

BOLINAS COMMUNITY PUBLIC UTILITY DISTRICT

BCPUD

BOX 390 270 ELM ROAD BOLINAS CALIFORNIA 94924

415 868 1224



MEMORANDUM

TO: Board of Directors
FROM: Jennifer Blackman
RE: Update on Water Supply
DATE: July 21, 2021

This memorandum provides a summary of the status of the District's water supply and current consumption data since the last memorandum to the Board dated June 16, 2021.

- Water Supply: From June 15, 2021 – July 19, 2021 our diversions from the Arroyo Hondo Creek to the Woodrat Water Treatment Plant averaged 60,631 gallons per day (GPD), which was slightly less than the diversions to the plant the prior month (63,432 gallons GPD), and the month prior to that (64,500 GPD). No water was diverted from Woodrat 1 reservoir to meet demand during this time, once again underscoring the beneficial impact of the community's conservation efforts.¹
- Rainfall: Virtually no rain has been received during this timeframe, but the recent marine layer has resulted in heavy fog and the staff measured (0.12 on June 14th), for a total annual rainfall in the district during the 2020-21 rain year (July 1, 2020- June 30, 2021) of 16.42 inches. As a reminder, we received 22.7 inches of rain last year. Average annual rainfall received in Bolinas is 32.5 inches. Thus far in July 2021, staff has measured 0.28 of an inch of "precipitation" in the form of dense fog, which did have an impact on creek flows as discussed below.
- Woodrat 1 and Woodrat 2: Our stored usable water supply in the Woodrat reservoirs as of July 19, 2021 (combined) is estimated to be 9,601,153 gallons², a decline in storage of approximately 1 million gallons over the last two months, when compared to the 10,662,058 gallons in storage on May 17, 2021.³ This decline in storage between mid-May and mid-July is due to continued environmental losses (evaporation – which was much more pronounced due to the longer days and extremely windy weather in recent weeks -- and seepage) as well as possible measurement imprecision. At the present time, a "decline in rate of storage" factor has not be built into the scenario summary through January 31, 2022, but staff anticipates a continued rate of loss in water storage of at least 300,000 gallons per month is likely during August – October (which are shorter days, but generally dry and warm).
- Water Consumption. From June 15, 2021 – July 19, 2021 water *production* averaged 57,462 GPD or approximately 98 GPD per connection. Water *consumption* during this same timeframe averaged 58,951 GPD, or just under 100 GPD per connection.

¹ Water was diverted from the Arroyo Hondo to Woodrat 2 for portions of three days during this timeframe on an experimental basis; one day was unmetered, the other two days' combined diversion was 144,101 gallons. Due to licensing constraints, staff has determined any future diversions must be deferred until after November 1.

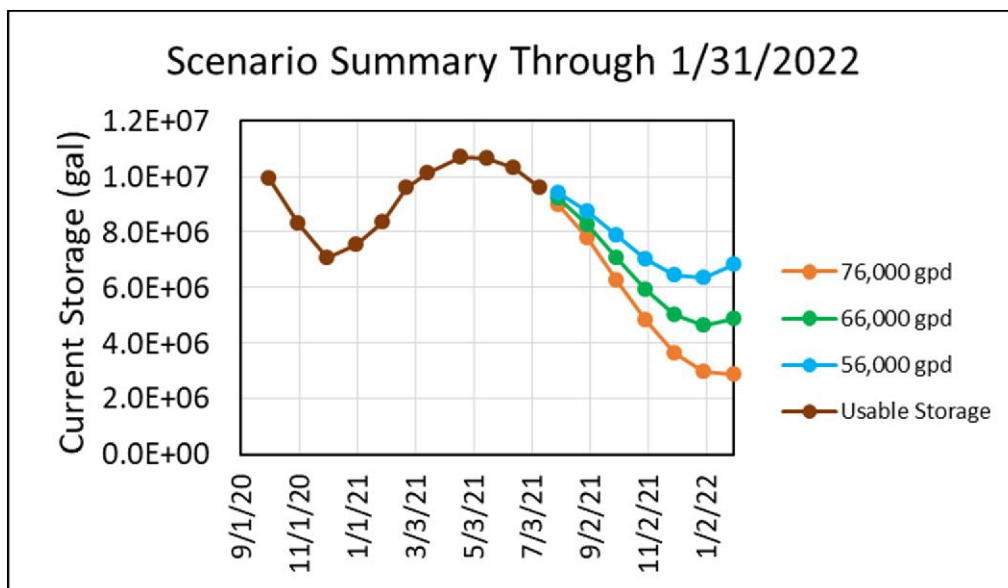
² We also had 792,458 gallons of treated water in storage in our East and West tanks (combined) as of July 12, 2021, for total usable water storage (treated + raw) of 10,924,557 gallons.

