Grand County Stream Management Plan (GCSMP) Update
4th Stakeholder Outreach Meeting
December 11, 2023, from 5:30 to 8:00 PM
Northern Water Willow Creek Campus, 725 County Road 40, Granby, Colorado 80446
Hybrid Meeting Held via ZOOM
Meeting Summary – FINAL

ATTENDANCE

Meeting Participants: Rachel Badger, Doug Bellatty, Paula Belcher, Andrew Breibart, Brooklyn Cimino, Mark Coleman, Brian Craig, Isabel de Silva Shewell, Anna Drexler-Dreis, John Ewert, Steve Fitzgerald, Kayli Foulk, Craig Friar, Charley Garcia, Tiffany Gatesman, Randy George, Pierre Glynn, Quinn Harper, Kirsten Heckendorf, Todd Holzwarth, Joan Jones, Richard Jones, Becca Jonswold, Ingrid Karlstrom, Kirk Klancke, Abby Loberg, Mark McLaughlin, Kimberly Mihelich, Andy Miller, Neal Misbach, Katherine Morris, Brian Murphy, Rich Newton, Jim Obermeyer, Will O'Donnell, Mary Price, Jessica Rahn, Katie Randall, Pranay Sanadhya, Banning Starr, Jen Stephenson, John Tilstra, Dave Troutman, Jason Turner, Mely Whiting, Jamie Wolter, and Kristina Wynne

Technical Consultant: Seth Mason

Facilitation: Samuel Wallace and Seth Greer

ACTION ITEMS

Peak Facilitation	• Distribute an interest survey regarding the Stakeholder Advisory Committee to the entire stakeholder group. • Share the Comprehensive Watershed Analysis (CWA) presentation with stakeholders.

MEETING INTRODUCTION AND BACKGROUND PRESENTATION

Samuel Wallace, Peak Facilitation (Peak), started the meeting with a brief presentation on the background of the GCSMP update, the stakeholder process, and agenda for the meeting. Below are key themes from the presentation.

- The GCSMP update is a project managed by Grand County Learning by Doing (LBD), a collaborative stakeholder group that includes the County, water utility companies, and local land managers. The intention of this process is to update the original GCSMP, which was established in 2010, to maintain and, where possible, improve river and stream health in the LBD Cooperative Effort Area (CEA). The CEA contains the Fraser River Watershed, the Williams Fork Watershed, and the Colorado River Basin upstream of its confluence with the Blue River. All discussions related to the update will apply solely to this area.
- The scope of the GCSMP update is on stream and river health in the CEA. The plan also exists within the confines of existing legal frameworks and water rights allocations. The scope of this update does not include consumptive water use planning, lakes and reservoirs, areas outside of the CEA, or attempts to modify water rights or reverse water development projects that are in operation or have been approved.
- The update process is divided into two phases. Phase 1, currently in motion, seeks to solicit community input on visions, goals, and priority geographies and produce a technical report on the present conditions of streams and rivers in the CEA, known as the Comprehensive Watershed Assessment (CWA). The main objective of this meeting is to present on a subset of CWA results. Phase 1 started in spring of 2023 and is expected to be completed by early spring 2024.

- The stakeholder engagement section of Phase 1 will include five open-house stakeholder meetings, of which this meeting is the fourth. The first three meetings, occurring in May, July, and September 2023, respectively, introduced stakeholders to the process and objective of the GCSMP update process, garnered stakeholder input on visions for a successful project and healthy CEA watershed, and provided information on historical and present water management, recent landscape changes, diversion infrastructure, and streamflow data for specific reaches across the CEA.
- Peak is the neutral third-party facilitator in the update process. In addition to organizing and facilitating meetings, Peak is responsible for gathering, processing, and summarizing stakeholder input from Phase 1 of the process to create deliverables which will be used in Phase 2 of the update.
- The facilitation and technical team will solicit stakeholder input during the meeting using Menti, an online polling software.

Group Discussion

Below are key themes from the discussion following the presentation on the GCSMP update and the stakeholder process.

