TWG 11-5-97
B Gold
Attachment 10C

GCMRC - FY98 BIOLOGICAL RESOURCES PROGRAM

FY98 RFP: MONITOR THE AQUATIC FOOD BASE OF THE COLORADO RIVER ECOSYSTEM

ESTIMATED COST RANGE: $125,000 - $175,000 / yr.

MANAGEMENT OBJECTIVE(S):

-- Maintain and enhance the aquatic food base in Glen and Grand Canyons.

PROJECT OBJECTIVES:

Monitoring

1) **Determine impacts alternative operating criteria have on the food base.**

2) **Monitor community structure, density, distribution, and composition of algae, macrophytes and macroinvertebrates along the mainstem and tributaries in a manner compatible with research and monitoring activities on fish.**

3) **Identify key parameters (i.e., nutrient levels, water quality, community structure) associated with the maintenance and enhancement of aquatic food base for long-term monitoring.**

4) **Data collections that enable distinction between the effects of dam operations and natural variation on the aquatic food base and previous monitoring efforts.**

5) **Linkages between nutrient levels, water quality and community structure (benthos, drift, etc.) in relation to dam operations, Lake Powell input and tributary influences.**

Research

1) **Determine if and at what densities the standing aquatic food base in Glen Canyon is a limiting factor in higher trophic level productivity in association with different operating criteria.**

2) **Determine the effects of large fluctuations associated with dam releases on the aquatic food base in Glen and Grand Canyons and associated fish resources.**

PROJECT DURATION: One Year - FY98, renewable for one additional year.

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GCMRC - FY98 BIOLOGICAL RESOURCES PROGRAM

FY98 RFP: MONITOR NATIVE FISH OF THE COLORADO RIVER ECOSYSTEM

ESTIMATED COST RANGE: $450,000 - $525,000 / yr.

MANAGEMENT OBJECTIVE(S):

--Maintain or enhance existing population of HBC in lower 1,200 meters of the LCR.

--Maintain levels of recruitment of humpback chub in the mainstem and LCR.

--Verify the status of and management for healthy, self sustaining populations of: (1) flannelmouth sucker, bluehead sucker, and speckled dace in the mainstem Colorado River in Grand Canyon and its tributaries; and (2) native fish in Glen Canyon based upon the capability of the habitat to support those fishes.

-- Minimize, to the extent possible, interactions between native and non-native fishes.

-- Evaluate through monitoring and research the reasonable and prudent alternatives specified by the US Fish and Wildlife Service.

PROJECT OBJECTIVES:

1) **Establish linkages among dam operations and the resulting flow regimes and related abiotic (e.g., temperature, turbidity) and biotic (e.g., food base) parameters on spawning, reproductive success, larval transport, recruitment, habitat use, food availability and diet.**

2) **Monitoring to annually evaluate the status and trends of native fish populations, especially humpback chub and flannelmouth sucker, in the Colorado River ecosystem. Monitoring activities should consider parameters such as: abundance, age structure, growth rates, condition, year class strength, distribution (i.e., spatial patterns of abundance) reproductive success and overall recruitment in response to dam operations. Monitoring activities should utilize PIT tags to augment existing databases, as appropriate.**

3) **Competitive and predator-prey interactions with non-native fish and the influence of dam operations, including potentially increased water temperatures, on these competitive and predatory interactions, if any.**

4) **Assess the condition of adult humpback chub and other native fish. Utilize results of aquatic food base studies, as appropriate. Evaluate the effects of existing and potential parasites, diseases, and other factors on the condition of mature humpback chub and other native fish.**

5) **Examine the importance of the LCR, backwaters, and nearshore habitats to differing parts of the life cycles of native fish.**

6) **Temperature studies: Determine optimal, upper and lower water temperature limits on reproductive success, and growth and survival of larval, juvenile, and adult fish. Evaluate effects of increased water temperatures on various factors which may affect population survival (e.g., parasite distribution and abundance, swimming performance).**

PROJECT DURATION: One Year - FY98, renewable for one additional year.

