

# Proposal Reviews

## #193: BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

University of California, Davis

**Initial Selection Panel Review**

**Research and Restoration Technical Panel Review**

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## Initial Selection Panel Review:

### CALFED Bay-Delta 2002 ERP PSP Initial Selection Panel Review

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

Please provide an overall evaluation rating.

#### **Explanation of Recommendation Categories: Fund**

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

**Consider as Directed Action in Annual Workplan** (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)

**Not Recommended** (a proposal not currently recommended for funding-after revision may be considered in the future)

#### **Note on "Amount":**

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

| <b>Fund</b>                        |          |
|------------------------------------|----------|
| <b>As Is</b>                       | -        |
| <b>In Part</b>                     | -        |
| <b>With Conditions</b>             | -        |
| <b>Consider as Directed Action</b> | <b>X</b> |
| <b>Not Recommended</b>             | -        |

Amount: **\$1,219,387.00**

Conditions, if any, of approval (if there are no conditions, please put "None"):

**See below.**

Provide a brief explanation of your rating:

**Results of the proposed research would contribute to our understanding of this at-risk fish species. Concerns with the proposal which were expressed by this and previous panels include: 1) the proposal needs a better explanation of how physiological studies would be applied; 2) a better experimental design for telemetry studies should be developed; and 3) other funding sources should be found to support any Klamath River telemetry work. We recommend that the applicants review the comments and resubmit the proposal for consideration as a directed action.**

# Research and Restoration Technical Panel Review:

## CALFED Bay-Delta 2002 ERP PSP Research and Restoration Technical Panel Review Form

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

**Review:**

**Please provide an overall evaluation summary rating:**

**Superior:** outstanding in all respects;

**Above Average:** Quality proposal, medium or high regional value, and no significant administrative concerns;

**Adequate:** No serious deficiencies, no significant regional impediments, and no significant administrative concerns;

**Not Recommended:** Serious deficiencies, significant regional impediments or significant administrative concerns.

| Overall Evaluation Summary Rating | Provide a brief explanation of your summary rating  |
|-----------------------------------|---|
| -Superior                         | <b>This project was ranked as highly relevant to regional needs for research and several goods and an excellent by panel and outside reviewers. Some administrative issues and some budget inconsistencies were noted. Overall, weaknesses in describing the linkages between the elements of the project, poor justification for small sample sizes and methodology in the tagging studies, inadequate description of how the physiological studies would be applied (in an ecological context) and questions regarding the genetics approach reduced the overall ranking to adequate.</b> |
| -Above average                    |   |
| X Adequate                        |   |
| -Not recommended                  |   |

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

**The goals, hypotheses and objectives were clearly stated. The principal goal is to advance the understanding of Green sturgeon biology. One external reviewer suggested that this is a well-planned, broad and thorough study to address every aspect of Green Sturgeon biology that science and management might wish to know about green sturgeon. The one major deficiency was a poor linkage among the various components of the project.**

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

**This project was judged as good to excellent by outside reviewers. The consensus among regional and external reviewers was that the project team is capable and qualified to conduct this research project as proposed. Since they have an ongoing project, they propose to take their research to the next phase, thus some level of success seems very likely. Reviewers offer several observations that may be relevant to the efficient execution of the project. Specifically comments on how to more effectively evaluate sturgeon habitat preferences with the tagging/telemetry studies and comments on the genetic analysis should be noted as areas where the quality of the project could be improved. The panel also felt strongly that the diverse elements of the proposal were poorly linked and that without strong linkage between the PIs the precise direction of this research was difficult to recognize.**

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

**Because this project focuses on Green sturgeon it is likely to generate information that can make an important contribution to understanding of watershed conditions needed by this and similarly sensitive species. The results should prove very useful to managers seeking to understand factors affecting at-risk species and how to manage their habitat.**

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

**There was one budget issues raised with regard to accuracy. The external reviewers felt the budget was reasonable in spite of its high total. Some part of the budget were poorly justified, but the consensus was that because of the need to better understand sturgeon biology and the fairly comprehensive nature of this proposal the cost/benefit was somewhat reasonable.**

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

**Regional reviewers rated this project as a high priority for ERP (3 of 3H). The rationale is that it is an ongoing project that addresses the needs to understand Green Sturgeon biology, it addresses habitat restoration issues, and an at-risk species. They felt that because it is being conducted by a highly qualified team and the project is linked to other related projects within the region it has strong appeal as a research project.**

