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**To: California State Water Resources Control Board**

**From: Dylan O’Ryan**

**Subject: California Water Crisis**

The California water crisis can be explained by three-pronged causes: (1) increased drought conditions; (2) groundwater levels decreasing; (3) pollutants in water. I am going to outline a three-pronged approach to fixing the water crisis in California and beyond: (1) increased research; (2) water curtailments of users; (3) research-driven policies; in which the State Water Resources Control Board (SWRCB) should be responsible for overseeing this process.

Firstly, researchers have shown that there is an increasing crisis facing water access in California, namely in the San Joaquin Delta. Luoma et. al. (2015) outlined challenges that the Delta is facing: California’s water supply is over-allocated, where more than 500% of average annual river flows is allocated to state water rights; a decaying water management infrastructure; native ecosystems and species are declining; chemical runoff from industries is threatening the water quality of the Delta. With all of these complex challenges that one small segment of California water is facing, this is only magnified across the state. Additional scientist and researchers have outlined three main characteristics of the global water crisis: (1) unsustainability, essentially a dramatic decline in water availability and stock; (2) vulnerability, high variability in water resource availability resulting in decreased human wellbeing; (3) chronic scarcity, which is persistent inadequate access to water (Srinivasan et. al., 2015). These main characteristics of the global water crisis all contribute to decreasing human wellbeing in a

national and global scale, conveying the importance of shifting the way that we manage water to ensure access to clean, safe drinking water and levels of water that enable ecosystem safety.

The first cause of the water crisis in California is increased drought conditions. Droughts can be defined in many ways (e.g., meteorological, hydrological, agricultural, and socioeconomic), however, the simplest definition for drought is the “mismatch between the amounts of water nature provides and the amounts of water that humans and the environment demand” (Mann and Gleick, 2015). Research is reinforcing ideas from past studies on droughts, where there is a growing risk of droughts in the “western United States driven primarily by raising temperatures” (Mann and Gleick, 2015). Researchers are also concluding that the California drought challenges are a result of snowpack decrease, reservoir water storage decrease, and a decrease of groundwater access (Galvani, n.d.). With the drought conditions increasing in California, access to water is not the only issue associated with drought. Saltwater intrusion is driven by drought, as water is pulled from the Delta the water-level decreases allowing for saltwater from the Bay to enter the water system (Luoma et. al., 2015).

In addition to drought conditions in California, groundwater levels are decreasing increasing the water crisis. Groundwater Californians majorly rely on groundwater as a source of their water use, totaling about 85 percent; in which some communities around California rely solely on groundwater (DWR, Spring 2020). From a Department of Water Resources (DWR) press release on groundwater levels in the state for Spring 2020, they conclude that groundwater levels are lower than general from the previous year [2019] (DWR, Spring 2020). Groundwater droughts (a decrease in groundwater levels) are “reduced recharge over a prolonged period of time and these droughts are often enhanced by human activities” (Van Lanen and Peters, 2000). Groundwater levels have been consistently decreasing since the mid-2010s, “from spring 2013 to

spring 2014, before the worst of the present drought hit, groundwater levels dropped in 88% of the wells in California, with 22% of those wells dropping by more than 10 feet in that one year” (Luoma et. al., 2015). Luoma et. al. (2015) outlines effects of groundwater level decrease where there are economic effects (cost increases and damage costs from subsidence), availability decreases, and land subsidence.

The third cause of the water crisis facing California is water pollution. Researchers recognize that water pollution is a huge factor that effects environmental ecosystems across the globe. A case study from California’s Central Coast identifies the effects of agricultural pollutants on water resources in California. Findings from the research states that “nonpoint sources of pollution are a major cause of water quality impairment” (Dowd et. al., 2008). Therefore, when addressing water pollution, you must recognize both point and nonpoint pollution sources to address a more holistic view of pollutants. Along with environmental effects of pollution, there are also a public health crisis associated with this. Around 76,000 health episodes (GI, respiratory, eye, and ear infections) originate from polluted waters of Orange County’s Newport and Huntington Beaches (Dwight et. al., 2005).

I identify a three-pronged approach to fix water crisis: (1) increased research; (2) water curtailments of users; (3) research-driven policies. With increased research there would be increased knowledge base on the water crisis. Therefore, funding state-level research and prioritizing the three-pronged causes of the water crisis would be beneficial in curtailing the water crisis. Water curtailments have been shown to work, as identified by Lee et. al. (2001), “on average [gallons per capital per day] was reduced by 34% in 2019 when compared to 1994 levels” (Lee et. al., 2021). This research conveys the usefulness of water curtailments that are placed on users as a method of decreasing water usage. Therefore, I suggest water curtailments

should be placed on users during a water crisis. The last pronged approach to the California water crisis would be research-driven policies. With the implementation of policies that are built around current research being done on water access in California, we can better design policies to address the water crisis.

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