June 2003

Ecosystem Restoration Program Project Evaluation Phase 2 Report

Prepared for:

CALFED
BAY-DELTA
PROGRAM

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

Jones & Stokes

ERP PROJECTS EVALUATION
PHASE 2 REPORT

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ERP PROJECTS EVALUATION
PHASE 2 REPORT
METHODOLOGY DEVELOPMENT AND PILOT EVALUATION

EXECUTIVE SUMMARY

Since 1995, the CALFED Ecosystem Restoration Program (ERP) has funded more than 300 ecosystem restoration projects. In an effort to better understand what is being, and can be, learned from these projects, CALFED has initiated the initial phases of a comprehensive retrospective review and evaluation of restoration projects funded through the ERP (Projects Evaluation). This report presents results from Phase 2 of the Projects Evaluation, which was conducted in 2002.

The primary purpose of Phase 2 was to test and refine methods that could be used in conducting a comprehensive review of all ERP–funded projects (Phase 3). Specific methods tested included an analysis of readily available existing data, individual and group interviews, and an online survey. Other possible methods such as focused workshops and automated reporting were evaluated, but not tested.

Phase 2 focused on two scales of resolution, a program level and a project level. At a program level, existing information was reviewed and compiled for all 320 ERP projects funded from 1995 through 2001. At the project level, interviews were conducted for 27 projects and online surveys received for another 22 projects.

Results from Phase 2 provide insights into the effectiveness and efficiency of particular methods of evaluation as well as specific information on program-wide accomplishments and a select number of projects. Findings, particularly quantitative information regarding the program as a whole, should be viewed as preliminary until such time as a comprehensive review of all projects can be conducted. Summary statistics regarding habitat acres and river miles were generated primarily from project proposals. Additional efforts are needed to confirm and verify

the accuracy of these estimates. Similarly, results at a project level are based on a limited number of interviews, which may not be representative of all 320 ERP projects.

In the process of reviewing existing information, talking to project proponents, and exploring various methods, a considerable amount of insight was gained, not only into the projects that have been funded through the ERP and the specific tools that may be useful for evaluating these projects, but into the ERP program itself. As a result, a number of areas are identified where actions could be taken to improve the overall program, enhance project tracking, and facilitate future performance evaluations. In fact, the notion of Phase 3 has changed somewhat from a very focused, one-point-in-time review and analysis, to more of a strategy for developing and engaging a structured framework for ongoing, continuous review at multiple levels.

Regardless of the specific methods used to compile data for future reviews, results of Phase 2 clearly point to the need for a well-defined set of performance indicators. The lack of agreed-upon indicators and an overall framework for evaluation makes it difficult to assess performance.

The ERP has funded a broad variety of projects that either directly or indirectly contribute to ecosystem restoration within the CALFED Solution Area. These projects include:

- planning and design studies;
- habitat protection through acquisition of land and/or easements;
- construction activities (e.g., physical habitat restoration, fish screens and ladders, and dam removals);
- water purchases, research, and monitoring related to fisheries;
- research and public education regarding water quality and projects to control nonnative species; and
- environmental education and watershed stewardship.

The ERP invested a total of $335 million in ecosystem restoration projects from 1995 through 2001. Terrestrial and aquatic habitat protection and restoration activities account for approximately 51% ($172 million) of that investment. The ERP also invested heavily (27%, $90 million) in improving fish passage (both upstream and downstream) through the design and construction of new fish screens and ladders and the removal of several dams. The Sacramento River Region and the Delta and East Side Tributaries Region jointly account for approximately 60% of the ERP investments. Projects are distributed relatively evenly among the other two CALFED regions (Bay, San Joaquin River), and projects located in more than one region (Multi-Region).

Through the end of 2001, the ERP had funded proposals for approximately:

- 58,000 acres of habitat proposed for protection, including 12,000 acres dedicated to wildlife-friendly agriculture and 16,000 acres of floodplain;
- 39,000 acres of habitat proposed for restoration, including 9,500 acres of shallow-water tidal and marsh habitat;
- 63 miles of instream habitat proposed for protection and/or restoration;
- 93 miles of riparian corridor proposed for protection and/or restoration;
- 75 fish screens, accounting for an additional 2,700 cubic feet per second (cfs) of diversion capacity;
- 16 fish ladders and 10 dam removals to provide better upstream passage;
- 31 projects involving analysis of environmental water and sediment quality;
- 18 projects intended to specifically address nonnative invasive species; and
- 75 projects supporting local watershed stewardship and environmental education.

Results from interviews conducted for 27 selected ERP–funded projects suggest that ERP projects are being successful in terms of accomplishing their individual goals. Those projects that involved extensive agency, stakeholder, and/or local collaboration appear to have been particularly successful in developing creative solutions, resolving resource conflicts, and promoting a better understanding of issues and concerns. Nearly all of the projects reviewed had

difficulties with contracting or took much longer than expected. Many of the projects, particularly the channel dynamics and sediment transport projects, experienced difficulty in obtaining regulatory permits for construction. In almost all cases, applicants expressed a desire that there be more interaction between the applicants and CALFED ERP staff. Finally, most of the projects reviewed were found to lack well-articulated experimental designs and post-project monitoring (two essential elements for adaptive management).

The vast majority of ERP projects address Goal 1 of the Ecosystem Restoration Program Plan (ERPP), which focuses on At-Risk Species. A large percentage of the projects also address Goal 2 (Ecological Processes), and Goal 4 (Habitats). Much smaller percentages of the funded projects address Goal 3 (Harvestable Species) and Goal 5 (Nonnative Invasive Species) (16% and 9%, respectively).

The most common type of adaptive management observed during the reviews was trial-and-error learning—project proponents adjusting their practices based on what they are seeing and learning. However, these adjustments represent primarily management actions rather than any purposeful responses to articulated conceptual models and thus constitute random acts more than planned steps. Many of the projects reviewed included component steps of an adaptive management approach (as defined in the Strategic Plan), such as conceptual models, hypothesis testing, and monitoring. However, few projects reviewed exhibited all the steps required for a deliberate adaptive management design. The first four steps of the adaptive management process identified in the Strategic Plan (defining the problem, selecting goals and objectives, preparing conceptual models, and initiating restoration actions) are fairly well represented. The feedback steps in the process (step 5, monitoring, and step 6, assessing, evaluating, and adapting, including assessing results against the conceptual model) are highly underrepresented, or not represented at all.

Key recommendations for conducting Phase 3 of the ERP Projects Evaluation include:

1. **Use multiple methods for project review.** The ERP should not rely on a single method for evaluating project activity. Throughout Phase 2, the richest and most accurate information was derived from the use of multiple tools that provided different types of information and different perspectives on performance. Multiple methods also yield results accessible to a wider audience by providing both quantitative and qualitative data.
2. **Develop a continuous learning and review strategy.** Continuous review at multiple levels is necessary, not only because of the sheer size of the program and number of projects being implemented, but also because the information available changes over time as older projects are completed and newer ones initiated. Analysis of information from completed projects supports the program's adaptive management goal of learning from doing and using the new information to continuously improve program implementation.
3. **Finalize and implement a multilevel framework for measuring performance.** The ERP needs to adopt a framework or set of indicators for evaluating performance, at the program, project, and ecosystem levels. Some form of performance indicator framework is essential for conducting future evaluations. Information gained through Phase 2 of the Projects Evaluation will assist in developing these performance criteria.

Additional recommendations for improving the ERP as a whole include:

1. Invest more in post-selection activities. The ERP has spent, and continues to spend, considerable resources on selecting projects, including extensive technical peer reviews. At least an equal amount of resources is needed to track, assist, and assess projects once they have been funded to better meet the objective of adaptive management.

2. **Take a more active role in developing conceptual models and defining projects**. The ERP program has relied largely on the PSP process and project applicants to define ERP–funded projects and the conceptual models associated with these projects. This process is primarily reactive in nature and therefore places an unnecessary burden on project applicants and the ERP program. It also makes administration and evaluation of the program cumbersome. Taking a proactive role in establishing Bay-Delta system and/or regional conceptual models; establishing standards for monitoring and performance evaluations; and designing projects to fit uncertainties, test assumptions, and reduce key stressors or threats in the system would be a more effective and efficient strategy.
3. **Establish stronger linkages among planning, implementation, research, monitoring, and assessments.** The ERP has funded a fairly broad spectrum of projects ranging from planning and implementation to monitoring and research. What the ERP has not done is effectively link these various projects to create a whole that is greater than the sum of its parts. At the program level, efforts should be undertaken to link the various projects and use what is learned to influence future decision-making.
4. **Improve contracting and permitting**. Problems with contracting and permitting were frequently mentioned during the Phase 2 interviews and web-survey responses. If not addressed, these difficulties could seriously undermine the potential of the program.

1.0 INTRODUCTION

The CALFED Ecosystem Restoration Program (ERP) was initiated in 1995 with the funding of five restoration projects for approximately $3 million. Since that time the ERP, using an annual grant funding program supported by State, federal, and private monies, has funded 320 ecosystem restoration projects at an approximate cost of $335 million through 2001. The ERP also has developed and finalized a long-term planning document, the ERPP, and the ERP Strategic Plan, which are intended to guide program implementation over the next 30 years. Both documents were finalized in 2000 with the signing of the Record of Decision (ROD) for the overall CALFED Bay-Delta Program.

Over the past several years, many stakeholders and CALFED agencies have expressed an interest in conducting a review and evaluation of projects funded by the ERP. Stakeholders have expressed an interest in developing a better understanding of program accomplishments and a perspective on how funded projects relate to the Strategic Plan and long-term goals, including the ERP's commitment to an active adaptive management strategy. In response to these interests, CALFED has initiated the ERP Projects Evaluation (Projects Evaluation), a retrospective review and evaluation of ERP-funded projects. This report describes how the Projects Evaluation is being conducted and presents recommendations from Phase 2 of the evaluation. The recommendations presented were developed by the authors of the report (Kleinschmidt Associates and Jones & Stokes) based on results of the evaluation. These recommendations do not necessarily reflect the opinions of CALFED staff or the CALFED agencies.

1.1 ERP Projects Evaluation

The ERP Projects Evaluation consists of three distinct phases:

- Phase 1—Initial Scoping
- Phase 2—Methodology Development and Pilot Evaluation
- Phase 3—Comprehensive Evaluation

Phase 1 was completed by Kleinschmidt Associates in March 2002 (see Appendix A). Phase 2 was completed in June 2002 and is described in detail in this report. Phase 3 will be conducted beginning in 2003. CALFED staff developed the overall approach to the Projects Evaluation with input from Kleinschmidt Associates, stakeholders, and the ERP Independent Science Board (ISB). Phase 1 of the evaluation was intended to refine the overall objectives of the evaluation and develop an initial methodology (see Appendix A for a copy of the Phase 1 report). Phase 2 of the evaluation involved conducting an initial investigation, both at a programmatic level (all ERP-funded projects) and at a project level (selected ERP projects), to test and refine the evaluation methodology and identify specific tools and techniques for conducting a more comprehensive review. Phase 3 will involve a comprehensive evaluation of the program and funded projects. Throughout all phases of the evaluation, CALFED will seek to improve implementation of the ERPP, including the Proposal Solicitation Package (PSP) and project reporting processes, based on what is learned from the review.

The primary objectives of the Projects Evaluation are to:

- provide a broad overview of ERP accomplishments as well as detailed project information;
- determine what is being learned or can be learned from the projects funded; and
- examine linkages between funded projects and the goals, objectives, and targets of the ERPP and its Strategic Plan, including the extent to which the concepts of active adaptive management are being adopted by project proponents.

1.2 Phase 2 of the Projects Evaluation

The primary purpose of Phase 2 was to refine the methodology for conducting a comprehensive review and evaluation of the projects funded by the ERP, including specific tools and techniques that could be used. Specific methods explored included:

- review and compilation of readily available data,
- individual and group interviews,
- an online survey, and
- discussions with ERP staff.

Two different levels of review were investigated during Phase 2:

- programmatic-level review—designed to provide fairly broad statistics summarizing the accomplishments of the program as a whole, and
- project-level review—designed to generate more detailed information about the status, accomplishments, and problems encountered by specific projects.

These reviews involved using different sources of information and different investigation techniques. Each review yielded different information about the program as a whole, including specific ideas on potential ways to improve the program, track projects in the future, and conduct future retrospective evaluations.

The process of conducting the programmatic-level review provided many insights with regard to how project information is being maintained and tracked and how the program is being administered overall. The process of conducting the project-level reviews provided insight into specific projects, such as how they relate to the overall CALFED strategy and goals and what is being learned by project applicants in the process of implementing their projects.

In addition to refining the methodology and tools for use in Phase 3 (comprehensive evaluation), a considerable amount of information was compiled and analyzed as part of Phase 2. This was particularly true for the programmatic-level review, which involved reviewing the proposals and contract scopes of work for all 320 funded projects. Information from these reviews was compiled in a database and used to generate a variety of program statistics, as presented in Section 3. Appendix B of this report provides a listing of the 320 projects that were reviewed.

One of the objectives of the programmatic-level review was to generate summary statistics that could be used to characterize ERP activities and accomplishments as a whole, and in the process assess the value and usefulness of the ERP's existing project database and other available information such as project proposals, contracts, and quarterly reports. Efforts were made to gain as much insight as possible from the available information. However, in many cases the existing information was limited and/or inconsistent from project to project,

particularly with regard to the reporting of specific habitat types and habitat acres. For example, some project applicants report riparian restoration activities in terms of linear feet or miles while others report target areas in terms of acres. Similarly, some project proponents provide details on the specific types of habitats to be restored while others use general terms. Few projects use a consistent nomenclature, which is essential for generating summary statistics to quantify accomplishments for the program as a whole. Some of the existing data were also out of date. Results presented in this Phase 2 report should be viewed as a starting place, rather than as an end. The exercise of trying to generate quantitative summary information for the program during Phase 2 points to shortcomings of the ERP (particularly in terms of project tracking) that can be improved upon to support future evaluation efforts. The information generated as a result of Phase 2 also serves as a platform for conducting a broader, more comprehensive evaluation, including verification and refinement of the summary estimates presented herein.

The project-level reviews yielded considerable information about 27 funded projects and general information about another 22 projects. This information, as summarized in Section 4 of this report, provides insight into what is working and not working at the project level as well as information on what is being learned. However, this information is by nature limited by the number of projects reviewed and the number of individuals interviewed. The information represents the perspectives of those interviewed. The primary objective of the project-level reviews was to test different methods and approaches to gathering project information. The results of this pilot evaluation are secondary outcomes that are subject to change as more projects are reviewed and evaluated in Phase 3 of the Projects Evaluation.

At the outset of Phase 2, a subcommittee of the Agency Stakeholder Ecosystem Team (ASET) was formed to assist in developing the methodology and reviewing information. Members of the subcommittee were Serge Birk, Central Valley Project Water Association; Anitra Pawley, The Bay Institute; Scott Cantrell, California Department of Fish and Game; and Rick Sitts, Metropolitan Water District. This subcommittee met several times during Phase 2 to discuss the evaluation and solicit input. Additional outreach was conducted with project contract administrators and the Bay-Delta Public Advisory Committee (BDPAC) Ecosystem Subcommittee.

2.0 APPROACH AND METHODOLOGY

Phase 2 of the Projects Evaluation consisted of two primary components, a broad programmatic review of all ERP projects funded, and a detailed review of a select number of projects. Each component of the review was specifically designed to address different objectives and to test different evaluation methodologies as described below. Additional details on the approach and methodologies can be found in Appendix C. Findings regarding the effectiveness and efficiency of the various methods tested are provided in Section 2.3.

2.1 Programmatic Review

The primary purpose of the programmatic review was to test the use of existing information to generate summary information on the ERP and the projects that have been funded through the program. The review was intended to represent a broad perspective on the program as a whole and its accomplishments. The review focused on identifying and compiling existing data to generate statistics that describe the program's accomplishments. Several metrics were identified as potential means to assess and represent program activity and accomplishments, such as acres of habitat proposed for restoration. These metrics, or indicators, are listed in Appendix C. In addition, an analysis of ERP expenditures and numbers of projects awarded by region was developed (see Section 3).

The programmatic review was based on information that could be readily obtained from project proposals, contracts, quarterly reports, existing summaries, and the CALFED ERP database. Using the list of metrics noted above, proposals and contracts for each of the 320 ERP projects were reviewed and data were recorded for each applicable metric. The evaluation team also associated each project with Strategic Plan goals based on information available about the nature and goals of the project. Data from each project were then compiled into program-wide metrics, and program statistics were generated, including totals and distributions of project by CALFED region.

