sacramento river
conservation area
forum
a voice for all interests

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March 23, 2005

Tom Griggs,
River Partners
Re: CALFED Monitoring PSP

Dear Mr. Griggs:

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Subsurface Water Quality monitoring activity between Sacramento River Miles 167 and 240 in Butte, Glenn, and Tehama Counties. This project is listed as Project # 54 in the "Project Tracker" system on our website at: www.sacramentoriver.ca.gov. Please keep this project updated as it progresses.

On February 1st, 2005, Daniel Efseaff presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

On March 17, 2005, the project was presented to the SRCA Forum Board of Directors and was found to be consistent with the principles and guidelines of the SRCA Forum Handbook with no objections noted at this time.

We appreciate the effort your organization has made in bringing these projects to the Forum and your recognition of the value of the principles and guidelines of the Handbook. We look forward to your continued coordination with SRCAF and the local contacts on this project as well as any future project proposals.

Sincerely,

Burt Bundy, Manager
SRCA Forum

Cc: CALFED ERP Monitoring PSP

Sub−surface water quality monitoring on restored riparian sites along the middle Sacramento River

Tom Griggs

Technical Panel Review

Technical Review Panel's Overall Evaluation Rating:
Inadequate

Explanation Of Summary Rating

Overall, the question addressed by this proposal is interesting and valid. As explained earlier, the primary problems are its relevance to this program and the fatal technical flaw. The project creatively uses an earlier restoration project to address the issue of 'biofiltering' but fails to consider whether the earlier restoration worked. The major technical problem is the usefulness of 7m wells for understanding changes in water contaminants due to uptake by roots, and there appears to be some confusion regarding vadose zone and groundwater processes. Finally, some consideration should have been given to sampling unrestored systems.

Goals And Justification

The proposed project seeks to take advantage of a planted restoration site to assess the efficacy of this practice in improving subsurface water quality. The problem, however, is that improvement of subsurface water quality was not the goal of the original restoration project − it was to restore wildlife populations. Although interesting, the work proposed here is tangential to the primary purpose of this program which is to determine whether restoration activities are attaining their objectives. The conceptual model provided was not an explanation of the restoration project but of the monitoring project. In addition, the conceptual model is inadequate to explain the difference in sampling strategy for nitrogen and Diazinon. The hypothesis (i.e., plant uptake will filter subsurface flow) is clear. This hypothesis is justified and, if appropriately tested, would generate useful data.

Approach

The external technical reviewers and the technical panel were convinced that 7−m wells would not provide insights into 'soil' water. The study sites have not yet been chosen so it is not possible to determine whether they are appropriate. Using previously−restored sites perhaps should be coupled with unrestored agricultural systems as a control. No mention is made of the sampling strategy for determining the end−members for fingerprinting the subsurface water using the isotope data.

Feasibility And Likelihood Of Success

The project as designed is not consistent with the objectives. It seems technically feasible, although documentation on the potential study sites is lacking (e.g., a map would have been helpful). The spatial scale of the project is appropriate in the 2 lateral dimensions but not in the vertical dimension (i.e., the wells are too deep). The environmental compliance review was concerned about access to potential sites.

Performance Measures

Because they are not assessing whether the restoration project worked like it was supposed to, this question is not answerable.

Products

The project, if designed correctly, could provide useful information on the role of vegetation buffers between upslope areas and rivers and this information could help focus future restoration efforts. There does not appear to be any link with other restoration activities. There are links to CSU Chico. There is no description of access to the raw data however the findings will be disseminated via a local newsletter, one journal article, and a presentation. We anticipate that the results would stand up to peer−review.

Capabilities

The PIs are well−qualified to undertake this research and have significant experience in the field. The technical review panel recommends the inclusion of geotechnical experts.

Budget

The budget seems high although the number of peer−reviewed publications per $'s is low.

Regional Review

The main problem identified by the regional panel is that this proposal does not address the primary purpose of this solicitation, which is to assess whether a past restoration project was successful. The project has scientific merit and would be acceptable in another context if it had been appropriately designed.

