



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ARIZONA ECOLOGICAL SERVICES FIELD OFFICE
3616 West Thomas Road, Suite 6
Phoenix, Arizona 85019



Telephone: (602) 379-4720 FAX: (602) 379-6629

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February 18, 1993

MEMORANDUM

TO: District Manager, Yuma District Office, Bureau of Land Management, Yuma, Arizona

FROM: Field Supervisor

SUBJECT: Biological Opinion for Lake Havasu Fisheries Improvement Partnership Program, Lake Havasu, La Paz and Mohave Counties, Arizona and San Bernadino County, California

This biological opinion responds to your request dated January 6, 1993, for initiation of formal Section 7 consultation with the Fish and Wildlife Service (Service) pursuant to the Endangered Species Act (Act) of 1973, as amended, on the Lake Havasu Fisheries Improvement Partnership Program. This project will be conducted on Lake Havasu, a mainstem reservoir of the lower Colorado River in La Paz and Mohave Counties, Arizona and San Bernadino County, California. The species of concern for this project are the endangered bonytail chub (*Gila elegans*), razorback sucker (*Xyrauchen texanus*), bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis*), peregrine falcon (*Falco peregrinus*), and Yuma clapper rail (*Rallus longirostris yumanensis*). Lake Havasu was proposed as critical habitat for the bonytail chub on January 29, 1993 (FR Vol. 58, No. 18, 6578-6597). There is no designated critical habitat in the project area.

This biological opinion was prepared using information contained in the environmental assessment, biological evaluation, Service files and information developed during the informal phase of the consultation. Additional information was obtained from the grey and published literature and through discussions with species experts and other knowledgeable individuals.

The 90-day formal consultation period began on January 7, 1993, the day your request was received by the Arizona Ecological Services Office. Notice of that receipt was sent to you in a memorandum dated January 15, 1993.

Biological Opinion

It is the Service's biological opinion that implementation of the proposed project is not likely to jeopardize the continued existence of the bonytail chub or razorback sucker or adversely modify or destroy the proposed critical habitat for the bonytail chub. The Service concurs with the Bureau of Land Management (BLM) finding of no effect to the bald eagle, brown pelican, peregrine falcon and Yuma clapper rail.

Background Information

Consultation History

The BLM requested a list of threatened and endangered species for Lake Havasu on June 16, 1992. A list was sent to the BLM on August 7, 1992. A biological evaluation developed for the proposed project, dated July 21, 1992, concluded that the project would not affect the razorback sucker. The Service did not concur with the finding of no effect to the razorback sucker, and informed the BLM that a "may affect" situation also existed for the bonytail chub. The Service, the BLM and representatives of cooperating agencies met to discuss the project and its potential impacts to the endangered native fish species before the final biological evaluation was prepared. These discussions led to the inclusion of a program to increase the existing populations of bonytail chub and razorback sucker in Lake Havasu as part of the proposed project.

The Service concurred with a finding of no effect to the razorback sucker and bonytail chub from one part of the proposed action. On July 10, 1992, the Bureau of Reclamation (Reclamation) requested the Service's concurrence for the construction of a recreational facility at the Havasu Pumping Plant Inlet. This action involved only shore-based facilities to enhance fishing on the existing breakwater. No habitat improvement structures were part of this action. The Service concurred with Reclamation's findings on July 14, 1992 contingent upon Reclamation implementing two actions in conjunction with the project. First, that posters showing the razorback sucker and bonytail chub be displayed in the new facilities. These posters should identify these species as endangered and inform anglers of action to take if they catch one of these fish. The second item was to discourage the use of live bait fish and the release of excess bait fish in the area.

Description of the Proposed Action

The BLM and their cooperators propose to put artificial fish habitats (67,482 bass shelters, 54,724 catfish houses, 3,484 Fish 'N Forests, 1,050 tire towers and 11,800 brush bundles) into 42 coves on Lake Havasu. The

artificial structures would be placed adjacent to rooted aquatic vegetation in 10 to 25 feet of water. Approximately 90 acres of lake bottom (0.4 percent of the lake) would be treated.

