

# Comprehensive Evaluation of the EWA: Evaluation Framework, Potential Criteria and Evaluation Steps

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There is general agreement the Environmental Water Account program (EWA) should undergo an objective evaluation of performance. During the first three years of operation some effort has been made to evaluate various aspects of the EWA. Effects on fish salvage from changes in Delta exports have been documented. Methods of obtaining and using EWA assets have also been described. More recently, work has been completed to begin estimating the population effects of salmon on entrainment. Further, the recent draft EIR/S examines two modes of future program implementation (flexible and fixed assets) relative to each other and a no project alternative. However, there has been no comprehensive evaluation of past EWA implementation.

Here we describe three issues central to a comprehensive and objective evaluation of the EWA. The evaluation framework identifies the performance standards that could be used in a comprehensive EWA evaluation and the relationship between those standards and more specific evaluation criteria. Next we list potential evaluation criteria that would be important to completing a comprehensive evaluation, including criteria to reflect various concerns about the EWA. Finally, we list the steps in order of priority that could be used in an annual evaluation, as well as steps for a less-frequent, multi-year evaluation.

## I. EWA Evaluation Framework:

The evaluation framework describes the standards against which EWA performance is assessed and the relationship between the more general performance standards and specific evaluation criteria. We used statements of purpose for the EWA as the sources for performance standards.

The CALFED Record of Decision states:

The EWA has been established to provide water for the protection and recovery of fish beyond water available through existing regulatory actions related to project operations. The EWA is a cooperative management program whose purpose is to provide protection to the fish of the Bay-Delta estuary through environmentally beneficial changes in SWP/CVP operations at no uncompensated water cost to the projects' water users... The EWA will provide additional protection for fish and provide support for a commitment not to reduce south of Delta project deliveries... The EWA will provide for fishery protection actions that are

supplemental to a baseline level of protection established by an existing set of regulatory programs.

The Environmental Water Account Operating Principles Agreement (2000), an attachment to the CALFED Record of Decision, states:

The EWA is a cooperative management program whose purpose is to provide protection to the fish of the Bay-Delta Estuary through environmentally beneficial changes in the operations of the State Water Project and the federal Central Valley Project, at no uncompensated water cost to the projects' water users. The EWA is intended to provide sufficient water, combined with the Ecosystem Restoration Program and the regulatory baseline, to address CALFED's fishery protection and restoration/recovery needs.

Examination of the EWA purpose statement reveals three performance standards:

1. Protection of fish in the Estuary
2. No uncompensated water costs to projects' users and
3. Implementation as a cooperative management program

The purpose statements also stipulate that the EWA and two other factors (the Ecosystem Restoration Program and the regulatory baseline) are to "address CALFED's fishery protection and restoration/recovery needs." Therefore, a fourth performance standard for the EWA is:

4. Success, in combination with other CALFED programs, in achieving CALFED's fishery protection and restoration/recovery needs.

We suggest the purpose statements present a hierarchy of three performance standards. Highest priorities are: biological performance and water supply reliability, followed by cooperative management (Figure 1). The fourth factor would require evaluation of biological performance across three different programs, and would most appropriately consider system-level or population-level responses. This fourth factor is more appropriately considered in multi-year reviews of the EWA. Overall, we envision an EWA evaluation framework based on the purpose statement structured something like that depicted in Figure 1.