Administrative Review

According to the PI's timeline, the project would start before monies were released. Also, there was a question regarding access to their sites. Because the PIs have not yet identified sites, we are forced to assume that they would pick sites for which they have permission to access.

Additional Comments

Sacramento Regional Review

Sacramento Regional Panel's Overall Ranking:
Medium

Summary:

The panel ranked the proposal MEDIUM priority for funding. This project would provide useful information about the water quality benefits of riparian restoration. However, the panel agreed that the project is too focused on a specific aspect of riparian restoration that is only weakly linked to ERP goals for at−risk species populations and habitat.

1. Applicability To ERP Goals And Regional Priorities.

The project monitors subsurface water quality in restored riparian areas along the Sacramento River adjacent to agricultural fields. Monitoring is focused on how riparian planting improves water quality with respect to contaminants and nutrients from the adjacent agricultural areas. No monitoring of increase in available habitat for, or populations of, at−risk species or increase is proposed. The panel agreed that the project's applicability to ERP goals is weak. This project would be more valuable if linked to more comprehensive riparian restoration monitoring.

2. Links With Other Restoration Actions.

The project does not seem to be linked to other monitoring, specifically surface water monitoring, occuring in the region. Project results would provide information useful to other restoration activities in the area.

3. Local Circumstances.

There do not appear to be any local constraints on project implementation. However, the timeline in the proposal shows that wells will be installed in winter 2005. If funded,

proponents will not have funding for this work by winter 2005 (no cost share is identified).

4. Local Involvement.

Links to local entities could be stronger particularly with respect to public outreach. Proponents should seek a wider audience including RCDs, local and regional watershed groups (specifically the Sacramento River Watershed Program).

5. Local Value.

This project would be stronger if linked with more comprehensive monitoring and assessment in the area. The project is focused on specific water quality improvements at local sites that may not be applicable at larger scales.

6. Other Comments:

Assumption that groundwater movement is from upland to the river may be flawed under certain circumstances. Movement could be in the other direction. The project would produce useful information but is likely more appropriate for a research−oriented funding source.

External Technical Review #1

Goals And Justification

This project seeks to monitor how effective riparian restoration projects along the Sacramento River are at improving water quality in groundwater affected by agricultural projects. The investigators have 3 hypotheses: (1) riparian vegetation will lower the concentration of nitrates in sub−surface water; (2) water from the river has a minor effect on sub surface nitrate concentrations; (3) no residues remain from historic pesticide use on the restoration sites.

The investigators present a simple conceptual model for their investigation in Figure 1. The model does not detail controlling geomorphic, soil or vegetation factors, however, and does not delineate or specify the hydrologic pathways that might be encountered. Much more would need to be known, and measured, regarding the specific site conditions to be able to draw conclusions that could be generalized to other areas in the Sacramento River basin, much less to other river basins in California or elsewhere in the western United States.

Moreover, a major problem that I see in this proposal is that the investigators do not distinguish between vadose zone (i.e., unsaturated soil water zone) and groundwater dynamics, either with respect to hydrology or nutrient uptake. In fact, they seem to confuse the two in their discussion – for example in the Executive Summary and elsewhere they state that they will monitor "sub−surface soil water" and yet their sampling strategy uses piezometers that can only measure groundwater (i.e. saturated subsurface areas). To sample "soil water" they would need to use tension lysimeters (i.e., lysimeters that draw water from unsaturated areas using suction, or negative pressure). This distinction is non−trivial because plant roots generally obtain most of the nutrients from the vadose zone.

Also, I'm not sure that the hypotheses are particularly novel. One of the investigators has been a colleague of Richard Lowrance, who is, as cited, one of the leading researchers in

riparian vegetation nutrient relations, and that team and others have shown hypothesis 1, i.e., that in many systems that riparian vegetation lowers concentrations of nitrates in subsurface water due to vegetation uptake (and/or associated soil microbial uptake). This is not to say that such research in the Sacramento River area might not provide new insights, but it is to say that a more compelling reason than the fact that it's in the western US needs to be given, such as something particular about the soils or geomorphology or hyporheic conditions in the Sacramento River basin, for this research to produce information that can be carried beyond the specific sites under study.

