

# Products of the Independent Science Board Work Plan

Curtailed by contracting limitations  
Concentrated on Delta issues because of  
immediacy of the concerns

# Independent Science Board Suggestions concerning the Delta Improvements Package

- Levee Integrity Assessment and Implications [Summary of ISB report circulated]
- Water Supply Improvements in the DIP
- Monitoring and Data Assimilation, including Real-Time Forecasting, to support decision-making

# Levee Integrity Assessment and Implications

- Potential for catastrophic failure of levees in the Delta has been apparent for many years
- Renewed attention due to 2004 Jones Tract failure: damages ~ \$90M
- Mount and Twiss (2005)
  - Delta is a dynamic landscape, changing on multiple scales
  - Probability and impacts of levee failures will continue to be affected by subsidence and sea level rise, requiring both engineering and planning responses
  - Likely to be an increasing tendency for Jones Tract-like failures
  - High probability that abrupt change will take place in the next 50 years due to seismicity or regional flood events
- Business-as-usual approaches will embed high risk to ecosystems, stakeholders and society with multiple \$B costs.
  - Current authorization of funds for levee maintenance unlikely to reduce the hazard significantly

# New Delta Risk Management Strategy (DRMS): Issues to consider

- Key uncertainty in assessing risk is the limited extent of geotechnical data. Need a multi-year commitment to upgrade information
- Cast the DRMS study broadly: examine linkages between levee system stability, water management, navigation, agricultural practice, recreation, and ecosystem restoration
- Broad range of strategies likely to be necessary. “Fixing dikes” may not be viable everywhere
- Look ahead. Evaluate strategies that take account of future change in the Delta, including the impacts of subsidence, sea level rise, changes in land use and water exports
- Expand risk-based economic analysis in order to link the cost of various actions to the benefits of likely outcomes
- Consider various ways of funding levee integrity programs and policies using established objective, analytical economic tools to examine ways to distribute costs. Pay attention to likely subtle and secondary costs and benefits in both public and private sectors.

# Delta Risk Management Strategy: Conduct of Assessments

- Incorporate broadly based external review into the DRMS
  - workshops at early-to-mid course to advise on the study's methodology, quality of data, and initial analyses
  - workshops at the conclusion to evaluate study's adequacy.
- The Authority needs to continue to monitor the management of Delta levees as the landscape changes, and as science and technology continue to refine understanding of the relevant processes and potential responses.
- There will not be a quick fix; this is a fundamental, long-term management problem for CALFED.

# Water Supply Improvements in the Delta Improvements Package

- Includes a draft plan from DWR and USBR to increase pumping capacity from South Delta
- Pumping capacity to increase from 6680 cfs to 8500 cfs, and ultimately to ~10,300 cfs
- Working hypothesis behind the proposal is that increased flexibility allowed by increasing capacity would
  - increase water supply reliability
  - allow better maintenance and improvement of water quality and ecosystem condition

# ISB Review of Proposed Pumping Capacity Increases

- How securely is it known that these improvements will be achieved?
  - Developed a set of questions about chemistry and biological issues, beyond hydraulics and water delivery, taking account of likely long-term changes in environmental and socio-economic conditions
  - Planned workshop with Calif. Water and Environmental Modeling Forum on integration of hydrodynamic models with biological and water quality models for the Delta.
- How could the first stage of the proposed pumping capacity increases be used to learn more about the controls on water quality and ecosystem functioning?
  - Adaptive Management approach possible, based on modeling, enhanced monitoring and prompt data analysis

## Sample questions (fundamentally interdisciplinary)

- What is the background knowledge base, about present and future water supplies and demands?
- What are the likely impacts on flow, habitat condition, and water quality of the new pumping capacity scenarios under likely environmental conditions ?
- How might population growth, markets, regional water transfers, and demand management affect the use of the enhanced pumping capacity?
- What large future changes (e.g. climate change, levee stability, population change, structural economic changes, and technological changes) should be envisioned in estimating what might affect the need for and outcomes of changing pumping capacity?

