



California
Water
Research

November 17, 2021

Via email

California Natural Resources Agency
715 P Street
Sacramento, CA 95814

Re: Comments on the Draft Climate Adaptation Strategy

To Whom it May Concern,

Please accept the attached comments on the Draft Climate Adaptation Strategy.

Sincerely,

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The first California Climate Adaptation Strategy was published in 2009, in response to Executive Order S-13-08. In the briefing from the COP26 conference in Glasgow, Secretary Crowfoot described where we are now:

Climate change has gotten existential for us. We have wildfires that have burned one of every 15 acres in the state. It's burned entire communities. Jared's agency is providing emergency water to people. We have communities across the state that are experiencing record temperatures... I try to keep it very real. The time for talking is complete. It's time for taking action.

Secretary Blumenfeld stated,

[There is] a lot of interest in California's investment for climate adaptation. \$15 billion larger than budgets of many countries... The thing that I took away is just a sense of urgency. Often it was legislative leaders or leaders in California that were pushing. Now the sense that we're not going to solve this with the wealth inequality that we have on the planet. And finally, just accountability. So, people are going to be looking at us a year from now and asking, what did you do?

The Secretaries need to translate these words into action. The Draft Climate Adaptation Strategy, while having a lot of good details, lacks a clear vision and sufficient accountability. Given the urgency of the climate crisis, we must do better. Whether people in California are displaced by climate change, or whether they even survive, will depend on the decisions we make now. Whether ecosystems in our state survive climate change will also depend on the decisions we make now.

We should not underestimate the challenge that the climate crisis poses to state agencies. To even begin to meet that challenge, the Climate Adaptation Strategy needs to have measurable, actionable targets for protection of vulnerable populations, critical infrastructure, and ecosystems. We offer the following comments.

1. Extreme events

The Summary of Projected Climate Change Impacts on California needs to include a discussion of low probability, but extreme events, particularly river flooding. Climate scientist Daniel Swain stated¹,

I think from my perspective, as a climate scientist, you think a lot about extremes and sort of what one might call in the business tail events or low probability, high consequence outcomes. I just can't stop thinking about the ongoing pandemic and sort of the lessons that we, well, the lessons that could be learned from it, and that I wish we had really seriously considered before it happened, and applied them not just to climate change, but just sort of extreme events in general and how science can be used as a tool to explore the space of what's possible.

¹ Water Talk Podcast, Episode 11: Rivers in the California Sky
<https://www.watertalkpodcast.com/episodes/episode-11>.

In 2018, a study by Swain et. al.² suggested “that California’s major urban centers (including San Francisco and Los Angeles) are more likely than not to experience at least one such extremely severe storm sequence between 2018 and 2060 on a business-as-usual emissions trajectory.” While COP26 resulted in commitments to limit global warming, it should be considered that these projections are based on relatively coarse ~100 km resolution models. New ~50 km models show that the coarse models “can misrepresent important processes driving precipitation, such as extratropical cyclone activity, and ocean eddies.”³ This year saw unprecedented flooding in Europe, on the East Coast, and in British Columbia, as well as extreme heat in the Pacific Northwest.⁴

2. Disaster response planning

One of the key lessons from the pandemic was that tabletop exercises for worst case scenarios were extremely important for response. The Climate Adaptation Strategy should more explicitly address the need to do such scenario planning. In particular, Action 16 needs to include development of response strategies, not just pre-positioning of resources.

Action 16: Integrate future climate risk into emergency management, response, and early warning systems.

- **Success Metric:** Number of pre-positioned resources intended to anticipate and mitigate catastrophic wildfires and other climate-driven disasters
- **Timeframe:** Under review
- **Agency/Agencies:** CA Governor’s Office of Emergency Services

3. Flooding

We asked the following questions at the IRWMP Roundtable of Regions Virtual Summit⁵ on and got the following answers:

Q: There was unprecedented flooding in Europe in June, and there is currently unprecedented flooding in British Columbia. What does this indicate for California?

Wyatt Arnold: That there will be unprecedented flooding in California

Q: How is DWR preparing for unprecedented flooding?

