HUMPBACK CHUB
RECOVERY PLAN

Prepared by the

Colorado River Fishes Recovery Team

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APPROVED:

Date 08-22-79

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ACKNOWLEDGMENTS

The following consultants provided valuable expertise, criticisms, and technical review as this recovery plan was developed: Neil Armantrout, Paul Holden, James Johnson, Robert R. Miller, William Miller, C. 0. Minckley, W. L. Minckley.

The picture of the humpback chub used on the cover was drawn by Mark J. Orsen, Senior Technical Illustrator of the Museum of Zoology at the University of Michigan, and kindly supplied by Robert R. Miller.

PREFACE

The Humpback Chub Recovery Plan is intended to serve as a guide for research and management activities in the Colorado River basin which will lead to the preservation and enhancement of the species and its habitat. This plan identifies specific objectives, timetables, and activities. It also suggests funding responsibilities for a five-year period. The cooperation of a multitude of state, federal and local agencies, university personnel, private consultants, and concerned citizens is vital to the success of the planned recovery effort.

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INTRODUCTION

General Description

The humpback chub (Gila cypha Miller) is one of North America's most bizarre animals. A prominent nuchal hump, flattened head (concave posteriorly), long fleshy snout, and small eye give it an almost grotesque appearance. Yet, these features combine to provide this minnow with unique adaptations which enable it to survive in one of the world's most severe aquatic ecosystems - the Colorado River.

The humpback chub was one of the last large fish species to be discovered in North America. A specimen caught in the Grand Canyon, and another specimen and a head from unknown localities, formed the basis for describing this unique creature (Miller 1946). Recent publications have more fully described the intraspecific variation of this species (Holden and Stalnaker 1970; Minckley 1973; Suttkus and Clemmer 1977).

The following summary (Minckley 1973) aptly describes the humpback chub:

> "Body streamlined; skull concave on dorsum. Nape abruptly produced at occiput into a truncate, prominent hump, which often projects forward to overhang occiput in large adults. Caudal peduncle thin, somewhat pencil-like but not greatly elongated, its length divided by length of head less than 1.0; head length divided by caudal peduncle less than 5.0. Squamation often incomplete, or scales embedded deeply (especially on hump). Fins large, falcate. Origin of dorsal fin about equidistant between snout and caudal fin base. Dorsal fin rays usually 9, anal fin rays 10 or more. Mouth inferior, overhung by snout. Pharyngeal arch small, its lower ramus short, teeth usually 2, 5-4,2."

Maximum length of humpback chubs is about 45 cm and adults tend to be olivaceous or brownish on the back and silvery on the sides and belly.

Characters which distinguish it from the closely related bonytail chub (G. elegans) and roundtail chub (C. robusta) include: 1) the prominent nuchal hump with lateral grooves that extend posteriorly along the hump, 2) the flat head with fleshy snout and small eyes, 3) dorsal rays typically 9 and anal rays typically 10 (occasionally 11), 4) a caudal peduncle depth intermediate between those of the bonytail (narrow)

and roundtail (wide), 5) the loss of squamation, especially on the nuchal hump (closely approximated in the bonytail chub), and 6) expansive falcate fins.

Characters distinguishing young humpbacks from other young Gila are less definitive. The hump shows signs of forming at approximately 50 mm, as does the flattened head and subterminal mouth, but detecting these features is difficult. The dorsal and anal fin ray counts of 9-10, and subterminal or inferior mouth are probably the best distinguishing character for young specimens (approx. 70 mm total length).

A considerable number of specimens of Gila have been collected since the early 1950's that do not fit the description of either the bonytail, roundtail, or humpback chub. Most of these fish are intermediate in morphology between the humpback chub and the other two species. The hump is usually similar to that of the bonytail; but lateral creases, characteristic of the humpback chub, are also found on these intermediate specimens. The intermediates show development of a.flat head, fleshy snout and small eye, but not as extreme as Gila cypha (Holden and Stalnaker 1970). These specimens tend to bridge the morphological gap between the humpback chub and both the bonytail and roundtail, and make it difficult to determine the intraspecific limits of the humpback chub.

A manuscript in press (1978) by Smith, Miller, and Sable (University of Michigan) suggests that many of the specimens referred to by Holden and Stalnaker (1970) and others as intergrades or hybrids are actually pure Gila cypha (see also Suttkus and Clemmer 1977). Although their data are not available yet, it appears that the intraspecific variation of the humpback chub includes all, or nearly all, abruptly humped specimens. This study, when completed, is expected to clarify the taxonomic problems surrounding the Gila robusta complex.

Recently researchers have generally referred to all Gila specimens with a hump and lateral creases as Gila cypha (Holden and Stalnaker 1975; Seethaler et al. 1976; Kidd 1977; Holden 1977). Studies are underway to clarify the systemic status of the humpback chub and to determine the relationships of the intermediate forms. The humpback chub is defined in this report to include these intermediate forms.

Historical Distribution and Abundance

The humpback chub is endemic to the Colorado River basin. It was not reported before the 1940's because of its restriction to canyon areas that were inaccessible to early researchers. Considerable man-made alterations had occurred in the Colorado River aquatic community before the 1940's, especially in the lower basin (Miller 1961). This suggests the possibility that populations of this species were lost due to man's intervention before their existence was known. For example, Miller (1955) reported on remains of this species from Indian ruins near the site of Hoover Dam. It is possible that a population of humpback chubs existed in this area but were eliminated when Hoover Dam became operational in the 1930's. If population losses of this nature did occur, they were probably restricted to the lower Colorado basin, as the upper basin, including Grand Canyon, was little altered until the 1960's. Olsen's (1976) record of "Gila cf. cypha" from an Indian site in the Gila River basin must have been based on pharyngeal bones of Gila robusta or G. elegans (see Minckley 1976).

Interest in Colorado River endemic fishes increased in the 1960's, primarily because of the rapid disappearance of these fishes in the lower basin and the threat imposed by the Colorado River Storage Project dams in the upper basin. Until the 1950's, the humpback chub was known only from the Grand Canyon (Miller 1946). A number of surveys were made in the upper basin in the 1950's and 1960's, primarily as pre—and post-impoundment investigations of the Flaming Gorge and Glen Canyon reservoir sites. Humpback chubs were found in relatively large numbers in the upper Green River (Smith 1960; Bosley 1960; Vanicek et al. 1970) and in the Colorado River above and below Glen Canyon Dam (Holden and Stalnaker 1970, 1975; Minckley 1973). Specimens were taken from Desolation Canyon of the middle Green River in 1967 (Holden and Stalnaker 1970) and the lower Yampa River in 1969 (Holden and Stalnaker 1975). One individual was found in the White River of Utah and another in the Colorado River near Moab, Utah in the 1950's (Sigler and Miller 1963). The most recent population to be discovered was in the Colorado River at Black Rocks (Colorado), near the Utah-Colorado border (Johnson 1976; Kidd 1977).

Therefore, the historical distribution of Gila cypha probably included most of the larger, swift-water canyons on the Colorado and Greem rivers above Lake Mead, and two Green River tributaries, the Yampa and White rivers.

The absence of reliable data makes it difficult to adequately assess pre-1950 humpback chub abundance. Their abundance in the canyon areas listed above was usually limited, although they were common in one or two particular spots within those areas (Smith 1960; Holden and Stalnaker 1975; Kidd 1977; Seethaler et al. 1976). Occurrence of humpback chub bones in caves used by Indians suggests a fair abundance at one time in the area near Hoover Dam (Miller 1955). However, the general impression is that during historical time, this species may have been uncommon when compared to other endemic fishes.

Present Distribution and Abundance

Available data indicate that several major changes have occurred in humpback chub populations. Humpback chubs were eliminated from the Green River above the mouth of the Yampa River in Colorado, Utah, and Wyoming when Flaming Gorge Dam became operational in 1962 (Vanicek et al. 1970). Humpback chubs were common in fishery samples from Lake Powell soon after closure in the 1960's, but they have not been collected during the last few years (personal communication, Dale Hepworth, Utah Division of Wildlife Resources). The cold tailwaters of Glen Canyon Dam (Lake Powell) have apparently caused major reductions in both distribution and abundance of humpback chubs in Marble and Grand canyons (Minckley 1973; Holden and Stalnaker 1975; Suttkus et al. 1976). Recent researchers in Marble and Grand canyons have found humpback chubs distributed from River Mile 27 to River Mile 108, with a concentration occurring in and near the mouth of the Little Colorado River (Suttkus et al. 1976; personal communication, C. Minckley, Museum of Northern Arizona). C. Minckley (1977) recently recorded humpback chubs 13 km upstream in the Little Colorado River. Due to the recent discovery of humpback chub populations in Desolation Canyon and the Black Rocks area, no population changes have been documented. Recent collections in the White River (Anonymous 1977) and the Colorado

River near Moab, Utah (Taba et al. 1965; Holden and Stalnaker 1975) have failed to find any humpback chubs. Present distribution of the humpback chub includes (Figure 1):

1. The Green River in Desolation and Gray canyons (Holden and Stalnaker 1975; Holden 1977);
2. The Green River in Dinosaur National Monument (Miller 1964; Holden and Stalnaker 1975);
3. The Yampa River in Dinosaur National Monument (Miller 1964; Holden and Stalnaker 1975; Seethaler et al. 1976);
4. The Colorado River between Palisade, Colorado, and Black Rocks near the Colorado-Utah border (Kidd 1977);
5. The Colorado River in Marble and Grand Canyons from River Mile 27 to River Mile 108 (Suttkus et al. 1976; Suttkus and Clemmer 1977) and the Little Colorado River from its mouth to a point 13 km upstream (C. Minckley, personal communication).

Distribution in all the areas listed above is sporadic, with concentrations in very small parts of the canyon areas (Holden 1977; personal communication, C. Minckley, Museum of Northern Arizona).

Reproduction of humpback chubs as evidenced by young-of-the-year or juvenile fish is recorded from Desolation and Gray canyons (Holden and Stalnaker 1975; Holden 1977) and from the Grand Canyon near the Little Colorado River (Suttkus et al. 1976; Suttkus and Clemmer 1977; personal communication, C. Minckley, Museum of Northern Arizona).

The humpback chub has generally been associated with fast currents and/or deep channels (Holden and Stalnaker 1975; Seethaler et al. 1976; Kidd 1977). Holden (1977) studied preferred habitat of this species in Desolation and Gray canyons in September, 1977. Young-of-the-year and juvenile chubs preferred habitats with little current, a silt substrate, and a depth of 0.3-1.0 m. Adults utilized a variety of areas, usually over a sand substrate, and showed little preference for either depth or velocity. Distributional information stresses the preference for canyon areas that contain deep, fast water, although microhabitat studies indicate that shallower, slower areas within these canyons are used during daily activities.