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# Monitoring, Data Assimilation, and Forecasting

- CALFED Program seeks to make multi-faceted improvements on an unprecedented scale with a monitoring and data analysis system designed decades ago largely for regulatory purposes.
- Early attempt to design an inter-agency Comprehensive Monitoring Analysis and Research Program to support CALFED. Many good concepts developed but no implementation.
- Agencies depend mainly on the Interagency Ecological Program (IEP) for monitoring and data interpretation.
- Much of the monitoring is constrained by regulatory mandates

# Results

- Data not easily accessed
- Not easily combined with other data sets
- Few measurements designed to document connections made between management actions, physical conditions of the water system, water chemistry, and biological processes.
- Most data combination or sharing is for support of single-agency responsibilities or short-term management decisions
- Analyses often not transparent or shared
- Little assimilation of data and analysis into policy and management on a continuing basis.
- Potential for surprises and for crucial information gaps when an issue is forced on CALFED from the outside (e.g. by the environment or the courts)

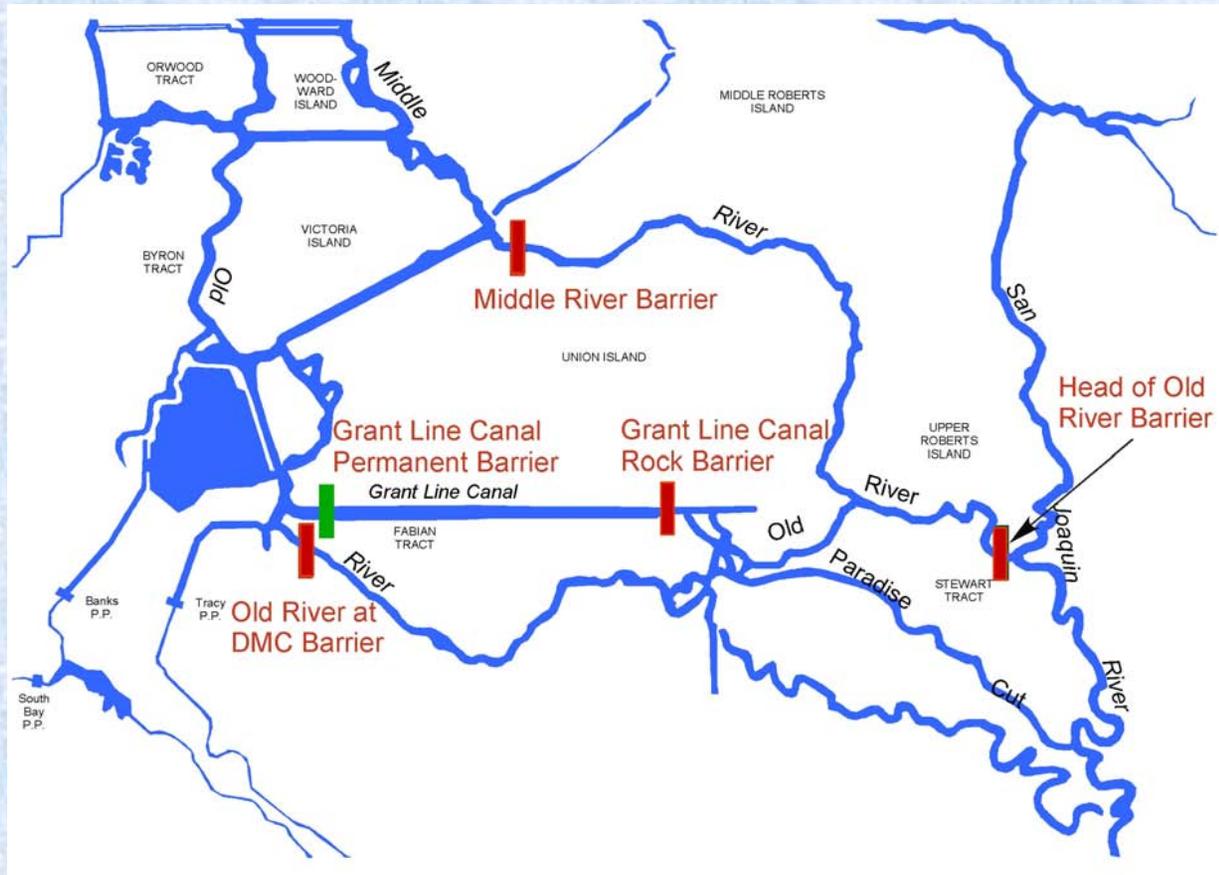
## Meanwhile, elsewhere ...

