

# Addressing Hydrologic Variability in Complex Water Management Systems

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## BIOGRAPHICAL SKETCH

Michael Mierzwa, a California licensed P.E., is the lead flood management planner for the State of California's California Department of Water Resources (DWR). He is currently leading the development of the 2017 Central Valley Flood Protection Plan Update (CVFPP Update), which will outline a long-term path for implementing improvements in the State's Central Valley flood management system. The CVFPP Update is being developed in coordination with key stakeholders, local, state, and federal partner agencies, and the public. Previously, he served as a water management and flood policy advisor to DWR's Deputy Director for Integrated Water Management. He started his career as a hydrologist, specializing in climate and estuarine modeling, and as a technical editor. His range of expertise includes: planning and design of large-scale water resources systems, supporting and conducting real-time emergency operations, communications and coordination of water management issues with internal and external audiences.

He earned a master's degree in Civil Engineering from University of California, Davis and a bachelor's degree in Civil Engineering from Texas A&M University. Mr. Mierzwa has also represented California and the United States as a delegate at several domestic and international water management conferences and workshops, most notably at the International Commission on Irrigation and Drainage meetings.

Some of his notable accomplishments include:

- Completing DWR's 2010 FloodSAFE Implementation Plan and 2013 Strategic Implementation Plan;
- Leading the communications and engagement associated with the \$4.9B FloodSAFE public safety initiative and initiating the FloodSAFE Annual report series;
- Designing the technical studies for the 2012 *CVFPP*;
- Designing of the Department's 2007 Delta Emergency Response Plan; and,
- Creating new estuary modeling approaches, including source water fingerprinting, estuary residence time calculation, dissolved organic carbon modeling for flooded Delta-islands, and real-time salinity compliance modeling processes supporting State Water Project compliance activities.

## ABSTRACT

Hydrologic variability is one of several key considerations in managing complex water management systems, such as California's Central Valley State Plan of Flood Control. While the need for sizing channels, levees, reservoirs and other physical features to address the peak runoff volumes associated with extreme precipitation events is well understood by the flood management community, these same facilities also are used to address needs for other hydrologic extremes (such as base flow conditions).

Australia's Millennium Drought ended with several significant floods in the Murray-Darling river basin and Texas's most recent flooding (May 2015) also represent a dramatic end to an extended drought. Recognizing the role that hydrologic variability plays in defining both floods and droughts, it is equally important to recognize that the tools and approaches used to study extreme hydrologic event need to be as diverse as the range of flows being managed. This presentation will share experiences learned in the Murray-Darling river basin in addressing hydrologic variability as a prelude to a panel discussion focused on the importance of addressing hydrologic variability in California's Central Valley. This discussion will be used to help inform the current (2017) and future Central Valley Flood Protection Plan updates.

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Extreme Precipitation Symposium  
June 23, 2015

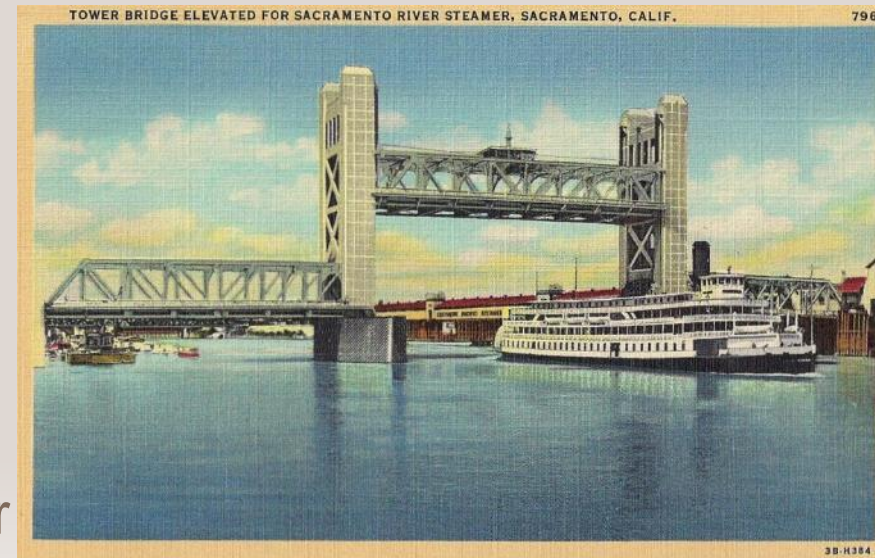
Presented by:

