



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title ONE THOUSAND YEARS OF COLORADO RIVER FLOW:

THE PROXY RECORD OF OXYGEN ISOTOPES IN MARINE MOLLUSKS FROM
THE COLORADO DELTA

Duration: September, 1996 through August, 1998

Federal funds requested: \$89,552

Non-federal (matching) funds pledged: \$198,037

Principal investigators:

Dr. Karl W. Flessa, University of Arizona Dr. David Dettman, University of Arizona

Dr. James C. Zachos, University of California, Santa Cruz

Congressional districts:

Arizona #2

California #17

STATEMENT OF CRITICAL REGIONAL OR STATE WATER PROBLEMS:

The Colorado River is the most important source of water in the arid southwest but current allocations among the states and Mexico are based on flows estimated from less than 80 years of direct measurement. Are these historic flows representative of the flows that can be expected in the future? Have there been times when the rivers flow was much less than flows directly observed? Has the seasonality of the rivers' flow varied during the past 1,000 years? To answer these questions, we need records covering longer time periods than are provided by direct measurements

Information on the duration and magnitude of times of low flow is critical for planning allocations during future droughts. The frequency, duration, and magnitude of times of low flow in the past provide estimates of the likelihood, duration and magnitude of low flow in the future. Results of this study will be of interest to international (U.S.-Mexico), federal, regional, state, and district level agencies concerned with allocating future supplies of Colorado River water.

STATEMENT OF RESULTS OR BENEFITS:

We will provide estimates of the flow of the Colorado River where it enters the northern Gulf of California. Isotopic analyses of well-dated mollusks will provide estimates of the volume of river water entering the Colorado Delta in 50 year intervals back to the year 1000 A.D. Isotopic analyses of growth bands within the shells will provide estimates of the seasonality of flow during the past 1,000 years.

These estimates will be also used to corroborate tree-ring estimates of flow during the past 400 years and to identify the likely recurrence intervals of times of unusually high or low flow conditions. Such information can be used in developing plans for managing the Colorado River system in times of water shortage.