- While lakes and reservoirs are important to the County's waterways, the Inter-Governmental Agreements (IGAs) that govern LBD and the SMP do not include standing bodies of water in their scope. LBD has access to monitoring information on County lakes and reservoirs that can be provided to stakeholders upon request.
- Meeting participants explained that the title of the GCSMP may be confusing, seeing as the plan does not focus on the entirety of Grand County but rather the streams and rivers within the CEA. LBD members responded that focusing efforts on the CEA allows for more detailed monitoring and development of more robust implementation projects within this area. The information gathered on the CEA during the SMP process can be used to assist similar efforts elsewhere in the County. LBD will consider the potential confusion of the title in future outreach.

PHASE 2 AND STAKEHOLDER ADVISORY COMMITTEE OVERVIEW

Samuel gave a brief presentation on what stakeholders can expect from Phase 2 of the update process, including details on the Stakeholder Advisory Committee that will be formed during the phase. Below are key themes from the presentation.

- Phase 2 will focus on using the data and objectives gathered in Phase 1 to produce deliverables and projects that LBD and its partners can use to address the needs of the CEA's waterways.
- Phase 2 is divided into four tasks. The first task will be to develop an assessment framework that will be used to identify priority stream reaches. The second task will develop planning objectives that respond to key issues in priority stream reaches. The third task will use the frameworks and objectives developed in the first two tasks to identify and prioritize potential habitat improvement projects. The fourth task will develop an actionable implementation plan for the identified projects.
- The stakeholder process in Phase 2 of the update will center around a Stakeholder Advisory Committee, a subset of stakeholders that will work directly with the facilitation and technical consultants to process information from each task in Phase 2 and provide recommendations to LBD on strategies and outcomes. The formation of the Committee will build relationships between stakeholders, garner diverse perspectives on the nuanced issues within the CEA, and formulate collaborative frameworks for project implementation.

- Membership on the Stakeholder Advisory Committee will consist of 12 to 15 stakeholders that represent the diverse field of perspectives within the CEA area. Committee members will be expected to attend six to eight regularly scheduled workshops over the course of two years. Workshops will involve engaged discussions among Committee members to build consensus on recommendations. Workshops will include some technical elements but will focus on conversations regarding values and priorities.
- Stakeholders responded to a Menti question gauging interest in the Stakeholder Advisory Committee. The interest form will also be sent out to the entire contact list in survey form. Peak and LBD will process the information gathered from stakeholders to develop a framework for the Committee. Further information on the Committee and details on enrollment will be presented to the stakeholder group in the coming months.

PRESENATION ON COMPREHENSIVE WATERSHED ANALYSIS (CWA) RESULTS
Seth Mason, Lotic Hydrological (Lotic), presented results from the CWA. Below are key themes from the discussion.

CWA Overview and Scope

- The technical analysis within the CWA was broken into six topics: hydrology, water quality, water temperature, geomorphic conditions, riparian areas, and aquatic biota. This presentation will contain results from the hydrology, water quality, and water temperature sections of the analysis. The remaining three sections will be discussed at the 5th stakeholder meeting, which will be scheduled in the coming weeks.
- The CWA broke the CEA into seven sub-watersheds. Results for each subset of data will be presented for each sub-watershed. The seven sub-watersheds include:
  - The Colorado Headwaters sub-watershed includes the reaches of the Colorado River and its tributaries above Grand Lake.
  - The Upper Colorado sub-watershed includes the sections of the Colorado River directly above and below Granby Reservoir and its tributaries in this area, spanning to the confluence with the Fraser River.
  - The Middle Colorado River sub-watershed includes the stretch of river between the confluences with the Fraser and Williams Fork Rivers and corresponding tributaries.
  - The Lower Colorado River sub-watershed includes the Williams Fork River and the stretch of the Colorado River below the confluence with the Williams Fork River.
  - The Upper Fraser River sub-watershed includes the headwaters of the Fraser River and its uppermost section, including tributaries.
  - The Middle Fraser River sub-watershed includes a short section of the Fraser River, the Elk Creek, and the Saint Louis Creek.
  - The Lower Fraser River sub-watershed contains the remaining stretch of the Fraser River to its confluence with the Colorado River and all of its tributaries in this section, including Ranch Creek.
- The results from each subset of the CWA included a causal pathway conceptual model, which visualizes the connections between river metrics and potential drivers or outcomes within the greater environmental context of the area. These conceptual charts will be used to identify potential projects based on drivers connected to areas of concern in Phase 2.
- Stakeholders were encouraged to consider how the results from the CWA reflected their on-the-ground experience of Grand County's waterways throughout the presentation and engage in conversation regarding these comparisons.