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Lead Flood Management Planner

California Department of Water Resources



# A Different View of the Central Valley



California's Central Valley landscape is still predominately agricultural in character.

Source: National Geographic Magazine, Oct. 2014: Used with permission.

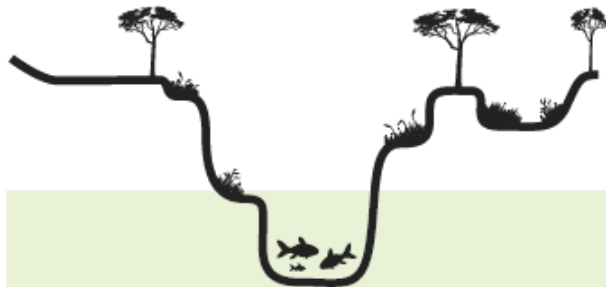
C V F P P

2017 ROADMAP

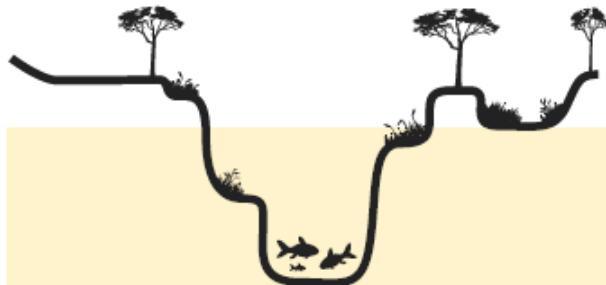


# Managing for Different Hydrologic Conditions

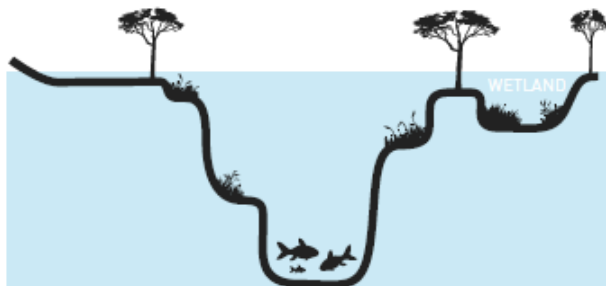
## 1 Frequent base flows



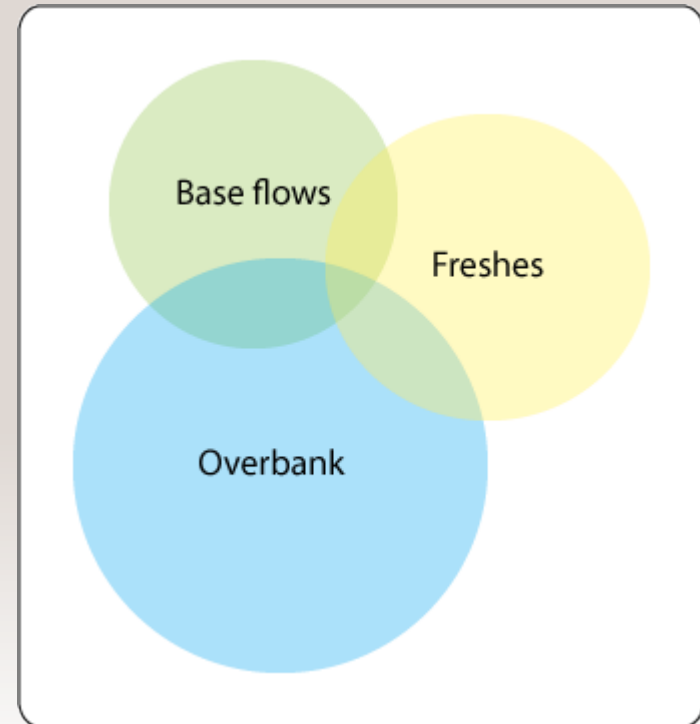
## 2 Variable pulses ("freshest")



