January 18, 2019

California Water Plan Update 2018  
Strategic Water Planning Branch  
Statewide Integrated Water Management  
California Department of Water Resources  
PO Box 942836  
Sacramento, CA 94236-0001

Electronic submission to:  
Attn: Francisco Guzman  
cwpcom@water.ca.gov

Re: Comments: 2018 California Water Plan Update

Dear Mr. Guzman and Water Planners,

Thank you for the opportunity to comment on California’s 2018 Draft Water Plan Update (Update). These comments are submitted on behalf of two organizations that are intensively involved in protection of the Medicine Lake Highlands — Medicine Lake Citizens for Quality Environment, and Mount Shasta Bioregional Ecology Center.

**MEDICINE LAKE CITIZENS FOR QUALITY ENVIRONMENT** is a grassroots non-profit organization, founded in 1998. Our goals have been to promote and protect the unique environmental and recreational values of the Medicine Lake Highlands including its immense volcanic aquifers.

**MOUNT SHASTA BIOREGIONAL ECOLOGY CENTER** is a nonprofit organization dedicated to protecting and restoring the outstanding natural environmental and cultural values of Mount Shasta and its surrounding bioregion since 1988.

Medicine Lake Volcano is located in northeastern Siskiyou County. The Highlands encompass the uppermost reaches of the volcano. Nestled in the heart of the Highlands caldera is the volcano’s namesake, Medicine Lake, a high-elevation, snow fed alpine lake. Medicine Lake volcano is the largest volcano by volume in the Cascade Range that extends from British Columbia to northeastern California. Medicine Lake Volcano is a broad shield volcano covering some 850 square miles. The Modoc, Klamath and Shasta-Trinity National Forests all converge in the Highlands. The rugged volcanic landscapes of
the Lava Beds National Monument were formed by age old eruptions from the Medicine Lake Volcano.

With these comments, we are including two studies of high relevance to the management needs of the Medicine Lake volcanic aquifer:

— *California’s Water Future: Hydrogeological Report on the Risks to the Medicine Lake Volcano Aquifers*, by Robert Curry Ph.D., Registered California Geologist (3295), University of California emeritus professor, 2014; and


These studies analyze the groundwater aquifer that supplies the Fall River Springs and demonstrate the value of Medicine Lake Volcano’s passive (requiring no maintenance), gravity-fed, pristine water to the entire State of California.

The Update emphasizes the State government’s unique role and commitment to sustainable, equitable, long-term water resource management and the need to bolster efforts by water and resource managers, planners and decision makers.

To help achieve the State’s commitment and bolster these efforts, the managers, planners and decision makers need to look beyond the Sierra Nevada as the state’s main source of water supply and groundwater recharge. The Update fails to mention or even recognize the vast groundwater and natural recharge supplied by northern California’s Cascade volcanoes, including Medicine Lake Volcano, Mount Shasta, and Mount Lassen. Annually, these snow-capped mountains recharge extensive underlying volcanic aquifers, which store and release vast quantities of groundwater to spring fed rivers that supply multiple human, wildlife and aquatic needs while providing drought resilience.

Rain and snowfall at Medicine Lake Volcano are stored underground in volcanic aquifers and released at an annual volume of 1-1.4 million acre feet at the Fall River Springs, California’s largest spring system (Curry, 2014). The spring waters then flow into the Fall River, a major tributary of the Pit River, which flows into Shasta Lake Reservoir. Groundwater stored under Mount Shasta flows into the Shasta, McCloud and Upper Sacramento Rivers. These volcanic spring fed rivers are the major sources of inflow to Shasta Lake, providing 15-30% of drought year storage and contributing to the Central Valley Project. Mount Lassen’s volcanic aquifers supply Hat Creek to the north and Lake Almanor to the south. Half of Lake Almanor’s water comes from springs, supplying water to the North Fork of the Feather River, flowing into Lake Oroville and the State Water Project.

The volcanic aquifers underlying California’s Cascade mountains provide spring fed rivers that generate up to 40% of the states hydroelectric power, which plays an important role in fulfilling California’s renewable energy needs.
Climate change is the leading cause of more frequent and intense droughts. Because of their immense storage capacity, drought resilient volcanic aquifers provide a steady supply that keeps rivers flowing. With increased temperatures, less snow and more rain, these cold temperature volcanic aquifers are becoming increasingly important to the state’s water supply, they also provide the necessary cold temperatures needed for the survival of endangered and threatened aquatic species.

Even though California’s Cascade volcanic aquifers are located in less populated areas, they nonetheless face threats from industrial development and land use changes. Ground disturbing activities in volcanic regions tend to promote long-lasting sediment intrusion, filtering through the porous landscapes, thus affecting groundwater quality and flows.

Geothermal development has the potential to impact volcanic aquifers by heightened ground disturbing activities including new roads, power plant and pipeline construction, forest fragmentation and clear cuts for the numerous power plants and high-voltage transmission line corridors, excavation of huge waste water sumps, and use of toxic chemicals.

