

# CALFED Science Program PSP Grant

## Supplement Proposal

### Technical Selection Panel Review

**Grant Supplement Identification:** *Brandes, 2*

**Applicant Organization:** U. S. Fish and Wildlife Service

**Grant Supplement Title:** Use of Scales to Determine Race and Life History Characteristics of Juvenile Salmon Sampled at Chipps Island.

**Original Grant (Year):** Estimating Juvenile Chinook Salmon Spring and Winter Run Abundance at Chipps Island (2006)

#### **Review**

*The following review form has been broken down into three subsections: (1) technical review criteria, (2) value added review criteria, and (3) funding recommendation. It includes a review and summary rating for each of these subsections using all review criteria. Technical criteria is separated from the value added criteria because these issues will be weighed separately, but with equal importance. No supplement proposals will be funded that are rated inadequate in either criteria.*

#### **Subsection 1: Technical Review**

*Review about the technical merit of the supplement proposal. Criteria for consideration are:*

##### ***Technical Review Criteria***

- ***Purpose:*** *Are the goals, objectives and hypotheses of the supplement proposal clearly stated and internally consistent?*
- ***Background:*** *Is the underlying basis for the supplemental work clearly explained and well documented?*
- ***Approach:*** *Is the approach to the supplemental work well designed and appropriate for meeting the objectives of the supplemental project? Is it clear who will be performing supplemental tasks including management and administration of the project and are resources set aside to do so?*
- ***Feasibility:*** *Is the approach for the supplemental work fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?*
- ***Budget:*** *Is it clear how much each aspect of the supplemental work will cost including each task, salaries, equipment, etc.? Is the budget reasonable and adequate for the work proposed?*
- ***Qualifications:*** *Is the project staff qualified to efficiently and effectively implement the supplemental project? Do they have available the infrastructure and other aspects of support necessary to accomplish the*

*project?*

- **Past Performance:** *Unless informed otherwise by CALFED staff, reviewers should assume that the applicants have met the commitments indicated on their existing CALFED grant/contract*

**Purpose:** The goals of the project are clearly stated. The investigator proposes to investigate whether increment patterns on scales of out-migrating Chinook salmon juveniles can be used to identify races in combination with genetic analysis. The hypothesis is that scale pattern analysis can allow identification of spawning run races. The objectives are to analyze scale increment patterns of juveniles and compare that with genetic analyses of the same individuals.

**Background:** The basis for the supplemental work is fairly well explained. In the existing CALFED grant, Brandes is standardizing collections of juveniles collected by trawl at Chipps Island, a major migration pathway for smolts on their way to the ocean. Genetic analysis of these individuals already is being done under the existing contract. An earlier analysis of scale patterns of adult Chinook salmon found significant differences in increment spacing and number among different races of Chinook salmon: spring, fall, late fall, and winter. Another analysis of out-migrating juveniles suggested differences in habitat use were reflected in scale growth patterns, indicating that migration pathways of races may be inferred from analysis of smolt scales. Genetic analysis may confirm that observed differences in scale patterns can be used to monitor race composition of out-migrating smolts.

The attachment of Paul Raquel's (1980) scale pattern analysis was helpful, and provided visual and statistical documentation that scale patterns of different races were different.

**Approach:** The approach is fairly well designed and appropriate for meeting the objectives. However, the investigator assumes that the results of the genetic tests are the gold standard for separating races. The geneticist subcontracted apparently has done this for years, but no reference is given to evaluate the work. The supplemental proposal mentions the geneticist is still resolving which microsatellites to use for the analysis. As in all things, there is some level of error associated with genetic classification of race assignment, which should be acknowledged in the approach section.

**Feasibility:** The approach is well documented.

There are pitfalls with the analysis. First, hatchery practices may have blurred differences in hatch time and habitat use if selection of adults was biased. The relative influence of hatchery production on total juvenile numbers is unknown but believed to be large. Some of the endangered and threatened races have been supplemented by hatchery stocking for years. Run timing is known to be inherited, and if hatchery selection of adults used to supplement harvest is inherited, then differences in spawning, egg development time, and subsequent

habitat use may have been obscured over time. Second, it appears that operation of the plumbing system in the Delta may change growth patterns that may have been more evident during the 1980s when water withdrawals were not so common. It would be useful to verify that scale increment spacing does infer habitat use by comparing scale patterns of individuals with additional markers such as otolith microchemistry proposed in other CALFED studies.