Further, on hypothesis 2, the mixing of river water in the river plain groundwater is going to depend on the geomorphology and subsurface hydrology of a given site. The answer to this question can change dramatically within say 100−200 m along a single river meander. For this hypothesis to be useful, the investigators should at least consider posing it within consistent HGM (hydrogeomorphic) classes. Further, they should seek to control for the soil conditions, including both natural variation and any restoration variation that might have occurred.

Finally, the 3rd hypothesis about pesticide residue, without clarifying the concerns above, will only be concluded at the level of the sites investigated. It will be very difficult to make generalizations from this experimental design.

Also, I'm left feeling that the researchers haven't looked into pertinent research from elsewhere in the western United States. Their citation list is fairly dated and spotty − for example they don't include any studies from the AWRA Proceedings of a conference devoted to riparian ecology and management in 2000 – there were many talks and papers from western US riparian studies at that conference that have since been published in JAWRA or elsewhere.

Approach

As discussed, the experimental design will not address soil−water but groundwater chemistry and nutrient changes. So, they will not meet their stated objectives in this regard. The study would detail groundwater chemistry changes in 3 restored riparian areas. The riparian areas that they would sample are not yet determined, and it is not clear what their site criteria are except that they will have shallow groundwater levels and be in restored vegetation areas. The investigators do not specify the type of vegetation conditions (e.g. maturity, species mixes) so they will not be able to control for variations in rates of uptake that are simply due to species differences or rooting depths. Also, they are not controlling for soil properties or riverine geomorphology, as discussed above, so these variations won't be addressed.

Given all these caveats, I don't see any major equipment problems in measuring groundwater per se. If they are able to align the piezometers perpendicular to the flow paths (not always easy – subsurface flowpaths don't always follow topographic contours), they should get some idea of the changes in groundwater chemistry that should be at least partially due to the riparian vegetation and soils on their sites. Again, though, it will be difficult to generalize from these results to other sites along the Sacramento River without better controls on the soil, geomorphic, vegetation and hydrologic parameters discussed above. Also, again, they will not be measuring soil water water quality dynamics, only groundwater.

Technical Feasibility

The methods appear feasible for monitoring groundwater chemistry. PVC piezometers are inexpensive to construct. They can be labor intensive to install. The miscellaneous expenses that include chemical analysis appear to be fairly high cost ($99,000).

Performance Measures

As discussed previously, it will be difficult to extrapolate these results to other restored riparian areas without careful evaluation of the soils, vegetation, geomorphic and hydrologic variables in play at each site. I believe the project will provide useful information about the effectiveness of the sites that are actually measured, with regard to the groundwater component only, but the study lacks consideration of the site parameters that would allow extrapolation to other restoration sites, and also the project completely lacks a soil water component.

Also, given that up to 20 pages could be used, but yet the project description is only 9 pages long, it seems that the investigators could do a much better job detailing both the conceptual model and how the data obtained from the experiment will support/reject components of that model. As it is, the project description is too sketchy for such an evaluation to be conducted.

Products

For reasons that I discuss earlier, it will be difficult to extrapolate these results to other riparian restoration sites in the Sacramento Valley, much less to other sites in the western USA. The results will likely have limited application, and without an investigation of causal variables (soil parameters, vegetation factors, geomorphic variation, hydrologic variation) as well as of soil water dynamics, it will be difficult to publish these results in a peer−review journal.

Capabilities

There is no problem whatsoever with the credentials and capabilities of the investigators – they have national level reputations for doing good science. The project team appears quite capable of doing not only this work, but also of writing a much more explicit and focused and generalizable research proposal.

Budget

The chemical analysis seems to be fairly expensive, but I trust that these are the going rates. Overall, the budget seems adequate and reasonable.