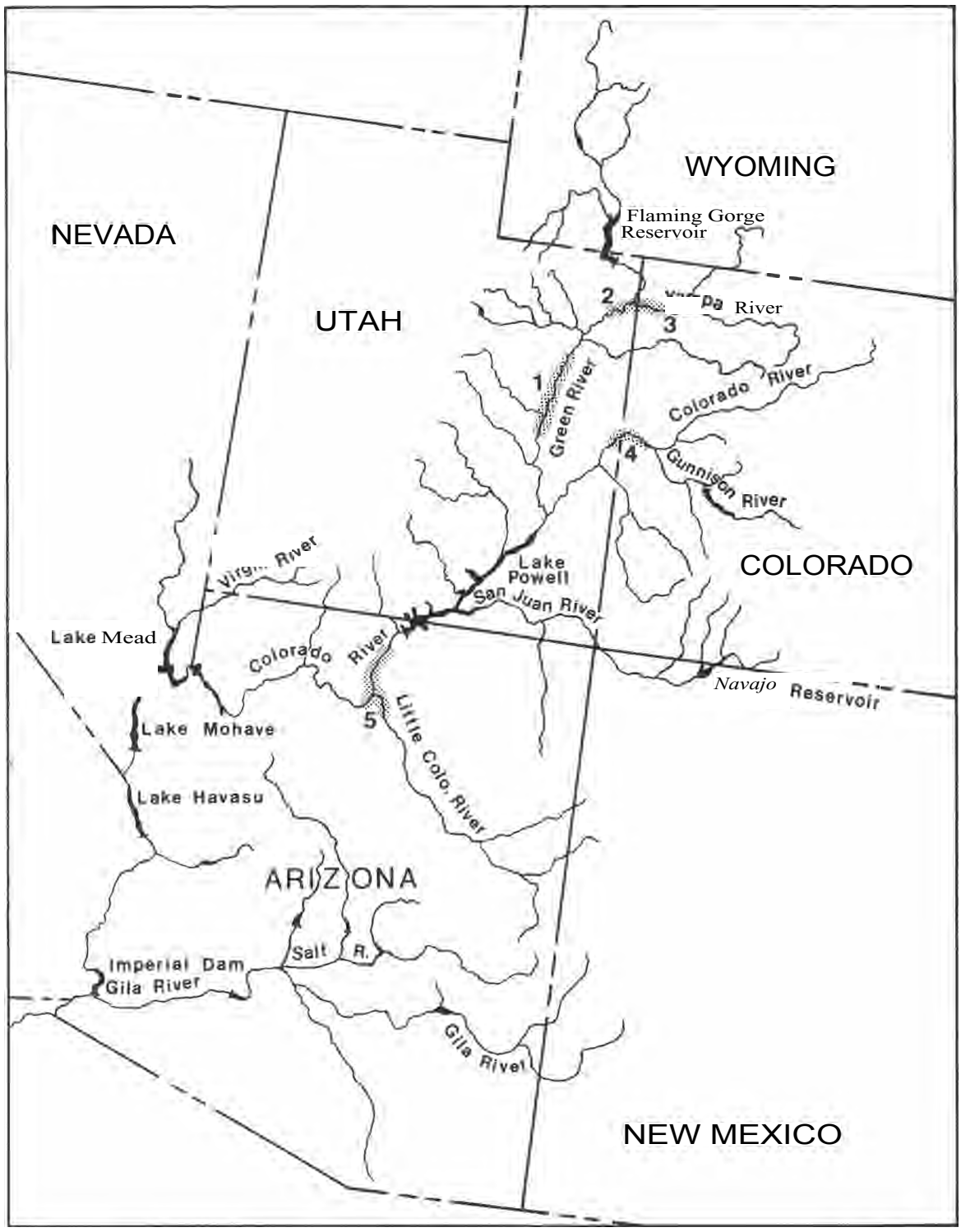

Figure 1. Present distribution of the Humpback chub(Gila cypha) within the Colorado River drainage.

Humpback chubs are relatively common in Desolation-Gray canyons (Holden 1977), in the Little Colorado River (personal communication, C. Minckley, Museum of Northern Arizona), and the Black Rocks area of Colorado (Kidd 1977). The Desolation-Gray canyons area probably contains the largest population, as the other two areas have less suitable habitat. The Little Colorado River is serving as a refugium for the Grand Canyon population from the cold, fluctuating conditions of the Colorado River in that area. Humpback chubs are relatively rare in the Green and Yampa rivers of Dinosaur National Monument where they usually have been taken from one or two rather restricted reaches (Holden and Stalnaker 1975; Seethaler et al. 1976).

Life History

No specific research has been conducted on humpback chub life history except the microhabitat study mentioned previously. Therefore, life-history information must be extrapolated from data on closely related species (bonytail and roundtail chubs) and the occasional observations of field researchers.

Spawning of roundtail and bonytail chubs appears to occur at river temperatures of approximately 18°C (Vanicek and Kramer 1969; Holden 1973). Due to the close systematic relationship between these species and the humpback chub, it is reasonable to assume that similar temperatures are required by the humpback chub. Paul Holden (personal communication, Logan, Utah) collected a ripe male humpback chub in the lower Yampa River at the same time that roundtail males were ripe there. The specimen had slight breeding tubercles in the dorsum and splashes of orange coloration near the paired fins, similar to that noted in roundtails and bonytails. Size of humpback young in Desolation and Gray canyons in September suggests that spawning occurs in May or June when water temperature first reaches 18°C. Suttkus and Clemmer (1977) stated that spawning of humpback chubs "probably occurs during June and July in the Grand Canyon area."

Growth of young humpbacks, as shown by length/frequency analysis (Holden 1977), indicates that in September, Desolation Canyon young-of-the-year are 30-70 mm and juveniles (age I and II?) are 70-150 mm.

These specimens were somewhat larger than young roundtail chubs found during the same study in the Green River near Jensen, Utah, and are larger than both roundtails and bonytails collected by Vanicek and Kramer (1969) in the Green River of Dinosaur National Monument. Larger young are expected in Desolation Canyon because of the probable earlier spawning time.

The subterminal mouth of the humpback chub suggests bottom feeding (Miller 1946). This assumption has not been tested since no stomach analyses of this species have been made. Humpback chubs have been observed feeding on the surface in Desolation Canyon and several netted at Black Rocks and in Dinosaur National Monument were caught very near the surface (personal communication, P. Holden, Logan, Utah; personal communication, N. Armantrout, BLM, Moab, Utah). This suggests that the humpback is a surface feeder, as is the bonytail chub (Vanicek and Kramer 1969).

Minckley (1973) noted that humpbacks caught below Glen Canyon Dam had fed primarily on planktonic crustaceans which apparently originated in Lake Powell. No food habit studies have been conducted on specimens from more natural environments.

Reasons for Decline

The major reason for decline of humpback chub populations has been the operation of Flaming Gorge and Glen Canyon dams, and perhaps Hoover Dam. Impoundments and cold tailwaters created by these dams have eliminated humpback chub populations from significant portions of prior habitat (Vanicek et al. 1970; Holden and Stalnaker 1975; Suttkus et al. 1976; Suttkus and Clemmer 1977; Smith et al. 1978). The fish eradication program on the Green River prior to closing Flaming Gorge Dam probably adversely affected humpback chub populations in Dinosaur National Monument (Miller 1963, 1964), although pre-eradication studies were not conducted in this area and, therefore, no objective data are available to support this assumption.

Desolation Canyon and Black Rocks populations have not been known sufficiently long for population changes to be documented. It seems reasonable to assume that reduced flows far below the cold, fluctuating

tailwaters of dams may be adversely affecting humpback chub habitat, as is suspected for other rare fish (Colorado squawfish, bonytail chub; Joseph et al. 1977). Such reductions may have altered river hydraulic performance to a point where humpback chub habitat, especially that needed for spawning and rearing, has been reduced or altered significantly, and therefore reproductive success has been lowered.

Another potential reason for decline is competition and/or predation by exotic species. A large number of exotic species has been introduced into the Colorado basin and, therefore, may have added to the demise of the humpback chub (Miller 1961;Holden et al. 1974).

Another reason for decline may be hybridization (Minckley 1973; Holden et al. 1974). The relatively frequent occurrence of probable hybrids in relation to the number of good humpback chubs in recent collections suggests a gradual "swamping" of the genetic stock (Holden and Stalnaker 1970, 1975; Holden 1977). Some authors have suggested the hybridization is caused by habitat modification, especially that resulting from dams in the 1960s (Minckley 1973; Johnson 1976). Other authors (Holden et al. 1974) have suggested that the hybridization occurred before major alteration. Regardless, hybridization in small, isolated populations may well cause the demise of such populations, or at least the loss of pure genetic stock. Recent alterations in the upper basin, and proposed alterations, especially flow depletions, may increase the hybridization potential and therefore speed the demise of the humpback chub.

GOAL: Restore and maintain a minimum of five self-sustaining humpback chub populations in the Colorado River system by 1990.

1. Determine humpback chub habitat requirements and areas of essential habitat.
   11. Quantify habitat requirements and limiting factors.
      111. Determine the physical and chemical characteristics of the habitat used by present populations, including spawning areas.
      112. Determine biological habitat characteristics.
      113. Establish historical and current reasons for reduced numbers and distribution.
   12. Identify essential habitat.
      121. Research methods of identifying and analyzing natural spawning and nursery sites, migration routes, or other habitats.
      122. Recommend consultants or agencies to research and analyze key habitats.
      123. Determine the location and status of available and potential habitat.
2. Protect and manage the humpback chub and its habitat so wild populations are increased and/or maintained.
   21. Locate all existing populations by conducting species inventories in suspected habitats.
   22. Determine population status and levels needed to maintain five secure populations.
      221. Research methods of determining population dynamics and the biological potential of the species to respond to management.
      222. Research non-lethal sampling techniques to collect humpback chubs and sympatric species effectively.
      223. Determine population size and structure through tagging (or otherwise marking).
      224. Recommend contractors and agencies to implement population monitoring techniques.
   23. When deemed desirable, reintroduce marked humpback chubs (wild or hatchery stock) into five stable habitats to achieve desired densities of spawning adults.
      231. Supplement four existing populations with stocked fish if deemed necessary.
      232. Plant humpback chubs into unoccupied areas when habitat is restored and maintained.
      233. Evaluate the success of possible reintroduction programs.

24. Eliminate unfavorable activities affecting key habitats by responding to detrimental modifications.

241. Implement Section 7 of the Endangered Species Act for federally funded projects or any project which impacts habitat on federal lands.

