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March 3, 2017

Felicia Marcus, Chair, and Members of the Board
State Water Resources Control Board
c/o Jeanine Townsend, Clerk to the Board
P.O. Box 100
Sacramento, CA 95812-0100
Submitted via email to: *commentletters@waterboards.ca.gov*

Comment letter— Climate Change Resolution

Dear Chair Marcus and Members of the Board:

The Wheeler Water Institute at the Center for Law, Energy & the Environment, along with the UC Water Security and Sustainability Research Initiative (UC Water), the Berkeley Water Center, and other colleagues in the University of California system, respectfully submits the following comments in response to the State Water Resources Control Board's Consideration of a Proposed Resolution Adopting a Comprehensive Response to Climate Change.[1]

The Board's proposed resolution is timely given the extremes of recent weather patterns, including this winter's intense wet period coming on the heels of a multi-year drought. As these weather patterns illustrate, California must be better prepared for the intensification of extreme dry and wet conditions brought by climate change. Indeed, much has changed in the state of knowledge about climate change, its impacts, and the potential for responses since the Board's

[1] http://www.waterboards.ca.gov/board_info/agendas/2017/feb/022217_8.pdf

last resolution in 2007.[2] Anthropogenic warming has been directly implicated in California's recent drought.[3] Moreover, projections based on climate models show a myriad of impacts including increased variability of the distribution of water year types, increased potential for extreme weather events, and increased frequency of dry years.[4] Additionally, projections show an increased shift in precipitation type from snow towards rain.[5] More than five years of drought and a very wet beginning to the 2017 water year that resulted in widespread flooding and struggles to manage reservoir releases, especially at Oroville Dam, illustrate the importance of addressing the hydrologic variability and extreme weather events that are projected to accompany future climate change.[6] Given that, in the near future, severe drought as well as high degrees of variability may not represent an anomaly but, rather, the new normal,[7] the Board is wise to act now to avoid a state of perpetual crisis in California's water future.

We commend the Board for this timely effort to address both mitigation of greenhouse gas emissions and adaptation to the effects of climate change. Forward-looking leadership will be essential to address the increasingly urgent issue of climate change.

We particularly support the following actions outlined in the Resolution:

1. *Encouraging mitigation through reduction of energy intensity.* As the Resolution outlines in section I, decreasing the energy intensity of California's water supply is an important mitigation measure. We support these mitigation efforts, and encourage the Board to go further in explicitly addressing energy intensity of specific water sources (see recommendation 1 below). We also encourage the Board to give more explicit consideration to the energy intensity of wastewater treatment (see recommendation 2 below).

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[2] SWRCB Resolution No. 2007-0059, http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2007/rs2007_0059.pdf

[3] See, for example, Williams, A. P., R. Seager, J. T. Abatzoglou, B. I. Cook, J. E. Smerdon, and E. R. Cook (2015), Contribution of anthropogenic warming to California drought during 2012–2014, *Geophys. Res. Lett.*, 42, 6819–6828, doi:10.1002/2015GL064924. See also Diffenbaugh, N.S., D.L. Swain, and D. Touma (2015), Anthropogenic warming has increased drought risk in California, *PNAS* 12 (13) http://www.pnas.org/content/112/13/3931.abstract

[4] See, for example, Natural Resources Agency (2014), *Safeguarding California: Reducing Climate Risk. An update to the 2009 California Climate Adaptation Strategy.* http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf See also Miller, K.A., A.F. Hamlet, D.S. Kenney, and K.T. Redmond (2016), *Water Policy and Planning in a Variable and Changing Climate.* Taylor and Francis.

[5] See, for example, Kapnick, S. and A Hall (2012), Causes of recent changes in western North American snowpack. *Clim. Dyn.* 38, 1885–1899 https://link.springer.com/article/10.1007%2Fs00382-011-1089-y. See also Berghuijs, W.R., R.A. Woods and M. Hrachowitz (2013), A precipitation shift from snow towards rain leads to a decrease in streamflow, *Nature Climate Change* 4, 583-586. http://www.nature.com/nclimate/journal/v4/n7/abs/nclimate2246.html

[6] Natural Resources Agency (2014) *Safeguarding California: Reducing Climate Risk. An update to the 2009 California Climate Adaptation Strategy.*

[7] See, for example, Cook, B.I., T.R. Ault, and J.E. Smerdon (2015), Unprecedented 21st century drought risk in the American Southwest and Central Plains, *Science Advances,* February 12. http://advances.sciencemag.org/content/1/1/e1400082.short

2. *Improving ecosystem resilience.* In section II, the Resolution enumerates strategies to enhance ecosystem resilience to impacts of climate change. We commend the Board on their emphasis on long-term planning in this section, and encourage the Board to go further by explicitly addressing flow requirements (see recommendation 3 below). We also encourage the Board to expand the incorporation of effects of climate change into the evaluation and approval of long-term projects not only in the Delta, but also more broadly (see recommendation 4 below).
3. *Assessing and responding to climate change vulnerability.* Section III of the Resolution outlines a plan for assessing vulnerability to climate change, sharing this information publicly, and taking concrete actions to address vulnerabilities. We support this effort, and encourage the Board to go further in specifically addressing the needs of disadvantaged communities (see recommendation 5 below).
4. *Relying on data, modeling, and analysis.* Section IV of the Resolution outlines a plan to provide access to climate change data, and to take climate change impacts into consideration when conducting analyses of water availability and shortages.[8] We support this emphasis on relevant data and sound modeling, and encourage the Board to go further by addressing the Division of Water Rights' broader data needs for effectively administering and enforcing California's water rights system in the context of climate change (see recommendation 6 below).
5. *Public outreach on the Board's efforts to address climate change.* Section VI of the Resolution describes the Board's plan to communicate with the public on climate change-related actions and policy goals. Such a communication plan is of central importance and we support this proposal. We encourage the Board to consider further actions to help build communications capacity (see recommendation 7 below).