In addition to the artificial habitat structures, the project would enhance shoreline access for fisherman by constructing parking lots, trails and fishing docks. Restrooms and fish cleaning stations would also be provided.

The facilities and habitat enhancement structures would be put in place over a five to ten year period as funds and other resources become available. Public agencies and private groups are involved so funding for the project will likely come from a variety of sources.

The proposed action also includes the creation of up to ten native fish rearing coves in Lake Havasu with the objective of releasing approximately 30,000 razorback suckers and 30,000 bonytail chub into Lake Havasu by the year 2003 to restore depleted populations of these species in the reservoir. Juvenile fish from federal or state hatcheries would be placed in barriered, renovated coves or coves adjacent to Lake Havasu and allowed to grow to 300 millimeters (mm) before being released into the reservoir. At 300 mm, the native fish are believed to be beyond the range of vulnerability to predation by the non-native fish in the reservoir. Cove development would occur over a five year period with a ten year period estimated to achieve project objectives. Monitoring of the coves and the reservoir to locate released fish are part of the action. The opportunity to revise the plan to take advantage of new information is included.

Species Descriptions

The Colorado River Basin encompasses seven states and a portion of Mexico. For water supply considerations, the basin was divided into two sections at Lees Ferry, Arizona. The upper basin states are Colorado, New Mexico, Utah and Wyoming. The lower basin states are Arizona, California and Nevada. By international treaty, Mexico receives a share of the Colorado River waters.

The endangered fish species considered in this biological opinion were once found throughout the Colorado River Basin. The decline of these species can be attributed to a combination of alterations to riverine habitats and the introduction of non-native fish species to the basin.

Bonytail chub

The Bonytail Chub Recovery Plan (USFWS 1990) summarizes information on this species. The biological and distributional information provided in this biological opinion is summarized from the recovery plan unless otherwise noted.

The bonytail chub was first described in 1853 (Baird and Girard 1853 in USFWS 1990). It belongs to a closely related genus containing two other Colorado River basin endangered species, the humpback chub (Gila cypha) and Virgin River chub (Gila seminuda). The roundtail chub (Gila robusta) is a candidate category 2 species. The distinctive feature of the bonytail chub is the extremely thin caudal peduncle. It shares the small head and predorsal hump of the humpback chub, although the hump on the bonytail chub is not so large. In some areas of the upper basin, genetic flow among the three Gila species (G. elegans, cypha, and robusta) is suspected. Genetic research is underway to clarify the genetics of the genus Gila.

Listed as an endangered species on April 23, 1980, the bonytail chub was once found in tributary rivers throughout the Colorado River Basin. Critical habitat for the bonytail chub was proposed on January 29, 1993. The areas proposed for designation included the mainstem Colorado River from Hoover Dam to Parker Dam, including Lake Mohave and Lake Havasu. Recent captures are from six locations. In the lower basin, bonytail chub are taken each year in Lake Mohave. Lake Havasu still has a small population. In the upper basin, bonytail chub have been found in four areas of the Colorado, Green and Yampa Rivers. Successful reproduction and recruitment of young fish to the population may be occurring in the upper basin, but problems of identifying young bonytails from the young of other Gila species and the presence of possible intergrades between species has confused positive identification. Bonytail chubs have been observed spawning in Lake Mohave (Jones and Sumner 1954), but successful recruitment in the population has not been positively documented in the lower basin. Dr. Paul Marsh of Arizona State University believes that while most of the young bonytails in Lake Mohave are the result of ten years of a larval and juvenile stocking program, some are wild-spawned fish. Eleven juvenile bonytail chubs have been taken from Lake Mohave since 1981. One of these fish aged to the 1978 year class and was likely wild-born. The first introductions of hatchery spawned fish was made in 1981 using young-of-the-year fish (Marsh and Minckley 1991). Not all of the hatchery spawned fish were marked (three of the eleven captured fish were marked). Only five of the eleven were aged. The origin of the remaining juvenile bonytail chubs is unknown.

