

ITEM 5

**The Role of Science in the
Delta Visioning Process**

Information Item

Bay-Delta Public Advisory Committee

May 25, 2006

Delta Science Panel Report



- The Delta Science Panel is:
 - Dr. Jeff Mount - Dr. Robert Twiss - Dr. Richard Adams
- The intent of the report:
 - To guide upcoming visioning efforts through review of the principal forces that are influencing the Delta and will impact any efforts to manage it.

The Role of Science in the Delta Visioning Process



- The report addresses:
 - Some key scientific understandings that can inform current Delta restoration and management, which might help define and bracket the scope of alternative visions as they are developed.
 - Suggestion of ways that the scientific community may provide support for a visioning process to be started in the very near term.
 - Suggestions for design of the visioning process itself to more fully incorporate science and technical support.

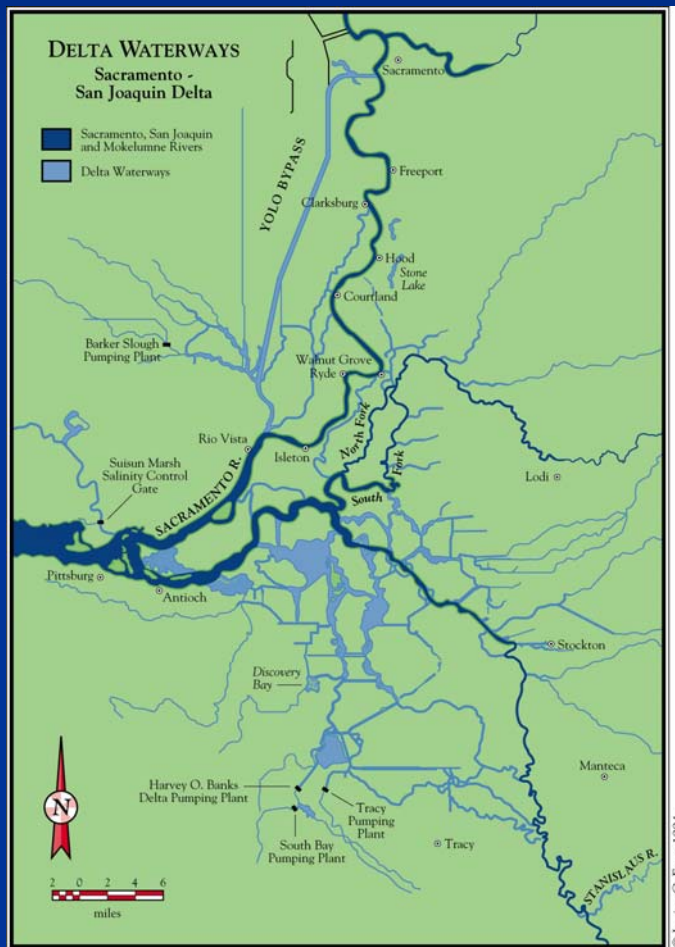
Getting to a Delta Visioning Process



Science Panel Charge:
“Prepare a report, based on a synthesis of CALFED science, that will be used to inform the development of scenarios or options for a new long-term Delta vision.”

Richard Adams, Jeffrey Mount, Robert Twiss,

A Problem Facing the Delta Visioning Process:

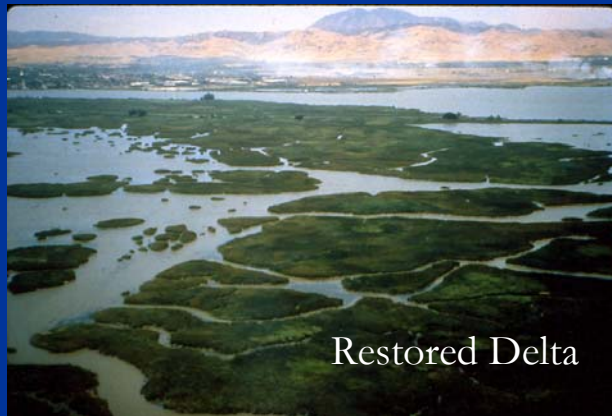


- The Delta is a dynamic landscape and ecosystem undergoing significant change at multiple scales
- Change, both gradual and abrupt, will impact management of the Delta and environmental services
- Future “preferred states” of the Delta must accommodate hydrologic, ecologic and physical landscape change

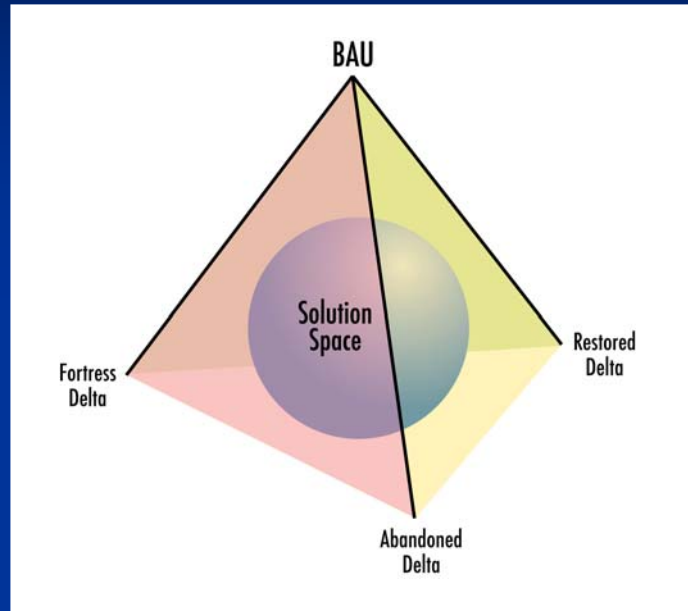
“Environmental Services” Provided by the Delta and Impacted by Change