242. Implement existing state or local laws to protect non-federal lands and water.

243. Encourage adoption of legislation to protect humpback chub populations and their habitat.

25. Prepare habitat management plans to maintain and increase the availability of key habitats.

251. Determine habitat improvement or maintenance criteria, techniques, and features.

252. Determine precise sites for habitat restoration or maintenance for existing and potential populations.

253. Implement at least five habitat plans by delegating responsibilities to land and water management agencies.

3. Establish a long-term humpback chub and a short-term bonytail and roundtail chub captive propagation program to supply fish for scientific studies and reintroductions, and to populate refugia.

31. Build facilities at a new or existing hatchery to produce 10,000 humpback chubs, 10,000 roundtail chubs, 10,000 bonytail chubs, and certain hybrids crosses annually.

32. Annually maintain and operate two facilities as humpback chub refugia and to produce a minimum of 20,000 humpback chubs (through 1990), 10,000 roundtail chubs, 10,000 bonytail chubs, and their hybrid crosses (through 1985).

33. Develop propagation and holding techniques to maximize production of young and maintain adult brood stocks.

34. While maintaining genetic integrity, produce or acquire and maintain the following brood stocks: 10 pairs of humpback chubs in each of the two facilities; 10 pairs of roundtail chubs in each facility, 5 pairs of bonytail chubs at the new facility, and 10 pairs of bonytail chubs at Willow Beach.

341. Obtain brood stocks of the three Gila species from inviolate wild populations initially.

342. Develop replacement brood stock from captively reared chubs.

343. Keep brood stocks from geographically isolated areas separate and occasionally infuse wild chubs to maintain genetic heterozygosity.

4. Determine the taxonomy of all sympatric species and hybrids of the mainstream Colorado River Gila complex at several life stages.

41. Determine the taxonomy of several humpback chub, bonytail chub, roundtail chub life stages.

42. Determine the taxonomy of the following hybrid crosses at several life stages: humpback x roundtail, humpback x bonytail, bonytail x roundtail, and intraspecific humpback chub crosses.

43. Conduct other studies using wild or captive Gila fishes.

5. Conduct information and education programs to gain support for recovery program.

51. Develop and produce needed information and education (I & E) materials.

511. Develop color brochures or leaflets and posters.

512. Develop a short color film on the humpback chub and other threatened and endangered species in the Colorado River system.

513. Initiate, produce, and distribute a periodic newsletter.

514. Develop an audio-visual program for loan to schools and interested groups.

52. Make the public and public agencies aware of the humpback chub, its needs and plight, and the recovery efforts underway.

521. Disseminate I & E materials to fishermen, river runners and others.

522. Provide workshops for public agencies to inform them of their responsibilities for endangered species and to involve them in I & E programs.

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NARRATIVE

Synopsis and Details of Recovery Plan Steps

The narrative section of the plan provides detail for the research and management activities of the step-down outline section.

GOAL: Restore and maintain a minimum of five self-sustaining humpback chub populations in the Colorado River system by 1990.

Seven major objectives must be accomplished to create stable humpback chub populations. Most vital are efforts to protect and manage existing populations and their habitat. A hatchery propagation program is called for - it will produce fish for laboratory studies and reintroductions. The hatcheries will also serve as refugia in case some catastrophe were to eliminate wild humpback chub stocks. The research work planned includes comparative taxonomic studies of fishes in the genus Gila, development of propagation techniques to maximize production while maintaining genetic diversity, analysis of humpback chub habitat requirements, and quantification of population characteristics. Management activities include preparation of habitat management and protection plans, an Information & Education campaign, and coordination of the multi-agency recovery effort. A five-year budget which assigns priorities, requests funds, and suggests agency responsibilities is included.

1. Determine humpback chub habitat requirements and areas of essential habitat.

Habitat preferences must be quantified. All areas with characteristics conducive to humpback chub survival, especially reproduction, must be identified.

11. Quantify habitat requirements and limiting factors.

Analyses of the physical, chemical, and biological characteristics of habitat used by humpback chubs will be conducted, especially in the spawning area. Hopefully, specific limiting factors can subsequently be recognized.

111. Determine the physical and chemical characteristics of the habitat used by present populations, including spawning areas.

In situ determinations of water depth, temperatures, velocity, turbidity, substrate type, and other characteristics will be used to develop electivity curves for several life stages of the humpback chub.

112. Determine biological habitat characteristics.

The interactions of humpback chubs with other fishes, invertebrates, and certain disease organisms will be investigated. Competition for space in spawning and nursery habitats with other species will be researched.

113. Establish historical and current reasons for reduced numbers and distribution.

The reasons for the decimination of the humpback chub populations in the upper Green River and Colorado River in the Grand Canyon are well known (population reduction followed by loss of spawning habitat). The causes of declines in other areas may be postulated by examining historical data describing habitat and humpback chub occurrence.

12. Determine the location and status of available and potential habitat.

Methodology to identify and describe sites in which populations can be maintained or established will be developed.

121. Research methods of identifying and analyzing natural spawning and nursery sites, migration routes, or other habitats.

Criteria must be established and refined to locate and describe reproductive sites, nursery sites, feeding and resting areas. Habitat descriptions will aid in selecting sites for restoration of the species. Incremental analysis of habitat may be used.

122. Recommend consultants or agencies to research and analyze key habitats.

Field work may be coordinated through the Fish and Wildlife Service and the seven state wildlife agencies in the basin. Specialized research problems may be delegated to contractors and sponsored by a resource management agency.

13. Establish critical habitat under Section 7 of the Endangered Species Act.

Based on analyses of habitat requirements and location of occupied and potential habitats, critical habitat can be recommended. Note that actual designation of critical habitat is a legal process; only the Secretary of the Interior has authority to do this.

2. Protect and manage the humpback chub and its habitat so wild populations are increased and/or maintained.

If the recovery program is to succeed,some populations and habitats of the humpback chub must be stabilized and others should be increased. Combined with knowledge of what good humpback chub habitat is, population levels must be researched and manipulated and the critical habitats protected and restored via habitat management plans.

21. Locate all existing populations by conducting species inventories in suspected habitats.

Only four populations are currently known, due to the difficulty of getting access into deep canyon-bound rivers and the inefficiency of sampling techniques. Other populations may exist in areas like Cross Mountain Canyon on the lower Yampa River or Cataract Canyon on the Colorado River. The existence of the humpback chub must be documented to offer the habitat legal protection.

22. Determine population status and levels needed to maintain five secure populations.

To manage and maintain viable humpback chub populations, the characteristics of a "healthy" population must be described. Very little is currently known about such population descriptors.

221. Research methods of determining population dynamics and the biological potential of the species to respond to management.

Basic research about the natality, growth rate, age at reproduction, mortality, movements, etc. will provide data about population characteristics. Simulation models may be constructed to predict the responses of humpback chub populations to habitat changes. Beneficial habitat management practices, such as optimum flows or temperature regimes, can then be recommended.

222. Research non-lethal sampling techniques to collect humpback chubs and sympatric species effectively.

Available sampling devices and techniques are inadequate. Gill and trammel nets are most effective for catching chubs but can cause direct mortality or invite diseases to gain a foothold. Electrofishing devices cause less mortality, but are inefficient in deep, swift rivers or in waters with high conductivity. Innovative research is needed to develop better methods of sampling and observing humpback chubs without killing or injuring them.

223. Determine population size and structure through tagging (or otherwise marking).

Estimates of population size and age class composition will be made by mark-recapture census techniques or other methods. The carrying capacity of suitable habitats must be determined. Such studies will likely be contracted to a competent researcher.

224. Recommend contractors and agencies to implement population monitoring techniques.

Resource agencies with wildlife management responsibilities will monitor humpback chub populations using techniques developed by researchers. Annual estimates of year-class size, reproductive success, and distribution will be used to measure population stability and the success of reintroduction programs.

23. When deemed desirable, reintroduce marked humpback chubs (wild or hatchery stock) into five stable habitats to achieve desired densities of spawning adults.

If and where needed, humpback chub populations can be restored or enhanced by transplanting chubs. These fish should only be stocked into habitats in which subsequent natural reproduction is possible. Moreover, it is inadvisable to transplant stocks from one population to another, e.g. rearing chubs from the Grand Canyon and stocking offspring into the Yampa River. It may be necessary to artifically sustain wild populations for short periods while habitat management techniques are developed and implemented. Reintroductions must not be made in areas where habitat is unavailable or cannot be restored.

231. Supplement four existing populations with stocked fish if deemed necessary.

When the status of the four known populations is determined, it may be necessary to temporarily bolster their numbers with hatchery-reared fish. The zoogeographic (genetic) integrity of each population must be maintained. The real hope of maintaining existing populations will be in providing vital reproductive habitat, not hatchery culture programs.

232. Plant humpback chubs into unoccupied areas when habitat is restored and maintained.

Areas in which humpback chubs previously occurred should be managed to provide useable habitat. Populations can be established by stocking wild or hatchery fish into these areas. The restoration areas should be geographically isolated from existing populations. In this way a single natural or man-made biological disaster cannot destroy several humpback chub populations.

233. Evaluate the success of possible reintroduction programs.

The success of reintroduction programs must be evaluated to determine if they are useful for achieving desired population levels. Stocked fish may be marked. Evaluation programs can succeed if efficient sampling techniques are developed and stocked fish and their progeny can be identified.

24. Eliminate unfavorable activities affecting key habitats by responding to detrimental modifications.

After unfavorable land and water-use practices are identified, steps should be taken to reduce or eliminate those practices. The protective measures implemented will depend on the nature of the habitat disturbance and the type of habitat affected.

241. Implement Section 7 of the Endangered Species Act for federally funded projects or any project which impacts habitat on federal lands.

The responsibilities of several federal agencies to the humpback chub and its habitat are listed in Section 7 of the Endangered Species Act of 1973. Section 7 consultations will clarify the roles of each agency; in some cases Federal Register Publication and subsequent litigation may be necessary. Unequivocal statements of adherence to Section 7 and protection of the species should be included in binding decisions in landscape planning documents of federal land management agencies.

242. Implement existing state or local laws to protect non-federal lands and water.

Most states have laws affording protection to the State's environment; some have provisions for endangered species in water use decisions. Proper planning at the state and local level can provide protection of vital habitat.

243. Encourage adoption of legislation to protect humpback chub populations and their habitat.

States with no authority to protect humpback chubs should press for adoption of meaningful laws. Creation of state Endangered Species Acts, coordination of the activities of several state agencies by executive order, or the power to invoke eminent domain may be viable tools to protect endangered species.

25. Prepare habitat management plans to maintain and increase the availability of key habitats.

Habitat change is the primary factor causing the rarity of humpback chubs. Habitat management is necessary to establish the humpback chub in parts of its former range, that is, to allow population expansion.

