Selection Panel Review Summary

Proposal No.: 011
Proposal Title: Management Tools for Landscape-Scale Restoration of Ecological Functions in the Delta
Principal Investigator: Alison Whipple
Amount Requested: $875,000
Recommended Amount: $875,000

Summary: This proposal seeks to develop a landscape-scale conceptual model of the historical Delta to identify landscape features remaining today with the idea that knowing how this earlier landscape supported various ecological functions will provide important information to achieve a better functioning Delta today.

Assessment: The Selection Panel found this to be a high quality proposal providing a context within which restoration efforts can be considered. The proposal satisfies identified needs in several planning processes including the Delta Plan. A strong technical panel has been assembled for the project. The concern was raised about whether there was sufficient water quality expertise on the Landscape Team.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 011

Proposal Title: Management Tools for Landscape-scale restoration of Ecological Functions in the Delta

Reviewer: #1

Conflict of Interest Statements:

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

- Correct

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 does an excellent job of explicitly addressing how the proposed research aligns with the ERP goals. The information generated from this proposed research would build on a very limited historical dataset and will increase our knowledge of how function links to habitat type (numerous ERP goals, clearly discussed with program directors).

   Rating: Excellent: Outstanding in all respects

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:

   Overall, the proposal describes a multi-layered project involving an interdisciplinary team of scientists. Despite the complexity of such an approach, the proposal does a thorough job of

explaining the methodology of the data collection, mapping, and model development. The one portion of this proposal that concerns me both for the lack of specifics in the proposal about assignment of ecological function metrics. This is a crucial portion of the proposal that should include more detail (like the example of tidal channels on page 10).

Rating: Very Good: High quality in nearly all aspects (except ecological functions).

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:

I think the project's proposed two-pronged approach is documented and completely feasible. Permits are already in place or easily obtained.

Rating: Very Good: High quality in nearly all aspects

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 detail contained in the section on the conceptual models is outstanding. I agree with the authors' assertion that conceptual models are enhanced by historical information; I find the incorporation of both historical data and landscape ecology to be a strength of this proposal. In addition, Figure 4 was an excellent illustration of the model.

Rating: Excellent: Outstanding in all respects

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 include a specific plan for project performance evaluation in great detail; money was devoted for project management Proposed performance measures will assess how well the project is functioning. One strength of this proposal is the ability of data generated from this project to inform future restoration projects as well as provide excellent outreach materials.

Rating: Very Good: High quality in nearly all aspects

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:

   Excellent outreach materials that will aid in generating support for restoration projects. I also think the visual representation of data as maps will be readily accessible forms of data summary.

   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:

   I do not see any issues with duplication of work previously conducted. In addition, it appears to build nicely on work previously (or simultaneously) funded by CALFED with knowledgeable local scientists in a range of fields.

   Rating: Very Good: High quality in nearly all aspects

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 proposed research team seems highly qualified to implement the proposed project. In addition, the facilities and project management team seem more than adequate to support the research.

   Rating: Very Good: High quality in nearly all aspects

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:

   Budget seems in line with work proposed and will support the required personnel and needed equipment.

   Rating: Very Good: High quality in nearly all aspects

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: Superior

Please provide a brief explanation of your summary rating:

Overall, I think this proposal is an outstanding proposal – well-written and thoroughly research making it a pleasure to review. The PIs have extensive local ecological experience, and will supplement that expertise with a panel of experts in different fields. My only concern is the vagueness of the "ecological function assignment" as discussed in several sections above. Assigning ecological function to different habitats is essential to the project, yet the exact methodology of doing so is vague throughout the proposal and will be subjective even through recognized experts will be involved. If the authors keep this in mind and provide more details, I still do feel as if invaluable information that can inform restoration for years to come will be developed from this project.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 011

Proposal Title: Management Tools for Landscape-Scale Restoration of Ecological Functions in the Delta

Reviewer: #2

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 clearly describes the problems addressed, goals, objectives, hypotheses, and links to ERP goals. The sections of the proposal that included these elements are Section 6.1 (Problem Statement, Project Goals and Objectives), and Section 6.6 (Relevance to the CALFED ERP). Additionally, the proposal includes a section on "Scientific and Restoration Design Questions Addressed". The proposal justifies the adoption of at least three novel and timely approaches to restoration planning.

First, the proposal makes a strong case for the need to address Delta restoration from a **landscape perspective**. Numerous sites are undergoing or are scheduled for restoration, but comprehensive analysis of how these individual site restorations will influence ecological functions on a landscape level has been lacking. A landscape approach to restoration has been advocated in the scientific and governmental literature for many years but rarely has been implemented because of the lack of coordinating networks of people, firms, and agencies involved in individual restoration projects. The CALFED Delta restoration program is one opportunity where such a coordinate network exists that would support sound landscape-scale restoration planning and assessment.

Second, the proposal also emphasizes the need for and value of **historical ecology studies** as a foundation for landscape restoration planning. This is again something rarely done in restoration practice but that can provide valuable insights into the underlying geomorphology and hydrology that led to the development of wetlands in the first place. Restoration efforts that consider historic conditions are likely to make better use of natural energies and create more permanent ecosystem features than those that do not. The authors correctly point out that these studies should not be used as a restoration template, because restoration to historical conditions is impossible, but rather as a guide to restoration planning.

Finally, the proposal makes the statement that restoration practitioners may have different visions of what a successful restoration would look like, something I have observed as well. To address this need the proposal puts forth a goal of using 3-D **graphical representations** of current, past, and restored future landscapes. This is something I have not seen in other restorations and that I think would be of great value during the planning and outreach stages of the project.

The authors appear to clearly understand the needs and goals of the ERP and the research described in this proposal follows directly from their work on the Delta Historical Ecology Study. The proposed research is interdisciplinary, collaborative, makes strong use of existing data, and target several ERP priorities listed in several cited documents.

A quibble I have regards the hypotheses (top of p. 6). The hypotheses stated are very obvious and cannot be "tested" using the approach outlined (or perhaps at all). It is clear that historically the Delta provided much more ecological value than today, and it is likely that there are opportunities to restore landscape scale function (they are already going on). Rather than state hypotheses that will be tested, for a project like this it is sufficient to list the main questions and goals that will be addressed.

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 outlined is logical, and involves four tasks: 1. Historical and contemporary landscape analysis; 2. Past and Present ecological function assessment; 3. Development of landscape models, metrics, and restoration principles; and 4. Communication and outreach. A Landscape Interpretation Team (LIT) comprised of expert scientists will participate in developing and evaluating ecological functions and metrics and restoration principles and target metrics. Broadly, the approach is GIS-based and draws from existing data, with expert opinion used to provide a scientific foundation for interpreting ecosystem function from remotely sensed data.

Perhaps because the LIT members were not directly involved in preparing the proposal, detail and scientific justification are lacking on several important steps identified in Tasks 1 and 2, the results from which are used to carry out Task 3. Specifically, more detail and justification is needed for these aspects of the proposed research:

a. "Common landscape metrics" (paragraph at the top of p. 10). These are all things that can be analyzed using GIS, but what is their relationship with "key ecological functions"? Scientific literature is needed to back up the value of these as indicators of ecosystem functions, which are often difficult to determine.
b. "key ecological functions" (1st sentence in Task 2, and elsewhere). These are listed as examples, but not as measures that will actually be determined using remotely sensed data. It is not clear which functions will be used in functional analyses of past, present, and restored future landscape. Also, it is not clear how or if these will be quantified or assigned relative importance values.
c. Relationship of habitats to physical drivers (last paragraph before Task 2). What "quantitative and qualitative" analyses will be performed to determine how habitats and mosaics are related to physical drivers (which are also not listed)? I assume this would mean hydrology primarily, but also perhaps salinity and sediment loading. It is vaguely stated how this subtask would be performed.

For an example of extrapolation of wetland function to a landscape scale see: Tiner RW 2005, Assessing cumulative loss of wetland functions in the Nanticoke river watershed using enhanced National Wetlands Inventory data, *Wetlands* 25(2):405-419.

An additional question is why the historical landscape analysis is included in this proposal. I would think this step had been completed in the currently funded historical ecology project.

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:

Given that the project is primarily an analysis of existing data, there are no institutional, weather, or other constraints applicable to on-the-ground projects. Equipment needs will also not limit the project because the project is primarily computer analysis. The schedule of meetings presented appears to be realistic and within the time frame of the three-year project. There appear to be sufficient personnel listed for the project, perhaps more than is necessary (see budget question). From a personnel, equipment, and management perspective the project therefore appears feasible.

Regarding the scale of the project: While it should be possible to obtain the professional opinions of LIT experts during the meetings allotted, their involvement is limited in both time and monetary investment. If the scientific basis for linking remotely sensed data to ecosystem function and physical drivers is not well-established (see question 2 response), then adequately justifying the approach used is likely is probably beyond what can be accomplished.

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 does not focus on one particular habitat type, but to a landscape of habitat types. Thus, a model of interconnections among ecosystem components is not applicable to the proposal per se. However, development of landscape conceptual models will be conducted in Task 3, based on the results of Task 2 and on DRERIP report habitat conceptual models. The "Conceptual Model" section of the proposal outlines how the proposed project fits into and supports the ERP planning process, and the summary presented in Fig. 4 clearly shows how each proposal task fits into the broader planning process.

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 include a performance evaluation plan that includes monitoring, perhaps because the project would not involve any actual restoration. The success of the project will be determined by the quality and impacts of deliverables and outreach efforts.

Rating: Not applicable.

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 potential value of the results of this project to restoration practitioners is high. The primary products of the research appear to be the results of Tasks 1-3 and 3-D visualizations of past and possible future-restored landscapes. These will be communicated to various parties via a report, presentations, and a website. By including time-series of images the visualizations will also convey seasonal variation in landscapes. Integrating past, present and future landscape information and communicating it through visual tools is likely to result in greater uniformity of visions for restoration targets among restoration practitioners and stakeholders, as well as communication of Delta ecology to the general public.

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 project builds on a current ERP project, the Delta Historical Ecology Study, conducted by the Aquatic Science Center in collaboration with the CA Dept of Fish and Game. The PI on this proposal research is also the PI on the historical study, making it highly likely that the proposed research will build successfully on existing data collected in the historical study. There appears to be no duplication of other work I am familiar with in the literature, although I am unfamiliar with other ongoing projects in the Delta.

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 Aquatic Sciences Center appears to be a highly qualified organization with plenty of resources for carrying out this project. They have a large team of scientists and technicians plus managers and outreach specialists. The PIs and other team members have extensive experience

in the San Francisco Bay-Delta region and have been involved in landscape mapping and development of large-scale restoration plans in the region. The PI has academic training and professional experience in historical ecology and has developed well-received for his work on visualizing landscape trajectories. The co-PI has considerable experience tidal marsh ecology of San Francisco Bay. The LIT expert team appears to have deep knowledge and experience applicable to Delta ecology and restoration. Importantly, the graphic artists for the visualization products of the project are talented and have experience in ecology and environmental biology.

One concern about the qualifications is that it is not clear what roles the different team members will play in carrying out the project. The "Qualifications" section does not outline their roles, and the project bios in the Appendix do not specify their roles. Task 5, Project Management, does not specify who will do what, and the personnel are not listed in the budget.

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:

The majority of the budget goes toward personnel salaries and benefits. As a university professor, I am accustomed to only a small proportion of principal investigator salaries coming from grants (e.g. 1 mo/yr). In this proposal it looks like the Sr Manager/Senior Scientist II would have 1/3 of their annual salary covered by this grant for 3 years, and more than that for another staff member. If this is normal for this type of grant I am fine with that.

I would have liked to see the team member names on the Budget or listed in the budget justification. I assume the first two lines are the PI and co-PI but that is not certain. It is not clear what role the other positions requested are.

It seems like more personnel are receiving salary than might be needed to accomplish the project. For example, it would be nice to have a project manager and administrative staff but in my experience for a research project such as this the PI handles these duties. Also, what are the roles of the non-PI scientists? The GIS analyst is critical, but this is only 675 hours of the entire project at a low hourly rate.

The graphic artists are among the most important contributors to the success of the project, but are receiving a total of only about $20,000 out of the $875,000 funding request. Perhaps more ought to be dedicated to these and less to administrative/management staff and GIS technicians.

