

**Bullet conclusions from Performance Measures discussion, 21 February 2008  
Summarized by Delta Vision Science Advisors Mike Healey and Jeff Mount**

At their last meeting, the Delta Vision Blue Ribbon Task Force asked Science Advisors Mike Healey and Jeff Mount to provide guidance for development of ecosystem performance measures for the Delta Vision Strategic Plan. Mike Healey invited about 20 scientists from around the country for a discussion February 21, 2008. John Kirlin, Leo Winternitz, Stuart Siegel and Gary Bobker attended. Below are Mike and Jeff's summary conclusions from the meeting.

1. The CALFED Performance Measure Framework, which was developed in consultation with CALFED agencies and approved by the Independent Science Board, augmented and complemented by the functional classification of indicators developed by Wardrop et al. (2007) and Hershner et al. (2007) provides a solid foundation for performance measures. See Attachment 1 for information about the CALFED Performance Measure Framework and Attachment 2 for the Wardrop and Hershner indicator classification approach.
2. The single ecosystem goal provided by the Delta Vision needs to be elaborated upon to provide greater guidance for developing performance measures. The ecosystem goals provided by the ERP strategic plan have been widely recognized as a workable set of ecosystem goals and could provide a template for the Task Force to work from to develop an expanded set of Delta Vision ecosystem goals and corresponding objectives.
3. The agreement among ecosystem objectives produced by various planning processes (Delta Vision, BDCP, CALFED ERP) suggests that the ecosystem objectives described in the Delta Vision provide a reasonable starting place for developing Strategic Plan goals, objectives, actions and performance measures.
4. The framework, an expanded set of ecosystem goals together with their objectives, and the Delta Regional Ecosystem Restoration Implementation Program (DRERIP) models provide the necessary tools for developing performance measures. Three potential products should emerge from the joint application of these three tools:
  - a. A clear list of ecosystem processes and/or attributes that represent the value that society places on the ecosystem;
  - b. Viable indicators of performance on how the system is likely to respond to various policies or management actions. Keep in mind that response to any action or uncontrolled change in boundary conditions can be either positive or negative and we need to pay as much attention to the possible negative implications of any change as we do to the positive implications;
  - c. For at least some indicators, the tools should suggest benchmarks or targets against which to judge performance. Benchmarks or targets might be represented by an appropriate range of conditions, a positive trend, a desirable endpoint, a qualitative change, or other kind of metric.
5. Initial performance measures will need to be tried out and many will probably prove not to be as useful as hoped. Implementation of performance measures needs to be

considered an experiment and individual measures are subject to change or substitution as information accumulates.

6. Improvement in some aspects of ecosystem function may lead to declines in other aspects. Performance evaluation must be designed to help evaluate such tradeoffs.

