



United States Department of the Interior
Fish and Wildlife Service

Arizona Ecological Services Field Office

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In Reply Refer To:

AESO/SE

2-21-98-F-167

September 2, 1998

MEMORANDUM

TO: Superintendent, Grand Canyon National Park, Grand Canyon, Arizona

FROM: Acting Field Supervisor

SUBJECT: Section 7 Consultation for the Establishment of the Endangered Kanab Ambersnail into Grand Canyon National Park

The U.S. Fish and Wildlife Service has reviewed your August 11, 1998, biological evaluation for the establishment of new populations of the Kanab ambersnail (KAS) (Succineidae: *Oxyloma haydeni kanabensis* Pilsbry 1948) into Grand Canyon National Park in Coconino County, Arizona. Your request for formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), was received on August 12, 1998. The request letter which accompanied the biological evaluation designated the Arizona Game and Fish Department as an applicant in this consultation. This document represents the Service's biological opinion on the effects of that action on the endangered KAS without critical habitat in accordance with section 7 of the Act.

Your biological evaluation determined that the proposed project would have no effect to the endangered humpback chub (*Gila cypha*) with critical habitat, the endangered razorback sucker (*Xyrachen texanus*) or its critical habitat, the 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 August 11 biological evaluation, telephone conversations between our staffs, field investigations, 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, and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

The need to establish a second population of KAS has been informally discussed between the Service, National Park Service, Bureau of Reclamation, the Arizona Game and Fish Department (AGFD), and other entities for several years. In 1994, AGFD secured section 6 funding from the Service to evaluate if additional spring sites held a population of the KAS ambersnail or if any of those sites would be suitable as establishment locations. In 1997, AGFD entered into a

cooperative agreement with the Department of Interior's Central Utah Project Completion Act Office to continue the State of Arizona's 12-step reintroduction process which involves environmental assessments, National Environmental Protection Act compliance, and review by the Arizona Game and Fish Commission, federal agencies, expert biologists, and the public.

In 1996, the Service and the Bureau of Reclamation, completed a consultation on a one-time controlled flood from Glen Canyon Dam. Later, the concept of controlled flooding was incorporated into the preferred alternative on the operations of Glen Canyon Dam. After another consultation with Reclamation, a Fall test flood was also conducted in 1997. In both the 1996 and 1997 biological opinions, the Service issued the following Term and Condition: "In keeping with the 1996 biological opinion, before another beach/habitat building flow of 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 KAS ambersnail in Arizona, and Reclamation will reinitiate formal consultation with the Service if incidental take exceeds the 10 % level established in the 1995 opinion." Reclamation has agreed to this condition although there have been conflicting opinions about the intent of the term and the specific wording. The Service clarified its position in a July 2, 1998, memorandum.

Over the past few years, there have been several unsuccessful attempts to locate additional populations of this species in the Grand Canyon region. Based on certain criteria, three of the sites identified by AGFD have been selected for this action by AGFD and Grand Canyon National Park.

BIOLOGICAL OPINION

After reviewing the current status of the KAS, the environmental baseline for the action area, the effects of transfer and establishment efforts for the KAS, and the cumulative effects, the Service concludes that this action as proposed, is not likely to jeopardize the continued existence of this species. No critical habitat exists for the this species.

DESCRIPTION OF PROPOSED ACTION

ESTABLISHMENT OF NEW WILD POPULATIONS INTO NATURAL LOCATIONS

Approximately 500 KAS will be collected from Vaseys Paradise in September 1998. Supplemental stocking or a second effort into the same site may occur in 1999 which will result in an additional 500 KAS taken in 1999. The majority of the snails (75%) will be taken from the area nearest the river. This is the area most vulnerable to high flows from Glen Canyon Dam. It is also the area where snails are likely to be caught if they displaced or are otherwise transported downslope. The other 25% of the snails will be collected from the middle and upper areas of the vegetation to ensure a diverse population.

All individuals will be less than 5 mm long to minimize the transmission of the *Leucochloridium cyanocittae* parasite and minimize the seasonal die-off of mature individuals who have already reproduced (Blinn et al. 1992, Stevens et al. 1997). Snails will be removed from vegetation and placed in sealable, clear plastic containers along with a small amount of vegetation and damp litter. Each of the three sites discussed below will have approximately 125 individuals transferred with the expectation that most of the individuals will overwinter in each location.

