Grand County Stream Management Plan (GCSMP) Update
5th Stakeholder Outreach Meeting
Wednesday, February 7, 2024, from 5:00 to 8:00 PM
Granby, Colorado
Hybrid Meeting Option via ZOOM
Meeting Summary – FINAL

ATTENDANCE

Meeting Participants: Jessica Alexander, Rachel Badger, Erica Bean, Paula Belcher, Maura Bishop, Travis Bray, Andrew Breibart, Brian Craig, Mark Coleman, John Dacey, Anna Drexler-Dreis, Tony Eason, John Ewert, Steve Fitzgerald, Kayli Foulk, Craig Friar, Ashley Garrison, Randal George, Pierre Glynn, Daniela Gosselova, Evie Guay, Josh Hardy, Stephen Hampton, Quinn Harper, Kirsten Heckendorf, Todd Holzwarth, Becca Jonswold, Ingrid Karlstrom, Kirk Klancke, Russell Knight, Brendon Langenhuizen, Merrit Linke, Newton Logan, Katherine Morris, Brian Murphy, Rich Newton, Katie Nicholls, Jim Obermeyer, Will O'Donnell, Conor Peters, Jessica Rahn, Katie Randall, Steven Reeves, Pranay Sanadhya, Katie Schneider, Jen Stephenson, John Tilstra, Dave Troutman, Jason Turner, and Jamie Wolter

Technical Consultant: Seth Mason

Facilitation: Samuel Wallace and Seth Greer

ACTION ITEMS

Peak Facilitation	Circulate a survey to stakeholders who expressed interest in serving on the Stakeholder Advisory Committee to identify the interests and geographies they can represent on the Committee.

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 the 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 one, currently in motion, seeks to solicit community input on visions, goals, and priority geographies and produce a technical report on the present and historical conditions of streams and rivers in the CEA, known as the Comprehensive Watershed Assessment (CWA). Phase one started in the spring of 2023 and is expected to be completed in the coming months.

- The stakeholder engagement section of Phase one has included five open-house stakeholder meetings, of which this meeting is the fifth. 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. The fourth meeting, occurring in December 2023, reviewed the results from the CWA relating to hydrology, water temperature, and water quality. This meeting will feature the remaining results of the CWA pertaining to riparian areas, aquatic biota, and geomorphic conditions of streams in 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 one of the process to create deliverables, which will be used in Phase two of the update.

PHASE TWO AND STAKEHOLDER ADVISORY COMMITTEE OVERVIEW

Samuel gave a brief presentation on what stakeholders can expect from phase two 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 two will focus on using the data and objectives gathered in Phase one to produce deliverables and projects that LBD and its partners can use to address the needs of the CEA's waterways.
- Phase two is divided into four tasks. The four tasks include:
    - **Task 1:** Developing an assessment framework that will be used to identify priority stream reaches.
    - **Task 2:** Developing planning objectives that respond to key issues in priority stream reaches.
    - **Task 3:** Using the frameworks and objectives developed in the first two tasks to identify and prioritize potential habitat improvement projects.
    - **Task 4:** Developing an actionable implementation plan for the identified projects.
- The sequential nature of the project development in Phase two requires more consistent participation than Phase one's stakeholder process, necessitating a stakeholder group with a higher level of commitment to attend every meeting. The stakeholder process in Phase two 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 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 scope of the plan, and formulate collaborative frameworks for project implementation.
- The Stakeholder Advisory Committee will consist of 10 to 20 stakeholders. Committee members will be expected to attend six to eight regularly scheduled workshops over the course of two years, with meetings roughly once a quarter. 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.
- To ensure that the Committee is representative of the diverse field of values in the County, the Committee will feature two seats each for the following interests:
    - Environment and conservation
    - Tourism