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

**Three administrative issues were raised for this proposal. Reporting and coordination could be improved for this project. The applicant did not disclose the contractor conducting the fieldwork and this could pose problems for permitting their collections. Some discrepancies were noted in the budget totals.**

**Miscellaneous comments:**

**None**

## Delta Regional Review:

**Proposal Number:** 193

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

Overall Ranking:   -Low   -Medium   **XHigh**

Provide a brief summary explanation of the committee's ranking:

**The regional panel feels that information on green sturgeon life history, distribution, etc. is much needed.**

1. Is the project feasible based on local constraints?

**X**Yes -No

How?

**Earlier phases apparently were completed successfully. Participants and collaborators are local green sturgeon experts, and have successfully collected and tagged green sturgeon in the Sacramento-San Joaquin system before.**

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

**X**Yes -No

How?

**From the Restoration Priorities for the Delta and Eastside Tributaries Region:**

**"4. Restore habitat that would specifically benefit one or more at-risk species; improve knowledge of optimal restoration strategies for these species.**

**· Life histories and restoration or habitat requirements of at-risk species. Workshops, white papers, or pilot scale monitoring and survey programs that might summarize or better the state of knowledge about poorly known riparian or wetland species or groups of species that inhabit the Delta, especially where such studies can lead to population models (Strategic Goal 1, at-risk species assessments)."**

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

**X**Yes -No

How?

**Earlier phases of this work were funded by CALFED.**

**DFG personnel are listed as participants and collaborators; presumably, this work will be coordinated with some of their ongoing monitoring etc.**

**The applicants appear to be coordinating with other researchers (e.g., Ted Sommer, for work in the Yolo Bypass) and utilizing their expertise.**

**One main focus of this work is to compare results from the Sacramento-San Joaquin system to results of the Klamath.**

4. Does the project adequately involve local people and institutions?

Yes -No

How?

**Most participants and collaborators are from UC-Davis and DFG.**

**Coordination with other researchers (e.g. Ted Sommer of DWR) and projects (e.g., Yolo Bypass Study [part of Interagency Ecological Program]) is being done, at least for the field work. Coordination with FWS and tribes is being done for Sacramento-San Joaquin vs. Klamath comparisons.**

Other Comments:

**N/A**

## San Joaquin Regional Review:

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

Overall Ranking:    -Low    -Medium    **XHigh**

Provide a brief summary explanation of the committee's ranking:

**The committee felt that the personnel involved were very appropriate. The radiotag results should give much needed info in the distribution and spawning of this species.**

1. Is the project feasible based on local constraints?

**X**Yes -No

How?

**Applicant includes persons in the Central Valley most familiar with Green Sturgeon. The presence of aquaculture program at UCD provides rearing for physiology and reproductive components. Previously developed genetic capabilities make the genetics workable.**

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

**X**Yes -No

How?

**This project is developing information on an at-risk species. SJ #4 and MR #6.**

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

**X**Yes -No

How?

**This project is generally related to efforts at restoring the Delta. Difficult to find direct links to specific projects or plans. There is a reference to Yolo Bypass work.**

4. Does the project adequately involve local people and institutions?

**X**Yes -No



How?

**Most of the persons and institutions in this project are already locally involved. Would include IEP planning processes.**

Other Comments:

**Not clear from the proposal why there is such a focus on the physiology associated with moving between fresh and salt water. Cant see the CalFed connection.**

## Sacramento Regional Review:

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

Overall Ranking:    -Low    -Medium    **XHigh**

Provide a brief summary explanation of the committee's ranking:

**A valuable research effort on a high priority species.**

1. Is the project feasible based on local constraints?

**X**Yes -No

How?

**No visible impediments to the success of the project. This is a continuing phase of an ongoing project. Project is research with a highly qualified team of researchers.**

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

**X**Yes -No

How?

**This project addresses gathering information on at-risk species and will lead to restoration and management actions, PSP priorities Sac Region -2 & Sac Region-6.**

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

**X**Yes -No

How?

**This project is closely linked with other CALFED , AFRP and restoration actions for Green Sturgeon. Communication and coordination with other groups and entities (i.e., SRCA, Tehema Colusa Canal, Fish Screen Team) would likely improve success of future efforts.**

4. Does the project adequately involve local people and institutions?

**X**Yes -No

How?