The purpose of the supplemental stocking in 1999 is to increase the numbers of individuals at the site, as well to ensure genetic variation into the wild populations. The first monitoring trip (October 1998) will begin to evaluate initial establishment success and overwintering potential. The second monitoring trip (March-April 1999) will evaluate overwintering success and the potential for population augmentation. An actual augmentation event will not occur before such factors as site suitability, seasonal constraints, and current translocation protocols are re-examined. Precaution will be taken to prevent repeated failures. Augmentation decisions will be made after coordination with KAWG members. If population augmentation is necessary in 1999 a maximum of 500 immature KAS will be collected at Vaseys, using previously described methods unless otherwise noted, and distributed to the wild sites as needed. The actual number of snails to be collected and used for augmentation purposes will be based on indications of success or failure of the initial translocation procedure. No large scale reestablishment efforts are proposed after 1999. Small scale introductions of 5 to 10 individuals per site may be conducted in subsequent years at sites indicating the potential for long term success.

DESCRIPTION OF THE PROJECT AREA

The three wild sites identified for this action which occur within Grand Canyon National Park are Keyhole Spring, Upper Elves Chasm, and Lower Deer Creek. They are described below.

KEYHOLE SPRING

Keyhole Spring is a perennial water source issuing from the Muav Limestone geologic strata. It is located on river right, 47.1 miles (75.8 km) downstream from Lee's Ferry. The spring faces northeast, has multiple terraces and is positioned near the top of a talus slope. Existing game trails and ephemeral drainages in the area provide easy access to this site.

Water permanence at this site has allowed the development of a hydrophytic vegetative community, which sharply contrasts the surrounding xeric landscape. Two types of KAS primary vegetation are present at this site: cardinal monkeyflower (*Mimulus cardinalis*) and cattail (*Typha sp.*). The areal extent of the cardinal monkeyflower and cattail patches are estimated at 15-25 m² and 2-4 m², respectively. Other vegetation at the site includes maidenhair fern (*Adiantum capillus-veneris*), golden columbine (*Aquilegia chrysantha*), sedge (*Carex sp.*), and willow (*Salix sp.*). Repeated measurements of soil characteristics at this site indicate the substrate is very moist (98% median saturation; min/max 82-100), relatively shallow (15 cm median depth; min/max 7-15), and slightly acidic (6.7 median pH; min/max 6.1-6.6).

Although some evidence of a minor rockfall event is present at the site, the potential for natural disturbance (e.g., flash flood, mass failure) is presumed low. A majority of the vegetation at the spring is located under a slight precipice, thereby protecting it from disturbance.

Although the spring is conspicuous from the river corridor, it is not recognized as a point of interest for the river guide community and as a result is rarely visited.

UPPER ELVES CHASM

Elves chasm is popular tourist site for both commercial and private river enthusiasts. It is located on river left, 116.6 miles (187.6 km) downstream from Lee's Ferry. The proposed KAS establishment site is located in a narrow canyon above the high recreation use area and, because of its position, is designated as Upper Elves Chasm. Perennial springs located at Upper Elves Chasm discharge from the Bright Angel Shale geologic strata (near the base of the Muav Limestone layer). The spring faces northeast and is characterized by series of waterfalls and plunge pools. Access to the KAS release area is difficult and requires some technical climbing.

A series of large hanging gardens and vegetated talus slopes characterize the KAS release area at Upper Elves Chasm. Cardinal monkeyflower (*Mimulus cardinalis*) is abundant throughout the drainage in isolated patches and especially at the KAS release area (i.e., a large vegetated talus slope outside of the drainage area). The areal extent of this primary vegetation patch exceeds 200 m², thus providing ample habitat for KAS. Associated vegetation at this site includes maidenhair fern (*Adiantum capillus-veneris*), golden columbine (*Aquilegia chrysantha*), sedge (*Carex sp.*), and mosses. Repeated measurements of soil characteristics at this site indicate the substrate is moist (79% median saturation; min/max 65-100), relatively shallow (15 cm median depth; min/max 2-15), and slightly acidic (6.7 median pH; min/max 6.5-7.1).

