

MEMORANDUM
SEPTEMBER 28, 2018

TO: BOARD OF DIRECTORS
ANDREW MUELLER, GENERAL MANAGER
PETER FLEMING, ESQ. GENERAL COUNSEL

FROM: RAY TENNEY, P.E. & DON MEYER, P.E.

SUBJECT: OPERATIONS OF ELKHEAD AND WOLFORD MOUNTAIN RESERVOIRS

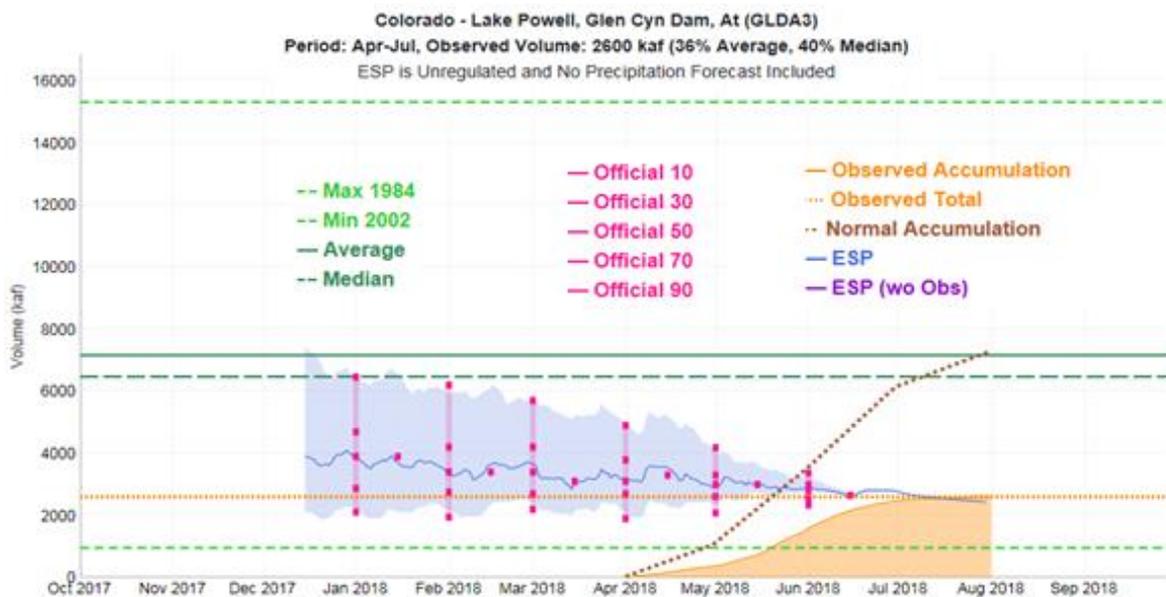
No Board Actions Requested

STRATEGIC INITIATIVE(S): 13. Asset Management

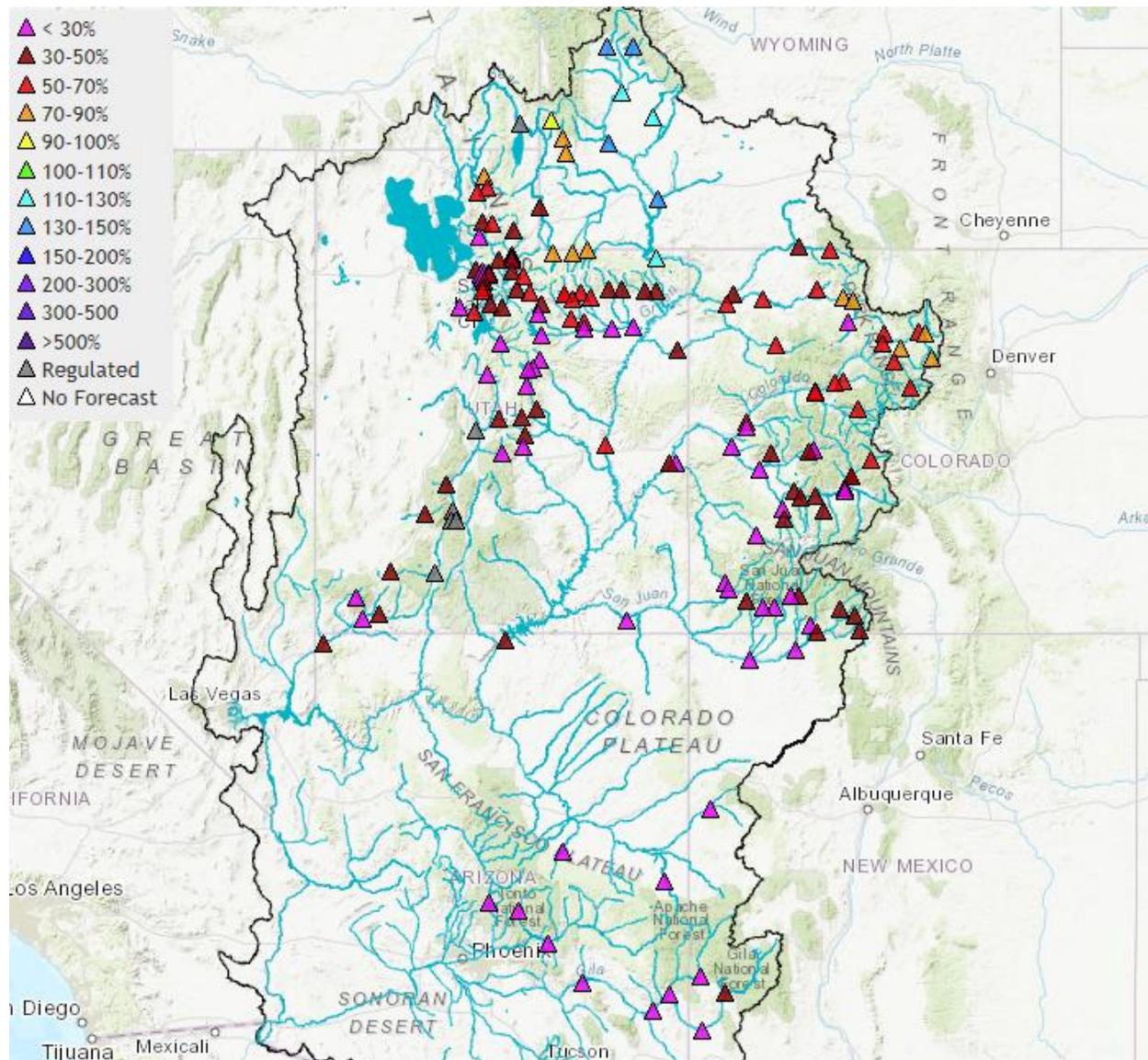
This memorandum provides a brief summary of 2018 seasonal and ongoing operations and maintenance activities at Elkhead and Wolford Mountain reservoirs. As historic hot, dry conditions persisted over much of the Western Slope for much of the summer, higher than normal emphasis is given to reservoir operations. A brief summary of the overall Colorado River Basin water supply sets the stage.

Colorado River Basin Water Supply Overview

The evolution of 2018 inflow forecasts into Lake Powell is shown in the graph below. April – July observed inflow was 2,600,000 acre-feet (AF) or 36 percent of average.



The April – July 2018 runoff at various locations in the Colorado River Basin are shown in the map below.



The bright point in the entire basin was the Upper Green River above Flaming Gorge Reservoir where runoff was 114% of average. But for this, inflow to Lake Powell would have been significantly lower.