CWA Results on Hydrology and Streamflow Behavior

Below are key themes from the presentation on the hydrology and streamflow results from the CWA and the ensuing discussion.

- Streamflow in the CEA is dependent on many factors. An important potential driver of hydrology is the presence of fire scars. Wildfires can impact streamflow by decreasing soil infiltration capacity and increasing overland runoff. In turn, altered flow regimes resulting from disturbance events like these will be reflected in peak flow and low flow measurements. Changes in hydrology have wide-ranging outcomes throughout the CEA, including channel morphology, pollutant loading, assimilative capacity of riparian environments, and ultimately the health of aquatic habitat and organisms.
- The streamflow analysis characterized streamflow metrics in different reaches and used time-series data to identify where significant changes have occurred over time. Some monitoring stations across the CEA have been active longer than others, and the certainty of results varies with the reliability of the data. Additionally, monitoring data in winter months is not as reliable as the corresponding spring or summer data due to the seasonal nature of many monitoring stations in the CEA. Visualized results for streamflow metrics in different reaches were characterized by certainty in addition to the magnitude and direction of change in the presentation. The results discussed below are among those that could be concluded with a relatively high level of certainty.
- Annual median streamflow patterns throughout the year were found to have varied across reaches within the CEA. The Headwaters of the Colorado and the Upper Fraser River displayed an expected pattern, with peak flows occurring in June coinciding with spring snowmelt and discharge levels gradually declining into the fall. The Colorado River below Granby Reservoir, however, displayed relatively flat median flows year-round, likely as a result of the highly managed water system below the reservoir. Other locations, such as the Middle and Lower Colorado River and the Lower Fraser River, display intermediate conditions, with slight indications of peak flow in the summer followed by rapid declines in the fall to relatively flat base flow conditions.
- Spring peak flows showed slight variations in geographic behavior between sub-watersheds. On the Fraser River, peak flows behaved as expected, with peaks growing larger further downstream in rivers due to the increased discharge from tributaries. The Colorado River displayed a similar pattern above the Granby Reservoir but showed a decrease in peak flows downstream from the reservoir. The Williams Fork River displayed stable peak flow conditions throughout.
- Late summer minimum flows in the Fraser and Colorado Rivers increased in downstream reaches, as would be expected in a natural system. The Williams Fork River displayed a decline in minimum flows moving downstream in reaches above Williams Fork Reservoir, likely indicative of water use, and showed increases in base flows below the reservoir as a result of water releases from the reservoir.
- When assessing changes in current stream flow patterns compared to historical records, Lotic found increases in summer minimum flows in the upper Colorado and Fraser Rivers, though the magnitude of change was varied across different tributaries and measuring sites in these reaches. The Williams Fork River displayed a decline in summer minimum flows. Mean winter flows have shown an increase in the Middle Fraser River and Elk Creek compared to historical data and a decrease in the lower Colorado River during the studied period. No significant changes were found for spring peak flows in the CEA compared to historical data.
- Stream flow affects riverine water quality and habitat through flushing flows, defined as peak flows that move sediment downstream in river channels By moving sediment

downstream, flushing flows help maintain habitat diversity. Lotic compared flushing flows to target flow levels to identify whether flows are meeting the needs of local habitats. In the monitoring period since the implementation of the first GCSMP in 2010, a greater number of reaches have met flushing flow targets than in the period before the plan, spanning from 1985 to 2009. Several droughts in the 1990s and 2000s likely contributed to the large number of unmet target flows in the pre-GCSMP period. In post-GCSMP measurements, the reach that has most consistently struggled to maintain flushing flow targets has been the Colorado River below the Granby Reservoir.

- Comparative data on achievement of summer minimum flow targets displayed similar patterns to those of flushing flows. Generally, targets were more consistently met in the period after the 2010 GCSMP than in the period before the plan's implementation. The Lower Fraser River and the Colorado River below Granby Reservoir most frequently struggle to meet present-day targets.
- Data on winter target flow achievement was predictably limited by seasonal monitoring operations but showed general improvements in the post-GCSMP period, with the exception of Ranch Creek.