Vegetation at Upper Elves Chasm may be subject to disturbance as a result of flash flood and/or rock fall events. However, the KAS release area (cardinal monkeyflower patch) is positioned on the upper slope of the site and is protected from the impacts of natural disturbances. Although the lower Elves Chasm area is used heavily by tourists, the limited accessibility of the upper area restricts most visitation.

LOWER DEER CREEK

Similar to Elves Chasm, Deer Creek is a popular tourist stop along the Colorado River. Lower Deer Creek Spring is located on river right, 136.1 miles (219.0 km) downstream from Lee's Ferry. The proposed KAS establishment site, however, is set apart from the recreational use area. Within the Lower Deer Creek Spring site, researchers have surveyed two spatially disjunct areas for the establishment of KAS: a floodplain marsh and a vegetated talus slope. Elevated river discharges may inundate vegetation and biota in the floodplain marsh, thereby making this section unsuitable for KAS establishment. As a result, research efforts have focused primarily on the vegetated talus slope. The talus slope is considered more desirable for KAS establishment.

The KAS release area is characterized by a large, densely vegetated talus slope. The spring faces south and emerges from the Tapeats Sandstone geologic strata. The spring is positioned under a slight precipice at the top of the densely vegetated talus slope. Abundant poison ivy (*Toxicodendron rydbergii*), overgrown vegetation and a relatively steep slope discourage visitor intrusion at this site. Researcher access to the site requires technical climbing gear and the use of biohazard suits to prevent poison ivy infection.

Large patches of cardinal monkeyflower are present at this site. The areal extent of this primary vegetation type is estimated at $> 60 \text{ m}^2$. The large amount of cardinal monkeyflower at this site provides abundant habitat for KAS. Associated vegetation at this site includes maidenhair fern (*Adiantum capillus-veneris*), sedge (*Carex sp.*), horsetail (*Equisetum sp.*), common reed (*Phragmites australis*), and poison ivy (*Toxicodendron rydbergii*). Repeated measurements of soil characteristics at this site indicate the substrate is near saturation (97% median saturation; min/max 90-100), relatively shallow (19 cm median depth; min/max 15-20), and slightly acidic (6.6 median pH; min/max 6.0-6.8).

Due to the slight precipice and the position of vegetation on the talus slope, this area is secure from natural disturbance impacts. No recreation use in the KAS release area has been observed or is anticipated. The dense understory and presence of poison ivy reduces casual visitation at the site.

STATUS OF THE SPECIES

Kanab ambersnail

Information on the species status, physical description, life history, population dynamics, distribution, rangewide trend, and other information is presented in the January 1995 biological opinion issued to the Bureau of Reclamation on the preferred alternative for the Operation of Glen Canyon Dam, Stevens et al. (1997), and other sources, and is summarized below.

The KAS was listed as an endangered landsnail under the Endangered Species Act in 1992 (57 FR 13657). 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 Lee's Ferry along the Colorado River in Grand Canyon National Park (Spamer and Bogan 1993). Recent surveys in the Kanab Creek drainage indicate the species may be more widespread than previously believed (V. Meretsky, Indiana University, pers. comm.).

The habitat and ecology of the KAS population in Arizona were studied in 1994 and 1995. In the Grand Canyon, the KAS occurs primarily on cardinal monkeyflower (*Mimulus cardinalis*), watercress (*Nasturtium officinale*), and water sedge (*Carex aquatilis*). These hydrophytic plants which grow from moist to saturated substrata wetted by the Vaseys Paradise spring outflows. Occasionally, the ambersnail is found on other plants including grasses and smartweed (*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 KAS is influenced by interseasonal and interannual conditions, including die-back of vegetation, killing frosts, monsoon-related scour and other factors. The population size may vary 10-fold between the end of the winter season and the peak of summer reproduction. The KAS at Vasey's Paradise is also subject to predation by deer mice (*Peromyscus maniculatus* and *P. crinitus*). The KAS is also host to the trematode, *Leucochloridium cyanocittae*, which parasitizes between 1 and 9 percent of the adult population. The highest rate of parasitism recovered was 9.5% of the mature snails (greater than 13 mm) (Stevens et al. 1997). Recent genetic evaluations also indicate that the KAS found at Vaseys Paradise may be genetically distinct from the KAS found near Kanab, Utah (Miller et al. 1997).

