

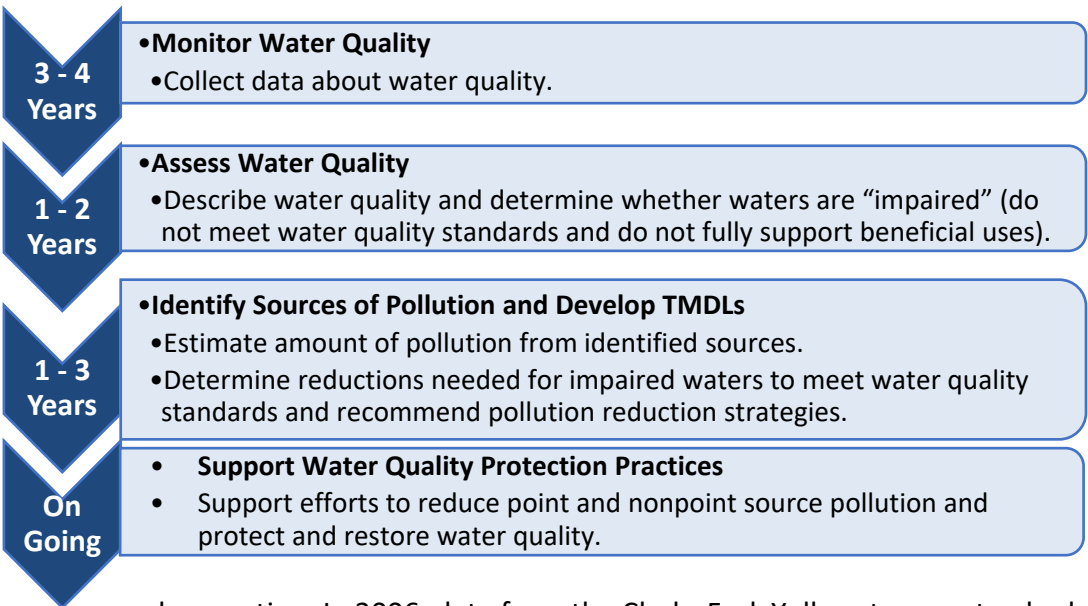
Clarks Fork Yellowstone Watershed Water Quality Assessment and TMDL Development Project

The Water Quality Division at Montana DEQ is conducting an assessment of water quality on the Clarks Fork of the Yellowstone River and its 17 tributaries. The purpose of this assessment is to determine the overall health of the Clarks Fork Yellowstone watershed and update water quality impairments. The process started in 2022 with data collection and will continue through 2025. If pollutant impairments are identified, Total Maximum Daily Loads (TMDLs) will be developed, which provide recommendations on how to improve water quality.

The water quality planning process is a multi-step adaptive process to address improvements to water quality. The diagram to the right describes the steps in the water quality planning process.

DEQ reviews publicly available monitoring data to assess if water quality in waterbodies is meeting its uses – beneficial uses can include agriculture, drinking water, aquatic life, and recreation. In 2006, data from the Clarks Fork Yellowstone watershed was assessed and 16 waterbodies were listed as impaired. Impairment listings throughout the watershed include metals, nutrients, sediment, and other impairments. The purpose of current data collection is to update the status of these existing water quality issues and to determine if there are additional impacts to water quality that were not previously identified.

Since 2022, DEQ has collected water quality data from 51 locations in the watershed and 17 waterbodies were sampled. Cottonwood Creek has been dropped from the project due to dry conditions. DEQ conducted five sampling events from June to October. Water quality data collected included metals, nutrients, algae, continuous DO, *E. coli*, suspended sediment, dissolved organic carbon, hardness, sulfate, chloride, benzene, toluene, ethylbenzene, xylene, volatile and extractable petroleum hydrocarbons and field water quality parameters (i.e. pH, conductivity, dissolved oxygen and temperature). The 2022 and 2023 preliminary nutrient and metals results are as follows:





**Clarks Fork Yellowstone River:** Total nitrogen was below the water quality threshold for all sites that were sampled. From July to September in 2022 and 2023, soluble nitrogen was at or exceeded the threshold (0.1 mg/L) at most sites along the river. In July 2022, total phosphorus was at or exceeded the water quality threshold (0.15 mg/L) at most sites along the river due to high flow conditions. Over the last two years, total recoverable copper, iron and lead exceeded the aquatic life chronic water quality standards at all sites during high flow. In June, dissolved aluminum exceeded the aquatic life chronic water quality standard at two sites and total recoverable copper exceeded the aquatic life acute water quality standard at two sites. In August 2023, four sites exceeded *E. coli* geometric mean standard (ARM 17.30.623) from upstream of Bridger to Edgar.



