White River Algae Technical Advisory Group (TAG) Meeting

January 27, 2021

1:00 Via Zoom Meetings

Alden Vanden Brink	Cory Williams	June Hueser	Shawn Welder
Bailey Franklin	David Graf	Kendall Smith	Steve Loshbaugh
Ben Rogers	Erik Wardle	Ken Leib	Tory Eyre
Bob Dorsett	Gary Moyer	Kendra Young	Travis Day
Bob Regulski	Hunter Causey	Lucas Turner	Tristan Nielsen
Brian Hodge	Ian Wilson	Mindi May	Tucker Feyder
Callie Hendrickson	Jeniffer Lynch	Natalie Day	Vance Herring
Chris Collins	Jocelyn Mullen	Perry Cabot	

Welcome and Introductions: Facilitator, Callie Hendrickson, welcomed everyone. She noted that the purpose of the meeting was to hear updates from US Geological Services (USGS), Trout Unlimited, CO Parks and Wildlife (CPW), and GEI Consultants related to the White River Algae Study.

Trout Unlimited (TU) & Colorado Parks and Wildlife (CPW) Stream Temperature in the Upper White River: Brian Hodge (TU) stated that the objectives of this study were to: 1) ID patterns in stream temperature, 2) Explore influences on stream temperature 3), Examine thermal suitability for aquatic biota, and 4) Generate continuous temperature data. That Power Point presentation is located on the District's website.

20 monitoring sites correlated closely with USGS' study sites. Two loggers were deployed per site, each logger recorded stream temp every hour within .2 degree Celsius. 15 of 20 sites were monitored April 2019- Sept 2020. The other five sites were monitored August 2019-September 2020.

To gauge suitability of the river for cold water fishes and trout in the upper White River a couple different temperature metrics were used. 1st metric used to gauge thermal suitability by using 30-day mean temperature (M30AT). 2nd metric used was a seven day mean maximum temperature (MWMT). 3rd biological temperature metric used was growing degree-day which is a predictor of growth distribution and development for a number of species including fish, aquatic plants and algae. This metric is a cumulative sum of mean temperatures. In one study, Ralston et al. (2014) found that degree days were a good predictor of algae blooms than were temperature or nutrient concentrations alone.

Results: Mean summer temperature and mean annual temperature increases from upstream to downstream. Variability in time, season and among sites. Between sites, during summer 2020, the stream generally warmed at a rate of 0.1-0.2 degrees Celsius per mile or 1-2 degrees per 10 miles. Heating and cooling varied among reaches. Neither mean summer or mean annual stream temperature differ between the North Fork White River (NFWR) and South Fork White River (SFWR). Summer 2020 was significantly warmer than 2019. Stream temperature is relatively predictable. Predictors variables are 3 day mean daily air temperature and mean daily discharge. The accumulation of degree days from upstream to downstream might suggest that the potential for growth occurs earlier and more rapidly at the relatively warm down stream sites compared to the relatively cold upstream sites.

Overall: stream temp varied a little with time and location, stream temperature did not differ between forks, stream temperature is not a standalone predictor of algal growth, stream temperature is affected by air temperature and discharge/flows, upper White River stream temperature is suitable for cold water fishes.

GEI Consultants' Taxonomic Analysis: Senior Ecologist, Jeniffer Lynch explained the purpose of their analysis was to analyze the data collected by TU and CPW to investigate the interactions between macroinvertebrates and Cladophora blooms. That Power Point presentation is located on the District's website.

14 study sites on the White River Mainstem, North Fork, and South Fork were sampled. Both Kick and Hess composite sampling methods were used. Overall, caddisflies and true flies dominated the invertebrate populations – mayflies were also abundant. EPT organisms made up 1/3 or more of the abundance.

Overall, trends among sites or years were difficult to detect with only 3 years of data and without a consistent set of sites samples. Variability in duplicate analysis also complicates trend detection. Tributary sites were often more similar to each other than to mainstem sites based on similarity indices. Geographic location influenced similarity among sites.

