I.   Project Title:

Development of a centrarchid monitoring plan for the Colorado River, Colorado.

II.   Principal Investigator(s):   Dr. Kevin R. Bestgen
                                 Larval Fish Laboratory (LFL)
                                 Department of Fishery and Wildlife Biology
                                 Colorado State University
                                 Fort Collins, CO 80523
                                 (970) 491-1848/5295; FAX 491-5091
                                 E-mail kbestgen@cnr.colostate.edu

III.   Project Summary:

The stocking plan for non-native fishes in the Upper Colorado River Basin calls for monitoring of centrarchid fishes in backwaters of the Colorado River, Colorado. At present, there is no monitoring program in place that can monitor centrarchid distribution and abundance with sufficient accuracy and precision. The goal of this study is to develop a sampling methodology to more accurately detect the presence and estimate the abundance of centrarchid fishes in backwaters of the Colorado River in Colorado. Such a program of sampling will assist managers in understanding trends in centrarchid fish abundance and its relationship to flood plain and riverine management activities.

IV.   Study Schedule: 2002–2005.

This was the original schedule until activities under C-18/19 were altered or terminated. The study schedule needs to be modified according to upcoming discussions regarding the fate of elements of the C-18/19 study.

V.   Relationship to RIPRAP:

COLORADO RIVER ACTION PLAIN: MAINSTEM
III. Reduce negative impacts of nonnative fishes and sportfish management activities.
III.A. Develop and implement control programs in reaches of the Colorado River occupied by endangered fishes.
III.A.2.a. Evaluate and make recommendations.

VI.   Accomplishment of FY 2002 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Develop a sampling program and technique to determine the number of backwaters to

be sampled in the reach. Computer simulations will be implemented with data gathered in 1997 and 1998 (Bundy and Bestgen 2001) and with data collected in this sampling program. Simulations will be used to determine the level of bias and precision that can be obtained with a given level of sampling and to determine the optimum number of backwaters to sample in a given year.

Because of ongoing discussions since early spring in 2002 regarding the fate of C-18/19 activities, we decided to wait on fully implementing this aspect of the work so that effort could be most profitably directed to the revised overall scope. We also did not proceed fully with simulations because we intended to use additional abundance estimates gathered in autumn 2002. We did assemble existing data and wrote most of the code needed for simulation sampling. Unspent 2002 monies will be used to accomplish this task as soon as abundance estimates are available from 2002 data.

Task 2. Develop comparisons of seining and electrofishing techniques to detect presence and estimate abundance and size-structure of centrarchids within backwaters.

We partially accomplished this task in autumn 2002. We were extremely limited in river area, and in type and number of backwaters to sample because of extremely low flows present in the Colorado River. The reach above the confluence with the Gunnison River (15-mile reach) was not accessible at all except at one drive-to location (Labor Camp). We decided against sampling that location because it was extremely overgrown with rooted macrophytes (*Typha* and others) and did not represent the usual condition for this and other backwaters in the river.

The portion of the Colorado River below the Gunnison River confluence was only partially accessible and few backwaters were available to sample. Five of seven backwaters were > 2,100 m^2 (mean = 1,890 m^2; range = 277–3,264 m^2), and were extremely time-consuming to sample. Backwaters in 1997 and 1998 averaged 700–800 m^2 and very few were larger than 2,000 m^2 (Bundy and Bestgen 2001).

A total of seven backwaters was sampled with various gear types so that we could begin to develop comparisons of sampling techniques to develop the monitoring program. Nearly all backwaters in the accessible reach were sampled and several were identified as hot spots of centrarchid abundance from earlier studies. Large backwater size demanded that capture-recapture sampling be used as the estimation technique in 6 of 7 backwaters. Large backwater size, presence of heavy cover, and deep mud necessitated use of electrofishing gear in those six backwaters. Removal sampling with seines was possible in only the one smaller backwater. Because we only recently finished 2002 sampling, abundance estimates and data analyses are incomplete.