External Technical Review #2

Goals And Justification

The restoration and monitoring activity is described clearly. The conceptual diagram represents the study design fairly well and the hypotheses seem reasonable given current information. It is somewhat unclear to me what pesticide levels have to do with riparian plantings, especially if the stated hypothesis is that there are no residues left from previous application, but from a monitoring perspective it seems like an interesting test. However, I do not think the stated hypothesis justifies proposed sampling regime.

Approach

The proposed research needs to distinguish between the laudable, but distinct goals of evaluating the effects of restoration and demonstrating the impact of riparian buffers in an arid landscape. The current design is far too expensive for the former and not detailed enough for the latter. It is not clear how wells of constant 7 m depth will allow mapping of more shallow flow patterns, usually nested wells at different depths are used for this. This approach will also hamper nitrate monitoring because flow lines at different depths during the year will be untraceable and there will be little evidence to link concentrations at such depths to riparian restoration. The rationale for correlating DOC, redox potential, and nitrate is insufficient at best and might be problematic (given current understanding) if the authors intend to use these correlations as evidence of riparian mitigation. Rather than the stated objective of "try to document" historical application of Diazinon, it would make more sense to select sites on the basis of documented applications. If this occurs at different locations than the nitrate sites, perhaps they ought to occur in separate studies.

Technical Feasibility

The project is not well documented. Although tracking nitrate reductions across a riparian planting offers some promise, the study design is not well−suited to capture the appropriate hydrologic information to support the chemical measurements (why are measurements at 7 m depth being proposed?). There is no consideration of how sub−surface stratigraphy might influence the performance of the wells, no mention of the rooting depths likely to play a significant role in plant uptake, and inadequate information about the role of DOC and redox measurements in the monitoring. Further, though isotopic measurements may offer some information about water sources, if this is really a pilot study then chemical isolation, though more imprecise, may be a more economical alternative. In either case, the sampling design necessary to fully inform a mixing model seems incomplete. The methods state that the approach will be to use standard groundwater monitoring techniques, but the feasibility section states that these are new methods of analysis. Since these techniques seem fairly routine, I wonder what the new method is that is being referred to and why the proposal cannot demonstrate project feasibility in any more detail. Finally, the well installations, as proposed, often require some pretty heavy equipment being moved in and out of riparian areas. I am concerned that there is no mention of the likely impact from well−installation on the restoration plantings and any restored habitat.

Performance Measures

If the hydrologic measurements were made in such a way as to capture potential flow paths relevant to riparian effects, this proposal would be a useful pilot study for addressing the nutrient−retention value of riparian restoration projects in the Sacramento basin.

Products

As stated, I am not at all confident that this project will produce scientifically defensible results. The broad−brush

strokes seem to be in the right place, but the details are not presented convincingly. It may be a simple matter of rethinking the sampling regime to generate more comprehensive information.

Capabilities

The project investigators seem qualified for this project. I have no information on their past record of project completion.

Budget

The cost of this project seems fairly expensive given the low number of sites. Most of the chemical costs seem to stem from the use of stable isotopes as tracers ($33,000/year) when one might expect a pilot study to first demonstrate that less−expensive chemical signatures were incapable of distinguishing different water sources. Further, since the Diazinon portion of the study depends upon (1) use of that pesticide at the TBD sites as well as (2) its hypothesized persistence and (3) a vague connection, if any, to riparian restoration, it is unclear why it is appropriate to spend nearly $10,000/year over 3 years to sample it. Why sample with such frequency and over 3 years? This is not explained in the proposal.

Additional Comments

The proposal makes the case that there is a need for some study of this nature in the arid west and the Sacremento basin. A few modifications would greatly improve this proposal.

External Technical Review #3

Goals And Justification

For which restoration actions will the outcomes be monitored? Well stated in the application: riparian vegetation plantings/restoration effects on water quality.

What are the goals &objectives of restoration action? Well stated in the application: riparian wetlands initially restored to provide wildlife habitat, but more recently recognized as a strategy for improving water quality.

