

## Selection Panel Review Summary

**Proposal No.:** 017

**Proposal Title:** Evaluation of Floodplain Rearing and Migration in the Yolo Bypass

**Principal Investigator:** Ted Sommer

**Amount Requested:** \$878,020

**Recommended Amount:** \$878,020

**Summary:** This project would directly address restoration actions currently being considered to improve passage for upstream-migrating fish such as salmon and sturgeon, and by using telemetry to document specific areas in the Bypass that present passage barriers to adult Chinook salmon and sturgeon under different hydrological conditions. It also would collect information on juvenile salmon residence time and survival in the Bypass, again using telemetry. Specific thresholds (e.g., flow and inundation criteria) for enhanced lower trophic productivity have not yet been identified in the Bypass. The proposed study would analyze an existing 12-year database (collected as part of an ongoing monitoring program in the Bypass conducted by biologists at CDWR) to identify these thresholds. In addition, the proposed work would collect new data on chlorophyll, and densities of zooplankton and drift invertebrates in summer and fall months, as these months are not represented in the current long-term dataset.

More precise information on environmental factors favoring rearing habitat and survival for native fishes in the Yolo Bypass is needed in order to develop performance criteria for management. This project will collect new data and analyze existing data to fill this information gap. Finally, one of the components of this project will evaluate the use of sulfur isotopes as a chemical “fingerprint” of floodplain use on otoliths. If successful, this tool would allow broad-scale, retrospective analyses on all fish species of interest to evaluate use of the Yolo Bypass, as well as determine age and growth during floodplain residency. Such analyses would open the door for analysis of the role of the Bypass within the life history of native fishes, and could continue to be used in order to evaluate influence of the Bypass under different hydrologic conditions and changing management scenarios.

**Assessment:** The Selection Panel found this project to be well written and well coordinated, leveraging lots of existing information and building upon past research in the Yolo Bypass. It also has relevance to BDCP and would inform implementation actions under OCAP. The proposal would fill knowledge gaps with regard to juvenile and adult stranding. If they are able to pick up a distinct isotopic signature for time spent in the Bypass by fish, then it will be a very useful tool. The project is cost effective for the amount of work it is proposing to do. The Selection Panel expressed some concern about the collection of data in years when the Bypass does not flood and wondered if the study wasn't too ambitious. Primary criticisms are that there is a lack of detail and analysis within the task descriptions and adult migration information may not be that valuable.

**CALFED Ecosystem Restoration Program  
External Scientific Review Form**

**Proposal Number:** 017

**Proposal Title:** Evaluation of floodplain rearing and migration in Yolo bypass

**Reviewer:** #1

**Conflict of Interest Statements:**

I have no financial interest in this proposal (please mark correct response).

- Correct  
~~- Incorrect~~

**General Review Questions:**

Along with your written observations in response to the questions below, please rate each using the following criteria:

- Excellent: Outstanding in all respects
- Very Good: High quality in nearly all aspects
- Good: Quality work, but with some deficiencies
- Fair: Lacking in one or more critical aspects
- Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The proposal addresses the needs of several species of concern primarily Chinook salmon and a major habitat type that has suffered at the hands of man for a long time, namely floodplains in the bay delta system. The project is designed to enhance restoration and facilitate monitoring of key species in their habitats over the long term. It is well designed to address ERP goals.

Rating: **Very Good.**

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The approaches for task one, two, and four are best described, adequate, and well documented, but those of tasks three and five are a bit vague. For task three, the details of how

existing data will be evaluated do not describe a statistical model that is easy to visualize or comment on. “Least squares regression ... more complex models ...” is not convincing. For task five, how will productivity versus standing crop be evaluated. Turnover rates are not included in discussion. Growth and survival rates can estimate secondary productivity of fishes, but not of lower tropic levels. To be more convincing the justifications for assertions in tasks three and five need better development. For the most part, objectives can be met and will contribute greatly to our knowledge. The section on tag testing and assumptions appears to be intentionally uninformative – are new tags at or below the maximum acceptable limits based on a percentage of the weight of individuals intended for use? In addition the description of evaluating substrate and depth selection based on six monitoring stations across the I-80 overpass is overly optimistic and probably will face critiques of pseudo-replication and inadequate data.