**This is a research project. Those entities interested in these efforts are informed and involved, but that is a small group.**

Other Comments:

**X**

# External Scientific: #1

## Research and Restoration External Scientific Review Form

Proposal Number: **193**

Applicant Organization: **University of California, Davis**

Proposal Title: **BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED**

### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

**none**

### Review:

**Please provide an overall evaluation summary rating:**

**Excellent: outstanding in all respects;**

**Good: quality but some deficiencies;**

**Poor: serious deficiencies.**

| <b>Overall Evaluation Summary Rating</b>      | <b>Provide a brief explanation of your summary rating</b>  |
|---|--|
| <input checked="" type="checkbox"/> Excellent | <b>Very Good/Excellent-The proposed subject may have significant merit. The proposers have made progress on the problem and wish to continue their efforts. The proposal is sound.</b> |
| <input type="checkbox"/> -Good                |  |
| <input type="checkbox"/> -Poor                |  |

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

**This is a well-written and well-thought proposal to advance the understanding of green sturgeon biology.**

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

**The proposal does a good job of laying the groundwork for where they are in this research and where they intend to take it if funded. This is basically a continuation proposal to continue work they have already started on green sturgeon. They provide a conceptual model of the problem that clearly illustrates what they know and what they need to know to better manage the species.**

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

**The proposed approach seems reasonable. They have evolved a research team and a series of cooperators that seem to function together to work toward learning more about green sturgeon in this system. The project seems likely to provide an array of information that is coordinated in its effort to understand and manage green sturgeon life history. The project undertakes to provide information on spawning habitat, genetics and reproduction that should be useful to managers to both protect the species, and possibly improve or at the least protect spawning habitat. With regard to methods for locating tagged sturgeon in the rivers: Do you really need to use a plane to locate them? Wouldn't it be more cost effective to have more beacons in the river habitat that could tell you how many fish have passed a given station. If you know ten fish had passed one location and only two had passed a subsequent location you could infer that 8 are between location 1 and 2. Then you could use a boat to track them for microhabitat locations.**

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

**A key element in the success of almost every element of this project is their ability to consistently capture green sturgeon for this research. Their ability to have some success with this in the past should provide the basis for future successes. Although this is an ambitious and complex project, the approach was fairly well documented and it appears to be technically feasible.**

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

**No section detailed performance measures for this proposal.**

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

**Listed products are publications and reports to the agency. Nothing is mentioned with regard to distribution of this information to managers outside of CALFED nor is anything discussed under products with regard to how these results are likely to shape the management of this species.**

7. **Capabilities.** 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?

**This group includes some very capable researchers that are apparently working closely with management agencies, tribal entities and others. They have a strong track record in term of experience and accomplishments to date working with sturgeon and the diverse expertise required to conduct this research. Because they have an establish project the infrastructure would appear to be in place.**

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

**The budget is complicated because of all the components. The budget justification is perhaps the weakest part of the proposal. A little more detail in the way of explanation and justification would have been helpful. This is a complicated proposal with many investigators involved so the costs are likely to be high. Most of what is provided seems reasonable. Klimley spent a lot of pages describing his role in each task as far as costs. Seems like that could have been done all in a page or two and used those pages for a more comprehensive written justification of expenditures.**

**Miscellaneous comments:**

## External Scientific: #2

### Research and Restoration External Scientific Review Form

Proposal Number: **193**

Applicant Organization: **University of California, Davis**

Proposal Title: **BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED**

#### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

**None**

#### Review:

**Please provide an overall evaluation summary rating:**

**Excellent: outstanding in all respects;**

**Good: quality but some deficiencies;**

**Poor: serious deficiencies.**

| Overall Evaluation Summary Rating | Provide a brief explanation of your summary rating  |
|-----------------------------------|---|
| -Excellent                        | <b>Project participants are clearly capable of developing a much more coordinated and exciting proposal, but even the submitted proposal would no doubt provide useful information on green sturgeon life history. I sure hate to see more than \$200k per year go to telemetric studies without associated testable hypotheses and without description of statistical methods used to generalize from observations made on small numbers of individual fish.</b> |
| XGood                             |   |
| -Poor                             |   |