    - Municipal interests
    - Outdoor recreation
    - Mining and industrial interests
    - Agricultural interests and irrigators
    - Water and sanitation special districts
    - Community at-large
- The Committee will also feature one seat each for land management agencies, including the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the National Park Service (NPS).
- In addition to diverse interests, Committee membership will consider geographic diversity. While there are no specific seats for CEA geographies, Committee membership will ideally feature representatives from the Colorado River Headwaters, Fraser River, and Colorado River Mainstem/Williams Fork River watersheds.
- Over the last several months, Peak has gauged the interest of stakeholders in serving on the Committee in the form of a survey sent to stakeholders via email. Stakeholders are encouraged to reach out to Samuel or Seth Greer, Peak, with additional interest.
- Interested stakeholders will be sent an additional survey to determine which seats and geographies they can represent. Peak will work with groups with more than two interested stakeholders to determine their representation on the Committee.

Clarifying Questions about Phase Two of the GCSMP Update Process
Stakeholders asked clarifying questions about phase two of the update and the Stakeholder Advisory Committee. *Questions are listed below in italics*, with the corresponding responses in plain text.

What entities will fund the implementation projects developed in Phase two?
Funding will be included in conversations about projects during Phase two.

Can stakeholders expect to see projects being implemented by Fall 2025?
The timeline for project implementation is likely longer than that. CWA results will need to be fully processed before the project identification and implementation process can begin.

Will LBD-affiliated organizations like Colorado Parks and Wildlife (CPW) be given seats on the Committee?
LBD members will be present for Committee meetings in an ex-Officio role, providing guidelines and background information when needed.

What expectations or standards will be applied to Committee members to ensure consistency?
The tentative schedule for Phase two includes six to eight Committee meetings over the next two years. Members will be expected to commit to participate on the Committee for the entirety of this period.

PRESENTATION 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 goals of the CWA are to assess hydrological regime characteristics, water rights, water quality, geomorphology, riparian, and biological data relevant to focus streams in the CEA to understand the condition of streams and aquatic habitat within the CEA and the factors that

affect their preservation and, where possible, their improvement. The CWA will provide the technical data that will be used by LBD and stakeholders in Phase two to identify and prioritize focus reaches in the CEA and develop and implement mitigation projects within these areas.

- The technical analysis within the CWA was broken into six topics: hydrology, water quality, water temperature, geomorphic conditions, riparian areas, and aquatic biota. Results from the hydrology, water quality, and water temperature analyses were presented at the fourth stakeholder outreach meeting on December 11. This presentation will contain CWA results on riparian areas, aquatic biota, and geomorphology.
- Results from the analysis of aquatic biota were divided into those pertaining to fish and those pertaining to macroinvertebrates. These topics were presented separately.
- 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 near the town of Winter Park, 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 its tributaries in this section, including Ranch Creek.
    - The CEA does not include the Troublesome and Muddy Creeks.
- The results from each subset of the CWA included a causal pathway conceptual model, which visualizes the connections between river metrics, potential drivers, and outcomes within the greater environmental context of the area. These conceptual charts can be used in Phase two to draw connections between priority stream conditions and their potential drivers.
- Stakeholders were given printed maps of the CEA with data from each area of focus to supplement the visuals included in the presentation. Stakeholders were encouraged to consider how the results presented in the meeting reflected their experiential knowledge of the watersheds and ask questions during the presentation.

CWA Results on Geomorphic Conditions

Below are key themes from the presentation on the geomorphic conditions of streams within the CEA and the ensuing discussion.

- Geomorphic conditions were analyzed using sediment sample data collected by LBD since 2010. LBD has collected data regarding pebble count, sediment cores, algal cover, and embeddedness. Data used in the analysis starts in 2019, when a change in sampling techniques was implemented. Data collected before this date can be useful in some studies but are not consistent with more recent data, which is more robust.