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.

Kanab ambersnail

In June 1995, primary habitat (dominated by monkeyflower, watercress, and water sedge) for the KAS was estimated at 905 m² at Vaseys. If the population occurred at Vaseys Paradise during the pre-dam era, the population would have had more limited habitat, and any of the lower habitat would have been regularly lost with annual flooding. Rematched historic photographs of Vaseys Paradise verify that the vegetative cover has increased since the completion of Glen Canyon Dam (Turner and Karpiscak 1980), which would have allowed the snail population size to increase.

In 1996, a controlled 45,000 cfs experimental flood lasted for 7 days from Glen Canyon Dam. Approximately 16 % of the total habitat was lost as a result of this flood. A flow of 45,000 cfs resulted in the inundation, scouring, and destruction of occupied habitat and ambersnails. Despite predictions that the habitat would recover within one year of this flood, field studies indicated that less than half of the habitat lost (49%) had recovered in one year and appears to take over three years to fully recover. In October of 1997, the Fall Test Flow scoured an additional small area (approximately 29.8 m² or 3.5%) of the existing primary habitat. 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 KAS can survive inundation. Although it is possible that ambersnails could be transported safely downstream to a new location, there is no evidence that any individuals have been safely transported by the surging, debris-laden water, and subsequently found suitable habitat to result in a new population. Consequently, snails transported downstream are considered unsalvageable.

The combination of flood induced scour and vegetative senescence results in varying amounts of habitat in these lower levels of Vaseys Paradise. Monsoon-related flood scour may also reduce the amount of available habitat.

Over the years, there have been several attempts to locate additional populations of the KAS in the Grand Canyon region. AGFD has evaluated a total of 74 springs, seeps, and wetland areas between 1996 and 1997. Other investigations have been conducted by Larry Stevens (Grand Canyon Monitoring and Research Center). During the summer of 1991, 43 sites were examined for both aquatic and terrestrial mollusks (Spamer and Bogan 1993). Although no additional KAS populations were found, several potential reintroduction sites were identified.

DEVELOPMENT OF A REFUGIUM POPULATION

A separate yet related action that is also underway is the establishment of a refugium population. The development of the refugium population is being conducted under different authority by AGFD, the applicants in this consultation. The Service, through the section 6 program, grants permission for AGFD to collect and transfer KAS for the purposes of establishing a refugium population as outlined in the AGFD 1999 Work Plan. This action is discussed in this document because it will be conducted at the same time as the principal action and will be monitored and documented in the same manner. The Kanab Ambersnail Recovery Plan (Service 1995) stipulates the need to develop a refugium population. The presence of this population would ensure the survival of this subspecies in the event an unforeseen catastrophic event destroys the only wild population in Arizona. The refugium population would be used only for preservation purposes and individuals from this population are not anticipated to be returned to the wild.

The Phoenix Zoo (TPZ) has expressed interest in providing the location and materials for the establishment of a KAS refugium population (Mike Demlong, TPZ, pers. comm.). TPZ has actively participated in Kanab Ambersnail Workgroup (KAWG) meetings and has discussed the potential for refugium development with KAWG members. To date, TPZ has successfully propagated KAS host vegetation (i.e., cardinal monkeyflower and watercress) and has constructed two functioning KAS habitat enclosures. Physical specifications of the habitat enclosures were developed by TPZ after consultation with KAWG members and Zoo officials. The refugium population would be located off-exhibit within TPZ property and visitation would be restricted to KAWG members, TPZ personnel, and other invited parties. A public interpretive display describing the biology and ecological significance of the KAS may be developed in the future. AGFD and TPZ assume full responsibility for monitoring this refugium.

Fifty (50) immature KAS (< 5 mm) will be collected from Vaseys Paradise in September 1998 and transferred to the habitat enclosures at TPZ. Collection and translocation of these KAS will coincide with the translocation of KAS for the establishment of new wild populations. Materials, methods and specific protocols for this action are described in detail in the Biological Evaluation. AGFD will monitor refugium population dynamics bi-weekly. Parameters to be measured within the refugium population will include KAS density, size, mortality and reproduction. Observation of KAS substrate preference, locomotion and associated behaviors will also be documented.