DWR Climate Change Technical Lead & Advisor Romain Maendly: Multiple programs

² Swain, D.L., Langenbrunner, B., Neelin, J.D. *et al.* Increasing precipitation volatility in twenty-first-century California. *Nature Clim Change* **8**, 427–433 (2018). <https://doi.org/10.1038/s41558-018-0140-y>.

³ Moreno-Chamarro, Eduardo & Caron, Louis-Philippe & Ortega, Pablo & Tomas, Saskia & Roberts, Malcolm. (2021). Can we trust CMIP5/6 future projections of European winter precipitation? *Environmental Research Letters*. 16. [doi:10.1088/1748-9326/abf28a](https://doi.org/10.1088/1748-9326/abf28a).

⁴ Alexander Robinson, Jascha Lehmann, David Barriopedro, Stefan Rahmstorf, Dim Coumou (2021): Increasing heat and rainfall extremes now far outside the historical climate. *npj climate and atmospheric science* [doi: 10.1038/s41612-021-00202-w](https://doi.org/10.1038/s41612-021-00202-w)

⁵ IRWMP Roundtable of Regions Virtual Summit: Climate Resilience and Integrated Regional Water Management: Building Successful Partnerships, November 15 & 16.

in DWR are working on this topic: FIRO, Central Valley Flood Protection Plan, and the climate change program through the weather generator that I described.

The Draft Climate Adaptation Strategy doesn't mention the Central Valley Flood Protection Plan anywhere, only Flood-MAR. The Central Valley Flood Protection Plan should be the primary state process for planning for needed flood protection planning and investments, and this should be reflected in the Climate Adaptation Strategy.

Flood-MAR is a groundwater replenishment program that also has flood protection benefits. The reduction in peak 3-day flood flows from different levels of implementation of Flood-MAR needs to be evaluated, together with the cost of implementation, to determine the level of state investment.

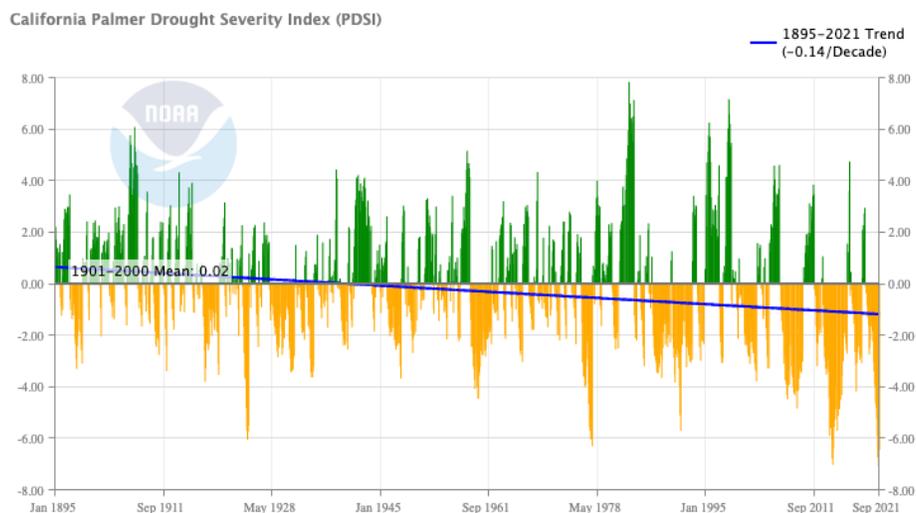
The success metric for reducing flood vulnerability California should be percentage of vulnerable urban and small community population that is protected, not permitted Flood-MAR projects. Action 5 should be revised:

Action 5: Reduce flood damages in California by helping regions prepare for new flood patterns.

- **Success Metric:** Reduced flood damages in California
- **Timeframe:** Under review
- **Success Metric:** Number of new projects permitted to capture peak flow and improve groundwater recharge

4. Drought

It is clear that droughts are increasing in severity due to increasing temperatures⁶.



The Summary of Projected Climate Change Impacts on California needs to include a discussion

⁶ Swain D., October 13, 2021. https://twitter.com/Weather_West/status/1448393544993951744?s=20

of the increased severity of droughts and associated reductions in runoff.