Is a clear conceptual model included? The conceptual model presented is very general and not specific to wetland landcover in the Sacramento River Valley. Further the model seems to imply that plants primarily influence ground−water quality. More likely, the source(s) of ground water drive biogeochemical processes… especially microbial activity.

Tested Hypotheses: 1) Riparian vegetation reduces NO3 in ground water 2) River water has minimal effect on sub−surface NO3 concentrations 3) No pesticide residues will remain from historic applications.

Addresses knowledge gaps? The topic has potential, especially on the west coast. However, the proposed methods will make it difficult to draw conclusions about either the river−ground water interactions or plant effects on ground−water quality, thereby limiting its usefulness.

Approach

Well designed approach? No. A) It would be helpful if the applicants had identified a set of potential sites, for which they could summarize important hydrogeologic features such as watershed size, topography, and surficial and bedrock geology. B) Most importantly, the proposed network of 7m deep wells across three restored riparian wetlands will not likely capture the effects of vegetation on ground water quality. Any

nitrate reduction will occur in the shallow soil, or where the nitrate−enriched water reaches an organic−rich substrate. However, no information is provided on the stratigraphy of the riparian wetland, nor do the applicants indicate they will collect the appropriate data. Further, at the very least, water−table wells will be required to infer the direction and rate of ground water flow.

Previous monitoring incorporated? No.

Contributions that will improve our general knowledge: While a number of studies have investigated ground−water flow and hydrochemical patterns across riparian wetlands, including restored sites, few studies have attempted to tie in the effects of vegetation. However, the proposed approach likely will not provide any additional insights, largely due to limitations in the methods. In addition, a major challenge to the applicants will be to separate plant and microbial effects on the ground−water evolution.

Will these contributions help decision makers? Doubtful. The project design will not provide enough information to assist decision makers. Again, the proposed sampling design and sample collection will not provide enough information for the applicants to address any of their research questions.

Technical Feasibility

Fully documented project? The application could be improved by providing a stronger conceptual framework and more details describing the methods.

Technically feasible? Not enough information is provided to answer this question. For example, how will 7m deep wells be installed at 16 locations across each wetland without causing significant disturbance?

Is scale of project consistent with objectives? Most likely not. The proposed 7m piezometer depths probably will not capture shallow biogeochemical processes affecting water quality.

Performance Measures

Does the proposed monitoring allow for evaluation of the restoration actions? No. Again, it will be difficult to assess the effects of vegetation on ground water quality based on samples collected at 7m depth.

Any specific performance measures? Not explicitly identified, but would assume a positive response would be inferred from a decrease in the contaminants of concern.

Is the rationale for performance measures clearly explained? Not entirely. For example, how will the redox measures be incorporated into interpreting the results? What is considered a significant improvement in water quality relative to each contaminant of concern?

Will the data and performance measures allow us to evaluate the conceptual model? The conceptual model provided is very general and lacks details describing the mechanisms by which riparian wetlands will influence ground−water quality. Although potential mechanisms are briefly described in subsequent text, the sampling design will limit the extent to which those mechanisms can be explored.

Does the monitoring/evaluation plan provide enough detail to evaluate how well the restoration action has been effective? No; again, mainly because of limitations in the conceptual framework and sampling approach.

Products

Will the project provide useful information to science/management? Doubtful, for reasons previously discussed.

Does the proposal explicitly state how the data will be available to others? The applicants propose an annual field day and a peer−reviewed article to present the results. No provision of direct access to the data is mentioned.

Will data mng't be usable/accessible practically? The application provides minimal information describing data management and accessibility. The authors mention providing contour maps and correlation results only.

Will results stand up to peer review? The challenge to the authors/applicants will arise mostly from the sample design and selection of analytes rather than the analytical procedures. Without a stronger conceptual framework and more solid sample design, it may be challenging to publish the results.

Capabilities

Is the team qualified? The researchers have extensive backgrounds in their research fields. However, from the description of their proposed methods and the lack of detail describing their experience in wetland hydrology, it is difficult to judge that they are well qualified for this project.

Appropriate mix of disciplines? The project seems like it would benefit by including a wetland hydrologist.

Performance record adequate to complete project? Yes.

Budget

The researchers might consider investing in more basic monitoring of the study sites before buying expensive equipment and investing in costly sample analyses. For example, a better designed hydrologic study using nested piezometers and water−table wells together with major ion analyses would provide more insightful information, less expensively.

Additional Comments

In addition to the limitations already emphasized, there are other considerations the applicants should address in their conceptual model and methods design.

For example: What features of the landscape setting might cause results to vary among your sample sites?

How do you expect O2, NO3, DOC and redox potential to change along the ground−water flowpath? How might these be related? Several of these parameters are mentioned as sample analytes, but their relevancy is not discussed.

Budget Review

1. Does the proposal include a detailed budget for each year of the requested support?
Yes.

2. Does the proposal include a detailed budget for each task identified?
Yes.

3. Are project management expenses appropriately budgeted?
Yes.

4. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs? Are indirect rates, if used, appropriately applied?
No.

If no, please explain

Description of expenses not identified in overhead costs. Rate is reasonable (21%).

5. Does the budget justification adequately explain major expenses? Are the labor rates and other charges proposed reasonable in relation to current state rates?
Yes.

If no, please explain:

Travel rates appear to be higher than standard .55 mile.

6. Are other agencies contributing or likely to contribute a share of the projects costs?
No.

7. Does the applicant take exception to the standard grant agreement's terms and conditions? If yes, are the approaches the applicant proposes to address these issues a reasonable starting point for negotiating a grant agreement?
Yes.

8. Are there other budget issues that warrant consideration?
No.

Other comments:

Subcontracting – Proposals for work to be performed by subcontractors or other entities in excess of the 25% of the total project dollars the grantee is required to provide a justification for subcontracting services. If subcontractors are pre−selected and identified in the proposals as part of the project team, the grantee should provide a justification on how each subcontractor was selected. Grantee shall identify labor rates and indirect costs rates paid to each identified subcontractor to ensure that labor rates are comparable to State rates.

The Subcontracted work should be identified with a rate and hours and attributed to each task and deliverable for each year. A performance evaluation is also recommended for subcontractors that receive more than 50% of the grant funds. If the subcontractor has not been identified, a position description complete with education level, experience, and abilities be submitted and the rate and hour associated with that position will be attributed to a task, and deliverable. The grantee is also required to comply with the State competitive bidding process as stated in the PSP.

The Grantee should charge a reduced indirect cost rate to the state for services that will be subcontracted by the grantee. (Researching SCM Section 3.06 B).

Subcontracting is 50% of proposal($295,000).

Environmental Compliance Review

1. Is compliance with California Environmental Quality Act (CEQA) required for this project?
No.

2. Is compliance with National Environmental Policy Act (NEPA) required for this project?
No.

3. Does this project qualify for an Exemption or Exclusion under CEQA and NEPA, respectively?
Does not apply.

4. Did the applicant correctly identify if CEQA/NEPA compliance was required?
Yes.

5. Did the applicant correctly identify the correct CEQA/NEPA document required for the project?
Does not apply.

6. Has the CEQA/NEPA document been completed?
Does not apply.

7. If the document has not been completed, did the applicant allot enough time to complete the document before the project start date?
Does not apply.

8. If the document has not been completed, did the applicant allot enough funds to complete it?
Does not apply.

9. Did the applicant adequately identify other legal or regulatory compliance issues (Incidental Take permits, Scientific Collecting permits, etc,) that may affect the project?
Does not apply.

10. Does the proposal include written permission from the owners of any private property on which project activities are proposed or, if specific locations for project activities are not yet determined, is it likely that permission for access can be obtained?
Does not apply.

Comments:

#0092: Sub−surface water quality monitoring on restored riparian sites along ...

This is my assumption from reading the text. However, it is not completely clear that all of the land is public land. Applicant shoud confirm that all land is public and will not require landowner permission to access.

11. Do any of these issues affect the project's feasibility due to significant deficiencies in planning and/or budgeting for legal and regulatory compliance or access to property?
No.