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In Reply Refer To:
AESO/SE
2-21-93-F-167

October 30, 1997

MEMORANDUM

TO: Regional Director, Bureau of Reclamation, Salt Lake City, Utah

FROM: Field Supervisor

SUBJECT: November 1997 - Fall Test Flow from Glen Canyon Dam

The U.S. Fish and Wildlife Service has reviewed the project description for the proposed Fall Test flow from Glen Canyon Dam in Coconino County, Arizona. Your October 10 request for formal consultation was received on October 14. This document represents the Service's biological opinion on the effects of that action on humpback chub (Gila cypha) endangered with critical habitat and Kanab ambersnail (Oxyloma haydeni kanabensis) endangered without critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.).

Your biological assessment also determined that the proposed project would have no effect to the endangered southwestern willow flycatcher (Empidonax trailli extimus) or its critical habitat, razorback sucker (Xyrachen texanus) or its critical habitat, bald eagle (Haliaeetus leucocephalus), or the American peregrine falcon (Falco peregrinus anatum). These species will not be addressed further in this biological opinion.

This biological opinion is based on information provided in the October 10, 1997, biological assessment, the final Environmental Impact Statement (FEIS) on the Preferred Alternative for the operations of Glen Canyon Dam, telephone conversations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, the project's effects are on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

This reinitiates consultation on the preferred alternative for the FEIS that resulted in a final biological opinion dated December 21, 1994, transmitted to Reclamation January 7, 1995, (1995 biological opinion) and the consultation of the February 16, 1996, biological opinion and conference report (1996 biological opinion) on the habitat/beach building flow conducted in March 22 through April 7, 1996. The 1995 biological opinion found that the preferred alternative is likely to jeopardize the continued existence of the humpback chub and razorback

sucker and is likely to destroy or adversely modify designated critical habitat for those species. The 1995 opinion also found no jeopardy to the bald eagle, Kanab ambersnail, or peregrine falcon. The southwestern willow flycatcher was not listed at that time and not addressed. In the 1996 biological opinion, the southwestern willow flycatcher was addressed. No jeopardy or adverse modification to its critical habitat was determined; nor was there jeopardy to the humpback chub, razorback sucker, and their critical habitat, or the Kanab ambersnail. A draft biological opinion for this action was sent to Reclamation on October 24. Reclamation responded with an October 29 memorandum requesting finalization of the document.

BIOLOGICAL OPINION

In this biological opinion, the Service finds that the effects of the proposed action are not likely to jeopardize the continued existence of the humpback chub or the Kanab ambersnail.

DESCRIPTION OF PROPOSED ACTION

The Fall Test flow is scheduled to begin at noon with upramp releases of 4,000 cfs until the desired release rate of 31,000 cfs is reached at approximately 3:00 p.m. the same day. This flow of 31,000 cfs would be maintained for approximately 48 hours. At the end of the 48 hours, beginning at 3:00 p.m., flows would decrease at a downramp rate of 1,500 cfs/hour until reaching the normal point in the release not lower than 20,000 cfs. The concept of Fall Test flows was not addressed in the FEIS. The ramp rates given follow the description of those for the habitat maintenance flows and beach/habitat building flows described in the FEIS on the preferred alternative for the operations of Glen Canyon Dam.

Flood flows within power plant capacity in the FEIS are referred to as habitat maintenance flows and may occur every year when the level of Lake Powell is less than 19 maf on January 1. Floods greater than powerplant capacity are called beach/habitat building flows and may occur in years when Lake Powell is above 19 maf on January 1. On page 40 of the FEIS, it identifies that under any alternative, "Grand Canyon sandbars that exist above normal peak river stage would continue to erode, and backwater habitats within normal stage would tend to fill with sediment." To correct this, most FEIS alternatives included beach/habitat building flows as "...scheduled high releases of short duration designed to rebuild high elevation sandbars, deposit nutrients, restore backwater channels, and provide some of the dynamics of a natural system."