- Farming
- Water Supply
- Flood Control
- Agricultural runoff disposal
- Urban runoff disposal
- Powerplant disposal
- Shipping
- Transportation
- Native Biodiversity
- Fishing
- Hunting
- Boating
- *Urban development*

Triangulating a Delta Solution



Four End-Member Delta Visions



Constrain and Test Delta Options: Filtering through “Critical Certainties”



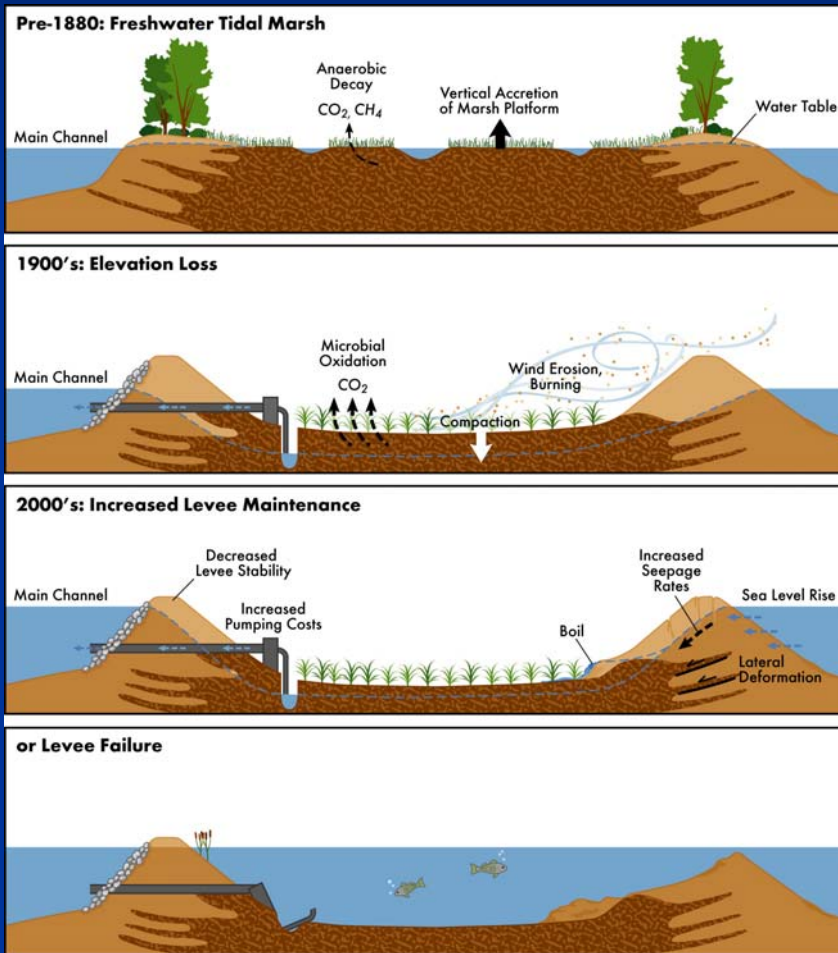
- Dynamic, not static conditions in the Delta
- Endogenous and exogenous forces acting on Delta at landscape scale
- Forces provide useful first-order “filter” of potential Delta solutions and reduce the proliferation of “what ifs”

Critical Certainties: Six First-Order Filters



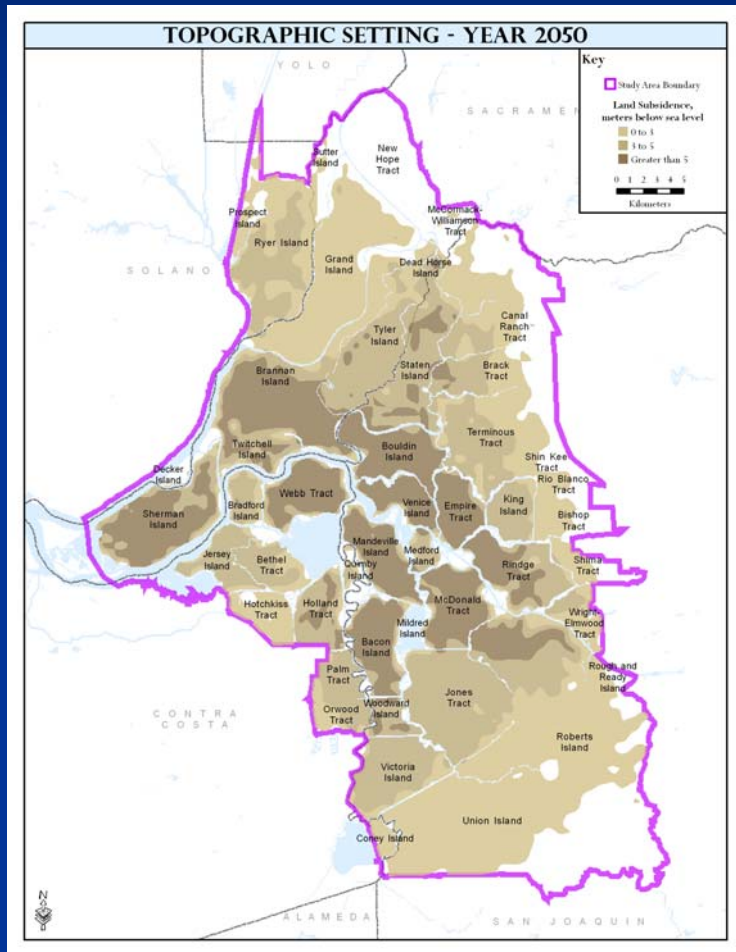
- Subsidence
- Sea Level Rise
- Regional Climate Change
- Seismicity
- Exotics and Ecosystem Change
- Population Growth

