Selection Panel Review Summary

Proposal No.: 010
Proposal Title: Battle Creek Stream Condition Monitoring for Adaptive Management
Principle Investigator: Sharon Paquin-Gilmore
Amount Requested: $445,225.00
Recommended Amount: $0

Summary: Project proponents hope to continue status and trends monitoring using protocols from previous studies conducted in 2001-2002. Three years of monitoring would be conducted and compared to earlier work.

Assessment: Battle Creek Watershed is an important watershed, where a great amount of work has been done. However, the Selection Panel found that the proposal did not meet the stated priorities in the PSP. In their review, the Panel recognized that some type of monitoring of the Battle Creek watershed is necessary, but that work in the proposal does not advance past studies and it doesn't synthesize prior data. Hypothesis and assumptions need to be measured to assess differences over the decade in light of modifications to the Battle Creek Watershed, yet this was not contained in the proposal. The Panel indicated that the applicant and their subcontractor have a sound performance record.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 010

Proposal Title: Battle Creek Stream Condition Monitoring for Adaptive Management

Reviewer: #1

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:

Although the overall goals of the project were clear (assess habitat and macroinvertebrates for threatened and endangered salmon and steelhead in the upper Battle Creek watershed), the problem was not clearly stated. Based on reading the proposal, it appears as though a Restoration Project is ongoing to address mainly fish passage problems related to a hydropower dam, but neither the location of this dam/project nor the nature of the degradation (flow, passage?) were ever stated. In addition, the proposal suggested that the Battle Creek hatchery weir was also an impediment, but only to fall and late fall Chinook salmon, perhaps because the weir is not in operation when spring and winter Chinook are ascending, but this was not explained. Likewise, the proposal suggests that fish population monitoring will occur as part of the Restoration Project, but there is no explanation about who or what these activities will entail. ***Overall, I found it difficult to understand how the goals of this proposal interacted with those of the Restoration Project, and whether they are complementary.***

Rating**: Fair**

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:

As I understood the proposal, the proponents will measure **habitat** at 10 sites throughout the upper Battle Creek watershed every year, and at 10 additional sites each year, for a total of 50 sites monitored over four years. However, field work will apparently be conducted only three years (2011-2013), so it was unclear whether only 40 sites would be measured. In additional, **macroinvertebrate kick samples** will be conducted at all 50 sites each year, and a version of the RIVPACS sampling protocol will be used to assess these assemblages compared to reference assemblages. RIVPACS has apparently been developed for the region by Hawkins et al. (2001), but this reference was not included in the References listed (although a grey literature publication by Hawkins 2003 was). ***In all, the support for using the RIVPACS method could not be assessed by a reviewer who is from another region and based on primary literature that is readily accessible. Lacking accessible primary literature, more information would have been needed to make this assessment.***

With regard to **stream habitat,** the proposal indicates that habitat was measured during 2001-2002 (for two years?), and 2006 (stated once, but not again), ***but there was not information about what these surveys entailed, or the basic findings***. The RIVPACS protocol was again used, and the components measured were listed, but there was no specific information about how these components would be measured. Again, since outside reviewers lack access to the publications defining these protocols, it would have been important to list them in a table, assuming space allowed this.

The habitat components listed are certainly important to salmon and steelhead, and measure key stream habitat features such as number of pools for adult spawners and juveniles rearing in the stream, large woody debris for cover, stream substrate and its embeddedness for spawning, and riparian canopy cover. **Riparian cover** is important not only for stream shading, but because recent research shows that about half of the invertebrates that make up stream salmonid diets and annual energy budgets come directly from the riparian zone as terrestrial invertebrates (see Baxter et al. 2005, Fausch et al. 2010 for reviews). ***Thus, future habitat assessments should consider more carefully this direct input of terrestrial invertebrates, and the riparian habitat that supports it, as key components.***

Overall, the **analysis of the data collected** appeared inadequately described. The stated goals were to measure the current status, the change since 2001-2002 (trends), and the interannual variability (i.e., apparently to help determine whether the change since 2001-2002 is statistically significant and biologically important). Thus, the analysis for each site would apparently be based on 4 data points, the early one (2001-2002), and three years of new data (2011-2013). The estimate of variance based on three years of new data is important, but suffers from a small sample size. Likewise, it was unclear what statistical design or test would be used, and whether this would be conducted with the site as the experimental unit (i.e., among all 50 sites), or with each year within site as the unit. ***Overall, more information would be required to judge whether the sampling design is adequate to answer the questions posed, and whether appropriate statistical techniques would be used.***

Rating: **Poor**

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 components that are proposed to be measured are clearly important to salmon and steelhead in the Battle Creek watershed, the scale at which the work is proposed is ideal (i.e., probabilistic sampling throughout the whole watershed), and the work is technically feasible. However, the approach is not fully documented (see above), and the way in which the data measured and the results obtained from the analysis will be used to assess habitat was not explained. For example, what criteria would be used for assessing bed substrate needed for spawning, and what actions would this trigger if criteria were not met?