This consultation was reinitated in October 1997 because the sediment inputs from the Paria River between mid-August and early October surpassed mean annual levels. Based on information presented to the Adaptive Management Work Group on the September 10-11, 1997 meeting, it was agreed that a high flow should be pursued. Recommendations for research flows may come from the Adaptive Management Program (AMP) as deemed necessary to protect downstream resources. The FEIS states that the "The AMP... is not intended to derogate any agency's statutory responsibilities for managing certain resources." Further, "...all program activities would comply with applicable laws and permitting requirements." One of the goals

of the AMP is to "Assur(e) resource management obligations are defined and fulfilled in good faith without abridgement of any Federal, State, Tribal, or other legal obligation." Recognizing these existing legal requirements, Reclamation initiated consultation with the Service on this Fall Test flow.

The beach/habitat building flows are described as being at least 10,000 cfs greater than the allowable peak discharge but not greater than 45,000 cfs. The FEIS also stated that "a test of the beach/habitat building flow would be conducted prior to long-term implementation of this element..." Additionally, the beach/habitat building flow would be conducted "only in years when projected storage in Lake Powell on January 1 is less than 19 maf (low reservoir condition)." Concerns over the use of habitat/beach building flows during low water years raised some concerns, so in the Record of Decision and the Operating Criteria and 1997 Annual Plan of Operations for Glen Canyon Dam, Colorado River Storage Project, the Secretary of the Interior announced that beach/habitat building flows would "... be accomplished by utilizing reservoir releases in excess of powerplant capacity required for dam safety purposes."

STATUS OF THE SPECIES

Humpback chub

Information on the species description, life history, population dynamics, status and distribution, rangewide trend, and other information is presented in the January 1995 biological opinion, Valdez and Ryel (1995), the Draft Synthesis Report (SWCA 1997) and other sources and is summarized below.

The humpback chub was listed as an endangered species under the Endangered Species Act on March 11, 1967 (32 FR 4001). Seven reaches of the Colorado River system were designated as critical habitat for humpback chub for a total river length of 379 miles (610 kilometers) (59 FR 13374). Critical habitat in Arizona includes most of the habitat now used by the Grand Canyon population of humpback chub. Designated reaches are the lower 8 miles (13 km) of the Little Colorado River (LCR) and from river mile (RM) 34 to RM 208 along the Colorado River. This represents approximately 28 percent of the historical habitat for the species (USFWS 1994). Known constituent elements include water, physical habitat, and biological environment as required for each life stage. The dominant factor affecting critical habitat is the presence of Glen Canyon Dam. Nonnative fishes have also resulted in predation and competition with native fishes.

The Grand Canyon population of humpback chub is the only successfully reproducing population in the lower Colorado River basin (Kaeding and Zimmerman 1983, Valdez and Ryel 1995). Except for a few individuals held for experimental purposes, no brood stocks are held in any refugium or hatchery.

Adult humpback chub may be found in deep, swift waters with varying depths. Humpback chub spawn in the spring between March and May in the LCR when water temperatures are between

16° and 22° C. Swimming abilities of young-of-year (y-o-y) humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20° to 14° C. Many y-o-y humpback chub are displaced from the LCR into the mainstem by monsoonal floods from July through September (Valdez and Ryel 1995). Young humpback chub are found in low velocity shorelines and backwaters. Survival rates are extremely low and believed to be less than 1 in 1,000 to 2 years of age. Low water temperatures and predation are believed to be the primary factors. Valdez and Ryel (1995) estimate that 250,000 young humpback chub are consumed by brown trout, rainbow trout (although not those stocked at Lees Ferry), and channel catfish. Most of the predation occurs between the LCR and Bright Angel Creek (RM 87.7).

Kanab ambersnail

Information on the species description, life history, population dynamics status and distribution, rangewide trends and other information is presented in the 1995 biological opinion, Stevens et al. 1997, and other sources and is summarized below.

The Kanab ambersnail is listed as an endangered landsnail under the Endangered Species Act. Currently two extant populations are known at two southwestern springs: one on private land near Kanab Utah, and the other at Vaseys Paradise 51.2 km (31.5 river miles) downstream from Lees Ferry along the Colorado River in Grand Canyon National Park (Spamer and Bogan 1993). The habitat and ecology of the Kanab ambersnail population was studied in 1994 and 1995.

In the Grand Canyon, the Kanab ambersnail occurs primarily on native Mimulus cardinalis (crimson monkey-flower) and non-native Nasturtium officinale (water-cress) growing from moist to saturated substrata wetted by the Vaseys Paradise spring outflows. Occasionally, the ambersnail uses other plants including Carex aquatilis and Polygonum amphibium.