Several of the program metrics were refined during the evaluation as more details were learned about the nature of the funded projects, especially details concerning the quality of

readily available project information. Ultimately these adjustments represent further refinement of the evaluation methodology that was the focus of Phase 2.

Section 3 of this report, "Summary Statistics for the Program," presents the actual statistics generated using various metrics. There were significant limitations associated with the secondary data sources used to generate a number of the statistics presented in Section 3, particularly quantitative estimates of various types of habitat proposed for protection and/or restoration. Given these limitations, the summary statistics presented in Section 3 of this report should be viewed as preliminary findings. Additional research and analysis are needed to verify and confirm the accuracy of some of these estimates. Section 2.3, "Analysis of Methods," discusses the development, use, and value of program metrics; identifies some of the specific limitations associated with the existing data sources; and provides specific recommendations for tracking program progress and accomplishments over time.

2.2 Project-Level Review

The primary purpose of the project-level review was to test various methods of collecting and evaluating information regarding specific projects and suites of projects. The review focused on what is being done and learned at the project level and how projects compare and/or relate to one another and to the program as a whole. Information-gathering focused on the status of implementation, project design (including experimental design), monitoring, information exchange, technical needs, and adaptive management.

Two distinct methods of investigation were tested for the project-level review:

- direct interviews (either by telephone or in person), including both individual and group interviews and
- an online survey questionnaire.

Direct interviews were conducted for 27 projects representing three project topic areas (channel dynamics and sediment transport, restoration of multiple habitats, and shallow-water tidal and marsh habitat) and all ERP-funded projects within one watershed (Butte Creek). See Table 4.1 for a detailed list of these projects. Both the topic areas and Butte Creek were chosen

based on ERP staff suggestions. This approach allows a comparison of projects with others in the same topic area as well as the evaluation of projects in relation to other projects in its watershed or geographic region.

Within each topic category, projects were selected for evaluation based on the likelihood that they would yield valuable information. This approach tended to focus on projects that have made progress (versus those that for one reason or another may not have started or may not have made significant progress) and thus allowed for a thorough testing of the interview questions. The purposive selection of projects, rather than random selection, increased the likelihood of obtaining useful data. Projects were therefore chosen based on suggestions from CALFED program staff and ASET subcommittee members. This approach was deemed appropriate, as the goal of this effort was not to gather a sample, the data from which could be extrapolated to represent the entire program.

In general, project proponents and other individuals that were identified as having particular knowledge of the project were interviewed about each project. All but eight of the interviews were taped. With the exception of one interview, the tapes were not transcribed but used to supplement detailed notes taken during each interview.[1] A copy of the guide used for the interviews is in Appendix C. Each interview was analyzed, and the results have been summarized in project profiles in Appendix D. A list of the project proponents interviewed is in Section 4.0, Table 4.1.

Because the project selection process was potentially biased by choosing projects that were completed or well underway, an online survey was developed for randomly selected ERP projects. The online survey questionnaire was emailed to 75 individuals representing 75 projects. These projects were selected randomly (using random sequence number generator) from the list of 320 ERP projects funded from 1995 to 2001, excluding the 27 projects for which detailed interviews were conducted. Twenty-two individuals responded to the survey (29% response rate). Several of the questions contained in the online survey were specifically

[1] The sole interview transcribed was done so because it was completed with handwritten notes as opposed to the other interviews that had notes taken on a computer. The handwritten notes were not as detailed and transcription was needed to fill in gaps.

designed to mirror questions asked in the direct interviews. The survey data were analyzed qualitatively and analyzed using summary statistics such as mean, average, and total. A copy of the online questionnaire is in Appendix C.

2.3 Analysis of Methods

Each of the methods employed offered advantages and disadvantages with regard to cost, accuracy, and level of detail. These advantages and disadvantages are summarized in Table 2.1 and are discussed briefly below. Recommendations on which methods to consider for Phase 3 are contained in Section 6, "Recommendations," of this report.

2.3.1 Review of Existing Information

Most of the readily available information on ERP-funded projects consists of basic information on the number, type, and location of projects, and funding amount. This information is useful for accounting purposes and tracking investments, but does not provide much detail about specific project activities. Reviewing project proposals and scopes of work provided additional details, but this information was limited and often inconsistent from project to project. This made it difficult to establish standard metrics that would work across a range of projects. A number of the programmatic indicators identified at the outset of the project did not end up being useful because of these problems. As a result, the programmatic review focused on fitting indicators to the data rather than analyzing the data relative to a pre-established set of metrics.

Reviewing and recording information from project proposals required a number of subjective interpretations, particularly in cases where information was limited. While methods were established to create consistency in these judgments, they represent a shortcoming of the method. The process of reviewing the proposals for project data was also time-consuming, particularly when weighed against the value and accuracy of the information obtained.

Ultimately, the exercise of trying to "mine" as much information as possible from the available data had the effect of highlighting gaps and/or inconsistencies. This information provided useful insights into how the program might be adjusted to enhance project tracking and

reporting in the future. This outcome is consistent with the overall Phase 2 goal of refining methods for a comprehensive evaluation.

Specific limitations associated with relying on existing information include:

- **Most of the available information represents proposed activities**. The statistics that can be generated using this information provide a general indication of funded activity, but not an updated accounting of actual accomplishments.
- **Available quarterly reports focus primarily on providing financial updates.** There are few data available through the quarterly reports on the technical details of the projects, such as acres restored or other activities undertaken.
- **Available data are often inconsistent from project to project.** For example, some of the riparian restoration projects list miles to be restored and others list acres to be restored. There are no standards for reporting specific information. This impedes a full synthesis of the data.
- **Projects often involve a variety of activities, and ERP topic areas used to track projects do not reflect this variability**. For example, many projects categorized as *Floodplains* and *Bypasses* focus largely on protecting floodplains, but may also involve restoration of associated wetlands or riparian habitats. Where there is a high degree of variability in activity in a project, as well as within a given topical class, it is difficult to generalize and develop consistent statistics across projects.
- **Some funded projects represent a complete project, while others represent a portion, or one phase, of a larger project**. Although the program has funded 320 projects, many of these projects are associated with the same or adjacent river segments or parcels of land. Accounting for multiphased projects, the ERP has funded 230 distinct projects.
- **Some of the available data are out-dated.** Not all of the information contained in the existing ERP project tracking database is updated on a regular basis.

Table 2.1. Summary of the Advantages and Disadvantages of Each Look-Back Method for Both the Programmatic and Project Reviews

TYPE OF METHOD	ADVANTAGES	DISADVANTAGES
Project Review Methods		
Individual interview	-Yields rich project information -Highly personable and interviewer can judge responses to questions -High response rates	-Requires considerable time to analyze and interpret the data -Does not yield good quantitative results
Group interview	-May yield richer information than individual interviews because responses spur additional thoughts -Ability to interview higher number of people	-More difficult for interviewer to facilitate -More difficult to coordinate time for interview -Not everyone may participate or peer pressure may exist to conform to group
Online Survey	-Relatively quick to implement, analyze, and interpret -Easier to obtain quantitative results -Lower cost to develop and distribute -Statistical analysis and power of test can be high -Most useful as a compliment to interviews -Possible to conduct random project evaluation of a fixed percentage of projects	-High up-front costs -Difficult to follow up conflicting or unclear answers to questions -More impersonal -Low response rates
Project Review Approach		
Project class	-Ability to compare lessons and biological responses across projects -First step to determining how to standardize monitoring and reporting requirements	-More difficult to interview associated stakeholders or people with regional overview knowledge of projects -Only able to connect projects by workshops because they may be geographically distant.
Region/watershed	-Ability to understand how projects fit together, regional problems and ecosystem -Ability to connect similar and relatively nearby projects and learning	-If projects are very different more difficult to compare lessons and biological responses across projects
Programmatic Review	-Provides basic project information -Does not infringe on project proponent's time Opportunities for self-reporting and automation	-Limited by available data -Provides data on proposed rather than actual activity

2.3.2 Project Interviews

Personal interviews (both by telephone and in person) provided by far the most information and insight into ERP projects. By talking directly to individuals involved in the projects it was easy to obtain detailed, up-to-date information. The open-ended interview format also allowed for probing and exploring specific issues. In general, proponents were very cooperative and helpful with the interviews. However, interview responses and quality varied with each interviewee, especially regarding their knowledge of the project. Interviews were also fairly time-intensive to conduct and record and provided primarily qualitative information.

Specific limitations associated with project interviews included:

- **Data collected for the project reviews represent the opinions of individuals involved with the projects.** To the extent possible, attempts were made to interview multiple parties representing different levels of involvement in a given project to obtain multiple perspectives. However, in some cases those interviewed may have been inherently biased toward the project. Similarly, the 27 projects chosen for detailed interviews were selected because they represented projects that were known to have progressed and would therefore yield information. This purposive selection may have resulted in a bias toward more successful projects. The online survey was also used to counter these concerns. In addition, interviews were conducted for projects known not to have progressed for one reason or another.
- **The project-level review was not intended to be representative of the program as a whole** but to provide an indication of typical conditions and to serve as a platform for testing various methodologies. A more complete evaluation will be done in Phase 3 of the Projects Evaluation.

Additional findings related to project interviews included:

- **Field visits followed by interviews provided a useful backdrop for asking project questions**. This method proved to be the most productive approach to gathering information. However, this approach was more time-consuming and costly than conducting telephone interviews with a single individual.

- **Focusing interviews on a watershed provided more information than those focused on classes of projects**. The regional approach allowed for a deeper understanding of a complex system and how individual projects contributed to a larger agenda. Interviewing proponents of similar projects within a region also provided an opportunity to conduct a negative case analysis,[2] which is a useful tool for validating data quality for qualitative inquiry.
- **The interview guide evolved throughout the course of the interviews as it was found that questions either were repetitive or did not elicit detailed responses.** It may be difficult, and unnecessary, to develop one consistent interview guide for all types of projects in the future. The most fruitful lines of investigation were those following:

Background

1. Tell me a about how the project got started and its chronological history.

Fulfilling ecosystem restoration goals

2. How has the project contributed to fulfilling the ERP goals, objectives, and milestones?
3. How many additional acres are available as a result of the project's restoration activities, and what activities has the project implemented that benefit listed salmonids and other listed species?

Information exchange and learning

4. What are the key lessons you have learned from this project?
5. What impediments were encountered while implementing the project?
6. What mechanisms are in place for learning across the region and between similar projects?

Adaptive management

7. How is adaptive management being accomplished with the project (how are results leading to adaptation and learning)? Is there a conceptual model? What restoration assumptions or hypotheses are being tested?

Monitoring

8. How is monitoring data being analyzed, managed, and interpreted?

Results and communication

9. What have project recipients completed compared to what is in the scope? What changed in the scope and why?

[2] Negative case analysis involves conducting multiple interviews until a consistent repetition or pattern of results emerges among similar cases or projects. For more information, see Patton, M. 2001. Qualitative research and evaluation methods. Sage Publications: London.

10. What were the key partnerships involved in the project and why?
11. What kinds of reports, graphs, maps, papers, and presentations has the project produced?
12. Is there assistance you need with any of the discussed topics? (e.g., adaptive management, monitoring, connecting to other projects)?

2.3.3 Online Survey

The online survey data were most useful as complements to the interview data. Use of the survey online was very efficient once the questions were determined and sent out. Analysis and organization of the data were also very simple. Responses were downloaded directly into a survey-response database. This function makes future online evaluation and data collection attractive.

Some contradictions were observed in the surveys. For example, one respondent indicated that the project did have an experimental design, but then answered that pre- and post-project comparisons cannot or will not be made for the project. Therefore, there could be differences in interpretation of certain questions by respondents. Another limitation of the survey instrument is the inability to interpret certain corollaries of responses such as body language, pauses, or other similar verbal and nonverbal communication.

3.0 SUMMARY STATISTICS FOR THE PROGRAM

One of the objectives of Phase 2 of the Projects Evaluation was to test the ability of existing data to support summary statistics that could be used to demonstrate program accomplishments. The information presented in this section provides a broad overview of the ERP and the projects that have been funded by the program between 1995 and 2001. General information is provided about the types, numbers, and regional distributions of projects funded as well as information on the number of acres of habitat proposed for restoration, miles of stream channel proposed for restoration, and other descriptive statistics. Projects selected in 2002 for funding by the program are not included in the information below. All figures cited in the text are found at the end of Section 3.

It is important to note that all the information presented below is based on a review of readily available data sources and represents proposed, rather than completed actions. In general, the existing data sources, particularly the ERP Projects Tracking Database, provide good information about the overall numbers and types of projects funded as well as the geographic location of these projects. The existing data are less reliable for generating program-wide quantitative estimates of habitat acres and miles of stream channel to be affected. Such estimates should be viewed as preliminary and should be verified during Phase 3 of the Projects Evaluation.

3.1 Program Overview

The CALFED Bay-Delta Program has funded ecosystem restoration projects for the past 7 years (1995–2002). Projects funded in the initial year (1995) were funded by the California Urban Water Agencies (CUWA) as an outgrowth of the 1995 Delta Accord (which formed the basis for the creation of CALFED). Since 1995, funding has been provided through an open, competitive solicitation process. Figure 3.1 displays the annual investment and number of projects funded by the ERP between 1995 and 2001. Figure 3.2 shows the general location of ERP projects funded between 1997 and 2000.

Approximately 20% of the projects funded between 1995 and 1999 are known to have been completed (see Figure 3.3). The highest percentages of projects completed are projects that were funded in 1995 and 1996. This information suggests there is a considerable lag time between project selection and project completion (i.e., few 1997–1999 projects had been completed as of October 2000). Some of this lag time is attributable to contracting and permitting delays. Some of it is attributable to the length of time it takes to actually complete a given project.

The types of restoration activities funded by the ERP over the past 7 years vary, ranging from planning and local watershed stewardship to physical habitat restoration and research. Table 3.1 displays the distribution of funded projects according to the ERP topic areas developed to track projects. This same information is displayed graphically in Figure 3.4. A complete listing of projects by type is provided in Appendix B.

Table 3.1. Types and Number of Restoration Projects Funded by the ERP

Type of Project	Number of Projects	Percentage of Total	Total $ (in millions)
Restoration of Multiple Habitats	23	7	60
Shallow-Water Tidal and Marsh Habitat	29	9	24
Floodplains and Bypasses	11	3	14
Riparian Habitat	12	4	7
Channel Dynamics and Sediment Transport	22	7	28
Uplands and Wildlife-Friendly Agriculture	5	2	39
Fish Screens and Passage	62	19	90
Fishery Assessments	25	8	9
Ecosystem Water and Sediment Quality	30	9	26
Environmental Water Management	3	1	6
Natural Flow Regimes	2	1	3
Nonnative Invasive Species	18	6	6
Special-Status Species	3	1	4
Local Watershed Stewardship	47	14	15
Environmental Education	28	9	4
Total	**320**		**$335**

The figures in Table 3.1 indicate that there has been a large investment in terrestrial and aquatic habitat protection and restoration (first six topic areas listed), which account for approximately $172 million (51%) of the investment. The ERP has also invested significant dollars ($90 million, or 27%) in improving fish passage (both upstream and downstream) through the design and construction of new fish screens and ladders and the removal of several dams. Much of this activity has targeted at-risk fish species, particularly salmonids.

With regard to the geographic distribution of funded projects, the Sacramento River Region and the Delta and East Side Tributaries Region account for approximately 60% of the number of ERP projects and approximately 70% of the funding. Projects are distributed almost evenly among the two other CALFED ERP regions (Bay, San Joaquin River), and projects located in more than one region (Multi-Region). Figure 3.5 displays the distribution of projects and funds among the four regions used in this report. A fifth category is used to indicate projects located in more than one region.

Below are the top three types of projects funded in each region and the total number of projects and amount invested. Appendix E provides additional information regarding specific types of restoration activity within each region as well as information on activities in each of the CALFED ERP Ecozones, which represent sub-units within each region.

Delta and Eastside Tributaries Region	72 projects	$108 million
Uplands and Wildlife-Friendly Agriculture	3 projects	$37 million
Restoration of Multiple Habitats	8 projects	$23 million
Shallow-Water Tidal and Marsh Habitat	12 projects	$14 million

Large investments were made in full-scale habitat protection and restoration projects, including Prospect Island, Twitchell Island, Liberty Island, McCormack-Williamson Tract, Stone Lakes National Wildlife Refuge (NWR), Staten Island, and Cosumnes River Preserve.