Rating: **Very Good.**

3. **Feasibility.** Is the proposed project’s approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

The project is based on broad experience in recent work by the PIs in the study area and with similar locations or species. Everything is technically feasible and there appear to be no access or permitting hurdles. Everything should be doable in the two-year timeframe of funding.

Rating: **Excellent.**

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

This is adequately addressed under part two of section 6. The proposed work will address habitat availability and use by species of concern under four scenarios and in a testable manner.

Rating: **Very Good.**

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project’s goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

The lead PI is involved in oversight of all aspects of the study and has a record of accomplishments evidenced by extensive scientific publications from prior studies in the system. Yet he is only funded in this proposal at the rate of about one hour per week each in Tasks 3 and

5 (and there is no evidence of matching funding or other involvement in this or related projects). Nevertheless, based on a history of success, it appears highly likely that he will ensure timely submission of quarterly and annual reports, and that he will ensure a synthesis of project elements. The Co-PIs are also well published and undoubtedly able to carry through with their parts of the project. Thus it appears that the work outlined will be published and contribute to the knowledge base needed to foster sound management of the Yolo Bypass.

Rating: **Very Good.**

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

Telemetry, genetic, and stable isotope components will provide new knowledge and further the primary literature in a general way as well as foster the understanding and management of the Yolo Bypass. The PIs are well connected with management agencies that can use the new information.

Rating: **Excellent.**

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

The proposal builds on past work, but addresses new questions and fills information gaps. Thus I do not view it as duplicative in any real sense.

Rating: **Very Good.**

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The team is strong and there is evidence in the literature cited section of broad experience in the system and with the species and analyses to indicate a high expectation of success. The qualifications of several participants in Task 5 are lacking in Section 9 of the proposal—this is also the weakest task in the proposal.

Rating: **Excellent.**

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

Costs seem reasonable for all tasks.

Rating: **Very Good.**

**Additional comments:**

The proposal suffers from poor editing and proof reading. Material seems to be missing in a few places. In the last paragraph of Task 3, the second sentence makes no apparent sense. Table 1 is mislabeled as Table 2 on page 10 and another Table 2 is presented on page 15.

**Overall Evaluation Summary Rating**

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: **Above Average** (with 3 sections scored as Excellent, 6 sections scored as Very Good).

Please provide a brief explanation of your summary rating:

Most of the task descriptions lack full details of methods and analyses that would be expected in a superior proposal and in some cases the omissions are too obvious to overlook.

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**CALFED Ecosystem Restoration Program**

**External Scientific Review Form**

**Proposal Number:** 017

**Proposal Title:** Evaluation of Floodplain Rearing and Migration in the Yolo Bypass

**Reviewer:** #2

**Conflict of Interest Statements:**

I have no financial interest in this proposal (please mark correct response).

- Correct

~~-Incorrect~~

## General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

Excellent: Outstanding in all respects

Very Good: High quality in nearly all aspects

Good: Quality work, but with some deficiencies

Fair: Lacking in one or more critical aspects

Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The problem and opportunity addressed and all the objectives are succinctly stated and internally consistent. While the Yolo Bypass perhaps “acts like a giant ‘fish trap’ for salmon and sturgeon en route to spawning areas in on the upper Sacramento River because they are drawn into the floodplain’s perennial channels following late fall or early winter flows with no exit from the Bypass at its upstream extent”, despite this “consensus” there does not appear to be a plethora of strong evidence of the magnitude and significance of this likely phenomenon. This uncertainty alone argues for the validity and need of research to test this hypothesis.

Although inferences of results from the adult salmon and sturgeon passage component may be considered somewhat limited to the Yolo Bypass, the objectives of the juvenile salmon residence time and survival, and particularly the 10-yr salmon data review and synthesis, will contribute significantly to the broader application of floodplain restoration and rehabilitation throughout the Delta. Similarly, floodplain attributes that support native fishes will be an important expansion of our knowledge base about what and how floodplain structure and dynamics enhance their occurrence, growth and survival. The test of the feasibility of  $\delta^{34}\text{S}$  as a fingerprint of floodplain occupancy is logically developed and, while perhaps tenuous for a variety of reasons, is definitely worth the investment.