Vaseys Paradise is a popular water source and attraction site for Colorado River runners; however, access is limited by the dense cover of poison-ivy (Toxicodendron rydbergii). The habitat and population size of Kanab ambersnail is influenced by interseason and interannual conditions, including die-back of vegetation, killing frosts, monsoon-related scour and other factors. The populations size may vary 10 fold between the end of the winter season and the peak of summer reproduction.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Humpback chub and Critical Habitat

The 1995 biological opinion includes an environmental baseline focused primarily on the aquatic environment, and that section is incorporated by reference to this document. Recent final reports from studies of endangered and native fishes for the Glen Canyon Environmental Studies also provide detailed accounts of humpback chub ecology and habitat use in the Little Colorado River, the Colorado River from Lees Ferry to Lake Mead, and tributaries to the river. Valdez and Ryel (1995) recount 332 miles of potential historic habitat that was available to a population of humpback chub centered in the Grand Canyon in the late 1800s and identified factors reducing that range: 13 percent from Lake Mead inundation of lower Grand Canyon, 10 % from Lake Powell inundation, and 14 % from Glen Canyon Dam operations, resulting in the loss of a total of 37% or 123 miles.

The Grand Canyon represents one of six populations in the states of Colorado, Utah, and Arizona. The other five populations are found in Black Rocks, Westwater Canyon, Cataract Canyon, Desolation/Grey Canyon, and Yampa Canyon (Valdez and Clemmer 1982). This Grand Canyon population is the only successfully reproducing population of humpback chub in the lower Colorado River basin (Kaeding and Zimmerman 1983, Valdez and Ryel 1995). Humpback chub in the Grand Canyon are distributed as nine aggregations in 190 miles of the Colorado River from RM 30 to 220, and the lower nine miles of the LCR. Various life stages of humpback chub are influenced by water temperature, food availability, modified flow regimes, and other factors. Cold water releases from Glen Canyon Dam (7.5° to 10°C) severely limit mainstem reproduction of humpback chub. Low temperatures in combination with competition and predation by non-native fishes, low recruitment and other factors contribute to the altered ecosystem where this species currently resides.

The 1995 biological opinion concluded that the preferred alternative for the operations of Glen Canyon Dam is likely to jeopardize the continued existence of the humpback chub and is likely to destroy or adversely modify critical habitat. While other actions may be responsible for the humpback chub being in decline prior to Glen Canyon Dam, or that cold water releases and reduction in sediment further impact the native fishery, the Bureau of Reclamation, is responsible for the impacts of the proposed action of operation under the preferred alternative. A reasonable and prudent alternative was given to remove the jeopardy. Implementation of the reasonable and prudent alternative has met with varying degrees of progress.

The 1996 biological opinion on the beach/habitat building flow did not find jeopardy. Although there was displacement and loss of humpback chub, the expected benefits of creating a high "spring" runoff to increase the quantity and quality of backwaters and other nearshore habitats was important in the decision making. The beneficial increase in backwaters was temporary because of the high flows of approximately 20,000 cfs that followed the flood. An additional 8,000 cfs low flow was conducted in September 1997 for aerial videography.

Kanab ambersnail

In June of 1995, primary habitat for the Kanab ambersnail was estimated at 905 m^2. Rematched historic photographs of Vaseys Paradise indicate that the vegetative cover has increased since the completion of Glen Canyon Dam (Turner and Karpiscak 1980) which would have allowed the population size to increase. If the population occurred at Vaseys Paradise during the pre-dam era, the population would have had more limited habitat, and any expanded habitat would have been lost with annual flooding. Both the monkeyflower and the watercress are deciduous and may freeze or experience severe die-back during the winter months. Monsoon-related flood scour may also reduce the amount of available habitat.

In 1996, an experimental flood was conducted from Glen Canyon Dam. The 45,000 cfs flood lasted for 7 days. Approximately 16% of the total habitat was lost as a result of this flood. Despite predictions that the habitat would recover within one year of this flood, limited regrowth has occurred (49%). Goals for this subspecies includes the establishment or discovery of a second population of the Kanab ambersnail in Arizona. Recovery planning was envisioned preventing additional massive losses from Glen Canyon floods until this goal is achieved.