"General Expenses" (mostly office supplies) and "Lease Costs" of about $100,000 are requested, plus 10% indirect "overhead" costs. In my experience office supplies and leasing are in fact overhead. Thus the actually indirect cost rate is about 25%. I would think that one or the other should be requested, but not both.

Rating: Fair

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:

This proposal includes some innovative approaches to restoration, including truly integrating a landscape perspective for restoration, using historical ecology information as a foundation for restoration, and using graphical 3-D visualizations as a means for unifying restoration goals and communicating findings. However, more scientific literature is needed to justify the linkage between remotely sensed data (and landscape metrics) and ecological function. Also, the roles and responsibilities of project team members are not spelled out and the budget is lacking adequate clarity and justification, may be overstaffed, and appears to include overhead costs twice.

CALFED Ecosystem Restoration Program

External Scientific Review Form

Proposal Number: 011

Proposal Title: Management Tools for Landscape-Scale Restoration of Ecological Functions in the Delta

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:

   This ambitious proposal aims to address a general problem of a lack of sufficient integration of historical data into restoration and management plans, and the difficulty of placing new projects into a broader framework of regional landscape-scale restoration. These goals are clearly stated, and explicitly linked to ERP goals.

   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 proposal explains the approach to be used reasonably well, given the space constraints. While the scope of the proposal makes it impossible for the authors to thoroughly describe the approach for each aspect to be investigated (e.g., connectivity, fish support, vegetation health), I feel that there could have been a couple more examples given to assure reviewers of the rigor of their methodology.

   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 milestones chart, description of approach, and experience of the investigators convinces me that there is no doubt this is technically feasible to complete. The nature of this project frees

it from any concerns about permitting, environmental compliance, etc. Normally, my concern would be with wrangling a large group of experts in a way that forces timely completion, but looking through the list of lead investigators and subcontractors, I have no doubt that will possible.

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:

The proposal provides a clear and detailed conceptual model, based on well-established science. This is **not** a proposal to perform hypothesis-testing science, so that aspect is not applicable. This is a broader effort to both improve the understanding of historical conditions in the delta, and to establish a framework into which future projects can be placed. The PIs are clearly deeply familiar with the associated conceptual models developed (DRERIP in particular).

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:

Again, this project does not lend itself to tidy measures to assess results, and a general plan was laid out for monitoring progress (in part using % of funds spent relative to % of project completed as a metric). That said, I felt the PIs could have been more specific about some of their performance measures (e.g., "The detailed schedule will incorporate critical chain management techniques to identify task dependencies" would be more compelling if it included at least some of that detailed schedule).

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:

I expect that the products that will result from the proposed work will likely be of significant value, not only for scientists and managers, but also for the public and decision-makers. That said, one of the example illustrations (Figure 7) was not very compelling. Thankfully, the quality of the others suggest that the ultimate products will be broadly quite useful.

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 project does a very nice job of building on a solid foundation of previous work, without being at all duplicative.

   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:

   This is an extremely respected and qualified team of scientists, using some of the biggest names in northern CA wetland and riparian ecology (and related fields) as part of their "Landscape Interpretation Team". It is the quality of this team, and the track record of the PIs, that mitigates some of my concerns about the project generally (see Overall Summary below).

   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 seems reasonable, given the scope of the project and the amount of involvement from senior personnel. Unless I am missing it somewhere, it is not explained why both an intern and a GIS analyst are listed under personnel, but with zero salary. If this is some sort of cost-sharing, that should be explained in the Budget Justification.

   Rating: **Very 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: **Superior**

Please provide a brief explanation of your summary rating:

This is truly an ambitious proposal, which has the potential to create an important database and framework that could assist in shaping the future of the region. That said, fulfilling such a grand vision requires a lot of effort, coordination, and resources, and even that cannot guarantee success.

It is the quality and track-record of the PIs and associated scientists that so increases the likelihood of success that I feel this project merits funding and the rating of “Superior”. This is a reasonably expensive and expansive proposal, and in the hands of even many good scientists, I would suggest the possibility of mediocre outcomes would be likely, but I believe this team has the ability to pull this off.