Filter 1: Subsidence



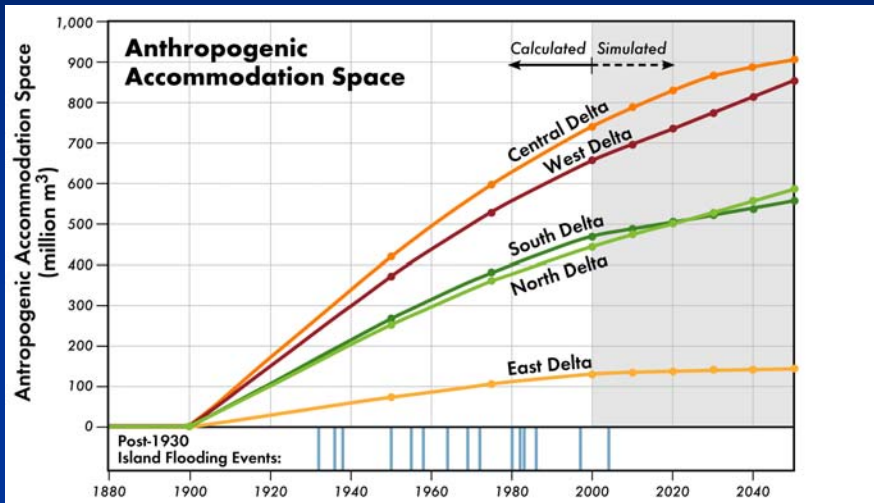
- Reclamation the greatest influence on the Delta
- Subsidence and associated levee construction an important legacy effect
- Subsidence will continue into the future

Filter 1: Subsidence

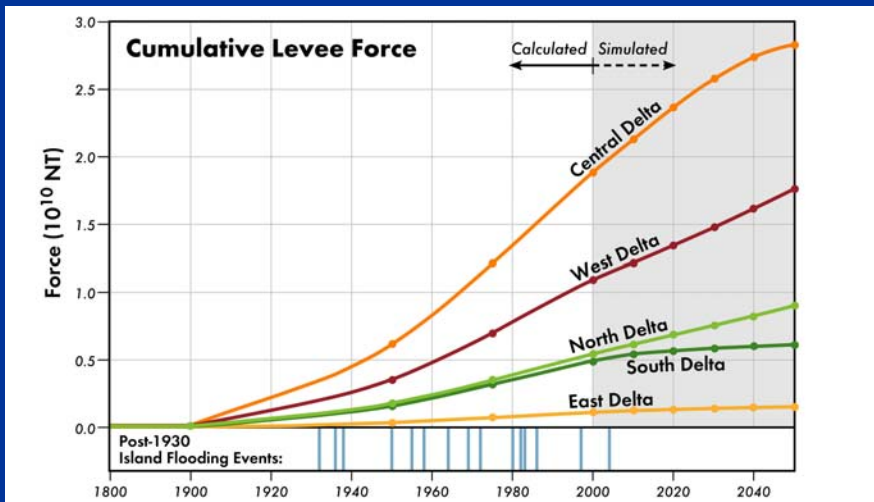


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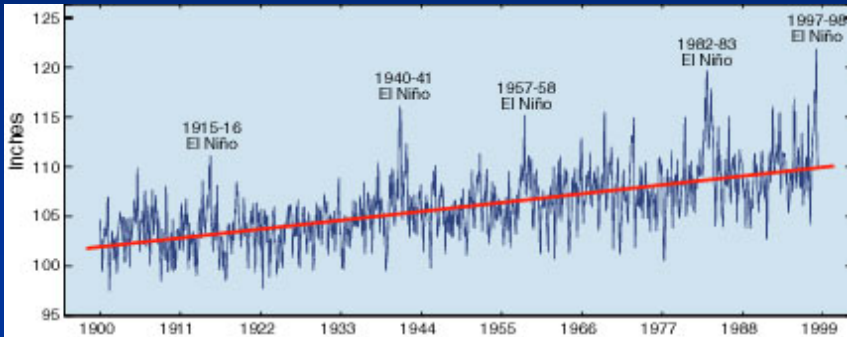
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Filter 2: Sea Level Rise

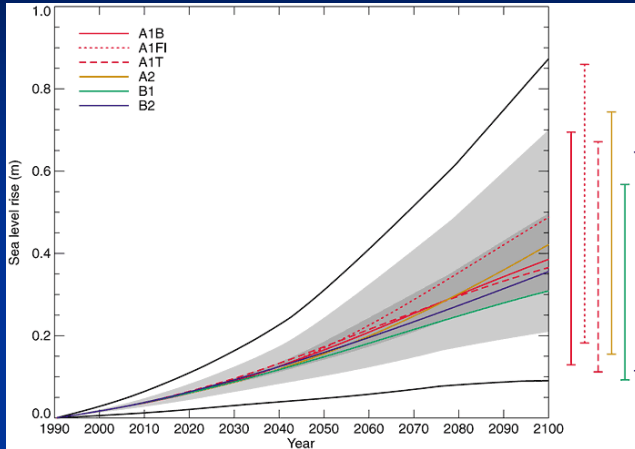


Ryan et al., 2005



- Character of Delta based on sea level
- All hydrodynamics, habitat conditions, levee heights tied to sea level
- Rate of sea level rise increasing
- A modest rise overwhelms current Delta levee network