EFFECTS OF THE ACTION

Humpback chub with critical habitat

Habitat maintenance and beach/habitat building flows as described in the FEIS are for the purposes of reforming beaches and backwaters to maintain areas for camping and habitats associated with sediment deposits. These flows were designed to occur in the spring or late summer, not the fall. The concept of this Fall Test Flow, while not precluded under an Adaptive Management Program, was not considered in the FEIS. The purpose of this Fall Test flow is to conserve the sediment resources delivered from the Paria River to the mainstem between the end of August through September. One of the goals of the preferred alternative is to conserve sediment resources. With the large number of resources that need to be considered (vegetation, endangered species, water resources, etc.) the chances of conflicting interest exists. The timing of this test flood while appropriate for sediment, is likely to significantly impact the young-of-year humpback chub.

The difference between this Fall Test Flow and the 1996 beach/habitat building flow is the life stage of the y-o-y humpback chub. From the March-April beach/habitat building flow, AGFD (1996) concluded that "Native fish appear to have been unaffected by the flood. The timing of the flood largely prevented newly hatched fish from being affected." Young-of-year humpback chub during the 1996 beach/habitat building flow would have been nearly one year of age. As a result of the 1996 flood, AGFD (1996) concluded that y-o-y humpback chub were able to persist in sheltered habitats and did not show signs of being displaced downstream.

The majority of humpback chub spawning in Grand Canyon occurs in the LCR from March through May (even early June) when water temperatures are between 16° and 22° C. During

the Fall Test flow, the fish will be between five and seven months of age. Assuming the larvae are approximately 7 mm long at hatching (Muth 1990) and grow at 10.63 mm per month in the first year of life while in the LCR (Valdez and Ryel 1995), 6-month old fish would theoretically be between 74 and 96 mm TL. Y-o-y fish may be of variable size because of the long spawning season from late March to early June. Y-o-y remaining in the LCR may be nearly as large as age I fish that moved into the cold mainstem at a small size.

Larval and juvenile humpback chub are often transported to the mainstem during flooding of the LCR. Robinson et al. (1996) and others (AGFD 1996) predict that few survive. Survival of these fish exposed to thermal gradients is not known but is expected to be very low. Fish that survive the temperature shock tend to select backwaters and other low velocity shoreline habitats including vegetated banks, talus slopes, or debris fans (Valdez and Ryel 1995). Further, AGFD (1996) concluded that during the 1996 flood, humpback chub maintained a preference for talus shorelines during the flood. Humpback chub tend to have a high fidelity for given reaches of the river and suggests a lack in the ability for long-distance drifting, that is common in other native fishes.

Swimming abilities of y-o-y humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20° to 14° C (Valdez and Ryel 1995). Fish travelling from the LCR left water temperatures of 20° C to find mainstem temperatures at 10° C.

The biological assessment estimates that an increase in flow to 31,000 cfs will result in a vertical stage increase of 2.9 to 4.7 feet depending on the initial flow (between 17,000 cfs and 23,000 cfs). At an upramp rate of 4,000 cfs per hour, this change will occur between 2.6 and 4.0 hours. The downramp rate of 1,500 cfs will require between 6.8 and 10.8 hours to return to the initial flows. This stage change will result in dramatic and rapid changes in shoreline habitats. The upramp will result in the inundation and virtual elimination of all backwaters used as rearing areas by young native fish (AGFD 1996) and changes in the configuration of shallow, sheltered shorelines. The scouring, redistribution of sediment, and inundation of backwaters that occurred during the 1996 flood was temporary and provided no significant benefit to the humpback chub.

Some humpback chub may find refuge in the impounded confluence of the LCR and the mainstem. These fish may be further protected by the suspended sediment making them unavailable to sight feeding trout. Many fish are expected to be displaced downstream. Displacement to downstream reaches may move fish into ephemeral and less desirable habitats. This displacement may result in increased energy expenditure by the fish adding to overwintering stress. Nearshore habitat for y-o-y is absent below about RM 77.

