Northern Nevada Water Planning Commission

STAFF REPORT

DATE: July 27, 2017

TO: Chairman and Members, Northern Nevada Water Planning Commission

FROM: Chris Wessel, Water Management Planner,

SUBJECT: Report on the analysis of historical precipitation data collected by Washoe County; discussion and possible recommendation to the Western Regional Water Commission ("WRWC") to approve a proposal from the Desert Research Institute ("DRI") for continuation of the regional precipitation monitoring project, in an amount not to exceed $20,000 from the Regional Water Management Fund ("RWMF"); and possible direction to staff.

SUMMARY

Dr. Dan McEvoy of DRI has reviewed the long term data collected as part of the regional precipitation monitoring program originated by Washoe County in the mid-1990s. The original purpose of the monitoring program was to establish observed precipitation in hydrobasins identified for future potential sustainable water importation projects. The program involves data collection and maintenance of 77 manual gauges (the "Network") where measurements are collected. In order to validate the usefulness of the data, Dr. McEvoy proposed to conduct the following analysis:

- Conduct a thorough QA/QC of all Network data to eliminate any spurious measurements;
- Evaluate the Network's value on the performance of gridded data products in the data sparse regions of Washoe County by comparison of observed values to modeled grid data. Error statistics including correlation, bias, and root mean squared error will be computed at each station using the entire record;
- Develop a final report to summarize the results from the data analysis and discuss implications for potential hydrologic applications using the Network data such as groundwater recharge estimates and precipitation trend analysis.

Dr. McEvoy will present on his findings regarding his analysis of the precipitation data.

At staff's request, DRI has submitted the attached proposal to provide personnel to continue the monitoring and maintenance of the Network at a cost not to exceed $20,000 for the Fiscal Year 2017-2018.

BACKGROUND

Washoe County sponsored a precipitation gauge monitoring program over the last 18+ years, as part of its regional water resource planning efforts. On May 4, 2016, the Northern Nevada Water Planning Commission ("NNWPC"), at its regular meeting, approved a scope of work and funding, in an amount not to exceed $37,989 from the RWMF, for DRI's proposed "Washoe County Rain Gauge Network: Continued Operation Plan and Historical Data Analysis" project, and recommended that the Commission approve the project and enter into an Interlocal Agreement with DRI for that purpose.

The monitoring gauges are serviced twice a year. The intended use of the precipitation data was/is to validate existing perennial groundwater recharge estimates within the targeted hydrobasins. The Network data has recently been compiled electronically and provides a unique opportunity to analyze the quality of Network precipitation records and use the data to validate spatial estimates of precipitation, while potentially improving existing groundwater recharge estimates.

Support for this project is identified in Chapter 2 of the 2016 Regional Water Management Plan which was approved by the NNWPC and adopted by the WRWC in the spring of 2017. The project is discussed as follows:

> *As a consequence of the merger of ("WCDWR") and TMWA, the WRWC inherited a long-term precipitation monitoring project from Washoe County which started in the mid 1990's. The project involves the collection of rain and snow fall using precipitation "can" gauges. The precipitation gauges are inexpensive, low tech, and simple to operate. As such the project has, over the last twenty years, expanded to include 77 sites where precipitation data are being collected in seven hydrographic basins including Cold Spring Valley, Lemmon Valley, Bedell Flat, Antelope Valley, Dry Valley, Smoke Creek Desert and Duck Lake Valley. The project is unique in the planning area as it represents the only long-term historic data record collected over a wide geographic area. Findings from the US Bureau of Reclamation study were released on February 2, 2016 and indicated that the region will likely experience an increase in mean annual temperature of five degrees over the next century. In addition, the findings suggest a 10-20 percent increase in the frequency and magnitude of floods affecting the Reno Sparks area.*
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> *The significance of this data collection effort becomes apparent when attempting to understand the hydrobasin microclimates which dominate the planning area. Currently, regional precipitation and climate models fail to predict observed microclimate conditions. Long-term data collection from a precipitation "can" gauge network in Washoe County provides a means of potentially calibrating regional models so they can be downscaled to better simulate microclimate conditions. The importance of refining these regional models will provide insight into climate variability trends as well as providing a more accurate analysis of hydrobasin recharge and perennial yield estimates. The information gleaned from these analyses will be key to planning the future of available water resources.*

FISCAL IMPACT

If approved, the fiscal impact to the RWMF will be $20,000. Budget authority is located in Fund Group 766, Fund 7066, Account Number 710100, Professional Services, Cost Object WP310007.

RECOMMENDATION

Staff recommends that the NNWPC consider the report, review the proposal, and, if acceptable, recommend that the WRWC approve DRI's proposal for continuation of the regional precipitation monitoring project for Fiscal Year 2017-2018, in an amount not to exceed $20,000 from the RWMF.

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Attachment: DRI Monitoring and Maintenance Proposal for the Fiscal Year 2017-2018.

