MEMORANDUM

TO: Board of Directors
FROM: Catherine Hayes, Board Secretary
DATE: June 19, 2019
RE: June 27, 2019, Regular Board Meeting

This memorandum shall serve as notice of the Regular Board of Directors Meeting of the Eagle River Water & Sanitation District:

Thursday, June 27, 2019
11:30 a.m.

Eagle River Water & Sanitation District Office
Walter Kirch Room
846 Forest Road
Vail, CO
81657

Cc public items:
ERWSD Managers
Ken Marchetti, Marchetti & Weaver, PC

Board Materials via Email:
Bob Armour, Vail resident
Caroline Bradford, Independent Consultant
Robert Lipnick, Vail resident
Rick Sackbauer, Vail resident
Cliff Thompson, IKS Consulting
1. Consultant/Guest Introduction
2. Public Comment *
3. Action Items
   3.1. Meeting Minutes of May 23, 2019, Regular Meeting 
   3.2. Meeting Minutes of May 23, 2019, Joint Special Meeting 
   3.3. Consent Agenda: Contract Log 
4. Strategy Items
   4.1. Moreton Retirement Partners Update – Cameron Cooke and Eric Obergfell
   4.2. Eagle Mine and Climax Mine Updates – Steve Bushong
   4.3. Board Member Input
5. General Manager Report – Linn Brooks *
   5.1. General Manager Information Items
      5.1.1. Backflow Prevention and Cross-Connection Control Program Notice of Violation
   5.2. Operations Report *
      5.2.1. Lift Station #4 State Notification
      5.2.2. Lead and Copper Sampling Update – Kailey Rosema
      5.2.3. Eagle Park Reservoir Company Quarterly Operations Report †
   5.3. Engineering Report – Jason Cowles *
   5.4. Public Affairs Report – Diane Johnson *
   5.5. Monthly Reports
      5.5.1. Development Report *
      5.5.2. Authority May Meeting Summary – draft *
      5.5.3. District and Authority Committees *
6. General Counsel Report – Kathryn Winn †
7. Water Counsel Report – Glenn Porzak
8. **Executive Session pursuant to § 24-6-402(a)(b) and (e), C.R.S.**

8.1. **General Counsel Review of Matters in Negotiation – Kathryn Winn**
   - 8.1.1. Hahnewald Barn Removal
   - 8.1.2. Lift Station #4 Update
   - 8.1.3. Backflow Prevention and Cross-Connection Control Program Update

8.2. **Water Counsel Review of Matters in Negotiation – Glenn Porzak**
   - 8.2.1. Minturn Water Matters and Bolts Lake†
   - 8.2.2. Water Model Data Sharing Agreement†
   - 8.2.3. CRCA Update

9. **Adjournment**
# EAGLE RIVER WATER & SANITATION DISTRICT 2019 CONTRACT LOG

<table>
<thead>
<tr>
<th>Contract Number</th>
<th>Date</th>
<th>Change Order</th>
<th>Project Name</th>
<th>Contractor</th>
<th>Amount</th>
<th>Manager</th>
<th>Account Number</th>
<th>Notes</th>
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<tbody>
<tr>
<td>19.15.046</td>
<td>Bid Process</td>
<td></td>
<td>Meadow Lane Sewer Main Extension</td>
<td>C. Keller</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>19.15.047</td>
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<td></td>
<td>Macroinvertebrate Sampling</td>
<td>Timberline Aquatics, Inc.</td>
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<td>L. Cribari</td>
<td>10.3.9.00.35.585</td>
<td>Open/Contract Expires 12/31/19</td>
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<td>19.15.048</td>
<td>06/06/19</td>
<td></td>
<td>VWTP Landscape and Riparian Project</td>
<td>Rocky Mountain Custom Landscape</td>
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<td>06/06/19</td>
<td></td>
<td>On Call Excavation Services</td>
<td>Heyl Construction</td>
<td>$100,000.00</td>
<td>J. Schneider</td>
<td>Various</td>
<td>Open/Contract NTE $100,000.00</td>
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<td>19.15.050</td>
<td>Pending</td>
<td></td>
<td>On Call Striping Services</td>
<td>Mountain Striping, Inc.</td>
<td>$10,000.00</td>
<td>N. Nemcanin</td>
<td>Various</td>
<td>Open/Contract NTE $10,000.00</td>
</tr>
<tr>
<td>19.15.051</td>
<td>Bid Process</td>
<td></td>
<td>Berry Creek Booster Pump Station Improvements</td>
<td>Mountain Striping, Inc.</td>
<td>$10,000.00</td>
<td>N. Nemcanin</td>
<td>Various</td>
<td>Open/Contract NTE $10,000.00</td>
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<tr>
<td>19.15.052</td>
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<td></td>
<td>Miscellaneous Services</td>
<td>J.R. Filanc Construction Services</td>
<td>$100,000.00</td>
<td>J. Schneider</td>
<td>Various</td>
<td>Open/Contract NTE $100,000.00</td>
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</tbody>
</table>
MEMORANDUM

TO: Boards of Directors
FROM: Linn Brooks, General Manager
DATE: June 19, 2019
RE: GM Report

Wolcott Solar Array Feasibility Study

Staff, counsel, and consultants continue to work on preliminary plans for a solar array at the Biosolids Containment Facility. The District sent a letter to the Bureau of Land Management (BLM) communicating its desire for an outright purchase of the BCF land; BLM representatives responded that the local realty specialist position is vacant, and this could delay the appraisal and purchase process. Local solar company Active Energies continues to move forward with planning efforts, and will be meeting with Holy Cross Energy representatives to discuss possible solar scenarios that would benefit HCE and the District, including an on-site battery that could store excess solar energy produced and could help HCE with its peak-shaving energy efforts. HCE and Active Energies are both assisting with a list of potential project partners that could take advantage of the tax credits from the project, should it move forward. Staff will continue to inform the boards of progress.

Staffing Update

I am pleased to announce that Siri Roman was promoted to Director of Operations. This position has existed off and on over the history of the District and was last occupied in 2015. Siri will oversee the Water, Wastewater and Field Operations departments. She will recruit to fill the now-vacant Water and Wastewater Manager positions. My goal with this structural change is to bring the operational departments closer together. This structure will support our One Water concept and bring consistency to our operational approaches to regulatory compliance and planning.
WATER SUPPLY

RESERVOIR UPDATES: 6/13/19

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Physical Capacity (AF)</th>
<th>Current Storage (AF)</th>
<th>Discharge (cfs)</th>
<th>Previous Month Change in Storage (AF)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eagle Park</td>
<td>3,301</td>
<td>2,751.87</td>
<td>0</td>
<td>+461</td>
<td>Filling</td>
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<tr>
<td>Black Lake 1</td>
<td>527</td>
<td>527.3</td>
<td>0</td>
<td>+350.6</td>
<td>Full pool</td>
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<tr>
<td>Black Lake 2</td>
<td>98.3</td>
<td>98.3</td>
<td>0</td>
<td>+ 0</td>
<td>Full pool</td>
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<tr>
<td>Homestake</td>
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<tr>
<td>Green Mountain</td>
<td>153,639</td>
<td>99599</td>
<td></td>
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<tr>
<td>Wolford</td>
<td>65,993</td>
<td>66920</td>
<td></td>
<td>+22920</td>
<td>Filling</td>
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</table>

Black Lakes 1 and 2 are at full pool. Black Lakes fish stocking is scheduled for June 20 and July 18. Eagle Park Reservoir (EPR) is filling, with a storage level of 2,751 acre feet as of June 13. Due to this year’s snowpack, EPR is predicted to fill to full pool without the need to run the East Fork Pump Station (EFPS). EFPS is 95% ready for start up; there is a warranty issue with one of the large pumps. EFPS testing is expected the week of June 17. Dam inspections are set up for July 10 – 11.