- Measurements of median channel substrate sizes were used to compare geomorphic data across time and space. Data from 2019 was compared to 2021data to assess changes over time in the Fraser and Colorado River watersheds.
- In 2019, channel substrate in most Fraser River locations contained large average sediment sizes, reflecting the steep nature of the stream. The 2021 data mostly displayed a similar pattern, but sediment sizes on Ranch Creek showed significant decreases from 2019 measurements.
- The 2019 measurements of Colorado channel substrate sizes showed similar data to the Fraser River, displaying large average sediment size throughout the watershed, with the exception of a measurement site upstream of the confluence with the Blue River, which displayed much finer sediment sizes. The data showed little change from 2019 to 2021, with the exception of a site directly upstream of the confluence with the Williams Fork River, which underwent a significant decrease in average sediment size in this period.
- Metrics of grain size, percent gravel, percent fine sediment, percent embeddedness, and filamentous algal cover were also gathered from data collected in 2019, 2020, and 2021 in both watersheds to compare geomorphology across time.
- Grain size metrics on Ranch Creek decreased significantly between 2019 and 2021. Additionally, metrics of percent embeddedness and algal cover significantly increased, as did data on percent fines, exceeding the state standard for percent fine sediments.
- The measuring site on the Upper Fraser River upstream from the Winter Park Sanitation District showed similar though less dramatic patterns to Ranch Creek, with the percent fines nearing exceedance of state standards for fine sediment levels in 2021.
- Sampling sites on the Colorado River upstream of the Williams Fork and downstream of the KB Ditch displayed decreases in grain sizes between 2019 and 2021. Additionally, these sites displayed increasing algal cover measurements and increases in fine sediment percentage, approaching exceedances of the state standard.
- The Colorado River sampling site upstream of the Blue River showed significant decreases in grain size and increases in algal cover between 2019 and 2021. Additionally, the percentage of fine sediments, already above the state standard in 2019, increased significantly into 2021.
- Among the drivers of changes in sediment regimes are the structure of valley bottoms, stream flow behavior, land use activities, wildfire impacts, and forest disease impacts. Lotic analyzed these factors over the study period to identify patterns that could affect stream geomorphology.
- Valley bottom morphology metrics were found by analyzing valley widths and floodplain confinement. These metrics were overlayed with land use data to determine areas where stream confinement as a result of land use may affect sediment load. Many urban areas in the CEA feature narrow valleys and partially confined floodplains. These factors may act as drivers in geomorphic data.
- Forest structures and dynamics in surrounding landscapes may have large effects on stream geomorphology. Evergreen forests, which constitute around 55% of the CEA's land cover, have undergone large-scale changes in the past several decades, starting with the beetle kill epidemic, which affected around 95% of CEA forests between 2003 and 2012. More recently, wildfires have had dramatic effects on the CEA's forests, burning around 31.4% of forest cover between 2018 and 2020. Wildfire, combined with rainfall events, can add significant amounts of sediment to streams and have lasting effects on geomorphic conditions.
- The impacts of intensive land-use development on stream sediment regimes were measured through floodplain fragmentation and valley bottom land development metrics. Floodplains in many areas of the CEA, including population centers, were shown to have some level of

confinement. A majority of the CEA was also considered to have some level of valley bottom land disturbance. The CWA also analyzed impervious land cover as a potential driver of sediment regime change. The Towns of Granby and Fraser were found to have the highest levels of imperviousness, potentially leading to sediment runoff and deposition in nearby streams.

- Lotic overlayed peak flow data for each sampling site across the Fraser and Colorado River watersheds with geomorphic metrics to identify potential correlation between the data. Peak flow showed a decrease from 2019 to 2021 in every sampling site. Decreased peak flows result in less sediment-moving energy in stream channels, which may lead to the buildup of fine sediments on stream beds.
- Beaver dams in streams may act as natural buffers that trap sediment and prevent it from becoming embedded in the stream bed, providing potentially beneficial impacts to geomorphology. Despite this, the presence of beaver dams in the Fraser River was not shown to have significant impacts on sediment metrics.
- LBD partners have implemented several projects to address sediment buildup since 2010. Among these projects is Denver Water's Fraser River sediment pond, completed in 2011. The pond was constructed to lessen the impacts of runoff of traction sand from nearby highways by trapping this sediment before it can reach the channel. The construction of the pond has likely correlated with positive patterns on its stretch of the river, including a decrease in fine sediment and an increase in average sediment size.
- Overall, measures of geomorphology in CEA streams are limited due to the change in data collection techniques in 2019. However, the available data displays relatively consistent sediment metrics over the last several years, with several exceptions on the Colorado and Fraser Rivers that should be considered when identifying priority reaches in Phase two. An increase in the number of years for which robust data is available will help to draw connections between drivers and sediment behavior in CEA streams.