Sacramento River Region	118 projects	$129 million
Fish Screens and Passage	46 projects	$82 million
Restoration of Multiple Habitats	11 projects	$17 million
Local Watershed Stewardship	26 projects	$9 million

Large investments were made in fish screens and passage on Battle Creek, Butte Creek, at ACID and City of Sacramento Intakes, and habitat protection and restoration on the Sacramento and Lower Yuba Rivers.

San Joaquin River Region	42 projects	$60 million
Channel Dynamics and Sediment Transport	15 projects	$20 million
Restoration of Multiple Habitats	3 projects	$19 million
Environmental Water Management	3 projects	$6 million

Large investments were made in habitat protection and restoration at San Joaquin River NWR, Tuolumne River, and Merced River; and water acquisitions.

Bay Region	39 projects	$17 million
Shallow-Water Tidal and Marsh Habitat	16 projects	$9 million
Nonnative Invasive Species	4 projects	$3 million
Local Watershed Stewardship	10 projects	$3 million

Large investments were made in habitat protection and restoration on the Napa River and at Hamilton wetlands, as well as on control of invasive Spartina and ballast water research.

Multi-Regional	49 projects	$22 million
Ecosystem Water and Sediment Quality	10 projects	$12 million
Nonnative Invasive Species	12 projects	$3 million
Fishery Assessment	7 projects	$2 million

Large investments were made in assessments of mercury, pesticides, and organic matter; Arundo donax eradication; and broodstock, genetics, and tagging studies.

3.2 Results by Project Type

The ERP has funded a broad variety of projects that either directly or indirectly contribute to ecosystem restoration within the CALFED Solution Area. These projects include: planning and design studies; construction activities (e.g., physical habitat restoration, fish screens and ladders, and dam removals); water purchases, research, and monitoring related to fisheries; research and public education regarding water quality and nonnative species; environmental education and watershed stewardship; and habitat protection through acquisitions and/or easements. The following sections briefly summarize activity according to four broad categories of activity:

- Habitat Protection and Restoration;
- Fish Screens and Passage;
- Water Quality, Invasive Species, and Fishery Assessments; and
- Watershed Stewardship and Environmental Education.

These basic categories represent relatively discrete types of activities and provide a meaningful way of summarizing the data. As noted in Section 2.1 above, there is considerable variation between projects in terms of the specific activities funded. The summaries below provide a broad perspective on program activity. In many cases projects are "lumped" into one category or another, even though they may actually involve elements of several categories.

3.2.1 Habitat Protection and Restoration

The ERP has funded 102 projects that focus specifically on the protection and/or restoration of terrestrial and aquatic habitats. Investment in these projects has been approximately $172 million. ERP topic areas represented by these projects include (number of projects in parentheses):

- Channel Dynamics and Sediment Transport (22),
- Shallow-Water Tidal and Marsh Habitat (29),
- Riparian Habitat (12),

- Restoration of Multiple Habitats (23),
- Uplands and Wildlife-Friendly Agriculture (5), and
- Floodplains and Bypasses (11).

Specific activities associated with these projects include restoration planning and design, habitat protection through acquisitions (in both fee title and conservation easements), construction (including pilot and full-scale restoration), and research. Funds awarded for these activities are distributed roughly as follows:

- planning only (includes design, feasibility studies, and permitting activities)—12 projects, approximately $7.4 million;
- habitat protection only—18 projects, approximately $79.4 million;
- pilot-scale restoration (may include habitat protection and planning activities)—32 projects, approximately $32 million;
- full-scale restoration (may include habitat protection and planning activities)—30 projects, approximately $42.5 million; and
- research and monitoring—10 projects, approximately $11.5 million.

Thirty-seven ERP projects involved some form of habitat and/or floodplain protection through acquisition (either in fee title or easements), and almost all of the projects involve some monitoring component. The data used for the analysis presented above were not detailed enough to separate out multiple activities associated with a given project, such as planning vs. construction. It should also be noted that in a few isolated cases, habitat protection and restoration activities are embedded in other topic areas such as Local Watershed Stewardship, which is not reflected in the above statistics.

Tables 4 and 5 in Volume II of the ERPP identify habitat restoration targets for the Sacramento-San Joaquin Delta and the Suisun Marsh/North San Francisco Bay Ecological Management Zones (pg 101 and 142 respectively). Efforts were made as part of the Phase 2 evaluation to assess progress toward these specific habitat targets. However, the quality of information provided in the project proposals was insufficient to support such an assessment. The ability to aggregate information across projects was limited both by the availability and the

consistency of existing information. Many projects involve protection and/or restoration of multiple habitat types that are not always accounted for in the same manner from project to project. In many cases there is overlap. For example, riparian areas often occur in floodplain areas. The nomenclature and metrics across projects are also often inconsistent. For example, some projects report instream habitat activities in miles while others report it in acres. Further, for some projects, what is implemented may differ from what was originally proposed because of amendments to the project.

In the absence of better information, a set of five fairly broad habitat categories, or indicators, were developed and used to aggregate information across multiple projects for the purpose of Phase 2 of the Projects Evaluation,. These categories, as defined in the text box on the following pagewere created based on what the available data could support and should be viewed as an initial step toward better tracking. The categories overlap and thus are not additive. Because of reporting and overlap issues, the aggregate numbers presented below should be verified and refined during Phase 3 of the Projects Evaluation.

Habitat Categories Used in Phase 2 of the Projects Evaluation

Habitat Protection—Acres of land, including floodplains proposed for acquisition (either in fee title or easement) for the purposes of protecting habitat and/or restoring ecological processes.

Habitat Restoration—Acres of habitat proposed for physical restoration. This category may represent a variety of habitat types, including shallow-water tidal and marsh habitat, riparian habitat, and upland habitat. In some cases these lands are the same lands proposed for acquisition (or some portion thereof). In other cases, restoration is proposed on private lands or lands already in public ownership where acquisition is not required. Floodplain areas are not included in this category. Floodplain areas were treated separately from habitat restoration areas because they are not treated as a specific habitat type in the ERPP but rather are identified as critical components for restoring ecological processes.

Floodplain—Acres of floodplain proposed for protection (through fee title or conservation easement) and/or reconnection with an adjacent watercourse. Floodplains may include wetlands or riparian habitats that are proposed for restoration as part of a project. Floodplain acres are also included in the Habitat Protection category and thus are a subset of that category.

Instream Habitat—Miles of stream channel or instream habitat proposed for restoration. Restoration activities may include channel reconfiguration, habitat enhancements, and/or gravel augmentation.

Riparian Corridor—Miles of riparian corridor proposed for protection and/or restoration.

Based on the information obtained from project proposals, ERP–funded projects (excluding planning, research and monitoring projects) account for approximately

- 58,000 acres of habitat proposed for protection, including 12,000 acres dedicated to wildlife-friendly agriculture and 16,000 acres of floodplain;
- 39,000 acres of habitat proposed for restoration, including 9,500 acres of shallow-water tidal and marsh habitat;

- 63 miles of instream habitat proposed for protection and/or restoration; and
- 93 miles of riparian corridor proposed for protection and/or restoration.

Table 3.2 provides a more detailed accounting of habitat acres and stream miles proposed for protection and restoration in each region based on what was reported in the project proposals. These numbers may not precisely represent what has actually occurred on the ground. Projects represented in this table are only those that propose either to acquire or to physically restore habitat (including instream habitat) or floodplains. Planning and research projects that do not involve acquisition or construction activities are not included. The locations of these projects are shown in Figure 3.6.

Table 3.2. Habitat Acres and Stream Miles Proposed for Protection and Restoration by Region

Region	Habitat Protection (acres)	Habitat Restoration (acres)	Floodplain (acres)	Instream Habitat (miles)	Riparian Corridor (miles)
Bay	2,843	8,092	303	4	2
Delta & Eastside Tributaries	30,216	19,671	10,450	18	27
Sacramento	14,002	2,665	3,162	4	32
San Joaquin	10,652	8,654	2,215	37	32
Total	**57,713**	**39,082**	**16,130**	**63**	**93**

Approximately one-half of the acreage proposed for restoration (19,671) is located in the Delta and Eastside Tributaries Region. Figure 3.7 shows the number of acres proposed for restoration by region funded between 1995 and 2001. These acreages comprise a variety of habitat types including wetlands, shallow water tidal, riparian, and uplands (including wildlife-friendly agriculture).

The ERP has funded 29 projects that collectively propose to restore 9,543 acres of shallow-water tidal and marsh habitat. This represents approximately 25% of the number of acres funded for restoration by the ERP. The vast majority of this acreage (8,091 acres or 85%) is located in the Bay Region. The remaining acreage is located in the Delta and Eastside Tributaries Region.

16,130 acres of floodplain have been proposed for protection, restoration, and/or reconnection. The majority of this acreage (10,450 acres or 65%) is located in the Delta and Eastside Tributaries Region. Another 20% (3,162 acres) is located in the Sacramento Region. Figure 3.8 shows the number of floodplain acres proposed for protection, restoration, and/or reconnection by region.

The ERP has funded 12 projects that collectively propose to protect and/or restore approximately 93 miles of riparian corridor. These projects include protection and enhancement of existing riparian areas as well as physical restoration projects involving riparian habitat. In addition to these projects, the ERP has funded several projects focused on the development of river corridor management plans and stewardship programs that address riparian areas. Funded riparian restoration activity is distributed relatively evenly among the San Joaquin River Region (32 miles), the Sacramento River Region (32 miles), and the Delta and Eastside Tributaries Region (27 miles).

The ERP has funded 16 projects that collectively propose to restore and/or enhance 63 miles of instream habitat. Several of these projects are the same as those that address riparian corridors or floodplain areas (as described above), but many of them are specifically focused on physical modifications to instream habitat, including gravel restoration and recruitment. Figure 3.9 shows the number of miles of riparian corridor and instream habitat proposed for protection and/or restoration by region. In addition to these projects, the ERP has funded water acquisitions to increase instream flows in a number of streams to enhance ecological processes and instream habitat conditions.

3.2.2 Fish Screens and Passage

Between the years 1995 and 2001, the CALFED Ecosystem Restoration Program funded 62 Fish Screen and Passage projects for approximately $90 million. These projects have focused on reducing juvenile mortality through the installation of new screens and increasing access to upstream spawning areas for anadromous fish through construction of ladders and removal of barriers to migration. Several projects have a funding history from feasibility and design to physical construction. Grant recipients included federal, State and local resource management

agencies as well as concerned nonprofit groups, local grass roots organizations, and private entities. During this time period, successive funding was granted for projects with multiple phases. Projects funded under the ERP's Fish Screens and Passage category include

- new fish screen feasibility, design, planning, and construction;
- modification, consolidation, and replacement of existing water withdrawal and screening facilities;
- construction and modification of fish passage facilities, including fish ladders;
- experimental fish passage methods;
- basinwide fish passage management plans;
- removal of outdated and/or insufficient facilities including dams, screens, and ladders; and
- post-project monitoring studies.

Many of the projects funded involved various phases of development ranging from feasibility to design and permitting to construction. The 62 fish screen and passage projects[3] funded represent 11 feasibility projects, 14 design and/or permitting projects, 25 construction projects, and 12 projects involving studies or other evaluations. Fourteen specific projects have been funded for multiple phases of development.

As a result of ERP funding, 75 fish screens that screened approximately 2,700 cfs of diversion capacity were either installed or replaced throughout the Central Valley and the Bay-Delta. In addition to the increased fish screening, 16 fish ladders were either constructed or rehabilitated and 10 barriers removed to provide better upstream passage for anadromous fish. Every one of these projects addresses the recovery of at-risk fish species, and a significant number of the projects are focused on restoring critical habitats.

Figure 3.10 displays the general locations of proposed fish screens and passage projects. In many cases more than one ERP project award was made for a given project; therefore a given location shown in Figure 3.10 may represent multiple ERP projects. The vast majority of the

[3] Some fish screen projects included construction/installation of more than one screen; thus, the number of actual fish screens is greater.

ERP Fish Screen and Passage projects (73% of the projects and 91% of the funding) are located in the Sacramento Region. Fish screen and passage projects in the other regions include two projects in the Bay Region for $.628 million; eight projects in the Delta and East Side Tributaries Region for $4.5 million; three projects in the Entire Bay Delta Watershed Region for $.96 million; and three projects in the San Joaquin Region for $1.2 million. Figure 3.11 displays the types of fish screen and passage projects funded by the ERP.

3.2.3 Water and Sediment Quality, Nonnative Invasive Species, and Fishery Assessments

The ERP has funded 73 projects at a cost of approximately $41.4 million to address ecosystem water and sediment quality, nonnative invasive species, and fisheries. Most of these projects focus on research or other analytical work to address various science-related questions regarding contaminants, nonnative invasive species, and fish biology and their roles in restoring the ecosystem. Some of the projects also involve education, outreach, and stewardship activities. Each of the three broad topics and the projects funded under each are briefly described below.

Water and Sediment Quality

The ERP has funded 30 projects involving analysis of environmental water and sediment quality, with an investment of approximately $26.4 million (approximately 8% of the entire ERP investment). Some of the items being evaluated by these projects include:

- selenium sources and consequences;
- organic carbon releases from wetlands;
- effects of wetlands restoration on methylmercury levels;
- toxicity studies for various fish species, including flathead minnows, rainbow trout, smelt, and splittail;
- dredging reuse;
- transport, transformation, and effects of selenium and carbon in the Delta;
- programs to reduce pesticide and fertilizer use;
- water quality criteria for chlorpyrifos and diazinon; and
- dissolved oxygen depletion in the San Joaquin River.

Most of the investment in these projects (50%) focuses across various CALFED regions and is classified as being Multi-Regional. The next highest percentage of investment is for the Delta and Eastside Tributaries Region (28%).

Nonnative Invasive Species

The ERP has funded 18 projects intended specifically to address nonnative invasive species at $5.9 million. Most of the ERP-funded nonnative invasive species projects are Multi-Regional (48% of funding) or focused on the Bay Region (42% of funding). The most common theme associated with these projects is eradication of invasive species. A few projects focus on education of the public, and others focus on developing and implementing monitoring programs. In fact, many of the education projects propose to focus on education as a goal rather than eradication, with proposed guidebooks and brochures covering more than 30 nonnative invasive species. Five projects focus on water quality control as a measure for addressing invasive species issues.

Twelve of the 18 projects mention specific species proposed for control. The species mentioned include purple loosestrife, zebra mussels, invasive clams, Chinese mitten crabs, *Spartina*, and *Arundo donax*. These projects propose to control invasive species at 64 different locations.

Fishery Assessments

The ERP has funded 25 Fishery Assessment projects, with an investment of approximately $9.1 million. Most of these projects are oriented toward research and monitoring. Three projects propose to do genetic evaluations, six propose to track fish movement, four focus on studying spawning behavior through monitoring or culturing, and five propose targeted research on the biology of specific fish species. The remaining seven projects involve a variety of other studies and evaluations. Specific species addressed in these projects include

- green sturgeon;
- spring-, fall-, and winter-run chinook salmon;
- steelhead; and
- delta smelt.

The majority of the fishery assessment projects are located in the Sacramento Region (approximately 53% of funding). Multi-Regional projects and projects in the Delta and Eastside Tributaries Region account for 22% and 17% of funding.

Figure 3.12 displays the investment in Ecosystem Water and Sediment Quality, Nonnative Invasive Species, and Fishery Assessment projects by region. A detailed listing of these projects by region is in Appendix B.

3.2.4 Watershed Stewardship and Environmental Education

The ERP has funded 75 projects involving watershed stewardship and/or environmental education activities, for an investment of approximately $18.8 million. This is in addition to projects funded separately by the CALFED Watershed Program. Watershed stewardship projects funded by the ERP involve proposals for a variety of capacity-building activities, such as funding a watershed coordinator, meetings, outreach, and facilitators. These projects also involve funding the development of restoration plans and specific on-the-ground activities. The ERP has funded 47 Local Watershed Stewardship projects representing 28 specific watersheds.

Several projects have also been funded under this category that are general in nature and not connected to one specific watershed. Funding for these projects has been approximately $13.3 million. The majority of this funding (more than 60%) has been awarded to projects in the Sacramento Region. The next largest investment in watershed stewardship has been in the Bay Region, representing 17% of the investment, or approximately $2.5 million for 10 projects.

The ERP has funded 28 Environmental Education projects. Investment in these projects has been approximately $3.9 million. These projects include funding for a wide variety of programs ranging from watershed tours to film festivals. Approximately 50% of the proposed Environmental Education projects are located in the Sacramento Region, 20% are Multi-Regional, and 18% are in the Bay Region.