## 3 Occasional overbank flows



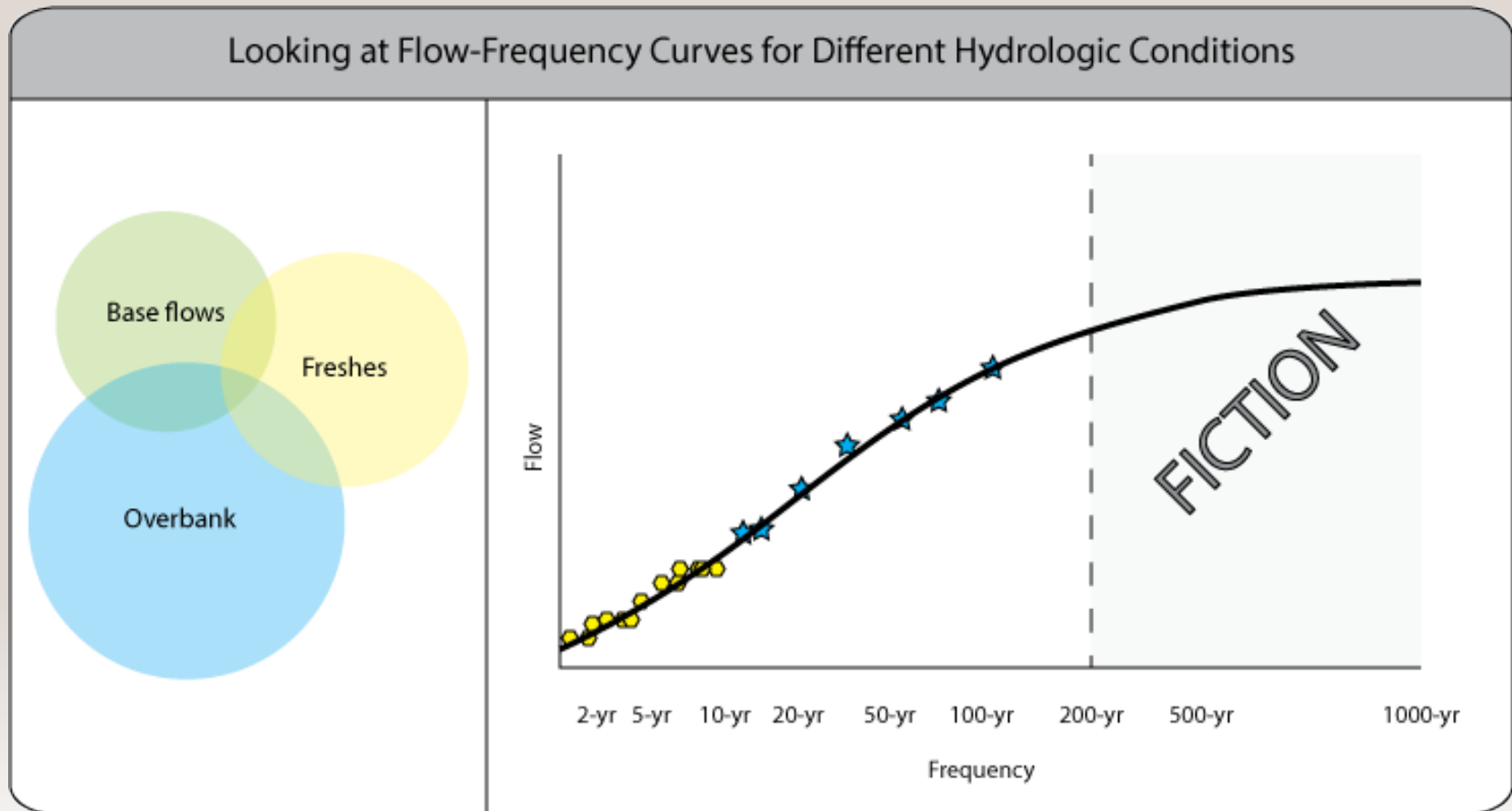
Because river flows vary over days, seasons, and years, the actions we employ to manage these flows are different.



