

Integrated Regional Water Management



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Scientist Climate Change Program



Talk Overview

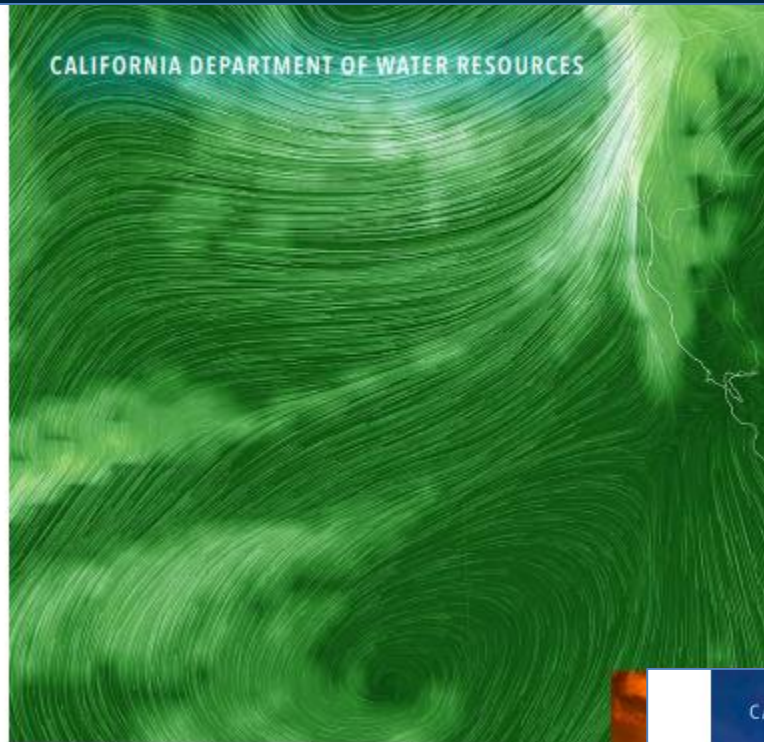
- Climate Change at DWR
- History of IRWM
- Climate Change and IRWM
- A Discussion with Deputy Director
Kris Tjernell



CLIMATE CHANGE PROGRAM AT DWR

- Identified snowpack changes in the 80's
- 12 full-time scientists, engineers, and support staff
- Based throughout CA
- Leadership role
- Climate change modeling
- Staff publishing





CALIFORNIA DEPARTMENT OF WATER RESOURCES
**HYDROCLIMATE
REPORT
Water Year 2017**
Office of the State Climatologist

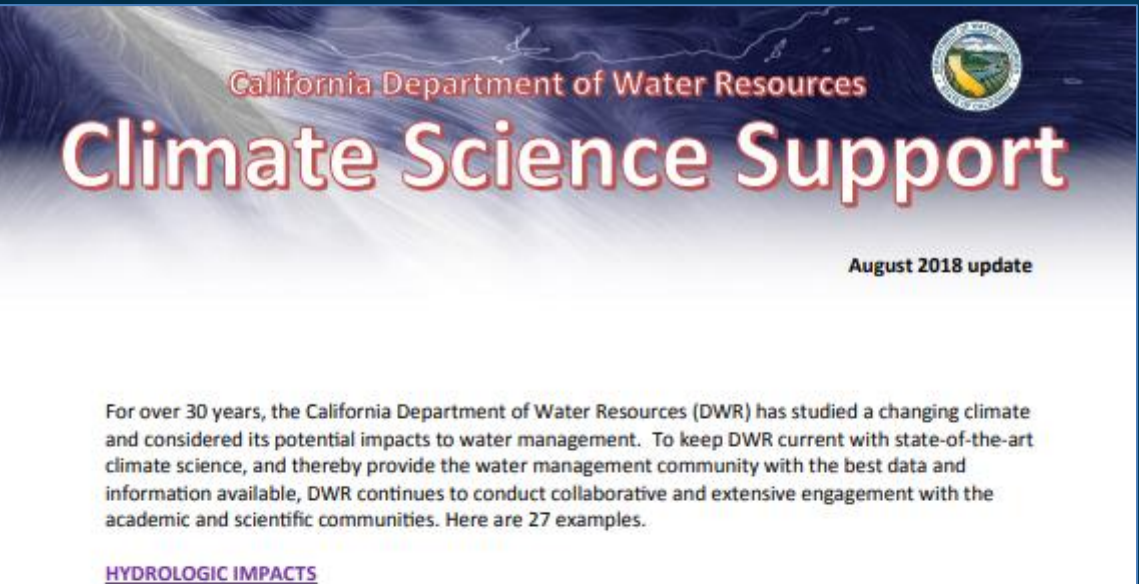
California Climate Risk Evaluation of Climate for California Department Water Resources