   Rating: **Fair**

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 proponents indicate that they will test the null hypothesis that there have been no changes in site or watershed conditions over time. However, as described above, for each site this would be based on four data points, and it was unclear specifically how these data would be analyzed to test this hypothesis. Help of good statistician in setting up a multi-level design, which considers appropriate fixed and random effects (e.g., site, time), would be necessary to achieve this goal. Overall, it was a bit unclear to me, as described above, how the metrics measured would be used to assess ecosystem condition, although this might be explained in the RIVPACS protocol. Nevertheless, it would have been ideal to explain the basics about how this protocol will be used, what outcomes would be generated, and how they will be used to make decisions about watershed management.

   Rating: **Fair**

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 work itself appears to measure the performance of habitat restoration in the watershed, but I found not discussion of how performance of this project will be evaluated. It was unclear how the results of this project would be used in future restoration efforts, except that, if well

conducted, monitoring data on habitat and biota (macroinvertebrates in this case), are extremely valuable for assessing change in response to management and restoration.

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:

As stated just above, if well conducted, monitoring data on habitat and biota (macroinvertebrates in this case), are extremely valuable for assessing change in response to management and restoration. However, without more details about how components of habitat will be measured and analyzed, it was difficult to assess whether these data would be of the highest quality or not.

Rating: **Fair**

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 project follows on habitat measurements made 5-10 years ago, although the number of sites and times measured was unclear. The work apparently does not duplicate previous efforts, but instead makes good use of these earlier data, if the work and analysis are well done.

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:

Both the proponent and the selected subcontractor have apparently been working in this watershed on these issues for about a decade, and so are familiar with the main issues and contacts. However, judging from the proposal, it is unclear whether the proponents have the expertise to adequately design a study and analyze the data collected in an appropriate way. Because the analysis was not adequately described, and appears inadequate, more information would be needed to judge this.

Rating: **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:

It is usual in proposals to provide a detailed justification for the budget proposed. Thus, the total budget ($445K) seems appropriate for the field work, lab work, and analysis proposed, but I would have liked to see a breakdown of how various large sums of funds would be spent (e.g., $225,000 for measuring habitat, $82,500 for bugs, $59,250 for analysis).

Rating: **Good**

Additional comments:

None.

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: **Inadequate**

Please provide a brief explanation of your summary rating:

The work proposed is clearly important for measuring components of habitat that will be needed to support wild salmon and steelhead, and the macroinvertebrates that indicate habitat quality and form part of the diet for rearing juveniles. However, lacking more complete information, it is unclear whether the protocol proposed would generate high-quality data about these components. Most importantly, it is unclear whether the statistical analysis, which was not described adequately, could answer the questions posed, and how the information generated would be used to alter current management. In addition, it was unclear how the project proposed interacts with, and presumably complements, the Restoration Plan for salmon and steelhead in this watershed. Additional care in designing the sampling and analysis could be applied so that the half million dollars requested here could answer the important questions posed about habitat conditions for these fish in this important watershed.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 010

Proposal Title: Battle Creek Stream Condition Monitoring for Adaptive Management

Reviewer: #2

Conflict of Interest Statements:

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

- Correct Correct; I have no conflict.
- 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 link to ERP goals is clear. The goals and objectives are clearly stated and internally consistent, but no distinction is made between goals and objectives, if this matters. What is proposed is really just "status and trends" monitoring. Some formal hypothesis tests are described, but these just whether statistically significant changes have occurred.

According to the proposal (p. 5):

> The effectiveness of the Restoration Project will be determined largely by tracking trends in fish population levels. Understanding fish population trends and restoration effectiveness will only be fully explainable through consideration of possible changes in the watershed's productive capacity as indicated by a time series of stream condition indicators. Separating the fish response caused by the Restoration Project and background trends in fish habitat has been an effort that Battle Creek Watershed Conservancy has developed over the last 10 years through an initial watershed assessment and subsequent stream condition monitoring program that effectively tracks the status and trends of fish bearing streams throughout the watershed.

Trying to distinguish the effects of the restoration project from other changes is a worthy effort, but the proposed monitoring seems unlikely to allow for it. Doing this would require an experimental approach, in which some parts of the watershed were assigned to treatments and others were left alone, say in a BACI design.