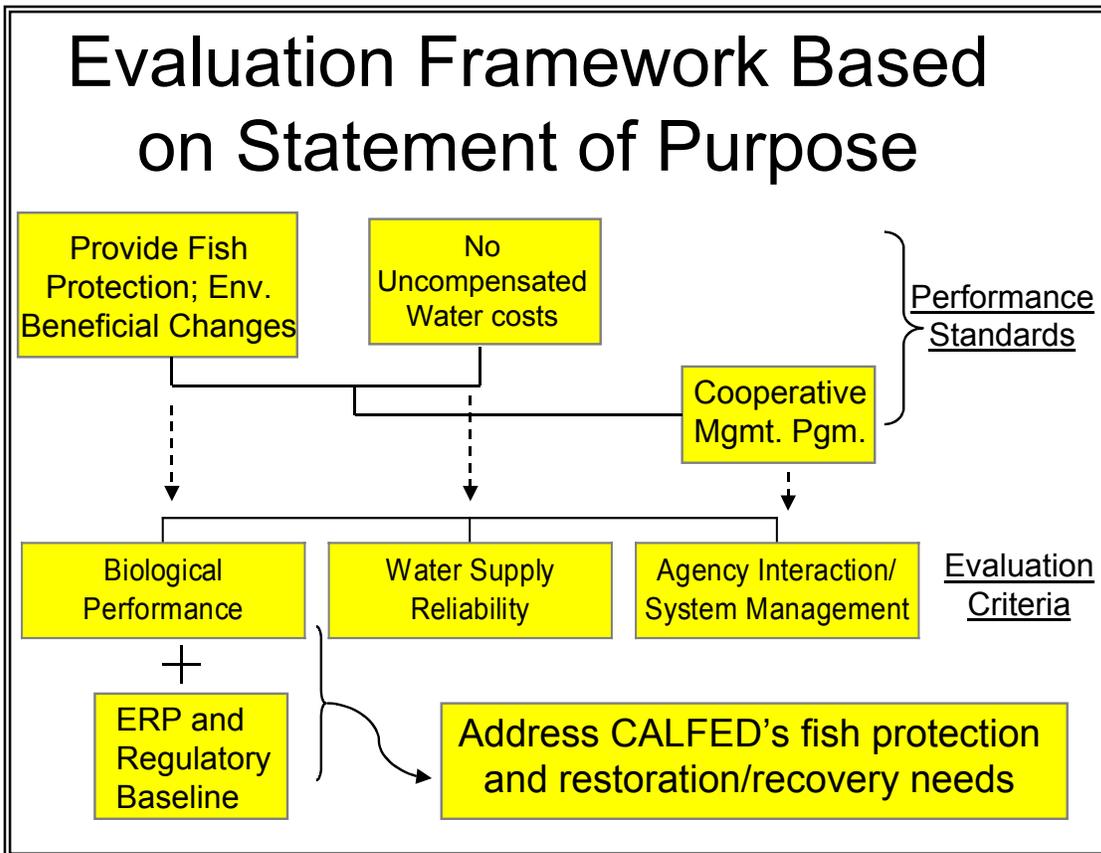


Figure 1. Diagram depicting the relationship between performance standards based on the EWA purpose statement and more specific evaluation criteria. The vertical position of the performance standards suggests relative priority. The evaluation to determine how well the EWA plus the Ecosystem Restoration Program (ERP) and the regulatory baseline address CALFED's fish protection and restoration/recovery needs would occur separately, possibly as part of a multi-year review.

## II. Specific Evaluation Criteria:

As mentioned by the EWA Science Advisors, criteria to evaluate program performance can take many forms. There are criteria that evaluate specific actions (e.g., how much water did the EWA buy and how was the water used). There are also criteria that evaluate specific responses (e.g., number of fish saved from entrainment). Finally, there are criteria to evaluate system or population level responses (e.g., changes in Delta habitat conditions, or changes in adult winter-run escapement). Although evaluating system and population level responses is considered the ultimate goal by many, it remains difficult to separate the effects of a program like the EWA from the effects of other CALFED programs and actions, from factors occurring in other parts of a species habitat (e.g., changes in salmon harvest rates), or from large scale factors affecting the entire system (e.g., climate change). Thus, it seems reasonable to expect that an evaluation of system and population level responses might not occur every year, particularly in the early years.

Based on the purposes of the EWA and recommended performance standards, we suggest the following specific criteria for use in a comprehensive evaluation of the EWA. Here the criteria are listed in no particular order. In section III we suggest a list of prioritized steps using the criteria below. In the series below, a general criterion descriptor is listed at each letter heading, followed by more specific criteria (number headings) related to that category. Information listed in parentheses after some criteria identify some initial ideas for methods to measure the EWA's response to each criterion. Several of the methods initially rely on qualitative information, but it is expected the level of information will develop through the course of completing multiple reviews.

- a. Water Supply reliability (or Export water supply reliability)
  1. Changes in export water amounts (detailed comparison of water operations, EWA case vs. non-EWA case).<sup>1</sup>
  2. Changes in the certainty of receiving allocated water (compare water operations with and without EWA, examine project allocations).
  3. Changes in reservoir storage (consider upstream carry-over, San Luis low point).
- b. Water Quality
  1. Changes in the drinking water quality of export water (examine data on bromide, chloride, and organic carbon fluxes at export locations; examine data on annual total salt and organic carbon loads in export water).
  2. Changes in environmental water quality in the Delta (examine data on salt and organic carbon fluxes at major inputs to the delta).
  3. Changes in environmental water quality upstream (examine water temperature regimes in project streams; model expected water temperatures for Salmonid spawning and rearing with and without EWA actions).
- c. Biological Performance
  1. Ability of projects to meet regulatory requirements (consider incidental take levels, VAMP flows, X2, upstream temperature criteria).
    - i. Was the EWA needed for the projects to meet regulatory requirement? (yes or no).
    - ii. How many fish were saved from entrainment? (estimate reductions in direct mortality from salvage estimates).

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<sup>1</sup> A detailed comparison of water operations with and without the EWA is fundamental to evaluating several other criteria.