A Collaborative Study of the Hydrosystems Research
Massachusetts, Amherst, and the California Department
Division of Integrated Water Management



California Climate Science and Data

FOR WATER RESOURCES MANAGEMENT

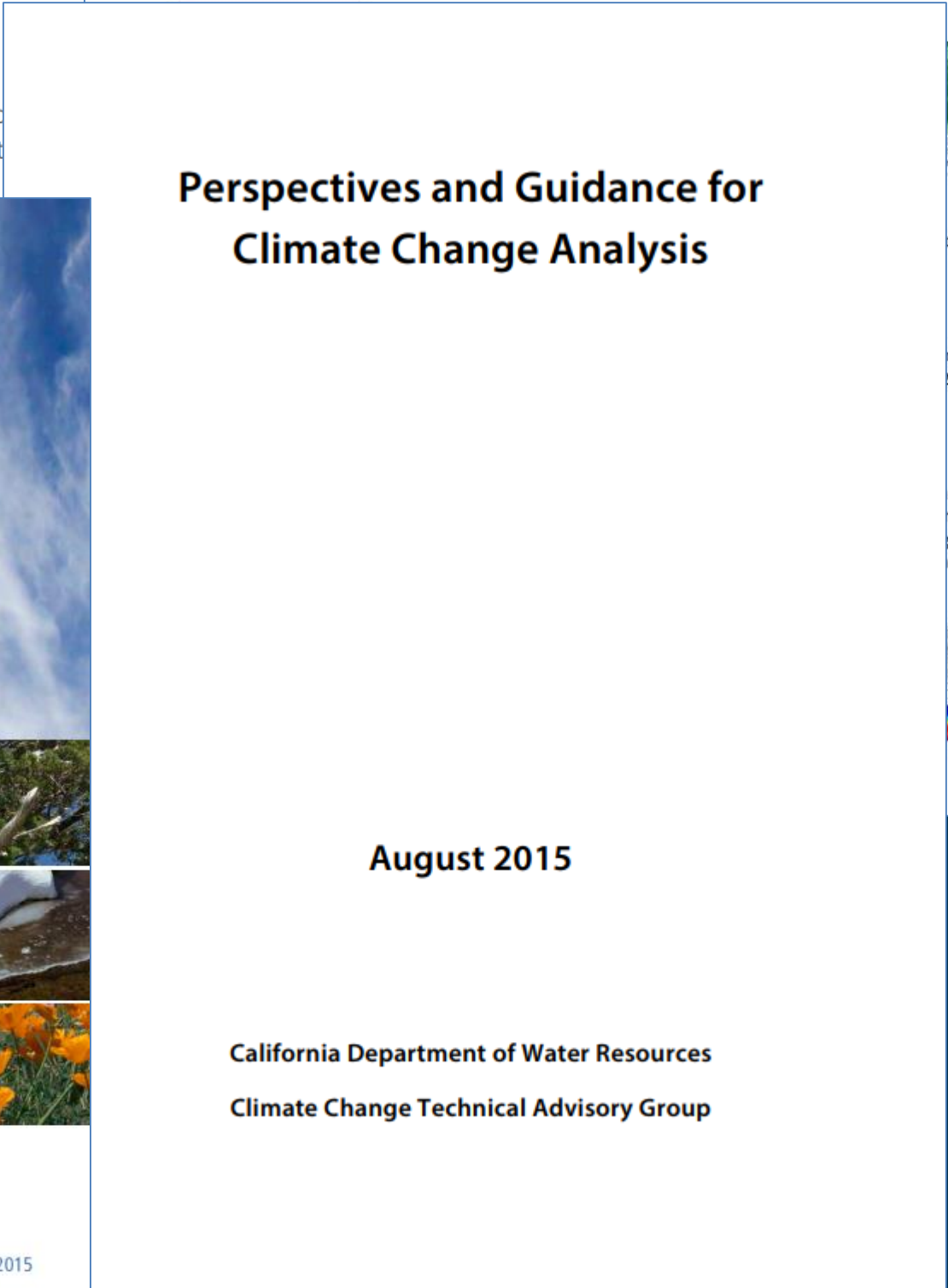


California Department of Water Resources Climate Science Support

August 2018 update

For over 30 years, the California Department of Water Resources (DWR) has studied a changing climate and considered its potential impacts to water management. To keep DWR current with state-of-the-art climate science, and thereby provide the water management community with the best data and information available, DWR continues to conduct collaborative and extensive engagement with the academic and scientific communities. Here are 27 examples.