Displacement of humpback chub may make them more vulnerable to predation, particularly after the suspended sediment levels decline. Valdez and Ryel (1995) estimate that approximately 250,000 young humpback chub may be consumed by brown trout, rainbow trout, and channel catfish, with most of the predation occurring between the LCR (RM 61.3) and Bright Angel

Creek (RM 87.7). Information from coded wire nose tags in rainbow trout indicate that stocked rainbow trout are extremely rare in the downstream areas occupied by humpback chub. The rainbow trout that prey on humpback chub are from local reproduction in Nankoweap Creek, Shinumo Creek, and other tributaries. Brown trout are spawned primarily in Bright Angel Creek. Currently no control methods are in place to counter this loss on the endangered humpback chub. It is not known whether this Fall Test flow will displace nonnative fishes.

Kanab ambersnail

This is the third consultation on the known population of the Kanab ambersnail in Grand Canyon. The 1995 biological opinion concluded that incidental take will assume to be exceeded if more than 10 percent of the occupied habitat were inundated. The 1996 biological opinion allowed the one time loss of 16% of the habitat to be taken but restricted future beach/habitat building flows without the establishment or discovery of another population of Kanab ambersnail in Arizona, or required the reinitiation of formal consultation if more than 10% of the occupied habitat were lost.

A flow of 31,000 cfs will result in the inundation, scouring, and destruction of occupied habitat and ambersnails. Individual ambersnails that are not salvaged from the inundated habitat are expected to be displaced and lost by high velocity flows or floating debris. It is not known how long the Kanab ambersnail can be inundated. In a field experiment during March 1996, snails were submerged for a minimum of 5 hours. The same snails were exposed to air from 5 to 60 minutes during a 36-hour time frame with no mortalities at the end of the 36 hours. Although it is possible that ambersnails could be transported safely downstream to a new location, there is no evidence that sufficient numbers have been safely transported by the surging, debris-laden water, and subsequently found suitable habitat to result in a new population. Snails transported downstream are considered unsalvageable.

As seen with the 1996 flood, a total loss of vegetation is expected in the zone of inundation. Therefore, ambersnails which fall or migrate down to the water's edge after the flood before vegetative rejuvenation will not find habitat below the 31,000 cfs line. The likelihood of a higher percentage of individuals being impacted is increased if individuals have been washed down to the river's edge after a natural disturbance.

A test flow in the first week of November is likely to find a portion of the Kanab ambersnail population in its dormant winter state. High winter mortality rates in combination with die-back of the primary habitat results in the lowest ambersnail numbers of year during the winter months. Expected high flows from the pending El Nino, the warming of waters in the Pacific Ocean which may create drastic weather conditions, is likely to result in additional high floods in 1998. A resulting high water year from Glen Canyon Dam may result in additional impacts to the Kanab ambersnail.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of ESA. Effects of past Federal and private actions are considered in the Environmental Baseline.

Since the project area occurs within the jurisdiction of the National Park Service, it is not likely that actions that might affect listed species within the project area would not be considered a Federal action. Actions by Tribes whose land is adjacent to the Colorado River or its tributaries may or may not be considered Federal actions. The Service is not aware of any proposed non-Federal action that may affect species or critical habitats considered in this consultation.

SUMMARY

Since the numbers of 1997 y-o-y are believed to be quite small, the expected additional loss from this Fall Test flow on the remaining year class could be significant to the humpback chub. The Service believes that the proposed action could exacerbate an already precarious situation for humpback chub. Maintenance of this species is sustained by spawning and recruitment in the LCR. Long-term survival continues to be compromised when the critical habitat unit cannot achieve its assigned conservation goal. There are years when a cohort of y-o-y chubs do not survive, under apparently natural conditions. This action may constitute an additional, human caused impact.

The habitat of the Kanab ambersnail has not fully recovered from the 1996 flood before this Fall Test flow. The cumulative effects of these two flows and future high flows with pending El Nino weather predictions and flood releases will determine the long term stability of this single population. Availability of habitat above the 45,000 cfs water level and the commitment of the Kanab ambersnail Working Group to establish of a second population will sustain this subspecies.

CONCLUSION

After reviewing the current status of the endangered species, the environmental baseline for the action area, the effects of the proposed Fall Test Flow, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the humpback chub or Kanab ambersnail and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for the Kanab ambersnail; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If the Reclamation (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

Humpback chub

Although verification of the loss of y-o-y will be difficult, the Service anticipates that nearly the entire year class of humpback chub could be lost as a result of the additive effects of the factors which result in substantial loss of year classes plus the effects of this proposed action. While the loss of fish attributed to the proposed action is difficult to distinguish from ongoing adverse effects, the Service believes this proposed action would exacerbate those conditions. Difficulties in verification are due to unlikely ability of finding a dead or impaired specimen, high mortality rates, and low survivability to age I may be masked by seasonal fluctuations in numbers or other causes. The incidental take is expected to be in the form of harm, harassment or kill.