Clarifying Questions on Hydrology

Meeting participants asked clarifying questions about the hydrology and streamflow section of the CWA presentation. *Questions are listed below in italics,* with corresponding answers in plain text.

Are stream flow levels higher in the post-GCSMP period than they were before implementation?
Stating that stream flow has increased is too broad of a statement. Generally, stream flow targets were more often met in the post-GCSMP period than in the pre-GCSMP period. However, large drought periods in the 1990s and 2000s contributed to lack of target achievement in the period before implementation. Additionally, targets for individual reaches are subject to occasional change and can therefore not be used as comparative metrics for stream flow totals.

How often are flow targets assessed and changed?
Targets are assessed annually for individual reaches by comparing actual flow data to current targets but are not often changed. The targets analyzed in the CWA are based on those identified in the original GCSMP.

Minimum flow targets are often set by the state, but flushing flow targets are often more difficult to identify. How reflective of present conditions are the current flushing flow targets, and do they need to be revised?
Developing flushing targets that accurately reflect changing conditions in streams and rivers is often difficult. There are likely targets in the CEA that would benefit from detailed reevaluation. This analysis can be discussed during Phase 2.

Why were changes in magnitude of precipitation not included as a driver in the causal pathway conceptual model for this section?
Variances in precipitation is considered a factor of changing climate in the conceptual model. There are many natural phenomena that can affect stream flow, but the model focuses more on human-caused drivers to initiate discussions on projects that can address them.

There has been much discussion in the County of ongoing drought conditions in recent years. Despite this, stream flow patterns are tending to meet targets in most reaches. Is this correct?
Yes.

Can the successful achievement of targets be attributed to management practices implemented by LBD?
Target successes can be attributed to several processes. To start, there are differences in the datasets from monitoring site to monitoring site due to differences in the length of the monitoring record and gaps in the record, potentially leading to incomplete datasets, especially in the pre-GCSMP period. Additionally, the extreme droughts of the pre-GCSMP period most likely affected each stream reache's ability to meet target goals during this time. The river system in the CEA is also highly managed, so some changes may be attributable to the management decisions of water rights holders. A combination of these factors and LBD operations has led to increased success in meeting stream flow targets.

Can the original GCSMP be considered a success?
A significant motivator for the CWA and the GCSMP update in general is to evaluate how well management objectives from the original document have been met. While measuring the success of the 2010 plan is difficult given the relatively short period of monitoring data available, continued assessment and evaluation of management objectives and operations in the area will lead to increasingly certain conclusions in the future.

The Colorado River has been in a drought cycle for almost the entire 21st century. Would you consider the high snow years in 2011 and 2015 to skew the post-GCSMP dataset?
Any outliers in a 13-year monitoring period are likely to have large effects on the data. It is difficult to draw certain conclusions from the dataset.

Can this data be used as a forecasting tool to determine likely future conditions and make management decisions?
Lotic was not tasked with developing forecasting tools, with one exception detailed later. The stream flow data assessed in this section of the CWA is purely retrospective.

CWA Results on Water Quality
Below are key themes from the presentation on water quality results from the CWA and the ensuing discussion.

- The causal pathways connected to water quality are more complicated than those for stream flow. There are many constituents in water that can contribute to water quality. The water quality analysis in the CEA focuses on nutrients, including phosphorus and nitrogen, metals, pH, and dissolved oxygen in the water column.
- Apart from the Fraser River, most monitoring stations in the CEA do not have reliable water quality data before 2008. Additionally, the number of sample days within this period varies between monitoring stations. Many samples collected across the CEA have also resulted in non-detects, where concentrations of certain constituents are below the threshold for detection. Due to these factors, metrics on many water quality parameters are limited.
- The State has developed regulatory standards for concentrations of certain nutrients in rivers based on healthy levels for aquatic ecosystems. Evaluation of nutrient load metrics in the CEA are based on occurrences of acute or chronic exceedances of these standards.
- Exceedances of phosphorus and nitrogen standards have been identified on Church Creek and in several locations on the Lower Fraser River. These exceedances are potentially due at least partially to the location of these monitoring sites below wastewater treatment plants.
- High nutrient levels can be harmful to aquatic habitats by triggering large algal blooms, impacting plant assemblage structure, and decreasing food quality for animals.