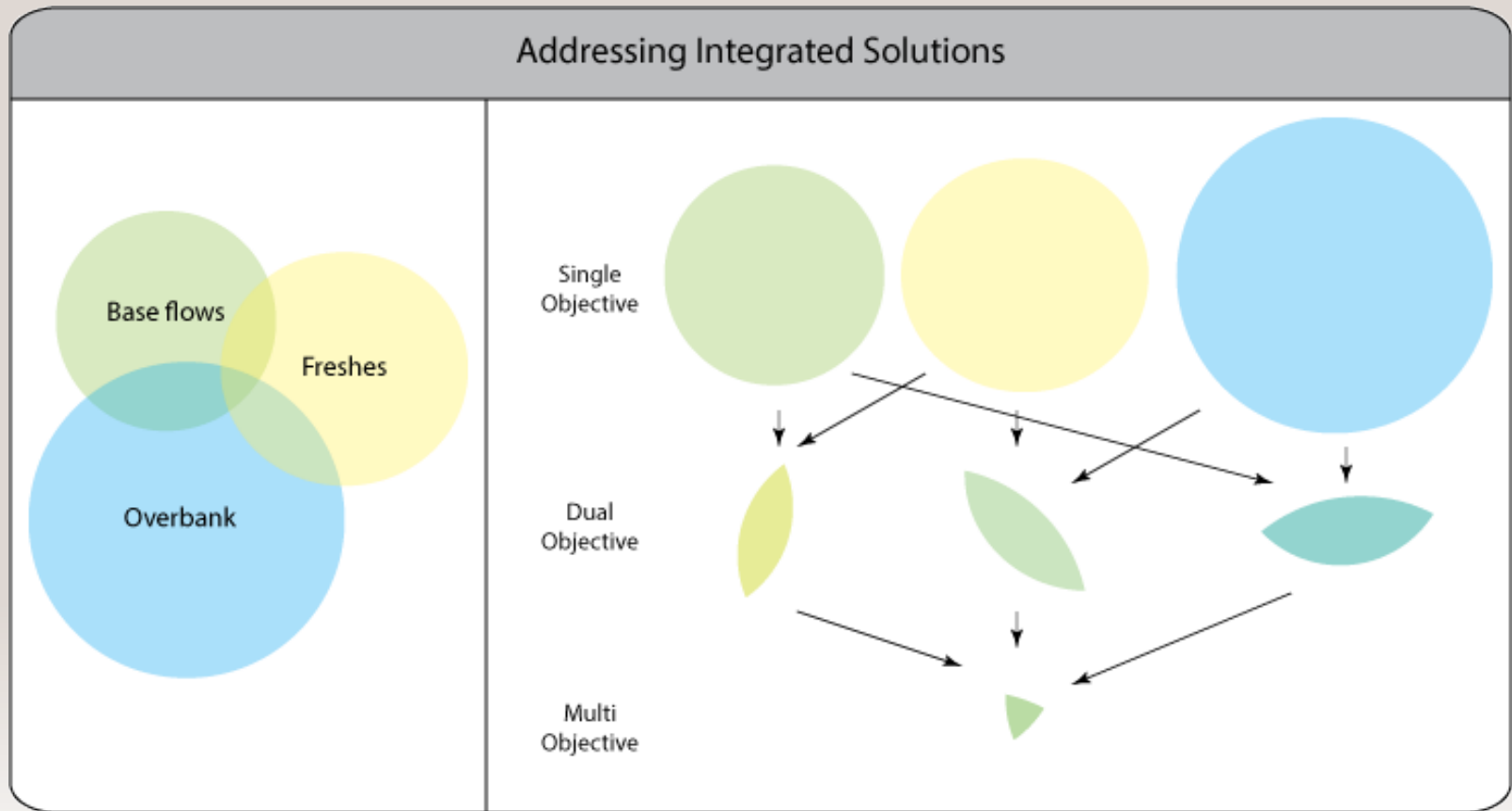
Source: The importance of water reform in the Murray-Darling Basin. (2011)