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

**This project appears to build upon previously funded research and does an exceptionally poor job of and explaining the goals and objectives of the new proposed research as compared to previously funded research. All project phases are mixed up, perhaps because the original proposal called for many phases of research and it was easier to work from the original multi-year (?) proposal rather than build a new proposal limited to goals and objectives for the phases of research to be funded by this proposal.**

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

**I am willing to believe that the existing state of knowledge concerning green sturgeon life history is very limited, but the presented conceptual model diagram is pretty close to worthless and suggests no intimate knowledge of sturgeon biology.**

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

**The approach seems chaotic and uncoordinated, but with a budget of this size (\$984/2 yr) and the involvement of UC Davis sturgeon aquaculture, physiology and genetics experts like Doroshov, Cech, and May, I am certain that at least some of the project results will prove of value. The proposal reads as if each PI was merely asked to contribute a paragraph or two concerning the kinds of things that might be fun to study in green sturgeon, but without any clear themes connecting these studies with sturgeon populations in their natural environments.**

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

**The authors fail to provide much evidence in support of an expectation that their research will be successful or relevant to the title of their proposal. For example, the proposed physiological studies purport to clarify the early life history of green sturgeon, but this research appears based exclusively on post-larval to saltwater-tolerant juveniles, life stages that are usually considered beyond the early life history (larval) stages of fishes. Much of the physiology studies deal with responses to stress regimes, but without any real argument that results from these studies would have much relevance for wild populations.**

**The genetic (stock composition at various locations) and reproductive (assessment of reproductive maturity so as to assist in identification of likely spawning grounds) components of the proposed research seem more relevant**

**Some of the proposed radio and ultrasonic tagging proposed in this project appears generally to consist of extremely intense continuous or frequent tracking of movements made over brief 1-3 d periods of time. Is this long enough for fish, just stressed by tagging, to resume normal behaviors. What can be learned from such intense observations even if fish do behave normally? The authors also propose a limited (40 fish) long-term tracking project using ultrasonic tags and a high-tech fixed point monitoring system. How will information generated from such tagging studies be used or interpreted? Tagging of green sturgeon is also planned in the Klamath River. Is that fundable by CALFED?**

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

**Final reports, manuscripts, meetings**



6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

See 5.

7. **Capabilities.** 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?

**Klimley has lots of experience tagging BIG stuff and has previous experience tagging green sturgeon. Other project Pis are well known and competent.**

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

**For this much money, it sure would have been nice to have seen a more coordinated project with some meaningful hypotheses concerning how the four subject areas of the proposed research are thematically connected and might influence overall status of green sturgeon in the Sacramento system**

**Miscellaneous comments:**

# External Scientific: #3

## Research and Restoration External Scientific Review Form

Proposal Number: 193

Applicant Organization: University of California, Davis

Proposal Title: **BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED**

### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

### Review:

Please provide an overall evaluation summary rating:

**Excellent:** outstanding in all respects;

**Good:** quality but some deficiencies;

**Poor:** serious deficiencies.

| Overall Evaluation Summary Rating | Provide a brief explanation of your summary rating   |
|-----------------------------------|--|
| -Excellent                        | <b>High priority research on important species (green sturgeon). Proven track record of scientists in sturgeon research. Proposal incomplete in articulation of integration (conceptual model) and field sampling design. Multi-discipline aspects diffuse without clear links to hypotheses relevant to management. Reading between the lines for important aspects of research: reproductive physiology and field elements have high priority for research. Other elements related to microsatellite DNA markers and physiological performance not well justified in current proposal. Overall, recommend restructuring work so that it is longer term, with field focus directed by central quantitative model(s) and supported by tools developed in laboratory (e.g. artificial propagation).</b> |
| XGood                             |  |
| -Poor                             |  |

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

**Green sturgeon is clearly a species at risk and there is a clear imperative to understand factors that can stem their further decline and promote their recovery. The current proposal contains elements to do this including fundamental research on 1) reproductive physiology and ecology; 2) early life history requirements; 3) population structure; and 4) patterns of**

habitat use and migration by the sub-adult and adult portion of the stock. While the principal study system is the Sacramento-San Joaquin system, the PI will also focus field work in Klamath system, which I found fully justified given the need to study reproduction and migration in a system where most stages of green sturgeon (and most importantly, spawning adults) can be sampled.

