

### **Aquatic/Fisheries Monitoring Progress Summary: August 2021 - August 2022**

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Since August 2021, MBS has accomplished all annual aquatic biological monitoring objectives on Sheep Creek, the Smith River and selected tributaries using a before-after/control-impact (BACI) design with Tenderfoot and Moose Creeks as off-basin reference streams. We outlined this statistical design approach in the Aquatic Monitoring Plan (AMP 2017) approved by Montana Fish, Wildlife and Parks (MFWP) and adopted by Tintina Montana in December of 2017. We visited and sampled 15 long-term monitoring sites: seven Sheep Creek sites, two Smith River sites and six tributary sites (many have been sampled since 2014) one to multiple times during the year based on the aquatic parameters, suitable streamflow levels and approved index period.

**August 2021.** Annual Chlorophyll-*a* and Stream Habitat Sampling occurred during the week of August 2<sup>nd</sup>, 2021. We reported that the Chl-*a* results received in 2021 indicated algal biomass across nearly all Sheep Creek sites has been increasing to 'nuisance' levels over the last 4 years since being reported below these levels in 2015 and 2017 (MBS 2021).

**October 2021.** We received the Chl-*a* biomass data results from our sub-contractor, Energy Laboratories, Inc. from samples collected at 5 sites (n=5 transects per site) in August 2021. All 5 sites (2 Control and 3 Impact) were significantly above the MDEQ threshold levels of 125 mg/m<sup>2</sup> (avg. 255 mg/m<sup>2</sup>).

**October-November 2021.** Fall redd count surveys were performed over three dates from late-October to mid-November 2021 to determine the number of brown trout, brook trout, and mountain whitefish using the project area streams to spawn. Brown trout spawn relatively early in Sheep Creek within the project area, and redd numbers counted in mid-October are nearly the same as those in early-November, oftentimes anchor ice and snow cover conclude redd counts by mid-November (November 11<sup>th</sup> in 2021). Redd counts of both brook and brown trout have slightly increased in 2021 compared to the previous 2 years, we attribute this to the natural breaching of a beaver dam on Sheep Creek in the project area that may have been acting as a barrier to spawning movements. We presented this data in the

annual monitoring report delivered to Tintina Montana, MT Department of Environmental Quality and MFWP in April 2022 (MBS 2022).

**November 2021.** We received the periphyton data results back from our sub-contractor, Rhithron Associates, Inc. from samples collected at 11 sites in late-July 2021 and delivered to their lab in Missoula, MT. Based on Teply's Diatom Index (TDI), only 1 Sheep Creek site (SH18.3) in 2021 had a probability of nutrient impairment; while in 2020, no Sheep, Little Sheep or Tenderfoot Creek sites had the probability of impairment.

**December 2021.** We delivered the raw fisheries data collected during the June to July 2021 sampling of the Tintina Monitoring Sites to MFWP in the form of a scientific collection permit report for SCP-25-2021 (Stagliano 2021).

**January-March 30<sup>th</sup>, 2022.** We processed, identified and provided multi-metric data analysis for 48 benthic macroinvertebrate samples following MDEQ protocols (MDEQ 2012); these were collected from 15 sites outlined in the AMP 2017.

**April 2022.** On April 28<sup>th</sup>, we delivered the summary and analysis report of all the Aquatic and Fisheries Monitoring data collected during the prior sampling year April-October 2021 for the Tintina Project Monitoring Sites (MBS 2022) to Tintina Montana and the MFWP Fisheries Biologist in Great Falls.

**April 2022.** On April 28<sup>th</sup>, we delivered the Scientific Collection Permit (SCP) application to MT FWP for the current fish sampling year 2022. This is the 9<sup>th</sup> year of this project and the 5<sup>th</sup> year sampling under the Aquatic Monitoring Plan (AMP).

**April-May 2022.** We conducted redd count surveys for spring-spawning rainbow trout on six Sheep Creek reaches, Moose Creek and Little Sheep Creek during two visits in late-April to early-May 2022. A new beaver dam constructed in the Fall 2020 on lower Moose Creek may add difficulty, and potentially function as a barrier, for rainbow trout attempting to access spawning areas on Moose Creek from Sheep Creek. Redd counts from previous years indicate that

rainbow trout are minimally using Sheep Creek and lower Moose Creek for spawning and are ascending Moose Creek for many miles upstream to find suitable habitat.