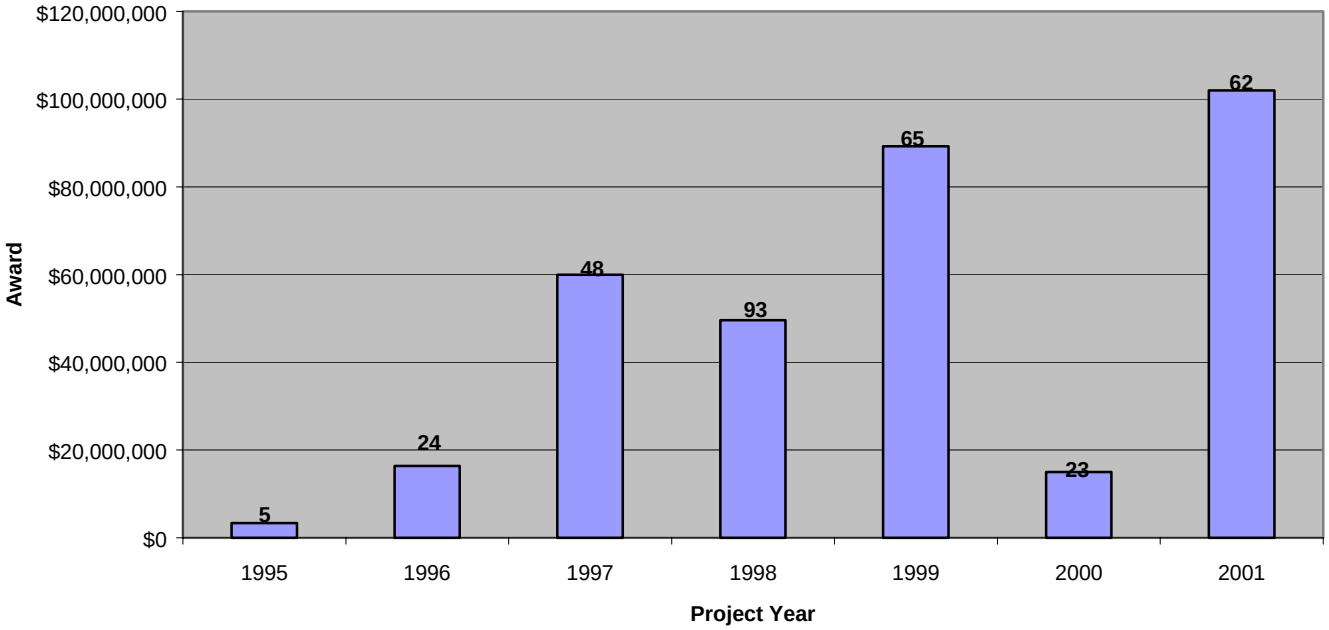

Figure 3.1. Annual Investment and Number of Projects Funded by the ERP between 1995 and 2001 (Number of funded projects is indicated above bars)

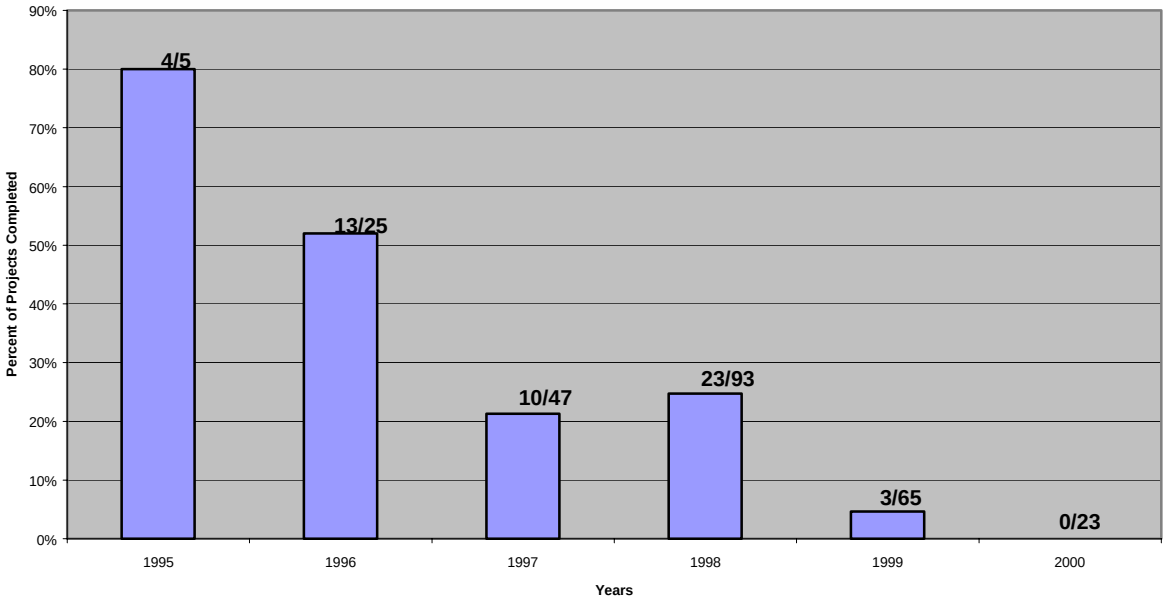

Figure 3.3. Percentage of ERP Projects Completed as of October 2000

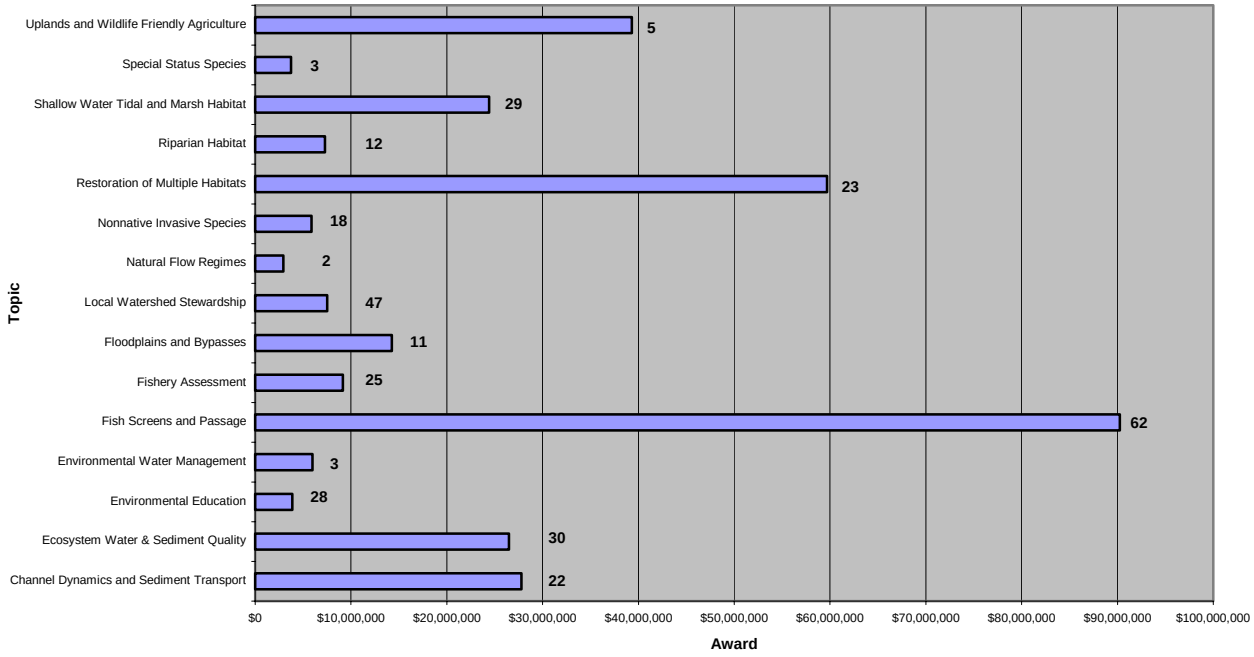

Figure 3.4. Distribution of Investment and Projects by Topic Area

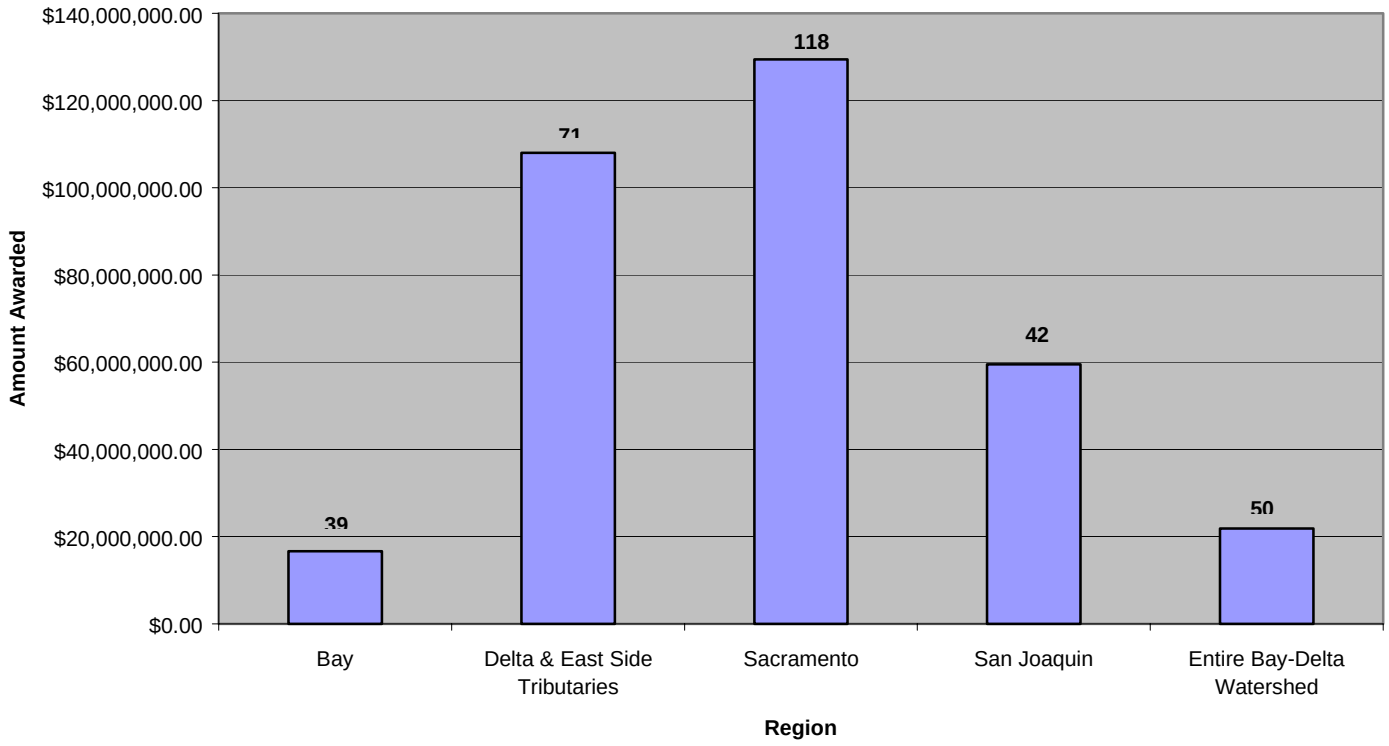

Figure 3.5. Investment and Number of ERP Projects by Region

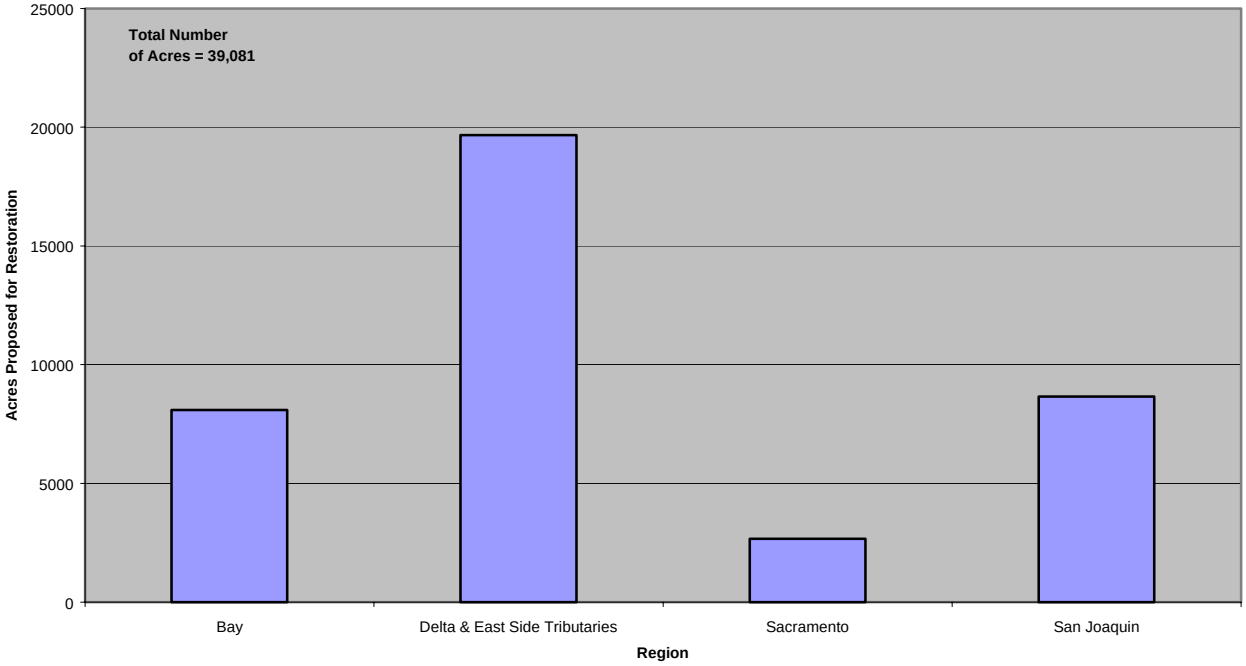

Figure 3.7. Number of Acres Proposed for Restoration by Region

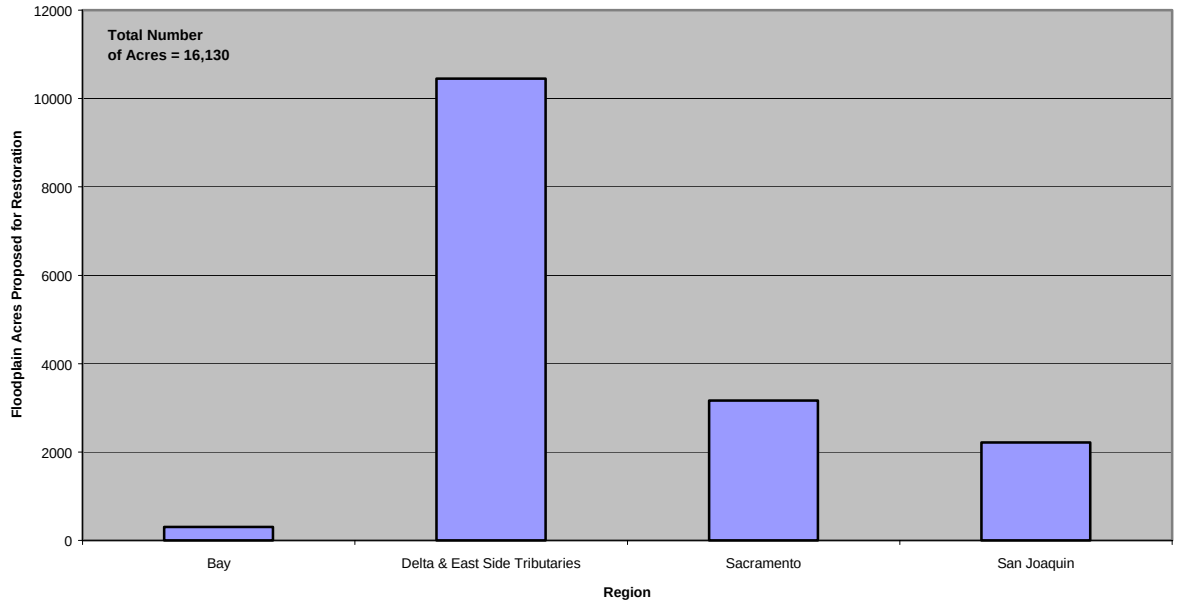

Figure 3.8. Number of Floodplain Acres Proposed for Protection, Restoration, and/or Reconnection by Region