STREAMFLOWS:06/17/19

<table>
<thead>
<tr>
<th>Gage Location</th>
<th>Daily Mean Discharge (cfs) 6/19/19</th>
<th>In-stream Flow Water Right Level (cfs)</th>
<th>ISF Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gore Creek above Red Sandstone</td>
<td>1120</td>
<td>35</td>
<td>Oct - April</td>
</tr>
<tr>
<td>Eagle River near Minturn</td>
<td>1210</td>
<td>85</td>
<td>Oct - April</td>
</tr>
<tr>
<td>Eagle River below AWWTF</td>
<td>3460</td>
<td>300</td>
<td>Oct - April</td>
</tr>
</tbody>
</table>

SNOW WATER EQUIVALENT (SWE)

“Normal” = 30-year median (1981-2010)

<table>
<thead>
<tr>
<th>SNOTEL Site</th>
<th>2019 Peak SWE (inches)</th>
<th>Normal Peak SWE (inches)</th>
<th>2019 % of Normal Peak</th>
<th>2019 Peak Date</th>
<th>Date of Normal Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vail Mountain</td>
<td>20.8</td>
<td>22.6</td>
<td>92%</td>
<td>March 25</td>
<td>April 25</td>
</tr>
<tr>
<td>Copper Mountain</td>
<td>21.5</td>
<td>15.4</td>
<td>140%</td>
<td>May 3</td>
<td>April 28</td>
</tr>
<tr>
<td>Fremont Pass</td>
<td>28.1</td>
<td>18.6</td>
<td>151%</td>
<td>May 30</td>
<td>May 6</td>
</tr>
</tbody>
</table>
COLORADO RIVER DATA
The Lake Powell water level is at 3,700 feet elevation as of June 18, and is at 49% of its storage capacity. Lake Mead water level is at 1219 feet as of June 19, and is at 40% of its storage capacity.
**WATER**

This spring, Avon Drinking Water Facility (ADWF) and Edwards Drinking Water Facility (EDWF) were offline while the operations team prepared for summer operations. Tasks included completing maintenance projects, cleaning, and disinfecting the facilities. Irrigation picked up the week of June 3. This was approximately 3 weeks later than last year as water production was lower this spring than last year.

Lead and Copper sampling is underway; Kailey Rosema will give a brief update at the Board meetings.

On June 10, in coordination with Carollo Engineers, Wade McCaulley and Melissa Marts presented at the 2019 American Water Works Association (AWWA) Annual Conference and Exposition (ACE19) in Denver. The title of the presentation was, *Computational Fluid Dynamics (CFD) Modeling Improves Clearwell Baffle Factor by Over 80% of Estimate for Colorado Treatment Plant Upgrade*. The presentation highlighted the recent modeling efforts used to design the clearwell baffle construction project at ADWF.

**WASTEWATER & LABORATORY**

On June 1, the District hosted a tour of the Edwards Wastewater Treatment Facility (EWWTF) for the Denver Metro Chamber Leadership Foundation. Parker Newbanks and Byron Nelson led the technical portion of the tour, explaining the treatment processes. The tour was extremely well received, with the audience applauding the operations work at one point.

The EWW Operators have been working closely with the Eagle River Watershed Council (ERWC) to clean up abandoned tires in the Edwards area. Tires removed from the river, riverbank and surrounding area were stored at EWW, and on June 13, the tire recycler hauled 314 tires from EWW for recycling. Operators took the remaining, un-recyclable tires to the landfill.

EWWTF is participating in a Holy Cross Energy (HCE) pilot project that may decrease peak demand on HCE’s system. HCE can predict peak demands on their system 24 hours in advance based on historical data and modeling, and their peaks generally occur in late afternoon during the winter and in the evening during summer. HCE will contact EWW operators a day in advance when peak energy demand is anticipated to see if the wastewater treatment operations team can shut down equipment or change the operational strategy to reduce energy use during the peak times. If the operations team is successful, the District will receive a credit for the amount of energy reduced, based on the historical usage of the three meters enrolled in the pilot program.

Wastewater operations completed annual maintenance at the facilities, including cleaning aeration basins, waste activated sludge tanks, nitrification cells, and pump and equipment maintenance. The team also prepared for spring inflow and infiltration that results from run off. Avon Wastewater Treatment Facility (AWWTF) is testing bypassing flow to EWWTF, which will be necessary for the construction of the Avon Nutrient Upgrade project.

**FIELD OPERATIONS**
In preparation for the ERWSD water Sanitary Survey, Field Operations and Engineering completed all but two tank inspections. Those inspections are expected to be complete by June 21.

Field Operations staff continues to assist with Capital Improvement Program (CIP) projects, including the Edwards Spur Road Project (all but one shutdown has been completed), Berry Creek BPS 90% design, and the Dowd Junction Collection System Improvement Project (60% Design on aerial crossings improvements). Field Operations has also assisted Customer Service with disconnections for backflow device non-compliance.

Fire hydrant flow testing analysis is ongoing for water model calibration and will be complete mid-June. Pressure Reducing Valve (PRV) condition assessments are 98% complete. Basingdale Lane valve replacement and fire hydrant relocation was also completed.

In early June, an emergency repair was completed on the District and Authority water interconnect in Dowd Junction. A drilling contractor obtaining soils samples for the Dowd Collection System Improvement Design Project hit the interconnect. Arrowhead Tank #1 supply line emergency repair was completed and the tank was placed back in service on 6/12.

Federal Emergency Management Agency (FEMA) floodplain manhole inspections were completed. During peak runoff, staff is performing daily inspections of all pipeline river crossing locations.

<table>
<thead>
<tr>
<th>WATER PROJECTS</th>
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<tbody>
<tr>
<td><strong>Edwards Spur Road Waterline Phase IIA</strong></td>
</tr>
</tbody>
</table>

**General Project Scope:** The purpose of this project is to install a new water main, as identified in the Water Master Plan and the hydraulic modeling efforts. The system requires improvements to increase capacity and redundancy along the Edwards Spur Road. This project includes approximately 2,500 linear feet of new water main, bridge and river crossings, pressure reducing valve (PRV) vaults and water main blow-offs. The project also includes a sewer interceptor stub-out for future work. A cost-sharing agreement with the Colorado Department of Transportation (CDOT) is in place to substantially reduce the overall cost of the water main installation. CDOT roadway improvements and water main improvements will occur concurrently.

**Project Update:** Water main installation work is underway, including installation of 1,900 linear feet of water main, fittings, valves and associated corrosion prevention anodes. New PRV vault and water main bridge hanger systems were fabricated and installed. The new PRV vault is commissioned and in service. Crews are working around the clock to complete water main work, which CDOT anticipates in June 19, 2019. Testing and disinfection of water mains is complete through 1,800 linear feet of water main. Five successful tie-ins to existing water mains were completed with one remaining. Staff is coordinating with residents and businesses to prepare for the final upcoming water shutdown. Notifications were sent to affected residents and businesses as we prepare for the final shutdown that will affect Old Edwards Estates and the adjacent commercial area.
Berry Creek Booster Pump Station 1 Replacement  

Carter Keller

**General Project Scope:** The Berry Creek Booster Pump station pumps water from the main Edwards Cordillera Valley Club (CVC) pressure zone (Berry Creek Tank 1) up to the larger Berry Creek Tank 2. This project will replace the station due to end of life cycle from an in-ground vault to a bunker-style, at-grade access vault. The replacement will increase reliability and address electrical safety issues that were identified, including inadequate access, ventilation, code compliance, and tank hatch improvements. Other items to be addressed include landscaping improvements and electrical, instrumentation, and controls upgrades, as well as emergency backup power and pumping connections.

**Project Update:** A workshop was held with the design team and District staff to review the controls and communication portion of the project. Communication will be coordinated with the ongoing RTU project to maintain system connectivity. The project received final approval by the Singletree entities. A location and extents application (LEA) was submitted to Eagle County. The project design is nearly complete, and the advertisement for bid period is scheduled to begin on June 20, with fall construction anticipated.

Village Hall Water Main  

Nikola Nemcanin

**General Project Scope:** A water main currently runs underneath the tunnel accessing Village Hall and the Park Hyatt in Beaver Creek. Corrosive soils and high groundwater have led to mainline breaks. The project will replace the main with a non-corroding PVC or HDPE pipeline material, reestablish the service to Village Hall, install a dry fire standpipe, and abandon the existing hydrant, making the new line a private service line.

**Project Update:**

The project is divided into two phases to maintain domestic water and fire suppression service to Village Hall and lessen the impact on the resort community: dry fire standpipe installation and water main replacement.