Centrarchids were present in 100% of backwaters and were abundant in most of those in 2002. Largemouth bass and green sunfish were present in 100 % (7 of 7) of backwaters sampled in 2002. In 1997 and 1998, largemouth bass were detected in 65% of backwaters (30 of 46) sampled, and green sunfish were found in 87% of backwaters (40 of 46). The small sample size of backwaters in 2002 limits inferences that can be made from these data but suggested that bass and green sunfish

remain in relatively large numbers in large backwaters of the Colorado River. Though sample size was small, we noted that bluegill were present in a larger number of backwaters (4 of 7; 57%) and were more abundant in 2002 than previously. Bluegill were a major population component in at least one backwater near Connected Lakes. In 1997 and 1998, bluegill were found in only 8 of 46 backwaters (17%) and were never abundant. The long-term consequences of more abundant bluegill populations are unknown and inferences were limited by the small backwater sample size. However, 2002 data may indicate more escapement of lentic-adapted bluegill from flood plain sources.

Although abundance estimates are not yet available, we removed 1,493 centrarchids from the seven backwaters sampled in 2002. Green sunfish *Lepomis cyanellus* was the most abundant species, followed by largemouth bass *Micropterus salmoides*, bluegill *L. macrochirus*, and black crappie *Pomoxis nigromaculatus*. These fish represented only fish captured that were too small to mark (< 55 mm total length) on one of the marking passes or fish captured on the last (4th) sampling pass when all centrarchids were removed. Because the fish that we removed represent a small percentage of the total handled, abundance estimates for some backwaters may be quite high. Recapture rates were estimated to be 15 to 30%, so abundance estimates should be relatively precise.

We anticipated a larger array of backwater sizes to sample so that we could employ a variety of gear types and estimation techniques. Low-river conditions did not allow for this. We plan to use unspent monies to sample a larger number of smaller backwaters in 2003. The information that we obtained in 2002 was very valuable because it gave us a baseline of information in a very low flow year from which to track subsequent estimates. The backwater sampling in 2002 also gave us valuable information about the response of centrarchid species to low-flow conditions in the Colorado River and will allow us to track abundance changes through time as river conditions change with flow year.

> Task 3. Develop estimates of the level of sampling intensity needed to provide unbiased estimates of centrarchid presence, abundance, and size-structure in backwaters that are selected.

Other than preliminary data analyses, no progress was expected on this task in this year. This task will be the result of data analyses after more extensive backwater sampling is completed.

VII.   Recommendations:

Although C-18/19 has been severely modified and portions of it eliminated, we feel this monitoring portion of the work should continue. The genesis of this project was to have a means of evaluating effects of stocking regulations on centrarchid abundance in the Colorado River. That need still exists. We have also gained valuable insight into the abundance dynamics of centrarchids and distribution and type of backwaters in a low flow year. Following these population and habitat dynamics over time and in different flow conditions should provide us with information regarding factors that affect longer-term distribution and abundance dynamics of centrarchids in the river. Another advantage of continuing this work is that the techniques that we propose are similar to those used in the intensive abundance estimation study in 1997–1998. Data collected from both studies could then be

used to understand status of centrarchids in the river and whether management actions have affected their abundance. Finally, the monitoring plan that would result from this work would provide a baseline of data for which effects of any management action (e.g., screening, fish removal) could be evaluated.

VIII.   Project Status:

Significant project changes (termination) have been proposed. We do not feel this is justified because centrarchid monitoring is still needed in the Grand Valley reach of the Colorado River. A variety of management activities have been proposed to reduce effects of centrachid fishes in the Grand Valley reach of the Colorado River. These include fish removal in the floodplain and the river, screening, and structural modifications to floodplain sources to prevent fish access to the river. Regardless of the management activity that is used to control or reduce effects of centrarchid fishes, a monitoring tool will still be needed to track their abundance. Without such, there will be no means to assess wether said management activities are having the desired effect.

IX.   FY 2002 Budget Status

A.   Funds Provided: $46,000
B.   Funds Expended: $31,500
C.   Difference: $14,500. The balance of the funds will be used for data analyses described in tasks 1 and 2. Any remaining funds will be used to increase sample size of smaller backwaters in 2003.
D.   Percent of the FY 2002 work completed, and projected costs to complete: We have completed about 67% of the work proposed and have sufficient funds to complete the remaining work.
E.   Recovery Program funds spent for publication charges: None.

X.   Status of Data Submission (Where applicable): No data have been submitted as estimates and data analyses are incomplete. No endangered fishes were captured.

XI.   Signed: <u>Kevin R. Bestgen</u>   <u>26 Nov. 2002</u>
                          Principal Investigator   Date