Hydrologic (e.g., pH, temp., conductivity) and vegetative conditions within habitat enclosures will be evaluated during each visit. Information gathered will be presented in interim and final reports prepared by AGFD.

EFFECTS OF THE ACTION

The proposed action is expected to benefit the species by reducing the significance of future losses of and the possibility of future extirpation from a catastrophic event at Vaseys. The action will also forward long term goals for downlisting this subspecies. The short term adverse effects include habitat loss and disturbance within Vaseys by collectors, and the removal of 500 young KAS in two consecutive years which represents approximately 1.7% of the total population per year. All individuals will be less than 5 mm long to minimize the transmission of the *Leucochloridium cyanocittae* parasite. KAS that survive the translocation process will be pre-reproductive individuals capable of overwintering and becoming reproductively active in the spring or summer of 1999. The species generally has a single reproductive cycle; however, in 1996 there were two reproduction peaks, one in June and another in August. This occurred after a mild winter (1995-1996) and an early spring in 1996 (Kanab ambersnail Interagency Monitoring Group 1997). Overwintering conditions can also be sufficient to eliminate the majority of the KAS population but this will not be determined until the first monitoring trip in 1999.

Given the low success of translocations in general (Minckley 1995, Griffith et al. 1989, and others), some level of population augmentation at the three site may be necessary. Translocating additional KAS into the three establish sites will result in additional impacts to the Vaseys Paradise KAS population there, but is expected to have a beneficial effect on the species as a whole. No significant adverse effect is expected from the removal of donor stock assuming all other conditions at Vaseys remain the same.

Keyhole Spring is the smallest site of the three, estimated area is about 25 m². Permanent water from the spring at this site has allowed the development of a hydrophytic vegetative community, which sharply contrasts the surrounding xeric landscape. It is not known if the transplanted snails at this site will be more vulnerable to predation. Although mice or other predators in the area could have a significant impact on the KAS population in this small location, the presence of *Catinella* sp. suggest that KAS may persist. No evidence of recreation impacts have been documented at this site.

Upper Elves Chasm is the largest of the three sites measuring over 200 m². Some of the lower area could be threatened by flash flooding. The largest threat to this site may be from flash flooding and rock falls from the steep upper slopes. The area below the introduction site is a popular with recreationists receiving 50 to 70 visitors a day. Some of the visitors, perhaps 10%, are likely to visit the upper area including the reintroduction area and impact KAS.

The floodplain marsh at Lower Deer Creek occurs around the 25,000 cfs level and is subject to elevated river discharges which inundate vegetation and biota, thereby making this section

unsuitable for KAS establishment. Although the talus slope is considered more desirable for KAS establishment and will be the focus of establishment, snails will likely move into this lower habitat which will provide only temporary habitat. Evidence of debris deposition was found in this marsh area as a result of the 45,000 cfs 1996 beach habitat building flow indicates the type of disturbance that can be expected from future flows of similar magnitude. Although Deer Creek is also a popular with recreationists, the spring site should be protected from the majority of hikers as the area is surrounded by poison ivy.

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.

Since the project area occurs within the jurisdiction of the National Park Service, it is likely that actions that might affect listed species within the project area would 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.

CONCLUSION

The success or failure of this action can only be determined with adequate monitoring. This action at a minimum, increases the understanding of translocation efforts into wild sites, and at a maximum increases the number of wild populations of this subspecies in Arizona from one to four and significantly advances the downlisting recovery plan objectives. It is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the KAS. No critical habitat has been designated for the KAS; 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. NPS has a continuing duty to regulate the activity covered by this incidental take statement. If NPS (1) fails to require the applicant 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

The Service anticipates take of 500 individuals in 1998 and 1999. All snails will be handled, transported and transplanted to a new location, and potentially lost. No large scale translocations will occur after 1999. However, 5 to 10 individuals may be transferred in subsequent years to each wild sites with initial indications of success.

Impacts from recreation may occur at all three sites but are assumed to be minimal, although greater at Upper Elves Chasm, and lesser at Lower Deer Creek and Keyhole Spring. Habitat disturbance or crushing of snails may occur from curious visitors or by those unaware of the presence of an endangered species. The Service anticipates an unquantifiable amount of KAS will be taken due to site disturbance. This form of take will be difficult to detect without constant observation and intensive study. As a surrogate measure of take, the Service will consider incidental take to be exceeded if field investigations by AGFD or Grand Canyon National Park indicate that habitat disturbance exceeds current levels.

