



Surface Water Monitoring Network 2021 Watershed Health Summary

Site Description	Site ID	Parameter Status						
		Temp	DO	TN	TP	E. coli	TSS	MVFP
Upper E. Gallatin River and Tributaries								
E. Gallatin R. near Story Hill & Kelly Canyon Rds	EGALMSU	Green	Green	Green	Yellow	Green	Green	Green
Bozeman Ck. @ Tuckerman Park	BOZMC03	Green	Green	Red	Green	Yellow	Green	Green
Limestone Ck. @ mouth	LMSTCMTH	Red	*	*	*	*	*	Yellow
Matthew Bird Ck. @ College St. & Black Ave.	MTWBC01	Green	Yellow	Red	Red	Red	Green	Yellow
Bozeman Ck. @ mouth	BOZMC00	Green	Yellow	Red	Green	Red	Green	Yellow
Bridger Ck. @ Story Mill Rd.	BRIDC01	Green	Yellow	Green	Green	Green	Green	Yellow
Mandeville Ck. above Red Wing Dr.	MANVC01	Red	Green	Red	Red	Red	Green	Red
E. Gallatin R. above Springhill Rd.	EGALUSGS	Red	Yellow	Green	Green	Yellow	Green	Yellow
Lower E. Gallatin River and Tributaries								
Hyalite Ck. @ Valley Center Rd.	HYLTVCRD	Red	Yellow	Yellow	Yellow	Red	Green	NS
Hyalite Ck. @ mouth	HYLTC01	Red	Green	Red	Green	Yellow	Green	Yellow
Thompson Ck. @ Dry Ck. Rd.	THMPCMTH	Green	Green	Red	Yellow	Green	Green	Yellow
Dry Ck. @ mouth	DRYCMTH	Green	Green	Red	Green	Red	Green	Yellow
E. Gallatin R. @ Gallatin River Ranch	EGALGRR	Red	Green	Red	Green	Green	Green	Yellow
Lower W. Gallatin River and Tributaries								
Baker Creek @ Amsterdam Rd.	BKRCNRC	Red	Yellow	Green	Green	Green	Green	Yellow
Camp Ck. @ Dry Ck. Rd.	CAMPMTH	Red	Green	Yellow	Green	Green	Green	Yellow
W. Gallatin R. @ Nixon Gulch Rd.	WGALMTH	Red	Yellow	Green	Green	Green	Green	Yellow

* = low/no flows prevented monitoring for much of the 2021 season NS = not sampled due to site access



Water temperature can affect many aspects of stream ecology. Warmer water temperatures accelerate photosynthesis by algae and aquatic plants, which can lead to overgrowth in streams with adequate nutrients. Because cold water can hold more oxygen than warm water, trout become stressed when water is too warm for too long. MT Fish, Wildlife & Parks often temporarily suspends fishing on streams where the daily maximum temperature reaches 22.8°C (73°F) for three or more consecutive days. **GREEN** indicates that the daily maximum temperature never exceeded 22.8°C. **YELLOW** indicates that the daily maximum temperature exceeded 22.8°C, but never for more than two consecutive days. **RED** indicates that the 22.8°C threshold was exceeded for three or more consecutive days. Hatching indicates that temperature logger readings were affected in periods of low flow.

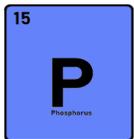


Dissolved Oxygen (DO) allows fish and aquatic insects to breathe under water. Increased water temperature and salinity (dissolved salts) can both decrease the amount of DO water is capable of holding. Guidance from the MT Department of Environmental Quality (DEQ) indicates DO concentrations of 8.0 mg/l as the minimum required by all fish life stages. **GREEN** indicates that all monthly measurements met or exceeded 8.0 mg/l. **YELLOW** indicates that one monthly measurement was below 8.0 mg/l. **RED** indicates that two or more monthly measurements were below 8.0 mg/l.

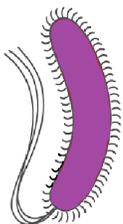
SWMN Watershed Health Summary Parameters (continued):



Nutrients - specifically nitrogen and phosphorus - are essential to aquatic plant and algae growth. Nutrients normally occur at low concentrations relative to demands, but when waterways become over-fertilized, excessive plant and algae growth can degrade water quality.



In 2021, the Montana Legislature set aside numeric nutrient standards in favor of descriptive, or “narrative”, standards that are currently being crafted into administrative rules. However, since both types of standards are derived from a common dataset that can be used to correlate levels of **Total Nitrogen (TN)** and **Total Phosphorus (TP)** in Montana's streams based with excessive algal growth and detriment to aquatic life, comparisons to the **pre-2021 numeric standards for each stream reach are used here**. **GREEN indicates that all monthly measurements were at or below the standard.** **YELLOW indicates that one monthly measurement exceeded the standard.** **RED indicates that two or more monthly measurements exceeded the standard.**



***E. coli* bacteria** are a reliable indicator of sewage or animal waste contamination in a stream. Most strains of *E. coli* don't cause disease, but their presence indicate potential contamination by pathogens that are impractical to monitor directly. *E. coli* concentrations are the best predictor of the risk of contracting swimming-associated illnesses like diarrhea, eye and skin infections, and respiratory illness. DEQ has *E. coli* guidelines that are based on statistical risk assessment using multiple samples collected during a 30-day period. While GLWQD does not collect samples with enough frequency to apply DEQ's assessment methods, we use their single-sample threshold as a guideline for this summary. **GREEN indicates that all monthly measurements were at or below the standard.** **YELLOW indicates that one monthly measurement exceeded the standard.** **RED indicates that two or more monthly measurements exceeded the standard.**



Total Suspended Solids (TSS) in the water column in high concentrations can have negative impacts on fish and macroinvertebrates by clogging their gills, or by settling out and filling in the tiny spaces between rocks, reducing suitable habitat. The State of Montana uses a descriptive sediment narrative that prohibits increases above unspecified “naturally occurring levels”. Several studies indicate that fish habitat conditions are being protected if TSS concentrations remain below 25 mg/L, and are considered compromised at concentrations above 80 mg/L. **GREEN indicates that all monthly TSS measurements were below 25 mg/L.** **YELLOW indicates that all monthly measurements were below 80 mg/L.** **RED indicates that one or more monthly measurements exceeded 80 mg/L.** It is important to note that these monitoring efforts were not timed to capture the higher TSS concentrations typically observed during storm events.



Aquatic Macroinvertebrates drive the flow of energy in stream ecosystems by feeding on algae, other insects, and even small fish, before becoming the major food source for trout. They are also indicators of water quality and aquatic ecosystem health, as the abundance and diversity of species present responds to water pollution and degradation of habitat. The **Montana Valley & Foothill Prairies Index (MVFP)** is one of many metrics that can be used to assess stream impairment from a macroinvertebrate sample. A score from 0 to 3 is assigned to each of six metrics included in the index, and relates the average to water quality and aquatic habitat impairment. **GREEN indicates unimpaired water quality/aquatic habitat.** **YELLOW indicates slight impairment.** **ORANGE indicates moderate impairment.** **RED indicates severe impairment.**

For more information on monitoring methods and sampling schedule, please see the GLWQD Surface Water Monitoring Network Project Plan at: <https://glwqd.org/surface-water-monitoring-program/>