The research project is Phase 5 of a multi-year project underway. Past phases have had demonstrated successes principally in artificial propagation and improved understanding of reproductive physiology and embryo/larval development. As this is my first exposure to the overall project, I may not appreciate the full context of the proposed research. Still, external review should have led the PIs to provide more context for the project. The goals and objectives developed in the current proposal lacked internal consistency. There was little integration of the elements and phases of past and planned research. The request for over one million dollars, which is a reasonable request given how funds were similarly spent in Columbia drainage white sturgeon, should have directed the PIs to show how this multi-disciplinary study would be more than the sum of the parts. True, there is a loose framework of how research relates to different critical phases of life history. But on the other hand consider the excellent and very relevant research done in the Columbia drainage on white sturgeon. This research was complex and served to fill critical gaps in life history, but was highly coordinated around a population model (MOCPOP) that was directly relevant to improved management and conservation of white sturgeon. I could envisage other coordinated quantitative frameworks such as bioenergetic models or habitat suitability models that could have made elements of the proposal more directly relevant to management. Thus, while I laud most of the individual elements, the proposal is more a portfolio than a program of coordinated study designed to protect and restore green sturgeon to the Sacramento-San Joaquin system.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

As indicated above, I did not find the conceptual model, encapsulated in a diagram, very compelling. To evaluate the justification, I think it is useful to focus on the hypotheses. The first four (A through D) seem relevant to Bay-Delta Program goals (for green sturgeon related to ecological requirements, passage and exploitation). For instance, information on spawning habitat requirements would supply subsequent spatially explicit models with critical inputs for flow, temperature, and protection/restoration of bottom habitats. Hypothesis B has bearing on fisheries management - the classic mixed stock (or in this case mixed species) issue where the rarer of two stocks received disproportionately high removals due to exploitation that equally occurs on the two stocks. This issue is particularly critical because it represents a continuous loss rate. Large and late maturing sturgeons similar to green sturgeon typically cannot tolerate >5% annual removals (takes). I did not find objectives E through G particularly compelling or well linked to general goals of recovery of the species. Some questions I had on this set of objectives: Are stress markers to be relevant in the field or are these under development to promote artificial propagation work? What is the feasibility of their application? Have stress markers worked elsewhere in the applications the PIs had in mind? Why is swimming performance critical? Is this related to inputs necessary for watershed flow models that could lead to protection of habitats critical to juvenile sturgeons? How is a species comparison of ontogenetic changes in salinity tolerance relevant? Is this an issue related to sympatry between species? Or would similarity between the species allow one set of environmental guidelines and measures apply to both species. Again very little context is given with these objectives. The final objective (H) is related to important field work, which consumes a large part of the proposals budget. Tagging and telemetry work is very important, but here too I would have expected increased

justification centered on relevance to specific (dam passage) or more general (population/habitat model) objectives.

I think the lack of an integrated framework may indicate that portions of the research are premature. It seems that too much is being packed into a two year study. As indicated above, I think issues of green sturgeon conservation could easily command a > million dollar budget, but I would think more could be done in terms of "adaptive" (reflective) research if the project was longer term (4-5 years) and less intensive in the laboratory and across two field sites.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

**Task 1. Physiological Studies:** Physiological studies are well designed. This is fundamental research on osmoregulation in sturgeons and fishes in general. Akin to research on smoltification, the research would constitute in a significant contribution to the scientific literature. We know surprisingly little about saltwater adaptation in anadromous fishes outside of Salmoniformes. I am unclear on the relevance of proposed development of metabolic and physiological performance indicators. I thought these indicators were most relevant to cultured organisms, which does not seem the focus of the overall proposal. Their development will apparently require exhaustive laboratory rearing studies and laboratory work up, yet their justification is not well articulated.

**Task 2. Reproductive studies:** Hatcheries could represent the last line of defense for green sturgeon and provide experimental material for laboratory and field studies. Research in support of artificial propagation is highly relevant to sturgeon restoration and should be given high priority (for some reason this work is not featured in conceptual model or hypothesis section, so I dwell on relevancy here). In addition, there is a clear link between careful laboratory study on sturgeon reproductive physiology and field assessments of reproductive status that scientists Van Eenennaam and Doroshov have demonstrated in their past research. This research will have high dividends in terms of fundamental research on sturgeon reproduction, population models, and population assessments. The research group at Conte Lab in Massachusetts has had recent luck using a "bioscope" (rigid fiber-optic device) for assessing sturgeon gender and ripeness in the field. This seems worthwhile to pursue for green sturgeon.

