



Ecosystem Reconciliation:
Realities Facing the San Francisco Estuary

7th Biennial Bay-Delta Science Conference

Over 1000 participants
236 Oral Presentations
153 Posters

Town Hall Meeting



Delta Science Program
Delta Stewardship Council

Data

CALIFORNIA WETLANDS

California
Central Valley
Project List
Map
Summaries
Questions
Questions Answered
Background Info on Wetlands
About Wetlands Portal
Wetland Condition (URAM)
California Environmental Data Exchange Network (CEDEN)
Feedback

Central Valley Wetland Information

The California Wetlands Portal provides wetland scientists, managers, and the public information about the wetlands of selected regions of California. The Central Valley is one of several regions covered.

Information available
Wetland information currently available for the Central Valley region includes:

- Habitat, modern habitat map
- Projects exist in this region, but information on them has not yet been compiled. Click [here](#) if you are interested in uploading information on projects.

View a list of Central Valley [wetland projects](#)
See Central Valley projects on an [interactive map](#)
View [summaries](#) of Central Valley wetland restoration activity
View answers to [questions](#) about Central Valley wetlands

Also: View a California map of [wetland conditions](#)

USGS Home
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USGS California Water Science Center
Home Projects Publications Water Data Webcam News Information Requests

San Francisco Bay Hydrodynamics

This project studies the hydrodynamics of San Francisco Bay and the Sacramento-San Joaquin Delta. The Bay/Delta region is located at the confluence of the Sacramento and San Joaquin Rivers. This region is a geologically complex network of tidally affected subwatersheds, channels, and sloughs. The hydraulic connection between surface water supplies in northern California with farms and cities south of the Delta is a critical component of the state and federal water delivery system, providing life support to a broad range of estuarine and fresh water fish species. Over 20 million Californians depend on fresh-water exports from the Delta, over 4.5 million acres of farmland are irrigated by Delta waters; and several endangered or threatened fishes depend on the Bay and Delta ecosystem, providing life support to a broad range of estuarine and fresh water fish species. Over 20 million Californians depend on fresh-water exports from the Delta, over 4.5 million acres of farmland are irrigated by Delta waters; and several endangered or threatened fishes depend on the Bay and Delta ecosystem, providing life support to a broad range of estuarine and fresh water fish species.

San Francisco Bay
Golden Gate
San Pablo Bay
San Joaquin River

Real-Time Data
Real-Time Stream Conditions

SAN FRANCISCO ESTUARY INSTITUTE

REGION-WIDE SCIENCE FOR ECOSYSTEM MANAGEMENT

HOME PROGRAMS PROJECTS DATA CENTER DOCUMENTS AND REPORTS CALENDAR ABOUT

Regional Data Center

SFEI is the regional data center for the San Francisco Estuary and its watersheds. The Institute manages water quality, tissue, wetlands, historical, and spatial data, and develops tools for uploading, accessing, and visualizing data. The tools below integrate and display data in meaningful ways to inform different audiences.

Central Valley Monitoring Directory
The Central Valley Monitoring Directory provides access to program and metadata for current water quality monitoring efforts in the Central Valley watershed. The goal of the directory is to improve coordination and integration of monitoring efforts. Information can be accessed through an interactive map and forms.

U.S. Coast Survey Map of California
CD3 Contaminant Data Display & Download
BAARI

TOOLS BY CATEGORY

Beta Version Central Valley MONITORING DIRECTORY

THE MONITORING DIRECTORY IS OPTIMIZED FOR USE WITH FIREFOX 8+ OR INTERNET EXPLORER 8+

Website survey
Please take a few minutes to provide your feedback on the utility and performance of this monitoring directory

The Central Valley Monitoring Directory provides access to the Central Valley watershed. The monitoring efforts in the Central Valley watershed has been developed to help improve the coordination of existing monitoring efforts through an interactive map and forms.

CEDEN
CALIFORNIA ENVIRONMENTAL DATA EXCHANGE NETWORK

HOW DO I?
Find Data
Submit Data
About CEDEN

The California Environmental Data Exchange Network (CEDEN) is a central location to find and share information about California's water bodies, including streams, lakes, rivers, and the coastal watersheds. Many groups in California monitor water quality, aquatic resources, CEDEN aggregates this information into a central environmental management system.

contact us | site map

AQUATIC SCIENCE CENTER
Water Boards

UMARP for each tributary

Purpose	ASSESSMENT	EVALUATION	MONITORING	Feasibility & Relevance
	INDICATORS	METRICS	MEASUREMENTS	1, 1
	Escapement: month time	Size of spawning population	Number of redds (weekly counts); Carcass surveys	

National Science Board
SCIENCE AND ENGINEERING INDICATORS 2012 DIGEST

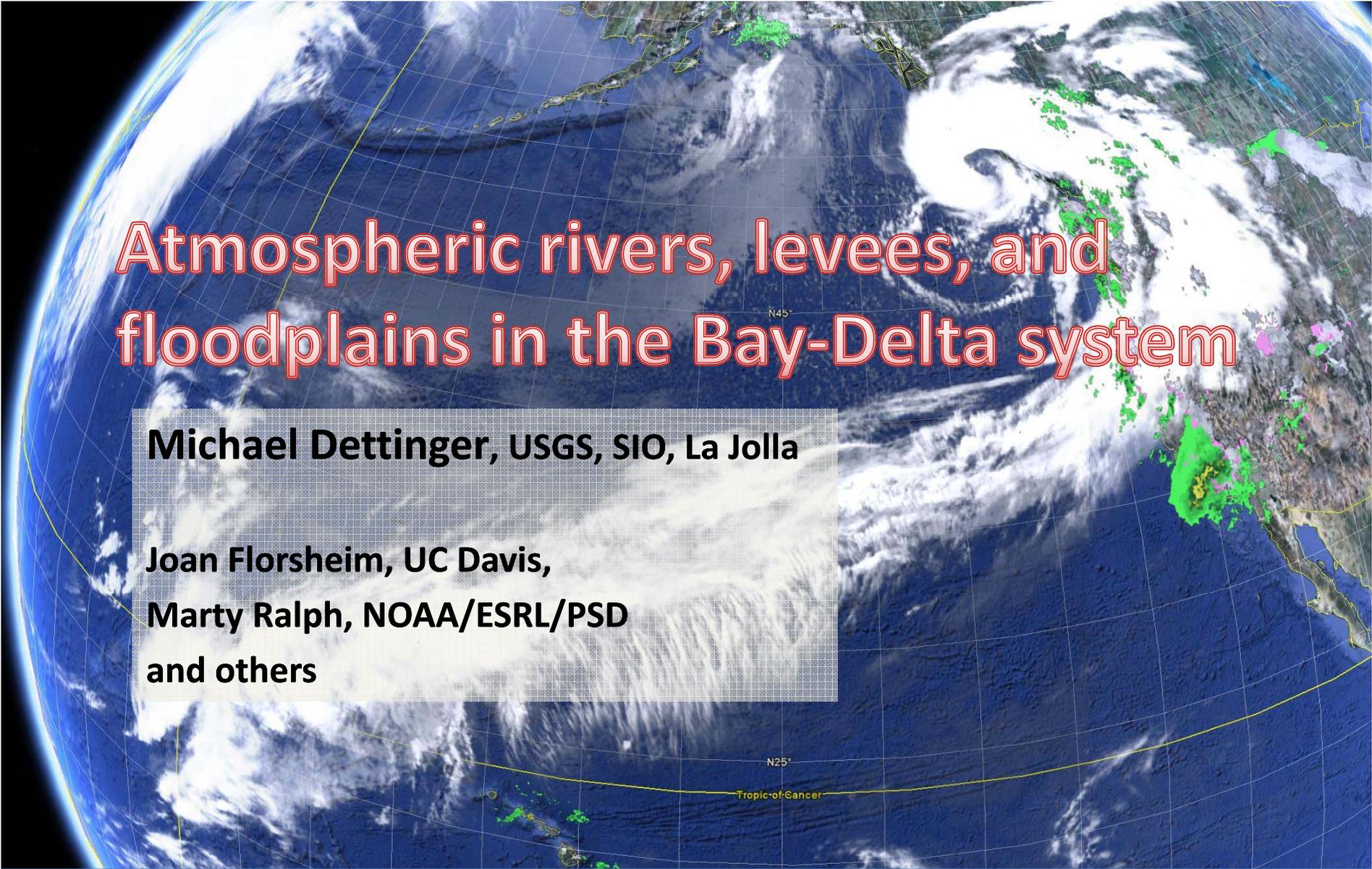
S&E Indicators Home >> Digest Contents

Contents

- Preface and Introduction
- Global R&D: Measuring Commitment to Innovation
- U.S. R&D: Funding and Performance
- U.S. R&D: Federal Portfolio
- STEM Education
- U.S. S&E Workforce: Trends and Composition
- Research Outputs: Publications and Patents
- Geography of S&T Globalization of Capabilities
- Glossary and Key to Acronyms
- Explore Further
- S&E 2012 Online Resources

Average mathematics and science PISA test scores of U.S. and OECD 15-year-olds: Selected years, 2003-09

Year	Mathematics (U.S.)	Mathematics (OECD)	Science (U.S.)	Science (OECD)
2003	~480	~480	~500	~500
2006	~480	~480	~500	~500
2009	~480	~480	~500	~500