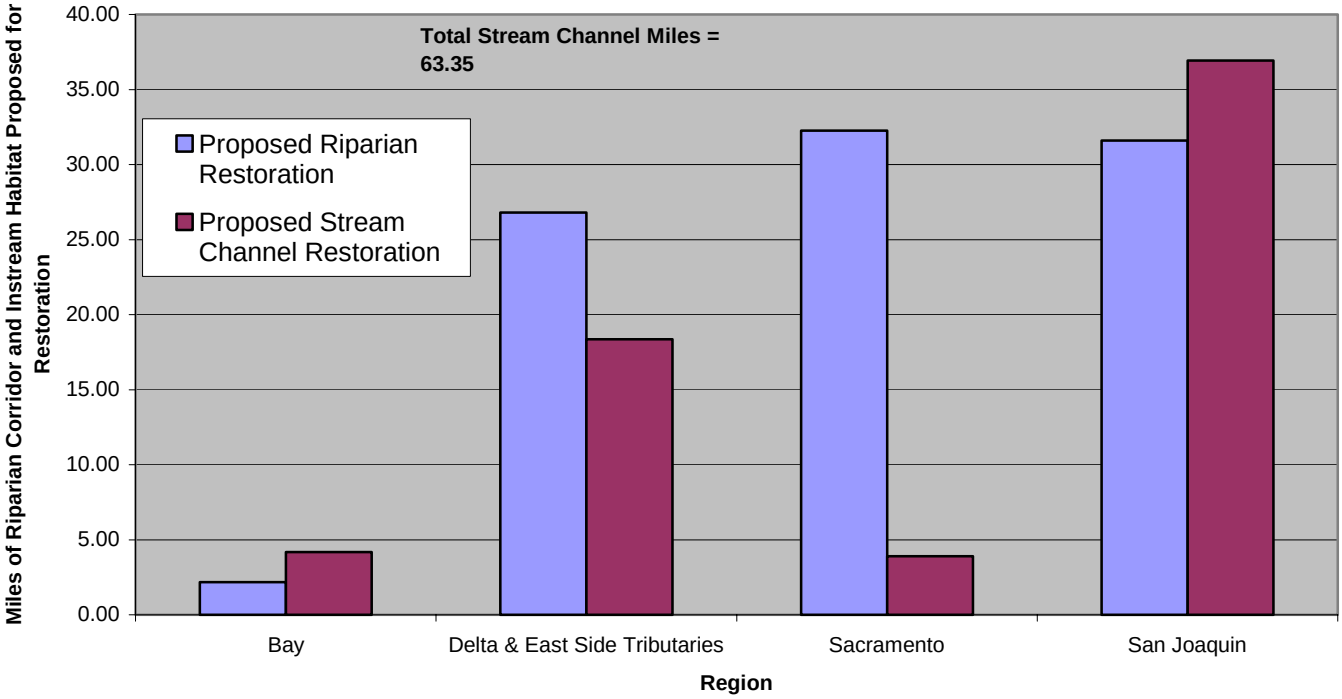

Figure 3.9. Number of Miles of Riparian Corridor and Instream Habitat Proposed for Protection and/or Restoration by Region

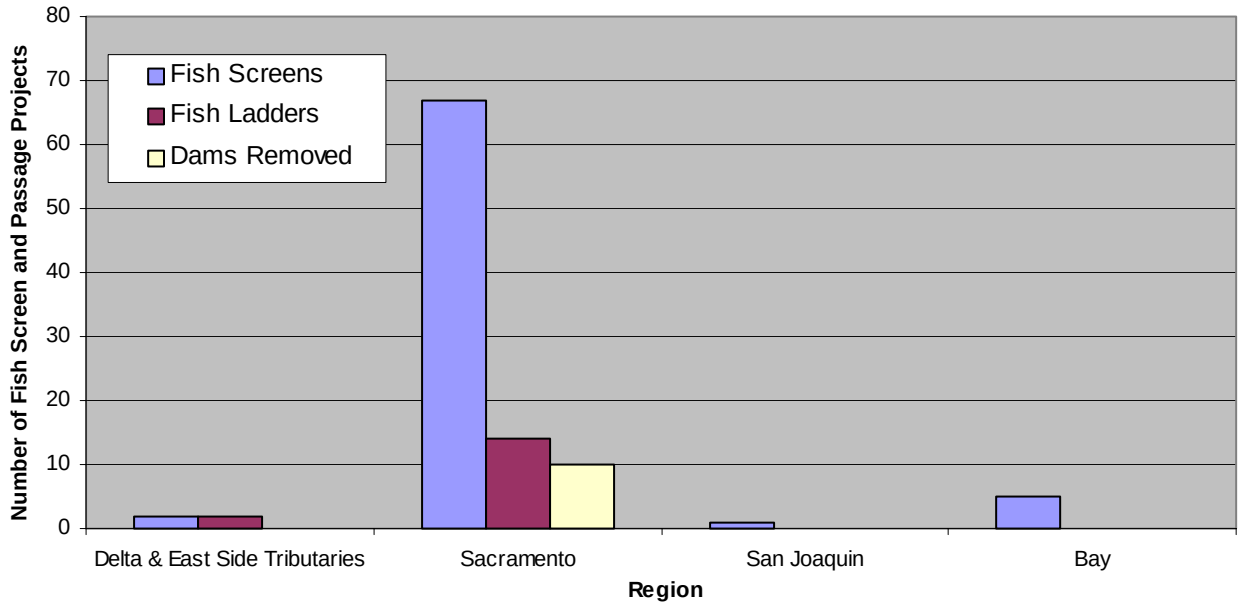

Figure 3.11. Types of Fish Screen and Passage Projects Funded by the ERP by Region

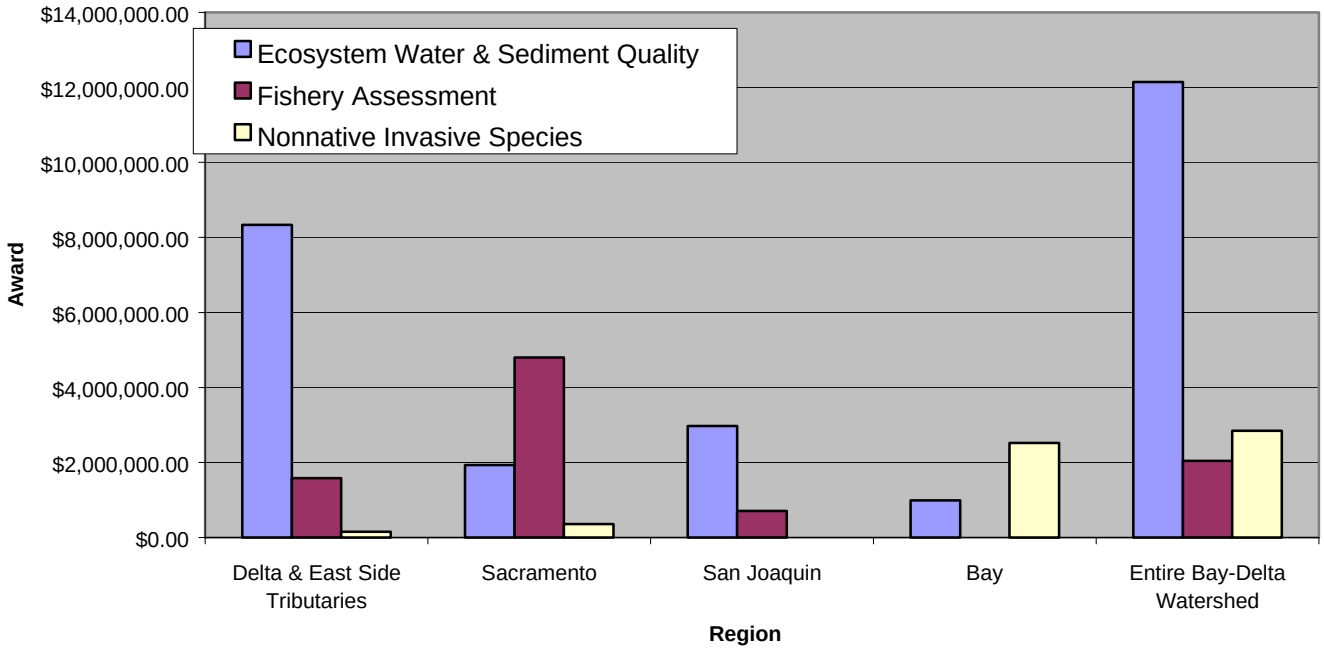

Figure 3.12. Investment in Ecosystem Water and Sediment Quality, Invasive Species, and Fishery Assessment by Region

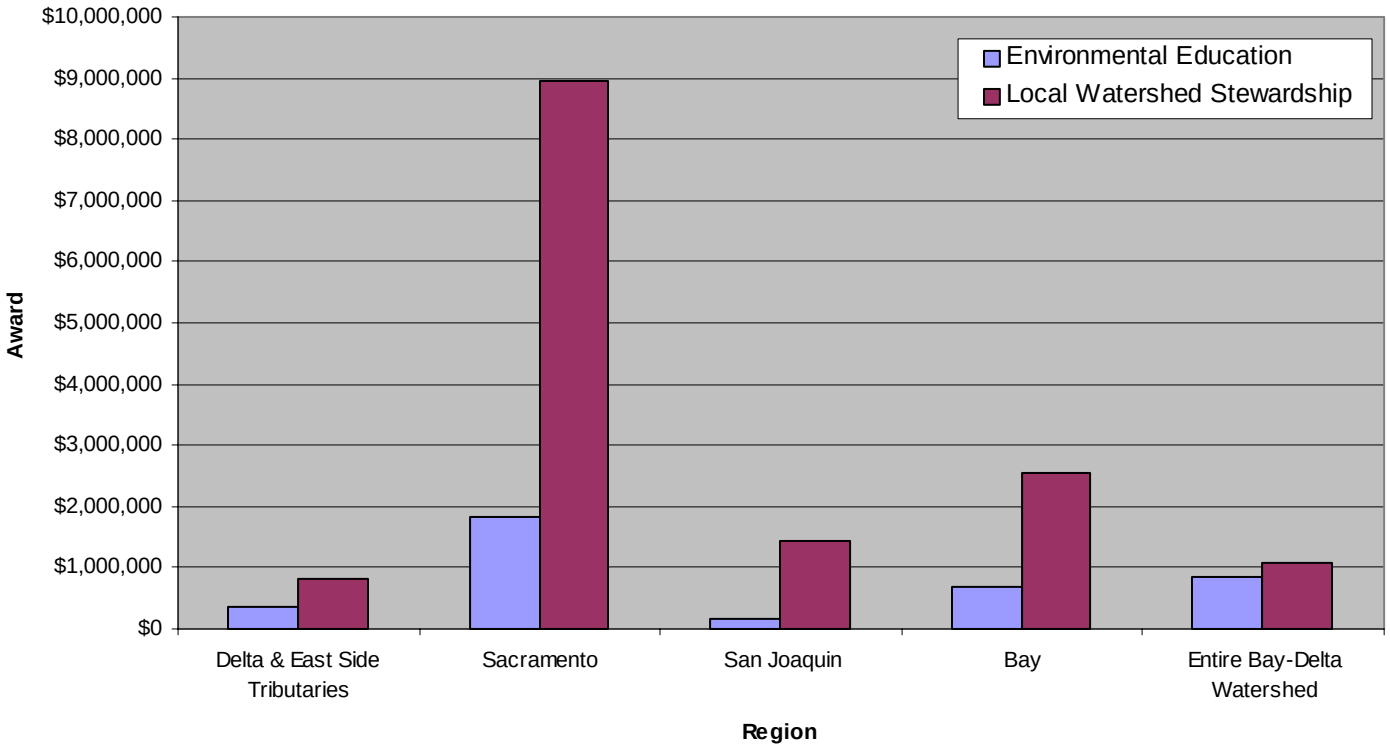

Figure 3.13. Investment in Environmental Education and Watershed Stewardship Projects by Region

4.0 PROJECT REVIEWS

Section 4 describes the detailed project-level review of ERP projects as well as findings from the web-based survey. The section is divided into general findings as well as findings under the categories of collaboration and information exchange, understanding and application of adaptive management, and contracting and permitting. These sections are followed by specific findings by classes of projects and the review of all Butte Creek projects. The section closes with findings of the web survey.

Detailed interviews were conducted on 27 ERP funded projects. These included:

- seven Channel Dynamics and Sediment Transport projects,
- five Restoration of Multiple Habitats projects,
- five Shallow-Water Tidal and Marsh Habitat projects, and
- ten projects funded in the Butte Creek Watershed.

In addition to the 27 detailed interviews, 22 projects were evaluated using a web-based survey. One additional Channel Dynamics and Sediment Transport project was added toward the end of the review to assess why it had not progressed. The specific projects reviewed and individuals interviewed are listed in Table 4.1. The locations of these projects are shown in Figure 4.1. Detailed profiles on each of the projects reviewed are in Appendix D.

4.1 General Findings of Project Review

In general, most of the projects reviewed could be classified as successful in terms of accomplishing their individual goals. However, nearly all of the projects had difficulties with contracting or took much longer than expected. Many of the projects, particularly the Channel Dynamics and Sediment Transport projects, also experienced difficulty obtaining regulatory permits for construction, which contributed to project delays. Complying with various permit stipulations also affected project costs and in some cases project design, particularly with respect to riparian areas and elevation changes that could affect flood control. In almost all cases, the projects were implemented with little or no communication or interaction with either CALFED staff (beyond the project selection process) or individuals involved in other similar restoration

Table 4.1—List of Projects and Associated Interviews Completed

Title	Awarded	Interviewed	Organization	Interview Date
Channel Dynamics and Sediment Transport				
Gravel at Basso Bridge	$250,975.00	Tim Heyne	Department of Fish and Game	6/6/02
Merced River Salmon Habitat Enhancement: Robinson Ranch Site	$1,699,101.00	Fred Jurick	Department of Fish and Game	5/5/02
Tuolumne River Channel Restoration (Pool 9)	$2,353,100.00	Wilton Fryer	Turlock Irrigation District	5/21/02
Merced River Salmon Habitat Enhancement (Phase III)	$2,433,759.00	Fred Jurick	Department of Fish and Game	5/5/02
Lower Clear Creek Floodway Restoration Project (Phase II)	$3,559,596.00	Hide Nakamisha	Western Shasta RCD	6/6/02
Merced River Salmon Habitat Enhancement (Phase I: Ratzlaff Reach)	$1,586,350.00	Fred Jurick	Department of Fish and Game	5/5/02
Knights Ferry Gravel Replenishment	$536,410.00	Carl Mesick	Carl Mesick Consultants	5/17/02
Restoration of Multiple Habitats				
Sacramento River Floodplain Acquisition—Natural Process Restoration	$9,879,800.00	Mike Roberts, Greg Golet, Ryan Luster, Wendy Duron	The Nature Conservancy	5/28/02
Sacramento River Floodplain Acquisition—Riparian Forest Restoration	$780,000.00	Same as above	The Nature Conservancy	5/28/02
Sacramento River Floodplain Acquisition and Riparian Restoration	$512,500.00	Same as above	The Nature Conservancy	5/28/02
Sacramento River Meander Restoration	$898,700.00	Same as above	The Nature Conservancy	5/28/02
Cosumnes Start-Up Stewardship and Restoration	$1,985,100.00	Ramona Swenson	The Nature Conservancy	5/17/02
		Becky Waegell	The Nature Conservancy	5/10/02
		Lisbeth Jacobsen	The Nature Conservancy	5/24/02
Shallow Water Tidal and Marsh Habitat				
Research to Predict Evolution of Restored Diked Wetlands	$575,172.00	Si Simenstad	University of Washington	6/5/02
Franks Tract Restoration	$323,186.00	Rick Roads	Moffat & Nichol Engineers	6/6/02
Hamilton Wetlands Restoration Planning	$1,025,015.00	Tom Gandesbery	California Coastal Commission	6/3/02
		Steve Goldbeck	Bay Coastal Development Commission	6/6/02
South Napa River Tidal Slough and Floodplain Restoration Project	$1,490,000.00	John Wankum	City of American Canyon	6/3/02
		Mark Joseph	City of American Canyon	6/4/02
Understanding Tidal Marsh Restoration Processes and Patterns	$1,042,246.00	Si Simenstad	University of Washington	6/5/02
Butte Creek Basin				
Lower Butte Creek Project Phase II	$775,000.00	Olen Zirkle	Ducks Unlimited, Inc.	5/6/02
Lower Butte Creek Project Phase III	$4,783,719.00	Olen Zirkle	Ducks Unlimited, Inc.	5/6/02
CSU Chico Butte Creek Acquisition and Riparian Restoration	$187,128.00	Don Holtgrieve	CSU Chico	5/9/02
CSU Chico Butte Creek Acquisition and Riparian Restoration	$125,000.00	Don Holtgrieve	CSU Chico	5/9/02
Butte creek Watershed Management Study		Don Holtgrieve	CSU Chico	5/9/02
Riparian Corridor Mapping on Butte Creek	$145,200.00	Don Holtgrieve	CSU Chico	5/9/02
Butte Creek/Sanborn Slough Bifurcation Upgrade Project	$1,000,000.00	Robert Capriola	California Waterfowl Association	5/8/02
Gorrill Dam Screen and Ladder	$369,641.00	Jim Well	Ducks Unlimited, Inc.	5/23/02
		Neil Schild	Montgomery, Watson, Harza	5/23/02
Adams Dam Fish Screen and Ladder	$70,304.00	Rick Ponciano	Rancho Escuan	5/22/02
Western Canal Water District Butte Creek Siphon		Ted Trimble	Western Canal Water District	5/24/02
Butte Creek Overview Interviews		Paul Ward	Department of Fish and Game	5/20/02
		Dave Ceppos	Jones and Stokes	5/24/02
		John Icanberry	Fish and Wildlife Service	6/3/02
Stakeholder interviews		Ron Long	Butte Slough Irrigation Co.	5/12/02
Additional Recommended Projects				
Wilms Ranch		Stephanie Spaar	Department of Water Resources	6/30/02
Total Projects: 27		**Total Interviewed: 30**		

projects, including similar ERP-funded projects. Finally, most of the projects lack a well-articulated experimental design and post-project monitoring (two essential elements for adaptive management).