**Task 3. Genetic analyses:** This research should be feasible given rapid development of microsatellite markers for other sturgeons. The idea of sorting out siblings and then estimating population genomic diversity seems a bit of a stretch however, in that it would assume that sampling was complete. In all instances of incomplete sampling, effective population size will be under-represented by sibling relatedness. While microsatellite markers may lead to unexpected research and management dividends, I would emphasize the part of proposed research that uses existing tools (MtDNA) to examine proportional contribution of green sturgeon vs. white sturgeon in mixed fisheries, and their relative contributions to eggs on spawning grounds (the latter through analysis of eggs). This will require careful sampling of fisheries and spawning grounds, which I did not think was given due consideration in the proposal.

**Task 4. Telemetric monitoring:** Telemetry tagging is quite feasible with sturgeons, which are robust to handling. The literature indicates that external tags can persist for > one year. Internal tags may be more difficult to detect, but could survive longer and are worth trying. I wondered why other tags were not being deployed as well. These could have still greater longevities and the reporting of these tags by fishers, fishery scientists, etc. would provide long term benefits and

broader spatial scale information on migration patterns. Still, telemetry is a good way to get short term information on habitat use patterns. The monitoring station approach is reasonable and has worked elsewhere - I assume that these monitors have been already purchased because I could not find them in the budget. I wondered why there was an emphasis on short-term manual tracking of sturgeons after release. I think there is reason to believe that sturgeons will not behave "naturally" for several days after tagging. Also emphasis on looking at habitat where sturgeons are captured, could say more about a minority of habitats where gear was more efficient (as an example) than the distribution of habitats actually utilized by sturgeons. I would think longer term monitoring, albeit less informative of microhabitat use, would be more representative of habitat utilization. To obtain microhabitat and diel habitat use information, it would be better to intensively track sturgeon that had been at large for > several weeks. The type of tags used (combined acoustic radio tags?) was not articulated and important in evaluating feasibility.

As stated above, I think the Klamath work is justified because it represents a system where spawning adults can be sampled. Migrations and spawning habitat, identified for this system, should greatly increase the odds of locating spawners and spawning habitat in the Sacramento system. Since fin rays are being collected for genetic analysis through field studies, I was curious why no age analysis were proposed. Growth, mortality rates, age at spawning, if supported by fin ray analysis, are critical inputs in population recovery models.

There is no description of field sampling design for eggs or early life history stages.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

I have addressed feasibility in the previous section. Here I will comment that laboratory portions of the research (task related to physiology and reproduction) are very feasible. The feasibility of tasks related to field work could not be fully evaluated because sampling designs were incompletely described. This is not entirely the fault of the PIs however, since it is necessary to do exploratory (adaptive?) research in the Sacramento system to locate critical habitats of green sturgeon and measure migration and population structure. I would not exclude these latter objectives because they were inherently risky. As stated above I think the scale of the research is somewhat too diffuse. It needs stronger integration around a conceptual model, or broken apart so that each product stands more on its own in terms of relevancy to green sturgeon conservation.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

The current research (Phase 1 and 2) seem well communicated to relevant state entities and publications, particularly those related to reproductive physiology and early development demonstrate past productivity. There is not much detail on organization and supervision of the project. I think this too speaks to the lack of integration in the proposal.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

**Field work and laboratory research on reproductive physiology will put managers on more solid footing in terms of evaluating and protecting habitats important to green sturgeon. Because so little is known about green sturgeon ecology, the information collected in the field and analyzed in the laboratory will be of great benefit. Important scientific products should also be expected from research on sturgeon physiology, reproduction, and perhaps genetics. The research will not provide management tools per se (e.g. a sturgeon population or habitat model), but will move incrementally towards that end, and should provide at least some domains of habitat and fishing influences on green sturgeon conservation that will be qualitatively useful to managers.**

7. **Capabilities.** 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?