- The CWA measured levels of suspended metals, including lead, silver, and iron, in different waterways based on the risk of noncompliance with State standards. Concerning iron levels were found on some sites on the lower Fraser River sub-watershed, on Stillwater Creek in the Colorado Headwaters sub-watershed, and on some sites in the upper Fraser River sub-watershed. Concerning lead concentrations were found on several sites in the lower Fraser River and on several sites in the upper Fraser River, including downstream from the Moffat Tunnel.
- High levels of metals are dangerous to aquatic habitats due to bioaccumulation within organisms. Non-detects were common for metal measurements in the Upper and Middle Fraser River and the Lower Colorado River.
- Physical parameters in waterways like dissolved oxygen and pH were also measured and compared to State standards. Dissolved oxygen levels have fallen below state standards in several locations on the CEA, including the Headwaters of the Colorado River, the Colorado River below the Granby Reservoir, the Williams Fork River below the Williams Fork Reservoir, and several locations on the Fraser River. Locations below reservoirs or in areas with high nutrient levels, such as the locations on the Fraser River, are expected to show lower levels of dissolved oxygen, but the drivers for low levels in the Colorado River Headwaters are not clear.
- Locations where pH was outside the healthy range for aquatic ecosystems were identified as well. Slightly acidic measurements were taken in the Colorado River Headwaters. Alkaline measurements were found much more commonly. Locations with pH levels outside of the regulated range included different sites in the Colorado Headwaters and sites on the upper Fraser River, Church Creek, tributaries in the Upper Colorado sub-watershed, the mainstem of the Middle Colorado River, and the Williams Fork River.
- Physical characteristics of water can have important impacts on aquatic habitats. Changes in dissolved oxygen can affect respiration for aquatic animals. Changes in pH can impact shell growth, ion imbalances, and, in cases with high pH, protein metabolism and ammonia levels.
- Several trends in water quality parameters were identified in the period from 2008 to 2020. Levels of metals showed negative trends over time in many locations in the Colorado Headwaters and Upper Colorado sub-watersheds. Nutrient levels showed moderate to large positive (i.e., increasing) trends over time in the Colorado Headwaters, Upper Colorado, and Lower Fraser sub-watersheds and small negative (i.e., decreasing) trends on the Upper and Middle Fraser River sub-watersheds.
- Water quality samples were taken in pre-fire and post-fire settings to assess the effects of recent and potential wildfires on water quality in the CEA. Post-fire inferences were limited due to the shortened sampling period in most post-fire locations. Where post-fire measurements were taken, water quality was found to worsen under rainy conditions than under dry ones due to overland runoff. Post-fire conditions were found to exacerbate constituent levels at higher rates in late summer and fall than in winter and during spring runoff conditions.

Clarifying Questions on Water Quality

Meeting participants asked clarifying questions about the water quality section of the CWA presentation. *Questions are listed below in italics,* with corresponding answers in plain text.

Which agency establishes standards for nutrients in waterways?

Standards are developed by the State Water Quality Control Division. Standards are based on toxicity levels for macroinvertebrates and other ecosystem components. Nutrient standards are evaluated often and can be revised for specific reaches based on ecosystem needs.

Does lead occur naturally in the river system, or is all dissolved lead the result of human activity?
Lead in waterways can have both natural and manmade origins, but lead levels in the CEA streams are likely dependent on point sources. Sudden increases in lead levels in downstream locations are often indicative of point source discharges rather than naturally occurring sources (e.g., the geology of the landscape).

Are excess nutrient levels on Church Creek related to wastewater operations?
It is difficult to assign a driver to these conditions due to the presence of only a single monitoring station, but wastewater operations are likely a factor.

Is there a date associated with the negative trends in metal concentration detailed in the presentation?
Trends are found for the entire period between 2008 and 2020. This is a very short period of time to be used in a trend analysis, so the results are sensitive to conditions at the beginning or end of the period.

