UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

2-21-90-F-018

December 1, 1989

MEMORANDUM

TO: District Manager, Bureau of Land Management, Safford, Arizona

FROM: ACTING Field Supervisor

SUBJECT: Biological Opinion, Stocking of Desert Pupfish into Cold Spring Seep and Big Spring, Graham County, Arizona

This responds to your request of November 3, 1989, for formal consultation pursuant to Section 7 of the Endangered Species Act (Act) of 1973, as amended, on the proposed stocking of desert pupfish (Cyprinodon macularius macularius) into two springs in Graham County, Arizona and existing and foreseeable future management of those two springs. Two species are of concern in this project: the endangered desert pupfish which is to be stocked, and the endangered Gila topminnow (Poeciliopsis occidentalis occidentalis) which is already present as stocked populations in the two springs. The 90-day consultation period began on November 6, 1989, the date your request was received in our office.

The following biological opinion is based on information provided in the November 3, 1989, biological evaluation, other information provided by the Bureau of Land Management (BLM), a site visit, data in our files, and other sources of information.

## BIOLOGICAL OPINION

It is my biological opinion that stocking of desert pupfish into Cold Spring Seep and Big Spring, proposed continuation of existing land uses, and certain future anticipated management actions (as described in the biological evaluation) are not likely to jeopardize the continued existence of endangered Gila topminnow or endangered desert pupfish.

## BACKGROUND INFORMATION

### Species Description

The Gila topminnow was listed as an endangered species, without critical habitat, on March 11, 1967. The Gila topminnow is a small livebearing fish known from the Gila, Sonora, and de la Concepcion River drainages in Arizona, New Mexico, and Sonora, Mexico (Minckley 1973, Vrijenhoek et al. 1985) and was once among the commonest fishes in the Gila River drainage (Hubbs and Miller 1941). Destruction of its habitat through water diversion, stream downcutting, backwater draining, vegetation clearing, water impoundment, channelization, and other human uses, along with competition with and/or

predation by nonnative fish species, most notably mosquitofish (Gambusia affinis), have resulted in extirpation of this species throughout most of its range (USFWS 1984, Meffe et al. 1983). At present, the Gila topminnow is known from only nine naturally occurring localities in the United States.

The Gila topminnow in Cold Spring Seep and Big Spring were introduced in 1985 as part of the recovery effort for that species. With the agreement of the BLM State Director, these stockings were made under full protection of the Act. Both populations are presently thriving.

The desert pupfish was listed as an endangered species on March 31, 1986. Critical habitat for this species was designated at Quitobaquito Spring, Organ Pipe Cactus National Monument, Arizona and at three locations in Imperial County, California. The desert pupfish is a small fish historically common throughout much of the lower Gila River system, the lower Colorado River system, and the Rio Sonoyta system in Arizona, California, and Mexico (Minckley 1973). The desert pupfish is presently known to occur naturally only in three localities in California and Arizona, and in the Rio Sonoyta, the vicinity of the Laguna Salada, and along the lower Colorado River in Sonora and Baja California, Mexico (Black 1980, Miller and Fuiman 1987, Hendrickson and Varela R. 1989). Decline of the desert pupfish is due to factors similar to those which caused the decline of the Gila topminnow.

## Site Description

Cold Spring Seep is a line of seepage along a hillside on the northern rim of the Gila River floodplain near the town of Fort Thomas, Arizona (T.5S., R.24E., NE 1/4 of the NE 1/4 Sec. 17). Estimated flow is 0.5 gallons per minute. The existing Gila topminnow habitat and potential reintroduction site for desert pupfish consists of two artificial earthen-bermed ponds which impound water from separate portions of the seepage (Figs. 1 and 2). The northernmost pond (pond 1) is about 20 feet in diameter and varies from 1 to 2 feet deep at the edge to 4 feet deep in the center. The southern pond (pond 2) is about 12 feet in diameter with a depth of 2 to 3 feet. Water in both ponds is clear and supports a considerable amount of submergent vegetation. Pond 1 was constructed in 1983 followed by pond 2 in 1985, to provide native fish reintroduction habitat. Both currently contain populations of Gila topminnow. The two ponds overflow into a grassy meadow area where BLM is considering construction of a third pond. Surface flow continues downstream but is thought to rarely reach the junction of the channel with another spring system coming from the northwest. That northwestern system has an upper pond which contains bass (Micropterus sp.) and mosquitofish.