Clarifying Questions on Geomorphology

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

Does the data collected on substrate characteristics measure only bed sediment load, or does it include metrics on suspended sediment load?

The data collected measures stream bed sediment, a metric of the sediment load resting on the bed. This metric is affected by both bed sediment and suspended sediment load.

What is bed load?

Bed load refers to the sediment moving along the stream bed. This is distinct from suspended sediment load, which moves through the river channel above the bed. LBD collects data on suspended solid loads. Stream bed sediment metrics are the composite measurements used to analyze geomorphic conditions.

How comparable would the data presented here be to sediment data collected in other watersheds, such as the Arkansas?

Sediment data collected after 2019 adheres to country-wide standards for characterizing geomorphic conditions. However, 1-to-1 comparisons between the data collected here and that of other watersheds is difficult because sediment data is heavily dependent on other stream conditions such as stream slope and contributing sediments.

In locations such as the Upper Fraser River site upstream of the Winter Park Sanitation District where grain size has decreased from 2019 to 2021, is the main driver a weakening streamflow that can no longer carry fine sediments downstream?
The retrospective analysis performed in the CWA did not identify the main drivers for specific metrics, but streamflow is one of several potential drivers for this phenomenon, along with changing stream bed traction, sand mobilization, and large-scale changes in forest dynamics leading to changes in watershed sediment regimes.

How are sampling dates for sediment data decided?
LBD samples sediment data every autumn. Sediment data pairs with macroinvertebrate data, so metrics for both must be sampled in the same window. LBD tries to sample data every September, but weather conditions may lead to slight changes in yearly sampling dates.

How is the state standard for percent fine sediment determined, and what does it represent?
The state standard is based on healthy levels of fine sediment for aquatic macroinvertebrates. Exceedance of this standard indicates stream conditions that are unhealthy for macroinvertebrates.

Are decreases in CEA-wide peak flows the result of lower snowmelt totals?
Peak flow measurements displayed in the presentation occurred during a relatively dry period in the region, so lower snowmelt totals are a likely contributor to these metrics. The management of water systems in the CEA may also contribute to decreases in peak flows. While it is not possible to separate these drivers in their effect on flows, Lotic has performed time-series analyses comparing changes in climate patterns to flow regime changes. The results of these analyses will be included in the final CWA report.

Is geomorphic data from 2023 available yet?
Lotic and LBD have discussed methods to include this data in updated metrics. The details have not been confirmed, but newer data will be included in the final CWA report. LBD publishes annual monitoring reports and operations documents that detail the data collected during the past year.

Is there data available that measures the snow totals from recent storms?
Yes. This data can be found on the **National Resources Conservation Service (NRCS)'s Snow and Water Interactive Map.** Currently, snow levels are at 110% of historical average at Winter Park and 102% of historical average at Devil's Thumb Ranch.

CWA Results on Riparian Areas
Below are key themes from the presentation on the conditions of riparian areas within the CEA and the ensuing discussion.

- Drivers that could potentially impact riparian health in the causal pathway model included human-driven factors such as agricultural and urban development and channel and streamflow alteration.
- The aspects of riparian areas that are most important to maintaining aquatic ecosystem health are canopy cover and belt width. Lotic's analysis primarily focused on riparian belt width in the CEA.
- Lotic collaborated with LBD to identify a data gap in existing belt width data. Brad Johnson, Trout Unlimited, performed a GIS analysis to fill this gap, compiling floodplain, land use, and land cover data to create a map of belt widths throughout the CEA, assigning each a letter grade based on its current condition and threats.