251. Determine habitat improvement or maintenance criteria, techniques, and features.

Much of the applied research will be conducted under tasks 11 and 12. Each management plan will no doubt be somewhat unique in responding to the limiting factors for humpback chubs in that area. Examples of suspected beneficial management procedures are providing optimum flow during reproductive seasons by manipulating reservoir releases to maintain water levels on spawning areas or providing warmer water during the spawning period by building multi-level reservoir outlets.

252. Determine precise sites for habitat restoration or maintenance for existing and potential populations.

Closely tied to task 12, the sites with the best potential to become stable humpback chub habitats will be identified. Habitat management plans should select at least one additional site to establish a humpback chub population.

253. Implement at least five habitat plans by delegating responsibilities to land and water management agencies.

Habitat management schemes will require multi-agency cooperation and funding. Specific responsibilities will be allocated in proportion to their role in managing land or water in each geographic area selected for humpback chub restoration.

3. Establish a long-term humpback chub and a short-term bonytail and roundtail chub captive propagation program to supply fish for scientific studies and reintroductions, and to populate refugia.

Under present environmental conditions, humpback chub populations seem likely to continue to decline even if certain management options are successful. The paucity of successful reproduction seems to be an important weak link in the chain of events endangering humpback chubs. If certain wild populations became extirpated, they could be re-established with captive-reared humpback chubs if reasons for extirpation in that area were eliminated. Hatchery culture will also supply specimens of known ancestry to clarify taxonomic variability and relationships among and within the Gila robusta complex. Further examination and description of related species and their known hybrids will enable investigators to accurately identify all life stages of humpback chub and sympatric species. The hatchery program will be limited to species of the Gila robusta complex and Gila River basin forms

31. Build facilities at a new or existing hatchery to produce 10,000 humpback chubs, 10,000 roundtail chubs, 10,000 bonytail chubs, and certain hybrid crosses annually.

An existing hatchery within the Colorado River drainage should be expanded to include new propagation facilities for fishes of the genus Gila. Likely candidates are the Rifle Falls State Fish Hatchery or the Hotchkiss National Fish Hatchery in Colorado. Facilities should include small ponds for holding brood stock and rearing fingerlings, a hatching house to incubate eggs and rear fry and several raceways of varying design to induce spawning of brood-stock and serve as rearing locations. Unless natural warm water is available (65°–70°) it will be necessary to use recirculation systems, biological filters, and water heaters to achieve proper spawning and growth temperatures.

32. Annually maintain and operate two facilities as humpback chub refugia and to produce a minimum of 20,000 humpback chubs (through 1990), 10,000 roundtail chubs, 10,000 bonytail chubs, and their hybrid crosses (through 1985).

When two propagation facilities are achieved (one new facility and the Willow Beach National Fish Hatchery) it will be possible to produce adequate numbers of humpback and other chubs. Most facilities will incur their major costs during construction or modification; day-to-day operation costs will be relatively constant throughout the expected 12 year life span. The Fish and Wildlife Service, Bureau of Reclamation, and certain state wildlife agencies will share the responsibility for funding the operation of propagation facilities. These two facilities will also serve as refugia for the humpback chub populations.

33. Develop propagation and holding techniques to maximize production of young and maintain adult brood stocks.

Most of the necessary technology will be developed in situ under controlled conditions. Specific problems are treating diseased brood fish successfully, inducing maturation of the gonads, and simply keeping brood fish alive and healthy over a period of years.

34. While maintaining genetic integrity, produce or acquire and maintain the following brood stocks: 10 pairs of humpback chubs in each of the two facilities; 10 pairs of roundtail chubs in each facility, 5 pairs of bonytail chubs at the new facility, and 10 pairs of bonytail chubs at Willow Beach.

The necessary size of the brood stocks in each hatchery will depend upon their fecundity and the culturist's success in producing young fish, i.e., adequate technology and manpower. The above numbers of fish are estimates. Adults and subadults (replacement brood fish) will comprise the total brood stock. Equal sex ratios may be used.

341. Obtain brood stocks of the three Gila species from inviolate wild populations initially.

Taxonomic studies (see 5) will provide direction towards selecting genetically pure brood stocks. The humpback chub population in the lower Little Colorado River is now being tried as a hatchery stock. Several roundtail chub populations are available. The extreme rarity of the bonytail chub will limit the choices; any captured bonytail chubs will probably be used in the hatchery program.

342. Develop replacement brood stock from captively reared chubs.

Hatchery-reared chubs can occasionally be used as a source of brood stock. This will allow maximum production by making large numbers of brood fish available.

343. Keep brood stocks from geographically isolated areas separate and occasionally infuse wild chubs to maintain genetic heterozygosity.

After the rearing program is established and successful, wild chubs should be regularly integrated into the propagation program. Thus, the natural heterozygosity of the species can be maintained, i.e., the hatchery stocks will not become domesticated. Since humpback chubs from geographically isolated areas may be genetically distinct, care must be taken to avoid gene pool mixing among populations. In this way overall genetic diversity will be maintained.

4. Determine the taxonomy of all sympatric species and hybrids of the mainstream Colorado River Gila complex at several life stages.

The humpback chub species was first described about 30 years ago. Roundtail and bonytail chubs were originally considered subspecies of Gila robusta, but in the last 10 years were elevated to full species status. Confusion still exists regarding reliable characters to identify these three sympatric species. Natural and induced hybridization among these species further compounds the problem. Taxonomic studies of hatchery-produced and wild specimens should be undertaken to clarify the limits of acceptable inter- and intraspecific variability. Specimens of known ancestry can be produced in hatchery facilities (see 3).

41. Determine the taxonomy of several humpback chub, bonytail chub, roundtail chub life stages.

Larval, juvenile, and adult specimen series will be preserved for taxonomic evaluation. Morphological and meristic characters will be noted and analyzed using appropriate statistical analyses. Four populations of humpback chubs will be compared.

42. Determine the taxonomy of the following hybrid crosses at several life stages: humpback x roundtail, humpback x bonytail, bonytail x roundtail, and intraspecific humpback chub crosses.

All of these hybrid crosses are thought to occur naturally to a limited extent. The occurrence of possible hybrid specimens in a collection of suspected humpback chubs confuses the acceptable limits of variability for G. cypha. Larval, juvenile, and adult specimens of each of the above hybrid crosses should be preserved for taxonomic evaluation as they are produced and reared in the hatchery. Morphological and meristic characters will be noted and analyzed using appropriate statistical analyses.

43. Conduct other studies using wild or captive Gila fishes.

Behavioral, physiological and biochemical studies of captive fishes of the genus Gila may yield insights into their taxonomic relationships. This research should be conducted at a propagation facility or in the field using a population of genetically pure humpback chubs. The biochemical research must be carried out on known pure samples at a recognized facility by a competent investigator.

5. Conduct information and education programs to gain support for recovery program.

The humpback chub is an obscure species which could benefit greatly if afforded even moderate publicity. The swift, canyon-bound waters in which certain humpback chub populations occur also have popular recreational uses, such as river running. Thus, there is already some public interest in the habitat of the species. Increased public awareness and support will aid the total recovery effort by generating additional funding.

51. Develop and produce needed information and education (I & E) materials.

Producing and distributing brochures, films, posters, and a newsletter should be coordinated by U. S. Fish and Wildlife Service and perhaps delegated to private marketing firms. Public agencies can supply expertise through consultation, but a private contractor would be

in the best position to effectively create good public relations through an I & E program.

511. Develop color brochures or leaflets and posters.

About 20,000 four-color brochures describing the humpback chub (and similar Gila fishes), its habitat, and the recovery effort will be printed. A large poster of the humpback chub with a short message will be printed (at least 2,000 copies) and made available through public agencies.

512. Develop a short, color film on the humpback chub and other threatened and endangered species in the Colorado River system.

A high quality 16 mm film will be produced which describes the plight of the humpback chub and other endangered mainstream Colorado River fishes and the recovery efforts underway. Copies of the film should be made available to state and federal agencies, conservation organizations, television stations, and schools.

513. Initiate, produce, and distribute a periodic newsletter.

News of the progress towards restoring the humback chub, as well as other Colorado River endangered species, should be made available to interested parties. The newsletter should be sent out at least quarterly. Perhaps the Endangered Species Technical Bulletin would be a good vehicle to publish a synopsis of recovery efforts.

514. Develop an audio-visual program for loan to schools and interested groups.

A film, slide series, and handouts will be developed for use in conservation-education programs. The programs will discuss the humpback chub and similar fishes, its habitat needs and limiting factors, and the recovery effort.

52. Make the public and public agencies aware of the humpback chub, its needs and plight, and the recovery efforts underway.

Recovery activities for the humpback chub must be based on widespread public support to be successful.

521. Disseminate I & E materials to fishermen, river runners and others.

Public agencies and conservation groups will utilize and distribute materials made available to them. See 61 for description of materials.

522 Provide workshops for public agencies to inform them of their responsibilities for endangered species and to involve them in I & E programs.

Annual workshops will be developed to inform public agency personnel about humpback chub identification, recognition of critical habitat, and management techniques. Also, the potential uses of I & E materials should be dealt with as a part of the workshop. In this way public agencies will get the "most" out of the materials and the overall public relations effort .will have some unity. Other endemic fishes of the Colorado River system would also be discussed at such a workshop.