Atmospheric rivers, levees, and floodplains in the Bay-Delta system

Michael Dettinger, USGS, SIO, La Jolla

**Joan Florsheim, UC Davis,
Marty Ralph, NOAA/ESRL/PSD
and others**

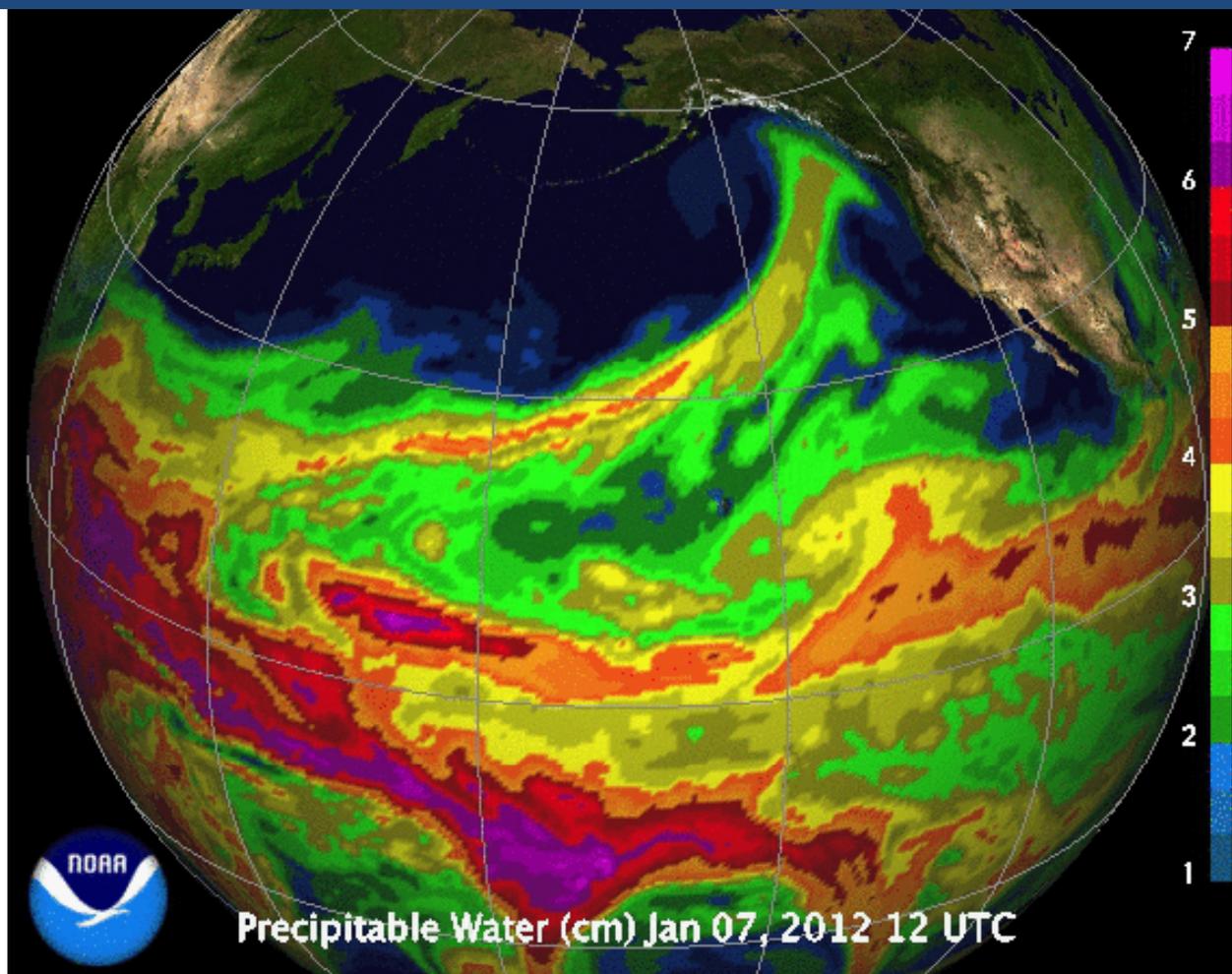


**Southwest Climate
Science Center**

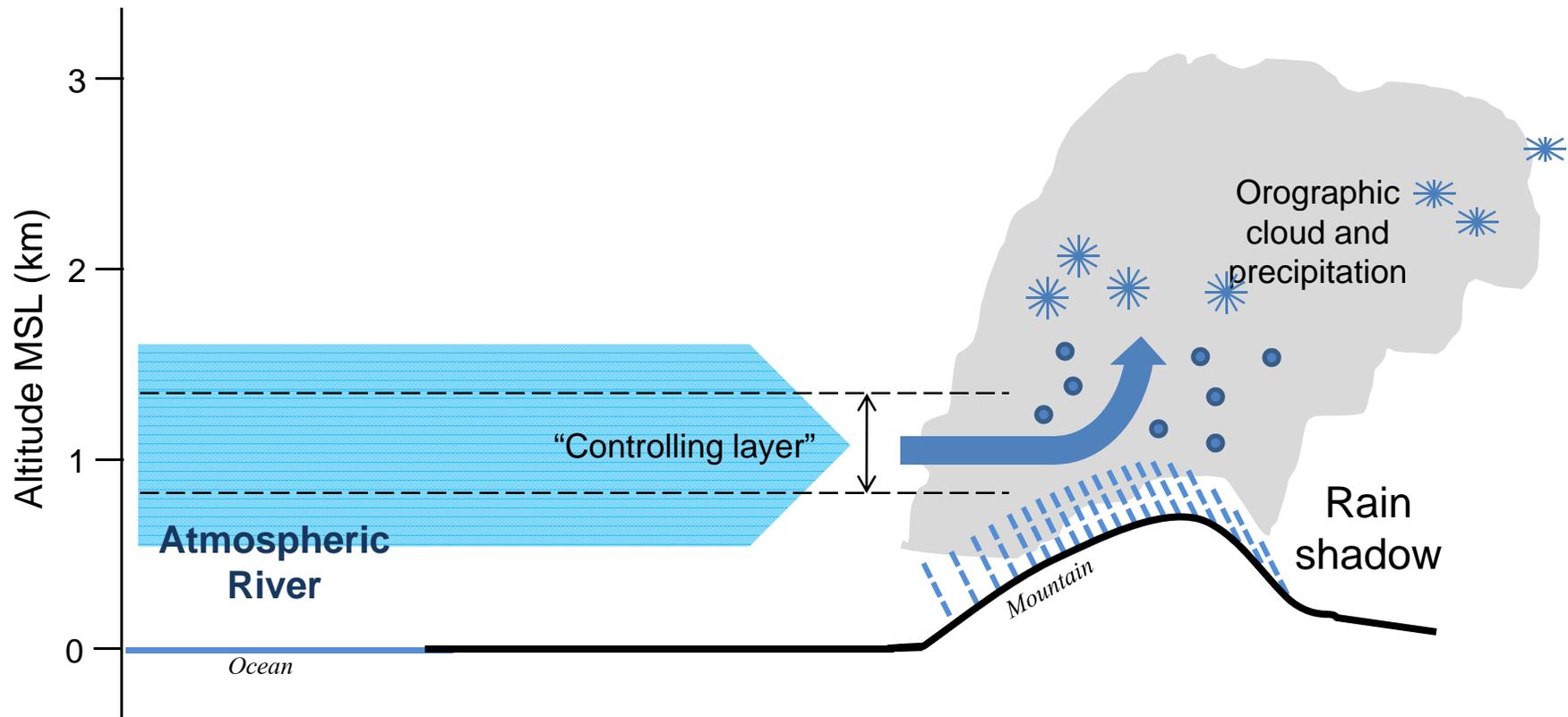
SCRIPPS INSTITUTE OF
OCEANOGRAPHY

*NOAA's California-Nevada
Applications Program*

Atmospheric Rivers (3 weeks in Jan 2012)