Little is known of the life history of this species in the wild, partly because of the scarcity of healthy populations to study. Adult bonytail chub have been reported from pools and eddies in the large rivers of the Colorado River Basin (Vanicek 1967 in USFWS 1990). Cold water released from large dams such as Flaming Gorge or Hoover, may make riverine habitats below the reservoirs less suitable for bonytail chub (Hammon 1982, Marsh 1985). Capture records from Lake Mohave are from the lacustrine areas of the reservoir. The species has not been collected in the river-like habitat of Lake Mohave below Hoover Dam. It disappeared from the Green River below Flaming Gorge Dam within a few years of dam closure. The specific habitat needed for spawning activity, and the habitat needs of larval and juvenile fish in the wild have not been determined.

Floating food items, including terrestrial and aquatic insects, appear to be major food items in the diet of adult bonytail chub in the upper basin riverine habitats. Plankton, stocked rainbow trout fry, and algae have been reported as bonytail chub food items in Lake Mohave. Young bonytail chub are likely to feed on plankton and algae. Young chubs of unknown heritage in the Green River were found to prey on chironomid larvae and mayfly nymphs. They shifted to floating food as they grew older (Vanicek and Kramer 1969 in USFWS 1990).

Razorback sucker

The razorback sucker recovery plan is in preparation. Available distributional and other biological information has recently been summarized (Minckley and Deacon 1991). Unless otherwise noted, information presented in this biological opinion concerning the razorback sucker's distribution and ecology was obtained from this source.

The razorback sucker is a large Colorado River Basin catostomid fish first described in 1861 (Abbott 1861 in Minckley and Deacon 1991). The distinctive sharp raised keel behind the head contributes to the species common name. The razorback sucker belongs to the monotypic genus Xyrauchen. Reports of intergrades among razorback sucker and other native suckers have been noted in the literature. Lake Mohave razorback suckers show little evidence of intergradation. This population is genetically diverse and thus very important to the survival of the species.

The razorback sucker was listed as an endangered species on November 21, 1991. Critical habitat for the razorback sucker was proposed on January 29, 1993 and included the Colorado River from Hoover Dam to Davis Dam and from Parker Dam to Imperial Dam. The razorback sucker was once found throughout the Colorado River Basin. Historic records indicate it was either abundant or common in many areas. In the upper basin, small numbers are found in 1200 kilometers of the Colorado, Green, San Juan and Yampa Rivers and in portions of Lake Powell. In the lower basin, razorback suckers are found in the Colorado River from the Grand Canyon to Imperial Reservoir. By far, the largest population, estimated at 60,000 individuals (Minckley et al. 1991 in Minckley and Deacon 1991) is in Lake Mohave in the lower basin.

The razorback sucker has been reintroduced into sections of the lower Colorado, Gila, Salt and Verde Rivers in Arizona, California and Nevada. These reintroductions have not yet been successful in re-establishing self-sustaining populations in these areas. Persistence of stocked fish in a reintroduction area was very low in riverine or open water areas occupied by non-native predacious fish. Condition factors of surviving fish also declined over time. Razorback suckers stocked in isolated or semi-isolated habitats with reduced non-native predators fared better, showing persistence time of over one year. (Dr. Dean Hendrickson, Texas Memorial Museum, personal communication).

Natural spawning of razorback suckers has been widely documented. Eggs and larvae have been taken and identified from both upper and lower basin populations. However, recruitment of juveniles into the populations has been extremely limited. In the Green River, it is estimated the last successful recruitment was in the 1960's (Tyus and Karp 1991). Extensive work on Lake Mohave and other lower basin habitats between 1963 and 1988 has found little evidence of recruitment. Captures from the 1980's to the present indicate some wild bred razorback suckers have survived to juvenile stages in irrigation canals below Lake Havasu (Marsh and Minckley 1989 in Minckley and Deacon 1991). Where these juveniles were spawned is not known.