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HUMPBACK CHUB

ABBREVIATIONS FOR AGENCIES

Abbreviations	State Agencies
AG&FD	Arizona Game and Fish Department
CDOW	Colorado Division of Wildlife
CDF&G	California Department of Fish and Game
NDF&G	Nevada Department of Fish and Game
UDWR	Utah Division of Wildlife Resources

Abbreviations	Federal Agencies
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BR	Bureau of Reclamation
NPS	National Park Service
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

HUMPBACK CHUB

PROPOSED BUDGET -- SUMMARIZED BY JOB

Priority	Task	Agency	Cost/Unit	Unit	Coordinator	1st. Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.
1	11. Delineate habitat requirements and limiting factors of humpback chub	USFWS			USFWS	25,000	25,000			
		BR				25,000	25,000			
		BLM				25,000	25,000			
		UDWR								
		CDOW								
		AG&FD								
1	12. Determine status and location of available and potential habitat	AG&FD			Each state agency	5,000	5,000			
		UDWR				5,000	5,000			
		CDOW				5,000	5,000			
		BLM				10,000	10,000			
		BR				20,000	20,000			
		NPS				5,000	5,000			
		BIA				5,000	5,000			
1	13. Recommend areas for critical habitat designation.	All agencies			USFWS	No cost associated				
1.	21. Locate existing populations	AG&FD			USFWS	15,000	15,000			
		UDWR				15,000	15,000			
		CDOW				15,000	15,000			
		USFWS				30,000	30,000			
		BLM				15,000	15,000			
		BR				15,000	15,000			
		NPS				15,000	15,000			
		BIA				5,000	5,000			
2	22. Determine population status and level needed to maintain secure populations	AG&FD			Each state agency	15,000	15,000	15,000	15,000	15,000
		UDWR				15,000	15,000	15,000	15,000	15,000
		CDOW				25,000	25,000	25,000	25,000	25,000
		USFWS				50,000	50,000	50,000	50,000	50,000
		BR				10,000	10,000	10,000	10,000	10,000
		NPS				5,000	5,000	5,000	5,000	5,000
		ELM				5,000	5,000	5,000	5,000	5,000

PROPOSED BUDGET -- SUMMARIZED BY JOB

Priority	Task	Agency	Cost/Unit	Unit	Coordinator	1st Yr.	2nd Yr.	3rd Yr.	4th Yr	5th Yr.
3	23. Reintroduce marked fish into stable habitats when deemed desirable.	AG&FD CDF&G NDF&G CDOW UDWR USFWS			USFWS	No cost estimate intil suitable habitat determined and extent of reintroduction determined				
1	24. Eliminate unfavorable activities (enforce existing laws)	USFWS All state agencids			USFWS	Task is already a responsibility of agencies and costs accounted for in present programs				
3	25. Prepare and implement habitat management plans	BLM MA BR NPS USFS CDOW AG&FD CDF&G NDF&G UDWR			USFWS	Can be covered in coordination with Colorado squawfish RMP premration				
2	.31-32 Maintain facilities for producing humpback chubs	USFWS CDOW BR			USFWS	50,000 50,000 50,000	50,000 50,000 50,000	50,000 50,000 50,000	50,000 50,000 50,000	50,000 50,000 50,000
2	33. Develop prop. and holding technique	USFWS CDOW			USFWS	Covered under 31-52 budget				
3	34. Maintain chubs and related species in hatchery facilities for genetic research	USFWS CDOW			USFWS	Same facilities a; 31, co			covere.	under 31
3	4. Determine taxonomy of Gila at various life stages	USFWS BR WS BLM (contract study)			USFWS	10,000 10,000 5,000 5,000	10,000 10,000 5,000 5,000	10,000 10,000 5,000 5,000	10,000 10,000 5,000 5,000	10,000 10,000 5,000 5,000

PROPOSED BUDGET -- SUMMARIZED BY JOB

Priority	Task	Agency	Cost/Unit	Unit	Coordinator	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.
1	511. Develop color brochure, etc.	All agencies			States	Cost will be covered under Colorado squawfish plan				
1	512. Develop a movie	All agencies			USFWS	Cost will be covered under Colorado squawfish plan as part of movie		this species will be		
2.	513. Initiate, produce, and distribute a periodic newsletter, i.e. Endangered Species Technical Bulletin	USFWS			USFWS	Cost is now covered under endangered species program and FWS				
1	514. Develop audio-visual program for loan to school.	States USFWS	$50/per program	AV program	States	2,000	2,000	2,000	2,000	2,000
1	521. Disseminate I &E materials to fishermen, river runners and others.	States USFWS NPS BLM			USFWS	Cost will be covered under Colorado squawfish plan				
1	522. Provide workshops for public agencies to inform them of their responsibilities for endangered species and to involve them in I & E programs	USFWS			USFWS	3,000	3,000	3,000	3,000	3,000

Appendix A

LETTERS OF COMMENT ON THE DRAFT RECOVERY PLAN AND TEAM RESPONSE

The full text of each letter of response has been reproduced. For coding purposes, each letter has been assigned a letter of the alphabet and pertinent questions or comments within each letter have been sequentially numbered. In responding to the questions or comments, reference will be made to the letter's alphabetical code and the sequentially numbered portion of the letter (Example: Code A-1 refers to the first pertinent comment of letter A).

United States Department of the Interior
NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. Box 728
Santa Fe, New Mexico 87501

IN REPLY REFER TO:
N1621(SWR)ONR

AUG 2 1978

A

Memorandum

To: Regional Director, Region 6, Fish and Wildlife Service

From: Regional Director, Southwest Region

Subject: Humpback Chub Recovery Plan

Thank you for the opportunity to review the draft "Humpback Chub Recovery Plan." We generally concur with the details of the recovery program, and have no suggestions at this time.

The range of Gila cypha only casually falls within the boundary of our Southwest Region; most of Arizona and all of Utah, Colorado and Wyoming fall within the Western and Rocky Mountain Regions. If you have not already sent those offices copies of the recovery plan, I suggest that you do so.

The funds required to locate existing populations and to determine their status and habitat requirements would be programmed out of the appropriate Region. Those priorities are assigned at the Regional level and based upon area priorities. All endangered species programs fall into our highest priorities for funding.

STATE OF CALIFORNIA—RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME
350 Golden Shore
Long Beach, California 90802
(213) 590-5151

August 3, 1978

Marvin P. Duncan
Acting Regional Director
U.S. Fish & Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225

Dear Mr. Duncan:

I have reviewed the last draft of the Humpback Chub Recovery Plan and find it satisfactory and recommend no changes at this time.

R-1 I have one comment on this and other plans in regard to the next step in the process - implementation of the plans. Unfortunately there appears to be a tendency to lose momentum once a recovery plan is completed and implementation is slow. One possibility, and it seems the Fish & Wildlife Service would be the best one to handle this, would be to separate and summarize each agencies list of responsibilities and meet with them individually to discuss their plans and progress.

Thank you for the opportunity to comment on the draft report.

JAMES A. ST. AMANT
Associate Fishery Biologist

JAS/saa

United States Department of the Interior
BUREAU OF RECLAMATION
CENTRAL UTAH PROJECTS OFFICE
PO BOX 1338
PROVO, UTAH 84601

IN REPLY
REFER TO CUPO-150
565.

AUG 11 1978

Memorandum

To: Regional Director, U.S. Fish and Wildlife Service, Denver, CO

From: Project Manager, Provo, Utah

Subject: FA/SE/ Colorado River Fishes Recovery Plan (Your Letter of July 26, 1978)

Mr. Chuck Lane of our staff and a member of the recovery team has reviewed the draft, Humpback Chub Recovery Plan, in his capacity as an individual team member and his comments are presented below.

Comments representing the official view of the Bureau of Reclamation are being prepared by Mr. Harold Sersland, Regional Environmental Specialist, UC Region, Salt Lake City, Utah. These comments will be submitted at a later date.

1. General. The draft appears to be very well written and accurately presents material reviewed and developed at the March 21 and 22, 1978 team meeting.

2. Page 10. The statement of the plan's goal appears somewhat inconsistent with the objectives presented to accomplish it. Currently there exist several self-sustaining populations of C-1 chubs. It seems as though first priority and emphasis should be on maintaining and improving existing populations and habitat. Establishing new populations may not be required. The present wording implies that establishing new populations is most important. Suggest rewording.

3. Page 13. The inconsistency mentioned in Comment 2 is demonstrated here. The goal emphasizes establishing populations whereas the C-2 most vital effort is stated to be protection and maintenance of existing populations and habitat.

4. Page 21, Item 32. Question whether the Bureau of Land Management, National Park Service and Forest Service should be exempted from C-3 contributing to the funding of artificial propagation facilities since some of the habitat problems result from activities under the jurisdiction of these agencies.

5. Page 23, Item 5. A statement that one I and E objective would be to explain why it is worth saving the humpback chub would be valuable. Legal, moral, esthetic, economic, philosophical, and other reasons could be cited.

C-4

Mr. Lane is available for additional consultation if appropriate (FTS 584-0359).

cc: Regional Drector, Salt Lake City, Utah
Attention: UC-150

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

6840 (931)

Your reference: FA/SE/ Colorado River Fishes Recovery Plan

AUG 1 1 1978

Memorandum

To: Regional Director, Region 6, Fish & Wildlife Service Denver, Colorado

From: State Director, BLM, Santa Fe, NM

Subject: Draft Humpback Chub Recovery Plan

Thank you for the opportunity to review the draft Humpback Chub Recovery Plan developed by the Colorado River Fishes Recovery team.

According to the present distribution map (Figure 1) the humpback chub is not presently inhabiting New Mexico's Colorado River basin area. Also, the New Mexico Department of Game & Fish does not consider it to be present in New Mexico.

In light of its absence in the state, we are unable to commit programs and dollars as suggested in the implementation schedule.

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AUG 16 '78

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FEDERAL ASSISTANCE

U. S. & WILDLIFE SERVICE

United States Department of the Interior

BUREAU OF RECLAMATION
LOWER COLORADO REGIONAL OFFICE
P.O. BOX 427
BOULDER CITY, NEVADA 89005

IN REPLY REFER TO: LC-150
565.

Your reference:
FA/SE/Colorado River Fishes
Recovery Plan

AUG 14 198

Memorandum

To: Regional Director, Region 6, Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver Colorado 80225

From: ACTING Regional Director

Subject: Draft Humpback Chub Recovery Plan - your office memorandum dated July 26, 1978

We have just reviewed the Humpback chub recovery plan and feel the information is accurate and up to date. We note that the Bureau of Reclamation is slated to spend several thousands of dollars, for various portions of the step down plan, during the next few years. The Lower Colorado Region has spent over $100,000 in studying the Grand Canyon between Lee's Ferry and Separation Rapid during the last year. This money, we believe, has been well spent and will be helpful to the recovery team in gaining information about the status of the chub in this area. This study will conclude in December of 1978 and there are no further plans, by this region, to study that or any other areas where Humpback chub exist. We do, however, understand that the Upper Colorado Region of the Bureau of Reclamation may be interested in studying other aspects of the Grand Canyon area.

As a final comment we would like to encourage the Fish and Wildlife Service to insure that adequate 'permits are available to study the chub. All the effort will be for nought if the study teams are not given enough latitude, via the permit system, to determine habitat requirements, limiting factors, status, etc., of the fish.

Roy D. Gear

RECEIVED
AUG 16 78
FEDERAL ASSISTANCE

In duplicate

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FA

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS

NAVAJO AREA OFFICE
Window Rock, Arizona 86515

IN REPLY REFER TO:

Land Operations

AUG 15 1978

Memorandum

To: Regional Director, Region 6, U.S. Fish & Wildlife Service

From: ACTING ASSISTANT Area Director

Subject: Draft of Humpback Chub Recovery Plan

The subject plan has been reviewed and the following comments are submitted:

F-1 1. The discussion does not attribute any particular value to the Humpback Chub which should be essential for a cost analysis.