FY98 RFP: MONITOR THE RAINBOW TROUT FISHERY OF THE COLORADO RIVER DOWNSTREAM FROM GCD TO LEES FERRY, IN GLEN CANYON NATIONAL RECREATIONAL AREA

ESTIMATED COST RANGE: $100,000 - $125,000 / yr.

MANAGEMENT OBJECTIVE(S):

-- In the Colorado River corridor below Glen Canyon Dam to the confluence with the Paria River, natural reproduced fish should compose at least 50% of the Age III rainbow trout. Sufficient suitable spawning habitat should be maintained to reach this objective.

-- The total populations of rainbow trout (age II plus) in this reach should be maintained at approximately 100,000 fish as determined from population estimation.

-- Rainbow trout should achieve 18 inches in length by Age III with a mean relative weight (Wr) of at least 0.80.

PROJECT OBJECTIVES:

1) **Synthesize existing information (published and unpublished data) on the Glen Canyon/Lees Ferry trout fishery and determine the fishery's likely response (growth, reproduction, recruitment population structure, size and distribution) to dam operations.**

2) **Monitoring activities for determining population size, structure, growth, distribution, reproductive success and overall recruitment in response to dam operations.**

3) **Develop methods for estimating the proportion of natural reproductive success in combination with stocking quantities and rates to determine desired levels of recruitment balanced against the carrying capacity for a range of dam operations.**

4) **Develop evaluation criteria for, and measure and assess the health and condition of the rainbow trout population.**

5) **Evaluate changing health and condition factors in relation to changes in the aquatic foodbase and nutrient levels as determined in the aquatic food base RFP.**

PROJECT DURATION: One Year - FY98, renewable for one year.

FY98 RFP: MONITOR WETLAND AND RIPARIAN VEGETATION ALONG THE COLORADO RIVER ECOSYSTEM

ESTIMATED COST RANGE: $60,000 - $80,000 / yr.

MANAGEMENT OBJECTIVE(S):

-- Preserve or restore (where possible) natural species composition and abundance within riparian and upland communities affected by dam operations.

-- Emphasize the preservation of unique plant communities and any special status species (Federal, Tribal, and State designations) to ensure their perpetuation within the system.

PROJECT OBJECTIVES:

1) **Monitor the community response (i.e., community structure, diversity, density, distribution, and extent of riparian and marsh vegetation) to dam releases along the Colorado River ecosystem.**

2) **Compare 1998 riparian and marsh vegetation data with historical monitoring data to evaluate change over time (i.e., the spread and contraction of communities, change in species composition, etc.), in relation to dam operations.**

3) **Monitor non-native/invasive vegetation with respect to recruitment, spread and survivorship.**

4) **Examine habitat integrity and composition as it is related to threatened and endangered species (e.g., Southwestern Willow Flycatcher, Kanab ambersnail), and linkages between vegetation, aquatic food base, fish habitat, and sediment-related resources.**

PROJECT DURATION: One Year - FY98, renewable for one-year.

FY98 RFP: MONITOR THE ENDANGERED KANAB AMBERSNAIL AT VASEYS PARADISE, GRAND CANYON NATIONAL PARK

ESTIMATED COST RANGE: $30,000 - $50,000 / yr.

MANAGEMENT OBJECTIVE(S):

-- Protect, restore, and enhance survival of native and special status species (Federal, Tribal, and State designations). Ensure that the required habitat for these species is preserved. Maintain native faunal components of the ecosystems for the benefit of threatened and endangered species.

-- Maintain a natural age-class distribution through out the majority of their natural range in Glen and Grand Canyons, emphasizing the need to recruit into breeding age classes.

-- The population of Kanab Ambersnail should be inventoried and maintained near current levels. Efforts to establish additional population center should be guided by the recovery plan for the species.

PROJECT OBJECTIVES:

1) **Relate food availability, habitat patch composition, area of cover, and condition at Vaseys Paradise to the historic and recent condition of those patches, and population requirements for sustainability.**

2) **Determine and statistically compare the historic (1995-97) and current population distribution, abundance, age-class/size distribution, population density, and condition (i.e., occurrence of Kanab ambersnail trematode parasite) of Oxyloma haydeni kanabensis at Vaseys Paradise as it relates to natural variation and to the local stage-discharge relationship.**

3) **Monitor abundance and food habits of Peromyscus predator at Vaseys Paradise.**

PROJECT DURATION: One Year - FY98, renewable for one year.