The following sections discuss general findings with respect to three main areas:

- collaboration and information exchange;
- understanding and application of adaptive management; and
- contracting and permitting.

Issues associated with collaboration and information exchange, and contracting and permitting, were mentioned by almost all of the individuals interviewed, and thus represent common themes. Issues related to adaptive management were examined specifically as a construct of the interview.

4.1.1 Collaboration and Information Exchange

Several individuals interviewed discussed collaboration and pointed to specific instances in which collaboration positively influenced the project by helping to resolve differences, keeping parties engaged, or promoting a better understanding of issues and concerns. Most of the collaboration occurred at the local level with parties directly involved in, or affected by, the project. Few projects involved direct interaction or information exchange with CALFED staff or with other scientists or managers working on similar restoration projects in the region. A few key observations about collaboration and information exchange are listed below.

- **Commitment and buy-in of farmers and landowners was critical, from the initial planning meetings to project construction, follow-up monitoring, and operation and maintenance.** In the Sacramento River Project, The Nature Conservancy (TNC) found that contracting local landowners, sometimes the same landowners from whom they had purchased riparian easements, often provided the best restoration stewardship because they knew the land and how to best nurture plantings for restoration.
- **Collaboration was costly in terms of time, but ultimately was instrumental in solving complex multiple stakeholder resource problems.** In the Butte Creek

watershed, the collaborative process took longer than expected, but the relationships built during the process allowed stakeholders to come to agreements that benefit agriculture, the environment, and hunting. One of the participants noted: "As a result of the project process, we know the leadership and how it works and are able to resolve any short-term issues quickly."

- **Public perceptions regarding restoration changed as a result of collaboration.** Representatives from both the Cosumnes and the Sacramento River projects specifically noted how collaboration helped residents understand the ecological importance of river meanders and restored riparian habitat as well as flood control. Stakeholder learning and changing perceptions as a result of outreach and interactions, both during and between meetings, were also noted on the Hamilton Wetlands project.
- **Newcomers and changing faces created challenges on several projects.** Individuals involved in the Butte Creek activities noted difficulty in dealing with frequent newcomers, particularly those that did not know the system. The South Napa Tidal Slough and Floodplain restoration project had a project manager change midstream, which hindered moving the project forward, particularly with permitting and the preparation of environmental compliance documents. Keeping large groups focused also was noted as a challenge for many projects.
- **Communication with CALFED was limited.** Proponents generally commented that there is little communication or interaction with CALFED once projects are awarded but often did not elaborate much beyond this point other than to mention that occasionally they needed technical assistance (such as incorporating adaptive management into a project, contracting help, or help with permitting). They also noted that they have limited knowledge of other ERP projects working on similar issues and that there is little information shared between different CALFED ERP projects, even within a given region.

4.1.2 Understanding and Applying Adaptive Management

Project proponents in the field were often unfamiliar with adaptive management.[4] In fact, there was frequently limited understand of adaptive management in many of the projects reviewed. Many of the projects included component steps of adaptive management, such as conceptual models, hypothesis testing, and monitoring, but none of the projects exhibited all the required steps in a deliberate adaptive management process. Several projects had simple cause-and-effect conceptual models. However, proponents stated the relationships, but they did not identify them as conceptual models. For example, most Butte Creek projects assumed that fish screens and improved passage would assist the recovery of salmonid species. The proponents did not test this assumption, and most mentioned that the Department of Fish and Game (DFG) was responsible for collecting the fish population numbers to demonstrate this cause-and-effect relationship.

Trial-and-error learning was common across projects. For example, California State University, Chico, had difficulty obtaining permits from the State Reclamation Board for streambed restoration planting along the Virgin Valley unit of their project. At the time, there was no policy for planting trees in the floodway, which made the permits difficult to obtain. In the end, the proponents did not apply for the permits and opted for planting valley oak, sycamore, and hardwoods on the levee terraces. However, the floodway restored itself with natural recruitment of willows and cottonwoods, but it is unclear whether the restoration planting assisted the natural recruitment.

A number of factors appeared to impede successful implementation of adaptive management. A few of these factors are highlighted below. (Additional discussion regarding the application of adaptive management is contained in Section 5, "Consistency with the Strategic Plan for Ecosystem Restoration.")

- **Project proponents often need technical assistance with adaptive management.** One of the biggest impediments to implementing adaptive management is the strong field-based experience of the project proponents. Most of these individuals are largely unfamiliar with the concept of adaptive management.
- **Limited funding for adaptive management and monitoring.** Three project proponents mentioned that monitoring was underfunded for their projects. Several others noted that research was not funded at all. In the channel dynamics projects, approved funding for monitoring was noted as being typically insufficient to provide a robust data set appropriate for rigorous statistical testing.
- **The 3-year period for implementation limits data collection and the ability to test hypotheses and adjust management according to data collection.** Proponents suggested the time period be expanded to at least 5–10 years to better interpret project success and implement adaptive management.
- **Adjusting projects midstream.** Another significant challenge to adaptive management is the temptation to modify a project (and associated experimental treatments within an adaptive management framework, if they exist) midway through implementation when certain treatments are failing. Project managers are focused on success, and thus may alter the experimental design when they see unexpected results. TNC Sacramento River project cited this as one of their key challenges for conducting adaptive management on local projects.
- **Adaptive management is not applicable to all projects.** As pointed out in the Strategic Plan, many projects and elements of the program may have to be implemented with a trial-and-error or passive adaptive management approach. Some proponents, particularly respondents to the survey, pointed out that their projects may not be able to implement adaptive management for political and feasibility reasons or

[4] On page 12 of the ERP Strategic Plan, adaptive management is described as: (1) having clear goals and objectives for management that take into account constraints and opportunities inherent in the system to be managed; (2) using models to explore the consequences of a range of management policy and program options in relation to contrasting hypotheses about system behavior and uncertainty; and (3) selecting and implementing policies and programs that sustain or improve the production of desired ecosystem services while, at the same time, generating new kinds of information about ecosystem function.

may not know the system well enough to begin development of models and their subsequent testing.

4.1.3 Contracting and Permitting

Contracting and/or permitting difficulties were noted by many of the individuals interviewed. Contracting delays were mentioned in nearly every project review. Proponents often experienced permitting difficulties, although this comment applied more frequently to particular types of projects, such as Channel Dynamics and Sediment Transport, and less so to others, such as Fish Screen and Passage. Some of the specific difficulties noted are discussed below.

- **Significant time lags occurred between the grant award and receiving funding.** Contracting often took up to 1½ years. Given the limited time that proponents can conduct work in aquatic systems, this can lengthen the project schedule and increase project costs. In Butte Creek, for example, the Sanborn Slough Bifurcation Upgrade project finished within scope and on schedule, but funds for the project became available late in the construction season, causing a compression of the construction period from 4 to 2 months. As a result, there were serious cash-flow problems for the contractors.
- **Three-year contracts are too short for implementing long-term restoration, conservation, and recovery projects.** Many projects lost the first year to contracting, leaving only 2 years to complete the project. Some projects, particularly Fish Screen and Passage projects, have used phasing to alleviate this problem.
- **Contractually separating project components can improve administration and implementation.** The Sanborn Slough Bifurcation Upgrade and Lower Butte Creek projects both were broken into three discrete phases, scoping and feasibility, permitting and pre-project monitoring, and construction and post-project monitoring. Another proponent recommended that construction and revegetation efforts, or similar combinations of efforts with large financial disparities, be separated contractually from one another. For example, the retainer held on construction is often greater than the funding needs for revegetation. If contracts are not separated,

the retainer from construction activities will not be received until the entire project is completed.

- **Permitting delays and difficulties were nearly universal for Channel Dynamics and Sediment Transport projects.** Wetland, flooding, and threatened and endangered species issues typically created the most problems. The State Reclamation Board and the Regional Water Quality Control Board permitting requirements were mentioned by several projects. In one case, the State Reclamation Board initially added 54 special permit conditions to a project. Permit difficulties were not noted in all cases. In Butte Creek, nearly all of the project proponents said that permitting, especially when done through a phased project, was relatively smooth. In addition, several proponents mentioned that the stakeholder process aided in streamlining permitting.

4.2 Findings for Specific Classes of Projects

Results are summarized below for each of the three classes of projects that were evaluated and one entire watershed (Butte Creek). Distinct or unique findings that are not discussed in Section 4.1 above are highlighted.

4.2.1 Channel Dynamics and Sediment Transport

Seven projects were reviewed in this project category. Project activities associated with these projects included gravel enhancements, stream channel reconstruction, stream habitat enhancement, floodplain reconstruction, revegetation, and elimination of instream gravel pits primarily to counteract historical declines in salmon populations, but also to restore channel dynamics, riparian habitat, and stream ecosystem function. Post-project monitoring is continuing on most projects. Success on these projects is difficult to measure. Salmon numbers and smolt survival are affected by many confounding factors, and funding for monitoring is seldom sufficient to address them. Salmon numbers are inherently variable, so a longer-term monitoring perspective is necessary. Furthermore, most of these projects focused on a small area of the river. Because salmon numbers at the project sites are affected by conditions downstream and

outside the project area, the absence of measured improvement may not reflect directly the effects of the project.

Several key findings from these projects, and lessons for future channel dynamics and sediment transport projects, are described below.

- **Stream riffle uniformity is not desirable when adding gravel or reconstructing a stream channel**. Subsequent projects are adding in-channel "bumps" to create flow and depth variability in riffles.
- **The source of gravel for replenishment appears to make a difference in restoration.** However, this was not an opinion universally held by the project proponents interviewed.
- **Low intragravel oxygen levels are affected by groundwater upwelling, and may be detrimental to egg survival.** While the addition of coarse gravel is pivotal to restoring spawning habitat, it was also suggested that fine sediment deposition in the gravel may also play an important role in the rate of egg survival.
- **Weed control is important for floodplain revegetation.** It is recommended that future projects either incorporate a weeding crew or use other weed control methods when trying to establish multistory plantings.

4.2.2 Shallow-Water Tidal and Marsh Habitat

Five projects were reviewed in this project category. Project activities ranged from research to develop conceptual models for shallow marsh and subtidal wetland restoration to actual restoration design, engineering, and implementation.

A number of important findings were noted about expectations and processes with shallow marsh and subtidal restoration.

- **Restoration rates are significantly longer (decades to centuries) for the Delta Region compared to the Bay Region.** Restoration rates depend largely on the degree of subsidence and the geomorphology of the region. Some of the breached shallow marsh sites in the Delta Region had subsided up to 6 meters during the time

they were leveed, and lower subsidence seems to be the major factor in accelerated restoration in the Bay area. The slow restoration rates discovered in Delta sites with significant subsidence has prompted the need to consider other strategies to accelerate the restoration process, or to decide not to attempt restoration of heavily subsided areas.

- **The numbers and species of fish collected in Bay and Delta wetlands are dramatically different.** While introduced species dominated the Delta shallow marsh sites that were monitored, native species dominated the Bay Region.
- **Native tule marsh vegetation will rapidly colonize emerging intertidal elevations.** However, these sites subsequently will be dominated by submerged and floating aquatic vegetation, including introduced species such as water hyacinth and *Egeria*.

4.2.3 Restoration of Multiple Habitats

Five projects for restoration of multiple habitats were reviewed. These consisted of four acquisition and restoration projects on the Sacramento River administered by TNC's Sacramento River Project and one acquisition project on the Cosumnes River administered by TNC's Cosumnes River Project. The five projects focused primarily on riparian lands adjacent to the Cosumnes and Sacramento Rivers. Representatives from all five projects indicated that they have focused on understanding how riparian restoration works, making it cost-effective, and scaling up from the parcel level to river subreaches. This learning process has been primarily through trial and error, although components of adaptive management such as hydrologic models and baseline monitoring have been incorporated over time.

Key findings from these projects include those below.

- **Partnering with local landowners, stakeholders, and agencies adds critical value to long-term project success.** In Hamilton City on the Sacramento River, local landowners provided valuable input and verification to hydrologic models that will assist the city with flood control and riparian and stream channel restoration efforts. Both the Cosumnes and Sacramento River projects have worked closely with research institutions, such as UC Davis, UC Berkeley, and California State University, Chico,

as well as the Point Reyes Bird Observatory. Collaboration with the Bureau of Land Management (BLM) on the Cosumnes project, and with the U.S. Fish and Wildlife Service (USFWS) on the Sacramento River project has been productive. Both projects are strengthening ties with the USACE in conjunction with the Comprehensive Study to enhance opportunities for flood control and ecosystem restoration in the region.

- **Making restoration cost effective.** A large factor in the Sacramento River project's success has been a reduction in the cost of restoration. When the project began restoration work, costs were as high as $50,000/acre to replant and restore riparian vegetation. They have reduced those costs to approximately $3,000/acre through contracting restoration activities with farmers and local nurseries (spawning a cottage restoration industry in the region), and by having a strong understanding of the abiotic and biotic site conditions (for example, the types of species that can be supported often depend on the level of the groundwater table).
- **Indirect and direct benefits to salmonids have been observed.** TNC's Sacramento River and Cosumnes River projects both observed direct benefits to salmon habitat attributable to their projects, such as salmon redds in areas where riprap was recently removed. Indirect benefits from riparian acquisition and restoration observed include increased shaded riverine aquatic habitat, increased juvenile floodplain rearing habitat, and reduced pesticide drift from agriculture from retiring orchards in riparian habitat adjacent to the Sacramento River.
- **Threat from exotics and undesirable species is one of the primary concerns for river restoration.** For example, black rats were found to have significant predation effects on nesting bird eggs throughout riparian forests. Restoration sites can be particular vulnerable to exotic invasions during construction, planting, or removing old buildings because exotics often invade disturbed ground. Inattention to understory revegetation can also lead to a weedy plant community.

4.2.4 Butte Creek

The watershed approach taken in Butte Creek to remove fish barriers and build screens on large diversions through a collaborative stakeholder process has been very successful. Ten projects located in the Butte Creek system were examined. Included were overview interviews of individuals with regional knowledge of the system, such as Paul Ward, DFG, who is responsible for collecting data on the watershed's fish populations; Dave Ceppos, Jones & Stokes, facilitator for the stakeholder driven process; and John Icanberry, USFWS and regional Habitat Restoration Coordinator. These "regional experts" were included both because they were involved in ERP-funded projects in Butte Creek and because they had a unique perspective on the projects in Butte Creek as a whole, rather than on an individual project basis.

Two common threads were present throughout all of the project reviews for the Butte Creek region: (1) the commitment of proponents and stakeholders to the collaborative process and (2) the belief that the fish passage and screen structures were directly responsible for the rebounding native salmonid populations in the region. Specific findings from the reviews include those below.