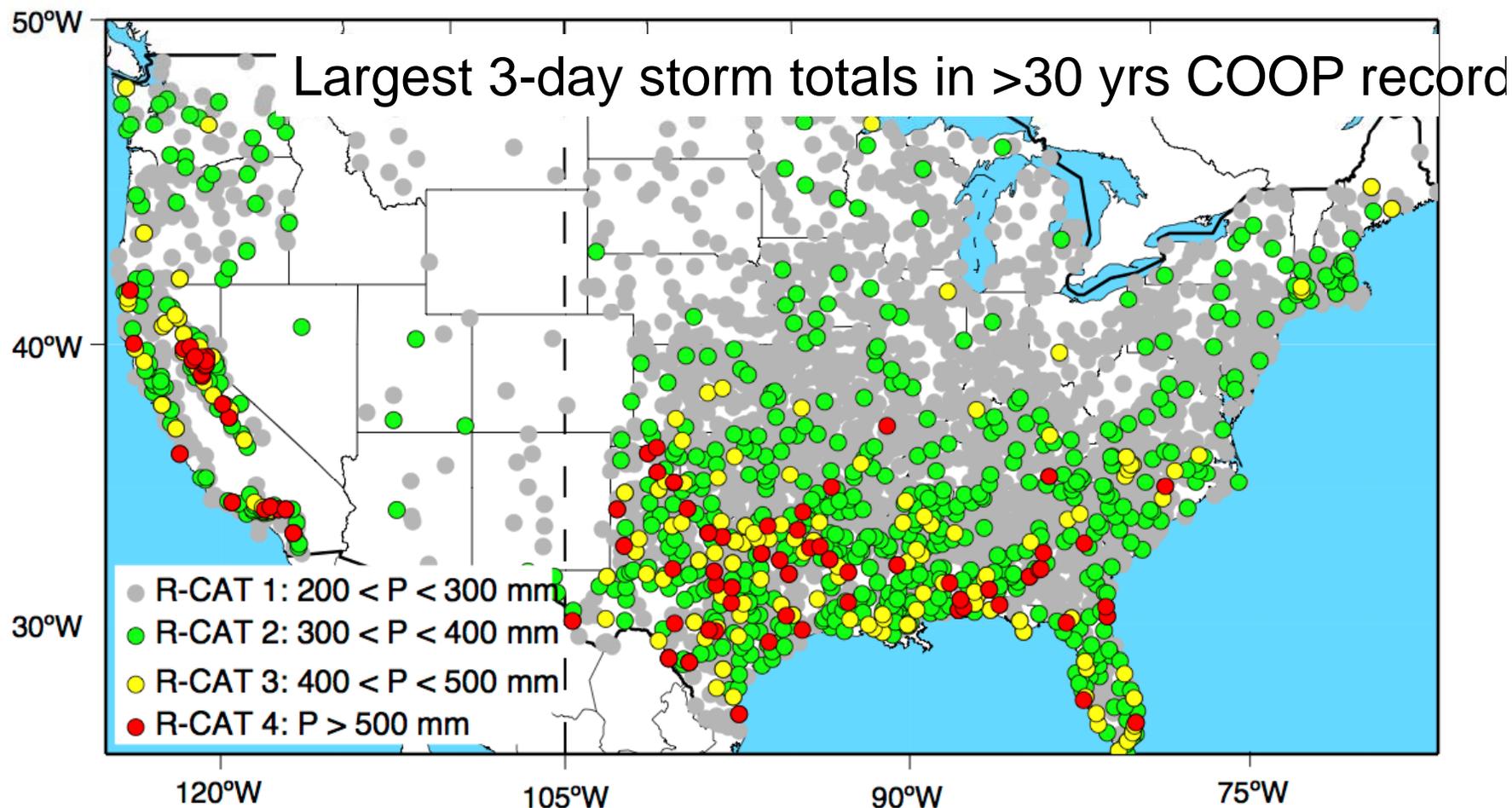


Landfalling atmospheric rivers

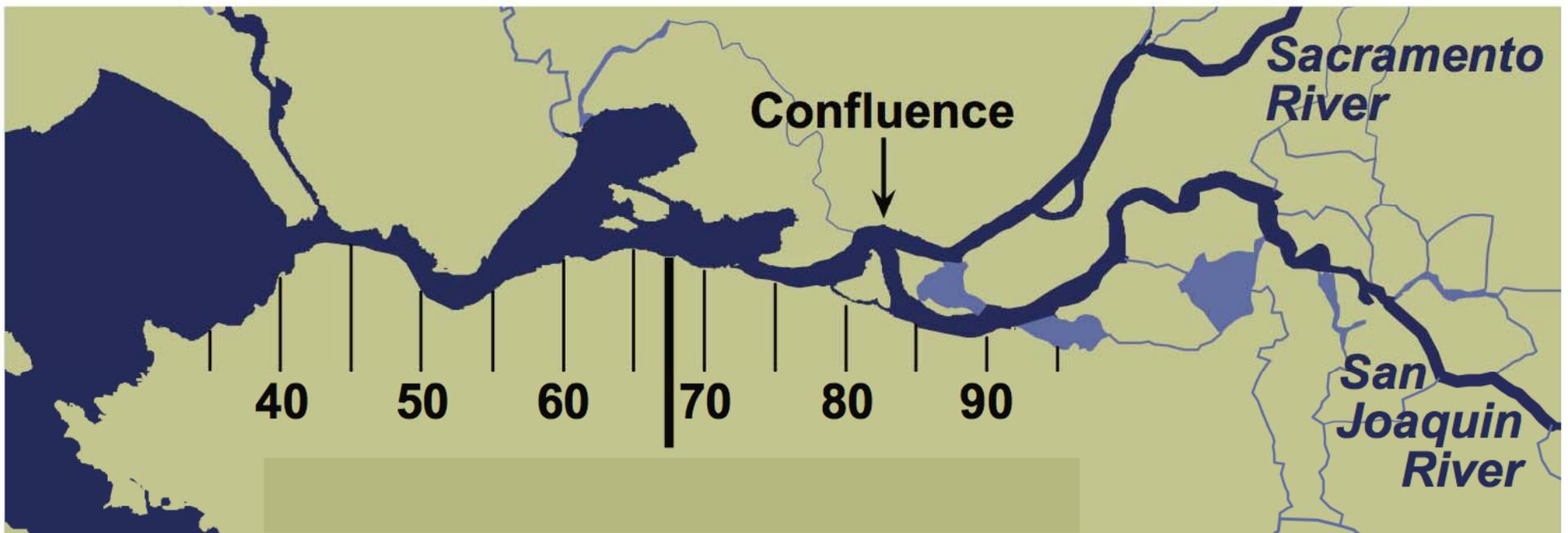
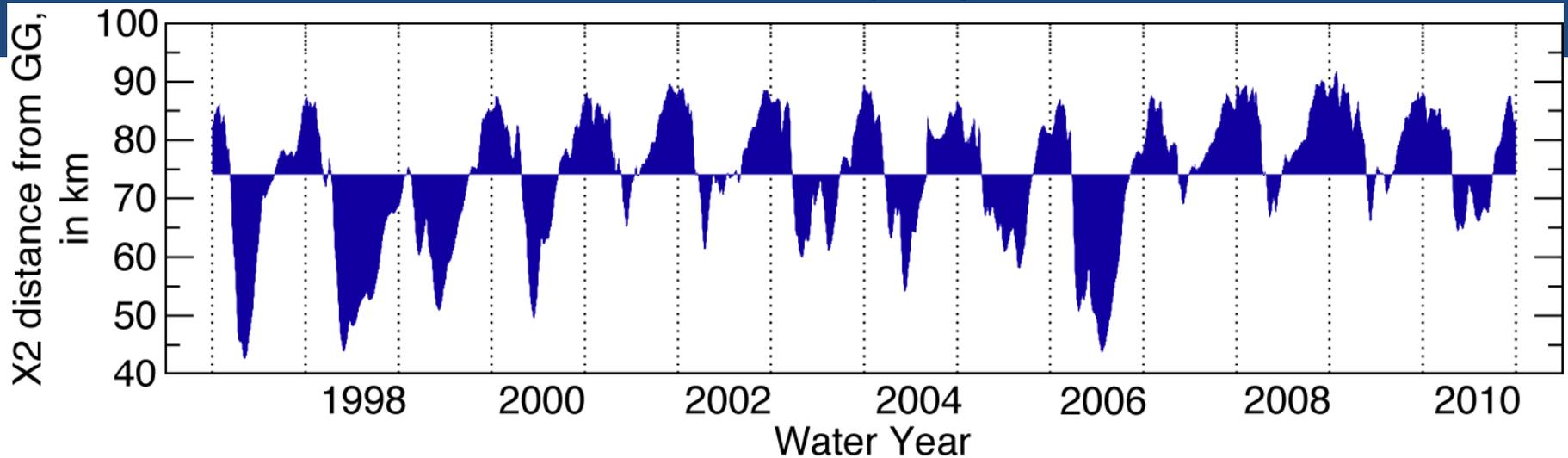


- Lateral structure from satellite data (~400 km width & 2000 km long)
- Vertical structure from airplanes & radar
(intense jet of vapor transport between 1 – 2 km above sea level;
10-20 Mississippis)

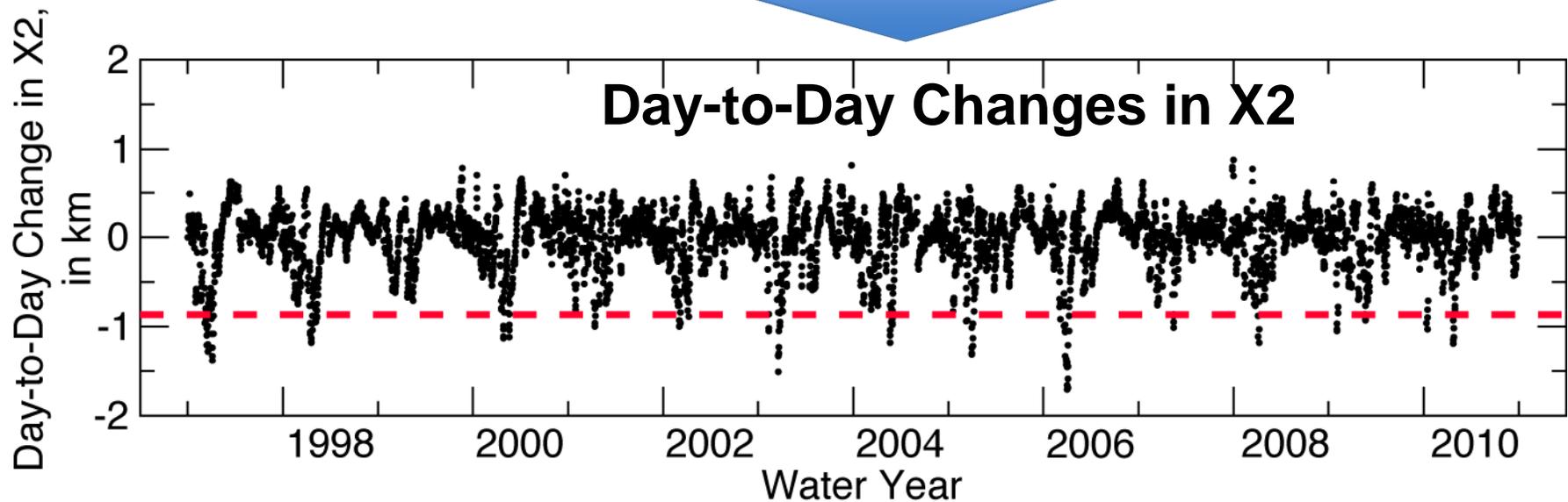
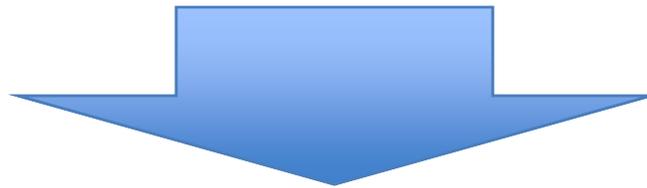
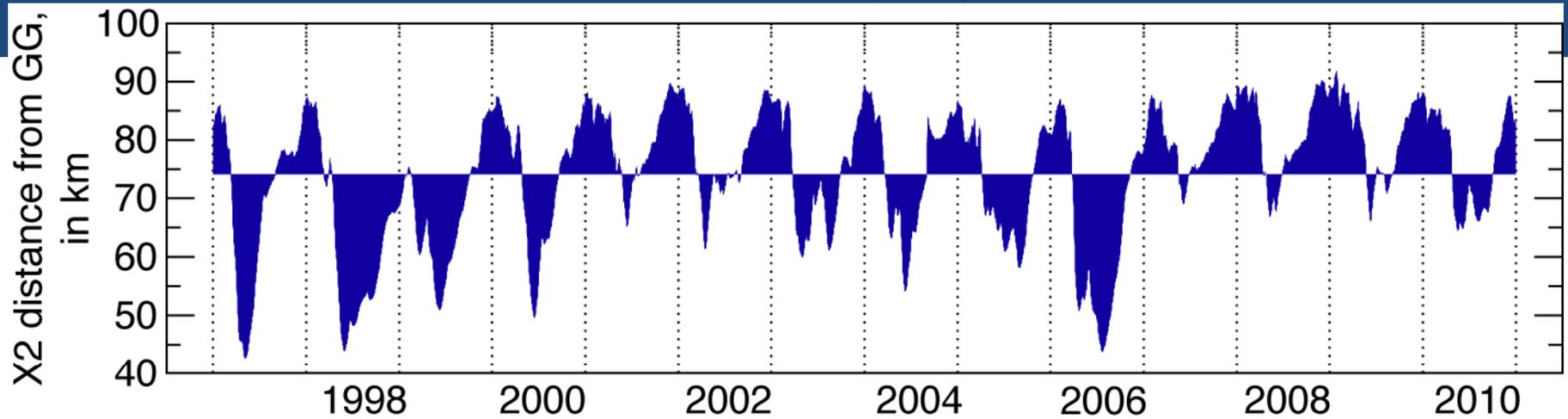
Just how BIG are these storms?