Since the 1980’s, the Medicine Lake Highlands have been the target of geothermal leasing and exploration leading to proposed development projects. A controversial environmental review period in the late 1990’s determined “no significant environmental impacts”. Subsequently, BLM and Siskiyou County issued EIS/EIRs for two 49 MW geothermal projects. Native American Tribes, environmental groups, and Stanford Environmental Law Clinic have been challenging these industrial projects for over 20 years, due to the projects’ significant impacts to hydrologic, cultural, environmental and recreational values.

In 2012, the developer revealed plans to enlarge the scope of development to 480 MWs. The new proposal would include enhanced geothermal systems (EGS), involving hydraulic fracturing with toxic chemicals (also known as geothermal “fracking”).

To support the 480 MW proposal, large-scale water resources would be needed for the EGS based project. Potential spills and other unanalyzed risks to water quality and quantity would increase exponentially with the new project size. The chemicals used with water intensive, high pressure EGS projects would include toxic hydrofluoric and hydrochloric acids, used to fracture rock to release steam. High pressure injection can cause acid migration, cross contamination, and trigger seismicity, thus affecting water quality and aquifer flow patterns. The potentially affected downstream users in the Fall River Valley, to our knowledge, do not have a formal groundwater sustainability agency (GSA) that would be needed for stakeholder input or protection for the Medicine Lake volcanic recharge area.

Mount Shasta’s spring water has been the target of numerous water bottling and beverage companies. Presently, there are three bottling plants and two more set to open. These plants depend on pristine water, either drawn from the mountain’s springs or by drilling into its volcanic aquifers. The total amount of water being extracted for water bottling purposes is unknown and unregulated by the state or the county. There is no groundwater management to assess the impact of groundwater extraction that could affect surrounding households and downstream users.
Despite their importance to the state, these volcanic aquifers have never been studied in a systematic fashion, leaving unanswered questions regarding precipitation intake, storage and release. Further monitoring, studies and effective policy are needed to ensure sustainable management.

State groundwater policy currently excludes the volcanic aquifers from the requirements of the state’s Sustainable Groundwater Management Act (SGMA). SGMA is an admirable achievement to better manage state water resources. However, DWR’s Bulletin 118 at present excludes volcanic aquifers from groundwater basin consideration, as the aquifers are not composed of alluvial material. In spite of the aquifers’ vast storage capacities, none of the volcanic aquifers are included in DWR’s basin boundaries.

Bulletin 118 basin boundaries would have to be modified from alluvial criteria to include California’s northeastern volcanic regions in order to be recognized by SGMA. It is important for the volcanic regions surrounding current basins to be designated as recharge areas and thus be included in the basin boundaries.

California’s Cascade volcanic aquifers are largely unrecognized, unstudied and unprotected, even though they substantially contribute to the state’s water supply, its hydroelectric supply, and its spring fed river ecosystems.

We urge State water policy and resource managers, planners and decision makers to include the State’s Cascade volcanic mountains and their underlying aquifers in their planning. To preserve these important water resources for California water users, a comprehensive plan is needed to address the value of these headwaters, develop an understanding of their dynamics, monitor and measure changes, and manage them to protect water quality and quantity.

To achieve these sustainable management goals, the following objectives and strategies should be incorporated into the 2018 Water Plan Update:

- Include pristine volcanic headwaters, aquifers and recharge areas in the Update
- Establish baseline studies and monitoring, measure current aquifer flow rates and changes
- Identify and protect drought and climate change resilient waters flowing into the Central Valley and State Water Projects
- Maintain cold water flows and habitat for aquatic wildlife species
- Maintain a reliable water supply for Northern California water uses, including drinking water, cultural values, agriculture, hydroelectric, wildlife habitat needs, and recreation
- Develop policy and management strategies for the volcanic aquifers
- Develop a cooperative protection and monitoring plan with the US Forest Service and BLM where recharge areas are located on federal lands
- Create a system of economic valuation for ecosystem services that could be paid to counties which provide critical source waters to the state
- Update SGMA to recognize volcanic aquifers and the need for resource protection
- Update Bulletin 118 to reinstate volcanic aquifers, extend basin boundaries to protect recharge areas
In closing, we encourage the water and resource managers, planners and decision makers to carefully consider the two attached studies and our comments, so that the California Water Plan Update will adequately address vital North State volcanic water resources, management and protection needs.

With much appreciation for your consideration,

Janie Painter
Director, MEDICINE LAKE CITIZENS FOR QUALITY ENVIRONMENT

Michelle Berditschevsky
Founder / Senior Conservation Consultant, MOUNT SHASTA BIOREGIONAL ECOLOGY CENTER


cc: Stanford Environmental Law Clinic
Pit River Tribe
Native Coalition for Medicine Lake Highlands Defense