols, metrics and evaluations used for the macroinvertebrate and periphyton communities appear to generally follow MDEQ guidelines, and are thus suitable for the baseline and long-term monitoring efforts. However, there are not enough "impact" stations established and monitored on Sheep Creek between the mine site and the Smith River.

The BLM Rapid Bioassessment (RBA) methodology that was used during the baseline habitat surveys (page 9) is not intensive or thorough enough to document the changes to trout habitat that would occur if a sediment/mine tailings spill should happen during or after the operation of the mine. Also, accurate comparisons between the densities and biomass of fish populations at the control versus the impact study reaches cannot be made unless more exact habitat measurements are collected within the survey reaches. The RBA is a very general methodology that only provides a rapid, "windshield" comparison among stream reaches. The RBA surveys only provided a limited number of basic measurements or observations (wetted width, substrate composition, the percentage of large woody debris and riparian shading) at ten equally spaced transects within each stream reach. Only three water depth measurements were taken at each transect and no water current velocity rates (ft/sec) were measured (page 7).

Trout in general, and particularly large (age 4+) brown trout, prefer places in streams where three vital microhabitat components - deep pools (>2 ft), hiding cover and low (<1 ft/sec) water current velocities - are present. These specialized microhabitats provide vital resting areas for large trout, especially during winter and spawning season. The RBA surveys did not quantify the actual fish habitat that is present in each of the study reaches. For example, the total surface areas of three basic macrohabitat types – riffles, pools and glide/runs – were not measured and quantified in the study reaches; nor, within the pools, were the surface areas of critical trout microhabitats. More intensive and expansive habitat surveys would accurately quantify actual trout habitat, allowing for more direct comparisons regarding the habitat that is available among the study reaches. More detailed baseline habitat measurements would also allow accurate assessments of changes that would occur to trout macro and microhabitats in the event of a sediment/mine tailings release from the mine.

The fish population surveys were fundamentally flawed from the onset. No rational is given for how the study reaches were selected. For example, was consideration of the proportion or relative abundance of macrohabitat-types evaluated or considered? No information is given about the number of people involved in the electrofishing efforts. Were there at least two qualified fish netters supporting the person shocking, or was the person running the shocker also doing the netting (as shown in Figure 1; page 12)? Lengths and wetted widths of the study sections are not reported in the report, nor are the month and actual day when the fish surveys were conducted. In Appendix Table B, the numbers of fish captured during the first versus the second electrofishing passes are not presented; nor are confidence intervals (standard deviations) given for the population estimates presented in this table.

Without knowing the wetted width or surface areas of the reaches, it is not possible to determine whether the backpack electrofishing unit that was used during the fisheries surveys - a Smith Root Model 24 LR- can produce enough power (in watts) to effectively cover the total wetted areas of the Sheep Creek and Tenderfoot Creek reaches. Perhaps a barge-mounted, generator-powered electrofishing system, with a higher rated maximum watt output and dual electrodes, would be more suitable and efficient on these streams, leading to better population data.

Block nets provide temporary barriers across the width of a stream and prevent fish from leaving a study reach during fish surveys. Without block nets in place, fish will typically begin exiting the reach as soon as the electrofishing unit is turned on. Also, many fish on the outer edge of the unit's electronic field are known to be initially repelled and will make upstream or downstream runs exceeding 200 feet (the entire length of the study reach). These "runners" can constitute a significant portion of the total number of fish that are normally present within the reach.

Block nets were not installed at the top and bottom of the study reaches prior to the electrofishing surveys on Sheep Creek and Tenderfoot Creek (Appendix G; page 10). Therefore, the population estimates presented in Table 3 are not valid or useful because the fish were not captured within a "closed system." Neither can these population estimates be compared to other trout streams in Montana and the Northern Rockies, where population data were properly collected and analyzed within a closed system.

During the baseline fishery surveys, young-of-the-year (YOY) fish were "noted on the field sheets" but were not included in the "fish totals" (Appendix G, page 10). This is another significant data deficiency because YOY fish are the life stage most sensitive to pollution and are also a direct measure of trout reproductive success (or failure). These newly emerged fish should have been carefully identified to species and measured to the nearest millimeter (mm). Length-frequency histograms then should have been prepared, so year-to-year comparisons of the numbers and size distributions of YOY fish of all species can be made within the electrofishing reaches.

