

# Northern Nevada Water Planning Commission

## STAFF REPORT

**DATE:** December 1, 2016  
**TO:** Chairman and Members, Northern Nevada Water Planning Commission ("NNWPC")  
**FROM:** Jim Smitherman, Water Resources Program Manager  
**SUBJECT:** Review, discussion and possible revision of draft Policy 1.2.a of the "Regional Water Planning Policies and Criteria" chapter of the 2016 Regional Water Management Plan ("RWMP") update, concerning conjunctive management of water supplies to withstand a 9-year drought cycle

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### **SUMMARY**

The drought standard policy as it appears in the Regional Water Planning Policies and Criteria chapter of the 2016 RWMP update is shown below:

**Policy 1.2.a: Conjunctive Management of Surface Water and Groundwater Supplies to Withstand a 9-year Drought Cycle**

For planning purposes, the conjunctive management of TROA-reliant surface and ground water supplies for municipal and industrial use in the greater Truckee Meadows area shall be designed to withstand the worst drought cycle of record, that being the drought of 1987-1994, plus one dry year (1987) added to the cycle.

A proposed revision to the policy is as follows:

**Policy 1.2.a: Conjunctive Management of Surface Water and Groundwater Supplies to Withstand an 8-year Drought Cycle**

For planning purposes, the conjunctive management of TROA-reliant surface and ground water supplies for municipal and industrial use in the greater Truckee Meadows area shall be designed to withstand the worst drought cycle of record, that being the drought of 1987-1994.

### **BACKGROUND**

The 8-year, 1987-1994 drought, the most severe on record, is the standard for Truckee Meadows Water Authority ("TMWA") water supply planning as stated at numerous locations in the TMWA 2035 Water Resources Plan ("WRP"). One example, on page 88 of Chapter 3, Integrated Management of Water Resources, states: "[u]nder TROA operations during the 8-year drought design (1987 to 1994) at 119,000 AF of demand TMWA continues to accumulate drought reserves through the drought period. TMWA has run several drought model simulations more severe than the drought of record with favorable results. These model runs are summarized in the attached discussion, and are presented in detail in the WRP.

TROA also uses an 8-year design drought to define the critical drought period. Additionally, an 8-year design drought was used to develop the TROA EIS.

In the past, pre-TROA versions of the RWMP's drought standard, one or more dry years was added to the 1987-1994 drought hydrology to develop a conservative drought standard for conjunctive management of water resources. With the 2015 implementation of TROA, the drought standard should be consistent among TROA, TMWA water supply planning and the RWMP.

As Section 43(2) of the Western Regional Water Commission Act requires the RWMP to be consistent with and carry out all aspects of TROA, staff recommends approval of the proposed revision.

**RECOMMENDATION**

Staff recommends that the NNWPC approve the proposed revision to Policy 1.2.a, and direct staff to include the revision in the draft Regional Water Planning Policies and Criteria chapter of the 2016 RWMP update.

JS:df

Attachment

**Objective 1.2 Provide for a Sustainable Water Supply and an Acceptable Level of Service to the Community**

**Policy 1.2.a: Conjunctive Management of Surface Water and Groundwater Supplies to Withstand an 89-year Drought Cycle**

*For planning purposes, the conjunctive management of TROA-reliant surface and ground water supplies for municipal and industrial use in the greater Truckee Meadows area shall be designed to withstand the worst drought cycle of record, that being the drought of 1987-1994, ~~plus one dry year (1987) added to the cycle.~~*

**Discussion:** The 8-year, 1987-1994 drought, the most severe on record, is the standard for TMWA planning. TROA also uses an 8-year design drought to define the critical drought period. Considering Section 43.2 of the Act requiring consistency with TROA and the 2015 implementation of TROA, it follows that the drought design standard should be consistent among TROA, TMWA water supply planning and the Regional Water Plan. In addition, TROA analysis has shown that under TROA operations water supplies and drought reserves accumulate to TMWA's benefit under the 1987 to 1994 drought hydrology. Since TROA implementation, TMWA has run several drought model simulations more severe than the drought of record with favorable results. These model runs are summarized below and discussed in detail in the TMWA 2035 WRP.

