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Re: Protest of May 17, 2021 Temporary Urgency Change Petition by the California Department of Water Resources and U.S. Bureau of Reclamation for the State Water Project and Central Valley Project[1]

To the State Water Resources Control Board:

This Protest requests that the State Water Resources Control Board ("Water Board") require a written report by the Petitioners on the methodology used for the runoff forecast used in this year's Drought Contingency Plans, together with an evaluation of the reasons for the errors in this year's runoff forecast by September 30, 2021. We also request that the Board hold a workshop to receive input on the Petitioners' subseasonal runoff forecast methodology by November 30, 2021. These actions are necessary to protect the public interest and the public trust in future drought years.

The Temporary Urgency Change Petition states:

> Although well below average rainfall, the snowpack in March 2021 indicated that sufficient reservoir inflow was likely available to meet requirements. Conditions

[1] The TUCP was filed for Permits 16478, 16479, 16481,16482 and 16483 (Applications 5630, 14443, 14445A, 17512 and 17514A) of the California Department of Water Resources and License 1986 and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 20245, and 16600 (Applications 23, 234, 1465, 5638, 13370, 13371, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 14858B, and 19304) of the U.S. Bureau of Reclamation.

> significantly changed at the end of April 2021 when it became clear that expected reservoir inflow from snowmelt failed to materialize. The May 90% exceedence forecast for the water year Sacramento Valley Four River Index identified a reduction of expected runoff of 685 TAF from those generated only a month earlier in April.

The same projections were in the Petitioner's March 22, 2021 Updated Drought Contingency Plan. The projections indicated that sufficient reservoir inflow was likely available to meet requirements. It has become clear that the forecasting used in the Petitioner's Drought Contingency Plans is inadequate for drought contingency planning with climate change conditions in the watershed.

One issue could be using runoff forecasts being based on historical runoff in analogous water years. The issue with using historic hydrologic information has long been noted by the Department of Water Resources engineers. In *Using Future Climate Projections to Support Water Resources Decision Making in California*[2], DWR's water resources engineers noted:

> In water resources planning, it is often assumed that future hydrologic variability will be similar to historical variability, which is an assumption of a statistically stationary hydrology. This assumption no longer holds true under climate change where the hydrological variability is non-stationary. Recent scientific research indicates that future hydrologic patterns are likely to be significantly different from historical patterns, which is also described as an assumption of a statistically non-stationary hydrology. In an article in Science, Milly et al. (2008) stated that "Stationarity is dead" and that "finding a suitable successor is crucial for human adaptation to changing climate."

The table below shows the reduction in the Four River Index this year with successive forecasts. In retrospect, the increase of 1.1 MAF in the runoff forecast in February was overly optimistic, and was not reduced enough in the March and April forecast.

SACRAMENTO RIVER UNIMPAIRED RUNOFF - SACRAMENTO RIVER INDEX (SRR)

	Probability of Exceedance					
Forecast Date	99%	90%	75%	50%	25%	10%
Dec 1, 2020	4.7 (26%)	6.7 (38%)	9.3 (52%)	12.8 (72%)	18.2(102%)	22.5(126%)
Jan 1, 2021	4.5 (25%)	6.3 (35%)	8.0 (45%)	10.9 (61%)	14.8 (83%)	18.8(105%)
Feb 1, 2021	6.1 (34%)	7.4 (41%)	8.6 (48%)	9.8 (55%)	11.3 (63%)	13.1 (73%)
Mar 1, 2021	5.8 (33%)	6.7 (38%)	7.6 (43%)	8.7 (49%)	9.9 (55%)	11.1 (62%)
Apr 1, 2021	6.3 (35%)	6.7 (38%)	7.3 (41%)	8.0 (45%)	8.8 (49%)	9.5 (53%)
May 1, 2021	5.8 (33%)	6.0 (34%)	6.3 (35%)	6.7 (38%)	7.2 (40%)	7.5 (42%)

[2] Francis Chung et. al., *Using Future Climate Projections to Support Water Resources Decision Making in California, Department of Water Resources,* May 2009.

The SWP and CVP March 22, 2021 Updated Drought Contingency Plan[3] states only:

> The Water Supply Index (WSI) forecasts that are utilized for this March Drought Plan are unique to this water year and informed by precipitation, runoff, and other antecedent hydrologic conditions as they existed on March 1, 2021.

No other information given on the methodology for the Water Supply Index Forecasts.

In conclusion, there appear to have been significant errors in the Petitioners' runoff forecasting, which are likely due to climate change. A written report by the Petitioners on the methodology used for the runoff forecast used in this year's Drought Contingency Plans will allow stakeholders to evaluate the methodology. A workshop would allow stakeholders to provide input on better subseasonal forecasting, which is of critical importance in protecting the public interest and the public trust. Given the enormous impacts of the Petitioners' TUCPs, the Water Board should include these requirements in the TUCP Order.

Sincerely,

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[3] California of Water Resources and the U.S. Bureau of Reclamation, State Water Project and Central Valley Project Drought Contingency Plan, March 1, 2021 – September 30, 2021, March 22, 2021. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Files/ITP/CVP-and-SWP-Drought-PlanFinal32221ay11.pdf.