[HYDROLOGIC IMPACTS](#)



Perspectives and Guidance for Climate Change Analysis

August 2015

California Department of Water Resources
Climate Change Technical Advisory Group

June 2015

Climate Change Program



King Tide conditions along the Point Lobos shoreline. DWR/2013

Climate change is having a profound impact on California's water resources, as evidenced by greater weather extremes, reduced snowpack, higher sea level, and changes in river flows. Models predict that more precipitation will fall as rain instead of snow, exacerbating flood risks and creating additional challenges for water supply reliability. These impacts are expected to intensify in the future.

Managing climate change and its impact of water supply is one of DWR's core values. DWR's climate change program implements climate mitigation and adaptation measures to ensure that Californians have an adequate water supply, reliable flood control, and healthy ecosystems, now and in the future. Our efforts to address climate change focus on:

- Raising awareness about the connection between [water and energy](#) use.
- [Partnering](#) with other efforts to support adaptation to climate impacts that are already occurring.
- Compiling resources for water management practitioners who need to incorporate climate considerations into their plans and projects.
- Funding climate monitoring and research.
- Developing water sector policies and management practices to support California's comprehensive approach to addressing the challenges posed by climate change.
- Promote awareness of [climate change basics](#).

Climate Action Plan

To mitigate future climate impacts, we have developed a [Climate Action Plan](#) to guide the Department's programs, projects, and activities in response to a changing climate. The Plan comprises three phases, the first of which was the development of our award-winning Greenhouse Gas Emissions Reduction Plan. The other two phases, near completion, consist of

▶ [Climate Change Program](#)

▶ [DWR Climate Change Blog](#)

▶ [Climate Change and Water](#)

▶ [Climate Action Plan](#)

▶ [Water Energy Nexus](#)

▶ [Resources for Water Managers](#)

▶ [Climate Change Program Activities](#)

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Climate News Digest

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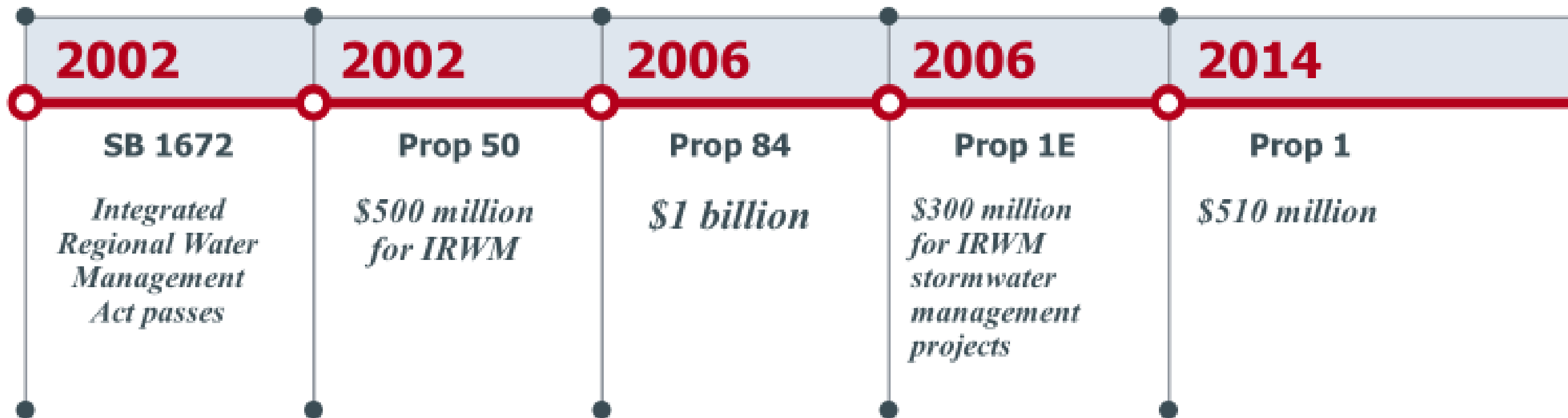


Integrated Regional Water Management (IRWM) is a collaborative effort to identify and implement water management solutions on a regional scale that increase regional self-reliance, reduce conflict, and manage water to concurrently achieve social, environmental, and economic objectives.





The Development of IRWM



California Department of Water Resources

The local match is often on the order of 4:1.