**On individual elements of the research, the group of PIs, particularly Doroshov, Van Eenennaam, Croker, and Cech have established track records in excellent science and service to the state. I am less familiar with Klimley's record, but he seems to have pertinent experience doing field work on sharks and has a demonstrated scientific record in remote telemetry. Kohlhorst has done creative and rigorous work on white sturgeon population dynamics in the past. His services seem underutilized in this proposal. Infrastructure at UC Davis is uniquely suited for the proposed research.**

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

**The budget seems reasonable given the multi-disciplinary nature of the work. I think funds could be more effectively spent, if field efforts were emphasized over a longer period rather than the intensive two year study proposed.**

**Miscellaneous comments:**

**The proposed research should have included collaboration by quantitative population ecologist, stock assessment scientist, or geographic information specialist. These disciplines would serve to more effectively integrate research portfolio of individual research elements laid out in the current proposal.**

## External Scientific: #4

### Research and Restoration External Scientific Review Form

Proposal Number: **193**

Applicant Organization: **University of California, Davis**

Proposal Title: **BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED**

#### Conflict of Interest Statements:

I have no financial interest in this proposal.

**X**Correct

-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

**No present conflicts. My institution once funded Doroshov for sturgeon work on the Hudson River; this work is long since completed.**

#### Review:

**Please provide an overall evaluation summary rating:**

**Excellent: outstanding in all respects;**

**Good: quality but some deficiencies;**

**Poor: serious deficiencies.**

| <b>Overall Evaluation Summary Rating</b> | <b>Provide a brief explanation of your summary rating</b>  |
|--|--|
| <b>X</b> Excellent                       | <b>I see a need for this research and no serious flaws in its workplan. It is broad, logical, and hypothesis-driven. When it is complete, we will know about as much about green sturgeon as we do white sturgeon, which is now a good deal.</b> |
| -Good                                    |  |
| -Poor                                    |  |

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

**The goals of this proposal are manifold but clearly stated. This is Phase 5 of this study, with Phases 3 & 4 currently underway. These phases represent a remarkably well-planned, broad, and thorough study of almost everything science and management might wish to know about green sturgeon.**

**Phase 5 seeks to advance in four subject areas: physiology, reproductive biology, genetics, and movements and distribution. Each one of these is a major study in itself, but by occurring simultaneously and by being conducted by a cohesive group of researchers who share samples and information, the whole should be more than the sum of the parts.**

**Placement of this work in a hypothesis driven framework and conceptual model raises the quality of the proposal.**

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

**My assumption is that if this proposal is for Phase 5, then the justification for a study of green sturgeon was long ago accepted by Calfed. But to underscore the obvious, the green sturgeon is a very poorly understood acipenserid, particularly for one found in North America. Given that sturgeon populations have painfully slow recovery rates, any information that helps manage this already somewhat scarce animal will be of value.**

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

**The approach is multi-pronged and highly physiologically driven. The only area that is weak are ecological considerations such as predation and competition, and perhaps Genetics (see next box).**

**Under Physiology in Statement of Problem, the transition of young sturgeon to the marine environment will be looked at in physical and physiological terms. This is important, but could there be an ecological component, such as the suitability of trophic resources to growing fish? Under the Approach to Physiology, is it fair to consider any fish held in artificial conditions as existing in a "no stress" environment?**

**I like that although this is ostensibly a Sacramento-San Joaquin study, the investigators realize that the bounds of this population are not well known and that important parts of its life cycle may occur in other waters (such as the Klamath), which are included.**

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

**Virtually all of this work is feasible and given the experience of the investigators, should proceed to finish. Some aspects of the work are not fully documented, which may be due in part to the sheer breadth of research proposed.**

**For example, the Genetics approach of using microsatellites to estimate the number of breeding adults will be a major tool if it works (for some non-acipenserids too). And mixed-stock analysis is an excellent complement to this. Unfortunately, no detail was provided on how mixed-stock analysis would proceed. Marine samples of a non-abundant fish are not easy to find. Moreover, simulation analyses have shown that one should have at least about 100 specimens in the mixed-stock sample (and 100 in each of the reference samples). Although that is not hard and fast, are collection sizes approaching that number realistic? And what statistical approach will be applied?**

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?



**I judge a study's success mainly by the quality and number of peer-reviewed publications that emanate from it. Also, by its usefulness to management. These are difficult to assess in the course of complex multi-year studies. But this entire study represents a logical, cumulative progression. Moreover, enough work products are emerging that I feel comfortable that this will not be an issue.**

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

**To date, this team has generated an adequate number of presentations and publications, and given their track record, I'm confident that eventually all information of merit would reach peer-reviewed journals. These phased studies represent such a leap in knowledge of this here-to-fore poorly understood species that it is difficult to imagine how new interpretative outcomes could not result.**

7. **Capabilities.** 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?