2. Changes in the survival of specific life stages (tracking delta smelt cohort success through age and growth studies; VAMP and DCC Delta salmon survival studies).
3. Changes in spawning population size (use quantitative life cycle models)
4. Changes in listing status (status reviews of listed species)
5. Hypothesized biological cost vs. benefit relative to other ERP actions. For example, biological cost/benefit of improving habitat quality vs. reducing direct mortality.
6. Changes in habitat quality (examine data on in-stream flows, in-stream water temperature, change in DCC operations, change E/I ratio.)<sup>2</sup>

d. Agency Interaction/System Management

1. Changes in the number or intensity of conflicts among government agencies (query agency managers on incidences and magnitude of conflict).
2. Changes in the number and types of conflicts between government agencies and stakeholders (query managers and stakeholders to assess working relationship; gather data on the number and types of law suits before and after EWA).
3. Changes in the level of risk<sup>3</sup> government agencies are willing to accept (query agency managers, assess actions that increase risk to resources or operations such as flexing the E/I ratio, or changing DCC operations, or holding water north of the delta longer than normal).
4. Ability to experiment with EWA assets (query agency staff to determine experiments considered and undertaken with EWA assets. Consider magnitude of assets devoted to experiments compared to magnitude of assets applied for specific needs).

e. Collateral benefits/impacts

1. Changes in the ability of government agencies to implement tools for other purposes. For example, has

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<sup>2</sup> It was noted that many of the habitat changes would be measured in terms of fish survival or production, but it was agreed that it is important to distinguish between EWA measures to reduce entrainment mortality and measures that improve habitat quality.

<sup>3</sup> Consider risk to water supply, risk to biological resources, or risk to water quality. Risk is generally defined as the potential to exceed some regulatory standard, or result in unmet contractual obligations, or lead to some unfulfilled assurances for resource protection.

implementation of the EWA led to broader acceptance of water transfers and their use in system management? (Query agency managers to identify collateral issues, query managers and stakeholders to determine benefits or impacts).

2. Changes in the water market (gather data on cost of water per acre-foot, regional trends in water availability, and factors considered in the sale of water).

f. EWA Resilience

1. Ability to accommodate extreme events (identify conditions qualifying as “extreme events,” model water operations and biological performance with and without an EWA under a variety of extreme events. Capture specific data when a real extreme event occurs).
2. Ability to leverage assets/manage debit (detailed examination of asset acquisition and expenditure; examine debit load over the year and timing/methods of debit reductions).
3. Functionality of the EWA as export amounts increase or asset base changes (modeling of operations with and without EWA under various export levels and hydrologic conditions; compare actual functionality of EWA relative to water operations and biological performance over a variety of years).

g. EWA Economics

1. Breadth of funding sources (identify cost-sharing sources; determine degree to which sources met their funding commitments)
2. Prudence in acquiring assets (retrospective evaluation of purchasing opportunities and purchases made; compare EWA purchases to purchases made by other programs)
3. Portfolio effectiveness
  - i. Allocation among regions
  - ii. Prudence in acquiring assets (savvy buyer,)
4. Firmness of assets (examine funding commitment, variable asset tools and storage, conveyance ability. Are we starting over again each year or are we developing long-term commitments to appropriations and contracts?)

5. Overall evaluation of cost/benefit

- i. Could EWA objectives have been met in other ways at lower cost?

h. Program stability/sustainability

1. Institutional acceptance (number of permanent staff (FTE's) by agency dedicated to EWA, establishment of a dedicated manager).
2. Reactive vs. proactive mode of operation.
3. Tools vs. task (are tasks increasing faster than the tools needed to address these tasks; are management issues increasing faster than ability to respond).
4. Operating budget vs. capital budget.

III. Steps in Conducting the Evaluation:

A dedicated team of agency staff and stakeholder representatives should complete any comprehensive evaluation of the EWA. The results of such an evaluation should also undergo peer review. Here we list ten steps in order of priority that could be used in an annual comprehensive review. These steps incorporate the criteria listed above. The evaluation of more specific criteria is implied in steps listing general criteria (e.g., assess EWA economics). We assume an evaluation framework based on performance standards developed from the purpose statement.

1. Complete a detailed comparison of annual water operations with and without EWA.
2. Assess the ability to meet regulatory requirements and preserve water supply reliability.
3. Assess changes in cohort/life stage survival.
4. Assess changes in spawning population size of fish species of concern.
5. Assess changes in environmental water quality in the Delta and upstream.
6. Assess agency interactions/system management.
7. Assess EWA economics.
8. Assess program stability/sustainability.
9. Assess program resilience.
10. Assess collateral benefits/impacts.

We suggest that an evaluation of the EWA with respect to its broader role (namely, to provide sufficient water, combined with the Ecosystem Restoration Program and the regulatory baseline, to address CALFED's fishery protection and restoration/recovery needs) might be done on a less-frequent basis by the

same or similar agency/stakeholder team. Some key steps (all equal in priority) for these less-frequent reviews include:

- Multi-year comparison of water operations with and without EWA.
- Re-analyze results of annual evaluations in the context of multi-year trends.
- Evaluate hypothesized biological cost vs. benefit relative to other actions (e.g., improving delta habitat quality vs. reducing direct mortality).
- Evaluate the effects of changes in habitat quality.
- Examine the role of the EWA in listed species status reviews.