In the absence of an experimental approach, much can still be learned by monitoring to test the ideas that went into designing the project; that is, to formulate the ideas as hypotheses. From my point of view, no scientifically significant hypotheses are proposed. Nor are such hypotheses described in the referenced Adaptive Management Plan (Terraqua 2004). Instead, there are "hypotheses" such as the following from the Adaptive Management Plan, Table 20: "

> Implementation of facilities modifications specified in the description of the Restoration Project, implementation of the Facilities Monitoring Plan, and implementation of any adaptive responses affecting instream flows or hydroelectric project facilities, will ensure that variations in flow regimes, following forced or scheduled outages where the available diversion flow has been released to the natural stream channel, do not strand salmon and steelhead or isolate them from their habitat when diversions are resumed

Various "uncertainties" are also identified, but these are mostly banal, such as: "Will fry and juvenile production be improved by increased spawning success and egg survival?"

Rating**:** Fair

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 is not clearly described in the proposal itself, but it is in Ward et al. (2008), which is cited. The probabilistic sampling plan seems up-to-date for status and trends monitoring; this is a major strength of the proposal. The sampling methods seem appropriate, but I am not really competent to assess the invertebrate sampling. The major weakness is the poor link to adaptive management.

   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:

   The project is certainly feasible and has a high probability of being completed as planned.

   Rating: Very 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 itself lacks a conceptual model, apart from a life cycle figure annotated with lists of the usual suspects for things to think about. As far as I can tell, the main hypothesis for the restoration project that the proposed project would monitor is that that the restoration project will work as expected.

   Rating: Poor

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 is intended to evaluate to develop data with which the Battle Creek restoration program can be evaluated. As noted above, it is really just status and trends monitoring, and does not seem to be guided by identified hypotheses.

   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:

   The monitoring results should be valuable, but will be less valuable than the results of hypothesis-based monitoring.

   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 project is part of an ongoing project.

   Rating: 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 project team seems well qualified to do the work proposed.

   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:

   I am not really competent to judge this, but as far as I can tell the budget is reasonable.

   Rating: Very good

Additional comments:

Reading the proposal and related documents (Terraqua 2004 and Ward et al. 2008), I am impressed by the attempt to pour the old wine of agency thinking about streams into the new bottle of adaptive management. This does not improve the wine. Thus, much of Terraqua (2004) is an argument that what the agencies were doing anyway satisfied the recommendations in Healey (2001). I do not believe that it did. To the extent that I can discover a main hypothesis in the documents, it is that the restoration program will work the way its designers think it will. Thus, according to Terraqual (2004:39): "The intent of the MOU Parties was to spend, if necessary, the limited funds available for Adaptive Management on implementing specific remedies to unforeseen short-comings in the Restoration Project, rather than committing these funds to experimentation for goals other than those specific to the Restoration Project." At p. 42, Terraqua (2004) asserts that, "The nature of adaptive management, by definition, is to design studies and management programs that can be adapted to uncertain or unforeseen circumstances." This is wide of the mark. The basic idea of adaptive management is to recognize that all environmental management is experimental, because we don't understand all that well how nature works, and to try to make the experiments informative. Adaptive management is not something to be tacked on at the end with the limited funds available.

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: Adequate

Please provide a brief explanation of your summary rating:

As status and trends monitoring, the project is well designed and the investigators are competent of execute it. Very likely the monitoring will be informative, but mainly for identifying questions. A much better job could be done of identifying the assumptions underlying the restoration plan and designing monitoring that would allow the assumptions to be evaluated.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 010

Proposal Title: Battle Creek Stream Condition Monitoring for Adaptive Management

Reviewer: #3

Conflict of Interest Statements:

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

X - 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 identifies an approach to measure benthic macroinvertebrate communities and selected physical channel characteristics to address goals related to restoration of salmon and steelhead populations in the Battle Creek basin. The proposed focus on invertebrates and major habitat characteristics is valid and would contribute to better understanding the responses of fish populations within the Battle Creek network. This assumes that other monitoring efforts are adequately monitoring trends in abundance and distribution of focal species (Chinook salmon and steelhead trout), native fish communities, and essential physical and environmental variables.

Goal statements are not differentiated from statements of objectives. A list of objectives is presented as "goals and objectives". The objectives are clearly stated though somewhat overlapping and nested.

The proposal states that some of the goals and objectives will rely on formal hypothesis testing and others will not. I could not find any explicitly stated hypotheses in the proposal nor any explicit experimental design to test a hypothesis. The closest expression of a hypothesis was the statement that the null hypotheses would be no change in watershed or site condition over time (2002 through 2013), suggesting that the hypothesis would be a vague statement that watershed or site conditions changed over time. This is not a mechanistic hypothesis and there is no indication of testing for the effects of treatments and comparisons to reference systems. While this might be possible within the sampled sites through time, the proposal does not make this clear. The measurements are designed to identify trends but the proposal does not present a design to test clearly stated hypotheses that are more than simple indications of change or no change. Data mining may possibly identify relationships between physical factors and macroinvertebrates that are responsible for trends and possible recovery, but the proposal does not make the analytical design clear.