Overall, the rationale for the need to more thoroughly investigate the benefits of the Yolo Bypass floodplain to native fishes—especially Chinook salmon, green sturgeon, delta smelt, splittail, Sacramento pikeminnow—and fill recognized information gaps is even perhaps understated. While there may be some arguments that echo “Don’t we already know enough about the Bypass?,” the proposed study has the potential to provide strong guidance to decision makers about the feasibility and benefit of floodplain restoration/rehabilitation elsewhere in the Delta, and important (“design”) features that could guide optimal implementation.

Rating: Excellent

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the

objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The approach to the question of adult fish passage into, within and without the Bypass is effectively framed by the DRERIP floodplain conceptual model with viable alternatives. However, both the information gaps addressed by the proposed research and the interactions among those research tasks could have been more specifically referenced to the various drivers, interfaces, links, and outcomes, as well as their concordant importance, understanding and predictability in the model. In the absence of some definitive illustration about where the various proposed tasks fit (in the model), you get the feeling that several of the tasks are somewhat ‘untethered’ adjuncts that really don’t address a critical information gap.

Rating: Very Good

3. **Feasibility.** Is the proposed project’s approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

The proposed approaches to all components are valid and in most cases based on well-established research findings. The one component that seems most speculative and unverified is the use of  $\delta^{34}\text{S}$  as a “fingerprint” of the Bypass (Task 4). The rationale is poorly developed or substantiated, at least certainly not at the level provided for the other tasks. For instance, if the sulfate in the water is supposed to have “a uniquely light sulfur isotopic composition ( $^{34}\text{S}/^{32}\text{S}$ ) reflective of a difference in the base of the food web”, why not demonstrate that assertion with tables and figures? There is no data illustrating the difference, e.g., how “light” is “light”? It’s already likely to be light because it is above the reach of salinity intrusion, so what is going to discriminate  $^{34}\text{S}/^{32}\text{S}$  at the scale of within and outside the Bypass? What evidence is there that the  $\delta^{34}\text{S}$  of POM, algae and primary producers upstream and outside the Bypass are significantly different, and particularly as represented in primary consumers that are prey for these fishes? This study component is very vague and unconvincing compared to the other, much better formulated components; there are tremendous lot of “if’s” and “could’s” in the description of how  $\delta^{34}\text{S}$  will be used, that indicate that it is much more an exploration than a dependable approach. It is unclear how “reconstruct floodplain habitat use” (different Bypass habitats?) will be determined? There is no mixing model description to explain how inputs from the Sacramento/American rivers will be distinguished or apportioned in comparison to Bypass inputs and those from the western drainages (i.e., Knights Landing Ridge Cut, Cache Creek, Willow Slough Bypass and Putah Creek).

In comparison, study designs and techniques for the other tasks are relatively well thought out and based on proven methodologies. The historical salmon data analysis (Task 3) is straightforward and should be very productive.

The adult telemetry using coded ultrasonic beacons (Task 1.1) should adequately address the task objectives. However, it is unclear how two of the questions—Are there specific areas of the floodplain where there is evidence of increased mortality or holding behavior? Do migratory fish move into areas of maximum flow and use this as a cue to migrate upriver?—are going to be

interpreted without complementary sampling of potential mortality or stressors contributing toward mortality, water quality parameters, or water flow rates?

The juvenile telemetry study (Task 1.2) should be equally powerful, especially because it will presumably be able to use the same array of ultrasonic beacon array to track Chinook smolt movement, residence, etc. through the Bypass. However, this application will be unfortunately confined to large fish and preclude any information on smaller subyearling salmon that may derive the greater benefit from occupying the Bypass. Although much more complicated in terms of detection capabilities, investment in a PIT tagging component would enable a much more complete population/life history spectra assessment of the scope, magnitude and variation of benefit to the salmon ESU passing through the Bypass.