# Flow-Frequency Only Provides a Limited Perspective



# We Need Different Tools to Address Different Objectives



# Describing System Performance

Chapter  
**1**

Context

Setting Historical Context

Chapter  
**2**

Converging

Summary of Refinements and Areas of Alignment

Chapter  
**3**

System  
Management

Strategies to Improve System Management

Chapter  
**4**

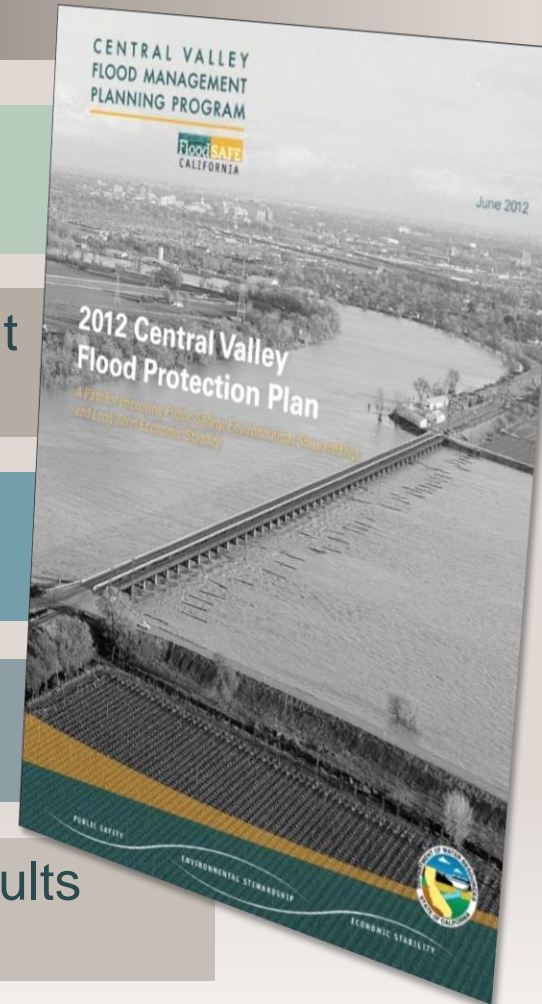
Implementation  
Timing

Investment Approach

Chapter  
**5**

Measuring Value

Tracking, Reporting of Investment Actions & Results



*Note:* Outline for 2017 Central Valley Flood Protection Plan Update, Chapter 5 is new for 2017 Update.



# Key Points

- Our understanding of the water management system in the Central Valley is still in its infancy.
- In Australia, it took a drought of record (the Millennium Drought) and a series of equally devastating floods to rethink and reshape Australian water management.
- Australia recognized 3 distinct conditions of environmental needs for hydrologic events.
- It is important to understand how our water management system responds to different environmental / hydrologic conditions and how our responses to these conditions interact.
- We need a portfolio of tools and ways of looking at broad system response and the interactions between different ways we manage flood waters.