Adult razorback suckers occupy a variety of habitats in the Colorado River Basin. Main channel habitats include flatwater areas, sand bars, and nearshore runs (Tyus 1987 in Minckley and Deacon 1991). Use of backwaters, eddies and other open water areas is widely documented. Flooded shallow backwaters may be important as feeding areas for adults and recently hatched young (Tyus and Karp 1991). However, very little empirical information is available on the habitat needs of young razorback suckers. What is known suggests the young fish utilize backwaters, shorelines and other shallow areas for at least the first few weeks of life and later move offshore or downstream.

In hatchery ponds, larval razorback suckers feed on small diatoms, phytoplankton and detritus. As the larvae grow, larger animal plankton are taken (Papoulias and Minckley 1990 in Minckley and Deacon 1991). Adult razorback suckers are both benthic and planktivorous feeders (Minckley 1973, Marsh 1987).

Environmental Baseline

The Colorado River Basin has experienced significant physical and biological changes in the last century. The alteration of basin rivers by the action of settlers and the introduction of new fish species to these rivers has had profound effects on native fish. This section does not attempt to quantify these effects. Considerable research and evaluation of these effects have been accomplished and the results published elsewhere. This document will only briefly address these effects in discussing the status of bonytail chub and razorback sucker in Lake Havasu.

The rivers of the Colorado River Basin have been significantly affected by physical changes. These have resulted from construction of dams and impoundments, water diversions and channelization projects. Rivers have been rendered seasonally dry or had normal seasonal flows altered by dams and diversions. Floodplains have been shut off from the river or developed for human uses. Daily, weekly and seasonal flow levels are determined by the need for water or power rather than the amount of runoff or surface flow. Warm, sediment laden water enters the big reservoirs. Water released at the dam comes from deep in the reservoir and is cold and clear. Temperature and turbidity conditions are affected for miles downstream.

Continued use and reuse of the water as it moves through the basin increases the salinity and affects water quality downstream. Pesticides and other contaminants are carried in the return flows from agriculture, municipal and industrial uses. These changes to the physical habitat have significantly reduced and fragmented the historic habitats of native fish species.

The introduction of non-native fish and other organisms, both deliberately and accidentally, have contributed to the decline of native fishes throughout the basin. Non-native organisms may compete directly or indirectly with the native species. Predation on native species, especially early life history stages, by non-natives is well documented. Non-natives may be sources of new disease or parasite introductions. Physical changes made to the basin rivers likely contribute to the success of non-native introductions by creating habitats more suitable to a non-native than native fish fauna.

Populations of the bonytail chub and razorback sucker have been eliminated from much of their former ranges in the Colorado River Basin. Both physical and biological changes in the habitats are responsible for these declines. Surviving populations are in areas where the physical habitat is still somehow suitable, at least for some life stages. Even in those areas, the presence of non-native fish species has adversely affected spawning and recruitment of native species.

The status of the bonytail chub in the wild is precarious. The recovery plan states that this species is the most endangered native fish in the basin. The recovery plan short term goal is to prevent the extinction of the species from the wild (USFWS 1990). Populations in the upper basin are very small and isolated. Successful recruitment has not been documented for many years. Areas of suspected recruitment also have other Gila species present and identification of young fish is complex. In the lower basin, the very small population in Lake Havasu is not known to have reproduced successfully in many years. Lake Mohave has what is believed to be the largest remaining population, but it is not self-sustaining. Both of the lower basin populations and probably most of the upper basin populations are dominated by old adults. Bonytail chub are a relatively long-lived species, but the existing populations are likely to reach senescence within a few years. There have been successful efforts to raise bonytail chub in hatcheries and small refugia. Efforts to restore habitats for self-sustaining populations in the wild have not progressed.