The Action for drought is far too vague, stating:

Action 3: Help regions prepare for drought.

- **Success Metric:** Fewer impacts to communities, agriculture, and fish and wildlife in next drought.

Preparation for drought should include reassessment of water system vulnerabilities to a three year drought, as well as evaluation of vulnerability to a six year drought.

The Action for drought must also consider more proactive measures to ensure that Temporary Urgency Change Petitions are a last resort of water agencies, not a first response. As stated in comments by One Water Network on the Water Resilience Portfolio⁷,

In the 2012-2016 drought, the Water Board temporarily suspended at least 35 minimum instream flow standards. By August 2015, the Department of Fish and Wildlife reported that there had been 783 fish rescues in 52 different watersheds, comprising 51 species, and more than 264,000 fish.⁸ This was crisis management.

5. Best Available Science

The Climate Adaptation Strategy is to be commended for having “Make Decisions Based on the Best Available Climate Science” be a priority. However, Best Available Science should include independent peer review.

Action 10 mentions the Delta Science Strategy and the Delta Stewardship Council but doesn’t mention independent review by the Delta Independent Science Board, a standing board of 10 nationally or internationally prominent scientists with appropriate expertise to evaluate the broad range of scientific programs that support adaptive management of the Delta. This should be remedied.

Action 10: Through the Delta Science Strategy, improve scientific understanding of climate change impacts and adaptation opportunities.

- **Success Metric:** Number of projects and amount of funding focused on climate change and related science questions in the Delta
- **Timeframe:** Under Review
- **Agency/Agencies:** Delta Stewardship Council
- **For More Details:** [Delta Stewardship Council’s Delta Science Program](#)

⁷ Deirdre Des Jardins, Climate change and instream flows, California Water Research blog, October 14, 2019. <https://cah2oresearch.com/2019/10/14/climate-change-and-instream-flows/>

⁸ Lehr, S. Chief, Fisheries Branch, California Department of Fish and Wildlife, *2014-2015 Drought Response*. Briefing to PSFMC, 8-21-2015. http://www.psmfc.org/wp-content/uploads/2015/09/8-PSMFC-Drought-Briefing-8-21-2015_compressed.pdf

6. Social networks

There are two actions associated with communities, listed under the following:

GOAL A: Consider future climate impacts in planning and investment decisions

Action 1: Provide technical assistance and funding to expand the capacity and planning capabilities of under-resourced communities, including California Native American tribes, to implement climate change mitigation, adaptation, and resilience projects.

GOAL B: Improve understanding of climate impacts on California's communities, including vulnerability drivers

Action 4: Invest in actionable, community-driven, and equitable research partnerships to inform climate actions that build community resilience, integrate land use and development considerations, and facilitate transitions to climate smart communities.

The Climate Adaptation Strategy should include an explicit goal to foster the creation of local and regional networks that will increase climate resilience. Ken Vance-Borland and June Holley did stakeholder social network analysis (SNA) and facilitation in Lincoln County Oregon, strengthening the local network for sustainable resources management.⁹ They explain:

[N]etwork structural characteristics that are hypothesized to contribute to sustainable natural resources management include: densely connected groups of people that share specific knowledge and work together productively; a heterogeneous set of groups within the network as a whole, contributing expertise in a variety of knowledge areas; bridging relationships between groups that facilitate the sharing of expert knowledge in response to emerging challenges; and ties to a periphery of diverse actors that provide specialized knowledge, skills, and other resources over time as changing circumstances require. [p. 278, citations omitted]

⁹ Vance-Borland, Ken and Holley, June. (2011). Conservation Stakeholder Network Mapping, Analysis, and Weaving. *Conservation Letters*. 4. 278 - 288.
[doi:10.1111/j.1755-263X.2011.00176.x](https://doi.org/10.1111/j.1755-263X.2011.00176.x).