**June-July 2022.** Fish population estimates and community sampling using electrofishing methods occurred in late-June for the smaller monitoring streams (Little Sheep and Moose Creeks) to mid-July for the larger Sheep Creek sites and the Tenderfoot Creek reference reach. We followed AMP (2017) fish collection protocols using 2-pass electrofishing depletion methods for the smaller-width stream reaches and mark-recapture techniques on the mainstem Sheep Creek sites. Stream flows in the project area were higher in 2022 with continued rain events in late-June than during sampling in July 2021.

We collected and humanly euthanized five Rocky Mountain Sculpin (+5 juvenile Brook Trout from Little Sheep) from each of 8 sites for tissue metals analysis during this fish sampling period. These samples were analyzed at Energy Labs in Helena, MT and results were delivered in August. Most metals were at non-detectable levels (AS, CD, CU, PB, NI, SE) across all years and no metal concentrations (AL, FE & MN) showed levels elevated above baseline. Brook trout juveniles exhibited lower metal concentrations than sculpin.

**July 2022.** Benthic macroinvertebrate sampling occurred in late-July 2022 in accordance with the

mountain ecoregional index period outlined in MDEQ protocols (June 21st to October 1<sup>st</sup>; MDEQ 2012) and coincided with Hydrometrics water chemistry collections ( $\pm 5$  days). We collected both replicated, quantitative Hess samples ( $n=3$ ) and/or a semi-quantitative EMAP reach-wide sample across 15 sites outlined in the AMP 2017. We will process and identify these samples over the fall and winter at the MBS laboratory in Helena, MT.

**August 2022.** Benthic periphyton sampling occurred during the first week of August 2022 in accordance with the mountain ecoregional index period outlined in MDEQ protocols (July 1<sup>st</sup> to Sept 30<sup>th</sup>; MDEQ 2011) and coincided with Hydrometrics water chemistry collections (within  $\pm 5$  days). We hand-delivered these samples to our sub-contractor, Rhithron Associates, Inc in Missoula on August 8<sup>th</sup> and they are currently being analyzed.

**August 2022.** Annual Chlorophyll-*a* and Stream Habitat Sampling occurred during the week of August 2<sup>nd</sup>, 2022. Chl-*a* samples collected in 2022 are currently being analyzed at Energy Laboratories in Helena.

All biological samples and survey data collected for the AMP from April 2022 to November 2022 will be compiled, analyzed and summarized in a report delivered to Tintina by March 31<sup>st</sup>, 2023.

#### **LITERATURE CITED**

AMP 2017. *Aquatic Biological Monitoring Plan for the Black Butte Copper Project in the Sheep Creek Basin in Meagher County, MT* prepared by Montana Biological Survey for Tintina Montana, White Sulphur Springs, MT. December 2017. 18 pages.

MDEQ 2012. *Sample Collection, Sorting, and Taxonomic Identification of Benthic Macroinvertebrates Standard Operating Procedure*. Helena, MT: Montana Department of Environmental Quality. WQPBWQM-012. <http://deq.mt.gov/wqinfo/SOPs/WQPBWQM>

MDEQ. 2011. Periphyton Sample Collection and Laboratory Analysis: Standard Operation Procedure. Water Quality Planning: WQPBWQM-011

Montana Biological Survey (MBS) 2022. *Aquatic Monitoring Plan and Assessment Summary 2014-2021 for Streams in the Tintina Black Butte Copper Project Area of Meagher County, MT*. Report prepared for Tintina Montana, Black Butte Copper Project, White Sulphur Springs, MT 65 pp. + appendices

Stagliano, D.M. 2021. Scientific Collection Report to MT Fish, Wildlife and Parks. Report of fish collection activities and data delivered to MFWP Region 4 Fisheries Biologist in Great Falls and Research Coordinator in Missoula, MT for SCP-25-2021. Delivered December 28<sup>st</sup>, 2021