F-2 2. The plan discusses the development of suitable habitat. It also states that a possible reason for the decline of the Chub population is the competition or predation by exotic fish species. Presumably these exotic species will still be present unless it is planned to eradicate them.

F-3 3. The 5-year cost is projected at $1,410,000 of tax monies, an amount that appears excessive for the propagation of a fish species of doubtful value.

F-4 The funds received by the BIA for the Navajo Area are just adequate to cover the present operating program. In view of funds limitation, the Navajo Area would not be in a position to participate in the Humpback Chub Recovery Plan. Further, if the development of suitable habitats to re-introduce the Chub includes the river below the dam, it could possibly have an adverse affect on the development of the Navajo Indian Irrigation Project putting us into an untenable position with the Navajo people.

gd/ri-et

IL

REVOLUTION

AUG2 3 1978

CO 40

MIKE O'CALLAGHAN
GOVERNOR

GLEN K. GRIFFITH
DIRECTOR

1100 VALLEY ROAD · P.O. BOX 10678 · RENO, NEVADA 89510 · TELEPHONE (702) 784-6219

Region III
State Mail Room Complex
Las Vegas, Nevada 89158
August 17, 1978

Marvin P. Duncan
Acting Regional Director
U.S. Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225

Dear Mr. Duncan:

I have carefully reviewed the draft of the Humpback chub Recovery Plan and I particularly endorse the efforts that contribute to a knowledge of the Colorado River Gila complex. However, extreme caution is needed in the artificial propagation segments to avoid selective breeding that may eliminate natural (and necessary) variations within the group.

The proposed budget and job segments appear reasonable, although I cannot make commitments for this agency. Funding will depend upon a cooperative agreement and actual determination of Nevada costs.

We do have an interest in the Colorado River chubs and we intend to cooperate in the recovery effort.

Sincerely,

Robert C. Allan
Regional Assistant-Fisheries

RCA:dar

cc: Fisheries Division

STATE OF CALIFORNIA—RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME

1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-3531

August 21, 1978

Mr. Marvin P. Duncan
Acting Regional Director
Fish and Wildlife Service
P. O. Box 25486
Denver Federal Center
Denver, Colorado 80225

Dear Mr. Duncan:

Thank you for the opportunity to review the draft of the Humpback Chub Recovery Plan.

The activities and costs shown in the proposed budget that represent this Department's share of the recovery effort are noted. Since our costs would be low, no obstacle to our full and timely participation is foreseen; however, we all recognize that government agency budgets are subject to change and we can make no ironclad commitments at this time.

Sincerely,

E C Fulle

Director

cc: U. S. Fish and Wildlife
Service-Sacramento

OPTIONAL FORM NO.
MAY 1962 EDITION
445A FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT U.S. FISH & WILDLIFE SERVICE

M

TO : Regional Director, Region 6, Fish and Wildlife Service, Denver, Colorado

DATE: August 24, 1978

FROM : Acting Area Manager, Fish and Wildlife Service, Phoenix, Arizona

SUBJECT: Draft Humpback Chub Recovery Plan

We have reviewed the subject draft recovery plan and have the following comments:

I-1 The text discusses five known areas of humpback chub abundance, however, the map on page 6 shows four areas.

Throughout the draft plan the need for a better means of capturing humpback chubs is discussed. Has the team considered instead of the biologist going to where they suspect the fish to be, they let the fish come to them? It may be possible to capture the fish by constructing an electric weir which would divert chubs into a trap.

1-2 If properly designed it might be possible to capture fish moving both up and down the river. Weirs of this type are often used in the northwest where adult salmon and steelhead trout are diverted from a stream into a hatchery. It may be possible to design and construct a weir which could be powered by a portable generator and be easily moved from one area to another. Obvious advantages of this type of weir over a stationary rack weir is mobility and minimum maintanence needs.

Another method of solving the taxonomy questions that the team might consider involves using the technique of starch-gel-electrophoresis.

I-3 This technique has been used successfully on Pacific salmonids to identify races within a species.

The implementation schedule and proposed budget should be modified to show which Fish and Wildlife Service Region will be responsible for what part of the costs. For example, the plan discusses the

1-4 *use* of Willow Beach NFH as a refugia and a production facility for chubs, yet in the budget section of the plan a single amount is shown. For this region to adequately budget for holding and rearing the fish we need to know how much is available to this region.

RECEIVED
SEP 5 '78

FEDERAL ASS STAW2

I hope these comments are helpful to you in preparation of the final draft of the recovery plan. Please don't hesitate to call if additional information or clarification concerning these comments is needed.

Thank you for the opportunity to review and comment on the Draft Humpback Chub Recovery Plan.

AFA

IN REPLY REFER TO
6840
C-932.3

cc Anr

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

STATE OFFICE
Federal Office Building
2800 Cottage Way
Sacramento, California 95825

AUG 2 8 1978

Mr. R. Kahler Martinson
Regional Director
Fish and Wildlife Service
Lloyd 500 Building
500 N.E. Multnomah Street
Portland, OR 97232

Dear Martinson:

This is in response to your memorandum of July 6, 1978, concerning the draft humpback chub recovery plan. We appreciate the opportunity to review this document before it is finalized.

However, we have no specific comments on what appears to be a thorough and well conceived plan. Very little of the plan seems directed at the Colorado River contiguous to California. In addition, the Bureau administratively includes the Colorado River within the responsibility of the Arizona State Office. It is assumed, therefore, that you will receive more substantive comments from BLM offices in Arizona, Utah, and Colorado.

Sincerely,

Ed Hastey
State Director

RE D
SEP 7 78
FECERAL ASSISTANCE

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

IN REPLY REFER TO

6840
(U930)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
136 East South Temple
University Club Building
Salt Lake City, Utah 84111

AUG 31 1978

Memorandum:

To: Regional Director, Region 6, Fish & Wildlife Service
Denver, Colorado

From: State Director, Bureau of Land Management, Utah

Subject: Comments on Draft Humpback Chub Recovery Plan
(FA/SE/Colorado Fishes Recovery Team)

This refers to your July 26 memorandum requesting comments on the subject plan.

We have been involved in the planning and preparation of this plan through the Bureau's official representative, Mr. Bob Gervais, fisheries biologist, Colorado State Office. Our state office fisheries biologist, as well as our Moab and Vernal districts' fisheries biologists have also attended meetings and provided input into the plan, including proposed budget estimates. We feel the plan adequately represents the present situation of the Humpback Chub and its habitat.

We offer the following specific comments on the plan:

K-1 Page 15, item 21, dealing with "locating all existing populations . . ." may need to update present distribution based on the results of our on-going contract with you for inventory of fishes in the White River in Utah. At present, however, no chubs have been sampled during this contract, but fall sampling yet remains.

Page 19, item 25, Preparation of Habitat Management Plans (HMP) for Endangered Species has been given priority in BLM. We will coordinate HMP's for the Colorado River fishes with our Arizona and Colorado State Offices. Due to possible funding constraints in FY79 it appears that FY80 would be the earliest date that HMP's work could begin.

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FEDERAL ASSISTANCE

Pages 30-32, Proposed Budget - The funding levels in the proposed budget dealing with BLM appear realistic, but are highly optimistic under the present budget climate. Utah BLM's budget share would have to be worked out jointly with the Arizona and Colorado BLM for each fiscal year. Both of our offices are trying to resolve the funding level for specific endangered species recovery plans with our Washington Office. Due to the uncertainty of recent Congressional appropriations for BLM in FY 79, it may not be possible to allocate funds for any of the itemized tasks in 1979. BLM funds are contingent on Congressional appropriations which, hopefully, will increase for our wildlife program in future fiscal years especially as interagency documents such as this plan become available to justify budget requests.

As noted within the comments for the Colorado squawfish recovery plan, we have been able to accomplish habitat monitoring major river habitats on the Green, Colorado and San Juan Rivers in 1977. These habitat reports will be available to the team upon their completion.

We appreciate the opportunity to review this draft plan and hope our comments will assist you in finalizing the plan. Please continue to keep us informed on the status of this plan and field operations so that we can continue to plan and participate in this recovery effort.

United States Department of the Interior
NATIONAL PARK SERVICE
ROCKY MOUNTAIN REGIONAL OFFICE
655 Parfet Street
P.O. Box 25287
Denver, Colorado 80225

IN REPLY REFER TO:
N1423 (RMR) PN

SEP 5 1978

Memorandum

To: Regional Director, Region 6, Fish and Wildlife Service, Denver, Colorado

From: Regional Director, Rocky Mountain Region

Subject: Draft Humpback Chub Recovery Plan

We appreciate the opportunity to review the subject recovery plan and offer the following comments:

Implementation Schedule:

L-1 It appears to us that Task 12, Determine status and location of available and potential habitat; Task 13, Recommend areas for critical habitat designation; and Task 22, Determine population status and level needed to maintain secure populations, will depend upon completion of Task 11, Delineate habitat requirements and limiting factors of humpback chub. Therefore, we recommend beginning the former three tasks in the second or third year of the program. Also, for funding purposes, it appears to us that Tasks 12 and 22 could be carried out as a single project.

L-2 Task 4, Determine taxonomy of Gila at various life stages, appears essential to carrying out the humpback chub restocking objectives. We anticipate that National Park Service funds ($5,000) will be available to begin this study in FY 1979. It is assumed the study will be a single study through the Fish and Wildlife Service.

L-3 As increased energy development in western Colorado and Utah is certain to occur and place heavy demands on upper Colorado Basin water, we suggest the recovery plan explore methods of permitting this development in a manner that will have minimal impacts on the humpback chub and its habitat. Is it possible to design impoundment and diversion facilities to simulate quality

1

CONSERVE AMERICA'S ENERGY

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WILDLIFE SERVICE

habitat for the humpback chub? We believe a positive and cooperative approach to this issue would be better for both the endemic Colorado River fish and the Endangered Species program than Task 24. As written, Task 24 is almost certain to result in conflict, confrontation, and litigation in which the humpback chub may not fare as well as the snail darter.

You may be assured the National Park Service will make every effort to perpetuate the humpback chub in waters within the national parks and will continue to support recovery of the species.

for Glen T. an

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (a CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

U.S. FISH & WILDLIFE SERVICE
Region 2, Albuquerque, New Mexico 87103

TO : Regional Director, Region 6 (SE)

DATE: September 7, 1978

Acting

FROM : Regional Director, Region 2 (SE)

SUBJECT: Review of Gila cypha Draft Recovery Plan

We have reviewed the above draft recovery plan and have found it, for the most, well written. The Recovery Team is obviously well informed and is to be complimented on their effort.