The meteorologic drought, begun in 2012, created hydrologic drought impacts in 2014 and 2015 which required TMWA to release some of its upstream drought reserves for the first time since 1992. As defined in TROA, the region has been in a Drought Situation (i.e., the level of Lake Tahoe is projected to be below elevation 6223.5 feet on November 15 of a given year) since 2014. Although the 2015/2016 snow season produced a moderate recovery year for water supplies, it cannot be known with certainty the duration of the current drought. In addition, analysis has shown that under TROA operations water supplies and drought reserves accumulate to TMWA's benefit under the 1987 to 1994 drought hydrology.

The TMWA 2035 WRP reports that analyses of California blue oak tree-ring data concluded that drought periods of 8-, 9- or 10-years are rare occurrences with frequencies of 1 in 230 years, 1 in 375 years, and 1 in 650 years, respectively. While there has not been any new tree ring data collected since the 2003 study, a preliminary dendrochronological reconstruction of water-year streamflow was performed using as predictors the western U.S. tree-ring chronologies available from the public-domain International Tree-Ring Data Bank ("ITRDB") dataset and stream flows from the Carson River. The Carson River does not have reservoirs compared to the Truckee River and is therefore a more natural flowing river providing better correlation with select tree-ring cores. This reconstruction of the Carson River extended from 1500 to 2001, a period five times longer than the instrumental record. The reconstruction of the Carson River had 211 wet and dry spells with an average duration of 2.4 years, with the longest episodes being a 9-year wet period (1978 to 1986), and two 8-year droughts in 1841-1848 and 1924-1931. These three episodes were also the strongest found in the 502 year history in the reconstruction dataset.

TROA was implemented in December 2015. To stress TMWA's upstream drought reserves under TROA operations, two hydrologic scenarios or simulations were performed to test the robustness of the region's back-up water supply. Two twenty (20) year hypothetical worse-than-worse-case scenarios were used. The first 20-year simulation ("Repeat1987") ran the 1987-1994 drought of record plus the 1988 hydrology back-to-back after starting with actual 2012 to 2015 hydrology--the four driest back to back years in recorded history (115 years record

keeping). The second scenario ("Repeat2015") repeated actual 2015 hydrological conditions for an additional 20 years after starting with actual 2012 to 2015 hydrology. Both model runs used TMWA's forecasted customer demands through 2035.

The results of the Repeat1987 model using the Bureau of Reclamation's *RiverWare* validate the work that was done for the TROA EIS using TROM. The results of the model run suggest that not only can this region withstand a repeat of the 1987-1994 drought over the course of the next 20 years under TROA, but that combined upstream drought reserves would continue to grow and reach over 70,000 acre-feet.

The results clearly show that under TROA the region's water supply is extremely resilient. When drought reserves are needed to supplement natural river flows during the peak summer demand months, storage is used during that period, but is quickly refilled over the course of the next winter and spring. By the time reserves may be for the following summer's demands, upstream reserves have been refilled and upstream reserves are in most years identical to the previous year's reserves, or in some cases, many times better.

Despite a repeat of 2015 hydrological conditions for 20 years following the four (4) driest years in recorded history (a statistically impossible scenario), TMWA's upstream reserves in the Repeat2015 scenario are not only sufficient, but actually increase throughout the planning horizon. The results once again illustrate the importance of the Truckee River Operating Agreement to this community.

TMWA will continue to monitor its ability to meet current and future demands through the 1987 to 1994 drought period, the worst drought period of record, and based on factors such as demand growth, conservation improvements, hydrologic cycles, climate changes, etc., update its Board should future conditions change that require changes to the planning criteria or supply operation.