**Bear Creek:** Total suspended solids and total phosphorus increase from upstream to downstream during June, July, and October, while total nitrogen does not follow a seasonal or upstream to downstream pattern. Water quality thresholds for total nitrogen and total phosphorus still need to be determine on transitional creeks in the watershed. Total recoverable copper, iron and lead exceeded the aquatic life chronic water quality standards on Bear Creek at the headwaters site and near the mouth during high flow conditions.

**Silvertip Creek:** At the Wyoming border, elevated concentrations occurred each month in 2023. Total nitrogen exceeds the water quality threshold (1.3 mg/L) at the Wyoming border from July to September in 2022 and 2022. In August and September 2022, soluble nitrogen exceeded the threshold (0.1 mg/L) on Silvertip Creek near the mouth. Total phosphorus exceeds the water quality threshold (0.15 mg/L) at the Wyoming border from July to September. Along Silvertip Creek multiple metals exceedances occurred in 2022 and 2023. Total recoverable iron exceeds the aquatic life chronic water quality standards 19 times from June to October. Total recoverable arsenic has exceeded the human health acute standard 17 times. Total recoverable lead has exceeded the human health acute standard once and the chronic aquatic life standard twice. Total recoverable chromium exceeded the human health standard once.



**Dry Creek:** Total phosphorus increases from upstream to downstream from June through October. Total nitrogen does not follow a seasonal or upstream to downstream pattern. Total recoverable iron and lead exceeded the aquatic life chronic water quality standards on Dry Creek near the mouth in 2023 and 2023.

**Bridger Creek:** Higher concentrations of total nitrogen, soluble nitrogen, soluble phosphorus were observed at the upstream site on Bridger Creek. Water quality thresholds for total nitrogen and total phosphorus still need to be determine on transitional creeks in the watershed. Total recoverable iron exceeded the aquatic life chronic water quality standard 18 times between 2022 and 2023. Total recoverable selenium exceeded the

aquatic life chronic water quality standard upstream of South Fork Bridger Creek from June to October. South Fork Bridger Creek provides the majority of the load to Bridger Creek.

**Bluewater Creek:** Total suspended solids, total phosphorus, total nitrogen, and soluble nitrogen increase from upstream to downstream. Water quality thresholds for total nitrogen and total phosphorus still need to be determine on transitional creeks in the watershed. Total recoverable iron exceeds the aquatic life chronic water quality standard six times.

**Elbow Creek:** Due to land access issues, DEQ was unable to monitor the mouth of Elbow Creek. Total nitrogen exceeds the water quality threshold (1.3 mg/L) in September 2022. Total recoverable copper, iron and lead exceeded the aquatic life chronic water quality standards.

**Spring Creek:** Total nitrogen and soluble nitrogen are the highest concentrations from a tributary in the watershed. In 2023, each soluble nitrogen concentration was above 4.0 mg/L. The recommend aquatic life threshold for soluble nitrogen is 0.1 mg/L and the human health standard is 10 mg/L. Total recoverable selenium exceeds the aquatic life chronic standard in 2022 and 2023.

**Rock Creek:** Total nitrogen increases downstream of Red Lodge but decreases farther down the creek. Total phosphorus increases from upstream to downstream from June to October in 2022 and 2023. Total recoverable iron and lead exceeded the aquatic life chronic water quality standards twice.



**Red Lodge Creek:** Total nitrogen increases on Red Lodge Creek downstream of Cooney Reservoir. In July through September, total phosphorus was at or exceeded the water quality threshold (0.033 mg/L) at multiple monitoring locations. Total recoverable iron exceeds the aquatic life chronic water quality standard sevens times upstream of Cooney Reservoir.

**Willow Creek:** During most months, total nitrogen decreases from upstream to downstream, while total phosphorus increases from upstream to downstream. Water quality thresholds for total nitrogen and total phosphorus still need to be determine on transitional creeks in the watershed. Total recoverable iron exceeds the aquatic life chronic water quality standard six times upstream of Cooney Reservoir.

**Next Steps**

In 2024, DEQ will follow a similar sampling and analysis plan (SAP) to monitor the Clarks Fork Yellowstone Watershed, include *E. coli* monitoring on the Clarks Fork Yellowstone River and Rock Creek and nutrient response variable monitoring throughout the watershed. DEQ will include sulfate, sodium, chloride, and total dissolved solids monitoring on streams with high conductivity. Oil and gas parameters will be collected from the Wyoming border to the mouth. DEQ will be monitoring nutrient, metals, algae, and *E. coli* on Cooney Reservoir again in 2024. In 2025, Cooney Reservoir water quality monitoring will continue and DEQ will complete sediment monitoring throughout the watershed.

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