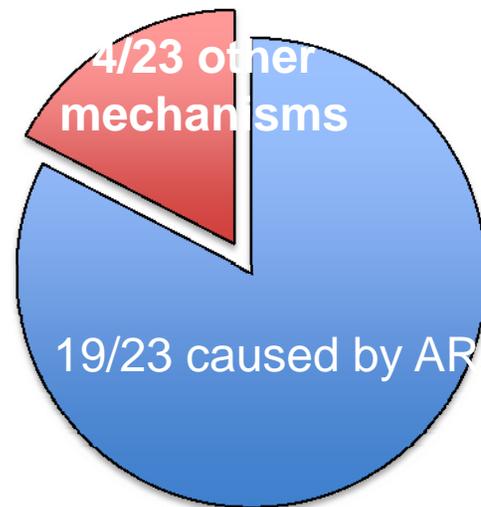
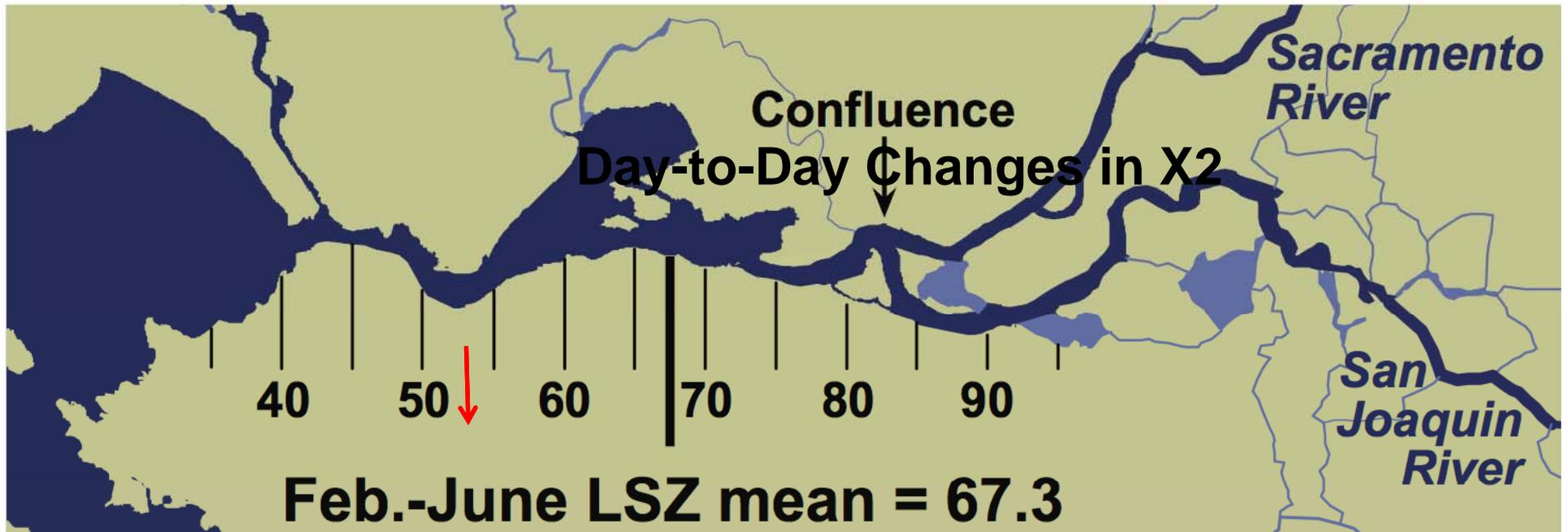


Atmospheric Rivers & X2: Distance from Golden Gate Bridge to where near-bottom salinity drops to 2 ‰



Atmospheric Rivers & X2: Distance from Golden Gate Bridge to where near-bottom salinity drops to 2 ‰

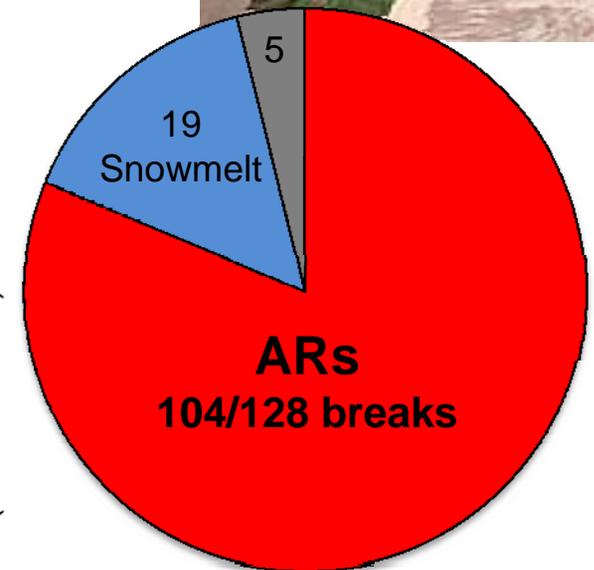
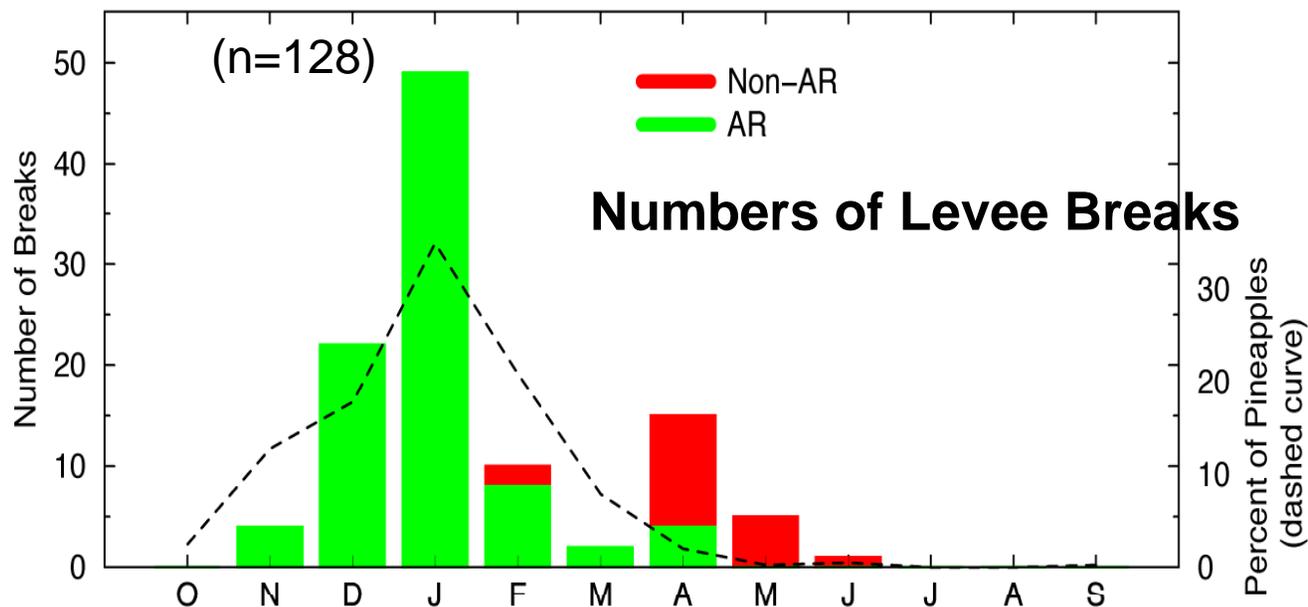




Central Valley levee breaks, 1951-2006



81% of well-dated levee breaks have been AR driven
(15% snowmelt)

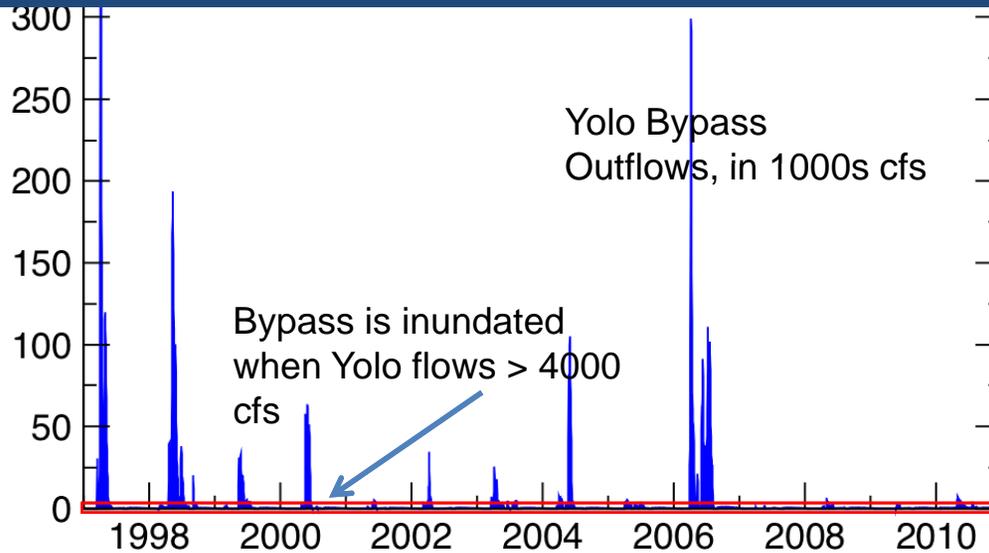
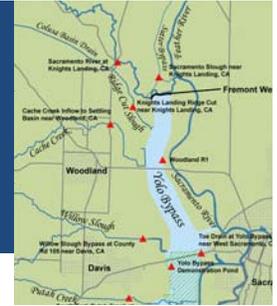


During the times of year when ARs make California landfalls, they are THE mechanism behind historical levee breaks.