- **Native species habitat created and restored.** Projects in the region have had numerous direct and indirect benefits to salmonid and native species habitat and passage. The Western Canal Water District Butte Creek Fish Passage Improvement Project successfully removed four dams (two Western Canal dams, McPherrin Dam, and McGowan Dam). Removing these dams improved access to approximately 20 miles of salmonid habitat.
- **Recovery of salmonids linked to projects.** There is a mix of anecdotal and actual data indicating that fish passage structures and screens are directly responsible for strong return runs of adult salmonids. Nearly everyone interviewed agreed that removing dams and building screens and ladders have helped population recovery in recent years. Nearly all cited the runs of fewer than 500 spring-run chinook in the late 1980s and early 1990s and the recent record runs of up to 20,000 fish. However, one interviewee admonished fish biologists to consider other factors besides

population numbers, stating, "[Restoration] has been so successful that the return runs have exceeded the carrying capacity of the creek."

- **Agreement by diverse stakeholders in a complex system.** The fact that so many stakeholders came to agreement on a complex and collaborative process is a significant achievement in itself. Achieving buy-in from local landowners and duck clubs was crucial to the success of the projects as well as continuing work in the region. Butte Creek now has a strong watershed group in place with a process to address future issues as they arise. The imminent threat of listing spring-run chinook and the real example of Glenn-Colusa Irrigation District (GCID) being shut down in the early 1990s for listed salmon take helped convene stakeholders for Butte Creek**.**
- **Weaknesses of the collaborative process.** The primary weakness of collaboration stated by the proponents was the length of time involved in the process and the real and perceived differences in power among stakeholders. The wielding of regulatory power by agencies, even after months of collaborative work, was mentioned several times during interviews. The length of time involved in collaboration can put a strain on stakeholders that may not have the funds or time to participate that extensively. Nevertheless, participants mentioned they had not lost any stakeholders in the process and came to mutually agreeable solutions and agreements.
- **Protection of agricultural land.** At the Western Canal Water District, water delivery to 30,000 acres is now more reliable as a result of the project. Upstream of the Western Canal Water District, Adams Dam Fish Screen and Ladder project did not result in the loss of any agricultural land. In general, landowners and water users in the region realized that they could improve their operations and water delivery while helping native fish. This complementary economic and wildlife benefit has been crucial to success in the region.
- **Innovative solutions for wildlife and agriculture.** Increased water availability for rice farming and decreased burning have helped the floodplain rearing of native fish as well as ducks. One unexpected result from work in the Butte Creek region was related to the Giusti Weir and Weir No. 1, which originally were slated to be modified for passage as part of the Sutter Bypass West Side Project. The estimated

cost of renovation was $3 million, which was nearly the same as the value of the property to which the weirs delivered water. The landowners were able to sell a portion of their water rights by shifting one-third of their property to dry land agriculture (wheat and safflower). The remaining water allowed the ranchers to farm two-thirds of their property in irrigated row crops. In exchange for selling the water rights, the two diversions could be removed to improve fish passage.

4.3 Online Survey Results

Several interesting results were returned from the online survey sent to 75 project proponents (22 respondents for a 29% response). These responses tended to complement many of the results of the detailed project interviews. Highlights of these answers are summarized here, and a more detailed accounting of responses is in Appendix F.

As shown in the interviews, project proponents had many contractual problems with CALFED (61% of respondents), whereas permitting, financial, and limited staff resources garnered only 8% of answers on project impediments. It is not too surprising that 59% of the respondents said their projects had minor scope changes since the project was awarded because nearly all of those interviewed mentioned small changes during the life of the projects they managed. Impediments largely delayed the project schedule (72%). Results related to how much proponents have shared technical information were mixed—39% saying they had shared some data, 26% said they shared extensively, 22% very little, and 13% not at all.

Forty-six percent of respondents said they had developed a conceptual model; 21% added a specific experimental design, and 18% developed both a model and design. Fourteen percent said they had not developed a conceptual model. Curiously, those that had some sort of experimental design or conceptual model came from a range of years (1998–2001), although conventional wisdom suggests that more-recently-funded projects are more likely to have components of adaptive management and older project likely to have little or no adaptive management. Those that answered “no” to the same question, i.e., they had no components of adaptive management, came from the same range of years (1998–2001).

With regard to monitoring, results from the survey were mixed. Eighteen percent of the respondents (4/22) indicated that pre- and post-project monitoring and comparisons have been undertaken (Appendix F, question 8), with 4% responding that comparisons have already been made and 14% stating that comparisons have been undertaken, but the data have not yet been analyzed. Overall, however; only 23% said that comparisons "cannot or will not be made," indicating that only a few projects are not carrying out monitoring. About the same number of respondents (24%) indicated that no performance measures had been established to judge the success of the project (Appendix F, question 9). However, an additional 19% said performance measures had been established but are not being measured. Although the data are not conclusive, it can be conjectured that a significant number of projects (at least 19% and possibly as high as 50%) are not monitoring at all. This could be attributable to a number of factors, including lack of monitoring expertise or insufficient funds to conduct monitoring. It is recommended that further analysis on monitoring by project be included during Phase 3 of the evaluation to ascertain how many projects are conducting monitoring, at what scale the monitoring is being undertaken, and what factors are limiting monitoring in those projects not carrying it out.

Most projects had produced some kind of literature or given a presentation, with only 13% responding they had done neither. Thirty-five percent, the highest response in this category, had made informal presentations. Peer-reviewed literature garnered only 4%. A total of 233 papers and presentations have been given by 22 respondents.

Survey respondents were asked to identify the acreage and corresponding habitat type affected by the project. Their answers yielded some very interesting results, with the most indicating riparian riverine aquatic habitat (12 times) and the next highest number indicating wildlife-friendly agriculture (nine times). Results indicated that 6,183 acres of riparian habitat were being affected; 20,450 acres of agricultural land were being affected by wildlife-friendly practices; and 10,510 acres of seasonal wetlands were being affected. This type of question would likely yield useful results for the program if asked about all projects.

Scores averaged 7.5 out of 10 for people's satisfaction with CALFED. Importantly, seven respondents (out of 13 with National Fish and Wildlife Federation (NFWF) as project administrator) gave enthusiastic kudos to NFWF's administration of projects, although specific comments on each contract administrator were not solicited in the survey instrument. One respondent (of two with USFWS as project administrator) gave similar positive comments about USFWS.

5.0 CONSISTENCY WITH THE STRATEGIC PLAN FOR ECOSYSTEM RESTORATION

One of the key objectives of the ERP Projects Evaluation is to assess the extent to which the restoration projects funded are consistent with the goals, objectives, and overall guidance of the Strategic Plan. One of the cornerstones of the Strategic Plan, as well as the CALFED Bay-Delta Program as a whole, is its commitment to adaptive management.

Results from Phase 2 of the Projects Evaluation that provide insight into the degree to which the current program and the restoration projects it has funded are meeting the overall goals and direction of the Strategic Plan follow. Specific recommendations for modifying the program to be more consistent with the Strategic Plan are presented in Section 6 of this report. It should be emphasized that the information below, as well as that in Section 6, is based on a broad overview of all the funded projects and a limited number of detailed project reviews. A more complete and accurate assessment should be available during Phase 3 of the evaluation.

5.1 ERP Goals and Objectives

The Strategic Plan and ERPP identify a set of six broad goals and associated objectives for the program. Many of the ERP projects were selected and funded prior to the establishment of these goals, which were not formally finalized until the ROD was signed in 2000. Beginning in 1998, project applicants were required to identify the specific ERP goals that their proposed project was intended to address. For the purposes of the ERP Projects Evaluation, goals and objectives also were assigned to all projects funded between 1995 and 1997. Figure 5.1 displays the percentage of funded projects that address each of the six ERP goals. Because many projects address more than one ERP goal, the percentages shown in Figure 5.1 total more than 100%.

The vast majority of ERP projects address Goal 1, At-Risk Species. However, a large percentage of the projects also address Goal 2—Ecological Processes, and Goal 4—Habitats. A

much smaller percentage of the funded projects address Goal 3—Harvestable Species and Goal 5—Nonnative Invasive Species.

5.2 Adaptive Management

The CALFED Bay-Delta Program as a whole has committed to adaptive management as a basic tenet of implementation. The ROD for the program states that the program will pursue a "as a central feature, science-based adaptive management." The Strategic Plan establishes adaptive management as the primary tool for achieving ERP objectives.

The Strategic Plan recognizes three basic types of adaptive management—(1) trial and error, (2) passive adaptive management, and (3) active adaptive management—and acknowledges that all three types may play a role in implementing the ERP. The Strategic Plan also provides a detailed framework for active adaptive management in the context of ecosystem restoration (commonly referred to as the Healey diagram). This framework suggests this six-step process:

1. define the problem;
2. select goals and objectives;
3. prepare conceptual models;
4. initiate restoration actions;
5. monitor; and
6. assess, evaluate, and adapt.

Numerous feedback loops are suggested in the framework (see Figure 5.2) as well as several decision nodes. The Healey adaptive management diagram also suggests three distinct types of implementation actions: (1) targeted research; (2) pilot restoration; and (3) full-scale restoration. The first two types of actions are intended specifically as learning stages to be conducted before the third action, which presumably involves a much larger commitment of resources.

One of the key questions investigated in the ERP Projects Evaluation was, "To what degree are ERP-funded projects applying principles of adaptive management?" This question was explored both in the programmatic review and in the detailed project interviews.

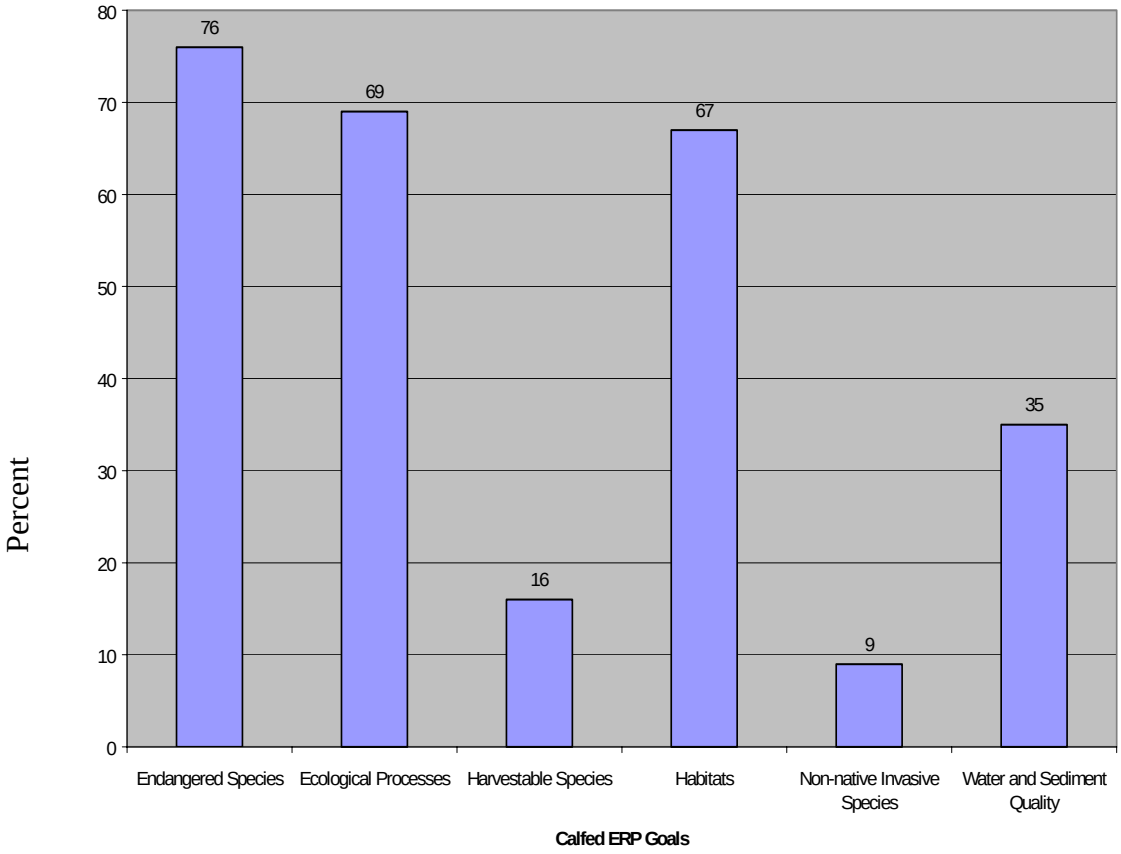

Figure 5.1. Distribution of ERP Projects According to Strategic Plan Goals

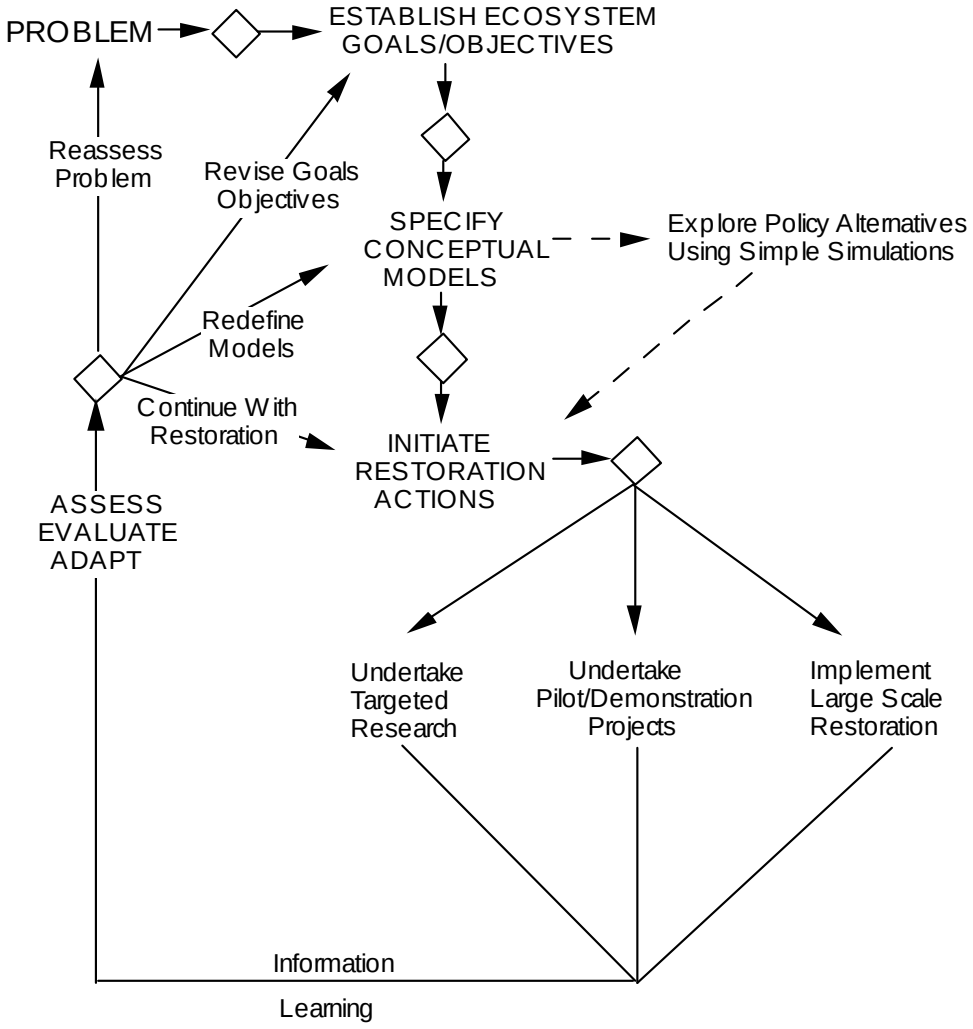

Figure 5.2. Adaptive Management Framework for the ERP (Strategic Plan for Ecosystem Restoration)

5.2.1 Program Level Investments

At the broad program level review, it was not possible to assess the degree to which individual projects are engaging all the specific steps in the Healey diagram. However, it was possible to categorize the restoration actions according to the three distinct types identified in the Healey diagram (targeted research, pilot/demonstration projects, large-scale restoration) and examine how funding has been distributed among these categories. Approximately 50% of the funding through 2001 has been earmarked for physical restoration actions, including research. The distribution of that 50% across the three different types of actions is shown in Table 5.1.

Table 5.1. Investment in Specific Types of Restoration Actions

Stage of Adaptive Management Process	Type of Project	% of Restoration Actions
Initiate restoration actions	Research-oriented	25
	Pilot or demonstration	35
	Full-scale restoration	40

These results suggest that there has been a relatively even distribution of funding across the three types of restoration actions. It further indicates that there should be things that can be learned from the actions that could benefit all three types of actions, particularly in terms of information from research and pilot projects that could be used to inform full-scale restoration projects.