The incidental take from all actions is expected to be in the form of harm and kill. The take of individuals for the transfer to TPZ is already authorized under the Service and AGFD section 6 agreement.

If, during the course of the action, the amount or extent of the incidental take anticipated is exceeded, Grand Canyon National Park 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 KAS.

REASONABLE AND PRUDENT MEASURES

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

1. Conduct the proposed translocation as outlined in the August 1998 biological evaluation. Avoid transferring KAS to areas subject to flows below 45,000 cfs from Glen Canyon Dam.
2. Complete monitoring as outlined in the August 1998 biological evaluation. Assess the status of the translocated population as scheduled. Evaluate, and where appropriate, utilize augmentation opportunities.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of ESA, NPS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

To implement RPM 1:

1. Any modifications of the collection or transfer protocol must be coordinated with the Service. Document KAS dispersal methods and introduction conditions.
2. Develop a Monitoring Plan for 1999 activities. Assess the status of the KAS and the native snail fauna in the wetland habitats of at the wild sites, and transmit that information in an interim report by December 1998 and a final report in the fall of 1999.
3. KAS must not be transferred to the floodplain marsh area of Lower Deer Creek.

To implement RPM 2:

1. As outlined in the August 11 Biological Evaluation, facilitate the completion of the following field investigations by AGFD:
 - a. October 1998 - If appropriate, evaluate translocation conditions. No habitat or population census should be conducted if snails are dormant.
 - b. March/April 1999 - evaluate overwintering conditions and need for population augmentation
 - c. May/June 1999 - conduct seasonal population estimates and augment population (or evaluate the need)
 - d. July/August 1999 - assess the peak of the reproductive period and augment if necessary
3. Coordinate with AGFD, GCMRC, Reclamation, the Service, and other appropriate entities to determine when attempts to establish at wild site should be abandoned or declared a success. Determine if an external peer review process may facilitate these decisions.

4. If it is determined that 500 individuals are not needed for augmentation to the wild sites, NPS may transfer some of those individuals to TPZ for the refugium, if needed.

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. In coordination with Glen Canyon National Recreation Area, the GCMRC, and other entities, develop a program to photograph, survey the habitat, and measure population density of the Niobrara ambersnail (*Oxyloma haydeni haydeni*) at -9 mile before and after any flood greater than power plant capacity.
2. Consider a September 1999 survey trip to evaluate post reproductive conditions, particularly if the October 1998 trip is cancelled.
3. Include in the Monitoring Plan for 1999 an evaluation of reference sites near the release sites to determine if changes in native landsnail communities in the translocation sites are attributable to natural population dynamics or to KAS introductions.
4. Consider an annual investigation of the successful sites after 1999.

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.

This concludes formal consultation on the establishment of new populations of the KAS in Grand Canyon National Park. 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.



Thomas A. Gatz

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (GARD-AZ/NM)
Director, Bureau of Indian Affairs, Phoenix AZ (Attn: A. Heuslein)
Regional Director, Bureau of Reclamation, Salt Lake City, UT (Attn: A. Morton)
Superintendent, Grand Canyon National Park, Grand Canyon, AZ
Director, Grand Canyon Monitoring and Research Center, Flagstaff, AZ
Project Coordinator, Arizona Fishery Resources Office, Flagstaff, AZ
Project Coordinator, Central Utah Project, Provo, UT (Attn: R. Swanson)

Director, Arizona Game and Fish Department, Phoenix, AZ
Director, Cultural Preservation Office, Hopi Tribe, Kykotsmovi AZ
(Attn: L. Kuwanwisiwma)
Hualapai Tribe, Peach Springs AZ (Attn: W. Clay Bravo)
Director, Navajo Nation Historic Preservation Dept., Navajo Nation, Window Rock AZ
(Attn: A. Downer)
San Juan Southern Paiute Tribe, Tuba City AZ (Attn: Johnny Lehi)
Southern Paiute Consortium, Pipe Spring AZ (Attn: C. Mayo)
Pueblo of Zuni, Zuni, New Mexico (Attn: Lt. Gov. A. Othole)

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