Florsheim & Dettinger, book chapter, in review; Florsheim & Dettinger, GRL, 2007

Recent Yolo Bypass Inundations

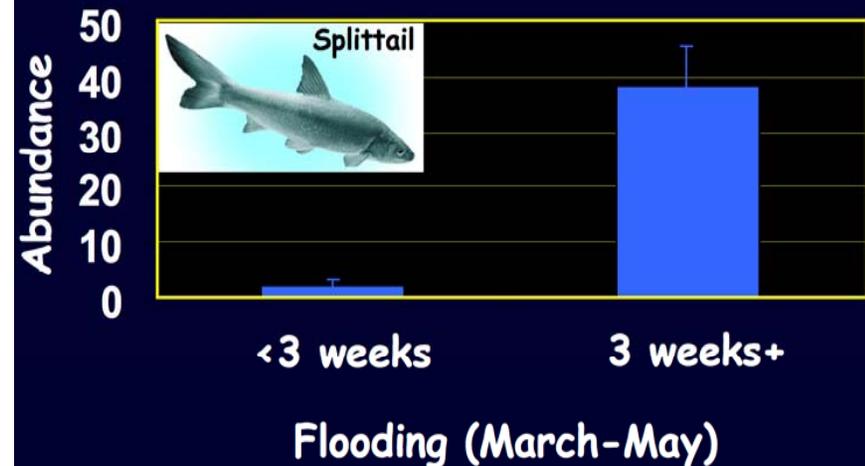


- Inundated floodplains are key nurseries & cafeterias for Bay-Delta fisheries & ecosystems
- Extended inundations are necessary for these benefits to accrue

Feeding is Greater on the Floodplain



Source: Sommer et al. (2001)



Source: Sommer et al. (2001)

Relevance to Delta Management?



ARs projected to become 10 – 15% more common & more intense this century, with addition of notable new extremes
(Dettinger, JAWRA, 2011)

ARs strongly influence salinity in the Bay-Delta (x2)
ARs dominate historical levee breaks
ARs initiate large majorities of ecologically significant inundations of Yolo Bypass

More intense storms, higher snowlines, and resulting greater flood risks projected for the 21st Century;

What future flood regimes will Bay-Delta ecosystems face?



Acknowledgements

Michael Dettinger, USGS, SIO, La Jolla

Joan Florsheim, UC Davis,

Marty Ralph, NOAA/ESRL/PSD

and other collaborators

SWRCB Workshops

Analytical Tools for Evaluating Water Supply,
Hydrodynamics and Hydropower

November 13-14, 2012

OCTOBER 2012

**SAN FRANCISCO
ESTUARY & WATERSHED** **SCIENCE**
Sponsored by the Delta Science Program and the UC Davis John Muir Institute of the Environment

Using Conceptual Models and Decision-Support Tools to Guide Ecosystem Restoration Planning and Adaptive Management: An Example from the Sacramento–San Joaquin Delta, California

Bruce DiGennaro¹, Denise Reed², Christina Swanson³, Lauren Hastings⁴, Zachary Hymanson⁵, Michael Healey⁶, Stuart Siegel⁷,
Scott Cantrell⁸, and Bruce Herbold⁹

Conceptual Model of Sedimentation in the Sacramento– San Joaquin River Delta

David H. Schoellhamer^{1†}, Scott A. Wright¹, and Judith Z. Drexler¹

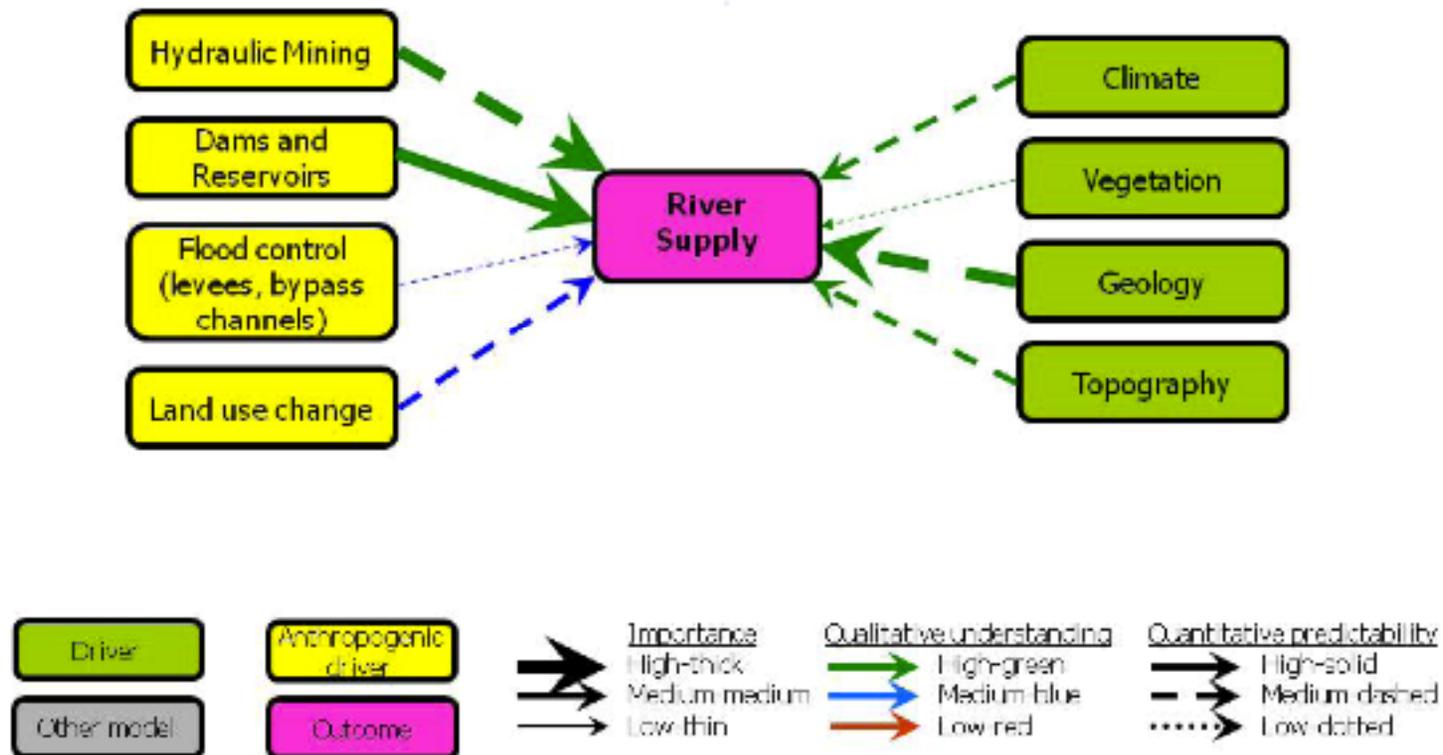


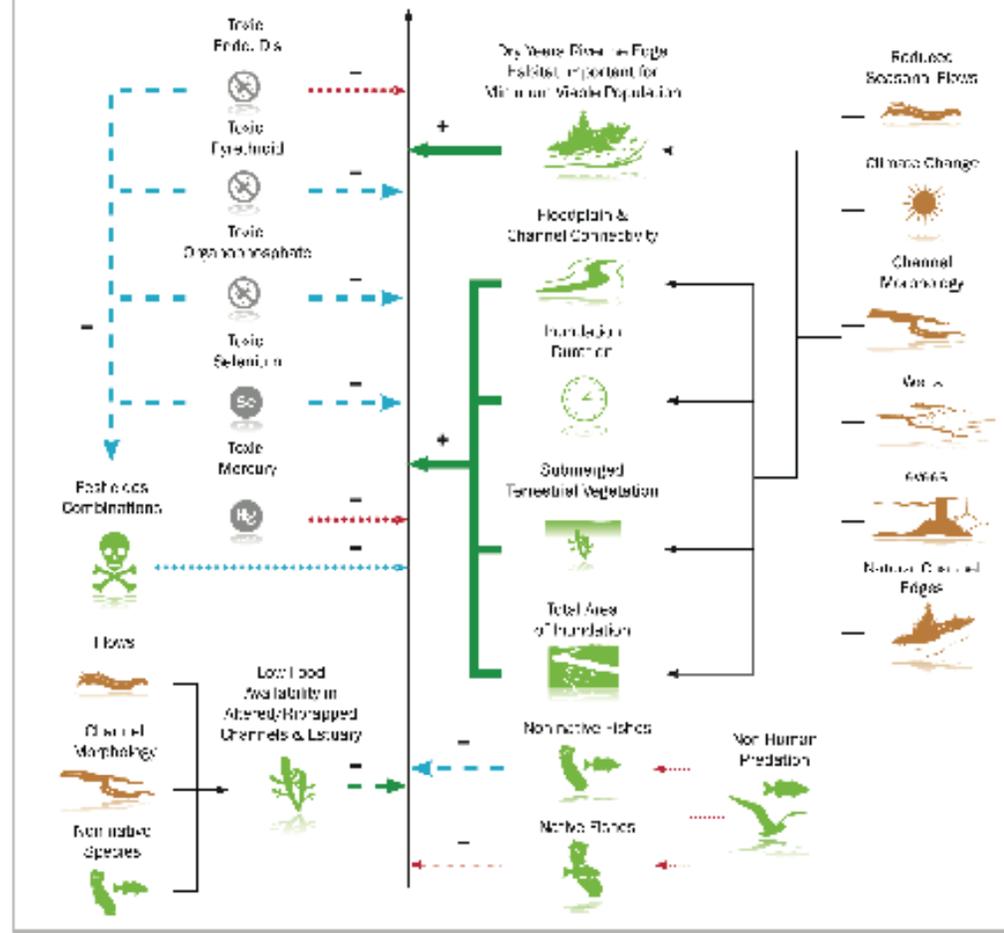
Figure 4 River Supply Sub-model. Each box is a driver and each arrow is a linkage. River supply is a driver of the regional and local sedimentation submodels.