There are two classes of take occurring as a result of the proposed action: (1) take related to conditions that preclude successful recruitment; and (2) take that directly impacts individual fish through mortality.

(1) Take that precludes recruitment. The lack of sufficient recruitment will not allow maintenance or expansion of this year class.

(2) Take that relates to individual mortality. Determination of the level of responsibility for this category of incidental take attributable to Reclamation is a complex undertaking. The actual probability of detecting individuals that have been stranded or displaced, is unlikely. In addition, the small population size contributes to the probability that take of individual displaced fish through predation or mortality will be limited.

As a surrogate measure of take the Service will consider incidental take to be exceeded if Reclamation does not implement the reasonable and prudent measures and terms and conditions.

Kanab ambersnail

The Service anticipates loss of less than 21m^2 or less than 1 percent of the habitat (based on March 1997 estimates) for the Kanab ambersnail in Grand Canyon could be taken as a result of this proposed action. All snails remaining in the habitat will be lost. This estimate is based on the known inundation level at 33,000 cfs instead of 31,000 cfs. The incidental take is expected to be in the form of harm and kill.

If, during the course of the action, the amount or extent of the incidental take anticipated is exceeded, Reclamation must reinitiate consultation with the Service immediately to avoid violation of section 9. Operations must be stopped in the interim period between the initiation and completion of the new consultation if it is determined that the impact of the additional taking will cause an irreversible and adverse impact on the species, as required by 50 CFR 402.14(i). An explanation of the causes of the taking should be provided to the Service.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the humpback chub:

1. Limit future test flows from October through February until a program has been designed and implemented to evaluate and assess factors determining y-o-y humpback chub recruitment.

2. Every effort shall be made to minimize loss of humpback chub in future Fall Test flows.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Reclamation must comply with the following terms and conditions in regards to the proposed action. These terms and conditions implement the reasonable and prudent measures described above. Terms and conditions are nondiscretionary.
The following terms and conditions implement the reasonable and prudent measures:

1. Develop and implement a program to evaluate effects of factors limiting overwintering survival of young-of-year humpback chubs in the Grand Canyon. The program shall evaluate the contributions of habitat restrictions, predation, reduced sediment loads, and cold water temperatures.

2. In keeping with Term and Condition #1 from the 1996 biological opinion, information on size of y-o-y and juvenile year classes of humpback chubs should be collected prior to and following this test, in areas where they are suspected to occur. Because of the short time frame, logistics, availability of field crews, and other factors, however, we understand that this may not be practical. If before and after surveys can not be conducted for this Fall Test Flow, Reclamation shall instead develop a survey plan to evaluate the displacement of y-o-y humpback chub during future Test flows. This plan should be completed by January 1998. The plan should be designed to test the hypotheses that (1) test flows do not significantly reduce densities of y-o-y humpback chub, and (2) test flows do not significantly affect/alter nearshore habitats used by native fishes.

3. Results of this program development should be provided to the Service by December 1997 and included in the annual review between the Service and Reclamation.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Kanab ambersnail:

1. Minimize future take and support salvage and refugia population(s).
2. Support additional surveys and monitoring.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Bureau must comply with the following terms and conditions in regards to the proposed action. These terms and conditions implement the reasonable and prudent measures described above. Terms and conditions are nondiscretionary.

1. In keeping with the 1996 biological opinion, before another beach/habitat building flow 45,000 cfs or greater, Reclamation will enter into informal consultation with the Service to evaluate the test flow studies, the establishment or discovery of a second population of Kanab ambersnail in Arizona, and Reclamation will reinitiate formal consultation with the Service if incidental take exceeds the 10 percent level established in the 1995 opinion.

2. In keeping with the 1995 biological opinion, Reclamation shall continue to monitor the Kanab ambersnail population and habitat before and after any scheduled flow greater than 25,000 cfs to document the levels of incidental take. Because of the time of year, we acknowledge that population sampling is not practical during the winter months. Habitat estimates should be made below the 31,000 cfs line post flood within 30 days if weather conditions permit. Habitat must be evaluated again 6 months post flood.