- Lotic aggregated this data to the stream reach scale to identify areas where belt width presented potential concerns for riparian habitats. Areas with low aggregate grades include the Upper Colorado River and the Middle Fraser River.
- Riparian condition grades such as these can be compared with land use data to identify land use patterns that pose the highest threats to riparian health. Agricultural land use appears to impact riparian health on the Middle Colorado River, while urbanization presents a challenge in the Fraser River Valley.
- In addition to land use practices, water management systems likely impact the riparian conditions of the CEA. Decreases to peak flows as a result of water management practices decrease floodplain inundation in stream reaches, narrowing belt widths.
- Despite land use impacts in many stream reaches, riparian areas in the headwaters of both the Colorado and Fraser River remain in very good condition.
- Overall, despite the relatively rural land cover of the CEA, there are widespread impacts to riparian areas due to agricultural land use practices, water management, and infrastructure development related to outdoor recreation and resorts.

Clarifying Questions on Riparian Areas
Meeting participants asked clarifying questions about the riparian areas section of the CWA presentation. *Questions are listed below in italics,* with corresponding responses in plain text.

What are the distinctions between heavy and light agricultural use and ranch land in the land use data used for the belt width analysis?
Ranch land is defined as grazed pastures. Heavy agricultural use is defined as land where recent agricultural operations are evident. Light agricultural use is defined as land where evidence of past agricultural practices is present, but there is no evidence of recent practices. Land use designations in the CWA are not meant to be definitive and are meant to be used to pare down priority locations for implementation projects.

Has Lotic or LBD considered monitoring overbank flows in the CEA's riparian areas?
There are no current measurements of overbank flows in the CEA, but this could be useful to consider in the future.

CWA Results on Aquatic Biota: Macroinvertebrates
Below are key themes from the presentation on the conditions of macroinvertebrate populations within the CEA and the ensuing discussion.

- Macroinvertebrate data in the CEA has been collected by a variety of entities for may years. In 2015, all data collected was shifted from semi-quantitative to fully quantitative data. Data collected in 2015 and after was used in the CWA as it is more robust than previous data.
- Macroinvertebrate population metrics are considered indicators for water quality and habitat condition in streams due to their relative longevity and sensitivity to water parameters like pollution or alterations in sediment regimes. Macroinvertebrate population health is measured through the Multi Metric Index (MMI), a metric that represents macroinvertebrate species diversity and the presence of sensitive taxa in a waterway. MMI does not measure total biomass of macroinvertebrates, so areas that have large numbers of one or a few species will likely receive relatively low MMI scores.
- The State of Colorado publishes MMI standards for attainment and impairment. Areas with MMI scores below the impairment standard are identified as having degraded stream conditions. Scores in between attainment and impairment standards likely require attention to ensure that they do not fall below impairment standards. The CWA assessed MMI scores

compared to state standards in stream reaches across the CEA from 2010 to 2021 to identify where macroinvertebrate population conditions are improving or worsening.