Dry stand pipe – Phoenix Industries finished installation of dry stand pipe. Due to the long lead time, fire department connections are not yet installed, pending arrival of parts.

Water Main replacement – The project is currently out to bid and was advertised accordingly. Due to the nature of this project and long lead times for material, bids are due on July 20. A pre-bid meeting is scheduled for June 26.

Arrowhead WST-1 Coating and Misc Improvements  

Nikola Nemcanin

**General Project Scope:** The Arrowhead 1 Water Storage tank is a 1.0 MG steel tank in need of recoating and a few miscellaneous improvements, including a new vent, structural center column, and overflow improvements. The project was originally scheduled for fall 2018 but was postponed due to drought conditions. The project is split into spring and fall phases for interior and exterior portions of the coating work, respectively. The project was bid in December for improved contractor interest and was awarded to Riley Industrial of Farmington, NM. The design engineer is SGM, Inc.
Project Update: Exterior coating is in its final stages. Interior coating is scheduled for September 15 depending on operational coordination with irrigation demands. The tank was filled with water on Monday June 3 and passed testing the following day. Placing the tank online was delayed by a transmission line leak on the 16” main to the tank that was discovered during filling. The leak was repaired and the tank was placed back online on June 12.

Solar Vail Water Main Improvements

General Project Scope: During relocation of the water main at Red Sandstone Elementary School (RSES), it was discovered that the 12” mainline was at extreme depths, greater than twenty feet. Work continues to raise the 12” water main to a depth of 7 – 8 feet.

Project Update: Phase 1 work on the Red Sandstone Elementary site was completed last fall. Phase 2 on the Solar Vail site started on June 17. Phase 2 will be closely coordinated with the Vail Recreation District and Red Sandstone Elementary School to minimize disruption to summer camps. The deep (~20’) water main tie-in was successfully executed at the onset of the project, and the project is progressing within schedule and budget.

Avon DWF Flocculation and Sludge Collection Upgrades

General Project Scope: Flocculation and sludge collection equipment has reached the end of its useful life and will be replaced with new equipment. In order to meet Partnership for Safe Water goals, a third stage of flocculation will be constructed to further improve water quality. Findings from the latest sanitary survey will also be addressed, with the addition of concrete curbs around Flocculation/Sedimentation Basins 1 & 2 and a trench plate to route any water on the facility floor away from the filter inlet channel. Chemical lines and the facility raw water inlet valve will be actuated for enhanced process control.

Project Update: Monthly preconstruction project meetings are taking place with staff, RN Civil, and Stantec. Long-lead items are being procured, and the contractor is refining the schedule with team input. The team is currently in the submittal review process, with plans for an on-time October construction start.

Wastewater Projects

Avon WWTF Nutrient Upgrades

General Project Scope: As identified in the Wastewater Master Plan Update, the Avon WWTF requires upgrades to meet Regulation 85 to reduce the concentrations of nitrogen and phosphorus in the effluent. These improvements will also allow staff to bypass flows from VWWTF to AWWTF during the peak winter season. This project also includes improvements identified in a 2017 condition assessment in other process areas throughout the facility. Scope includes the following: addition of 0.6 million gallons of aeration basin capacity; a new secondary clarifier; structural modifications to the existing aeration basins to remove the existing double-tees and replace with a building structure; a new odor control study and system; and other improvements throughout the facility.
Project Update: The project team completed the 30% value engineering effort and is working towards the 60% design milestone. The 60% specifications are anticipated at the end of June, drawings will be delivered in mid-July, and the 60% estimate will be provided in early September. Outreach to local stakeholders (e.g., Town of Avon, Liftview condos) continues, with a productive meeting with the Town of Avon building official completed and ongoing coordination with adjacent property owners.

Dowd Junction Collection System Improvements

Debbie Hoffman/Jeffrey Schneider

General Project Scope: The project consists of four major components, all of which are at the end of their useful lives: the aerial interceptor crossing at Dowd Junction; Lift Station 4, which conveys all of Minturn’s wastewater; the aerial interceptor crossing at the Minturn Road bridge; and the force main downstream of Lift Station 4. The project will also include capacity for growth in its respective service areas, most notably the Minturn area improvements.

Project Update: Geotechnical borings for new bridge supports in two locations were completed on June 5. Weather-related issues and coordination with nearby CDOT work hampered geotechnical efforts and delayed the project by about two weeks. HDR was released to complete final design, and the 60% plans and specifications were received on June 17 and are currently under staff review.

Other Projects

Overall Facilities Master Plan

Jeffrey Schneider

General Project Scope: This is a long-anticipated master planning project effort to study the current and future space needs for the District and Authority, including the existing office spaces, staffing needs, and other support functions (e.g., vehicle fueling, equipment staging, maintenance, and materials storage). An internal steering committee was formed to guide the project and consists of the General Manager and managers from Human Resources, IT, and Field Operations, along with a board subcommittee (Brian Sipes and George Gregory). This study will assess the current real estate portfolio and identify future real estate needs.

Project Update: The third project workshop is scheduled for July 3, with draft concept drawings under review by staff for suggested improvements to existing parcels at Hillcrest, Avon WWTF, ADWF, and VWWTF sites. Other site alternatives continue to be explored.

Vail Administrative Building HVAC System

Mark Mantua

General Project Scope: The south portion of the Vail administrative building is served by a variable air volume system, baseboard heat and two air handling units (AHUs). This portion of the building also contains eight different temperature zones, each controlled by a Trane system controller that can only heat or cool at one time. The AHUs are over 25 years old and well past their service life. Certain zones within AHU-1s service area consistently fail to cool efficiently. The District intends to install a new Variable Refrigerant Flow (VRF) system with the ability to simultaneously heat and cool zones in the south portion of the Vail administrative building.
**Project Update**: BG Building Works completed a preliminary design set of drawings, and ERWSD comments were incorporated into the preliminary plans. Bid ready plans are expected by July 1, 2019, for final comments, and building permits will be submitted to Town of Vail by that date as well. We anticipate bidding work this summer for fall HVAC improvements.

**Gore Valley Streambank and Streambed Stabilization**

**General Project Scope**: The Town of Vail operates and maintains the Gore Valley Trail (GVT) from Dowd Junction to East Vail. Eagle River Water and Sanitation District owns and maintains an 18” sanitary sewer interceptor main beneath the GVT in Dowd Junction. In many areas the GVT is supported directly adjacent to Gore Creek by a vertical retaining wall with steep embankment slopes running up to I-70 on the opposite side. In 2010, Gore Creek experienced a spring snowmelt run-off equivalent to the 100-year flows causing flood damage throughout Vail. One area of significant concern was a failure of a small portion of the GVT retaining wall, which exposed the sanitary sewer main just a few feet from Gore Creek. A temporary repair was completed by rebuilding and grouting the retaining wall. Since that time, Gore Creek has undermined the boulder wall once again and caused subsidence in the gravel shoulder of the GVT. Failure of the retaining wall in the area is again imminent without repair.

**Project Update**: The Town of Vail and ERWSD provided a second temporary repair in fall 2018, with the intention of completing a long-term repair in 2019. A streambed stabilization design was completed to address the long-term needs of both the GVT and the sanitary sewer interceptor that runs beneath it. ERWSD and the Town of Vail wish to combine their construction efforts to achieve cost-sharing and cost-savings benefits, minimize disruption to the neighborhood, and ensure the safety of an ERWSD sanitary sewer interceptor main. An IGA between the Town of Vail and ERWSD will be executed, allowing ERWSD to reimburse the Town of Vail for half of the costs incurred during construction. A public bid was conducted and the low bidder, Whinnery Construction, Inc. was selected as the primary contractor based on a bid amount of $542,320. Construction is planned for fall 2019.
MEMORANDUM

TO: Boards of Directors
FROM: Jason Cowles, Engineering Manager
DATE: June 27, 2019
RE: Engineering Manager Report

Water Master Plan Update
The 2019 Water Distribution System Hydraulic Model and Master Plan project kicked off in August of 2018 with the selection of AE2S as the consulting engineer for the project. This effort has been led by Planner, Micah Schuette, with a significant amount of support from GIS, Field Operations and Water Department staff. The purpose of the project is to develop an integrated GIS-based hydraulic model of the Authority and District water distribution systems that will be used to evaluate and develop a comprehensive and prioritized 10-year capital improvement plan for the water distribution system.