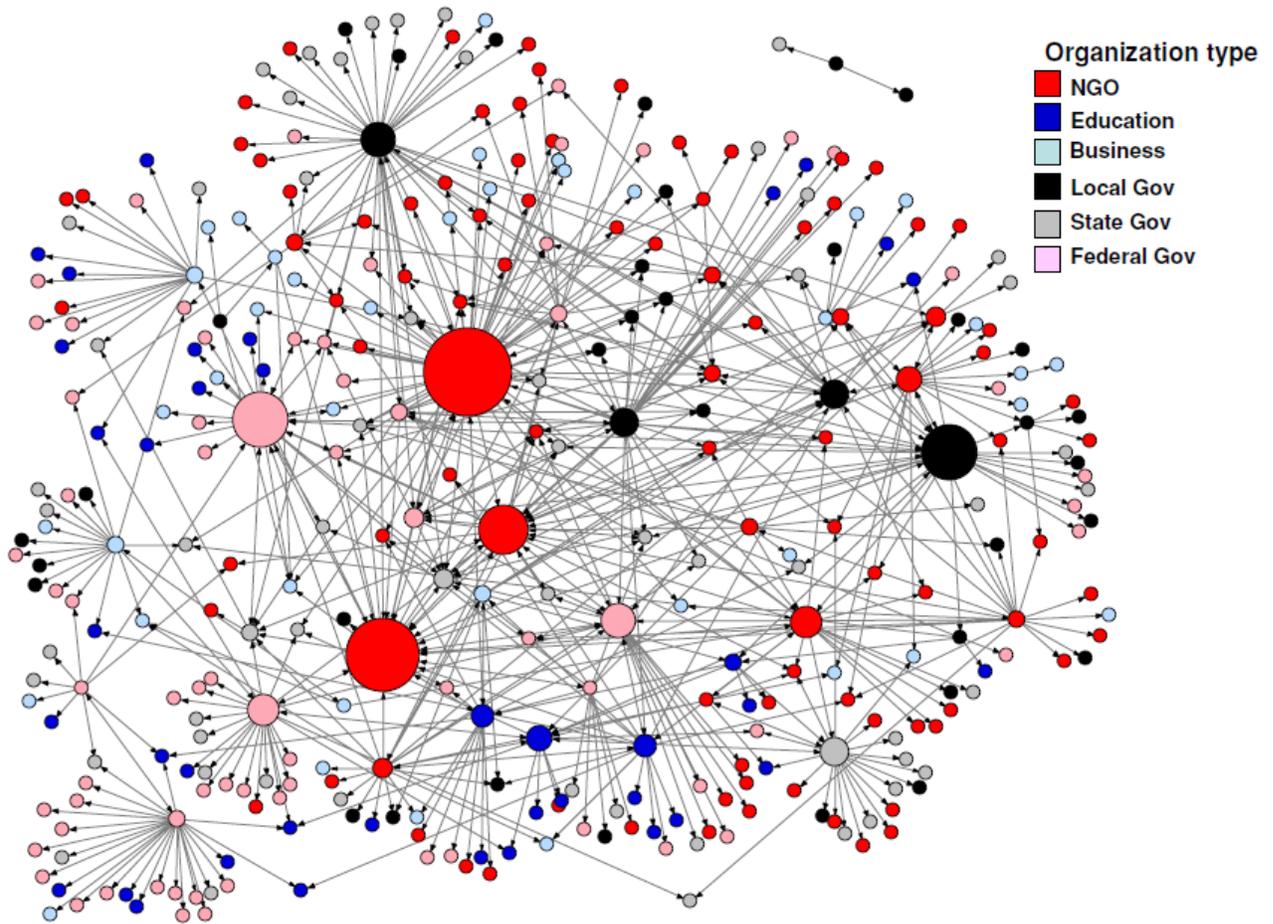


Figure 2 The collaboration network, showing answers to the question “Who are the key individuals with whom you have collaborated on sustainable natural resource projects or issues during the past two years?” Nodes are colored by the type of organization for which the person works,

and sized proportional to bridging score: the number of times an actor connects two other actors, each from a different organization type, who are not otherwise connected. Arrows point to the person that was named.

Figure 2 from Vance-Borland and Holley (2011)