

Memo

Date: Tuesday, October 06, 2020

Project: Water Supply Analysis TM

To: Doug Rodderick, NID

From: Megan Lionberger, P.E. and Sergio Jimenez, P.E.

Subject: Alternative 5-year drought based on the five-consecutive driest years in the 1976-2011 period of record

DWR recently released its Urban Water Management Plan draft guidebook for public review. The guidebook directs urban water suppliers to include a water service reliability assessment for a normal year, a single dry year and a five-consecutive-year drought. The following screenshot from the guidebook describes the definition of a five-year drought. While it directs the water supplier to use the driest five-year sequence within the historical period of record, DWR will allow suppliers to characterize the five-year drought differently.

- **Five-Consecutive-Year Drought.** The five-consecutive year drought for the DRA would be the driest five-year historical sequence for the Supplier (Water Code Section 10612). For the water service reliability assessment, Suppliers are encouraged to use the same five-year sequence for their water service reliability assessment. However, they may choose to use a different five-consecutive year dry period such as the lowest average water supply available to the Supplier for five years in a row. Suppliers are encouraged to characterize the five-consecutive year drought in a manner that is best suited for understanding and managing their water service reliability.

From Section 7.7.7.1, <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans/Draft-2020-UWMP-Guidebook.pdf?la=en&hash=266FE747760481ACF779F0F2AAEE615314693456>

NID asked HDR to modify the 5-year drought recently developed for the Water Supply Analysis Technical Memorandum (TM), presented as Table 3-1, to use the 5-consecutive driest years in the 1976-2011 2070 Median climate change hydrologic period of record. Figure 1 shows the 5-year running average watershed runoff. The five driest consecutive years are 1987 through 1991. Year types for these 5 years based on the Smartsville Index are 1987 - critically dry, 1988 - dry, 1989 - above normal, 1990 - dry, and 1991 - dry.

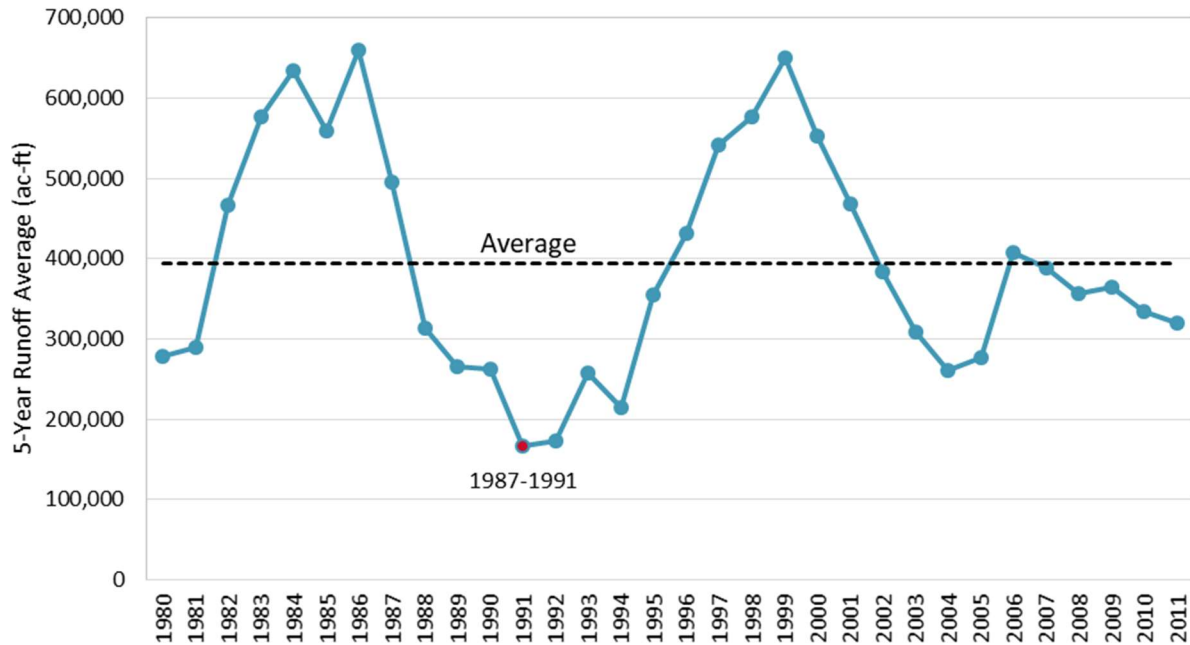


Figure 1. Running five-year average water runoff, showing the 1987-1991 five-year minimum.