The investigator did not mention how to apply Raquel's scale pattern "key" to distinguish races of juveniles collected in the trawl survey. Previous researchers have had difficulty in interpreting juvenile scales; it is not clear that the proposed project will overcome these problems. Although differences were apparent in scale patterns of adults, there was considerable overlap in increment number and spacing, suggesting that application of likelihood-based approach would be useful to assign race. Also, it was not clear what statistical tests will be used to compare results of the scale pattern analysis with results of the genetic test. Finally, no details were offered on how to handle differences between scale readers in scale pattern counts and race assignments.

**Budget:** The budget is clear and reasonable for the level of work proposed. It was not clear how the investigator decided to analyze scales from all of the juveniles sampled over the previous three years. It would be more cost efficient to randomly sub-sample the catch within month and analyze the scales for potential differences in patterns. Since numbers of scales translates directly into cost, some savings would be realized by starting with a sub-sample of individuals. Given patterns evident in adult scales, the investigator could estimate numbers of young to sub-sample to look for differences.

**Qualifications:** California Fish and Game fisheries biologists who are experienced in reading increment patterns of scales will train project staff with the use of image analysis technology. The Panel is not confident that the personnel can implement the project. Samples of juvenile salmon are already being conducted by the investigator under the existing CALFED contract.

### ***Technical Review Summary***

*The technical review of this supplement proposal is provided in the space below and addresses each of the technical review criteria (above), including strengths, weaknesses, and specific reasons supporting the evaluation.*

**Strengths:** If successful, this proposed project will allow cost effective monitoring of race identity for out-migrating smolts. Verification of race assignments through microsatellite analysis will support the results of the scale pattern analysis.

**Weaknesses:** As mentioned above, this proposal would have been stronger if the investigator had considered sub-sampling of juveniles to reduce costs, or provided some documentation why it is necessary to read all 9,000 scales. It would be useful to corroborate habitat use through additional markers such as otolith

microchemistry – so collaboration with other CALFED investigators would be helpful. Consideration of error associated with genetic and scale assignments, and how to apply a key given the error, would strengthen the proposal.

The name of the geneticist was not given and would have been nice to know. The budget proposed seems excessive. The proposal does not mention sub-sampling. There is overlap between the scale patterns between the races, and no consideration of that overlap. The proposal did not inspire confidence that the scale key previously developed could be applied. No one in the lab is trained in the methodology.

This methodology has been unsuccessfully tried before using juveniles. It is an important question, but this is not the way to do it. Other methods, such as combining genetics with otolith microchemistry would arrive at the desired conclusions.

***Technical Rating Criteria***

*Rating of the technical merit of the supplement proposal based on the following scale:*

- ***Superior:*** Outstanding in all respects with no technical concerns. Complete confidence proponents will accomplish the project goals.
- ***Above Average:*** A very good proposal with no significant technical concerns. Very confident proponents will accomplish the project goals.
- ***Sufficient:*** A reasonable proposal with some technical deficiencies but nothing critical. Fairly confident proponents will accomplish most of their project goals.
- ***Inadequate:*** A technically deficient proposal with serious impediments or concerns. Little confidence proponents will accomplish many project goals.

Please **X** the appropriate technical rating:

- Superior
- Above Average
- Sufficient
- Inadequate

***Explanation of rating and additional comments:***

The proposal has substantive technical flaws. The techniques proposed are not new and will not add significantly to knowledge already available through ongoing studies.

## Subsection 2: Value Added Review

Review about the value added of the supplement proposal. Criteria for consideration are:

### **Value Added Review Criteria**

- **Purpose:** *Is the new study justified relative to existing knowledge? Are new results likely to add to the base of knowledge? Is the supplemental project likely to generate novel information, methodology, or approaches? Is it clear how the purpose of the supplemental work differs from the work in the existing grant/contract?*
- **Relevancy:** *Is it clear how the supplement proposal evolved from and relates to the existing grant/contract? Does the supplement proposal clearly and directly address one or more of the objectives/priorities in the existing grant/contract? Does the supplement proposal identify new relevancies to CALFED priorities not identified in the existing grant/contract?*
- **Timeliness:** *Does the supplement proposal clearly illustrate the need for immediate funding before the next Science Program PSP cycle (1 to 2 years)?*
- **Approach:** *Is it clear how the approach of the supplemental work differs from and adds to the work in the existing grant/contract?*
- **Products:** *Are products of value likely from the supplemental project that differ from those proposed in the existing grant/contract? Is there a plan for widespread and effective dissemination of information gained from the supplemental project?*
- **Budget:** *Is it clear that supplemental funds are going to new or revised tasks or equipment relative to those proposed in the existing grant/contract? Considering the amount of funding requested in the proposed budget, is there a high value in terms of knowledge gained for the CALFED Program relative to other proposals you are familiar with (i.e. “bang for the buck”)?*