To date, the project has focused on the development of the hydraulic model which will provide staff with an in-house, GIS-based analysis tool to assess performance of the water distribution system under future water demand and operational scenarios. The GIS team has performed extensive updates, fixes, and enhancements to our water distribution GIS mapping to facilitate the development of the hydraulic model. Additional system information such as booster pump station pump curves, tank level set points, pressure reducing valve set points, and seasonal water department operational strategies have also been configured in the hydraulic model to reflect operational conditions. Finally, current and future demand scenarios have been developed for the model based on land use planning information obtained from local Land Use Authorities.

Over the past month, staff has performed extensive field testing to gather operational data from the distribution system that will be used to calibrate the hydraulic model to ensure that it accurately represents real world performance of the system. This field testing has included fire flow testing and pressure data recording throughout the multitude of pressure zones in the system. Once the model is fully calibrated, we can troubleshoot operational issues, evaluate operational changes, and assess impacts of future development on the distribution system.

In addition, staff has been performing condition assessments of major facilities in the water distribution system over the spring to assess the likelihood of failure of a facility. Inspections of all pressure reducing valves and booster pump stations are nearly complete. The condition of storage tanks will be assessed based on field inspections, past dive inspection reports, age, and materials. Similarly, the condition of buried water mains will be assessed based on factors such as age, material, soil corrosivity, and break history. All facilities will receive a relative condition score which will be entered into software that will also accept inputs from the hydraulic model such as capacity, population served, redundancy, and critical facilities served to determine the consequence of failure of an asset and produce an asset criticality score. Once the relative
likelihood of failure and consequence of failure of each asset is understood, the software can assist with the evaluation and prioritization of a 10-year capital improvement plan, which we plan to have completed by the end of the year. Staff will present an overview of the master planning process and an update on our current progress at the July Board meetings.
ME M O R A N D U M

TO: Boards of Directors

FROM: Diane Johnson, Communications & Public Affairs Manager

DATE: June 27, 2019

RE: Communications and Public Affairs Report

Potential 2020 ballot initiative to fully repeal the Taxpayer’s Bill of Rights (TABOR)
The Colorado Supreme Court issued a 5-2 ruling June 17 that overturned a decision from the State Title Board concerning a potential ballot measure to fully repeal TABOR. More information is in the attached Colorado Public Radio news report.

Colorado Water Conservation Board Demand Management feasibility investigation workgroups
The CWCB has initiated a statewide process to work on issues associated with Colorado River Drought Contingency Plans (DCP), Demand Management, and Compact Administration. The CWCB approved the 2019 Work Plan for Intrastate Demand Management Feasibility Investigations at their March board meeting. The plan includes establishment of eight workgroups that will investigate how a demand management program might work in Colorado. A CWCB email describing the workgroup process is attached to this report, along with an Aspen Journalism story about the organization of the workgroups.

Upcoming book by Eric Kuhn and John Fleck
Science be Dammed: How ignoring inconvenient Science Drained the Colorado River will be released in November. Eric and John are producing a series of working papers given the high profile of DCP. More information is on John’s blog; a draft of their second working paper is here.

Colorado River Research Group paper
The Colorado River Research Group, a “self-directed team of ten veteran Colorado River scholars,” released a new paper in May: Thinking about risk on the Colorado River. This paper urges water managers to consider low probability, high impact (“black swan”) events in their planning. The CRRG paper is attached to this report, as is a guest column published in the Grand Junction Daily Sentinel.

Denver Metro Chamber Leadership Foundation group tour:
The Denver Metro Chamber Leadership Foundation, which aims to educate and inspire people who want to make a difference as leaders in their community, held a program in the Vail area on May 30-31 in which attendees were introduced to the big ideas and emerging issues going on in our community. We hosted a subset of this group at the Edwards wastewater treatment facility, where they learned about how we treat wastewater as well as our organizations’ water quality stewardship and sustainability initiatives.
The tour was a hit; program organizers received comments from attendees such as:

- They did a great job and were well planned out.
- I learned so much!
- I had no idea what it takes to clean our wastewater.
- I know so much more about water treatment now! I loved this!
- Fascinating to see the operation and how they manage the widely varying levels of activity.
- Who knew ... great experience.
- The Eagle River team not only provided a great tour; but also, did an excellent job comparing and contrasting their unique operating environment against that of a major urban center (Denver).
**Vail Farmers’ Market**
The market started June 16 and runs every Sunday through Oct. 6. The district water station booth did not operate the first Sunday because market organizers were still working to secure a suitable location for our staff to provide drinking water.

**Colorado River Operations**
The U.S. Bureau of Reclamation’s Operation Plan for Colorado River System Reservoirs (the 24-month study) issued for June states that the 2019 April through July unregulated inflow to Lake Powell is forecast at 10.303 million acre feet or 144% of average. Observed unregulated inflow into Lake Powell for May was 2.511 maf or 107% of the 30-year average from 1981 to 2010. The forecast for June unregulated inflow into Lake Powell is 4.400 maf or 165% of the 30-year average.

**Attachments:**
2. April 23 email from CWCB Interstate, Federal, and Water Information Section Chief
4. May 2019 CRRG report: Thinking about risk on the Colorado River
Full TABOR Repeal Proposal Can Proceed, Colorado Supreme Court Rules

BY NATHANIEL MINOR | NATHANIEL.MINOR@CPR.ORG
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The Colorado Supreme Court on Monday gave the green light to a proposed ballot measure that would fully repeal Colorado's Taxpayer's Bill of Rights.

The Taxpayer's Bill of Rights, known colloquially as TABOR, is a wide-ranging set of fiscal limitations on all levels of government in the state. It also requires voter approval for all tax increases, a provision that's proven popular over the years.

The court's decision hinged on whether the repeal violated the state's requirement that ballot measures only address a single issue, a standard passed two years after voters approved TABOR in 1992.

The court, in a 5-2 decision, sided with backers of the initiative to repeal TABOR.

"The initiative could not be written more simply or directly," Justice Richard Gabriel wrote for the majority. "It essentially asks voters a single question: should TABOR be repealed in full?"

The court did not weigh the merits of TABOR or the repeal proposal, Gabriel wrote.
“... to conclude that the initiative here comprises multiple subjects would require us to read language into the initiative that is not there and to address the merits of that initiative and suggest how it might be applied if enacted,” he wrote. “As noted above, however, we are not permitted to do so.”

In her dissent, Justice Monica Márquez said the majority’s opinion “profoundly weakens” the single subject requirement.

“To offer an extreme example, under the majority’s logic, voters could repeal our state constitution’s entire Bill of Rights through a single initiative and do away with religious freedom, free speech, protections against unreasonable searches and seizures, the right to bear arms, the prohibition against cruel and unusual punishment, and due process, among a host of other rights,” she wrote.

- **The Full Story Behind TABOR:** Read/Listen To The Taxman Podcast

The court’s ruling overturned an earlier decision from the State Title Board, the gatekeeper for ballot initiatives. It means that groups backing the repeal, including the liberal-leaning Colorado Fiscal Institute, can proceed to collect signatures and meet other requirements to get the measure on the 2020 ballot.

Carol Hedges, executive director of the Colorado Fiscal Institute, said a 2020 ballot measure is a possibility — but not a certainty.

"This was an inquiry to find out what was possible," she said. "What this ruling does is it provides clarity that the option for repeal is one thing that is available to voters. But it does not presume that it will be the measure that gets considered in 2020."

TABOR defenders, including conservative groups like the Independence Institute and Colorado Rising Action, have vowed to fight any effort to weaken the measure.

"I thought it was judicial activism," said Michael Fields, Colorado Rising Action’s executive director. Various court rulings have chipped away at TABOR over the years, he added. "Knowing that that's the case, we've been ready for this battle for awhile."

Gov. Jared Polis said he doesn't back of complete overhaul of TABOR -- but there are parts if it he doesn't like. He says he'd have to see specific language of a ballot measure to weigh in on anything.

"I strongly support the right of voters to be able to vote on tax increases. The problem that you get into with TABOR is that is also has very complex formulas that effectively don't allow the state to be able to invest," he said.