3. Provide logistical support to the Arizona Game and Fish Department's proposal to establish vegetation for the refugium population of the Kanab ambersnail at the Phoenix Zoo, and subsequent support for the transfer of ambersnails when permit and weather conditions permit.

4. Continue coordination with the Interagency Kanab Ambersnail Working Group to establish or discover a second population of the Kanab ambersnail in Arizona.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures the Service believes that no more than 21m^2 and no additional losses of year classes from Fall Test flows will be incidentally taken. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

1. Reclamation, in conjunction with the Service, the Navajo Nation, Arizona Game and Fish Department, and other appropriate entities, should develop a genetics managament plan for the humpback chub in Grand Canyon. Consideration should be given to the creation of refugia for procurement of gametes for experimental purposes and the establishment of a second population.

2. Reclamation should negotiate permitting with the National Park Service and other managing agencies to facilitate the turn around time of future test flow requirements.

3. Consider funding information and education materials with the Kanab Ambersnail Work Group.

4. Reclamation should develop a three to five year plan on desirable conditions for future test flows.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the 1997 Fall Test flow outlined in the reinitiation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If we can be of further assistance, please contact Debra Bills or Ted Cordery.

Sincerely,

Sam F. Spiller
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ES)
Project Coordinator, Arizona Fishery Resources Office, Flagstaff, AZ

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REFERENCES CITED

Arizona Game and Fish Department. 1996. The effects of an experimental flood on the aquatic biota and their habitats in the Colorado River, Grand Canyon, Arizona, Ariz. Game and Fish Dep. Phoenix. 91pp.

Kaeding, L.R. and M.A. Zimmerman. 1983. Life history and ecology of the humpback chub in the Little Colorado Rivers of the Grand Canyon. Transactions of the American Fisheries Society 112:577-594.

Muth, R. 1990. Ontogeny and taxonomy of humpback chub, bonytail, and roundtail chub larvae and early juveniles. Dissertation. Colorado State University, Fort Collins, CO. 262 pp.

Robinson, A.T., R.W. Clarkson, and R.E. Forrest. 1996. Spatio-temporal distribution, habitat use, and drift of early life stage native fishes in the Little Colorado River, Grand Canyon, Arison, 1991-1994. Final report prepared for the Bureau of Reclamation, Upper Colorado Region, Glen Canyon Environmental Studies, Flagstaff, AZ. Cooperative Agreement No. 9-FC-40-07940.

Spamer, E.E. and A.E. Bogan. 1993. Mollusca of the Grand Canyon and vicinity, Arizona: new and revised data on diversity and distributions, with notes on Pleistocene-Holocene mollusks of the Grand Canyon. Proceedings of the Academy of Natural Sciences of Philadelphia 144:21-68.

Stevens, L.E., F.R. Protiva, D.M. Kubly, V.J. Meretsky, J. Petterson. 1997. The Ecology of Kanab ambersnail (Succineidae: Oxyloma haydeni kanabensis Pilsbry, 1948) at Vaseys Paradise, Grand Canyon, Arizona: 1995 Final Report.

SWCA, Inc. 1997. Draft Grand Canyon Data Integration Project Synthesis Report. Prepared for the Bureau of Reclamation. May 1997. 2-3 pp.

Turner, R.M. and M.M. Karpiscak. 1980. Recent vegetation changes along the Colorado River between Glen Canyon Dam and Lake Mead, Arizona. U.S. Geological Survey Professional Paper 1132.

U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of critical habitat for the Colorado River endangered fishes: razorback sucker, Colorado squawfish, humpback chub, and bonytail chub. Federal Register 59(54):13374-13400.

Valdez, R.A. and G.C. Clemmer. 1982. Life history and prospects for the recovery of the humpback chub and bonytail chub. Pages 109-119 IN W.H. Miller, H.M. Tyus, and C.A. Carlson, eds. Fishes of the upper Colorado River system: Present and future. Western Division, American Fisheries Society 182:29-39.

Valdez, R.A. and R.J. Ryel. 1995. Life History and ecology of the humpback chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona. Final Report to Bureau of Reclamation, Salt Lake City, Utah. Contract No. 0-CS-40-09110. BIO/WEST Report No. TR-250-08. 286 pp.