Efforts to recover the razorback sucker in lieu of listing were not successful, and the species was recently listed as endangered. The razorback sucker is still declining throughout its range. Numerically, the razorback sucker has significantly larger populations than the bonytail. However, the numbers give a false sense of security. The large population of razorback suckers in Lake Mohave are old fish close to reaching senescence. Researchers estimate that population will likely be lost or significantly reduced in 10 years. Successful recruitment in the upper basin has not been documented in recent years and populations there are

already small. In the lower basin, the Colorado River populations outside of Lake Mohave are small and not self-sustaining. The introduced razorback suckers in the Gila, Salt and Verde Rivers are not self-sustaining populations. Developing strategies to improve larval and juvenile survival is critical to the survival of the species in the wild (Minckley and Deacon 1991). Razorback suckers have been raised in hatcheries and other refugia. Little progress has been made towards providing habitats for self-sustaining wild populations.

In summary, the status of both the bonytail chub and razorback sucker is poor. There is little or no natural habitat left for what remains of these species wild populations. Both species have shown they can utilize altered habitats. Due to a skewed age structure resulting from years of unsuccessful recruitment, the remaining wild populations are likely to be lost in the near term. Some populations may already be below levels of reproductive viability due to low numbers. The survival of these species depends upon the maintenance of what habitat still exists and providing for successful recruitment. We must recognize that interim steps may be necessary to ensure survival of these species while larger questions are addressed.

Impacts of the Action

Biological Evaluation

The BLM's biological evaluation was transmitted to the Service with the request for formal consultation. The BLM determined that both beneficial and adverse effects to the bonytail chub and razorback sucker were likely to occur from the proposed project.

Direct and Indirect Effects

Placement of the fish habitat improvement structures in 42 coves scattered through Lake Havasu will affect the non-native fish populations in the treated coves. Cover is currently limiting in these areas and the structures will attract fish from adjacent areas. Spatial dispersal of fish within the cove would be affected as the new structures attract and concentrate fish. It is assumed that angler use of the treated coves will increase, resulting in higher fishing pressure and likely increased catch rates in the immediate vicinity of the structures. This increased catch may reduce the concentrations of fish at the structures, with overall effects to the total populations of fish in the coves. Species attracted to the structures that are not sought by anglers would likely maintain higher local concentrations.

The actual size of the fish populations in the treated coves may also be affected by the structures. Juvenile fish in areas without sufficient cover are extremely subject to predation. The additional cover available at the structures may increase juvenile survival. The increased predatory fish population may counteract some of this increased survival potential. Reduced levels of predatory fish elsewhere in the cove as a result of concentrating fish at the structures may influence juvenile survival in untreated areas of the coves.

In addition to cover, the structures will likely provide increased food resources in the form of algae and invertebrates. Predatory fish may also find an increased prey base, though the enhanced cover may make small fish and crustaceans such as crayfish harder to catch.

Adult bonytail chubs and razorback suckers may or may not be attracted to the increased cover offered by the structures. If they are attracted to the structures, there may be an increased risk of an angler catching an individual. If adults remain in the area of the structures to spawn, the potential for predation on the eggs, larvae and juveniles might not differ significantly from present levels.

The structures may provide cover for the young bonytail chubs and razorback suckers which would help to reduce predation. Conversely, if young fish utilize the structures, they may be at a greater risk of predation due to the higher levels of predatory fish around the structures. The potential reduction in predatory fish populations away from the treated areas may also reduce predation on the young endangered fish away from the treated areas.

The construction of the recreational facilities associated with the project is likely to have only minor impacts to the bonytail chub and razorback sucker. Providing for increased fishing access increases the risk of an angler catching one of these fish. There may be some local changes in habitat through shading or other additional cover that may provide some changes to concentrations of fish populations. Since all the recreational facilities are to be at treated coves, this effect is additive. Fish species not sought by anglers, especially carp, are known to concentrate around shoreside recreational facilities. Carp are known to consume razorback sucker eggs.

The project also included provisions to reintroduce 60,000 bonytail chubs and razorback suckers to Lake Havasu through operation of rearing coves. These fish would be hatchery born from parent stock taken from Lake Mohave and would be raised to approximately 300 mm in the coves before being released into the reservoir. The stocked and released individuals would be fully protected under the Act. This action does not include a designation for an experimental population. The augmentation of the existing bonytail chub and razorback sucker populations in Lake Havasu will provide a source of fish for reintroduction efforts, research and other management or recovery programs.