The food web studies (Task 5) are laudable and important, but perhaps their ability to deliver conclusive answers about the general patterns in zooplankton, and drift invertebrate species, how they are affected by different environmental conditions, and whether specific thresholds can be identified for flow, magnitude, and duration of inundation for enhanced lower trophic productivity is uncertain. The historic sampling design was not specifically organized to answer those questions; data mining has its limitations. In addition, the sampling protocol may not be the most sensitive approach to characterizing the production dynamic of the prey resource base for even juvenile Chinook salmon, much less the other, more generalist feeders. Sommer *et al.* (2001) document that dipteran pupae and adults (and the literature would suggest that it was likely that these adults were emergent forms) were the most prominent prey items in the Bypass (during 1998-1999); the quantitative production trends of aquatic dipterans is more accurately sampled by benthic sampling. In addition to filling some of the seasonal gaps in that information, the PIs might also consider a benthic sampling series that is specifically designed toward those questions.

The Chinook salmon run identification (Task 2.1) may be one of the more valuable components in this proposal and certainly feasible and worth the somewhat hefty investment. Given this investment, the PIs should make certain that catch numbers WILL allow complete sampling across the collection sites and particularly over the course of the season in the Yolo Bypass in order to capture all the variability in ESU, population and life history diversity over space and time. This reviewer is unfamiliar with the genomic and physiological indicators of thermal stress but the preferred techniques appear to be supported by the peer-reviewed literature.

Rating: Good

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

Opperman's (2008) DRERIP floodplain conceptual model is obviously the most appropriate and applicable to this study, especially as expanded by the PIs to include upstream fish passage.

Rating: Excellent

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance



measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

Although it is presented as an objective for development of (management, restoration) performance criteria, no explicit performance evaluation plan is described in the proposal.

Rating: Poor

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

The level of projected products—peer-reviewed scientific journal publications and conference presentations, as well as quarterly reports, are reasonable. No mention is made of academic products, in terms of graduate student theses, seminars, and inclusion of emerging project reports in classes.

Rating: Good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

The proposed research is founded on an exceedingly fine and ground-breaking history of research in and around the Yolo Bypass since 1998. Specifically, the teams involved in tasks 3 and 5 will be synthesizing the work that they have been primarily responsible for over that time. They (particularly T. Sommer) have published prominently on fish use in the Yolo Bypass and benefits thereof ; Sommer alone has been lead author on nine peer-reviewed scientific journals. The proposed research compliments and extends this early work, rather than duplicates it.

Rating: Excellent

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The PIs are eminently qualified and have extensive experience either in prior Bypass fish and food web investigations (Sommer) or in the methods to be utilized for this study.

Rating: Very Good

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

Given how much field work and extensive laboratory processing is involved, the budget is reasonable. It is encouraging to see the graduate student involvement in Task 1 (UCD) but a bit disappointing that it isn't included in other UCD components (Task 2) or UCSC affiliation (Task 4).

Rating: Excellent

**Additional comments:**

One of this reviewer's few concerns with the proposed research is the lack of any description about how the results of the divergent component projects (tasks) will be coordinated, integrated and synthesized. This is the sort of interdisciplinary research that, rather than a bunch of independent investigators just plugging their respective holes in our understanding of the way that the Yolo Bypass "works", they truly integrate their study with the past data, assemble workshops to consider how the Bypass is perhaps different from the DRERIP floodplain conceptual model, and what recommendations should be made to managers about designing, locating and implementing the next generation of floodplain restoration and enhancement?

**Overall Evaluation Summary Rating**

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Superior

Please provide a brief explanation of your summary rating: Despite a few uncertainties in the approaches and methodologies in several of the tasks, and a departure from an explicit performance evaluation plan, the proposed research will be exceedingly valuable in filling major knowledge gaps that can (especially with a bit more attention paid to causal mechanisms, e.g., producing stress, affecting fish growth and residence time) be applied to future restoration and

management of lowland, delta floodplain ecosystems. If I were to make a suggestion relative to effort and funding emphasis, it would be to use a fraction of the funding and effort allocated for Task 4 (Isotope Studies) and use that to acquire and process a few, strategic samples to indeed verify that the Yolo Bypass has a significantly distinguishable  $\delta^{34}\text{S}$  signature, and reallocate that funding toward both the Task 1.2 juvenile salmon telemetry (e.g., fund initial PIT tag study) and Task 5 food web studies (benthic sampling). If the Isotope Studies prove to be successful, then considerably more funding should be allocated to it in a supplemental proposal.