The analysis presented in Table 3-1 of the Supply TM was updated using consecutive Water Years 1987 through 1991, shown in Table 1, below. In addition to watershed runoff, environmental flow requirements and PG&E contract purchase values were also updated. An assessment of the total annual supply indicated that the first year, 1987, was in drought stage I of the NID drought management plan, with a voluntary usage reduction of 10-20%. Assuming a 10% reduction in usage in year 1, year 2, 1988, was a drought stage 4, requiring a 40% usage reduction. Year 2 was the only year in analysis resulting in a water supply shortage. Year 3, an above normal Water Year essentially resets the system resulting in a higher than average carryover storage going into year 4, assuming no runoff is lost to spill. 1990 and 1991 are both moderately dry years, relative to the first two year in the drought analysis. Runoff in these years, in combination with the higher than average initial carryover storage results in adequate supply to meet full deliveries in the last two years of the 5-year drought.

Table 2. Summary of 2070 5-Year Drought Water Supply, assuming conditions in consecutive Water Years 1987 through 1991.

Analysis Variable	Avg. Year	Hypothetical 5-Year Drought				
		1987	1988	1989	1990	1991
Watershed Runoff (ac-ft) ¹	383,500	97,200	95,200	315,900	158,200	166,700
Available Carryover Storage (ac-ft) ^{2,3}	87,500	87,500	8,120	0	118,215	72,279
Contract Purchases from PG&E (ac-ft) ⁴	7,500	38,100	32,200	34,900	30,500	30,900
Recycled Water (ac-ft) ⁵	5,300	5,300	5,300	5,300	5,300	5,300
Total Supply (ac-ft) ⁶	483,800	228,100	140,820	356,100	312,215	275,179
Environmental Flow Requirement (ac-ft) ⁷	46,200	27,900	24,000	45,100	31,000	27,000
Total Demand Before Reduction (ac-ft) ⁸	255,136	236,836	232,936	254,036	239,936	235,936
Drought Action Stage ⁹	-	I	IV	-	-	-
Drought Demand Reduction ⁹	0%	10%	40%	0%	0%	0%
Total Demand with Reduction (ac-ft) ⁸	255,136	219,980	161,475	237,885	239,936	235,936
Water Supply Shortage (ac-ft) ¹⁰	0	0	-20,655	0	0	0

- 1 Period of Record average and Water Years 1987-1991 watershed run-off are based on results of the Hydrologic Analysis TM under median climate change conditions, per NID water rights (see Section 2.1 of the Water Supply TM).
- 2 Average available carryover storage is usable storage simulated by the HEC-ResSim model (average October 15 carryover storage minus 9,218 ac-ft dead storage) based on FERC FEIS minimum flows, 2060 projected demands from the Raw Water Demand Model Update, and 2070 median climate change hydrology developed in the Hydrologic Analysis TM.
- 3 Carryover storage represents conditions at beginning water year and is calculated as the previous year's carryover storage plus the previous year's total supply minus the previous year's total demand with reduction.
- 4 Estimates are based on Appendix B of the Coordinated Operations Agreement. Availability is subject to hydrologic conditions.
- 5 Projected municipal recycled water supply from 2015 UWMP.
- 6 Total supply is equal to watershed runoff + available carryover storage + contract purchases from PG&E + recycled water.
- 7 Environmental flow requirements are based the Smartsville Index and historical DWR Bulletin 120 data.
- 8 Total demand is equal to customer demand + environmental flow requirement.
- 9 Based on NID's 2015 Drought Management Plan.
- 10 Total Supply minus the total demand with reduction, if less than 0.