Filter 2: Sea Level Rise



IPCC, 2001

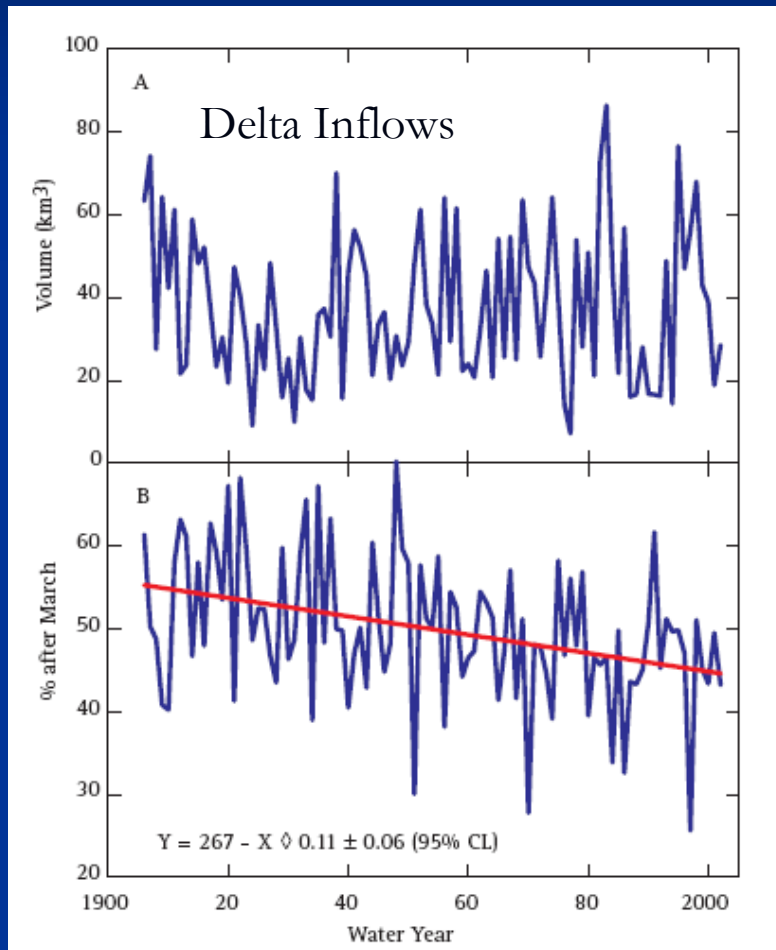


Source: Anderson et al., 2001

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Filter 3: Changes in Runoff

Conditions: High Flows*

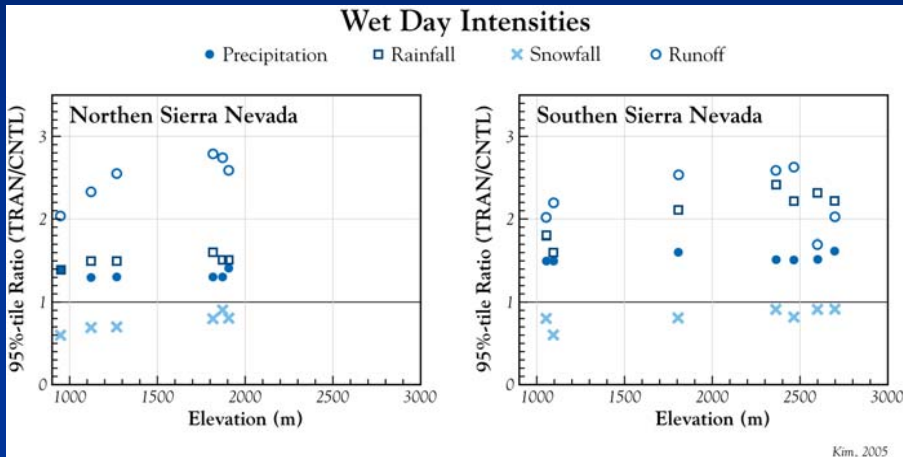


- Timing of peak runoff shifting to winter
- Intensity of winter storm events appears to be increasing
- Downscaled models suggest continued increase in intensity and frequency of high runoff events