Transition Matrix: Splittail

Blotic Ablotic

Figure 7





One Delta – One Science

One Plan – but many contributing programs.

Elements:

Linking Large Policy Questions, Management Actions to the Science

Structure and Organization of Science

Data Sharing, Modeling and Visualization

Effective Communication *[all-directions]*



Science Plan vs Science Programs

Delta Science Plan is the framework to bridge science activities and policy/management actions

Many science programs and activities can contribute to the Science Plan objectives

Science Plan can facilitate synthesis activities and develop a 'system' perspective

The Science Plan should be the foundation of a scientifically based adaptive management program

We need a shared vision for how we conduct science in the Bay-Delta System



Text a **CODE** to **22333**



Submit a **CODE** to <http://PollEv.com>

100%
80%
60%
40%
20%
0%

255503

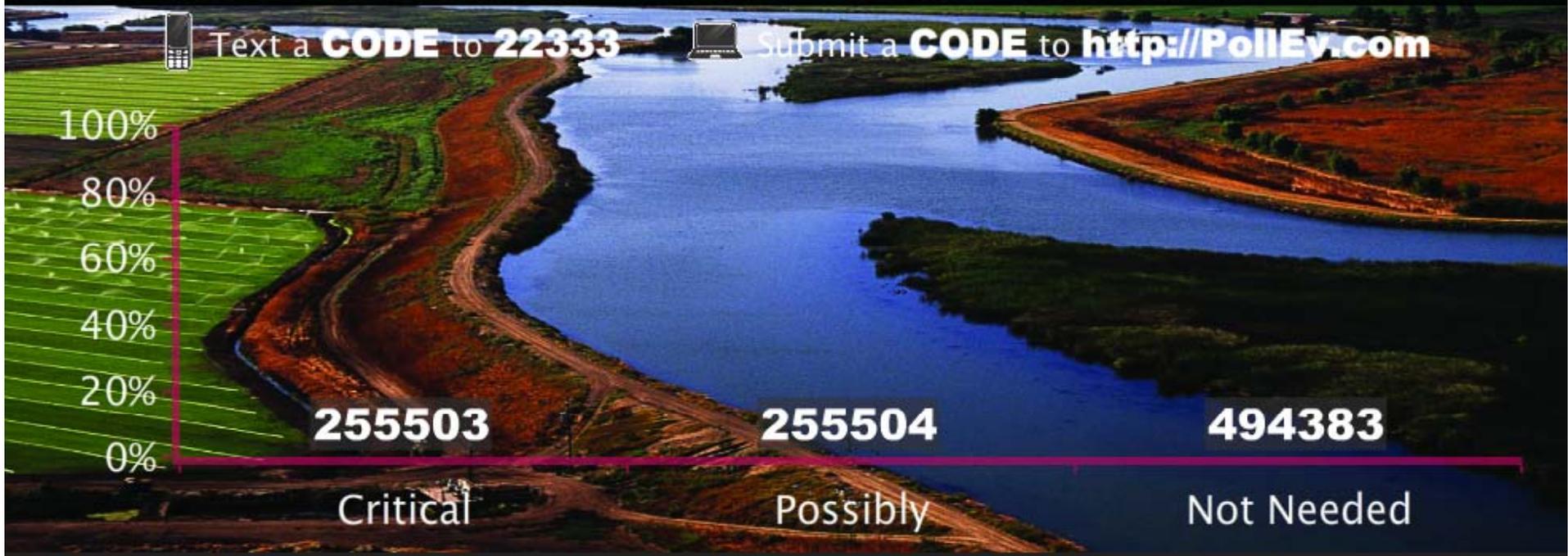
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Critical

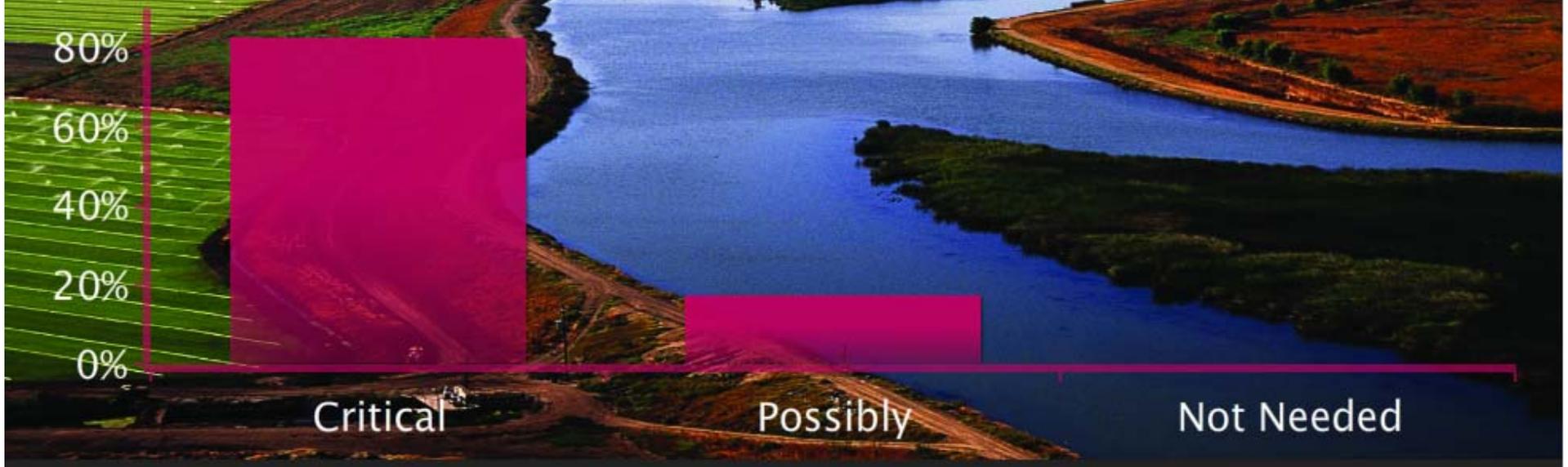
Possibly

Not Needed



We need a shared vision for how we conduct science in the Bay-Delta System

i This poll has received the maximum number of votes



Current Delta science capabilities

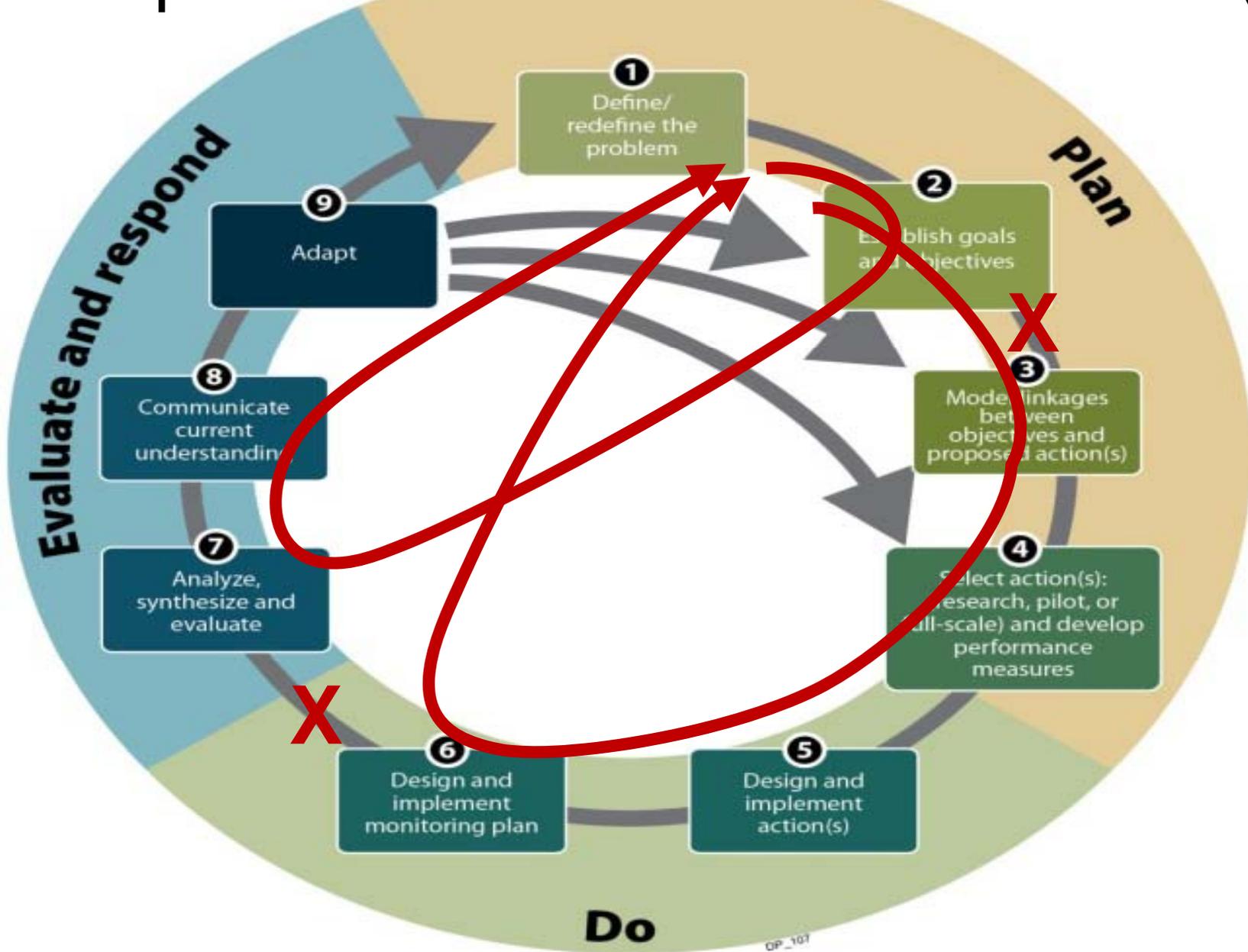
“... the strong combination of monitoring and assessment, agency driven science, and academic peer-reviewed proposal-driven science should be perpetuated” *NRC 2012*