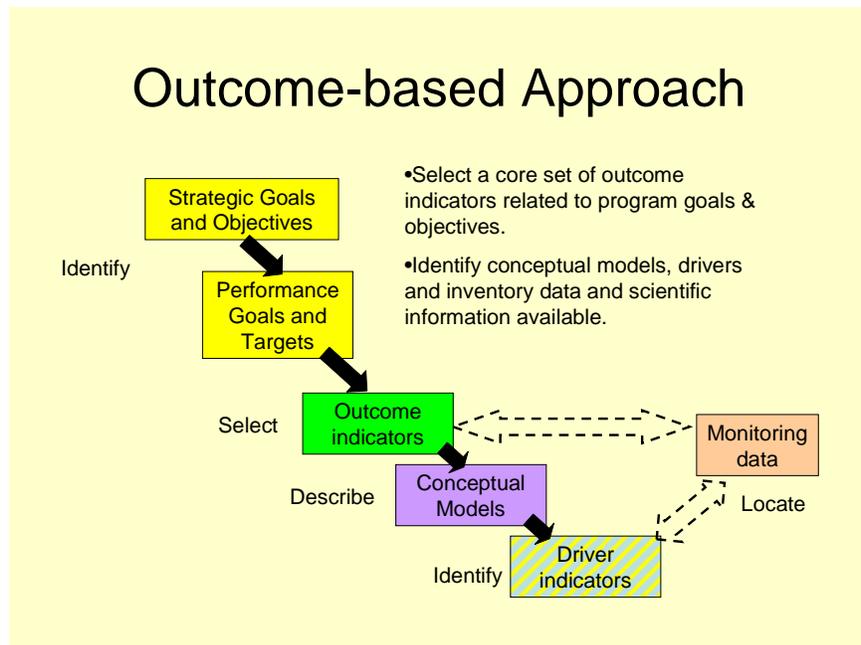
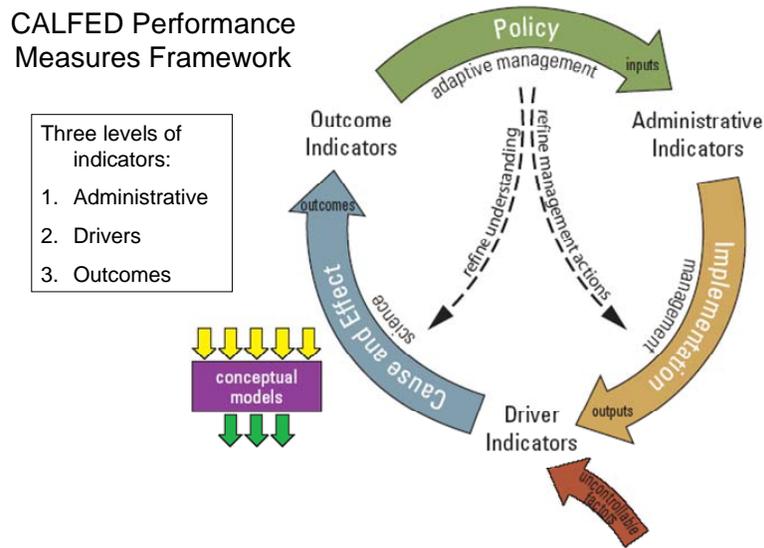
7. As a next step, a small group could be assembled to work through the exercise of developing performance measures for one of the ecosystem goals by means of the tools described in 4 above.

**Attachment 1 - CALFED Performance Measures Framework.**

The CALFED Performance Measures Framework is found in Appendix A of the Draft Phase 1 Performance Measures Report developed by CALFED agency subgroups, October 2007.

([http://www.science.calwater.ca.gov/pdf/monitoring/monitoring\\_phase\\_1\\_report\\_final\\_101707.pdf](http://www.science.calwater.ca.gov/pdf/monitoring/monitoring_phase_1_report_final_101707.pdf)). The framework was reviewed and approved by the Independent Science Board at their August 2005 meeting.

The slides below illustrate main components of the framework.



**Attachment 2 - Wardrop and Hershner indicator classification.**

Wardrop et al. (2007) and Hershner et al. (2007) devised a framework for performance evaluation that included 5 specific types of indicators:

1. Condition indicators measure status relative to an explicit reference condition. They provide a snapshot of the current state of the system. To be effective, a condition indicator must have an appropriate reference standard and the reference standard must indicate whether the system is in good or poor condition. Managers can assess trends in ecological condition by monitoring condition indicators over time;

2. Evaluation indicators have a clear relationship to a management objective. These are a subset of condition indicators that evaluate the effectiveness of management actions. Evaluation indicators must be responsive to management actions and relevant at the management spatial and temporal scale;

3. Diagnostic indicators are based on an unequivocal dose–response relationship. For the Delta, the correlation between longfin smelt and X2 could be such a relationship. Identification of factors at a multitude of spatial and temporal scales may be required for some indicators. For many management decisions, particularly at larger spatial scales, associations among condition and stressor indicators, rather than dose–response relationships, can be sufficient;

4. Communication indicators are simple and easy to interpret. These indicators encouraging comprehension of condition in its most elementary or integrated form. Examples include the sliding scale assessments provided in the appendix to CALFED's end of stage one report.

5. Futures indicators forecast future conditions based on current information. If suitable models are available, it may be possible to estimate the probable trajectory of condition or the vulnerability of the system to a stochastic event. These indicators are frequently utilized at large spatial and temporal scales. Bay-Delta examples include regional responses to climate change, such as changing hydrology and sea level rise, and seismic risk in the Delta.

**References**

Hershner, Carl, Kirk Havens, Donna Marie Bilkovic, and Denice Wardrop. 2007. Assessment of Chesapeake Bay Program Selection and Use of Indicators. *EcoHealth* 4:187–193.

Wardrop, Denice Heller, Carl Hershner, Kirk Havens, Kent Thornton, and Donna Marie Bilkovic. 2007. Developing and Communicating a Taxonomy of Ecological Indicators: A Case Study from the Mid-Atlantic. *EcoHealth* 4:179–186.