Lead Scientist's Report

Summary: Delta Lead Scientist Dr. John Callaway will discuss an article from *Science* on anthropogenic contributions to the recent large-scale drought in the western United States, provide an update on the Science Needs Assessment, highlight the new 2020 Delta Science Fellows, review upcoming events, and provide the By the Numbers Report.

Large Contribution from Anthropogenic Warming to an Emerging North American Megadrought. Williams et al. Science. April 2020.

Temperatures in the Western United States have been warmer in the 21st century relative to the 20th century, and the increase in regional temperatures has been reflected in reduced snowpack, reduced river flow and lake levels, increased drought stress for forests, and shifts in agricultural activities. Although droughts are driven by natural climate variability, anthropogenic climate change has also contributed to recent conditions. This study compared conditions in the western United States during the recent dry period (2000-2018) to those in historic times, going back to the year 800.

Scientists used a combination of 1200 years of tree ring data from approximately1500 trees and models to reconstruct historic soil moisture conditions across the region and evaluate the contribution of climate change to recent drought conditions. The tree ring data indicated that the 2000-2018 period was the second driest period observed over the 1200-year period, exceeded only by a megadrought in the late 1500s. Based on modeling evidence, the 2000-2018 drought was more intense because of human induced (anthropogenic) climate change. The analysis also showed that the 2000-2018 drought was preceded by the wettest two-decade period in at least 1200 years, highlighting the potential for climate variability in the region. Four megadroughts during the period lasted longer than the 2000-2018 drought, indicating the potential for current conditions to extend over longer time periods. Impacts of global warming will continue to intensify droughts in the region, primarily due to declining spring precipitation, and reductions in summer runoff and soil moisture due to increased evaporation.

The value of considering current conditions in their long-term context, as well as the necessity of incorporating climate change into planning and adaptive management approaches is increasingly being recognized and is a priority for the Council. The proposed amendment to the Ecosystem Chapter of the Delta Plan highlights the importance of incorporating climate change into Delta management, and the Delta Plan recognizes the critical value of adaptive management. The Council's recent Delta Adapts initiative will integrate climate change into Delta planning and resilience efforts through an assessment of climate change vulnerability and the development of climate adaptation strategies. In their 2019 letter to the Delta Plan Interagency Implementation Committee, the Delta Independent Science Board also stressed the importance of considering science and management decisions on longer time scales.

Science Needs Assessment Pre-Workshop Discussion Series Overview

The Science Needs Assessment Workshop has been rescheduled for October 5 to 6, 2020. The Workshop is being hosted by the Delta Plan Interagency Implementation Committee (DPIIC) and the Delta Independent Science Board (Delta ISB) to identify science needs in the Delta in the face of rapid change and climate impacts. In the interim, DPIIC and the Delta ISB are hosting a four-part discussion series ahead of the workshop to begin engaging Delta stakeholders on topics that will inform the Workshop:

1. What do we know about projected climate change impacts for the Delta? (April 28)
2. What question will that raise for management decisions? What do managers need to know? (June 3)
3. What science needs to be done to address management questions? (July 28)
4. What changes are needed for science governance, funding, and integration to support the needed science? (September 9)

The online discussions include panels, real-time polling, and Q&A sessions to encourage open discourse and participation. The two discussions to date have included close to 100 participants with valuable input that is being incorporated into the planning of the October Workshop. Details on Workshop and the upcoming discussions can be found at: https://deltacouncil.ca.gov/pdf/dpiic/flyers/2020-04-27-28-science-needs-assessment-flyer.pdf

2020 Delta Science Fellowship

Delta Science Fellowships are awarded to graduate students and postdoctoral researchers to pursue management-relevant research in the Delta. The Council has supported Delta Science Fellows since 2010;the program began in 2003, under CALFED. This program provides valuable research on critical Delta issues, as well as mentoring and training for early-career scientists. In May, the Delta Science Program and California Sea Grant announced the recipients of the 2020 Delta Science Fellowship, including one masters student, five PhD students, and four postdoctoral researchers:

- Dave Ayers, UC Davis
- Denise Colombano, UC Berkeley
- Chelsea Lam, UC Davis
- Madison Mathers, UC Davis
- Alexandria McInturf, UC Davis
- Nicol Parker, UC Santa Barbara
- Christina Richardson, UC Santa Cruz
- Julie Shahan, CSU East Bay
- Richelle Tanner, UC Davis
- Martin Volaric, Stanford University

Each fellowship provides up to two years of support to awardees. The early-career scientists work collaboratively with academic and community mentors to address priority issues identified in the 2017-2021 Science Action Agenda. California Sea Grant administers the fellowship program on behalf of the Delta Science Program. This year, the State Water Contractors provided funding to support three of the fellows. More information about the Delta Science Fellowship awardees, can be found at: https://caseagrant.ucsd.edu/news/delta-science-fellows-2020

On your radar

California Water Data Science Symposium:

The Fifth Annual California Water Data Science Symposium will be held June 29-30 from 9:00 A.M to 4:00 PM as an online meeting. The Surface Water Ambient Monitoring Program (SWAMP), the California Water Quality Monitoring Council, the California Water Boards Data Center, and the San Francisco Estuary Institute (SFEI) are sponsoring this free annual event, which aims to promote the generation of meaningful monitoring data to inform water quality management decisions. More information and registration are available at: https://www.eventbrite.com/e/2020-california-water-data-science-symposium-tickets-86455846765

By the Numbers

Delta Science Program staff will provide a summary of current numbers related to Delta water and environmental management. The summary (Attachment 1) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

List of Attachments

Attachment 1: By the Numbers Summary

Attachment 2: Visual abstract - Large Contribution from Anthropogenic Warming to an Emerging North American Megadrought

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