³ Note: a slight error in the projections in my previous memos about the usable water estimated to be in storage has been corrected – prior memos slightly underestimated the usable amount in storage in the district's reservoirs those months.

Individual water consumption remains quite uneven. For example, in June 2021, the highest 10 water users logged an average water use of 331 - 1450 GPD (the highest usage was due to a hose left on resulting in a water loss of 40,000 gallons that month).⁴ In June 2021, 26 customers (including the highest 10) used more than 200 gallons of water per day, whereas 20 customers did so in May. In June 2021, 99 customers used more than the anticipated ration amount of 125 gallons per day, whereas in May 2021, 108 customers did so. In June 2021, 182 customers used more than 100 gallons per day, whereas in May 2021, 194 did so.

5. Updated Models: *Note: All models in this memo assume the Hypothetical Minimum Rainfall Scenario presented in my June 2, 2021 memo, i.e., that the district will receive rainfall approximately equivalent to the 2020-21 rain year, or 9.9 inches of rainfall, between October 2021 and January 2022.*

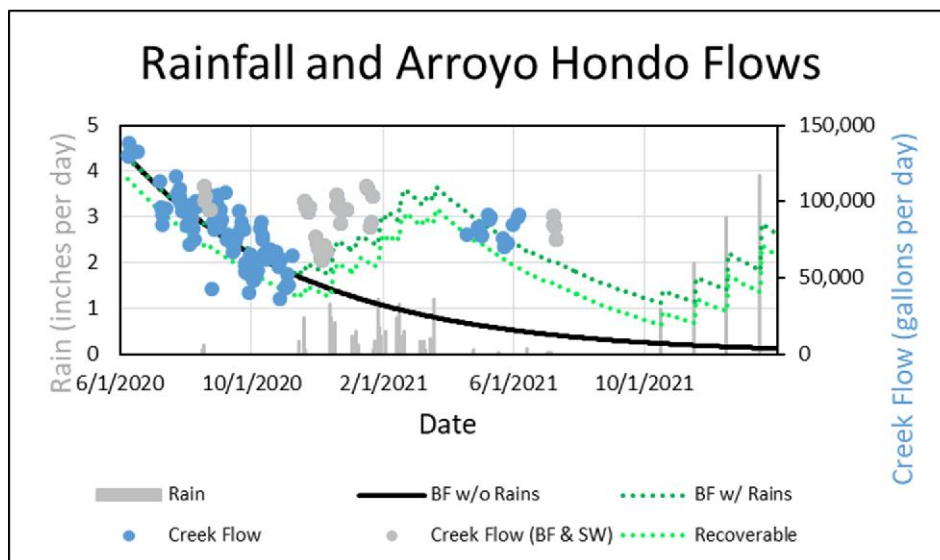
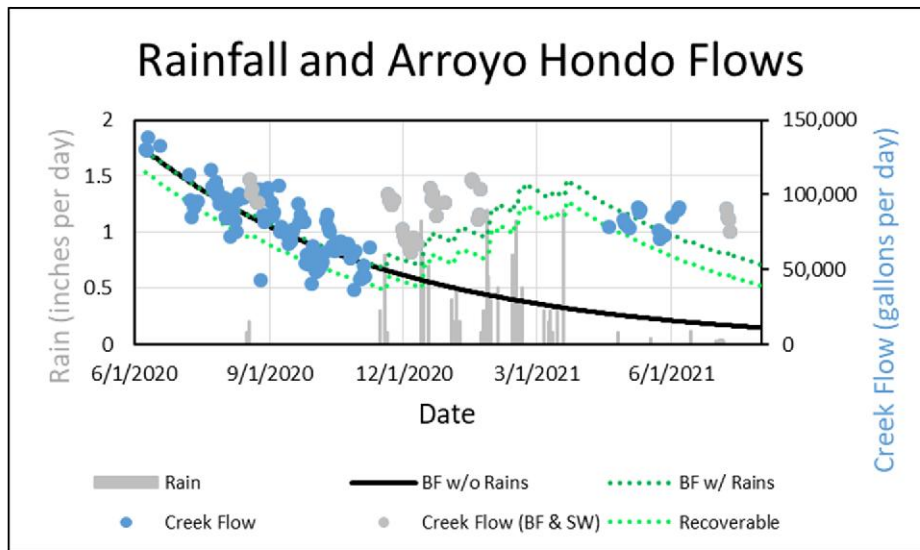
The graph below is an updated Scenario Summary reflecting the actual water storage data recorded as of July 12, 2021 (brown line in upper left area of graph with the eleven dots) and the “fork” of projections as to how much stored water the district will have available through 2021 and beyond based on differing rates of overall community water consumption and assumed (but hypothetical) receipt of 9.9 inches of rain during October 2021 through January 2022. The most recent seven-day running average community consumption is approximately 54,900 GPD. placing the district just above the blue line right now. This graph continues to project that if consumption stays close to current levels (and at or below the ration trigger of 66,000 GPD) and the 9.9 inches of hypothetical rainfall occurs by January 31, 2022, the district will have between 4.9 and 6.8 million gallons of water in storage through January 2022 (green and blue dots on right side of graph box, respectively)⁵.