From: Wimmerer, 2005

*modulated by water operations

Filter 3: Changes in Runoff Conditions: High Flows*

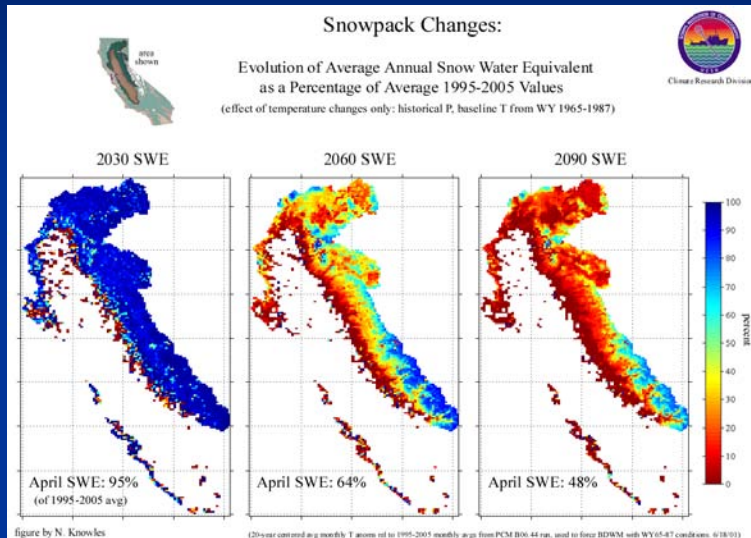


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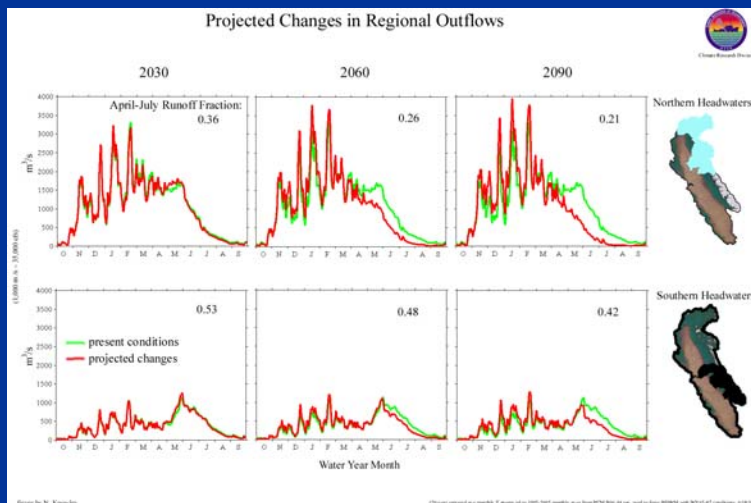


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Filter 3: Changes in Runoff Conditions: Low Flows*



- Decline in spring flows extends low-flow periods
- Potential for increase in number of days failing to meet current environmental flow standards
- Significant decline in Delta water quality (relative to current standards) during low flow events



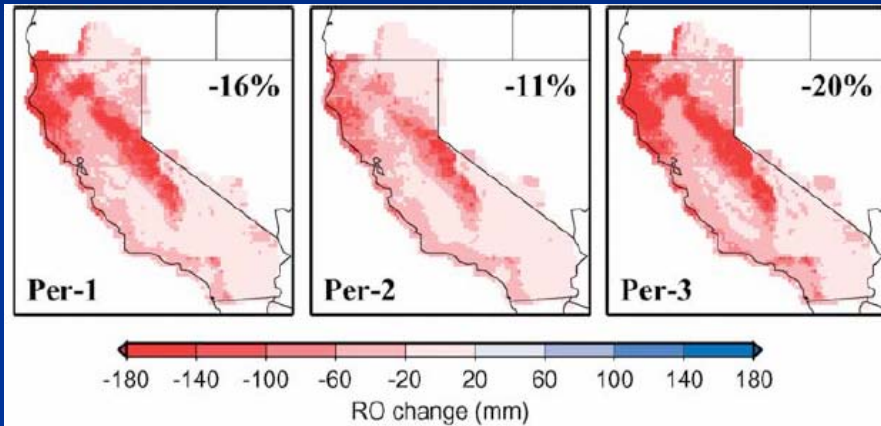
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2010-2039

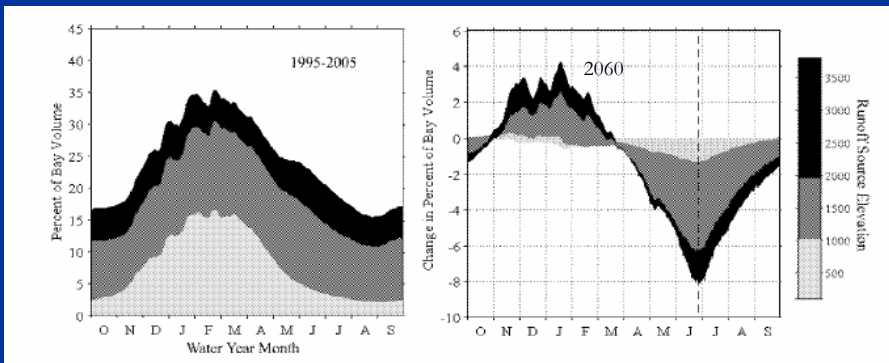
2040-2069

2070-2098



VanRheenan et al., 2004

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Knowles and Cayan, 2004

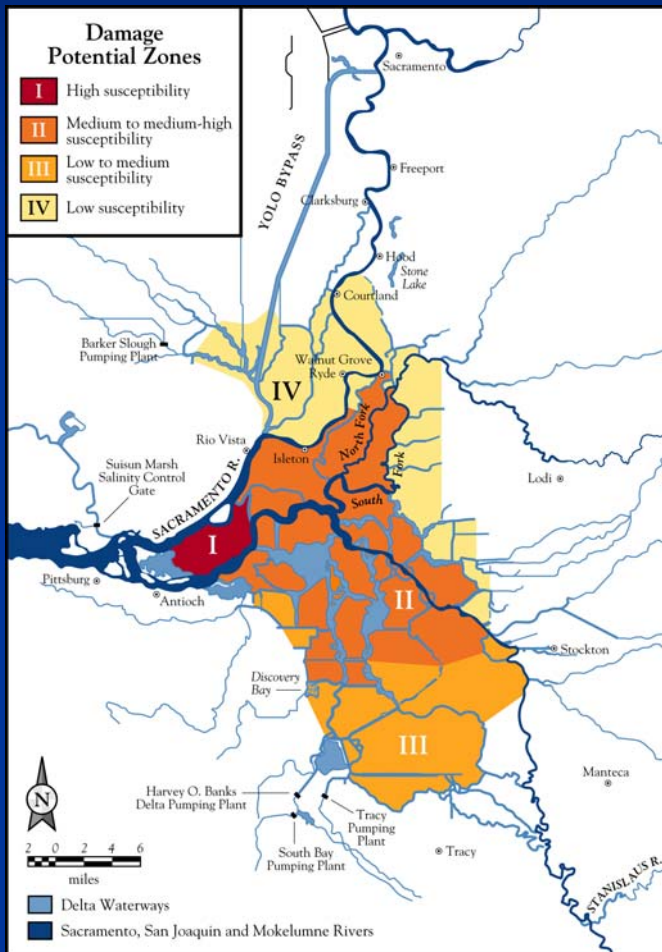
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Filter 4: Seismicity