Washoe County Rain Gauge Network: Continued Operation Plan and Historical Data Analysis

Personnel: Dan McEvoy, Greg McCurdy, and Albert Wolf, Desert Research Institute (DRI) and Western Regional Climate Center (WRCC)

Purpose

Washoe County installed and maintained a storage rain gauge network (Network) of over 80 gauges with records that date back to the late 1990s. Following the recent merger of the Washoe County water utility with Truckee Meadows Water Authority, the Network program responsibilities have been assumed by the Western Regional Water Commission (WRWC). The program involves data collection and maintenance of manual gauges where measurements are collected and gauges are serviced twice a year. The intended use of the precipitation data was to validate and potentially improve existing groundwater recharge estimates that are commonly calculated using Hardman maps or Parameter Regression on Independent Slopes Model (PRISM; Daly et al. 1994) data. Additionally, Network could be used to provide improved monitoring of regional water sources and supplies. Precipitation measurements outside of the Network are sparse in this region, especially central and northern Washoe County, and minimal efforts have been put into validating spatial estimates of precipitation. The Network data has recently been compiled electronically and provides a unique opportunity to analyze the quality of Network precipitation records, use the Network data to validate spatial estimates of precipitation, and potentially improve existing groundwater recharge estimates. We are proposing to have Desert Research Institute (DRI) continue assisting in the monitoring and maintenance of the network.

Scope of Work

Network Monitoring and Maintenance

DRI has a long history of weather station installation and maintenance and Greg McCurdy and Albert Wolff have extensive experience in this field and have spent significant time in remote regions of Nevada. DRI will assist WRWC staff in the collection and maintenance of the Network. This partnership between WRWC and DRI staff will help to develop familiarity with the locations of gauges, routes to follow, measurement process, precipitation record keeping, and gauge maintenance. Fieldwork will be conducted twice a year, one in the Fall and one in the Spring, to the Network to empty gauges, record precipitation measurements, and perform maintenance on all gauges.

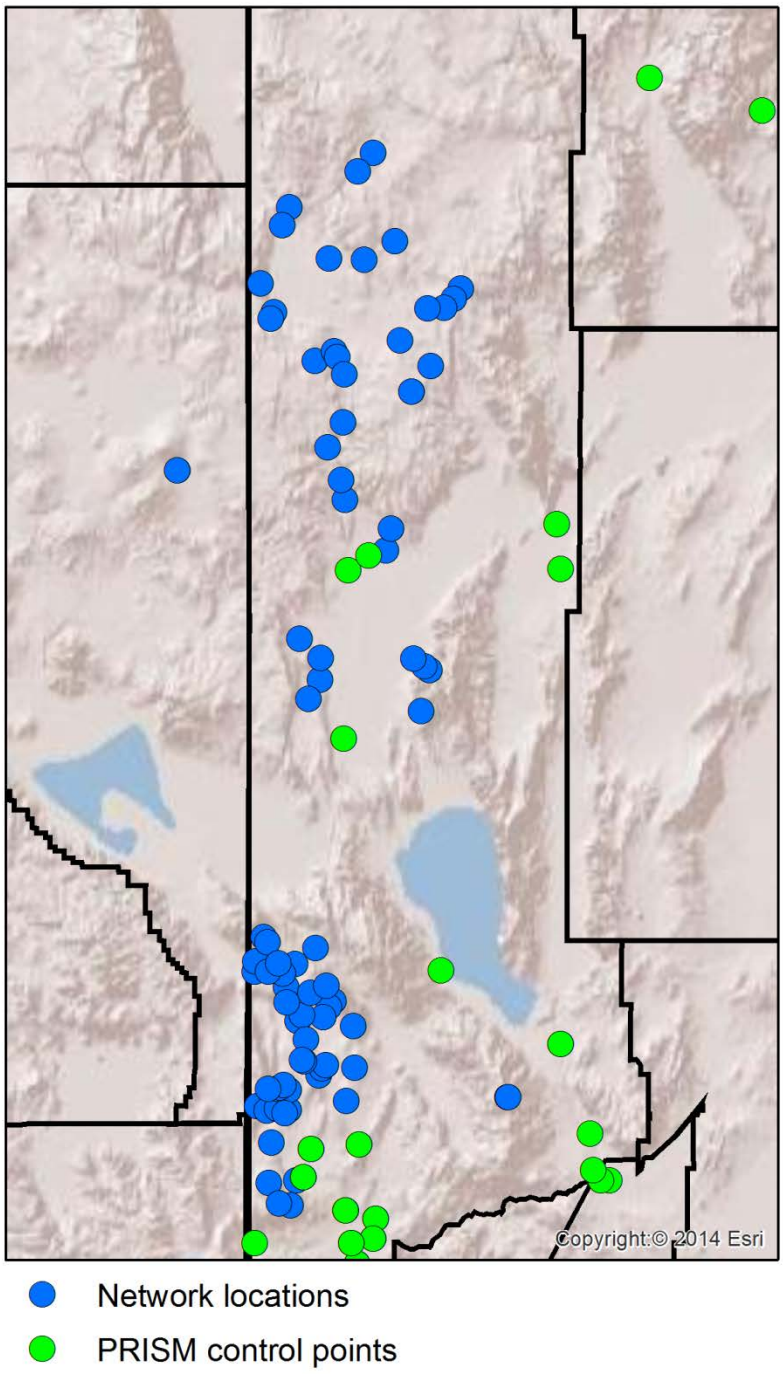

Figure 1. Network locations (blue dots) and PRISM control points (green dots) used in Jeton et al. (2005).

Cost Estimate

The *Network Monitoring and Maintenance* cost is estimated not to exceed $20,000 for fiscal year 2017-2018 .