

RECEIVED
AUG 18 2000
CALFED Bay-Delta Program

**Draft Program-Wide Performance Indicators for the
CALFED Ecosystem Restoration Program**

Prepared for: The CALFED Comprehensive Monitoring and Assessment
Program and the CALFED Ecosystem Restoration Program

Anitra Pawley, Ph.D.

The Bay Institute

July 2000

Participants

The following individuals participated, at some level, in one or more of the steps (outlined below) involved in the process of developing the draft list of Performance Indicators included in this document. Participation in the process does NOT necessarily denote co-authorship, nor approval, of this document or any of its contents.

Bill Alevizon, MWDSC
Serge Birk, CVPWA
Andrea Atkinson, USGS
Scott Cantrell, CDFG
Bellory Fong, CALFED
Carolyn Marn, USGS
Doug Morrison, USFWS
Bruce Thompson, SFEI
Terry Young, EDF

Introduction

Large scale regional restoration planning is a relatively recent phenomenon. Although the need to objectively evaluate and monitor the success of such efforts is widely recognized, as yet no widely-accepted, unified framework exists for developing appropriate program performance indicators for large-scale, comprehensive ecological restoration efforts (Harwell, 1999). At the least, it has been suggested that such indicators should encompass a wide array of inherent ecological attributes and system stressors; multiple lines of evidence must be examined to properly evaluate changes in ecological integrity as well as program/project success (Noss 1990). Most large scale ecological restoration and management programs choose multiple indicators or a "*suite of indicators*" in the form of a "*report card*" to demonstrate how actions affect ecosystem structure, processes and associated stressors. Program performance indicators, in this sense, are commonly used to:

evaluate environmental response to restoration/management efforts

inform adaptive management

provide information designed to facilitate management decisions

inform the public of restoration progress

In November 1999, the ERP Performance Indicators Coordination Team was convened for the purpose of developing a Program Performance Indicators Development Process and a recommended suite of performance indicators for the CALFED Ecosystem Restoration program. This document briefly summarizes the process followed to accomplish this task, and a draft list of *program-wide performance indicators*. The program-wide geographic scope of the ERP is defined as the "primary geographic focus [area] of the ERP: the Sacramento-San Joaquin Delta, Suisun Bay, the Sacramento River below Shasta Dam, the San Joaquin River below the confluence with the Merced River, and their major tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs" (CALFED ERPP Vol 1, 1999). As program implementation proceeds, it will likely become necessary to develop performance indicators for each of the defined major "ecological zones" to assist in project-level evaluation.

How were the Draft Program-Wide Performance Indicators prepared?

The preliminary list of program performance indicators (attached) was developed by the ERP Program Performance Indicators Coordination Team through a logical five step process informed by the ERP Strategic Goals and Objectives and supporting rationales and previously defined ecological attributes of Bay-Delta System ecological integrity

(CALFED Indicators Workgroup, 1998; CALFED 1999a,b,c; Pawley et al., 2000).

The process (Figure 1) was designed to facilitate the coordinated, consistent development, and future refinement, of ERP performance indicators. The indicator development steps are:

- (1) Determine a practical organizational framework to classify indicators*
- (2) Establish guidelines (criteria) for the selection of Program Performance Indicators*
- (3) Identify key system attributes directly reflecting ERP Strategic goals and objectives*
- (4) Select the most important attributes that as a set allow the evaluation of program performance at the "program-wide" scale*
- (5) Construct appropriate Program Performance Indicators capable of evaluating change for each of the key system attribute identified in (3) above*

These steps, and their relationship to essential prior and subsequent steps necessary to developing a final list of Program-wide ERP Performance Measures, are presented diagrammatically in Figure 1. This figure illustrates the complexity of the adaptive management process and the means in which indicator assessment assists managers to reassess program objectives and restoration actions once program implementation proceeds. It should be noted that the performance indicators identify system parameters to be evaluated/monitored and do not necessarily define the *metrics*, or actual measurement data that will be used to quantify change in associated performance indicators. The performance indicators will be refined and associated metrics will be identified through a subsequent process involving specialists intimately familiar with the measurement of these parameters. *In this manner, the draft suite of ERP Program-wide Indicators will be refined to represent the essential list of indicators for measuring Ecosystem Restoration Program performance.*

The Program-Wide Performance Indicators are presented in Tables A1 - 6. Each of the tables is organized around the ERP Goals. The main column headings include:

1. **System Attribute** – are particular system properties identified in the ERP Strategic Goals and Objectives and the Ecosystem Restoration Program Plan as priority restoration /management "targets". These include "stressors" as well as inherent ecological properties.
2. **Strategic Goal and Objective Addressed** – specifies the specific CALFED ERP strategic goal and objective to which the particular performance indicator(s) listed are directly linked, and designed to evaluate. Many indicators address multiple goals

and objectives. Indicators that address multiple goals and objectives are desirable for the program-wide "suite" of indicators to synthesize progress performance using the fewest number of measures possible.

3. Performance Indicators – are identified and selected for their ability to allow objective, quantifiable means of evaluating ERP progress in terms of the stated goals and objectives.

4. Short-term (ST)/Long-term (LT) Indicators - Short-term is distinguished from long-term because change in many of the parameters of interest cannot be scientifically measured over an initial seven-year period (designated by the CALFED ERP as Stage I), and yet some measure of progress is clearly needed. Hence "surrogate" measures of progress in implementing management actions are substituted in the short term for actual measures of biological performance. Long-term measures are those parameters that allow evaluation of the biological changes of primary interest - in populations, communities, and ecological processes. Change in some of these biological measures may also (possibly) be scientifically documented within the first seven years of the program, and so are included as both short and long term measures.

5. Pressure (Stressors) (P)/State (S)/Management Response (R) - The Pressure-State-Management Response Model (PSR) is one of the most widely accepted classification schemes for performance indicators because it offers a means to assess environmental condition in the context of the stressors/pressures that impact ecosystem health and the associated management responses to alleviate stressors. At the program-wide scale, it is an excellent organizing framework but it is not very diagnostic, due to the difficulty of isolating factors over broad spatial/temporal scales. By categorizing the program-wide set of indicators according to the PSR framework, we show the breadth of indicator types that compose the entire suite.

6. Justification - provides a summary textual description of the ecological and management relevance of each attribute/stressor selected. The management relevance is also established by direct linkage of each attribute to a particular ERP strategic goal/objective, as provided in Column 2 (Goal/Objective Addressed). Additional justification including the documentation of science support will be provided in subsequent refinements.

References

CALFED. June 1999. Ecosystem Restoration Program Plan: Strategic Plan for Ecosystem Restoration.

CALFED. June 1999. Ecosystem Restoration Program Plan Volume 1: Ecological Attributes of the San Francisco Bay Delta Watershed.

CALFED. June 1999. Ecosystem Restoration Program Plan Volume 2: Ecological Management Zone Visions.

Harwell et. al. 1999. A Framework for an Ecosystem Integrity Report Card. Bioscience 49(7): 543-556.

Indicators Workgroup. 1998. Framework process for CALFED ecosystem restoration program ecological indicators development. Draft, August 27, 1998.

Noss, R.F. 1990. Indicators of monitoring biodiversity: a hierarchical approach. Conservaton Biology 4: 355-364.

Pawley et. al., 2000. DRAFT Framework for Developing Performance Indicators for the CALFED Ecosystem Restoration Program Draft, July, 2000.