Interrelated and Interdependent Effects

The increased angler use resulting from the implementation of the project may have some effect on local businesses and municipal services. This increase may be difficult to quantify and may represent only a shift in area of use, not an increased use of the lower Colorado River fishery. Other types of recreation use of Lake Havasu may also be affected.

Management of Lake Havasu as a water storage reservoir and delivery point for the Central Arizona Project and the Metropolitan Water District canals is not likely to be directly affected by this project. If changes to existing management were proposed, it would be likely that Section 7 consultation would be required regardless of the fish habitat improvement project.

Cumulative Effects

The areas around Lake Havasu are undergoing urban development. Some of this development results from recreation use of the area. Other derives from retirement communities and industrial development. It is likely that the Lake Havasu area will continue to develop with or without the proposed project. Effects to the reservoir itself from this development are uncertain.

Relationship to Survival and Recovery Opportunities

As stated in the environmental baseline, the bonytail chub and razorback sucker are in serious danger of extinction from the wild. Remaining populations in the upper basin are small and isolated. The lower basin populations are larger, but only because of the populations in Lake Mohave. Sufficient recruitment to sustain existing populations of either species is not occurring anywhere in the Colorado River Basin. Maintenance of the populations and habitats that remain is essential to the short term survival of these species as well as providing the nucleus for recovery actions.

The recovery priorities in the bonytail chub recovery plan stress actions that are needed for the survival of the species. Establishment of refugia, maintenance of refugia populations, captive propagation and stocking represent the majority of the most urgent and important recovery tasks for the bonytail chub. Although there is no recovery plan for the razorback sucker, we assume the same types of actions would be necessary for its survival.

The proposed action would provide a refuge population of bonytail chub and razorback sucker in Lake Havasu. Augmenting these populations would enable the hatcheries to produce large numbers of young fish of different parents to assist in maintaining genetic diversity. Having substantial populations in the wild provides a buffer against loss of other, smaller populations and provides wild adapted fish for transplant.

Research opportunities will result from the establishment of these populations. Little is known about these species life histories and habitat requirements. This information is needed for both survival and recovery actions.

Incidental Take

Section 9 of the Act, as amended, prohibits the taking (harass, harm, pursue, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without a special exemption. The concept of harm includes significant habitat modification and degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding and sheltering. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of the agency action, is not considered taking within the bounds of the Act, provided such taking is in compliance with the incidental take statement provided in the biological opinion.

The primary purpose of the proposed project is to create habitat for non-native sport fish species in Lake Havasu. Non-native fish species have been identified as causing the decline of native fish species through competition and predation. The available habitat in Lake Havasu already contains these non-native fish species. Local densities of these fish likely vary tremendously in response to local habitat conditions. The proposed action would alter non-native fish densities in 42 coves. The proposed improvements would cover approximately 0.4% of the reservoir (90 acres of the 20,400 acre reservoir). Changes in non-native fish density could extend beyond the 90 acres. The degree to which these changes in densities of non-native fish species would affect bonytail chub and razorback sucker adults and young is not known.

The conversion of up to ten coves for bonytail chub and razorback sucker rearing facilities will require the coves be renovated to remove as many non-native fish as possible to minimize the risk of predation on the young native fish. This part of the project provides rearing habitat for young native fish that is extremely rare in the Colorado River Basin. The development of the rearing coves was intended to offset potential adverse effects to bonytail chub and razorback sucker from the placement and operation of the fish enhancement structures.

The rearing coves will receive large numbers of young bonytail chubs and razorback suckers from the hatchery. There will be some percentage of mortality due to effects of transport and actual stocking. This mortality is not considered to be take for this project by the Service. There will also be mortality of young fish in the rearing coves from natural causes, including some predation by non-native fish. The percentage of stocked fish that will be lost from the rearing coves is not known but is estimated by the BLM to be 85%.

There may be an increase in the angler take of bonytail chubs and razorback suckers over the life of the project. Populations of both species in the reservoir will increase significantly with the releases from the rearing coves. The released fish may move to areas of the reservoir used by anglers. If the fish enhancement structures attract bonytail chubs or razorback suckers, there may be some accidental taking of these species in the treated areas.