5.2.2 Project-Level Findings

Many of the individual projects reviewed included component steps of adaptive management, such as conceptual models, hypothesis testing, and monitoring. However, almost none of the projects reviewed had put all of the boxes and arrows together in a deliberate adaptive management design. Many projects completed only the first steps of the adaptive management process: defining the problem and selecting goals and objectives (see Figure 5.2). Others exhibited simple cause-and-effect conceptual models; while the proponents stated the relationships, they did not identify them as conceptual models.

Projects at either end of the adaptive management spectrum arose during the detailed review. For instance, TNC Sacramento River Project provides one example where a good faith effort has occurred to incorporate adaptive management. The project has defined problems, established ecosystem goals and objectives, and begun to develop conceptual models. The models have focused on geomorphic and hydrologic systems and have been tested by researchers and verified by stakeholders. Hypotheses gradually have been refined and narrowed as the proponents begin to understand the system. TNC has moved from pilot-level restoration to consideration of subreaches and the entire ecosystem. It also appears that this project has

reached a point where they have begun to assess and evaluate their models and problem definition based on what they have learned.

Another notable exception exists on Lower Butte Creek. In general, the project proponents have not done any adaptive management but are planning to test whether screening additional small diversions is worth the restoration investment. In this region there are approximately 40 small diversions (about 5 cfs), which would cost approximately $2.4 million to screen. The potential benefits to endangered salmonids such as spring-run chinook and steelhead of screening small diversions are largely unknown and have been questioned recently by members of the ERP Independent Science Board. As a result, Ducks Unlimited, Inc., plans to prepare a memorandum of agreement among all stakeholders regarding development of a fisheries management plan that would include components of adaptive management to carry out the test.

Other projects carried out individual steps of the adaptive management process during implementation, particularly with habitat and species monitoring plans and conceptual models. The Hamilton Wetlands project has developed conceptual models and is required by the USACE to develop an adaptive management plan for the project. Cosumnes River project is developing conceptual models and has completed baseline monitoring in the acquired parcels for the Cosumnes Start-Up Stewardship and Restoration project. Project proponents from both Hamilton Wetlands and Cosumnes River acknowledge they are planning on fully incorporating additional adaptive management steps during future project activities.

Probably the most common type of adaptive management observed during the project reviews was trial-and-error learning. Many of the project proponents have adjusted their practices based on what they have seen and learned since beginning the project. Such adjustments have been primarily management actions rather than any purposive response to an articulated conceptual model and thus represent random acts more than planned steps. Several reasons that there appears to be only a limited application of adaptive management are presented and discussed in Section 4 of this report.

6.0 RECOMMENDATIONS

The primary goal of Phase 2 was to test and refine methods that could be employed in Phase 3 of the Projects Evaluation, which will be a more comprehensive review of ERP-funded projects. The process of reviewing information, talking to project proponents, and exploring various tools provided a considerable amount of insight, not only into the projects that have been funded by the ERP and the specific tools that may be useful for evaluating these projects, but also into the ERP program itself. As a result, a number of areas have been identified where actions could be taken to improve the overall program, enhance project tracking, and facilitate future performance evaluations. In fact, the notion of Phase 3 has changed somewhat from a very focused, one-point-in-time review and analysis, to more of a strategy for developing and engaging a structured framework for ongoing, continuous review at multiple levels.

Regardless of the specific methods used to compile data for future reviews, results of Phase 2 clearly point to the need for a well-defined set of performance indicators. The lack of agreed-upon indicators and an overall framework for evaluation makes it difficult to assess performance. Ultimately, the initial development of appropriate, applicable, and reasonable indicators is an iterative process of: (1) evaluating available data; (2) identifying how those data can be used; (3) identifying additional data that may be needed to round out the analysis; and (4) identifying effective means to obtain those data. In many ways, the analysis and results presented in this report represent the beginnings of that iterative process.

Recommendations are organized below into two broad categories, (1) recommendations for improving the program, and (2) recommendations for carrying out Phase 3. In both cases, general recommendations are followed by more specific suggestions, including identification of specific tools and techniques for implementing a given recommendation. In so doing, the goal is to provide recommendations that are broadly applicable to the wide thematic and geographic scope of the program yet practical enough to be useful.

6.1 Recommendations for Improving the Program

Five overarching themes applicable to the ERP program as a whole arose during the course of conducting Phase 2 of the Projects Evaluation. All five themes are closely interrelated, and in all cases they relate to further defining the roles and responsibilities of the ERP versus what can be expected of project proponents.

1. **Invest more in post-selection activities.** The ERP has expended, and continues to expend, considerable resources on the project-selection side of the equation, including extensive work in preparing the PSPs and implementation plans, and in organizing technical peer reviews of proposed projects. An equal amount of energy is needed to track, assist, and assess projects once they have been funded. Examples of possible post-selection activities could include technical and compliance assistance, science reviews, coaching, and facilitating information exchange. Results from the project interviews and from the web survey indicate that project proponents would welcome more communication with CALFED staff and that the projects would benefit from both compliance and technical assistance.
2. **Take a more active role in developing conceptual models and defining projects.** The ERP has relied largely on the PSP process and project applicants to define the suite of ERP-funded projects and the conceptual models associated with these projects. The project selection process, as guided by the ERPP, Strategic Plan, and ultimately the Stage 1 Implementation Plan, functions as a gatekeeper, ensuring that projects are funded that address the goals and objectives of the program. However, this process is still somewhat reactive, with the ERP responding to, rather than defining, what is submitted. This approach puts considerable burden on the project applicants, particularly in terms of defining conceptual models and how their project fits in to the whole. It also places additional burden on the program and the selection process. On the front end (project selection), it forces the program to knit together a coherent strategy based on a set of somewhat random projects. On the back end (project evaluation), it forces the program to assimilate a wide range of conceptual models, monitoring data, and in the case of 2002 projects, performance indicators, which may be inconsistent from project to project. A more effective, and efficient, strategy would be to take a proactive role in establishing broad, systemwide and/or regional

conceptual models, establishing some standards for monitoring and performance evaluations, and designing projects to fit uncertainties in the models, test assumptions, and reduce key stressors or threats in the system. The Draft Stage 1 Implementation Plan and efforts to move the ERP toward a more directed action program are consistent with this proactive model.

3. **Establish stronger linkages among planning, implementation, research, monitoring, and assessments.** The ERP has funded a fairly broad spectrum of projects ranging from planning and implementation to monitoring and research. What the ERP has not done is effectively link these various projects together to create a whole that is greater than the sum of its parts. For example, the Strategic Plan defines a series of six steps for implementing adaptive management. Many of the ERP projects funded embody one or more of these steps, but none of the projects reviewed during Phase 2 had effectively integrated all six steps into the project. It may be appropriate to view an individual project in terms of how well and how efficiently it addresses a specific need; at the program level, however, projects should be viewed within a broader framework, so that program managers can use what is learned to influence program direction.
4. **Improve contracting and permitting**. Problems with contracting and permitting were almost universally mentioned during the Phase 2 interviews as well as in the web survey responses. On one end of the scale, these can be viewed as minor administrative problems. On the other end, concern and frustration associated with the contracting and permitting processes can seriously erode the potential of the program. These are very important implementation issues that influence project and program success. Several actions for improving contracting and project administration are suggested below.
5. **Refine project selection.** The program should make a more focused effort to solicit and select projects that help move the program toward fulfilling the ERP goals, objectives, and milestones. The information from this and future Project Evaluation efforts, and the work being done to evaluate progress on achieving the restoration milestones, should be used to refine annual implementation plans and should be explicitly included in selection criteria for future solicitations.

In addition to these broad, overarching recommendations, the following detailed recommendations and tools are suggested.

- **Standardize reporting requirements and create an online format for reporting.** The ERP made a significant step forward in this regard with the 2002 PSP process and the mandatory electronic submittal requirements. Additional standardized electronic submittals or online forms should be developed and used. Standardized electronic reporting would greatly enhance project tracking and future evaluations. Specific steps in the process to consider for reporting include:
  - PSP submittal—consider the value of requesting additional information, such as specific habitat types and acreage that might aid the selection process, and milestones addressed.
  - Contracting—consider collecting information on specific parameters of the project, including indicators. Different forms may be required for different types of projects.
  - Quarterly Reports—standardize information so that quarterly "roll-ups" could be developed across projects.
  - Closeout—consider a closeout form that would provide a record of items such as project deliverables, measures of success, and lessons learned.
- **Develop a focused outreach program.** This might include email updates, an online newsletter, an online help desk, project site visits, regional conferences or forums, and other mechanisms for promoting communication and information exchange between the CALFED program and the project proponents.
- **Develop and enforce contract requirements**. Contract requirements could be developed to facilitate compliance with reporting requirements and deliverables submission.
- **Centralize contracting.** Having contracts administered by multiple entities complicates the contracting process and exacerbates issues related to data reporting consistency and data availability. While centralization would not solve all the contracting difficulties, it likely would aid future project evaluations and the ability to implement standardized reporting.

- **Update all project contact information**. Updating the contact information would help communications and future phases of review.
- **Require more rigorous adaptive management review at the project workplan stage.** Once a project is selected, there may be an opportunity to conduct a review of the proposed conceptual model, monitoring, and other aspects of an adaptive management project. Such a review could serve as an information-gathering tool as well as an opportunity to augment a project to enhance its value to the program. It could also serve as an education/training opportunity for project proponents and an opportunity to ensure that monitoring activities are adequately addressed and funded.
- **Provide environmental compliance and permitting advice.** Many project proponents are not familiar with various environmental compliance and permitting requirements. Efforts to advise these proponents could lessen permit delays.

6.2 Phase 3 Recommendations

There are three overarching recommendations for carrying out Phase 3:

1. **Utilize multiple methods for project review.** Throughout Phase 2 it was found that the richest and most accurate information was derived using interviews in various formats and the survey. Combining this with targeted evaluation and learning workshops will likely yield high quality results that are relatively cost-effective to collect. Multiple methods also will yield results accessible to a wider audience because some prefer quantitative data to qualitative data, and vice versa.
2. **Develop a continuous learning and review strategy.** This concept is noted in Chapter 2 of the Strategic Plan. Continuous review will be necessary not only because of the sheer size of the program and number of projects being implemented, but because new information will become available over time as old projects are completed and new ones initiated. Continuous learning and review fulfills the program's goal to feed information into the loops of adaptive management in order to achieve the long-term goals of restoration.
3. **Finalize and implement a multilevel framework for measuring performance.** The ERP has not yet adopted a framework or set of indicators for evaluating performance at

the program, project, and ecosystem levels. Information gained through Phase 2 of the Projects Evaluation should be helpful in advancing this agenda. Ultimately, some form of performance-indicator framework will be essential for conducting future evaluations. Any performance-indicator framework for the ERP should be developed in conjunction with others working on this issue including The Bay Institute, the ERP Independent Science Board, and others. Figure 6.1 shows a conceptual indicator framework that may be useful for categorizing and organizing indicators at the different political, administrative, and biological levels in which ERP operates.

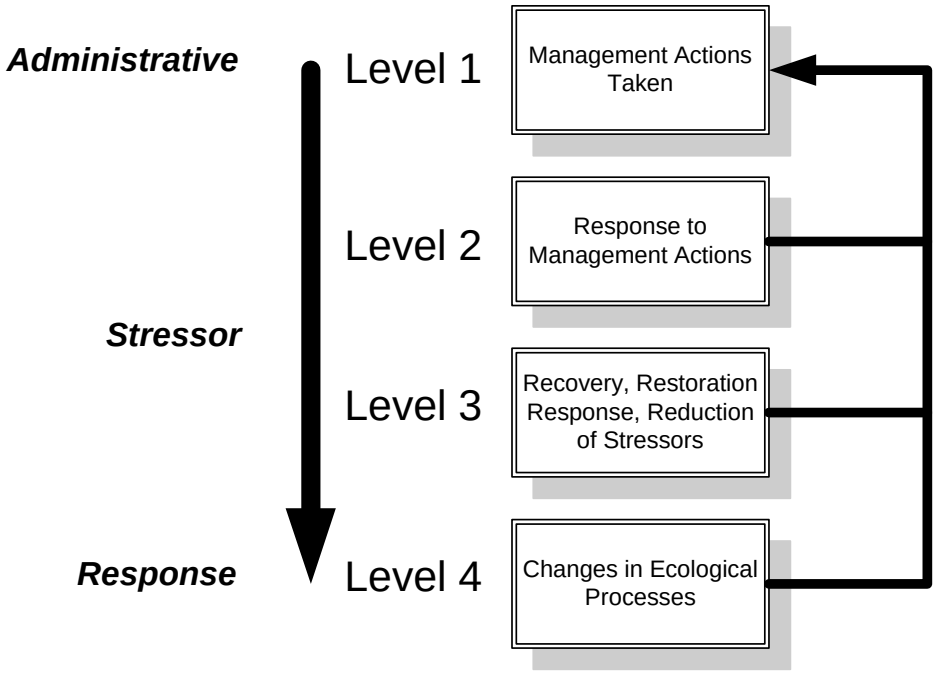

Figure 6.1. Hierarchy of Indicators Used to Evaluate the Effectiveness of Actions from Management to Ecosystem Response
(Modified from Yoder and Rankin. 2002. Comments and observation on indicator development and use: The need for adequate monitoring and assessment design and indicator discipline. Midwest Biodiversity Institute and Center for Applied Bioassessment and Biocriteria.)

In addition to these broad, overarching recommendations, the following detailed recommendations and tools are suggested:

- **Initiate focused workshops and other similar forums as a means of collecting project data and evaluating projects**. This represents a potentially cost-effective

approach that would allow data collection while simultaneously promoting information exchange and learning. Workshops could be organized along regional or topical lines. Regional workshops could be set up to extend over more than one day, with various tracks of interest to CALFED and proponents. These tracks could include: science and adaptive management; administration and contracting; regulatory compliance and permitting; data gathering for CALFED Project Evaluation (Phase III); and opportunities for project proponents to interact.

- **Use standardized reporting, monitoring and workplan development tools to test the program, project, and ecosystem measures of success.** Phase 2 has developed a baseline of data as well as a methodology for continuing into Phase 3. Once standardized monitoring protocols are established across projects, proponents should be required to submit response data on a yearly basis. This will be easiest to do through multiple methods, using online tools, workshops, and surveys and interviews.
- **Initiate collection of actual programmatic indicators.** Collecting data on actual project accomplishments, as opposed to proposed activities collected in Phase 2, will be critical for determining what the ERP has actually completed. This work will need to be achieved either through interviews, online surveys, or modified reporting requirements. Using conferences and workshops to evaluate project and their biological response may be an additional cost-effective means to develop and collect such data.
- **Collect biological response and project evaluation data through the 2003 Science Conference poster session.** The poster session from the Science Conference will provide an opportunity to begin collecting data on biological response and project activity that can be further refined at subsequent CALFED related conferences. This could follow a three-pronged approach, including (1) collect general project information; (2) provide quantitative and standardized biological response data; and (3) synthesize and report overall results. It may be possible to group similar posters and hold short evaluation sessions during the conference, combining survey, interview, and group evaluation to collect additional data. Following up this work at

both the CALFED Science and State of the Estuary Conferences would continuously refine this method.

- **Determine and verify actual degree of completion for all ERP projects.** An initial step toward collecting information about project completions could be accomplished quickly through an analysis of project reports for all ongoing projects. Some follow-up for unknown projects may need to be completed by phone. This effort would tie into the overall program evaluation and would provide an administrative indicator of success.
- **Use a stepwise or continuous approach to detailed project reviews.** It will be virtually impossible to conduct detailed reviews of all ERP projects in a short period of time. However, if the program sets an objective of conducting 15–30 reviews each year of completed projects, the reviews should be manageable. It is likely that workshops coupled with surveys could provide the most efficient means of data collection. However, interviews definitively produce the richest results, useful for reporting because they have quotes from proponents doing the work along with associated stakeholders. As a result, ERP should judiciously choose an appropriate number of projects to review each year in this manner.
- **Consider funding meta-analysis projects to measure cumulative project ecosystem impacts**. A combination of applied research and project evaluation for an entire region may be necessary to sort out confounding factors and attribute project impacts to restoration and ecosystem success. This also may be an opportunity to encourage scientists and managers to work together in an adaptive management framework as well as determine fulfillment of Strategic Plan goals, objectives, and milestones. It also is an opportunity to test large-scale restoration or ecological actions in an active adaptive management setting as initiated by the March 2002 Adaptive Management Workshop.