- Sub-watersheds with at least one yearly MMI score falling below impairment standards included the Colorado River Headwaters, the Upper Colorado River, and the Lower Colorado River. Sub-watersheds with at least one yearly MMI score between attainment and impairment levels include the Upper Colorado River, the Upper Fraser River, the Middle Fraser River, the Williams Fork River, and the Lower Colorado River. The Lower Fraser River and the Middle Colorado River have displayed MMI scores above attainment levels consistently in the study period.
- Spatial MMI patterns on the Fraser River display healthy macroinvertebrate populations in the headwaters with decreasing MMI scores downstream to Winter Park, followed by a steady increase downstream to the Colorado River. Several factors may lead to decreased MMI scores in the Winter Park area, including discharge from the Moffat railway tunnel, highway maintenance, and resort and urban development.
- LBD addressed habitat concerns on the Fraser River by implementing the Fraser Flats restoration project in 2016 and 2017. The project involved extensive reworking of the river channel to better benefit aquatic macroinvertebrates. After the completion of the project, MMI scores showed steady increases both upstream and downstream of the project area.
- Spatial MMI patterns on the Colorado River were more complex than those of the Fraser. MMI metrics near Grand Lake and Shadow Mountain Reservoir indicate degraded habitat conditions, with even more degradation occurring below Granby Reservoir. Downstream, in the Middle Colorado River, conditions improve, and MMI metrics exceed attainment. Downstream, the Lower Colorado River again shows MMI scores indicating degraded habitat conditions. Conditions in degraded areas downstream of the Shadow Mountain and Granby Reservoirs reflect those of streams below reservoirs statewide, likely indicating issues related to nutrient levels and water temperature. Impaired conditions in the Lower Colorado River are likely due to fine sediment accumulation as a result of land use changes, agricultural activity, and wildfire.
- Spatial MMI patterns on the Williams Fork River show good conditions above the Williams Fork Reservoir with degraded conditions below the Reservoir, similar to those below the Shadow Mountain and Granby Reservoirs.
- Time-series data displaying MMI scores in areas of the Colorado River affected by the East Troublesome Fire, including stretches downstream of Troublesome Creek, downstream of the KB Ditch, and upstream of the Blue River, show relatively good conditions prior to the fire, with steep drop-offs in MMI scores post-fire. The Colorado River above the Windy Gap Reservoir shows a decrease in MMI scores before the fire, indicating that other factors, including algae and fine sediment accumulation, decreased nutrient levels, and lowered flow rates may also lead to diminished MMI scores on the Colorado River.
- Overall, the CEA displays relatively stable macroinvertebrate populations, with several localized areas of concern, likely caused by reservoir operations, development, and habitat degradation.

Clarifying Questions on Macroinvertebrates

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

Why has the Fraser Flats project been successful when similar projects on the Williams Fork River have not?

The most likely reason is the location of the Williams Fork projects under the reservoir, making their target areas more vulnerable to changes in hydrology and water quality. Increased data collection will likely help to determine the exact reason for this phenomenon.

Is macroinvertebrate habitat degradation downstream of reservoirs the result of changes in water temperature, nutrient content, or both?
A combination of these factors, along with effects of reservoirs on geochemical stream parameters, likely lead to these issues. Reservoirs also alter habitat, leading to decreases in macroinvertebrate diversity and sensitive species presence. Downstream reaches may have high populations of a few species but still receive low MMI scores. LBD partners are addressing these issues by implementing projects such as the Windy Gap Reservoir Bypass.

Have any studies been conducted on macroinvertebrate metrics in reservoirs?
No, lakes and reservoirs are outside of the scope of the GCSMP.

CWA Results on Aquatic Biota: Fisheries
Below are key themes from the presentation on the conditions of fisheries in the CEA and the ensuing discussion.