**Purpose:** New results will not add significantly to the base of knowledge. There are no new approaches or information available here, beyond what is already being conducted in the existing CALFED contract to Brandes. It is clear that this supplemental work could add a cost-effective capability to monitor the race composition of out-migrating juveniles, which is a valuable benefit.

**Relevancy:** Yes, the proposal does address objectives of the existing contract, and is directly related to the CALFED priority of identifying trends and patterns of populations and system response to a changing environment.

**Timeliness:** No, there is not an immediate need to fund this project. The collections of juveniles are ongoing, and scales can be archived and read later. Because the genetic analysis of juveniles is just beginning; the supplemental project could be funded in 1-2 years.

**Approach:** It is very clear how the approach of the supplemental project differs from the existing grant/contract. This supplemental project would add a cost-effective capability to monitor race composition of out-migrating smolts if it were successful.

**Products:** Products of value are a potential cost-effective method to assign race composition of the out-migrating smolt run through scale pattern analysis. The plan for widespread dissemination is an agency report, and if the project is successful, a journal publication.

**Budget:** Compared to other proposals, this project has relatively low bang-for-the-buck. It is expensive (nearly \$300,000), doesn't provide any novel information, or test new technology.

### ***Value Added Review Summary***

*The value added review of this supplement proposal is provided in the space below and addresses each of the value added criteria (above), including strengths, weaknesses, and specific reasons supporting the evaluation.*

The major strength of this supplemental proposal is to determine if a cost-effective method can be found to assign race composition of out-migrating smolts. This is a very worthy objective. Although the proposal has relatively low bang-for-the-buck, the value added would be higher if the investigator considered proposing a pilot study, using the earlier study to estimate smaller sample sizes, and consider the error in estimates and how to assign the Raquel (1980) key to unknown race identities of individuals.

### ***Value Added Review Rating***

*Rating of the value added merit of the supplement proposal based on the following scale:*

- ***Superior:*** Outstanding scientific value with a pressing need for immediate funding and expected to add substantial new thinking/concepts to our knowledge/understanding on one or more highly relevant CALFED topics for a very reasonable supplemental cost.
- ***Above Average:*** At least high scientific value and a clear need for rapid funding. Expected to add solid basic new thinking/concepts to our knowledge/understanding on one or more highly relevant CALFED priority research topics for a very reasonable supplemental cost.
- ***Sufficient:*** A supplement proposal with a fair amount of scientific value and need for timely funding and expected to add some basic new thinking/concepts to our knowledge/understanding on one or more adequately relevant CALFED topics for a reasonable supplemental cost.
- ***Inadequate:*** A supplement proposal that has little scientific value or need for timely funding. Not expected to add significant new thinking/concepts to our knowledge/understanding on relevant CALFED topics or the supplemental cost is unreasonable for the knowledge gained.

Please select the appropriate rating with an **X**:

- Superior
- Above Average
- Sufficient
- Inadequate

***Explanation of rating and additional comments:***

The major value of the project is that if successful, it would provide a cost-effective means of monitoring the race composition of Chinook salmon smolts. Currently the only way of doing this is either through genetic analysis or otolith microchemistry analysis, which are both more expensive. The timeliness is increased by the recent collapse of the fall run of Chinook salmon from this system; however, a pilot project would be more appropriate given the state of the currently funded research

**Subsection 3: Funding Recommendation and Justification**

*Funding recommendation for this supplement proposal and a justification of this recommendation.*

Select one of the following three funding recommendations with an **X**:

- Fund in Full
- Fund with modifications
- Suggested Funding Amount \$ \_\_\_\_\_
- Do not fund

*Justification to recommendation. If the recommendation is to fund with modifications, modifications the applicants must make in order to receive funds are listed.*

The Panel has enough concerns about the application of the analysis and the cost to recommend this proposal not be funded at this time.

***Additional Remarks***

The proposal would have been greatly strengthened by consideration of error and statistical comparisons between genetics and scale pattern analysis, sub-sampling and cost, and between-reader error.