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To:	Dan Ray	From:	David Marmorek
Organization:	CALFED Bay-Delta Program	ESSA reference:	BdB122
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cc:			

Mr. Dan Ray,
 CALFED Bay-Delta Program,
 1416 9th Street, Suite 630
 Sacramento CA 95814

Dear Mr. Ray:

RE: PSP Review #67: *Adding Rigor to the CALFED Concept of Adaptive Management: Application of the Clear Creek Decision Analysis and Adaptive Management Model (CCDAM) to Tributary Restoration (ESSA Technologies Ltd. and Stillwater Sciences)*

Thank you for the opportunity to respond to CALFED's review of the above proposal, and for the time spent in reviewing our proposal. We submit the following short comments with the request that portions of this proposal be reconsidered by CALFED for Direct Action funding.

In the first part of this letter we address the concerns raised by both regional and scientific reviewers. These concerns are important, but are straightforward to overcome. We believe that the significant demonstrable accomplishments made on this project's two earlier phases merit a completion phase. In the second section, we provide a specific suggestion to fund the first two years of the proposed work. This maintains the overall focus and thrust of the proposal, which all reviewers appeared to endorse, and allows phase 3 to move ahead to provide proper application of the model and dissemination of results. Here, consultations related to structured implementation are held to a later phase or other local processes once sufficient local support has been achieved. CCDAM has strong support from the many agencies, entities and external scientists involved in its design. However, it is clear that the tool needs to be strengthened before all agencies are willing to use it to assist them in determining the most promising flow options. Should our request for Directed Action funding be accepted, we would be pleased to submit a revised proposal according to CALFED's schedule, in late summer.

1. Concerns and Responses

The proposal received three positive external scientific reviews (2 "excellent", 1 "good" rating) and an overall "Above Average" rating from the Research and Restoration Technical Panel. However, the regional review gave only a "low" ranking. We do not re-iterate here the many positive comments in the reviews, but rather focus on specific concerns, which are listed below.

1.1 Lack of detail on structural aspects of the model

In the 2002 PSP proposal, we chose to emphasize the overall conceptual model, the major hypotheses addressed by the project, key uncertainties, and the applied decision making framework in which the tool would be used to make real-world decisions. It was expressly because this project has involved applied modeling across *multiple* subsystems (fish, channel dynamics, hydrology and dam operations, riparian, etc.) that our proposal relied heavily upon a reference to the model's 96-page design document to provide structural details:

Alexander, C.A.D., D.R. Marmorek, and C.N. Peters. 2000a. Clear Creek Decision Analysis and Adaptive Management Model: Results of a Model Design Workshop held January 24th-26th 2000. Draft report prepared by ESSA Technologies Ltd., Vancouver, BC for CALFED Bay-Delta Program, 96 pp. and appendices.

<http://www.essa.com/clearcreekdesign.pdf>

Note: Cui and Braudrick 2000 (<http://www.essa.com/parkermodeldoc.pdf>), replaces section 4.2.9 in this document.

This reference was cited 5 times in our proposal and hyperlinks provided to our web site were it could be downloaded and viewed (in PSP standard pdf format). Unfortunately it appears that some reviewers did not examine this critical document. Many of the concerns raised by reviewers are answered in the Design Document. We have enclosed (by courier) hard copies of the design document, the amendment by Cui and Braudrick, and an overview presentation given on April 11th, 2002 in Redding to the Adaptive Management Forum Scientific and Technical Panel. The Panel conducted a review of the entire Clear Creek project, including CCDAM; their written review is currently being prepared.

1.1 The proposal is salmon-centric

The objectives of this project were defined collaboratively during three well-attended multi-agency design and review workshops, as well as numerous focused meetings with various local experts and agency representatives. The prototype Clear Creek Decision Analysis and Adaptive Management (CCDAM) model includes performance measures and submodels that explicitly address the critical ecosystem objectives: fish, power, riparian, channel, flood control, costs (Alexander et al. 2000; cited above). The results of the model design workshop's scoping exercise best summarize this (Table 1.1). (We note that Table 1.1. is not new information; it is from the Design Document cited in our 2002 PSP proposal). Of course, as with any project, scoping decisions must be made to keep the entire body of work manageable and reasonable within funding/time constraints (e.g., nutrient removal and water quality were not deemed central to making flow management decisions when compared to elements bounded in). Both regional and technical reviewers agreed that the work "will provide an overall integration of key system linkages for comparing the relative effectiveness of different flow related restoration strategies" (p.4, p.6).

Table 1.1: A multiple objective ecosystem restoration project: summary of model scoping decisions made during Model Design Workshop held January 24th - 26th 2000.