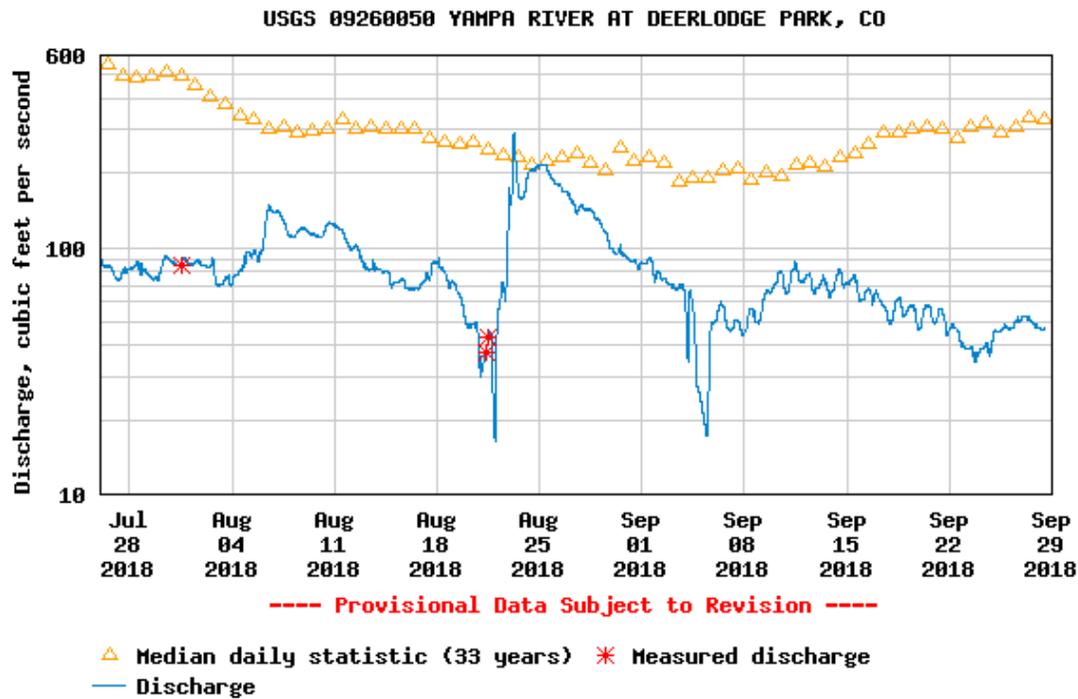
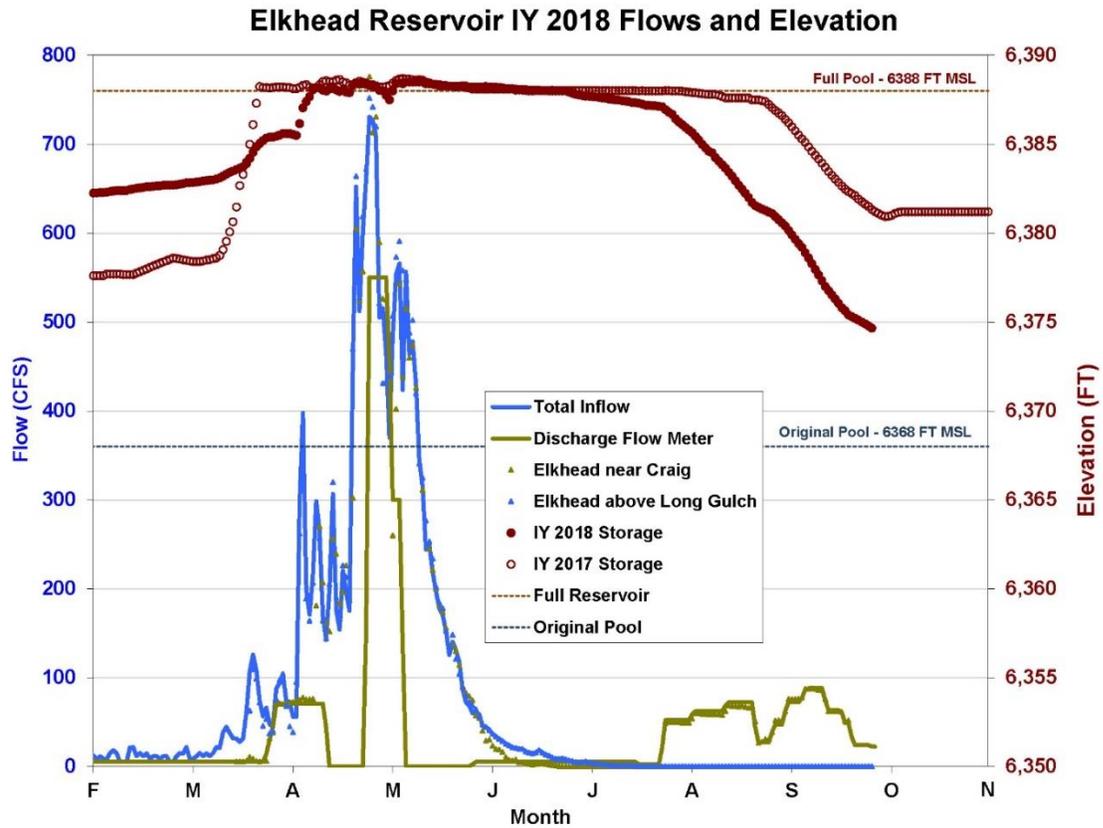
La Nina conditions persisted throughout 2017 and the spring of 2018, however El Nino Southern Oscillation (ENSO) neutral conditions currently exist, with a 65-70 percent chance of El Nino onset during winter 2018-19. El Nino conditions typically favor more precipitation in the south and less to our north.

Elkhead Reservoir

Operations

On the following page is a graph of 2018 Elkhead Reservoir operations. April through July runoff into Elkhead was 37,000 AF or 51 percent of average. This was slightly lower than 56 percent of average for the entire Yampa River basin. Very hot, dry mid to late summer conditions resulted in record low streamflows throughout the basin. The reservoir is currently at 8,500 AF or 13.5 feet down from full pool, releasing 20 cfs for Endangered Fish. The Recovery Program has leased the entire 2,000 AF of additional storage provided for in our agreements, initially opting for 500 AF, and as the conditions worsened during the summer requesting the additional 1,500 AF to help bolster flow at Maybell and below for the listed fishes. As of this writing the Recovery Program pool including the lease water has only 350 AF remaining and will run out about October 10th.

In an historic move the Yampa River was placed under administration in early September to assure the reservoir releases were delivered. The Calling Right was the Lily Park Ditch (1886 priority) with the initial calling priority (Swing Right) set at the Mock Ditch 1950 priority. The most recent swing right was administered at the McIntyre Ditch with a 1955 priority with water rights junior to 1955 curtailed. Releases to the Craig Station Power Plant were made from pools in both Stagecoach reservoir (unit 3) and Elkhead reservoir (units 1 and 2, from the original Elkhead pool). In late September the River District contemplated the release of additional Elkhead water to bolster flows and take the Call off the river to allow curtailed water users to resume diversions. As it turned out, the Call was taken off on September 26th without additional Elkhead water due to scaled back diversions, cold nighttime temperatures and administered water yet to arrive at the Deerlodge gage (USGS streamflow graph on the following page).



Maintenance

At the July 2018 quarterly meeting, the Board authorized staff to enter into an agreement with Moody Construction & Sons, Inc. For installation of erosion protection of the Malburg Pond embankment. That work is now complete pending final staff approval. At the same meeting, the Board authorized staff to enter into an agreement for repair of the Elkhead Reservoir spillway concrete with B&RW Construction Co. Inc. That work is ongoing and proceeding as planned.

Wolford Mountain Reservoir

Operations

On the following page is a graph of recent Wolford Reservoir operations. April through July runoff was 34,000 AF or 63 percent of average. Runoff above Cameo was 62 percent of average, however runoff in the Upper Colorado (Blue and Fraser Rivers) was closer to average. Extremely dry mid to late season conditions throughout the basin resulted in exceptionally low streamflows and an unprecedented draw on the Historic Users Pool (HUP) in Green Mountain Reservoir and Recovery Program Endangered Fish Pools in Granby, Wolford and Ruedi Reservoirs.

Fortuitously the maintenance drawdown at Wolford provided more than 200 cfs of additional Fish water to the 15 Mile Reach mid-July to September 1st. To bolster a rapidly diminishing HUP Pool in Green Mountain Reservoir the River District provided about 4,000 AF of contract water from Ruedi Reservoir for direct delivery to the Grand Valley Irrigators in July and August. This delivery also helped relieve very low streamflow and high temperatures on the Fryingpan and Roaring Fork. As conditions worsened in August and September, a concerted, cooperative effort made 10,500 AF of additional water available from unscheduled contracts in Ruedi Reservoir. Entities contributing to this effort include:

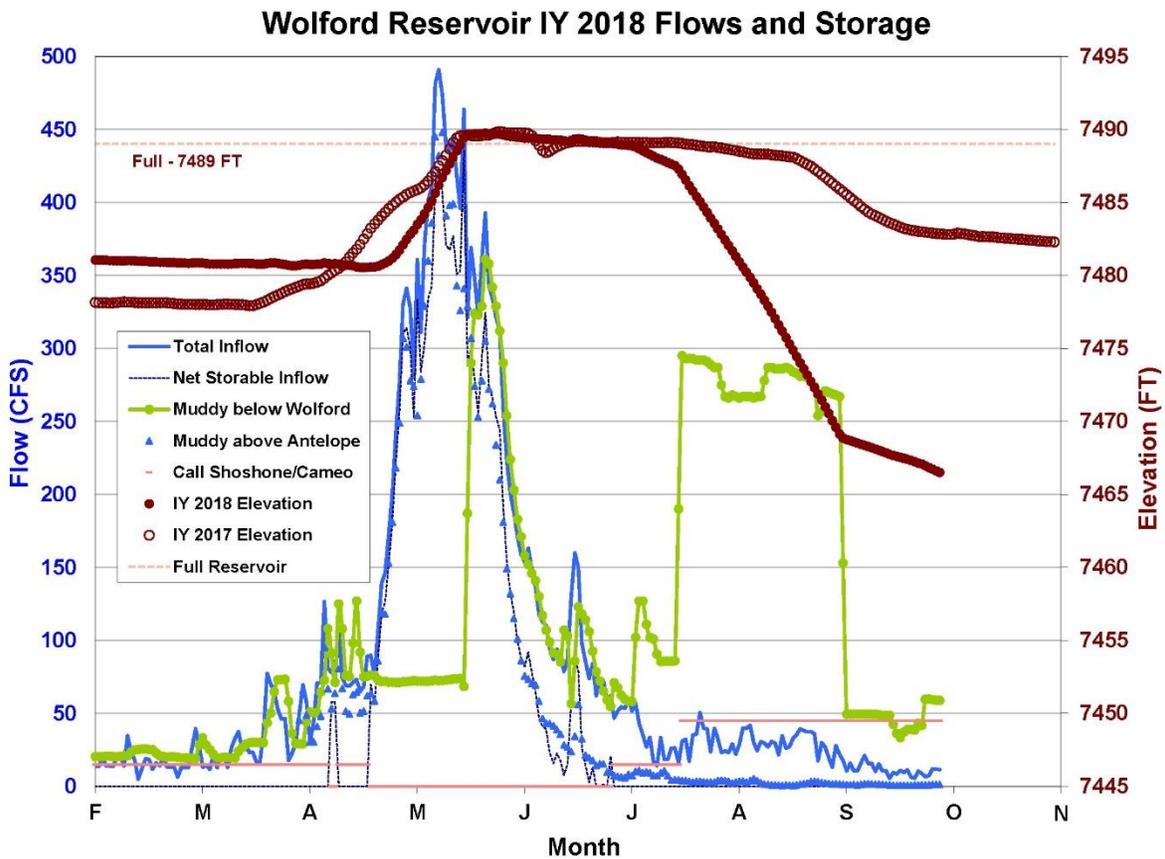
- For use in the 15 Mile Reach by the Recovery Program
 - Exxon: 5,000 AF
- Direct delivery to GV Irrigators in substitution for Green Mountain HUP delivery
 - Ute Water: 4,000 AF
 - Town of Carbondale: 250 AF
 - Town of Palisade: 162 AF
 - City of Aspen: 400 AF
 - Snowmass Water and Sanitation District: 400 AF
 - Garfield County: 350 AF (approval 10/1)
- **Total: 10,562 AF**

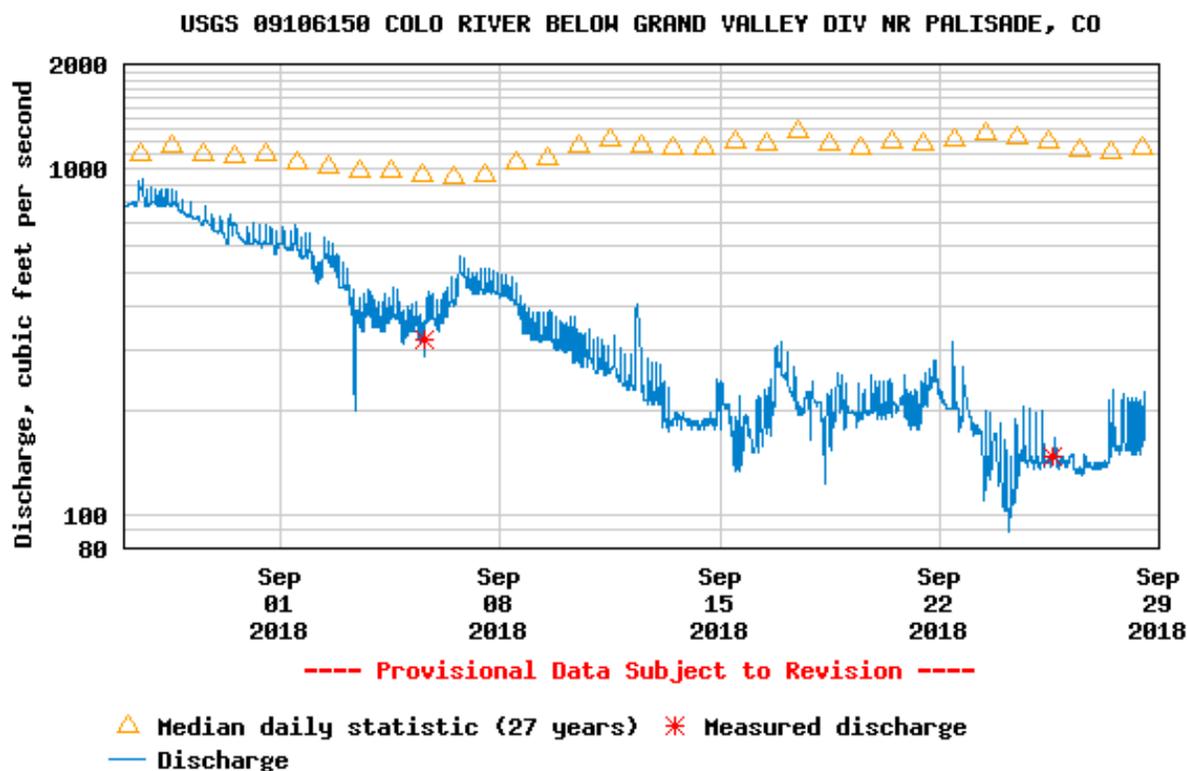
Overall, between July and October, approximately **14,500 AF of Ruedi was made available to the GV Irrigators (9,500 AF) and to the 15 Mile Reach (5,000 AF).**

Additionally, **1,000 AF of Grand County water pumped by Windy Gap into Granby Reservoir in June was also released as substitution for HUP direct delivery.**

In spite of these extraordinary and greatly appreciated measures, the Grand Valley Irrigators are experiencing shortages in October, and flows in the 15 Mile Reach have been at or below 200 cfs for several weeks, see USGS graph on the following page.

The final numbers are not yet in at the date of this memorandum, but in this historic year overall demand on the **66,000 AF Green Mountain Historic User Pool** totaled approximately **76,500 AF**, 9,500 AF of that coming from Ruedi and 1,000 AF from the Grand County.





Silver Creek Fire

The Silver Creek Fire started west of Wolford Mountain Reservoir on July 19th. The Wildfire has grown to 18,719 acres and is 60% contained. While the reservoir has not yet been subject to direct impacts, there is a possibility of post wildfire impacts to the reservoir. Staff is planning to participate in and host meetings for the US Forest Services Burned Area Emergency Response program which should help inform what the impacts will be and what if any mitigation measures are needed.

Dam Crest Rehabilitation

Dam Crest Rehabilitation work is ongoing and more information will be available by the Board meeting.

Outlet Works Main Gate Replacement

Replacement of the outlet works main gate is scheduled for April 2019 after ice is off the reservoir and before the reservoir fills. The gate is currently under construction by Steel-Fab. At the January 2019 Board meeting, or possibly before, staff expects to request authorization to enter into a contract with Marine Diving Solutions (MDS) for installation services.

Dam Deformation Monitoring

Dam deformation monitoring continues with daily observations, monthly movement readings, periodic surveys, data reduction and evaluation, and results presentation to the State Engineer (SEO) and others via a portal on our website. A presentation on the status of the deformation investigation was made to the Association of State Dam Safety Officials (ASDSO) in Seattle earlier this month. In general the crest settlement and downstream movement in the maximum section of the dam embankment are continuing with rates and patterns similar to past behavior, with some slowing of the settlement detected in the most recent readings.