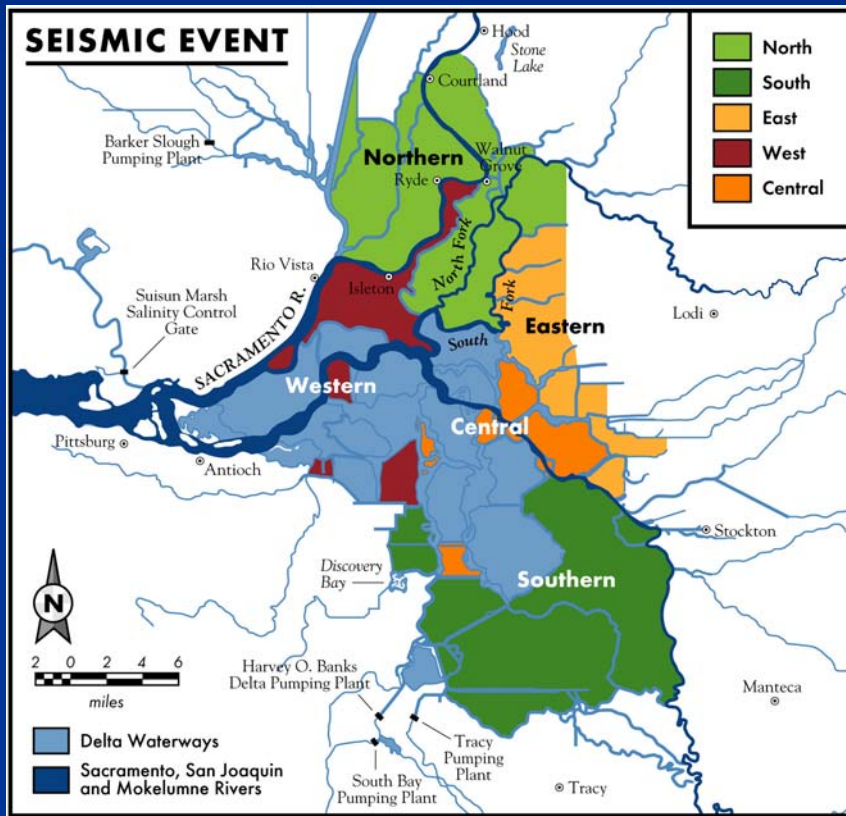
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- Risk highest in western Delta
- Unlike flood risk, seismic risk increases with time

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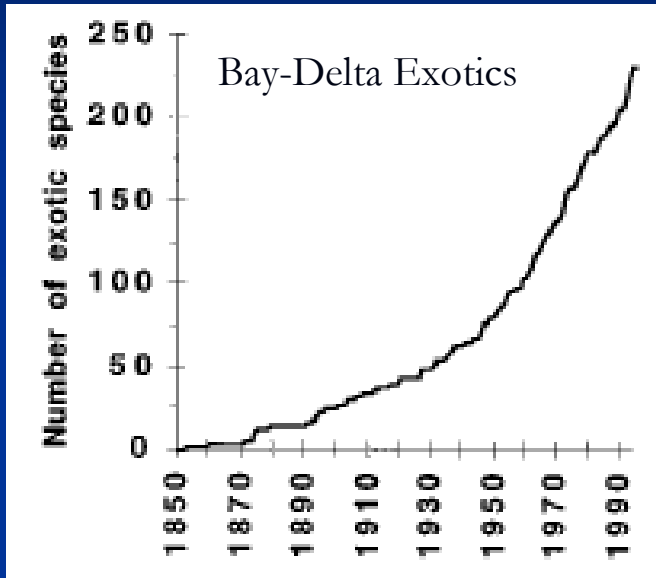
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Filter 5: Exotic Species and Ecosystem Change