“ ... the myriad ways in which science is conducted within agencies, universities, and nongovernmental think-tanks – needsmore cohesion, improved monitoring and information systems, better systems models, and more effective ways to bring the knowledge gained to the public and policy makers” *DISB 2012*

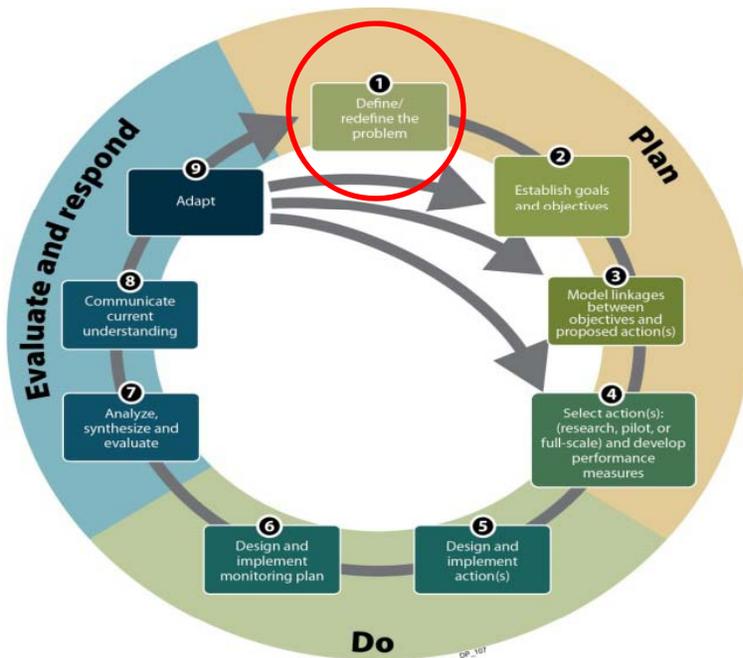
“Future science for the Bay-Delta will need to be responsive, creative, bold and collaborative. It will need to be engaged more directly with managers and policymakers, and draw analogies from elsewhere to help craft policy for a changing environment.”
Healey et al. 2008



Example weak links in the AM Process (X)



Adaptive Management



Science/Policy Disconnect

“In general, non-scientist governance professionals have difficulty defining for scientists what they want or need to know. Similarly, scientists have difficulty defining what kind of knowledge or evidence non-scientist governance professionals would accept as a basis for actions and for defining alternatives. “

– NRC 2012 Report

At times of change, the learners will be the ones who will inherit the world, while the knowers will be beautifully prepared for a world that no longer exists.

Alastair Smith



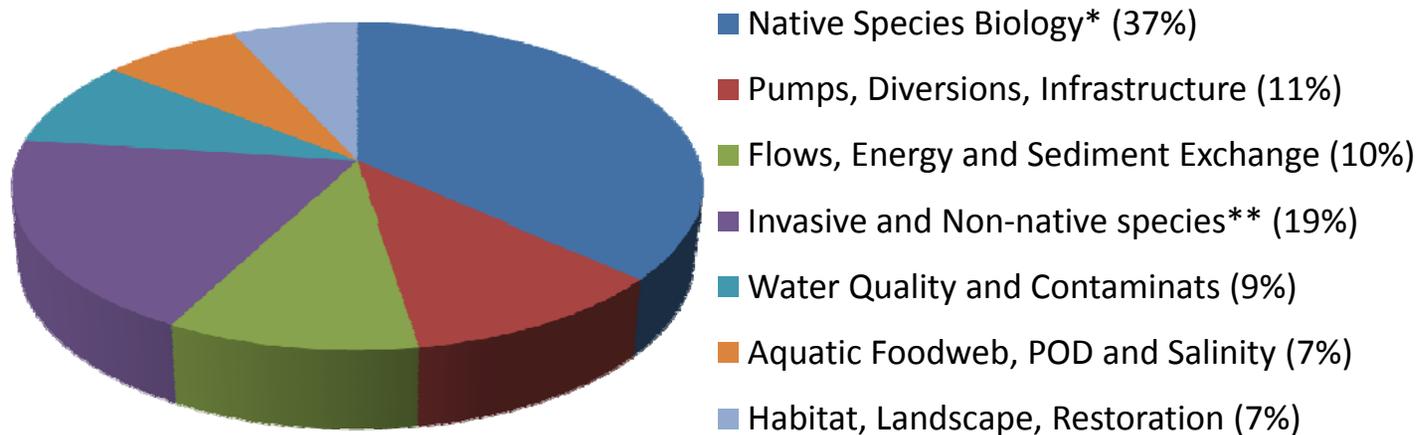


Sources of Science Issues

From 23 sources, including the following organizations:

- Bay Delta Conservation Plan Office
- Delta Stewardship Council
- Delta Vision
- Department of Fish and Game
- Interagency Ecological Program
- National Marine Fisheries Service
- National Research Council
- Public Policy Institute of California
- San Francisco Estuary Partnership
- State Water Resources Control Board
- U.S. Fish and Wildlife Service

Major Themes in 487 Science Issues



* Includes Chinook salmon, steelhead, sturgeon and other native listed aquatic and terrestrial species.

** Includes predation.



Publication Information

	Delta Science Plan (proposed)	South Florida Science Plan	Great Lakes Action Plan	Puget Sound Science Plan	Water Institute of the Gulf Science Plan	Gulf of Maine Science Plan
Publicati- on Year	2013	2005	2010	2010	2012	2009
Number of Pages	TBD	151	41	61	23	33



Delta Science Plan Objectives Addressed in Other Science Plans

	Delta Science Plan <i>proposed</i>	South Florida Science Plan	Great Lakes Action Plan	Puget Sound Science Plan	Water Institute of the Gulf Science Plan	Gulf of Maine Science Plan
Collaborative organizational structure						
Data management						
Synthesis of science						
Scientific exchange						
Communication strategies						
Adaptive Management						



Delta Science Plan Objectives Addressed in Other Science Plans

	Delta Science Plan <i>proposed</i>	South Florida Science Plan	Great Lakes Action Plan	Puget Sound Science Plan	Water Institute of the Gulf Science Plan	Gulf of Maine Science Plan
Accessibility of information						
Strategies for addressing uncertainty						
Addresses conflicting scientific information						
Prioritization of research (short- vs. long-term)						
Refining and developing models						
An integrated approach for monitoring						



One Delta – One Science

Town Hall Meeting

A new way of doing science for Bay Delta. How do we connect and enhance existing programs to allow synthesis and ‘system understanding’

Grand Challenges

What if we were to have, what questions could we answer.

Build open clusters of scientists around questions

Town Hall Meeting

Mark Cowin – Department of Water Resources

Randy Fiorini – Delta Stewardship Council

Ren Lohofener – US Fish and Wildlife Service

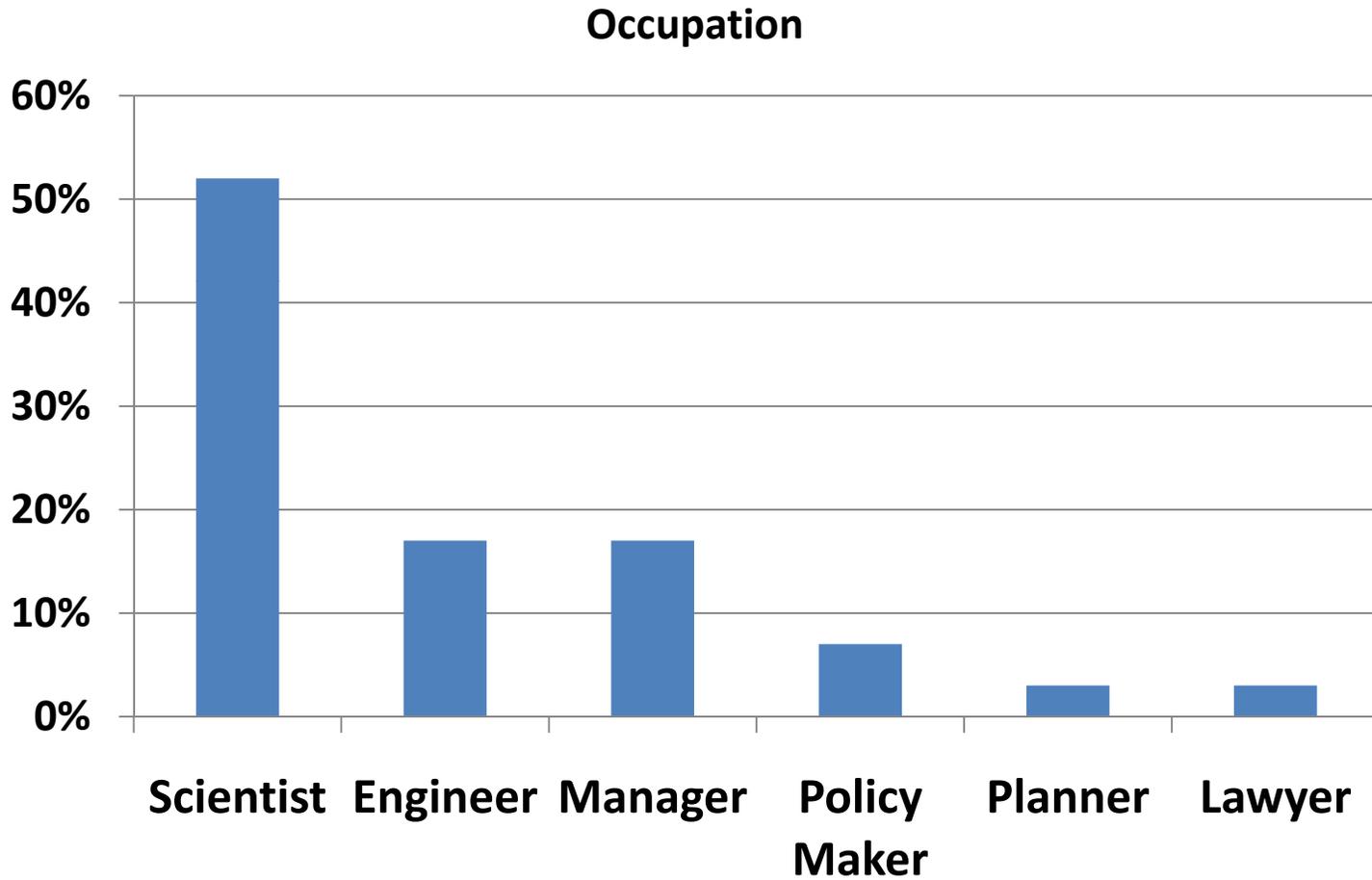
Grand Challenges for the Bay-Delta System