Proposition 1: Regional Water Security, Climate and Drought Preparedness funding is intended to improve regional water self-reliance, security, and adapt to the effects on water supply arising out of climate change.

- **Specifically, the purpose is to assist water infrastructure systems adapt to climate change**
- Provide incentives for water agencies throughout each watershed to collaborate in managing the region's water resources and setting regional priorities for water infrastructure
- Improve regional water self-reliance, while reducing reliance on the Sacramento-San Joaquin Delta.



- Describe likely Climate Change impacts on the region as determined from the vulnerability assessment
- Address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge.
- Consider the effects of sea level rise (SLR) on water supply conditions and identify suitable adaptation measures.
- Reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.
- In evaluating different ways to meet IRWM plan objectives, where practical, consider the strategies adopted by CARB in its AB 32 Scoping Plan.
- Consider options for carbon sequestration and using renewable energy where such options are integrally tied to supporting IRWM Plan objectives.
- Identify and implement, using vulnerability assessments and tools such as those provided in the Climate Change Handbook, RMS and adaptation strategies that address region-specific climate change impacts.
- Demonstrate how the effects of climate change on its region are factored into its RMS.
- Reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.
- An evaluation of RMS and other adaptation strategies and ability of such strategies to eliminate or minimize those vulnerabilities, especially those impacting water infrastructure systems.



- **Include potential effects of Climate Change on the region and consider if adaptations to the water management system are necessary.**
- **Consider the contribution of the project to adapting to identified system vulnerabilities to climate change effects on the region.**
- **Consider changes in the amount, intensity, timing, quality and variability of runoff and recharge.**
- **Consider the effects of sea level rise on water supply conditions and identify suitable adaptation measures.**
- **Contribution of project in reducing GHGs compared to project alternatives.**
- **Consider the contribution of the project in reducing GHG emissions as compared to project alternatives**
- **Consider a project's ability to help the IRWM region reduce GHG emissions as new projects are implemented over the 20-year planning horizon.**
- **Reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions**
- **Contain policies and procedures that promote adaptive management and, as more effects of Climate Change manifest, new tools are developed, and new information becomes available, adjust IRWM Plans accordingly.**
- **Demonstrate information sharing and collaboration with regional land use planning in order to manage multiple water demands throughout the state, adapt water management systems to climate change, and potentially offset climate change impacts to water supply in California.**



- Evaluate IRWM region's vulnerabilities to climate change and potential adaptation responses based on vulnerabilities assessment in the DWR Climate Change Handbook for Regional Water. At a minimum, the vulnerability evaluation must be equivalent to the vulnerability assessment contained in the Climate Change Handbook for Regional Water Planning, Section 4 and Appendix B.
- Provide a process that considers GHG emissions when choosing between project alternatives. Same requirement with the following additional detail: "At a minimum, that process must determine a project's ability to help the IRWM region reduce GHG emissions as new projects are implemented over a 20-year planning horizon and consider energy efficiency and reduction of GHG emissions when choosing between project alternatives."
- Include a list of prioritized vulnerabilities based on the vulnerability assessment and the IRWM's decision making process, and A list of prioritized vulnerabilities which includes a determination regarding the feasibility for the RWMG to address the priority vulnerabilities.
- Address adapting to changes in the amount, intensity, timing, quality, and variability of runoff and recharge.
- Areas of the State that receive water imported from the Sacramento-San Joaquin River Delta, the area within the Delta, and areas served by coastal aquifers must also consider the effects of sea level rise (SLR) on water supply conditions and identify suitable adaptation measures.