- Rapid growth in sensor technology: new types of observations possible, cheaper and more plentiful measurements
- Improved ability to transmit, assemble, and combine data from multiple sensors and networks
- Expanded use of computer processing to combine and interpret massive data sets and to use them for forecasting and other scenario generation through a process called Data Assimilation.
- Data Assimilation forces continual analysis and re-cycling of recorded experience in the manner of Adaptive Management.
- Already used by private water supply agencies to manage extensive systems

# Some local developments

- Real Time Data and Forecasting (RTDF) Project in the CDWR Office of Water Quality
- Involves agency personnel and State Water contractors
- Larger prototypes elsewhere (e.g. Columbia R. estuary)
- Combine data assimilated from physical and chemical sensor networks, computer modeling.
- Approach can involve biological data and processes
- Approach can be scaled up to larger geographical; scales and longer time scales

# Enhanced monitoring and data assimilation could be used for design and operation of projects such as the South Delta Permanent Barriers



South Delta Barriers Locations

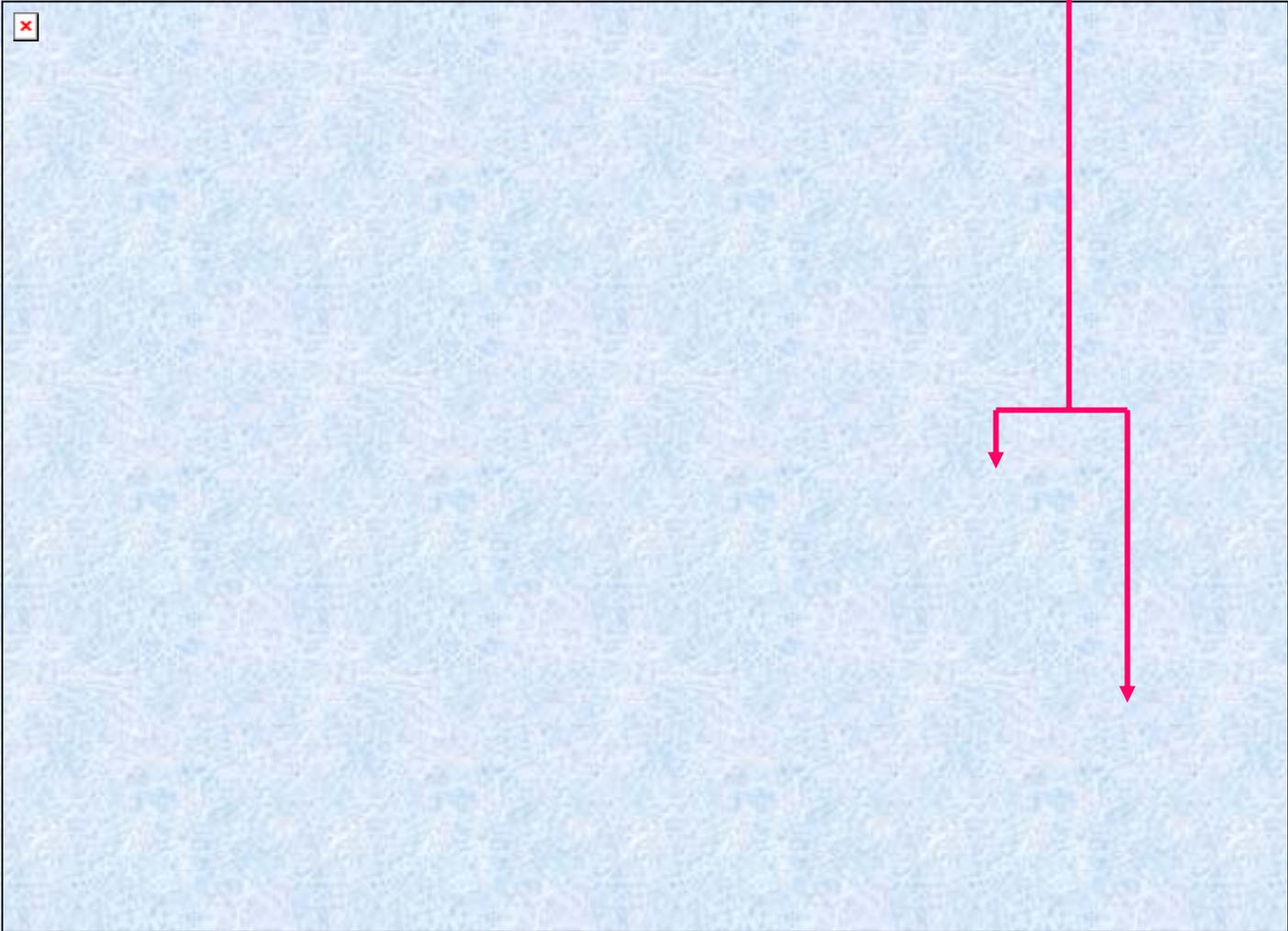
# Enhanced monitoring and data assimilation could be used for larger scale projects such as