Rating: **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 proposal states that "Current and ongoing Restoration Project related monitoring is focused on water temperatures and fish population metrics (e.g. numbers of adults, juveniles, redds etc.) within the project area and not on fish habitat conditions. I would assume this is correct but it is a critical requirement that CALFED should confirm. .

The approach is builds on a proven system of habitat and macroinvertebrate assessment methods used in the western United States (AREMP RIVPACS) and a previously reviewed monitoring plan (SCMP). Protocols and measurements are appropriate , though I am surprised

that physical and riparian conditions will be monitored on only 20 of the 50 monitoring sites for macroinvertebrates. This assumes that the sampling of 10 fixed sites will be adequate to account for interannual variation in the four sets of 10 sites that will be sampled only once. This approach is likely to identify major differences in site characteristics and that may be satisfactory, but disturbances such as floods or extreme droughts could produce variation in within-site conditions between years that make interpretation difficult. A simplified set of habitat measurements (e.g., width-to-depth ratios, maximum pool depths, particle size, embeddedness, percent fine sediment, general canopy description, simple linear count of large wood) could be completed in less than two hours and would reinforce the annual measures of macroinvertebrates.

The sampling sites continue the sampling of sites from 2001-2002. I assume these sites were coordinated with other monitoring studies, especially fish community monitoring. I could not find a statement in the proposal that the sampling sites in this proposal would be coordinated in any way with related sampling of fish communities, water quality, channel characteristics, or riparian conditions. The importance of such coordination is self-evident and I assume is included in the design.

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 tasks identified in the proposal are based on standard monitoring protocols and the investigators have extensive experience with the approaches and the Battle Creek basin. The monitoring approach is highly feasible.

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:

One of the strengths of the proposed monitoring is that it builds on a series of previous efforts to develop a broad conceptual framework for monitoring ecological recovery in the Sacramento-San Joaquin River system, and more than a decade of planning and development of the Battle Creek Salmon and Steelhead Restoration Project. In that sense, it is extremely strong conceptually.

The proposal would be strengthened greatly by more explicit development of hypothesized or predicted relationships between physical/environmental variables and biotic responses. The only relationships identified in the proposal state that water quality can affect upstream migration, spawning and incubation, rearing and outmigration and that habitat quality and food and nutrient

availability can rearing. This is simply identifying elements of a broad conceptual model developed in the overall Battle Creek restoration Project. I am certain the investigators could provide more robust hypotheses of the responses of the biota (e.g., which taxa are likely to respond and why, which taxa will exhibit slow responses, which taxa will decline, which taxa exhibit high variability, which taxa are sensitive to flood events, which taxa are sensitive to drought, how these responses are related to restoration actions, how macroinvertebrate abundance and distribution are related to fish responses).

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 plan is a monitoring effort. In that sense it fulfills the performance requirement. If the performance measures are intended to include quality assurance and control, the proposal does not identify any QA/QC component. If such assessments are available based on prior or on-going measurements, the proposal should identify reports or publications that quantify the measurement variance and sources of error.

Rating: **Excellent** (but incomplete if QA/QC or evaluation of monitoring accuracy are required)

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 proposed monitoring builds on a well-established system of habitat and macroinvertebrate monitoring protocols. The data will be useful, are related to desired fish responses, and build on prior monitoring. Any integration and synthesis with other monitoring projects in Battle Creek will increase the value of these products greatly.

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:

This work builds on previous monitoring and would not be considered duplication.

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 investigators have extensive experience in monitoring stream habitat and aquatic biota. In addition, they have implemented monitoring projects in the basin previously and are well informed. They have good communication with agencies and private citizens

   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 budget is reasonable for a three-year monitoring program and analysis.

   Rating: Excellent

Additional comments:

None.

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:

The proposal is technically sound and the investigators are well qualified to implement the monitoring tasks. The weakness of the proposal is that is almost totally task oriented and descriptive. It does not synthesize any of the patterns observed in 2001-2002 and build on the synthesis. It does not develop mechanistic questions or hypotheses. Monitoring is not simply observation and description, and trend analysis does not have to wait until the end of the project. If the investigators predicted likely biotic and environmental trends and relationships, the monitoring results could be evaluated within that context on an on-going basis to inform other monitoring and recovery efforts within the Battle Creek basin.