Cladophora Study results - Both adverse and beneficial interactions can occur between Cladophora and macroinvertebrate species. Taxonomic composition analysis was not conclusive, but caddisflies often dominated sites without Cladophora growths, while true flies commonly dominated sites with Cladophora growths. Similarity indices did not show any distinct trend of higher similarity between sites with (or without) Cladophora. Several metric values differed between sites with and without Cladophora when statistically analyzed. Diversity was higher at sites with Cladophora. More favorable values for metrics associated with EPT taxa and intolerant taxa occurred at sites without Cladophora, suggesting that more tolerant macroinvertebrate communities were present at sites with Cladophora. Variability in metric values from the duplicate sample analysis and the limited number of years sampled indicated these patterns should be considered with caution until further data is collected.

Insecticide Effects: spraying events occurred on the North Fork of the White River (NFWR) in late June and late July 2018. Sites on the South Fork of the White River (SFWR) and NFWR were sampled before the June spraying event, and then after the spraying events in July and August. Sites on the NFWR that were sampled in July and August included one site upstream of the spraying event and one to two sites downstream. None of the sites sampled in June had Cladophora growths observed in July and August. Shifts in the taxonomic composition occurred at the impact site between June and July, but assemblages in August more closely resembled those in June. Similar if less pronounced shifts occurred at the site upstream of spraying. No similar shifts occurred at the South Fork sites. The presence of Cladophora at sites downstream of spraying resulted in an inability to determine if effects from insecticide spraying occurred or if differences among sites and months were instead related to Cladophora.

Summary: Macroinvertebrate assemblages are balanced and diverse. Differences in sampling methods and laboratory analysis were minimal. Variability in the duplicate analysis indicates that further data should be collected. More data necessary to determine if macroinvertebrate populations vary between sites or years, as well as determining if aerial spraying of insecticides had an effect. Differences were noted between sites with and without Cladophora; this analysis would still benefit from further data collection, but more consistently suggested that Cladophora might be affecting macroinvertebrate assemblages.

Overall recommendations: Continuing this study for another two years would help determine if the patterns observed were “real” or would not persist over time with the naturally high interannual variability in macroinvertebrate populations. Select a consistent set of sites to sample. Repeating the insecticide study with some changes to the sampling design to allow for better differentiation of effects of insecticides vs. Cladophora would also be informative. Identify Chironomidae to genus/ species level if the insecticide study is repeated. Use only one sampling method. Best option: collect 3-5 replicate Hess samples and process them separately. Use of a rating scale to describe density and thickness of Cladophora at each site or describing habitat differences through other measurements.

USGS Update: Natalie Day presented results of the data (algal taxonomy, synoptic sampling, streambed mobilization, historic streamflow records) that came after the December 2020 presentation to the TAG. That Power Point presentation is located on the District’s website.

Algal taxonomy: Laboratory results show that a variety of organisms exist at each of the sample sites. Four of the broadest divisions of algae were looked at. There were no dominant species of algae among any of the sites. The larger effort to look for patterns will take place in 2021.

Synoptic sampling: USGS targeted a low flow period when little to no algae growth was expected (to minimize nutrient variability) and when irrigation was off (to minimize streamflow variability). Sampling events at all 20 sites occurred on October 22, 2020. The data was used to compare nutrient concentrations and loads across sites.

Streambed mobilization: The force from Snowmelt runoff (streamflow shear stress) affects algal attachment, movement of sediment and nutrients, and reorganizes physical habitat. This was assessed during peak streamflow in 2018-20 using high-flow measurements, channel surveys, and grain-size analysis. High flows in 2018 and 2020 DID NOT cause streambed mobilization at the site WR below North Elk Creek near Buford, CO. High flows in 2019 DID mobilize the streambed at this location. Differences in streamflow magnitudes in 2018-2020 provided a good opportunity to characterize the lower and higher ranges of sediment mobility for each site.

Next steps are to begin the larger modeling efforts which will analyze water quality conditions as they relate to algae growth. All the data that has been collected over the past three years will be used in the modeling. USGS anticipates the first draft of the final report available for internal review in late Summer 2021. The final report should be complete and made available to the public in December, 2021.

Public Comment:

- None

See https://www.whiterivercd.com/white-river-algae-study.html for more info.