Voters will face another TABOR question later this year: The legislature referred a measure, Proposition CC, to November's ballot that would allow the state to keep revenue that would have otherwise been refunded under TABOR. Fields said that vote will be telling.

"If they can't pass Prop CC, there's no way they're going to pass a full repeal of TABOR," Fields said.
Good morning!

If you're receiving this email, it's because you have expressed your interest in serving on a workgroup for the CWCB's Demand Management Feasibility Investigation in 2019. It's also possible that someone you know has volunteered you for such a task. First and foremost, thank you (or your volunteering friend) for your willingness to dedicate your time, expertise, and energy to this process. Demand Management represents a new paradigm to evaluate for Colorado River water management, and it is crucial that the CWCB deliberately and thoroughly consider the elements, challenges, and opportunities that any demand management program may present for Colorado and the water users and stakeholders, while seeking to obtain more certainty and security in our Colorado River water supply.

As we all know, the implementation of a demand management program in Colorado and the Upper Basin is not a foregone conclusion. The Upper Basin DCP documents allow us to study the feasibility of such a program, but do not obligate or require the establishment of a program. What these groups will be doing is identifying key elements to consider in evaluating the feasibility of a demand management program and coordinating analysis, perspectives, and possible solutions to the challenges that demand management may present in Colorado. This work will be facilitated through the CWCB staff to ultimately allow the Board to develop Colorado's position regarding whether and how and Colorado River Demand Management Program could, or should, operate within Colorado. The Board and the workgroups will be guided by the 2019 Work Plan approved by the Board in March 2019, and the Support and Policy Statements adopted by the Board in November 2018 (both attached to this email). As always, solutions and proposed courses of action will be consistent with the values, goals, and actions identified in Colorado's Water Plan.

A few points for your consideration:

- The workgroups are not intended to supplant the role of the basin roundtables and the Interbasin Compact Committee as the primary public forums for water policy discussions in Colorado. We're proud of the public input and deliberate multi-stakeholder process that the roundtables represent, and there's no need to recreate that very effective configuration. CWCB staff will continue to work closely with the roundtables and IBCC and keep these forums up to date and informed on the work of the workgroups and the solutions identified through this process, as the feedback and review of the roundtables will continue to inform the state's work.

- Rather, these workgroups will serve as effective and efficient groups of subject matter experts in Colorado River and water management solutions, geared to help identify and assess solutions to the big questions and potential opportunities associated with the potential implementation of a demand management program. To state it simply: these groups have to be small to work effectively, and the membership must already possess a depth of knowledge on the subject matter of their respective workgroup. Members of the workgroups will assist CWCB staff in presenting proposed solutions to the Board as well as other interested water users and stakeholders, and incorporating feedback and perspectives from these groups into identified solutions.

- Not everyone will have the opportunity to serve on a workgroup, but as is the hallmark of CWCB's outreach processes, everyone will have the opportunity to review and comment on the work of these groups as they inform the CWCB's evolving positions on potential demand management implementation. Not only will we continue to work with the roundtables and IBCC, but we're ready to continue outreach and informative sessions with other water users and
stakeholders statewide. The Colorado River is that river of statewide concern, and any success on the demand management front will require water users, tribes, and other stakeholders being actively engaged, involved, and informed as we move forward.

Over the next few weeks, we will be working to finalize the membership of these workgroups. Our staff will be reaching out to folks to discuss the time commitment and expectations of the anticipated final rosters. Regular updates on the progress of the workgroup process and demand management feasibility will be provided to the CWCB at their regular meetings.

Thank you again for your interest. Have a great week!

Brent Newman
Section Chief
Interstate, Federal, and Water Information Section

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The Colorado Water Conservation Board on Monday released the names of the 74 people it has asked to volunteer on eight workgroups being formed to investigate how a demand-management program might work in the state.

The list of people asked to serve reads like something of a who’s who of Colorado water mavens, and they will be helping the CWCB investigate what’s billed as a “voluntary, temporary and compensated” demand-management — or water-use reduction — program in the state.

The workgroup meetings, which the CWCB considers similar to staff meetings, are to be closed to the public and the media. However, the CWCB staff members holding the meetings then plan to share the insights they’ve gleaned from the workgroup meetings in open settings, including meetings of the CWCB’s board of directors.

“From our point of view, the workgroups are assisting the CWCB’s project-management team in framing demand management issues for public review, comment, and contributions,” said Brent Newman, the chief of CWCB’s Interstate, Federal and Water Information section. “We want to come to our usual public forums with a more informed initial ‘first stab’ at demand management.”

The workgroups, as currently configured, include Andy Mueller, the general manager of the Colorado River Water Conservation District; Jim Lochhead, the CEO of Denver Water; Mely Whiting, an attorney for Trout Unlimited on Colorado river issues; Kathy Chandler-Henry, an Eagle County commissioner; Doug Kemper, the executive director of the Colorado Water Congress; Mark Harris, the general manager of the Grand Valley Water Users Association; and many other notable water managers and experts.
The workgroups are divided by the following topics: law and policy; monitoring and verification; water-rights administration and accounting; environmental considerations; economic considerations and local government; funding; education and outreach; and agricultural impacts.

A ninth workgroup, on tribal interests, was to be formed, according to a CWCB staff presentation at the agency’s meeting in May, but a tribal workgroup was not included on the workgroup roster released Monday.

The Colorado River Water Conservation District, which is based in Glenwood Springs and represents Western Slope water interests, has five of its employees on five different workgroups.

They are Mueller, who also is an attorney, on the law and policy workgroup; John Currier, the district’s chief engineer, on the monitoring and verification workgroup; Chris Treese, the district’s external affairs manager, on the economic considerations and local government workgroup; Jim Pokrandt, director of community affairs, on the education and outreach workgroup; and Dave Kanzer, deputy chief engineer, on the agricultural impacts workgroup.

Colorado, Utah, Wyoming and New Mexico are each developing demand-management programs after a series of drought contingency-planning, or DCP, agreements were signed last month by representatives of those four states and the three lower-basin states of California, Arizona and Nevada.

The DCP agreements give the four upper-basin states an opportunity to store as many as 500,000 acre-feet of water in Lake Powell, and three other federal reservoirs in the upper basin, to use as insurance against violating the Colorado River Compact of 1922.

The water in the new demand-management pool must be water that otherwise would have been consumed by fields, pastures, lawns and other uses, but instead has been sent down the river system to be stored.

Before any of the demand-management programs can be launched in the four upper-basin states, they each need to be approved by the Upper Colorado River Commission, which includes representatives from the four states and the federal government.

The commission will hold a demand-management stakeholder workshop in Salt Lake City on June 21. The workshop will be open to the public.

The CWCB plans to hold a series of public demand-management workshops — as opposed to the closed workgroups — throughout the state this year.

Despite the closed-door workgroup meetings, the CWCB plans to hold an orientation webinar in July for the workgroup members that also will be open to the public.

The roster of the invited workgroup participants from the CWCB was slated to be released by June 1, but the effort was delayed after a six-page draft confidentiality agreement that was circulated by the state raised concerns among some of the potential workgroup members.

“We heard from multiple people that it was more than was necessary to achieve the goal of being able to have open conversation, and so we really took those words to heart,” CWCB director Becky Mitchell said of the first confidentiality agreement. “After some reflection, we realized that was just not the direction we wanted to go. So we’re taking a good hard look at that.”

An update sent out last week by CWCB staff said the agency was now “considering an approach that will entail a simpler and less restrictive agreement between the parties.”

Mitchell said the next version of the agreement will be closer to one page, not six pages.
The confidentiality agreements are seen by the CWCB as necessary to create “an environment for frank, candid and open discussions,” according to a recent memo to the workgroup participants.

But the confidentiality agreements are also meant to try to keep confidential some of the information provided by the state to the members of the workgroups.

A workgroup, of sorts, on the Colorado River in the Grand Canyon.