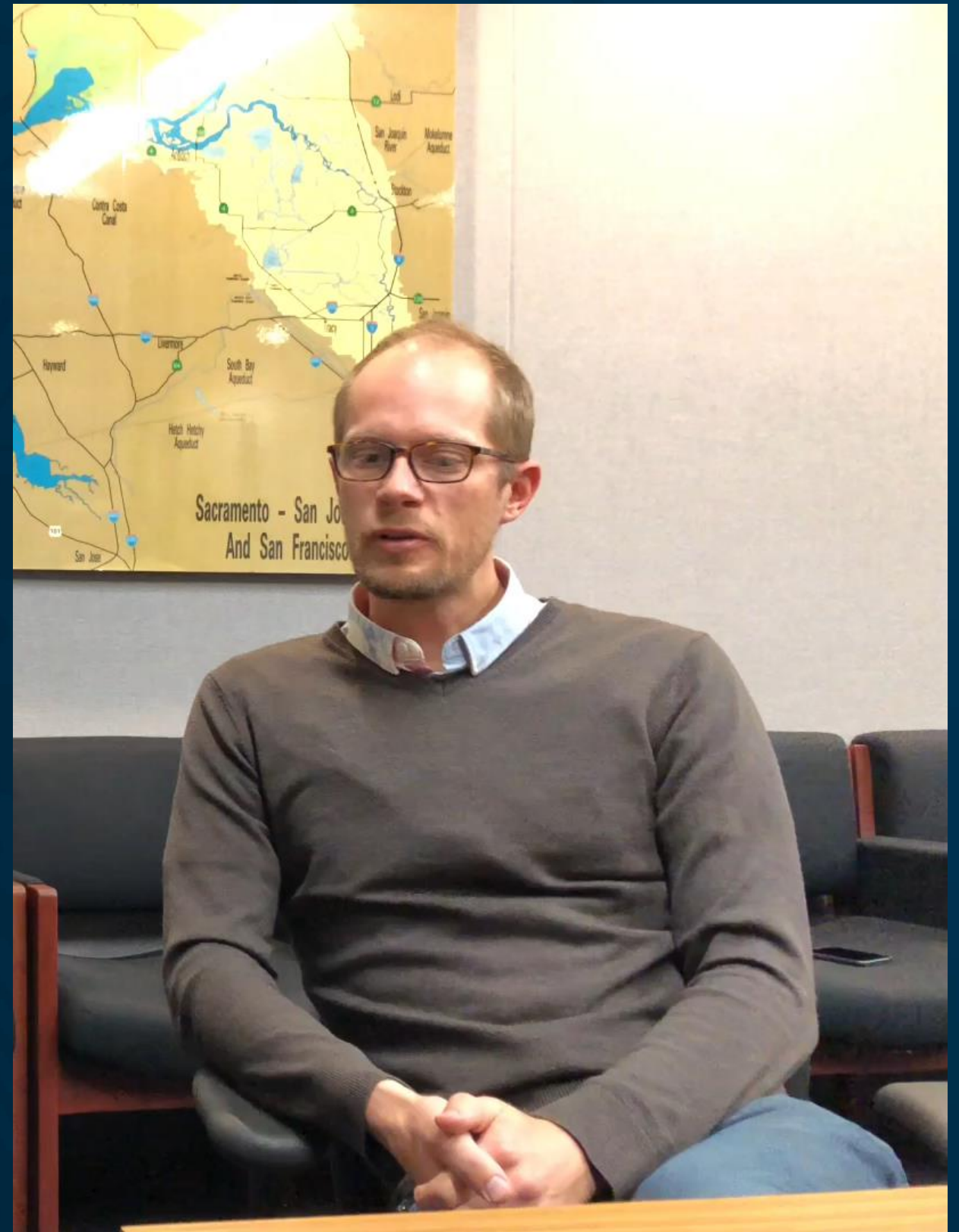
**How is DWR supporting
climate change planning
within IRWM? Thoughts from
Kris Tjernell, the Deputy
Director of Integrated Water
Management**





Climate Change and IRWM Planning

In conclusion...



DWR Climate News Digest

February 2019

Disclaimer: The information and links provided on this web page are not intended to state or imply any formal position of the California Department of Water Resources

The information provided in the DWR Climate News Digest is a selected compilation of recent popular news articles, publications, and other information relevant to climate change and water management, and is intended to provide educational and thought-provoking material for water managers and water users.

To subscribe to the DWR Climate News listserv and receive notifications when new editions are posted, send an email to: climatechange@water.ca.gov.

TOPICS

Agriculture/Food Production

[World's food supply under 'severe threat' from loss of land](#)

[The Guardian – February 21, 2019]

“Most countries said the main driver for biodiversity loss is land being cut down for farm fields, and meadows covered in concrete. Causes include overexploitation of water supplies, pollution, invasive species and climate change.”

[The World Is Losing Fish to Eat as Oceans Warm, Study Shows](#)

[New York Times – February 28, 2019]

“Fish populations are declining as oceans warm, putting food security at risk for millions of people around the world, according to new research.”

General Water Management

[Rare L.A. mega-storm could overwhelm dam and flood dozens of cities, experts say](#)

[Los Angeles Times – February 18, 2019]

“This rare mega-storm — which some say is rendered all the more inevitable due to climate change — would last for weeks and send more than 1.5 million people fleeing as floodwaters inundated cities and formed lakes in the Central Valley and Mojave Desert, according to the U.S. Army Corps of Engineers.”

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