

Executive Summary

A. Project Title and Applicant Name: BIOLOGICAL ASSESSMENT OF GREEN STURGEON IN THE SACRAMENTO-SAN JOAQUIN WATERSHED; Joseph J. Cech, Jr.

B. Project Description and Primary Biological/Ecological Objectives: The green sturgeon (GS, *Acipenser medirostris*) is a CALFED Priority Group I species, and the proposed work will focus on the biological characteristics of this species and its habitats towards their eventual restoration. Our coordinated UC Davis-CDFG team will address key areas of scientific uncertainty about GS to minimize harm to this species and its population(s) in the lower Sacramento-San Joaquin watershed. In the first two phases (years) of a multi-phase investigation, we will determine baseline information regarding this species' biological requirements in the Sacramento-San Joaquin watershed, and the feasibility of GS culture for further research and potential mitigational considerations. The project has five objectives: 1. determine juvenile GS' food and oxygen requirements at different environmental temperatures, temperature tolerance limits and behavioral tendencies, and swimming performance; 2. determine GS' requirements for gonadal development, spawning, and the successful rearing of larvae and juveniles; 3. determine potential environmental stressors' effects on GS' reproductive functioning and well being; 4. determine the genetic stock structure of naturally spawning GS from the Sacramento-San Joaquin river system; and 5. determine GS spawning site suitability in the Feather River and provide GS adults, sub-adults, larvae, and eggs from the Sacramento system to UC Davis scientists conducting the studies outlined in the first four objectives. These projects will provide valuable information to decision-makers regarding environmental resource management options to restore Bay-Delta ecological health and water quality.

C. Approach/Tasks/Schedule: We will determine the physiological/behavioral responses and limits, reproductive/early life history requirements, stress responses, genetic makeup, and spawning locations/requirements of GS in the lower Sacramento-San Joaquin watershed. We will capture juvenile GS from Feather and Sacramento Rivers (including cooperative arrangements with Curt Brown, USFWS). Sturgeon egg and larval sampling will be conducted with simultaneous temperature, depth, flow velocity and substrate composition measurements during the late winter and spring of 1999 and 2000. Sturgeon eggs will be either maintained alive or preserved and transported to UC Davis researchers. During the fall of 1999, modifications will be made to procedures of a scheduled sturgeon tagging study so that adult and sub-adult green sturgeon captured during this tagging can be held alive until they can be transported to the UC Davis Aquatic Center. During juvenile longline sampling in the west delta during August and November of 1999 and 2000, all GS juveniles will be made available for UC Davis scientists for live pickup at various delta marinas. With USFWS and tribal (Yurok) cooperation, we will capture a few brood fish for captive spawning from the Klamath basin (where spawning GS are more likely captured) to characterize early development and provide more fish for the proposed studies. At UC Davis (Phase 1, currently funded), we are determining GS' temperature tolerance limits and behavioral tendencies, swimming performance limits, developmental progress of gonadal tissues and germ cells, rhythms of circulating hormones and gonadal responses to stressors (including culture conditions), molecular markers to differentiate white sturgeon (WS) and GS and their relative proportion spawning in the Sacramento-San Joaquin drainage, and GS genetic polymorphisms.

During Phase 2 (here proposed), we will continue spawning location/requirements studies, determine temperature's influence on food and oxygen consumption rates, optimum artificial spawning techniques, and degree of reproductive isolation of Sacramento-San Joaquin GS from Klamath River and Rogue River (Oregon) populations. Plans for subsequent phases will depend upon results from the first two phases.

D. Justification for Project and Funding by CALFED: CALFED funding is proposed because of the critical need for species-specific information on GS in the natural environment and in laboratory and culture conditions. Published information on the life history and environmental requirements of this native species is almost entirely lacking. Because this species is rare and only lightly harvested in California, there is little justification for funding from normal sport or commercial fisheries research funding sources. Without determining the GS' vulnerability to temperature stress and flow characteristics, spawning and early rearing requirements, responses to stressful environments, and population identity, we cannot justify flow and other recommendations for maintenance and preservation of this species.

E. Budget Costs and Third Party Impacts: Requested CALFED funding is \$159,000 - 205,013 for Feb., 2000 - Jan., 2001. This amount includes funds for salaries and benefits of personnel (students' support; and partial support of a staff research associate, and associate research biologist), student fee remissions, equipment, supplies/expenses, operation of vehicles and vessels, and overhead (@10 - 46%, except for student fee remissions and equipment costs). "Leveraged" support (\$48,276) will be provided by UC Davis (5% of investigators' salaries and benefits while working on the GS project), and an estimated \$30,000 of support by using CDFG personnel and vessels conducting white sturgeon (WS) research funded by Federal Sport Fisheries Restoration Funds and matching state funds for obtaining GS, and by using State Water Project facilities and personnel to collect juveniles at the Byron fish screens. Eventual enhanced sport and native Californian fisheries and more flexible water management strategies should benefit third parties.

F. Applicant Qualifications: Drs. Joseph J. Cech, Jr., Serge I. Doroshov, Gary P. Moberg, and Bernard P. May are well-known, UC Davis fish (including sturgeon) biologists; and Raymond G. Schaffter and David Kohlhorst are well-known CDFG Bay-Delta sturgeon authorities.

G. Monitoring and Data Evaluation: Data collection and evaluation will follow established procedures. In addition to quarterly, annual and final reports, results will be presented at interagency workgroup meetings, workshops, and professional scientific meetings, and published in peer-reviewed journals. Feather River temperature data will be entered on the CDFG web page within 30 days of data collection.

H. Local Support/Coordination with Other Programs/Compatibility with CALFED

Objectives: Most of the infrastructure/equipment required for this project is already available at UC Davis and CDFG Bay Delta and Special Water Projects Division. Assistance from USFWS (Paul Zedonis, Jay Glase) and the Yurok Tribal Fisheries biologists (Troy Fletcher, Rose Bond, Desma Williams, Dave Hillemeier) has been arranged. Increased knowledge of this priority (tier one) species will potentially assist several CALFED projects.

PROJECT DESCRIPTION