**Proposed roster of CWCB demand management workgroups**

**Law and Policy**

Facilitator:
Karen Kwon, first assistant attorney general, Colorado

Staff:
Brent Newman, chief, Interstate, Federal and Water Information Section, CWCB;
Amy Ostdiek, assistant attorney general, Colorado

Members:
Andy Mueller, general manager, Colorado River District
Jim Lochhead, CEO/manager, Denver Water
Bennett Raley, attorney at Trout Raley, representing Northern Water
John McClow, general counsel, Upper Gunnison River Water Conservancy District
Taylor Hawes, Colorado River Program director, The Nature Conservancy
Anne Castle, senior fellow, Getches-Wilkinson Center, University of Colorado
Beth Van Vurst, attorney, represents Southwestern Water Conservation District
Lee Miller, general counsel, Southeastern Colorado Water Conservancy District

**Monitoring and Verification**

Facilitator:
Michelle Garrison, water resources specialist, CWCB

Staff:
Brian Macpherson, decision support systems specialist, CWCB
Members:
Kelley Thompson, lead modeler, Colorado Division of Water Resources
John Currier, chief engineer, Colorado River District
Kevin Lusk, principal engineer, Colorado Springs Utilities
Tom Simpson, manager, Colorado and Arkansas Basins, Aurora Water
Luke Gingrich, Western Colorado area manager, J-U-B Engineers Inc.
Laura Belanger, water resources and env. engineer, Western Resource Advocates
Perry Cabot, research scientist and extension specialist, Colorado State University
Cary Denison, Gunnison Basin Project coordinator, Trout Unlimited
Gerry Knapp, consultant, Lower Arkansas Valley Water Conservancy District
Robert Sakata, owner, Sakata Farms
Carrie Padgett, engineer, Harris Water Engineering

**Water-Rights Administration and Accounting**

Facilitator:
Lain Leoniak, assistant attorney general, Colorado

Staff:
Mike Sullivan, deputy director, Colorado Division of Water Resources
Kevin Rein, state engineer, Colorado Division of Water Resources
Ryan Gilliom, water resource scientist, Colorado School of Mines

Members:
Frank Kugel, general manager, Upper Gunnison River Water Conservancy District
Rick Marsicek, planning manager, Denver Water
Drew Peternell, Colorado director, Trout Unlimited
Kyle Whitaker, Colorado River programs manager, Northern Water
Dick Wolfe, retired Colorado state engineer
Steve Witte, retired Division 2 engineer
Cleave Simpson, general manager, Rio Grande Water Conservation District

**Environmental Considerations**

Facilitators:
Lauren Ris, deputy director, CWCB;
Linda Bassi, chief, Stream and Lake Protection Section, CWCB

Staff:
Brandy Logan, hydrologist, CWCB;
Jojo La, endangered-species policy specialist, CWCB

Members:
Kathy Kitzman, water resources principal, Aurora Water
Maria Pastore, senior water resources project manager, Colorado Springs Utilities
Melinda Kassen, senior counsel, Theodore Roosevelt Conservation Partnership
Abby Burk, western rivers regional program manager, Audubon Rockies
Matt Rice, director, Colorado basin program, American Rivers
David Graf, water resource specialist, Colorado Parks and Wildlife
Al Pfister, wildlife biologist, Western Wildscapes, LLC
Torie Jarvis, director, NWCOG Water Quality/Quantity Committee
Mely Whiting, Colorado Water Project legal counsel, Trout Unlimited
Karen Wogsland, director of programs, Colorado Water Trust

**Economic Considerations and Local Government**

Facilitator:
Amy Moyer
Staff:
Amy Ostdiek, assistant attorney general, Colorado

Members:
Chris Treese, external affairs manager, Colorado River District
Alexandra Davis, deputy director of water resources, Aurora Water
Seth Clayton, executive director, Pueblo Water
Sean Cronin, executive director, St. Vrain and Left Hand Water Conservancy District
Kathy Chandler-Henry, Eagle County commissioner
Barbara Biggs, general manager, Roxborough Water and Sanitation District
Steven Ruddell, forester and environmental economist, CarbonVerde, LLC
Patti Wells, former general counsel, Denver Water, former CWCB board member
Liesel Hans, water conservation manager, City of Fort Collins
Karn Stiegelmeier, Summit County commissioner
Kelly Romero-Heaney, water resources manager, City of Steamboat Springs

**Funding**

Facilitator:
Anna Mauss, chief operating officer, CWCB

Staff:
Russ Sands, senior program manager, Water Supply Planning, CWCB

Members:
Ted Kowalski, Colorado River Initiative lead, Walton Family Foundation
Dave Bennett, director, Water Resource Strategy, Denver Water
Pat Wells, GM, water resources and demand management, Colorado Springs Utilities
Aaron Citron, policy adviser, The Nature Conservancy
Dick Brown, economist
Keith McLaughlin, finance director, CO Water Resources and Power Dev. Auth.
Alan Matlosz, executive VP, Colorado Public Finance Group, George K. Baum & Co.

**Education and Outreach**

Facilitator:
Brent Newman, chief, Interstate, Federal and Water Information Section, CWCB

Staff:
Megan Holcomb, program manager, Water Supply Planning Section, CWCB

Members:
Jim Pokrandt, director of community affairs, Colorado River District
Todd Hartman, media-relations coordinator, Denver Water
Chris Woodka, issues-management coordinator, Southeastern Water
Andy Schultheiss, executive director, Colorado Water Trust
Hannah Holm, coordinator, Water Center, Colorado Mesa University
Doug Kemper, executive director, Colorado Water Congress
Laura Spann, program coordinator, Southwestern Water Conservation District
Lisa Darling, executive director, South Metro Water Supply Authority

**Agricultural Impacts**

Facilitator:
Alex Funk, agricultural water resources specialist, CWCB

Staff:
Andrew Rickert, program associate, CWCB
Erik Skeie, special project coordinator, CWCB
Members:
Dave Kanzer, deputy chief engineer, Colorado River District
Alan Ward, water resources division manager, Pueblo Water
Eric Wilkinson, former general manager, Northern Water
John Stulp, former water policy adviser to Colorado's governor
Cindy Lair, program manager, State Conservation Board, CO Dept. of Agriculture
Mark Harris, general manager, Grand Valley Water Users Association
Aaron Derwingson, agricultural coordinator, The Nature Conservancy
Paul Bruchez, rancher, fly-fishing guide, member of the Colorado Basin Roundtable
Travis Smith, senior water consultant, DiNatale Water Consultants
Allen Distel, president, Bostwick Park Water Conservancy District, Montrose
Ken Curtis, chief of engineering and construction, Dolores Water Conservancy District
Tom Gray, former Moffat County commissioner, Colorado River District Board

In workshops in 2017 and 2018, approximately 100 of the leading water-supply and river managers, scientists, and stakeholders concerned about the future of the Colorado River assembled to identify key research needs in the basin. One of the most prominent themes that emerged from those discussions was the need to better understand how the river system is vulnerable to low-probability, high-impact events that fall outside the scope of normal expectations and existing management plans. Included in this category are completely unexpected shocks, so-called “black swan” events, as well as the more familiar and predictable, albeit highly improbable, events. Many of these risks pertain to extreme hydrologic conditions, including megadroughts and catastrophic floods. Other risks include possible physical phenomena that might further undercut ecosystem stability affecting endangered species and environmental restoration efforts, and socioeconomic events that might stress the existing legal/management framework beyond any known circumstance. There are many reasons to believe that the likelihood of such events occurring in the Colorado River basin is increasing at the same time our water-supply safety net—including reservoir storage, ground-water reserves, and “unused” apportionments—is increasingly under unprecedented stress.

As the states of the Colorado River basin reconvene in 2020 to negotiate new rules concerning how to allocate the pain of water-supply shortage and thereby supplant the expiring Interim Shortage Guidelines and Minute 323 of the Mexican-US Water Treaty, an opportunity and need exists to do so with an eye toward the full range of potential futures that may stress the region and the river. Many of the current management challenges in the basin—including the thorny problem of overallocation—can be traced back to poor planning assumptions regarding hydrology, climate, and consideration of the full spectrum of the river’s values and services. To do better in the future will require good data fed through well-constructed scenarios and planning frameworks. Central to this effort will be scientifically informed anticipation about the low-probability, high-impact events that have thus far received little attention outside of small subsets of the scientific community. To that end, we encourage planning processes embracing a wide range of possible climate futures and societal responses to those future conditions.

The Hydrologic Swans

The Colorado River basin has warmed steadily in recent decades and will continue to do so as long as humans emit greenhouse gases into the atmosphere. This warming, which is already causing river flows to decrease, is a component of a wider range of interrelated climate change impacts to watershed runoff, stream flow, and water demands. More frequent and intense extreme events are expected in a warmer future. To the extent that the rarest of these events (i.e., the extreme tails of the probability curves) fall outside of what is considered reasonably possible, the occurrence of these events has the potential to blindside and overwhelm management systems.
Perhaps the most acknowledged of these risks is megadrought—a drought measured in multiple decades rather than years. When compared to the paleohydrologic record, the first 19 years of the 21st century are already among the five driest extended periods in the past 1,200 years. Whether the current period is characterized as the beginning of a new megadrought, or whether the low basin runoff of the early 21st century is merely a consequence of an emerging aridification trend (discussed in an earlier CRRG publication1) associated with rising temperatures—or a combination of both—is unknown. Whatever the case, the present is a condition that is quite anomalous with respect to the 1906-to-present historic record used in most water scenario planning. This situation is disconcerting given the role of multiple megadroughts in undermining past civilizations in the region, namely the Ancestral Puebloans (Anasazi) on the Colorado Plateau (mid-1100s and late 1200’s) and the Hohokam in Arizona (late 1200s and late 1400’s). This kind of a possible black swan hydrologic event—a protracted megadrought—demonstrates that planning scenarios should consider a longer hydrologic record than the last century. In fact, the abnormally wet period of the early 20th century that water managers have traditionally considered part of the “normal” watershed runoff pattern might be better viewed as a highly unlikely hydrologic event that cannot be assumed to be part of the future.

There are multiple pathways for a megadrought to overtake the Colorado River Basin in the coming decades of the 21st century. First, there is the likelihood that the current drought, driven by warming as much (or more) than precipitation deficit, might continue to worsen for years or decades into the future. The risk of such aridification certainly increases with time unless greenhouse gas emissions are curbed, and could yield a more or less permanent (on human time scales) megadrought worse than any of the last

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1,000 years. This scenario is in line with recent assessments of future Colorado River stream-flow reductions driven by continued warming. Additionally, there is still the risk that natural variability could trigger megadroughts in the future, and that these megadroughts could be as long and severe as those in the recent geologic past. Megadroughts lasting as long as 50 years have occurred in the shared headwaters of the Colorado River and Rio Grande. The odds of such extreme drought happening again only go up as the planet warms.

Perhaps less appreciated are the risks of catastrophic flooding in the basin. The spillways at Glen Canyon Dam were significantly eroded by cavitation in 1983, as were those at Oroville Dam (in California) in 2017, when floodwaters exposed weaknesses of existing infrastructure. Although weather prediction and water resource management plans have improved and been revised following the events at Glen Canyon Dam, there is nevertheless the possibility that an unusually large flood might occur in the basin headwaters. We know such great floods have occurred in the past (outside of the relatively short stream gauge period) based on field observations of the flood deposits and analysis of the paleohydrologic record. Even if Lake Powell and Lake Mead remain low, megaflood risk persists and is likely to be increasing. Precipitation intensity, and the amount of precipitation falling in the most intense events, are increasing globally and across the United States, in large part because sea surface temperatures and atmospheric water vapor content are both rising, increasing the odds of more extreme precipitation events. These trends will continue as long as emissions of greenhouse gases to the atmosphere continue.

Recent scientific work also highlights that the climate system may have more multi-decadal variability than previously thought, or than simulated by state-of-the-art climate models. This variability has most famously manifested itself in the form of past megadroughts, but may also generate periods of above normal precipitation, or “mega-pluvials.” It is conceivable that such a wet period could reoccur in the future, only to be supercharged by warmer sea surface temperatures and atmospheric moisture content to yield a combination of much above normal late-season snowpack (remember 2015’s “Miracle May”), more intense melt-season runoff, and an extreme and persistent rain event in just the right location to generate an unprecedented megaflood. Short lead times, when combined with a dependence on often untested (and perhaps under-capacity) flood control infrastructure, often leave managers with few tools to deal with such extremes.

**Other Risks**

Adapting planning frameworks to consider threats beyond the hydrologic black swans creates even more challenges. Recent history in the basin has featured dozens of salient stressors that, while not completely unanticipated, were outside of the scope of past planning endeavors. Examples include the massive loss of forest ecosystems in the Rocky Mountains and Pacific Northwest from beetle kill, the destruction of Mexican water delivery infrastructure in the 2010 earthquake, and the introduction of new exotic species (e.g., quagga muscles). Other conceivable risks include shocks to world trade that shift energy costs or agricultural production, the potentially unpredictable impact of national immigration policy on other aspects of relations with Mexico, and regional economic booms and recessions. As the recent DCP negotiation highlighted, two of the most problematic features of the current management framework—the inability of Pinal County, Arizona farmers to easily absorb CAP curtailments, and the environmental and public health challenges associated with limiting Salton Sea inflows—have influenced, and are influenced by, matters that were heretofore considered outside of basin water management planning.
Certainly it is not realistic to charge water managers with simultaneously addressing all possible interrelationships among water-related sectors, especially in the context of totally unexpected black swan events. But it is reasonable to expect planning and decision-making efforts, such as the basin states negotiations over new guidelines, to broaden the scope of scenario planning as applied to the analysis of water delivery reliability. At a minimum, environmental needs should be an integral part of that assessment. Similarly, it is increasingly evident that the decision-making mechanisms through which new challenges are addressed must become more agile. Admittedly, identifying planning processes that are both broader in scope yet support more agile and adaptive management in application is a heavy lift, but it is a challenge the Basin’s water management and policy community must accept.

**Conclusion**

Omitting low-probability, high-impact events from future scenario planning efforts on the grounds that we are powerless to prepare for what we cannot fully anticipate or comprehend is both foolish and unnecessary. The reality is that we are learning a great deal about many such risks. For example, one step forward is Reclamation’s recent emphasis on “stress test” modeling, which assesses how the water delivery system would perform if the hydrology of recent decades were to persist. Perhaps the next step could take inspiration from the approach used in the Severe Sustained Drought study of the early 1990s, which used the hydrology of a megadrought from the late 1500s to test modern system performance under extreme water scarcity, focusing not only on water deliveries, but on the drought’s economic and environmental impacts, legal/political ramifications, as well as considering potential coping mechanisms. And even if we cannot predict what the next actual black swan event will be, basin managers can establish a process to continuously evaluate all of the climatic, hydrologic, socio-political, economic, and other trends that might affect basin management, and to advise on the implications of those factors and possible ways to mitigate or address them. Many researchers in the academic community are already mobilized to assist in this effort.

Undoubtedly, the basin will continue to experience events and conditions that surprise even the most insightful managers and diligent researchers. Effectively dealing with these risks will test the social capital built up among basin leaders and the limits of our governance regimes. The (generally) collaborative environment among water managers that has evolved over the past 15 years is a welcome asset in this increasingly turbulent period. The renegotiations of the Interim Guidelines is a looming (although not isolated) opportunity to build upon that framework, and to create increasingly broad and inclusive planning frameworks to seek truly robust management solutions.

Find more Colorado River Research Group publications, member biographies and activities, and contact information at [www.coloradoriverresearchgroup.org](http://www.coloradoriverresearchgroup.org).

4
'Black Swan' water planning in the Colorado River Basin

By HANNAH HOLM

By now, it's old news that the Colorado River — notwithstanding the current abundant water year — is generally shrinking, and is expected to shrink more in coming decades. The states that share the river completed a drought plan earlier this year that brings them closer to living within currently available supplies, and a new round of negotiations on long-term management of the river is due to begin next year.
However, a new report warns that planning for gradually declining water supplies, as difficult as that is, may not be enough to adequately prepare for the future. In May, the Colorado River Research Group released a report warning that water planners should also take into account "black swan" low-probability, high-impact events. The research group is a consortium of well-known scholars focused on the Colorado River Basin, and all their reports can be found at www.coloradoriverresearchgroup.org.

Longer, deeper, "mega" droughts are one black swan the report discusses. Given the severe drought years we've recently experienced, this is not surprising. But the report warns that extreme floods are also possible, and notes the spectacular damage done to the spillways at Glen Canyon Dam in 1983 and California's Oroville dam in 2017, during high water years. The same warming temperatures that boost evaporation rates, magnifying drought, also enable the atmosphere to hold more water. When this soggy atmosphere lets loose, rainfall is more intense.

Unexpected physical phenomena and socioeconomic events could also put high stress on management systems. Massive pine beetle damage to mountain forests and an earthquake in Mexico that damaged irrigation infrastructure are two examples of relatively recent, unexpected physical phenomena mentioned in the report. Shifts in global markets that affect agricultural production could also affect water demands.

The report is focused broadly on the management of the Colorado River and its tributaries, but individual communities are vulnerable to the same kinds of shocks. I checked in with the largest water utilities on the Western Slope to find out what kinds of "black swan" events worry them, and how they try to prepare. Linn Brooks of the Eagle River Water and Sanitation District, Dave Payne of Ute Water and Randi Kim of the city of Grand Junction put wildfire, landslides, dam breaches, terrorist attacks and power interruption, as well as extreme droughts and floods, on their lists of potential disruptions.

In terms of preparedness, Payne, Brooks and Kim all mentioned the importance of system redundancy, so if something goes wrong with one part of their water treatment and distribution systems, there's a backup. Brooks also noted the importance of keeping on top of infrastructure maintenance and upgrades. Under-resourced utilities with aging infrastructure and outdated equipment are more vulnerable.

As part of its risk-reduction strategy, Ute Water has a diverse portfolio of water sources it can draw on, including several streams on Grand Mesa, the Colorado River and Ruedi Reservoir in the Roaring Fork Valley, as well as interconnects with the city of Grand Junction and other domestic water providers in the Grand Valley. The city also has a diverse portfolio, maintaining water rights in the Gunnison and Colorado Rivers in addition to their primary source, Kannah Creek.

To reduce risks associated with wildfires, the city of Grand Junction has worked extensively with the US Forest Service on prescribed burns to reduce the risk of catastrophic wildfire in the city's water supply watershed. Such fires can damage infrastructure as well as foul source water. Ute Water addresses wildfire risks through making its reservoirs available for fighting fires. Ute also closely monitors the areas around its tunnels and pipelines for landslide activity, the other major natural hazard on Grand Mesa.

To get a better handle on potential supply vulnerabilities, the Eagle River Water and Sanitation District is developing a detailed model of its water rights and hydrology in order to preview the impacts of different scenarios, and anticipates increasing planning for extreme events as the tools to do so become more available. The city of Grand Junction is also engaged in modeling, evaluating scenarios that include successive drought years.

The Colorado River Research Group report acknowledges that water managers can't be expected to address every possible risk. But they call for the inclusion of more extreme events the range of scenarios considered in analyzing system reliability, and for developing the capacity to be agile and manage adaptively as situations change. This in turn requires close monitoring
of the key factors that could affect water systems. These are points that people directly responsible for providing water to our taps appear to already understand very well. Applying this level of diligence to system reliability at a basinwide scale would benefit us all.

On a basinwide or local level, developing the capacity to manage black swan events requires not only forethought, but also resources. Redundant systems and constant monitoring don't come cheap. That's worth thinking about when we pay our utility bills.

Hannah Holm coordinates the Hutchins Water Center at Colorado Mesa University, which promotes research, education and dialogue to address the water issues facing the Upper Colorado River Basin. Support for Hutchins Water Center articles is provided by a grant from the Walton Family Foundation. You can learn more about the center at http://www.coloradomesa.edu/water-center.
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MEMORANDUM

TO: Board of Directors
FROM: Catherine Hayes, Board Secretary
DATE: May 28, 2019
RE: Summary of Authority’s May 23, 2019, Board Meeting

The following is a summary of items discussed at the May 23, 2019, Authority Board Meeting:

Board members present and acting included: Acting Chair Sarah Smith Hymes, Secretary Kim Bell Williams, Treasurer Geoff Dreyer, directors Mick Woodworth and Pam Elsner, and alternate director Melissa Nelson.

WaterSmart Presentation
Chris Wolff, water demand management coordinator, presented information on WaterSmart customer portal. This is a new tool being rolled out for customers and the District to track and manage water use, compare use to similar households, ensure customers are adhering to the water use regulations, and detect leaks or abnormalities, among other uses. The software will be rolled out to customers in the near future.

Quarterly Finance Report
James Wilkins presented the Q1 finance report. He noted revenues were tracking closely to the budgeted amount for the first quarter. The continued cold, snowy weather has precluded the need for early outdoor irrigation water use, so May water sales are lower than normal. Discussion ensued regarding staff efforts to update the Authority’s water system impact fees due as projects are added to the capital investment plan.

Lake Powell Projected Inflow
The board discussed the current water year, which saw a high volume of precipitation. This will increase the level of Lake Powell, but because of the “new normal” of a warming climate, it's unclear how this will contribute to a total percentage of increase.

6 West Update
Jim Collins and Jason Cowles updated on the 6 West development. The Authority and District received an extended escrow agreement, via a cash bond, which will be held by a title company escrow agreement in the amount of $340,000. A three-year warranty was also provided to the Authority and District, which could be extended if such a need is demonstrated. The standard warranty period is two years.

Communications Update
Diane Johnson said an informational pamphlet to remind customers of the water use regulations was distributed with billing statements, via mail or email. She also noted the Drought Contingency Plan was signed May 20 by all seven basin states. She explained the significance of this plan and discussed continuing efforts in Colorado to come to agreement on how a “compact call” would be handled in the state.

Restructuring Update
Jim Collins discussed Monday’s restructuring committee meeting. Topics of ongoing discussion include a better quantification of potential cost savings; how to ensure current tenets of the Authority Agreement would be preserved and translate to the new governing board; and future legislation to allow the electors of each director district to elect that district’s board representative, rather than the current at-large system. Once staff gathers the needed data, another meeting will be scheduled.
## COMMITTEES

### DISTRICT

<table>
<thead>
<tr>
<th>COMMITTEE</th>
<th>Chairpersons</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDIT/BUDGET</td>
<td>Steve Coyer, Steve Friedman</td>
</tr>
<tr>
<td>HAHNEWALD BARN</td>
<td>Steve Coyer, Bill Simmons, Linn Brooks</td>
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<tr>
<td>RETIREMENT PLANS</td>
<td>Steve Friedman, Linn Brooks, Melissa Mills McLoota, James Wilkins</td>
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<tr>
<td>REAL ESTATE AND NEW DEVELOPMENT</td>
<td>George Gregory, Brian Sipes</td>
</tr>
<tr>
<td>EMPLOYEE HOUSING</td>
<td>Steve Coyer, Dick Cleveland</td>
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<tr>
<td>ORGANIZATIONAL DEVELOPMENT</td>
<td>Bill Simmons, Dick Cleveland</td>
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### AUTHORITY

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<tr>
<td>AUDIT/BUDGET</td>
<td>Geoff Dreyer, George Gregory</td>
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<tr>
<td>NEW DEVELOPMENT</td>
<td>Geoff Dreyer, Mick Woodworth</td>
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<tr>
<td>UNALLOCATED WATER</td>
<td>Geoff Dreyer, Sarah Smith Hymes</td>
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<tr>
<td>TRAER CREEK TANK</td>
<td>George Gregory, Sarah Smith Hymes</td>
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### JOINT

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<thead>
<tr>
<th>COMMITTEE</th>
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<tr>
<td>WATER QUALITY</td>
<td>Sarah Smith Hymes (A), Timm Paxson (D)</td>
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<tr>
<td>RULES AND REGULATIONS</td>
<td>Kim Bell Williams (A), Bill Simmons (D)</td>
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<tr>
<td>WATER DEMAND MANAGEMENT</td>
<td>Mick Woodworth (A), Steve Coyer (D)</td>
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<tr>
<td>WILDERNESS POLICY (DORMANT)</td>
<td>George Gregory (A), Mick Woodworth (A), Vacancy (D)</td>
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<tr>
<td>EAGLE RIVER MOU</td>
<td>Sarah Smith Hymes (A), George Gregory (D)</td>
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<tr>
<td>CLIMATE ACTION PLAN</td>
<td>Sarah Smith Hymes (A), Timm Paxson (D)</td>
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</tbody>
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(A) = Authority
(D) = District