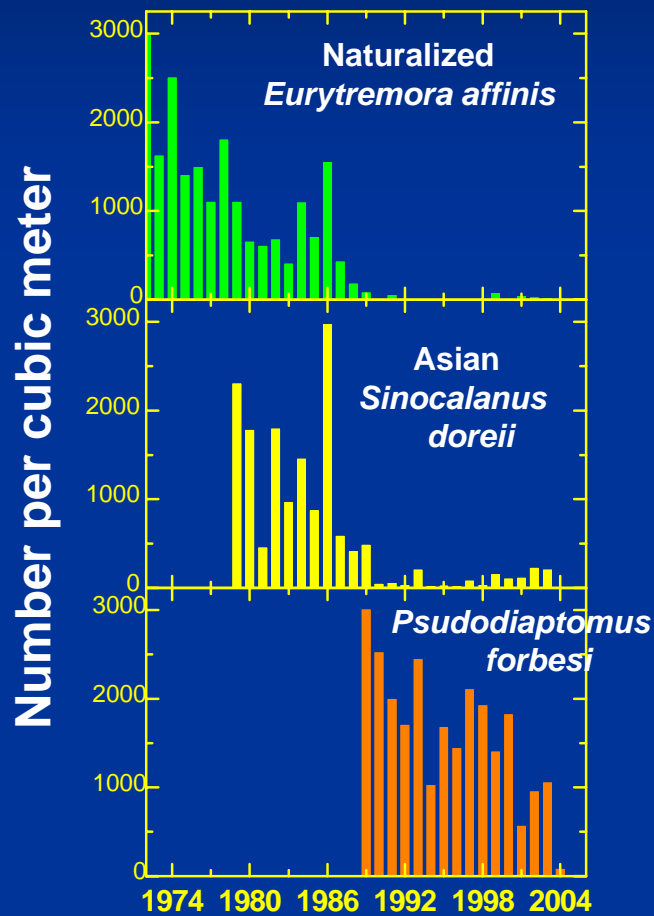


From Cohen and Carlton, 1998



- Bay-Delta is the most invaded estuary in the world
- Pace of invasions *may* be accelerating
- Characteristics of the estuary appear ideal for future invasions from food web disruptors and ecosystem engineers
- Ecosystems will be different and respond in unpredictable ways to future management efforts

Filter 5: Exotic Species and Ecosystem Change



California Department of
Fish & Game Zooplankton
survey

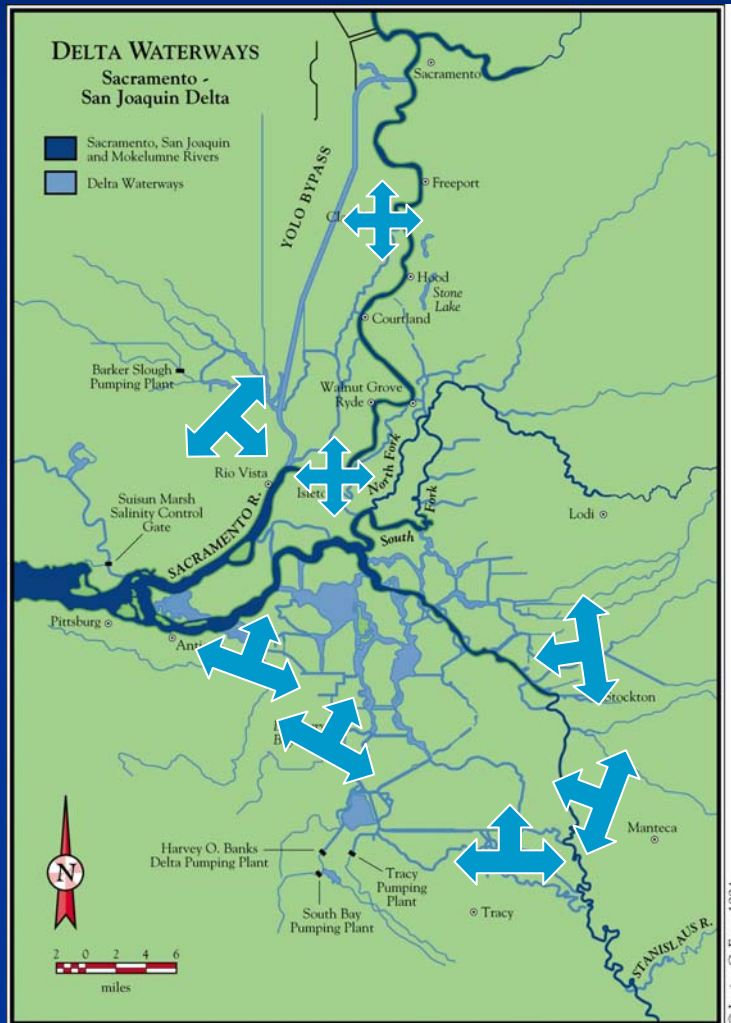
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Filter 6: Population Growth



- Fastest growing region in California
- Increasing population and water supply pressures
- Demand for conversion of the Delta to homes

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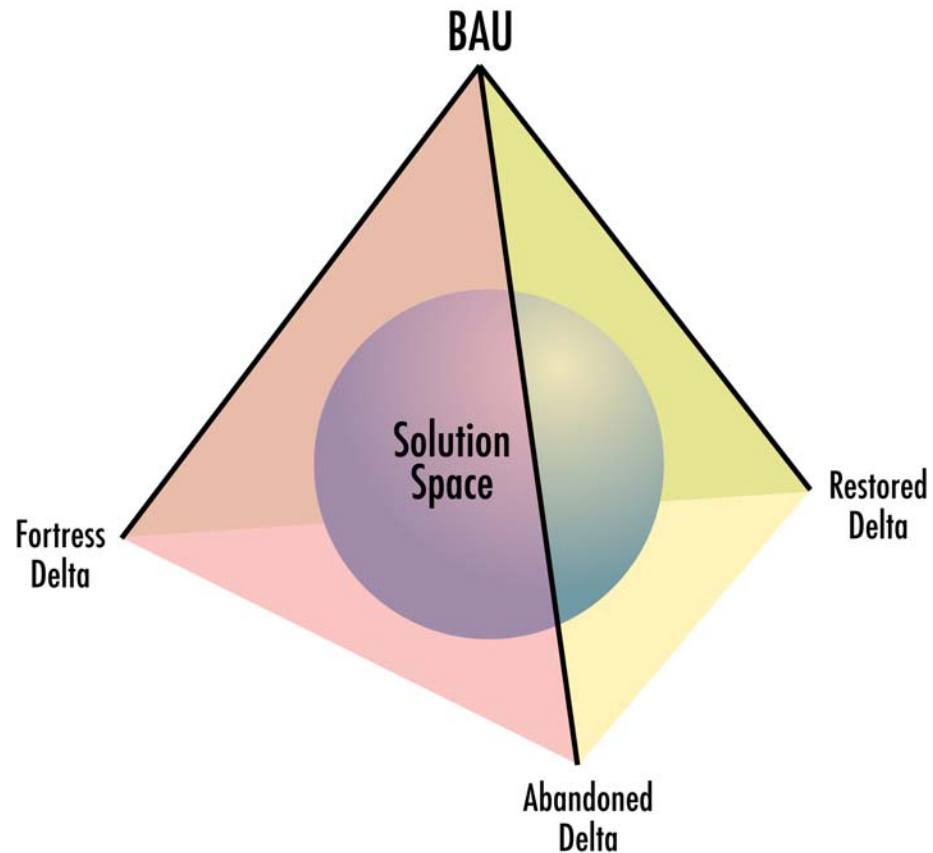
*this can be managed directly, but some members of the committee believe we will be unable to