The following questions have been raised in our Regional Office:

1. The prime objective of the plan, to establish and maintain a minimum of five humpback chub populations, must be questioned. There are now only four distinct humpback chub populations known (Little Colorado, Desolation Canyon, Black Rocks, Yampa). The only other historic records are from areas now flooded by lakes Mead and Powell. We question the prime objective of five populations while available data indicates there may be only four areas of suitable habitat remaining for this species. We recommend the number be changed to four or deferred until it can be determined if there is in fact a fifth potential reintroduction site for this species. If not, it will be impossible to ever attain the prime objective.

M-1

2. Objective 23 recommends six new populations of humpback chub be established on page 10 and five populations on page 17. Which is correct? Is this in addition to the fifth population in the prime objective? If only five populations are needed to delist(?) the species, why are ten or eleven populations needed and where is the habitat going to be found if it is highly questionable that even one more habitat exists?

M-2

   Recommendation: Reword 22 to four populations. Reword 23 to search for new habitats with needed environmental parameters.

3. Objective 3 is much too ambitious in view of the possibilities that no new habitats will be found and existing populations may be at maximum carrying capacities now. The second part of the objective, hybridization and taxonomic work, is highly desirable and can easily be carried out at one existing hatchery (Dexter NFH).

14-3

The draft Humpback Chub Recovery Plan is well along the road to completion, but is still in *need* of some tuning. We understand the Team's reasons for recommending specific numbers of populations - a goal to strive for that can be recognized when attained - but question the biological basis for suggesting five populations are needed, especially when existing data indicates the four existing areas may be the only remaining habitats suitable for this species. We believe the above suggestions should be incorporated into a final draft.

cc: David Langlois

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

COLORADO STATE OFFICE
ROOM 700, COLORADO STATE BANK BUILDING
1600 BROADWAY
DENVER, COLORADO 80202

IN REPLY REFER TO

CO-933
6840

SEP 7 1978

Memorandum

To: Regional Director, Regional 6, Fish & Wildlife Service

From: State Director, Colorado

Subject: Draft Humpback Chub Recovery Plan

We have reviewed subject and make the following comments and suggestions.

Present Distribution and Abundance

The location and abundance of humpback chubs is incompletely known. Much additional inventory work needs to be done to establish location and extent of remaining populations. In fact, the Bureau will undertake such an inventory during FY 79 to identify unknown populations which may be effected by our land management practices.

This point of incomplete knowledge of humpback chub populations should be stated more clearly in the draft plan. And, especially, identification of present habitat for the purpose of Critical Habitat designation should not be done until the results are available from the inventory work done by the Bureau during FY 79.

N-1

Parts of the proposed recovery efforts itemized in the plan are already being undertaken by BLM in Colorado. We presently have under contract aquatic studies pertinent to the recovery plan on the Yampa and White Rivers. We also have funded work to develop a taxonomic description of larval fish forms of endemic species of the Upper Colorado Basin.

Agency Funding

Our participation in the recovery effort for this species obviously depends on funds being made available for this purpose by congressional appropriation. Our success in obtaining these funds for other endangered species (peregrine falcon, Colorado squawfish) has been very poor.

N-2

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SEP 11 '78

U. S. FISH & WILDLIFE SERVICE

Save Energy and You Serve America!

Until funds are made available specifically for species recovery efforts, funds for this purpose will have to come from monies for our base program. Hence, our level of recovery effort participation will not be certain.

cc: WO (360)

Acting

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

NEVADA STATE OFFICE
Room 3008 Federal Building
300 Booth Street
Reno, Nevada 89509

IN REPLY REFER TO
6840
(N-931.7)

SEP 7 1978

Marvin P. Duncan
Regional Director, Region 6
Fish & Wildlife Service
P.O. Box 25846
Denver Federal Center
Denver, CO 80225

Dear Mr. Duncan:

The Humpback Chub does not occur in Nevada and the Nevada BLM will not be participating in the Recovery Plan as it is drafted.

The plan is well done and should provide for the recovery of the species.

Thank you for the opportunity to comment.

Sincerely yours,

E.I. Rowland
State Director, Nevada

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SEP 12 '78
FES ASSTACE

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Region 3
517 Gold Avenue, SW.
Albuquerque, New Mexico 87102

2630
September 8, 1978

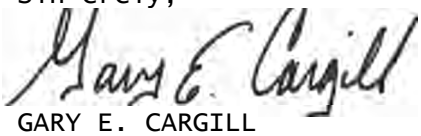
Marvin P. Duncan, Acting Regional Director
USDI, Fish and Wildlife Service
P. O. Box 25486, Denver Federal Center
Denver, Colorado 80225

Dear Mr. Duncan:

Thank you for the opportunity of reviewing the draft recovery plan of the Humpback Chub. The plan is well written, concise and complete.

We can offer no substantive suggestions or criticism. National Forest streams in Arizona and New Mexico may never have suported the species and so our review has been for interest alone.

Sin erely,



GARY E. CARGILL
Deputy Regional Forester

STATE OF COLORADO
Richard D. Lamm, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
Jack R. Grieb, Director
6060 Broadway
Denver, Colorado 80216 (825-1192)

September 11, 1978

Mr. Marvin P. Duncan
Acting Regional Director
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80255

Dear Mr. Duncan:

Thank you for the opportunity to comment on the Humpback Chub Recovery Plan draft. Colorado will use the plan as a guide to implementing recovery programs for the humpback chub.

The recovery team has requested that we determine the status and location of the humpback chub population in the Colorado River below Grand Junction. We have already implemented an "extensive" population and Vabitat monitoring project for this population. We will consider additional research studies which may be needed to determine precise population characteristics. The plan also suggests that Colorado spend $50,000 annually to rear humpback chubs. Although we do not have these funds available currently, it may be possible to request these funds under our Cooperative Agreement to manage endangered wildlife.

Several editorial changes can be suggested. However, one of our staff, David Langlois, is also team leader of the Colorado River Fishes Recovery Team and he will likely put together the other agency comments for the final revision. At that time these minor corrections will be included.

Sincerely,

Robert Evans
Acting Director
for Jack Grieb

RE/dl

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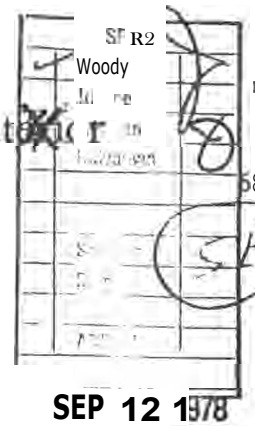
SEP 14 78
FEDERAL

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ARIZONA STATE OFFICE
2400 VALLEY BANK CENTER
PHOENIX, ARIZONA 85073

IN REPLY REFER TO
6840 (932)



SEP 12 1978

Mr. William O. Nelson, Director
Fish and Wildlife Service
P. O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Nelson:

We have reviewed your Draft Humpback Chub Recovery Plan and feel that adequately covers the situation in Arizona.

As identified in your Recovery Plan, at the present time there are no Humpback Chub inhabiting public lands in Arizona.

We would be glad to work with the Recovery Team or another group to inventory habitat within Arizona to determine potential for Humpback Chub reintroduction.

Sincerely,

State Director

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SEP 28 '78
FEDERAL ASSISTANCE

United States Department of the Interior

BUREAU OF RECLAMATION
UPPER COLORADO REGIONAL OFFICE
P.O. BOX 11568
SALT LAKE CITY, UTAH 84147

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U.S. FISH WILDLFE.

IN REPLY
REFER TO: 150
565.

14 1978

Memorandum

To: Regional Director, Fish and Wildlife Service, P. O. Box 25486, Denver, CO 80225

From: Regional Director

ACTING

Subject: Comments on Draft Humpback Chub Recovery Plan

We have reviewed the above draft recovery plan and offer the following comments:

S-1 We support the recovery team's initial program of research to determine habitat characteristics and population status. We suggest that the recovery team consider a two-phase study. The first phase would basically include the inventories of existing habitats and populations. To support this statement, we are scheduling up to $500,000 over a three-year period to fund studies for completing the data requirements of the first phase of the Humpback Chub Recovery Plan as well as similar activities related to the Colorado River squawfish. The results of the first phase would be reported to evaluate the necessity of a full recovery effort. A decision report could be prepared which would be sent through the appropriate agencies and committees of Congress for review and authorization. The recovery effort could then be implemented with specific authorized funds.

S-2 There is another reason for supporting a two-phase approach and that would be to provide for NEPA compliance. It appears to us that the draft of the Humpback Chub Recovery Plan does not point out the need for the preparation of an environmental statement prior to making a decision on taking any action toward implementation of the recovery plan. We suggest that prior to requesting funds for implementing the recovery plan, an environmental statement be required.

S-3 The recovery plan suggests the Bureau of Reclamation program $50,000 a year for five years for a fish hatchery to propagate endangered species. We feel the funding and constructing responsibilities should be borne by the Fish and Wildlife Service

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

rather than the Bureau, and suggest that this obligation for the Bureau be deleted from the recovery plan's recommendations. As previously outlined, the Bureau of Reclamation will be contributing a significant amount of money toward the recovery plan in funding of the habitat requirement studies.

United States Department of the Interior

RECEIVED

NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063 EP 22 A 8 : 06

SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

N1423

(WR)RNR

September 18, 1978 U.S. FISH a DLFE.

Memorandum

To: Regional Director, Fish and Wildlife Service,
Region 6, Denver, Colorado

ADMIN

From: Regional Director, Western Region

Subject: Review Comments on Draft Humpback Chub Recovery Plan

Thank you for the opportunity to comment on the subject plan. We contacted Denise Reno of your office late last month and we appreciated the extra time she gave us to review the plan and submit comments. (Originally you asked for comments by September 1, 1978.)

We fully support the purpose and intent of the recovery plan, and we will be able to supply some limited logistical support, i.e. river trips, helicopters, etc. However, our funds as presently programmed are extremely limited to carry out these programs as suggested in the draft recovery plan.

Some specific comments on particular pages follow:

Page 12 Para. 5. Grand Canyon National Park is now in the process of developing an "Endangered Species/Fishing" brochure for general distribution. This is being coordinated with Glen Canyon National Recreation Area and the Arizona Game and Fish Department.

Page 15 Please indicate the nature of the park's responsibility toward recognizing critical habitat in terms of closures, restrictions, etc.

Page 18 Para. 242. National Park Service needs to further evaluate the existing situation of Arizona Game and Fish stocking trout in (or directly upstream) from park waters.

Page 19 Para. 25. We suggest that the document emphasize that habitat management includes the research and exploration of methods and techniques of management. Projection of a balance of technical and economic practicality will assist in avoiding criticism.