Without the inclusion of YOY numbers, the length-frequency data presented on the figures in Appendix B are incomplete. However, these figures do provide some useful information about the size structure of the rainbow trout (RBT) and brown trout (BNT) populations that were netted in the sections on Sheep and Tenderfoot creeks. Although not clearly labeled, it appears that the data on these figures is from the autumn sampling period. The size structure difference between these populations was dramatic. When the data from all of the Sheep Creek reaches were combined, over 60% of the BNT population was comprised of large fish ranging in length from 300 to 450 mm, compared to only 6% of the RBT population being of that size. The length-frequency distribution of the RBT population in Sheep Creek (6% of RBT were >300 mm) is very similar to that of RBT in Tenderfoot Creek (8% of RBT were >300 mm). These RBT length-frequency distributions, where wide ranges of length classes are present and larger fish are present in low numbers, is typical of a resident (non-migratory) fish population.

On the other hand, the BNT population in Sheep Creek has a very high proportion of much larger and older fish. This is more typical of a migratory population and speaks to the importance of Sheep Creek as a spawning and rearing stream for Smith River (and quite probably Missouri River) trout, especially BNT. Again, this was not mentioned or addressed in the application report.

RECOMMENDATIONS

A. To properly assess the aquatic baseline conditions on Sheep Creek, expanded fish habitat surveys need to be conducted at all aquatic study reaches on Sheep and Tenderfoot creeks. These surveys must include quantifying the surface areas of trout macrohabitat-types (pools, riffles and glide/runs) within all reaches. Microhabitats that provide critical resting areas for trout (pools where water depths are >2 ft, water current velocities are <1 ft/sec and hiding cover is present) also need to be quantified.

B. Fish surveys must follow accepted procedures for deriving population estimates from two-pass depletion surveys, to include: (1) installing block nets at the upper and lower ends of the survey reaches; (2) weighing (to the nearest gram) and measuring (to the nearest mm) all fish that are captured, including the YOY; (3) ensuring that at least two netters are teamed with the person operating the electrofishing unit; and (4) conducting a third electrofishing pass if there is not at least a 75% reduction in the numbers of fish captured between the first and second pass. Following these strict procedures is the only way to ensure that the population estimates derived from the depletion surveys are statistically valid within certain confidence intervals. Pit-tags should be implanted in all age-1 rainbow and brown trout that are captured during electro fishing to determine annual growth rates and to better understand the resident versus migratory components of these populations. Finally, the number of people involved in the electro fishing surveys should be presented, along with their professional qualifications and years of fisheries field experience.

C. To more clearly document the amount of BNT spawning that is occurring in Sheep Creek, surveys that count BNT redds (egg incubation sites) need to be conducted during the autumn spawning season at riffles within all of the study reaches.

D. The number of aquatic and surface water quality stations on the 16 miles of Sheep Creek between the mine and the confluence with the Smith River must be increased. At a minimum, stations need to be established just downstream of Coon, Moose and Black Butte creeks, as well as near the mouth of Sheep Creek at the Highway 4 Bridge. Surface water samples also need to be collected monthly on the Smith River at the USGS stream gauging stations located just upstream and downstream of Sheep Creek.

E. Tintina needs to collect baseline aquatics and water quality information on streams potentially affected along the transportation corridor where the company plans on hauling copper concentrate to railheads. This includes Deep Creek or the Shields River, depending which route the company selects. Given the frequency, year-round operation and number of haul trucks planned to move concentrate over the life of the mine -- an estimated 11-14 year period, accidents involving ruptures of containers and potential spills of copper concentrate and diesel are not improbable. The environmental impact statement will need to evaluate potential impacts along these transportation routes. Therefore, Tintina should establish several water quality baseline stations along the selected route, and establish fish surveys of the detail and rigor similar to that needed for the Sheep Creek drainage.

F. To accurately establish baseline conditions, aquatic and surface water quality monitoring, as outlined above, must occur for at least three consecutive years, beginning in the spring of 2016 on Sheep Creek, Deep Creek (or the Shields River) and the Smith River. Spring and autumn sampling should be continued, making sure that the spring sampling is conducted well before runoff and that the autumn sampling roughly coincides with brown trout spawning season.

CONCLUSION

Tintina claims to be using the best state- of- the- art mining, wastewater and sediment control technologies available in the industry. They should, therefore, also be willing to fund and implement a state- of- the- art monitoring plan to ensure that the valuable aquatic resources that exist downstream of their mine are properly monitored and protected. If no pollution impacts ever occur to Sheep Creek, they will have proof that their technologies were successful. If their technologies fail the extent of damage to Sheep Creek and the Smith River must be clearly documented, so complete mitigation and restoration efforts can take place.