The existing level of take from anglers is very low. The degree to which it could increase over the life of the project is not known. Fish taken by anglers may or may not be returned alive to the reservoir so it is difficult to assess potential mortality. The Service sets a limit of twenty each of bonytail chubs and razorback suckers taken by anglers per calendar year. Individuals caught and released alive and those killed by anglers are both included in the limits set.

The measures described below are not discretionary and must be undertaken by the agency as part of the implementation of the proposed action or made a binding condition of any permit or other implementation document given to or developed by an applicant, as appropriate.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take authorized by this biological opinion:

1. Measures will be taken to inform anglers using Lake Havasu of the presence of the two endangered fish species in the reservoir.
2. Measures to reduce the potential mortality of any endangered fish taken by anglers will be implemented.
3. Measures will be taken at the rearing coves to minimize the potential sources of mortality to young endangered fish.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the BLM must ensure their cooperators' and their own compliance with the following terms and conditions which implement the reasonable and prudent measures described above.

1. To implement reasonable and prudent measure 1, the following terms and conditions will be implemented:
 - a. Information about the presence of the bonytail chub and razorback sucker in Lake Havasu will be posted at all recreational facilities used by anglers around the reservoir. This may be in the form of displays, posters, pamphlets or other appropriate formats.
2. To implement reasonable and prudent measure 2, the following terms and conditions will be implemented:
 - a. Posted information about the bonytail chub and razorback sucker will contain clear photographs or line drawings to assist anglers in identification.
 - b. Posted information will also direct the angler to immediately release any live bonytail chubs or razorback suckers they may catch to the reservoir. Direction for the disposal of dead angler-taken fish will also be included.
 - c. Information on where anglers may report catching and releasing a bonytail chub or razorback sucker will be provided.
3. To implement reasonable and prudent measure 3, the following terms and conditions will be implemented:
 - a. Monitoring of the rearing coves will be adequate to detect damage to the barrier nets and other physical features of the coves.
 - b. Posted information on the purpose of and the closure of these areas to recreational use will be provided.
 - c. Biological monitoring will be sufficient to detect higher than expected mortality of stocked fish.

Reporting Requirements

The BLM or designated agent or cooperator will annually provide the Service with a listing of the number of bonytail chub and razorback suckers reported taken by anglers for that calendar year. If angler take in one or more areas of the reservoir is higher than expected but the total is still below the allowed incidental take, the BLM or designated agent or cooperator will inform the Service.

A report on the stocking and release of bonytail chubs and razorback suckers from the rearing coves will also be provided to the Service. Reports should contain information on problems encountered, estimates of numbers released, and other information as appropriate.

If, during the course of the action, the amount or extent of the incidental take is exceeded, the BLM must immediately reinstate consultation to avoid violations of Section 9. Operations must be stopped in the interim period between the initiation and the completion of the new consultation if it is determined the impact of the additional taking will cause an irreversible and adverse impact on the species. The BLM will provide an explanation of the causes of the taking.

There are two types of incidental take in this opinion. A reported angler take of greater than twenty individuals of either bonytail chubs or razorback suckers or of both species in a calendar year will be considered as exceeding the angler-related incidental take allowed under this biological opinion. If monitoring of the rearing coves shows an estimated mortality of stocked fish of greater than 95% for two calendar years in succession, this will be considered as exceeding rearing cove incidental take allowed under this biological opinion.

Conservation Recommendations

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's Section 7(a)(1) responsibility for the species.

1. Provide, through cooperators or designated agents, an expanded public information program to highlight the recovery opportunities of the proposed action and the compatibility of this endangered fish recovery with recreational fishing.

2. Explore the possibility of more extensive research on the potentials of rearing coves for endangered fish recovery.

Proposed Critical Habitat

The Act requires that all federal actions be evaluated to determine if destruction or adverse modification of either proposed or designated critical habitat would occur as a result of the proposed action. This determination requires that the effects of the action on the elements of the habitat that led to it being considered critical for the species survival and recovery. On January 29, 1993, Lake Havasu was proposed as critical habitat for the bonytail chub.