Moderated brainstorming on

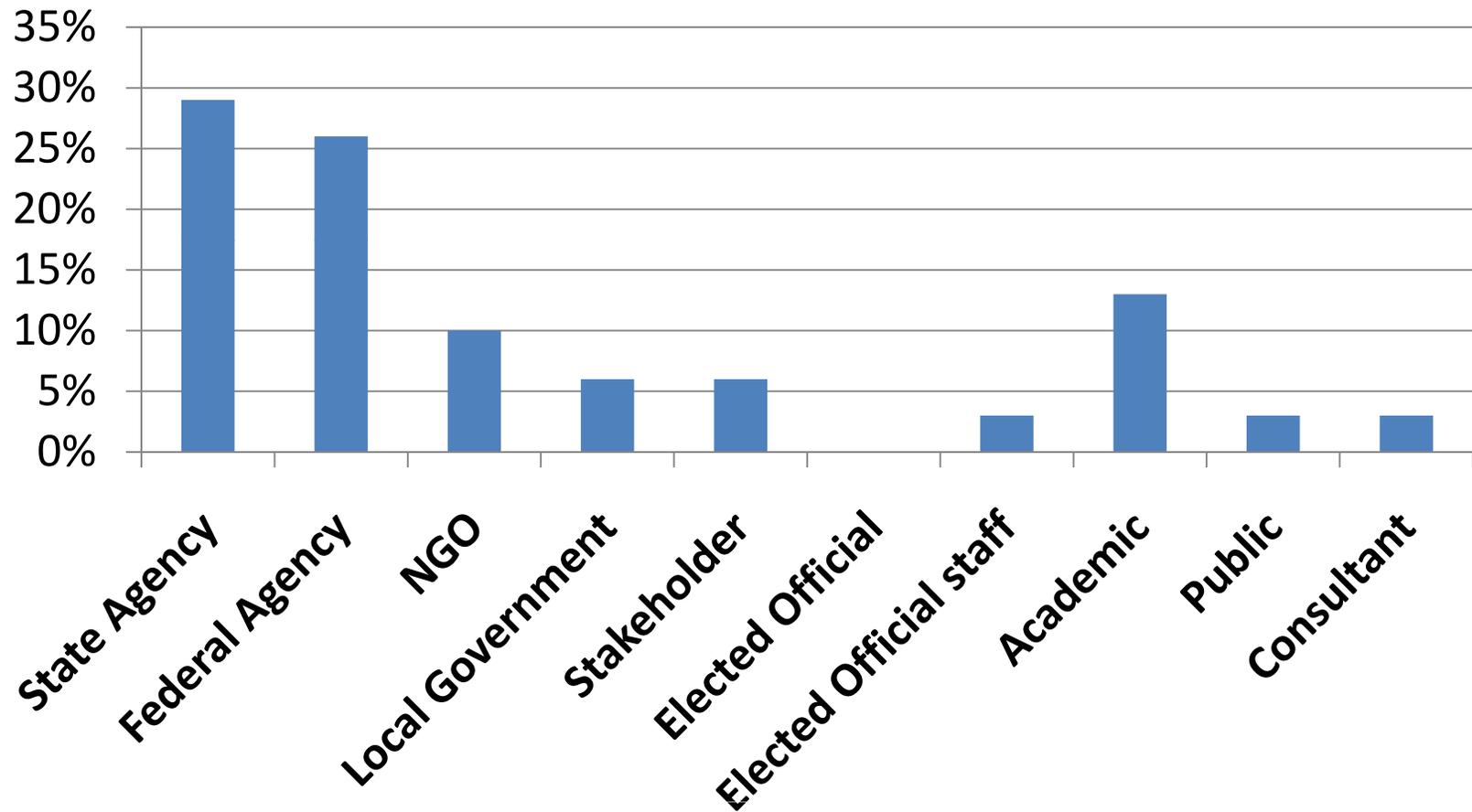
*'Ideas on how science should be structured to
address these Challenges'*



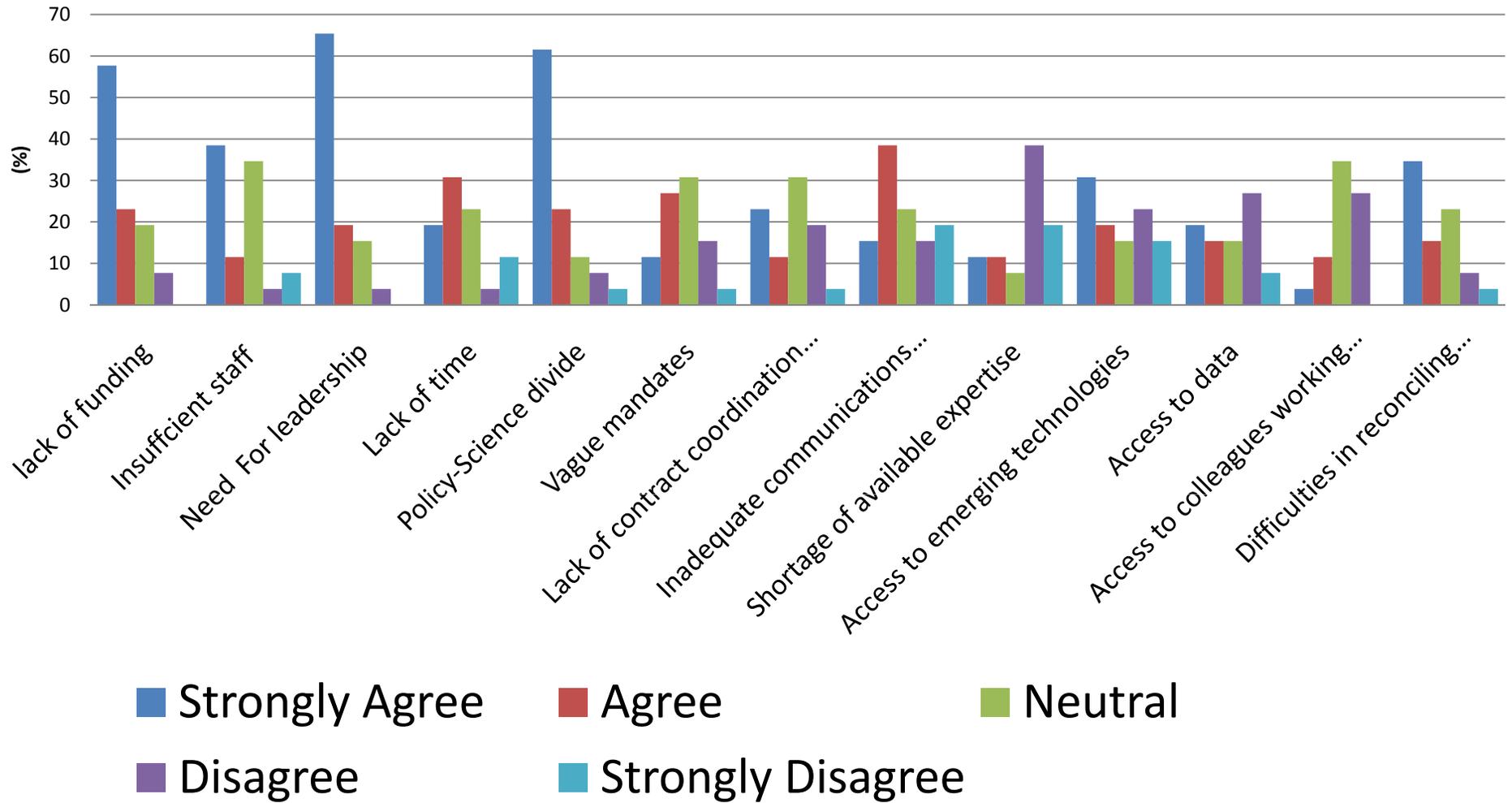
Summary of Town Hall Feedback



Affiliation



Barriers



Barriers and Big Ideas

Examples from feedback:

- Acknowledgement of common understanding
- High-level 'Translators' between Science and Policy
- Bold Actions now to test hypotheses
- A system-wide perspective [Bay-Delta-and . . .]
- New metrics for detecting population changes