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## **CALFED Ecosystem Restoration Program External Scientific Review Form**

**Proposal Number:** 017

**Proposal Title:** Evaluation of Floodplain Rearing and Migration in the Yolo Bypass

**Reviewer:** #3

### **Conflict of Interest Statements:**

I have no financial interest in this proposal (please mark correct response).

- Correct X
- Incorrect

### **General Review Questions:**

Along with your written observations in response to the questions below, please rate each using the following criteria:

- Excellent: Outstanding in all respects
- Very Good: High quality in nearly all aspects
- Good: Quality work, but with some deficiencies
- Fair: Lacking in one or more critical aspects
- Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The issue of floodplain rearing of native anadromous fish in the Yolo Bypass has been prominent over many decades. The benefits and hazards of fish rearing or migrating through the Yolo Bypass have been debatable due to a lack of comprehensive data. This proposal will provide helpful information to assist in guiding future actions in the bypass and is clearly linked to ERP goals. However, the real benefit from the research would be primarily derived from

conducting studies when the bypass floods. The proposal indicates that the studies would be conducted even if the bypass does not flood, but those benefits are arguable.

Rating: Very Good

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The study approach is multifaceted using a multi-disciplinary approach and is composed of significantly different tasks focused on different aspects of flood plain rearing and fish migration. The proposal has organized an impressive list of investigators which, collectively, will attempt to acquire critical data on an extremely complex component of the northern Delta ecosystem. Using different techniques, the proposal is ambitious in an attempt to answer a wide array of questions of potential benefits ranging in growth and survival of downstream-migrating juvenile fish to hazards for upstream migrating adult fish. Each approach for the different study tasks has a strong basis in established science. In particular, the study tasks focused on genetics, fish physiology, and use of isotopes for evaluating fish population-wide usage of the bypass will be particularly valuable, but only if the studies are performed when the bypass is flooding. Evaluation of which race of salmon utilizes the bypass will be of limited value due to the fact that utilization is solely controlled by the timing of bypass flooding and the seasonal presence of the various salmon races in the lower river system is already well known. The use of telemetry to study the migration of adult fish is a well-established technique to evaluate the movements and behavior of fish. However, the problem of blockage of adult fish at Fremont Weir has been well known for decades and this study component appears unnecessary because projects are already planned to fix adult fish passage at the weir. The juvenile telemetry study component has substantial merit, but only if it is conducted when the bypass is flooding.

Rating: Good

3. **Feasibility.** Is the proposed project's approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

Most elements of the proposal are technically feasible but are highly dependent on the timing and magnitude of bypass flooding at the time of the study. Although the study purports to have significant benefits if conducted without flooding of the bypass during the study period, that assumption is highly questionable.

Acquisition of permits was addressed in the proposal. Access to the study areas apparently will not be an issue because the lands are state-owned or accessible by public waterways. Timely issuance of state and federal fish sampling permits may be an issue. Historically, issuance of federal Section 10 permits can take considerable time. However, due to prior work

sponsored by the Interagency Ecological Program, both state and federal permitting may be expedited but is not assured.

Rating: Good

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

The proposal does not provide or describe a conceptual model unique to the proposal, but instead, relies on the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) floodplain conceptual model. The study proposal plans to provide information to evaluate assumptions in the DRERIP model and reduce uncertainties about many of the linkages in the model. The juvenile fish rearing aspects of the proposal are likely to yield valuable information to improve the DRERIP model. In particular, the food web dynamics and juvenile rearing and survival components of the proposal will improve the DRERIP conceptual model, but only if the study is conducted under flooding conditions in the bypass. The relative importance of adult fish passage study components for the conceptual model is likely to be low due to the fact that the problem with adult fish passage at the Fremont Weir has already been well known for decades (it is not a hypothesis) and there are already plans to fix fish passage at the weir.