FY98 RFP: MONITOR RIPARIAN AVIFAUNA ALONG THE COLORADO RIVER ECOSYSTEM, WITH PARTICULAR EMPHASIS ON THE ENDANGERED SOUTHWESTERN WILLOW FLYCATCHER

ESTIMATED COST RANGE: $60,000 - $90,000 / yr.

MANAGEMENT OBJECTIVE(S):

-- Protect, restore, and enhance survival of native and special status species (Federal, Tribal, and State designations). Ensure that the required habitat for these species is preserved. Maintain native faunal components of the ecosystems for the benefit of threatened and endangered species.

-- Maintain a natural age-class distribution through out the majority of their natural range in Glen and Grand Canyons, emphasizing the need to recruit into breeding age classes.

-- Evaluate the viability of food chain(s) for native fauna, including the Peregrine Falcon, Southwestern Willow Flycatcher, and other special status species.

-- In as much as such management is not deleterious to naturally occurring ecosystem components, consider and mitigate impacts to special status species that may use the river corridor opportunistically (Bald Eagle). Maintain self-sustaining fish populations as forage to provide opportunities for bald eagles. Monitor for nesting.

PROJECT OBJECTIVES:

Grand Canyon Riparian/Aquatic Avifauna

1) **Collect and interpret data on the current and historic distribution and population densities of wintering and spring and summer avifauna, and their relation to habitat patches, within the Colorado River ecosystem (River Miles -15 to 278).**

2) **Relate habitat structure/composition of survey areas to dam discharges and river flows during the study period, to breeding bird distribution and density.**

Endangered Southwestern Willow Flycatcher

1) **Collect detailed monitoring data of southwestern willow flycatcher habitat condition, habitat use and nesting success, and nesting fidelity, including the dynamic nature of its colonizing behavior through the study period and in comparison with previous data and other SWWF monitoring programs.**

2) **Relate current SWWF distribution to past data to provide a comprehensive analysis of population change through time.**

3) **Evaluate the effect of brown-headed cowbird (Molothrus ater) on the abundance and/or distribution of SWWF and what management alternatives should be considered to counteract this effect, if it is negative, in a fashion that does not interfere with SWWF territory occupation or nesting success.**

PROJECT DURATION: One Year - FY98, renewable for one year.

GCMRC - FY98 CONCEPTUAL MODELING PROGRAM

FY98 RFP: **DEVELOP A CONCEPTUAL MODEL OF THE COLORADO RIVER ECOSYSTEM FROM THE FOREBAY OF GCD TO THE WESTERN MOST BOUNDARY OF GRAND CANYON NATIONAL PARK**

ESTIMATED COST RANGE: $150,000 - $250,000 / 15 months.

GCMRC OBJECTIVE(S):

This conceptual model will be used to: (1) guide monitoring and research planning, (2) more clearly define critical attributes and linkages within and between resource categories, (3) promote improved understanding of key factors that drive change in the system, (4) make qualitative assessments of resource change resulting from alternative dam operations, and (5) provide information to stakeholders and managers regarding the potential impacts of alternative dam operations on the Colorado River ecosystem and associated resources.

PROJECT OBJECTIVES:

1) **State of the science synthesis of data needed for development of the conceptual model and identification of key information gaps, as well as priorities for monitoring and research.**

2) **Scoping meeting to define the scope of the problem, design first modeling workshop, develop list of participants.**

3) **Develop, using a workshop approach, a working conceptual model of the Colorado River ecosystem that can be run on an appropriate software platform and which identifies critical relationships that structure the ecosystem.**

4) **Revision of the conceptual model, through a second workshop, to the level of a strategic model which assigns numeric values to key parameters in the model and which can be used to test alternative assumptions and hypotheses regrading changes to the ecosystem and associated resources from alternative dam operations.**

PROJECT DURATION: Fifteen months - October 1, 1998 to March 31, 1999.