CWA Results on Water Temperature

Below are key themes from the presentation on water temperature results from the CWA and the ensuing discussion.

- The causal pathways connected to water temperature are relatively straightforward. The main drivers for warming and cooling of water are solar radiation and runoff, respectively. Warmer water presents several challenges for cold-water ecosystems, including decreased dissolved oxygen load and increased algal metabolism. Warmer waters can also lead to chronic and acute fish stress.
- Grand County waterways are home to one of the most robust water temperature monitoring networks in the state, with the United States Geological Service (USGS), Grand County Water Information Network (GCWIN), and other partners operating reliable monitoring stations going at least as far back as 2010 and in some cases much further.
- Lotic calculated water temperature metrics for each monitoring site based on the site's deviance from averages in the sub-watershed. This analysis indicated that the Lower Colorado River monitoring station data showed very stochastic temperature measurements, indicating that there might be a driver disrupting water temperature patterns in the area.
- The State identifies water temperature exceedance thresholds based on the time of year (i.e., water temperature exceedances are different for summer and winter months and the shoulder season in between). The State also identifies chronic (i.e., sustained exceedances) and acute (i.e., momentary exceedances) thresholds for water quality temperature.
- Exceedances of standards for water temperature in streams were also noted. The CWA is not a regulatory assessment of exceedances; it is intended to provide results that will help inform the identification of priority reaches, objectives, and restoration projects.
- Summer exceedances for chronic standards were found on the Colorado River above the confluence with Williams Fork and on the Arapahoe Creek. Spring and fall chronic exceedances were found in several locations on the Fraser River, on Ranch Creek, in the Upper Colorado sub-watershed, and on the Williams Fork River above Williams Fork Reservoir.
- Summer exceedances for acute standards were found on Ranch Creek, the Williams Fork River above Williams Fork Reservoir, and Church Creek. Spring and fall acute exceedances were found on Ranch Creek, in the Upper Colorado sub-watershed, and in various locations along the Lower Fraser River.

- Winter datasets for both chronic and acute exceedances were predictably limited, but the data that was present indicated no major deviations.
- Current and historical data were compared to assess changes in maximum weekly and daily average temperatures. Weekly and daily temperatures showed general increases across the watershed, with midsummer months displaying particularly high temperature increases. This pattern is likely due to warming air temperatures leading to earlier runoff and peak flow seasons. Both weekly and daily water temperature averages decreased in the fall months compared to historical data in many locations.
- Lotic collaborated with the LBD Monitoring Subcommittee to develop models to predict the sensitivity of water temperature to changes in stream flow and climate. The models found that changes in temperature in the main stem of the Colorado River were likely to be more sensitive to flows in the Upper Colorado River than those of the Fraser River. Colorado River water temperatures were found to be most reactive to Fraser River flows in early summer. This information can be used in the planning process to determine the most efficient locations and timelines of potential projects.

Clarifying Questions

Meeting participants had the opportunity to ask clarifying questions based on the water temperature section of the CWA presentation. *Questions are listed below in italics,* with corresponding answers in plain text.

Several analyses compared current temperatures to historical ones. However, the abbreviated dataset, from 2010 to 2021, has higher baseline water temperatures than previous decades. Was any data from the early-to-mid 1900s, featuring much cooler water temperatures, compared to current temperatures?
The data available in the CWA does not precede 2010. Comprehensive temperature data prior to 2010 may exist, but Lotic does not have access to it. The period selected for assessment was based on the amount of comparable data available.

OPEN HOUSE – ADDITIONAL FEEDBACK ON CWA RESULTS

Stakeholders explored specific metrics further using printed posters and handouts featuring relevant maps and charts and left additional feedback in the form of comment cards as necessary.

NEXT STEPS

- Peak will distribute a copy of the slide deck used in the CWA presentation to stakeholders.
- Lotic will present on results from the CWA regarding geomorphic conditions, riparian areas, and aquatic biota at the 5th Stakeholder Outreach Meeting. The CWA will be finalized and published for use in Phase 2 of the update process.
- Peak will send out a survey with questions gauging stakeholder interest in participating in the Stakeholder Advisory Committee to the entire stakeholder contact list.
- The 5th Stakeholder Meeting will be scheduled for February 2024. Details are forthcoming.