Rating: Very Good

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

The proposal does not explicitly describe performance measures to measure success of achieve the project's goals and objectives other than generally developing reports on the projects activities and publication of results. Without a clear description of performance measures, there is no assurance that resulting publication of study results will adequately describe how well the study achieved evaluation of the study hypotheses. Although it is reasonable to assume the researchers will do so, it is not explicit in the proposal and more detail could have been provided. In addition to journal publications which may not be sufficiently comprehensive, the study should also be required to produce a comprehensive final technical report on all aspects of the study, including all hypotheses, data, analyses, results, and conclusions. Quarterly and annual reports of study activities, data summaries, and presentations at conferences are not sufficiently detailed in this latter regard. A comprehensive final technical report (which apparently is not proposed) would be most valuable for guiding future studies and restoration projects.

Rating: Good

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

Most components of the study are likely to yield valuable information to guide ecosystem restoration efforts for floodplains, but only if the study is conducted under bypass flooding conditions. The adult telemetry component is unlikely to yield useful information because the upstream migration blockage at Freemont Weir is already well known and there are plans to correct the problem. The evaluation of the use of sulfur isotopes may prove to be invaluable for assessing population-wide usage of the floodplain, but only if the study is conducted under floodplain-inundation conditions. The use of telemetry to evaluate juvenile fish migration through the bypass may provide useful information, but will likely require more receivers than contemplated in the proposal. This latter situation is due to the wide, shallow expanses of the bypass under flooded conditions and the resultant difficulty in ensuring sufficient telemetry coverage. Additionally, the juvenile telemetry component of the proposal does not address the likely problem of misinterpreting telemetry data between those tagged juvenile fish consumed by a predator and true live smolts. The food web dynamics component of the proposal is also likely to yield useful information, but only if it is conducted under bypass flooded conditions. The task of analyzing historical salmon data will be valuable, but it seems this task should have been conducted under the original programs where those data sets were collected, not in a new study proposal. The value of evaluating thermal stress of adult salmonids in the bypass does not provide as much value as other study components (e.g., juvenile rearing) because it is already known that warmer water conditions are generally present in the bypass compared to the river during the fall months (and therefore fish will be more stressed in the bypass) and the fish passage problem at Freemont Weir is intended to be rectified. Results of the study would be best provided through a comprehensive final technical report (which apparently is not proposed).

Rating: Good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

The proposal's work will continue and expand prior work on evaluating floodplain rearing of juvenile fish in the bypass. The study will be a significantly important extension of past research in the bypass, building on prior knowledge acquired from those studies. Evaluation of historical salmon data may either be duplication of other studies, or may be more appropriately analyzed under those studies where the original data were developed.

Rating: Excellent

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The principal investigators for this study have a proven track record of expertise required for the study. Each individual is highly knowledgeable of the government and academic programs evaluating the Yolo Bypass, the biology of the fish species under study, the river system, the necessary field and laboratory techniques, and has ready access to the infrastructure to perform the study.

Rating: Excellent

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

The costs associated with the study appear reasonable, but the primary study benefits would be derived only if the study is performed under conditions when the Yolo Bypass is flooded. If the study is conducted under non-flooded conditions, the costs would be excessive and the benefits derived from the results would be low.

Rating: Very Good

**Additional comments:**

It's recommended that most components of the study be conducted only under floodplain-inundation periods which create those environmental conditions of most importance.

**Overall Evaluation Summary Rating**

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Above Average

Please provide a brief explanation of your summary rating:

Evaluation of floodplain rearing of juvenile fish in the Yolo Bypass during flooded conditions is highly important for guiding future ecosystem restoration efforts. Although use of juvenile fish in the floodplain has been known for many decades, the relative importance to the overall populations is still unknown. On a small time scale, juvenile fish may have a higher growth rate and apparent higher survival compared to those fish remaining in the mainstem Sacramento River. Conversely, enormous numbers of juvenile fish may become stranded in the Yolo Bypass during receding flood waters. This proposal will help answer questions and uncertainties of the relative importance of the flooded bypass for juvenile rearing. The proposal builds upon past research in the bypass. However, the primary value of the research will only be derived if the study is conducted during the periods when the bypass is flooded and should be a requirement of the study. Evaluation of adult fish movements and stress in the bypass is unlikely to provide useful information because the problem is already well known and there are plans to fix the problems at Freemont Weir. In this latter instance, there is a risk that conducting the adult telemetry component of the proposal may delay fixing Freemont Weir under the auspices of waiting for the study results.