Critical Certainties: Six First-Order Filters

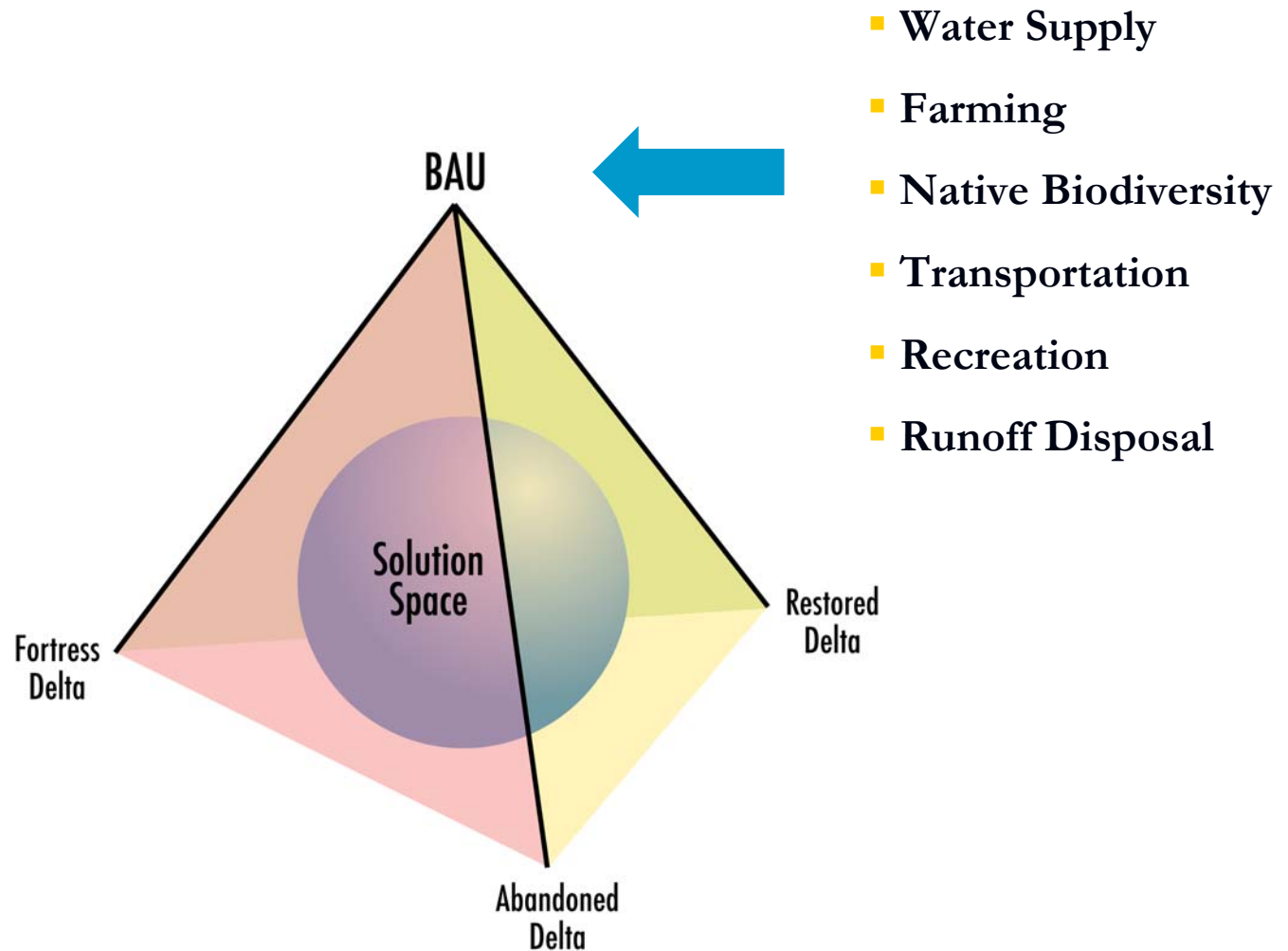


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Defining a Solution Space



Defining a Solution Space



Defining a Solution Space

- Subsidence
- Sea Level Rise
- Seismicity
- Runoff Change
- Exotic Species
- Urbanization/Population

- Water Supply
- Farming
- Native Biodiversity
- Transportation
- Recreation
- Runoff Disposal