⁴ Customer leaks during the June 15 - July 19, 2021 timeframe resulted more than 60,000 gallons of water loss (i.e., a hose left running and several large toilet leaks).

⁵ These are slightly improved projections from my most recent memo (which were 4.3 million and 6.5 million gallons in storage projected through January 2022, respectively) due to the correction of an error in the underlying spreadsheet which failed to properly credit one of the month’s anticipated rainfall into the model.

The next two graphs depict the district’s base flow (BF) recession model for the Arroyo Hondo creek, which was updated last month to: (1) reflect an assumed (but hypothetical) rainfall of 9.9 inches by January 2022; (2) depict the recoverable creek flow (assuming that 10 gallons per minute, or 14,400 gallons per day, flows past/around the dam⁶); and (3) correct the size of the storage area behind the dam from 1,995 sq. ft. to 1,500 sq. ft. The first graph shows conditions through July 2021, and the second projects creek flows (via the downward sloped dotted green lines) through January 31, 2022. The recoverable base flow⁷ is slightly improved as compared to previous predictions due to the measurable “precipitation events” during the timeframe covered in this memo, with about 29,630 GPD of recoverable creek flow per day by September 1, 2021. Last month, the model predicted 28,500 GPD of recoverable creek flow by September 1, 2021.

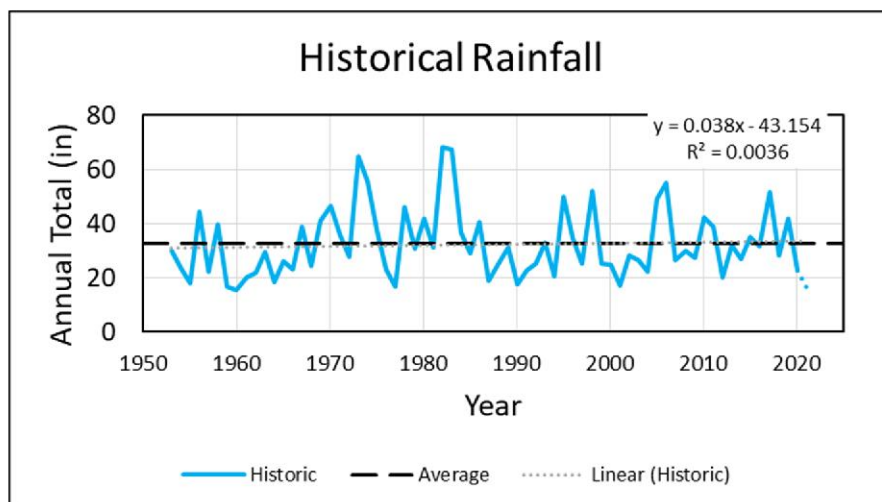
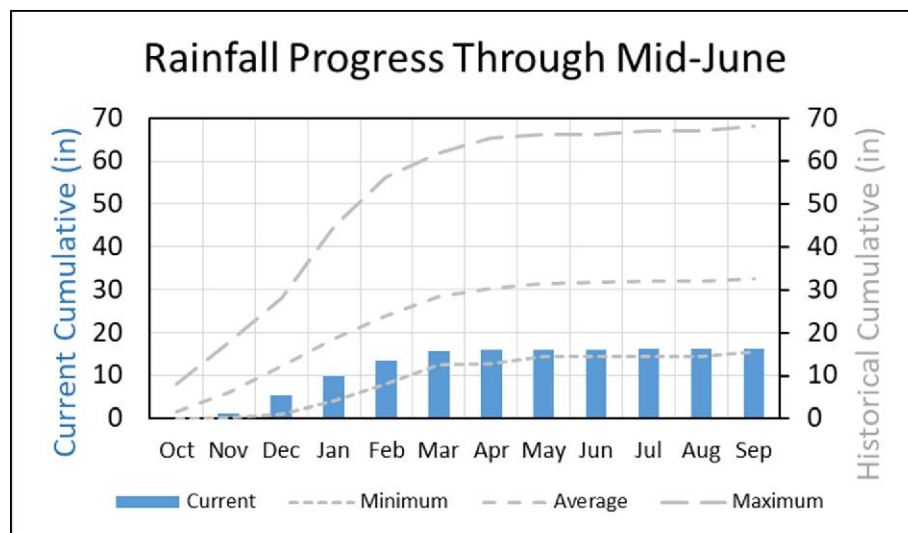


⁶ Note: staff repeatedly and on different dates has measured a rate of flow past/around the dam at 6 GPM, or 8,640 GPD, but for purposes of this memo and to be conservative in the event this flow should increase, the model assumes a continued flow past/around the dam of 10 GPM.

⁷ Dry season creek flow minus estimated flows past/around the dam.