**What really excites me about this study is that it is being performed by the foremost researchers of white sturgeon in the world. This group knows sturgeon and should be able to work efficiently while avoiding the mistakes that would otherwise be likely with newcomers to such unique fishes. Cech, Doroshov, and Kohlhorst in particular are well known as competent and experienced sturgeon researchers. The other bonus to this wealth of experience is that it will allow for an excellent comparison with knowledge of its sympatric congener, the white sturgeon.**

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

**The costs of this work component by component are reasonable. But the total is staggering. I mean that in the positive sense--to date, sturgeon, despite their allure and threats have not attracted major funding. This funding is an order of magnitude above what has occurred elsewhere around the U.S. But it also is by far the most complete study of a sturgeon species.**

**Miscellaneous comments:**

**I was pleased that there will be a concerted search for actual spawning locations. In frequently-perturbed large rivers, these probably highly specific locations can then be fully protected.**

## **Prior Performance/Next Phase Funding: #1**

**New Proposal Number:** 193

**New Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

1. Prior CALFED project numbers, titles, and programs: *(list only projects for which you are the contract manager)*

**CALFED # 00-B06, USBR # 00-FC-20-0142, Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed, Phase II**

2. Prior CVPIA project numbers, titles, and programs: *(list only projects for which you are the contract manager)*

**None**

3. Have negotiations about contracts or contract amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

**X**Yes -No -N/A

If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

**X**Yes -No -N/A

If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

**X**Yes -No -N/A

If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

**X**Yes -No -N/A

If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

**X**Yes -No -N/A

If no, please explain:

**Completion date of 00-B06 is May 31, 2002.**

Other Comments:

## **Prior Performance/Next Phase Funding: #2**

**New Proposal Number:** 193

**New Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

1. Prior CALFED project numbers, titles, and programs: *(list only projects for which you are the contract manager)*

**98-C15 Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed (Phase I)**

2. Prior CVPIA project numbers, titles, and programs: *(list only projects for which you are the contract manager)*
3. Have negotiations about contracts or contract amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

Yes -No -N/A

If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

Yes -No -N/A

If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

Yes -No -N/A

If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

Yes -No -N/A

If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

Yes -No -N/A

If no, please explain:

Other Comments:

**Reporting and project coordination could be improved but not considered a significant issue.**

## **Prior Performance/Next Phase Funding: #3**

**New Proposal Number:** 193

**New Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

1. Prior CALFED project numbers, titles, and programs: *(list only projects for which you are the contract manager)*

**Phase 1- Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed Proposal # ERP-98-C15 (B81738)**

**Phase 2 - Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed Agreement # 00FC200142**

2. Prior CVPIA project numbers, titles, and programs: *(list only projects for which you are the contract manager)*

**Phase 3&4 - Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed Contract # 11332-1-G005 CVPIA/AFRP**

3. Have negotiations about contracts or contract amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

Yes -No -N/A

If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

Yes -No -N/A

If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

Yes -No -N/A

If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

Yes -No -N/A

If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

Yes -No -N/A

If no, please explain:

Other Comments:

## **Environmental Compliance:**

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

-Yes No

If no, please explain:

**The applicant did not disclose the contractor conducting the field work. They will need a Scientific Collecting Permit for collection of Green sturgeon, comply with CESA/ESA for incidental take of state and federal listed species such as splittail, winter-run salmon, and steelhead. Complying with CESA/ESA requires a CEQA and NEPA document respectively.**

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

-Yes No

If no, please explain:

**Money and time are not allocated for preparing the required documents and obtaining the proper permits.**

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

Yes -No

If yes, please explain:

**But, if they comply with CEQA/NEPA and CESA/ESA, project is feasible.**

Other Comments:



## **Budget:**

**Proposal Number:** 193

**Applicant Organization:** University of California, Davis

**Proposal Title:** BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED

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

Yes -No

If no, please explain:

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

Yes -No

If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

Yes -No

If no, please explain:

4. Are appropriate project management costs clearly identified?

Yes -No

If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

-Yes No

If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

**Question 17a = \$982,061, and the Budget Summary = \$984,538.**

6. Does the budget justification adequately explain major expenses?

Yes -No

If no, please explain:

7. Are there other budget issues that warrant consideration?

-Yes No

If yes, please explain:

Other Comments: