Draft Individual Review Form

Proposal number: 2001-F206-1 **Short Proposal Title: Assessing the Relative Contribution of Nutrient Sources to the SJR Using Molecular Tracers**

1a) Are the objectives and hypotheses clearly stated?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

Yes, the proposal clearly states the objectives of the research and the hypotheses upon which the objectives are based. The objective is to develop a method for using molecular tracers to apportion nutrient loads to various sources in the San Joaquin River. The hypotheses are that these sources of nutrients also produce/discharge other compounds that are unique to the source thus measurement of the other compounds in relation to the nutrients being discharged can be used to identify sources and loads of nutrients once sufficient data is collected and appropriate models developed.

1b1) Does the conceptual model clearly explain the underlying basis for the proposed work?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

Yes, the conceptual model well explains the underlying basis of the work. Studies by others on use of tracers to estimate relative proportions of fecal matter from various sources is presented. Critical factors such as uniqueness of tracers to the various sources of nutrients and how well they track the fate and transport of the nutrients is presented. The use of multiple tracers for each source to strengthen this link is discussed as well as uncertainties that may impact the accuracy of the work.

1b2) Is the approach well designed and appropriate for meeting the objectives of the project?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

The approach appears to be well designed. They propose three years of data collection in wet and dry seasons. A sufficiently wide variety of molecular tracers for each potential nutrient source are being considered to characterize sources. River water will be collected to evaluate real world tracking of nutrients and their tracers. Transformation experiments to identify how well certain tracers will track the nutrient of concern will also be done.

Limitations - the actual time frame for data collection which is only ten days in the wet season (March/April) and ten days in the dry season (August/September). Catching storm events when the greatest amount of nutrient loading may occur in surface runoff or uncontrolled discharges from several key sources would be useful in collecting good real world data but limiting sampling to a ten day period, at most, would make it difficult to catch such an event. The authors propose cold water extraction of source material as a back up if surface runoff is not available during the wet season sampling. How representative this will be of the actual surface runoff is not discussed.

There is no discussion of the potential statistical power of the data to sufficiently distinguish good tracers for each source or what the likely statistical power should be for any given tracer that is sufficient for use as a tracer. It may very well be that the research itself will answer these questions.

The potential cost to implement such a tool in the future may be high. Analytical and maintenance costs specifically discussed totals $624 per sample. Specific costs per sample for fecal steroids, lignin decomposition products, and several PAH scans are not clearly defined but would reasonable bring the total cost to over $1,000 per sample. The selection of the best tracers will likely eliminate certain analytical scans but the total cost per sample will still likely be high. Best use of the tool would need to include frequent monitoring especially during winter season storm events to truly apportion source loads as some may be of extremely short duration but high loading. This leads to the question of whether $300 thousand per year for three years for a tool that may be expensive to use is worth the costs if the same money could be used now to support programs already targeted at known nutrient sources. Frequent, less expensive nutrient monitoring could pinpoint sources as well (certainly watersheds with the greatest inputs).

1c1) Has the applicant justified the selection of research, pilot or demonstration project, or a full-scale implementation project?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

This is clearly a **research effort** to **develop a tool** to identify and estimate relative loads of nutrients from several sources using molecular tracers.

1c2) Is the project likely to generate information that can be used to inform future decision making?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

If the tracers are sufficiently developed and the monitoring cost effective the tool should prove useful to managers in directing efforts to address the nutrient sources of greatest concern. However, as discussed under 1b2 the costs may be the limiting factor for future use as a monitoring tool. It will be at least four years before this tool could be put to use and another year or two before sufficient monitoring data is collected to direct management actions. This may be too long to wait to address DO problems in the Stockton area.

2a) Are the monitoring and information assessment plans adequate to assess the outcome of the project?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

This is not directly applicable but it should be noted that this is research to develop a tracer tool for identifying specific nutrient load apportions. It will not answer the question of which sources contribute the greatest loads until it is utilized in an appropriate monitoring program. Although it may be able to address loads during the two 10-day time periods when data was collected.

2b) Are data collection, data management, data analysis, and reporting plans well-described, scientifically sound and adequate to meet the proposed objectives?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

The data management and reporting plans appear appropriate, however, I recommend that the researchers make presentations specifically to CALFED and the work group trying to resolve the DO problems at Stockton not just at national scientific meetings.

3) Is the proposed work likely to be technically feasible?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

The project is technically feasible and the researchers appear to have contingencies well addressed although I would recommend that if a sample is lost and need to be recollected the upstream or downstream counterpart for that sample should also be recollected.

4) Is the proposed project team qualified to efficiently and effectively implement the proposed project?
Provide detailed comments in support of your conclusion [Note: in the electronic version, this will be an expandable field]

Yes, the research team is well qualified to do the work

Miscellaneous comments
[Note: in the electronic version, this will be an expandable field]

Has much potential. Costs to implement as a tool may be high.

Overall Evaluation Summary Rating

Provide a brief explanation of your summary rating
[Note: in the electronic version, this will be an expandable field]

- Excellent
- ■ **Very Good**
- ☐ Good
- Fair
- Poor

This is a very good research proposal and has great potential to develop a useful tool. Inefficiencies identified can be addressed buy the researchers during final development. Future use of the tool may be limited due to analytical costs to measure tracers at sufficient frequency and number of sites to truly apportion nutrient loads.