With regard to the BF recession model on the prior page, it is interesting to note that on June 10, 2020, the “starting point” documented creek flow in the Arroyo Hondo (the highest blue dot in the upper left-hand corner of the graphs) was 138,276 GPD, whereas on June 6, 2021 – almost exactly one year later – the documented creek flow in the Arroyo Hondo (the highest blue dot depicted above the “6/1/2021” on the horizontal bottom axis) was 90,870 GPD. As such, the creek flow in June 2021 was only about 2/3 of the creek flow in June 2020. This decline in creek flow roughly correlates with the differential in cumulative precipitation for those years (22.7 inches total rainfall in 2019-20 and 16.3 inches of total rainfall in 2020-21) – in other words, rain flow in 2020-21 was about 2/3 of the rainflow in 2019-20.

The next two graphs depict rainfall received in Bolinas as of mid-June, 2021: 16.12 inches from October 1, 2020 – mid-June 2021) relative to historic minimum, average and maximum rainfall (68 years of BCPUD rainfall data); as these graphs show, the district has received only slightly above the minimum recorded rainfall for this time of year.



Finally, the graph below correlates the rainfall progress through June of each year with total annual rainfall for the available historical record (preceding 68 years). During that time, the district has experienced only 4 other years where the rainfall received was 16.12 inches or less through the end of June. Those rain years generally turned out to be *much* drier than normal years with a minimum total rainfall received of 15.6 inches, a maximum of 18.4 inches, an average of 16.9 inches and a line of “best fit” projection of 16.8 inches. These statistics are consistent with the documented facts concerning the 2020-21 rain year: is was one of the lowest rainfall years on record in Bolinas.

