

Coping with Year 4 – How are We Doing and What's Needed Next

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The presentation reviews the development of the drought and some implications for current and future management. Effects on agriculture, urban, and ecosystem objectives are reviewed, as well as management innovations, particularly regarding groundwater, water conservation, and water trading. Remaining problems and promising innovations for future drought years also are presented.

Keywords: Drought, Management, Ecosystem Objectives

Session Title: Day 2 Plenary Session: Water and Drought Panel

Speaker Biography: Dr. Jay Lund is Director of the Center for Watershed Sciences and Professor of Civil and Environmental Engineering at University of California, Davis. His research and teaching interests focus on applying systems analysis and economic methods to infrastructure and environmental problems, including policy, planning, and management studies. His work is primarily in water resources and environmental system engineering, but with substantial past work in solid and hazardous waste management, dredging and coastal zone management, and urban, regional, and transportation planning. He received his B.Sc. in Civil Engineering, M.A. in Geography, and Ph.D. in Civil Engineering from the University of Washington. Dr. Lund has been honored with the following awards: Julian Hinds Award, American Society of Civil Engineers/Environment and Water Resources Institute, Hugo B. Fischer Award, California Water and Environmental Modeling Forum, ASCE/EWRI Planning and Management Council Service to the Profession Award, Boggess Award for best paper in the Journal of the American Water Resources Association, and California Water and Environment Modeling Forum Service Award.

Economic Impacts – Facts, Fiction and Uncertainty

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There are many claims made about the drought related economic impacts to our farming communities, urban areas, fishing communities from low water availability. Even the data seems to conflict sometimes. For example, agricultural employment and revenue is at or near record highs even as hundreds of thousands of acres have been fallowed and economic models estimate thousands of jobs have been lost. How should we interpret the information and put it into context? Is the drought an economic crisis? How does it compare to other natural disasters?

The drought provides an important opportunity for researchers, policy-makers, and the public to gain a better understanding of the links between water and the modern economy. For example, research on the 2009 drought has already had positive effects on our understanding of the effects of a much more severe drought today. While misinformation such as endangered minnows creating 40% unemployment can still be found in the media, the amount of misinformation and uncritical reporting is notably lower today.

This improved understanding of economic impacts also informs long-term policy debates in California that are too often driven by fear rather than facts. The drought can help us better understand the real costs of transitioning to sustainable groundwater management, and the critical importance of doing so. The drought helps us understand the real economic impacts of water shortages that could result from an earthquake in the Delta, and the wisdom of investing in twin tunnels to protect against that risk.

Keywords: Drought, Jobs, Agriculture, Economic Impact

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Speaker Biography: Dr. Jeffrey Michael is Director of the Center for the Business and Policy Research at the University of the Pacific's Sacramento and Stockton campuses. Jeff's areas of expertise include regional economic forecasting and environmental economics including work on water resources, the Endangered Species Act, climate change, and regulation on land use, property values and employment growth. His research has been published in scholarly journals and books such as the Journal of Law and Economics, Energy Policy, and Ecological Economics, and he has been a principal investigator on numerous grants including the Delta Protection Commission's Economic Sustainability Plan. Jeff is cited over 100 times per year in the local and national press including the Wall Street Journal, New York Times, San Francisco Chronicle, Los Angeles Times, NBC, NPR, and PBS. Jeff received his Ph.D. from North Carolina State University, M.S. from the University of Maine, and B.A. from Hamilton College.

Drought Impacts on Native Fishes of the Delta and Central California

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Most native fishes of California need cool flowing water to survive. During drought, the streams and rivers of Central California become very low and warm, a process exacerbated by human removal of most of the water. Most native fishes have been living in a state of human-created drought even without natural drought, so the present severe drought is pushing them to their ecological limits. Several species, most conspicuously delta smelt, are facing extinction in the wild as a consequence. Species persistence seems to depend on 'luck of the drought' until a systematic drought and climate change protection strategy is in place.

Keywords: Native Fish, Delta, Drought, Extinction

Session Title: Day 2 Plenary Session: Water and Drought Panel

Speaker Biography: Peter Moyle is Professor and former Chair of the Department of Wildlife, Fish and Conservation Biology at University of California, Davis. He is the author or co-author of more than 170 publications, including the definitive *Inland Fishes of California* (2002). He has served on numerous advisory bodies, including the Ecosystem Restoration Program Science Board of the California Bay-Delta Authority and the National Research Council Panel on the Klamath River. His research interests include conservation of aquatic species, habitats, and ecosystems, including salmon; ecology of fishes of the San Francisco Estuary; ecology of California stream fishes; impact of introduced aquatic organisms; use of flood plains by fish. He has long-term research projects in the Suisun Marsh, Putah Creek, Sierra Nevada streams and the Cosumnes River.