In addition to supporting the above aspects of the Resolution, we recommend the following:

1. *Explicitly address energy intensity of different water sources.* While the Resolution encourages the development of lower-energy water supplies, the Resolution does not specifically address the differential energy intensity and differential greenhouse gas emissions of different water sources.[9] The Resolution should explicitly prescribe an evaluation of energy intensity and greenhouse gas emission intensity of different water sources, and describe how the Board will take such an evaluation into account in its decisions on permitting.

[8] E.g. Resolution Section IV(19).
[9] See, for example, Stokes, J., and A. Horvath (2009), Energy and air emission effects of water supply, *Environmental Science & Technology* 43(8) 2680-2687.

2. *Give further consideration to the potential for energy intensity and GHG reductions in wastewater treatment.* Given that great potential exists for reducing the climate impacts of wastewater treatment:[10]

    a. The Board should consider supporting efforts to monitor and reduce greenhouse gas emissions associated with wastewater treatment, to integrate renewable energy production with wastewater treatment facilities where possible, and to clarify where other goals such as water quality and local air quality concerns may imply tradeoffs or methodological limitations.

    b. While the emphasis on disadvantaged communities is clearly important, the Board should expand the technical assistance programs to support the development of energy-efficient wastewater treatment systems[11] to all communities across the state.

3. *Explicitly address flow requirements*. Water year type designations are used to make many water management decisions, including around environmental flow requirements; however, climate models estimate significant potential changes in frequency of water year types.[12] To support the Board's goals of improving ecosystem resilience, the Resolution should explicitly put forth an adaptive management plan for establishing flow objectives and flow requirements that are consistent with and take into account projected climate change. Such a plan should include regular updates to water year types in order to maintain desired instream flow requirements.[13]

4. *Expand the incorporation of effects of climate change into long-term planning more broadly.* In section II(9) the Resolution discusses incorporating effects of climate change into decision-making when evaluating and approving long-term projects in the context of the Delta. A separate point should be added to section II that states that the State Water Board staff shall incorporate effects of climate change when evaluating and approving long-term projects not only in the context of the Delta ecosystem, but more generally around the state.

5. *Specifically address the disproportionate impact of climate change on disadvantaged communities.* The laudable emphasis on disadvantaged communities in the Draft

[10] See, for example, Water Environment Federation (2013), *The Energy Roadmap: A Water and Wastewater Utility Guide to More Sustainable Energy Management.*

[11] In Section I(E)(5) the Resolution currently discusses providing technical assistance programs specifically for disadvantaged communities.

[12] See Null, S.E. and J.H. Viers (2013), In bad waters: Water year classification in nonstationary climates, *Water Resour. Res.*, 49, doi:10.1002/wrcr.20097.

[13] See Rheinheimer, D.E., S.E. Null, and J.H. Viers (2016), Climate-adaptive water year typing for instream flow requirements in California's Sierra Nevada, *J. Water Resourc. Plann. Manage.*, DOI: 10.1061/(ASCE)WR.1943-5452.0000693.

Resolution[14] could be extended to evaluate and address the differential impacts that climate change is likely to have upon these communities.

6. *Address the Division of Water Rights' broader data needs in the context of climate change.* Water supply variability is expected to intensify with climate change, increasing the importance of effectively administering and enforcing California's water rights system.[15] In order to ensure that the Board is best positioned to address issues of water rights:
    a. We recommend clarifying section IV(19) of the Resolution to ensure that it addresses broader data needs.[16] For example, conducting near-term availability / shortage analyses to identify when water right holders need to curtail their diversions during a drought will require not only climate data and modeling, but also data and modeling focused on current and forecast stream flow, ecosystem conditions, water quality, and diversions.
    b. More broadly, the Resolution should explicitly discuss how projected impacts of climate change on water availability will be taken into account when issuing new water rights permits and when determining whether a stream system should be considered fully appropriated.

7. *Strengthen communications capacity of water agencies.* We recommend that the Board consider further actions to help build the capacity of California Water Agencies to be primary sources for climate information in their communities, and to thus further develop strong public support for the critical infrastructure investments to both mitigate and adapt to climate change.[17]

In conclusion, we recommend that the Board adopt the Resolution, and we encourage the Board to take into consideration the above recommendations. We applaud the Board for taking on this important issue in a thorough and forward-looking manner.

[14] The Resolution specifically mentions disadvantaged communities in Section I(E)(5) in terms of providing assistance for energy-efficient water treatment systems, and in Section III(12) in terms of responding to climate change impacts by providing technical assistance to protect drinking water systems.
[15] See, for example, Grantham, T.E. and J.H. Viers (2014), 100 years of California's water rights system: patterns, trends and uncertainty, *Environmental Research Letters* 9(8):084012.
[16] In section IV(19), it is unclear whether asking the Division of Water Rights to "identify data needs" is meant more generally, or is specifically targeted at "account[ing] for projected impacts of climate change when conducting water availability analyses and shortage analyses."
[17] Water Research Foundation (2014), *Effective Climate Change Communication for Water Utilities*. Report 4381, 166 pp.

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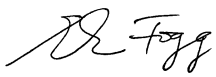

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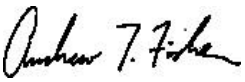

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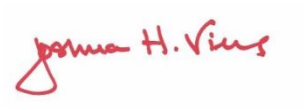

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