The proposed action would affect the physical and biological attributes of the coves involved in the program. No physical changes to the habitat in the rearing coves is anticipated since the barrier nets are permeable. The mere physical presence of the enhancement structures in the treated coves may not have adverse effects to the critical habitat elements. Placement of these structures in coves may or may not alter the use of that cove by the bonytail chub. Additional food and cover sites may be provided to adult or juvenile bonytail chubs by the structures. Conversely, the bonytail chub may move out of the area of the structures if the altered habitat is no longer suitable. Our knowledge of the habitat requirements for bonytail chub in reservoirs is limited, thus any definitive answer is not possible.

The proposed project would also result in changes to the biotic component of the habitat. The potential for effects to reproduction and recruitment are unclear. If the structures increase non-native fish populations in the coves, predation on eggs, larval and juvenile bonytail chubs will likely continue to preclude recruitment. If the structures attract non-native fish from other parts of the cove, thereby decreasing non-native fish populations in those areas, there may be some potential for reduced predation on bonytail chub. The additional cover available at the structures, if used by young bonytail chub, may have an influence on predation rates. This assumes that the increased populations of non-native predators does not negate any advantage of increased cover. It is not possible to determine the degree of these effects that could occur as a result of the project.

In the rearing coves, the biotic component would be altered by the elimination or significant reduction in the populations of non-native fish species in the cove. It is assumed that this reduction in potential predators would allow the stocked bonytail chubs in the cove to grow beyond the size vulnerable to predation. Once released into Lake Havasu, any eventual reproductive efforts could be affected by the physical and biotic changes described previously.

The magnitude of the potential adverse and beneficial effects should also be considered in the determination. The structures are not permanent changes to the coves and could be removed if research indicates there are major adverse effects to bonytail chub in the area. The small amount of Lake Havasu affected by the structures is also a consideration. The rearing coves are providing benefits to the bonytail chub population in Lake Havasu. While there clearly are effects to the proposed critical habitat from the proposed project, the Service concludes that the proposed project does not result in the destruction or adverse modification of the proposed critical habitat for the bonytail chub.

Conclusion

This concludes formal consultation on the Lake Havasu Fisheries Enhancement Improvement Program, as outlined in your January 6, 1993 request. As required by CFR 402.16, reinitiation of formal consultation is required if: 1) the amount or extent of incidental take is exceeded, 2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion, 3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion, or 4) a new species is listed or critical habitat designated that may be affected by the agency action.

The Service would appreciate notification of your final decision on this project. We would like to remind the BLM that the terms and conditions to implement the reasonable and prudent measures are mandatory and must be implemented and reports provided as required. In order for the Service to be kept informed of actions that either minimize or avoid adverse effects, or that benefit listed species or their habitats, we would appreciate notification of the implementation of any conservation recommendations by the BLM, cooperators or designated agents.

We would like to thank the BLM and the cooperators on this project for their positive efforts to work with the Service in resolving conflicts between the project and endangered species. The changes and additions discussed during informal consultation and incorporated into the final project provide benefits for endangered fish in Lake Havasu and allow for the improvement of recreational fishing opportunities. Without the willingness of personnel from the BLM and cooperators to work with the Service, the potential for this project to serve as an example of how endangered species recovery and recreational fishing can co-exist would have been lost.

In future communications on this project, please refer to consultation number 2-21-92-F-641. If we may be of assistance, please contact Lesley Fitzpatrick or me.

A handwritten signature in cursive script that reads "Sam F. Spiller".

Sam F. Spiller

cc: Chief, Fish and Wildlife Service, Arlington, Virginia (DES)
Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico
(AES)
Project Leader, Parker Fisheries Assistance Office, Parker, Arizona
Project Leader, Pinetop Fisheries Assistance Office, Pinetop, Arizona
Director, Arizona Game and Fish Department, Phoenix, Arizona

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