Submodels	Management Objectives	Actions	Performance Measures
<p>Dam Operations, Hydrology, Power, & Lake Recreation</p>	<p>Minimize:</p> <ul style="list-style-type: none"> - power costs - water costs - program costs (e.g. capital and operating costs of improvements at Whiskeytown) <p>Maximize:</p> <ul style="list-style-type: none"> - recreation in reservoir and along Clear Cr. - safety in reservoir and downstream - Optimize education value 	<ul style="list-style-type: none"> - Low flow management - Large managed releases (6000-8000 cfs) 	<ul style="list-style-type: none"> - Foregone power costs - Capital costs at Whiskeytown - Cost of foregone water uses - Reallocation of Trinity R. costs - # of visitors to Whiskeytown Lake in spring/summer - Suspended sediment in reservoir
<p>Channel, Riparian</p>	<ul style="list-style-type: none"> - Improve fluvial process and form - Functional riparian corridor - Improve temperature regime - Improve spawning gravel quantity and quality - Improve structural complexity - Improve biodiversity of riparian communities (plant and wildlife) - Make positive contribution to Sacramento R - Optimize education value - Improve fish access to habitat 	<ul style="list-style-type: none"> - Provide access above Saultzer Dam (former Saultzer Dam) - Gravel supplementation - Channel restoration program - Addition of large woody debris 	<p>Channel:</p> <ul style="list-style-type: none"> - % fines - % of floodplain area with exposed bars - temperature - Pool:riffle ratio - Total riffle area - Bedload movement: either yes/no - transport rates - scour depths - Benthic invertebrate species richness/diversity <p>Riparian:</p> <ul style="list-style-type: none"> - Seedling establishment - Diversity of age/size classes and species in floodplain inundated by ~ 2500 cfs - Number of bird species / # of birds
<p>Fish, Fish Habitat</p>	<p>Spring chinook and steelhead:</p> <ul style="list-style-type: none"> - minimum pop'n=1250 - cohort replacement rate >1 <p>Fall chinook:</p> <ul style="list-style-type: none"> - minimum (3200) - 2X baseline (\$400) - maintain current pop (7200) - carrying capacity (8190) <p>Optimize education value</p>		<p>Quality of spawning habitat:</p> <ul style="list-style-type: none"> - Distribution and abundance of redds - % unspawn females <p>Quantity of spawning habitat (sq. ft.)</p> <ul style="list-style-type: none"> - Fish density (fish/sq. ft.) <p>Quality of rearing habitat:</p> <ul style="list-style-type: none"> - depth, velocity, substrate, WUA - Juvenile production out of Clear Cr. (fry and smolt) - Egg-fry or egg-smolt survival rate

1.2 The proposal is premature and would be more useful in 2-3 years

The Sacramento Regional Review suggested that the proposed work is "premature" or "not ripe", and that the state of restoration efforts on Clear Creek is "new". The Research and Restoration Technical Panel did not share this concern, nor did the external scientific reviewers.

CCDAM is meant to help guide efforts in Clear Creek to define adaptive management experiments at various scales, as well as to guide critical research and monitoring activities that affect flow decisions and their consequences for various objectives. The model provides a quantitative integration of many different system components and objectives. It is important to do this work early in a restoration project to be able to affect planning decisions. Delaying work on CCDAM would lead to a greater fragmentation of research and monitoring activities, and a lack of explicit consideration of tradeoffs among multiple objectives.

The "newness" of the Clear Creek project was in fact a key reason why CALFED and local agency stakeholders selected Clear Creek for directed funding during Phase 1. This work has been structured from the beginning to help direct new and ongoing restoration and monitoring efforts. During the Phase 1 Case Study Selection Meeting¹, participants agreed on a set of criteria for selecting a case study from these candidates. Of the 11 criteria used, criterion #7 was:

"Is not 'too far along' in the finalization of decisions (i.e. flexibility to explore alternatives), but still has a pressing decision in the pipeline (i.e., is an important issue with large potential ecological benefits)"

There was consensus by participants that Clear Creek met this criteria. In addition, criterion #2 was, "Has a reasonable amount of field information and analysis available for modeling" (p.2). Participants at this meeting also agreed that, along with information and research from other related systems, Clear Creek met this criterion.

The "newness" of some of the issues we encountered during phase 2 required additional effort and cycling over appropriate methods. In this sense, we believe we achieved several scientific and methodological advances (particularly as related to sediment transport modeling).

1.3 How are previous products from early project phases being used?

External Scientific Reviewer #2 expressed a concern about an absence of products from the first two years of work and wondered whether there were extenuating circumstances affecting the project. It appeared at various places in this review that Reviewer #2 thought we were applying only for Year 3 funding, rather than Years 1 through 3 (e.g. "Assuming we are entering the third year, 82% of the cost seems to have been expended." *Actually, none of these funds have been acquired or expended.*). To be clear, our proposal was for three years of funding, to follow two years of existing work. None of the work outlined for Years 1 to 3 of the PSP proposal have been initiated.