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SEP 22 '78

FEDERAL ASSISTANCE

Page 28 Second citation should read: "Suttkus, R.D., G.H. Klemmer, C. Jones, and C.R. Shoop. 1976. Survey of fishes, mammals and herptofauna of the Colorado River in Grand Canyon. In Grand Canyon National Park Colo. R. Res. Ser. Contr. No. 34; 47 pp.

We look forward to working with you in this recovery program.

cc:
Superintendent, Grand Canyon, w/o enc.
Regional Director, Rocky Mountain Region, w/o enc.

United States Department of the Interior

NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:
N1423
(WR)RNR

October 2, 1978

Memorandum

To: Denise Reno, Fish and Wildlife Service, Region 6, Denver, Colorado

From: Regional Aquatic Ecologist, Division of Natural Resources Management, Western Region

Subject: Review Comments on Draft Humpback Chub Recovery Plan

You may recall having spoken to me about the subject Plan a few weeks ago. Two minor errors in the memorandum from our Regional Director to yours commenting on the Plan (copy enclosed) have been called to my attention.

Would you please do me the favor of running down the memorandum (and any copies made of it) and making the following two changes on page 2:

1. Change Klemmer to Clemmer

2. Change herptofauna to herpetofauna.

Milton C. Kolipinski

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16 78
FEDERAL ASSISTANCE

• state of utah -fa

DIVISION OF WILDLIFE RESOURCES

DONALD A. SMITH
Director

1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

September 19, 1978

Mr. Harvey Willoughby
Regional Director, Region 6
U. S. Fish & Wildlife Service
P. 0. Box 25486
Denver Federal Center
Denver, Colorado 80225

Dear Harvey:

I refer to FA/SE Colorado River Fishes Recovery Plan, on which you requested comments.

The overall content, substance and direction of the Plan is very good. It is apparent that considerable thought and effort went into this draft, and the Team is to be congratulated for its product.

U-1 The priorities seem logical in order, but I do believe Task 24., "Enforce existing laws", should also be assigned a top priority, *since* this is an ongoing activity even before the approval of the Plan, at least in Utah.

U-2 With respect to the budget, I believe projections for Tasks 21. and 22. are quite low. A large portion of the Colorado River system is in Utah, and these sums would do little to accomplish these tasks, when all costs, including equipment acquisition are considered.

I hope these comments will assist in the development of an approved Plan.

Sincerely,

Douglas F. Day
Director

FA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/OES 310.6

1979

ALT LAKE CITY
AREA OFFICE

V

Memorandum

To: Regional Director, Region 6

From: Director

Subject: Agency Review Draft - Humpback Chub Recovery Plan

We have reviewed the subject draft as requested in your memorandum of July 28, 1978. We have some comments to make which should clarify a few points in the draft.

V-1 Page 4, line 9 - Perhaps you should add the words "of drawings" between "Occurrence" and "in caves".

V-2 Page 5 - Delete the words "near the mouth of the Little Colorado River" from distribution #5. This is actually a statement regarding a concentration of humpback chubs on the Colorado River.

V-3 Page 8, line 10 - Change "fleeted" to "netted".

V-4 Page 8, line 21 - Change "Groge" to "Gorge".

V-5 Page 10, line 13 - Change to "Identify essential habitat". In the Narrative it can be pointed out that the Secretary of the Interior can use this information in determining "Critical Habitat" as required by Section 7 of the Endangered Species Act.

V-6 Page 12, line 4 - Change to "Verify genetic purity of humpback chub". Add the subobjective "Propagate humpback chub, bonytail chub, and roundtail chub (see #3) for taxonomic studies" and renumber subobjectives.

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

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JAN '79

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V-7 Page 20, line 3 - The justification for propagation of the bonytail chub and roundtail chub should be elaborated on. The contribution of taxonomic studies to the recovery of the humpback chub should be clarified.

V-8 Page 20 - Objective #3 and associated costs should probably be contingent on the development of general holding and propagation criteria for Endangered fish. These criteria are programmed to be accomplished by the Division of Research in FY 79.

V-9 Page 32 - Subobjectives #514 and #52 are not assigned to an agency for implementation.

V-10 Finally, we believe it is important that the estimated costs in the proposed budget be as accurate as possible. The Service and other agencies use these figures for planning purposes. Some of the cost estimates seem to be too high. Perhaps some of these tasks can be performed at the same time as they are performed for other species in the Colorado River, e.g., surveys for the humpback chub and the Colorado River squawfish.

We hope these comments will contribute to the completion of the Humpback Chub Recovery Plan. Please send us two copies of the completed plan with cooperators' comments and a title page for the Director's signature.

THE TEAM'S RESPONSE TO LETTERS OF
COMMENT TO THE DRAFT RECOVERY PLAN

Code of Comment

A — No reply required.

B-1 — The Recovery Team recognizes that the problem exists. To define agency responsibility and refine the goals of the recovery effort for Colorado River fishes, the Recovery Team and Fish and Wildlife Service sponsored a workshop in January, 1979. The goals and guidelines developed at that meeting are now available from the Fish and Wildlife Service.

C-1 — We are uncertain of the status of populations in some areas. We agree that habitat maintenance should have top priority and have given Task 24 a priority of 1. Establishing new populations (Task 23) was given a priority of 3.

C-2 — The wording has been changed.

C-3 — The three agencies identified are land management agencies and are responsible for habitat restoration and management. We feel their monies could better be used in that manner.

C-4 — We agree that the humpback chub has many values that should be emphasized in I and E material. We have identified the need for an I and E program, but leave the responsibility for design of those programs to the agencies involved.

D — No reply required.

E-1 — The Recovery Team appreciates your role in the studies conducted on the humpback chub and hopes you will continue to support the recovery effort.

F-1 — The humpback chub is a unique species whose value can not be measured in dollars and cents. Until we understand the role of this species in the Colorado River ecosystem, any economic analysis would be arbitrary.

F-2 — If suitable habitat for the humpback chub can be restored, that habitat may give the humpback chub a competitive advantage over introduced species. Habitat management plans will consider all aspects of the chub's environment.

F-3 — That is a value judgment which the Recovery Team does not accept.

Code of Comment

F-4 We can only suggest funding levels and tasks for agencies involved with the humpback chub. Because BIA is directly or indirectly responsible for lands and rivers that may impact humpback chubs, we have invited BIA to participate in habitat management.

G-1 This is the intent of Task 34.

No reply required.

I-1 In the text, the Yampa River in Dinosaur National Monument is considered seperately from the Green River in Dinosaur National Monument. However, because the reaches of the two streams inhabitated by humpback chubs are near the confluence of the two rivers, the two areas appear as one on the map.

1-2 All viable methods will be considered as sampling techniques by agencies and consultants doing field research on humpback chubs.

1-3 Starch-gel-electrophoresis is one of many techniques that will be used to investigate the relationships between members of the genus Gila.

1-4 The Recovery Team can only recommend tasks and funding levels for the recovery effort to the agencies involved. Willow Beach NFH was suggested because the Fish and Wildlife Service already has humpback chubs there. It is the responsibility of the agencies to determine which branch of the agency will complete the tasks and to appropriate funds accordingly.

No reply required.

K-1 The Recovery Team understands that one specimen of Gila was collected during fall sampling on the White River. It was tentatively identified as G. elegans or a member of the Gila complex.

L-1 The Recovery Team believes that information can be gathered for Tasks 12, 13, and 22 while Task 11 is being completed. We need the information as soon as possible and can not afford to wait until Task 11 is completed before beginning the other projects. We agree that several of these tasks can be carried out as a single project, but for the Step-Down-Plan prefer to keep them separate.

Code of Comment

L-2 We agree that an analysis of the taxonomy of Gila is essential to the recovery effort. The details of the required studies must be worked out by the agencies and consultants involved.

L-3 One of the most important reasons for investigating the habitat requirements of the humpback chub is to incorporate its needs into the planning process for water development projects in the basin. We agree that agencies involved with the welfare of the humpback chub should be as flexible as possible when dealing with development projects that affect the humpback chub. However, their primary responsibility is to the humpback chub and they can not compromise if the humpback chub will be adversely affected by the project. We must operate under existing laws.

M-1 Because of the limited information available about some areas of the Colorado Basin, we feel that 5 populations are a reasonable goal at present. Habitat surveys are an important part of the plan. If these surveys reveal that there are in fact, only 4 areas suitable for humpback chub, we will modify the prime objective.

M-2 Five populations are correct.

M-3 Task 12 will determine the availability of new habitat. Task 22 will evaluate the status of known populations. The Fish and Wildlife Service and other involved agencies will evaluate the merits of hatcheries that could be used for propagation of humpback chubs.

11-4 See comment M-3.

N-1 We believe the process for designation of critical habitat for the humpback chub should begin as soon as possible. Critical habitat can be amended when new data become available.

N-2 We are pleased that BLM has begun work on the recovery effort for the humpback chub.

O No reply required.

No reply required.

No reply required.

Code of Comment

No reply required.

S-1 We appreciate your funding of studies for the humpback chub. However, we feel that three years will probably not be sufficient time to complete the studies.

S-2 We agree that environmental statements may be required in certain cases; however, the Recovery Team can only recommend actions needed for the recovery effort. The agencies involved must determine whether their actions require an environmental statement.

S-3 We feel that our recommendation concerning funding of propagation facilities for humpback chubs is fair.

T-1 Questions concerning federal agency responsibility for critical habitat should be answered by Fish and Wildlife Service.

T-2 The research needs are outlined in Tasks 12 and 22.

T-3 The citation has been corrected.

U-1 The change has been made.

U-2 We agree with your comment and have increased our recommended funding levels. If participating agencies feel that funds recommended by the Team are inadequate, they should allocate additional funds.

V-1 Your suggestion has been incorporated into the plan.

V-2 Your suggestion has been incorporated into the plan.

V-3 The change has been made.

V-4 The change has been made.

V-5 Your suggestion has been incorporated into the plan.

V-6 The genetic purity of the humpback chub does not need to be verified. Further examination and description of related species and their known hybrids will enable investigators to accurately identify all life stages of humpback chub and sympatric species. Propagation of humpback chub, bonytail chub, and, roundtail chub for taxonomic (scientific) purposes is included under Objective 3 and does not need to be listed as a subobjective under Objective 4.

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V-7 Your suggestion has been incorporated into the plan.

V-8 We agree.

V-9 Subobjectives #514 and #52 were assigned to an agency for implementation.

V-10 The proposed budget is an estimate but is as accurate as possible at this time. Because of the large size of the river system and the rare nature of the humpback chub, studies will require large amounts of time, equipment, and manpower. Whenever possible, studies of humpback chub will be conducted concurrently with studies of Colorado squawfish but these studies will still be expensive. See the comments of Utah Division of Wildlife Resources.