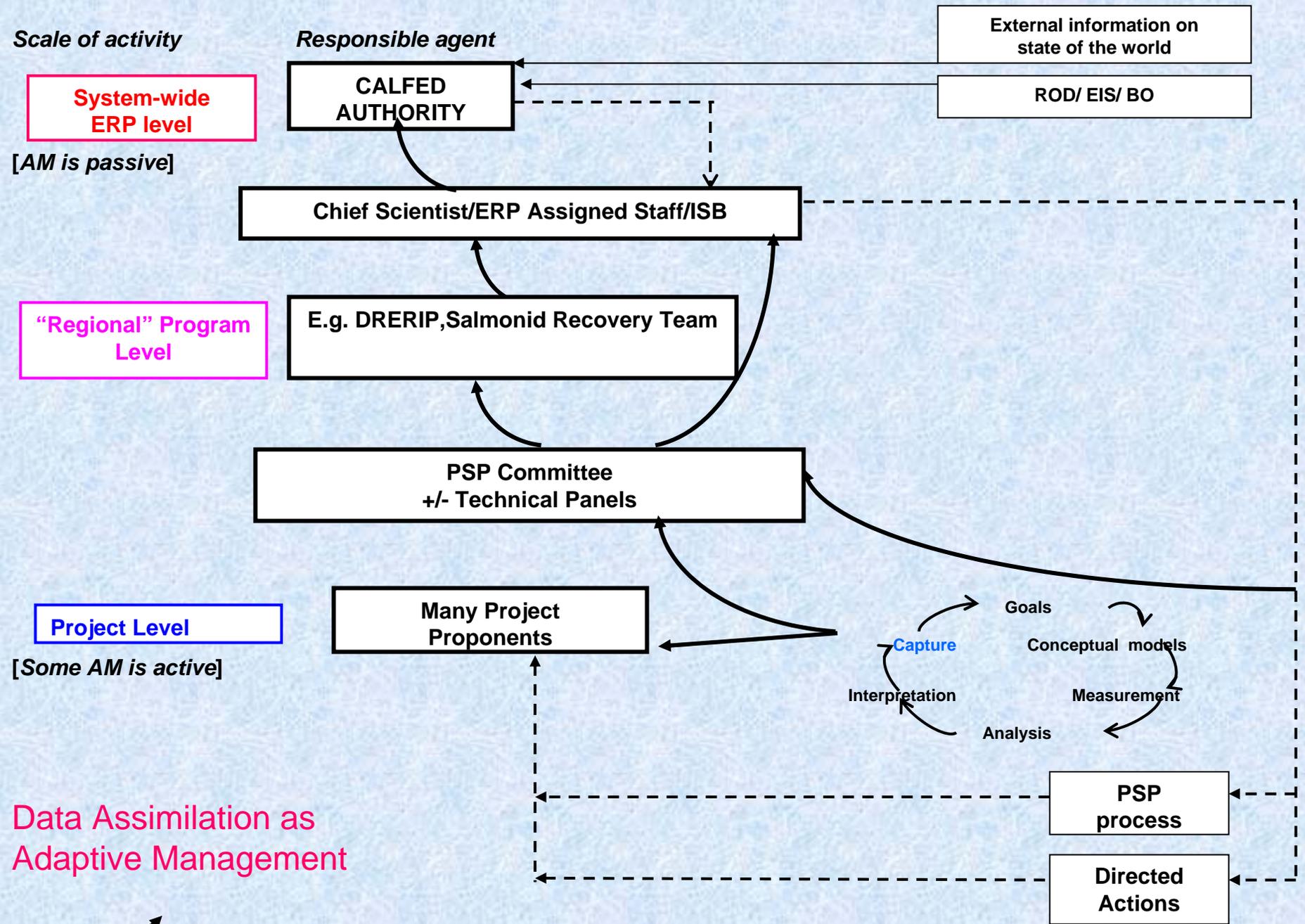
- Environmental water management
- Tracking and forecasting of water quality during regional inter-basin transfers
- Study of the buildup of unfavorable water temperature or dissolved oxygen conditions
- Tracking fish migration in relation to evolving environmental conditions
- Etc.

# ISB Recommendation

- Establish a Technical Panel to work with IEP and other agency personnel, water contractors, and other potential users to explore the utility and cost of a comprehensive observation and forecasting system for the Calif. Bay-Delta
- Promote the assimilation of data and analysis into the Adaptive Management system to support decision-making. [The left-hand side of the AM diagram.]

# Avoiding surprises





Thick arrows denote information capture and integration