Attachment G of the 2002 PSP addressed the status of previous phases. Phase 1 involved model design, which is summarized in the Design Document referenced above in section 1.1. In Phase 2, we developed a working prototype of the model, which was presented to local participants in July 2001. As explained on page 6 of our

¹ The case study selection meeting was held November 1st and 2nd 1999 at the Resources Building, Sacramento California, and is summarized in Appendix A of Alexander et al. 2000a. Participants are listed in Table D.1 in 2002 PSP proposal.

PSP proposal ("Year 1"), this prototype was only preliminary, and substantial improvements are required before CCDAM can be used. Completing the prototype involved three iterations of sediment transport modeling, but we finally converged to a very practical and defensible approach. The software was provided to Mr. Terry Mills of CALFED in September 2001 (the project monitor at that time). Example results are included in the enclosed presentation to the Adaptive Management Forum Scientific and Technical Panel. We are very confident in our ability to generate the products outlined in Table C.3 of our proposal.

1.4 Relationships between ESSA and the local agencies

CCDAM was developed "from scratch" based on the input from local agencies and entities, working together with outside experts. Participants at our meetings are listed in Tables D.1, D.2, and D.3 of Attachment G of the PSP proposal. The project involved a wide body of local agencies and stakeholders, including:

- the US Bureau of Reclamation (USBR);
- Bureau of Land Management (BLM);
- US Fish and Wildlife Service (USFWS);
- National Marine Fisheries Service (NMFS);
- Natural Resources Conservation Service (NRCS);
- California Department of Fish and Game (CDFG);
- California Department of Water Resources (CDWR); and
- the Western Shasta Resource Conservation District (WSRCD).

We were surprised to find the comment in the Sacramento Regional Review that: "CDFG level of involvement is lower than reflected in the proposal". CDFG were present at all three of the major workshops held for this project, as we reported. Clearly however CDFG have some concerns, which need to be remedied through greater interaction. In the workplan we have outlined how we would continue to build these relationships. In light of the need to build comfort around both CCDAM and the consultative process we outlined, we think that it would be wise to postpone Year 3 of the project (Consultations to Prepare for Structured Implementation), until all of the local and regional agencies are comfortable with CCDAM. This tool (and the consultative process in which it is used) are meant to aid local and regional decision making, not replace it. If CCDAM does not include some of the objectives and performance measures of concern to local agencies, then it should be revised accordingly (unless for some reason it doesn't make sense to model those issues).

1.5 Environmental compliance and permits

This was an oversight on our part, but one which can be easily remedied.

2. *Proposed Revisions to Project Design*

We believe that all of the Tasks outlined for Years 1 and 2 still make sense as outlined in the proposal. These first two years involve a great deal of local stakeholder involvement in tool development, testing and exploration. This will allow local agencies, as well as external scientists, to gain confidence with both CCDAM and how it could be used to aid (not replace) decisions on flow management. As stated above, we feel however that it would be wise to postpone the work in Year 3 under objective 4 (i.e. Develop and facilitate a consensus-based multi-stakeholder process for implementing the "most promising flows"). The process for making

decisions on flows is a matter for local and regional agencies to decide. It is up to those agencies to determine what decision making process should occur, and what role CCDAM might play within such a process. We believe that the work outlined in Years 1 and 2 provides a valuable opportunity to explore how decision analysis, adaptive management and models can be melded within a consultative process on watershed restoration. At the end of that period, it is our sincere belief that this process, and the CCDAM tool, will have gained the confidence of all local and regional entities, as well as external scientists. The removal of Year 3 work would reduce the overall project budget by 20%.

3. Conclusion

We greatly appreciate the opportunity to respond to the CALFED reviews of our proposal, and thank the reviewers for their time in reading and reflecting on both our original proposal, and this response. We believe that the above responses deal with all of the major concerns raised by reviewers. With the recommended improvements to our proposal, we would like to request that the project be reconsidered by CALFED for Direct Action funding. Should this request be accepted, we would submit a revised proposal according to CALFED's schedule, in late summer.

Yours truly,



David Marmorek
President
ESSA Technologies Ltd.

Enclosures (sent by courier):

Alexander, C.A.D., D.R. Marmorek, and C.N. Peters. 2000a. Clear Creek Decision Analysis and Adaptive Management Model: Results of a Model Design Workshop held January 24th-26th 2000. Draft report prepared by ESSA Technologies Ltd., Vancouver, BC for CALFED Bay-Delta Program, 96 pp. and appendices. <http://www.essa.com/clearcreekdesign.pdf>

Cui and Braudrick 2000 (<http://www.essa.com/parkermodel.doc.pdf>), replaces section 4.2.9 in this document.

Clear Creek decision analysis and adaptive management model (CCDAM) Presentation given to Adaptive Management Forum Scientific and Technical Panel on April 11th, 2002.