- Fishery data has been collected in the CEA for several decades by multiple entities. The CWA analysis of fisheries used data starting in 2007, before which data collection on the Fraser River was minimal.
- The 2010 GCSMP identified several factors that impacted county fisheries, including habitat and water quality, pressures from angling, inter-annual hydrological variability, disease, and inter-species competition. Among the most prevalent challenges facing CEA fisheries in 2010 were steep declines in rainbow trout populations due to whirling disease and a significant reduction in the range of cutthroat trout in the upper Colorado River drainage.
- Fish species presence varies across the CEA. Nonnative sport fishing species are present in most watersheds, with Brown Trout representing the dominant species in many locations throughout the Colorado and Fraser Rivers, and Rainbow Trout showing a strong presence in most stream reaches. Brook Trout, another introduced species, is the dominant species in the Upper Fraser River watershed. Native Sculpin appear consistently throughout the Fraser River but are absent in the Colorado River. Native Cutthroat Trout appear only in the headwaters of the Fraser River.
- Brown Trout biomass is relatively high in most Colorado and Fraser River sampling sites, with the highest biomass in the Upper Colorado River. Rainbow Trout biomass is highest on the Upper Fraser River. This stretch also displays the highest biodiversity of fish species, with presence of Brook, Brown, and Rainbow Trout and small numbers of Cutthroat Trout.
- Lotic collected time-series data on fish biomass at several specific sampling sites to identify patterns in fishery dynamics over time. The first sampling site, located on the Fraser River next to the Safeway in Fraser, displays increases in total fish biomass from 2010 to 2021. Throughout this time, species composition has changed significantly, with increasing Brown Trout numbers and decreasing Rainbow Trout biomass. CPW engaged in several stocking practices of Rainbow Trout during this period. Rainbow Trout numbers were found to increase directly after stocking events but continue to decrease over time, likely indicating inter-species competition and unfavorable habitat conditions for the species.
- Biomass metrics at the Kaibab Park sampling site on the Lower Fraser River, slightly upstream from the confluence with the Colorado River, are dominated by Brown Trout, the only species with a significant presence in this location. Rainbow Trout stocking practices on this site did not appear to have any effect on Rainbow Trout biomass. Brown Trout

biomass at this site has decreased over the last half-decade, indicative of potential sensitivity to low peak flows. Additionally, a river barrier was removed during this time, so some of this decreasing trend may be due to emigration of Brown Trout to other stream reaches.

- Sport fish biomass patterns are relatively similar in the Parshall/Sunset Pond measuring site to those of the Safeway location, with Brown Trout biomass steadily increasing over time and relatively low Rainbow Trout numbers.
- Native sculpin is a sensitive indicator species, and biomass measurements of these fish are often reflective of larger-scale watershed patterns. Generally, sculpin numbers have remained relatively consistent throughout the watershed. 2012 measurements showed a huge spike in sculpin observations, likely due to low streamflow totals leading to ease of observations. Sculpin biomass totals also displayed a dip in 2021. Newer data will confirm whether this pattern represents an anomaly or a downward trend in sculpin richness.
- The Fraser Flats habitat improvement project led to immediate increases in total fish biomass, indicating project success. However, in the years since, the numbers of both Brown and Rainbow Trout have decreased. It is unclear whether this pattern is an anomaly or indicative of a larger trend. Potential drivers for this decrease include the reopening of this stretch to angling and potential habitat degradation.
- Overall, CEA waterways contain fisheries that are robust in sport fish and dominated by nonnative species. Stocking of Rainbow Trout has had limited effects on biomass numbers. The long-term impacts of the 2020 wildfire season have yet to be determined but will likely appear in future data.

Clarifying Questions on Fisheries

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

The stretch of the Colorado River between the confluence with the Fraser River and Parshall has very high fish biomass and has been considered Gold Medal Waters in the past. Does this distinction still stand for this stretch of river?

Yes. This stretch contains 60 pounds of fish biomass per surface acre of water, meeting the criteria for Gold Medal Waters. The connectivity channel between the Fraser and Colorado falls into this stretch and is by default also considered Gold Medal Waters.

NEXT STEPS

- Lotic has delivered a draft CWA report to LBD. Currently in the editing stage, the final report will be shared with stakeholders and will have more detailed information about the drivers of stream parameters in the CEA.
- The results from the CWA and feedback collected in the five stakeholder outreach meetings will be compiled and used to develop priority reaches and projects in Phase two of the update process.
- This meeting concluded the in-person stakeholder outreach meetings in Phase one. An additional virtual meeting will be conducted following the publishing of the CWA results to transition into Phase two.
- Peak will circulate an additional survey to stakeholders who expressed interest in serving on the Stakeholder Advisory Committee and use the information to move forward with the formation of the Committee.