Big Spring is a small spring located in a wash on the north rim of the Gila River floodplain near the town of Pima, Arizona (T.6S., R.25E., NE 1/4 of the SE 1/4 Sec. 5) (Figs. 3 and 4). It is located about 8 miles southeast of Cold Spring Seep. Big Spring is about 2 miles from the Gila River and probably has a surface water connection to the river only during flood events. Flow in Big Spring is estimated to be 2.5 gallons per minute and the

water is moderately saline. A small concrete dam was constructed on the springrun in 1980 but was washed out by flooding in 1983. The existing dam was built in 1984.

Big Spring is within a 2.5-acre area fenced to exclude livestock. The BLM has been working on riparian vegetation restoration at the spring since 1980. The spring system is about 200 feet long and lies in a vertical walled gully about 5 to 10 feet deep. The spring emerges from under a 5 to 6 foot tall caliche ledge in the wash bottom. A springbox has been installed under the ledge and pipes a small amount of water to a trough below the downstream end of the fenced area. A pool about 10x15 feet and about 1 to 2 feet deep lies at the base of the ledge. The water then flows through about 150 feet of stream and enters a pool formed behind a small concrete dam. That pool is about 15 feet long, 5 to 10 feet wide, and several feet deep. The pool was over twice that length when the dam was constructed in 1984 but has been filled by sediment deposited during flood events. An apron of large boulders and a small plunge pool lie below the dam. The water then flows for another 100 to 200 feet before sinking into the ground. Topminnow are abundant in all three pools, the 100 feet of upper channel, and about 30 to 40 feet of the lower channel. The entire system has extensive riparian and emergent vegetation. Cattails are present in the headspring pool.

## Project Description

The proposed project would involve the stocking of 100 to 200 desert pupfish into the two ponds at Cold Spring Seep in fall 1989 or spring 1990. Pupfish would later be moved from Cold Spring Seep into Big Spring. The desert pupfish to be stocked would come primarily from a captive population presently located at Flowing Wells High School in Tucson, Arizona. Those pupfish are of documented Santa Clara Slough genetic stock. Because the desert pupfish population at Flowing Wells High School has only approximately 200 fish at the seasonal peak, and because the school wishes to retain a stock, the pupfish to be placed into Cold Spring Seep would need to be augmented with stock from Dexter National Fish Hatchery. The desert pupfish at Dexter are also of documented Santa Clara Slough genetic stock.

This consultation will also consider the effects of existing management and land use activities at the two sites, future maintenance of those activities, and foreseeable additional management activities on the desert pupfish and Gila topminnow.

### 1. Existing and Foreseeable Uses at Cold Spring Seep

Existing human uses occurring at Cold Spring Seep include cattle grazing, recreation, livestock watering, road access, and management for wildlife and native vegetation.

Cattle grazing and watering are managed under a BLM Allotment Management Plan (AMP). The AMP specifies ephemeral grazing, under which cattle are grazed only at times when rains cause sufficient green-up of annual plants. Grazing is terminated when those annuals are consumed or dry up. In this area, such rains normally occur in mid to late summer. Ephemeral grazing at Cold Spring Seep is infrequent and results in moderate livestock use of the immediate spring. Cattle use of the area is controlled by fences, one of which is located just uphill from the seep. Cattle use the seep, ponds, and stream directly for watering. However, a water right of 0.40 acre-feet/year for wildlife and fisheries use is held by BLM for Cold Spring Seep. Maintenance of livestock use in the area of Cold Spring Seep includes fence repair and gathering of livestock.

Recreational use of the area of Cold Spring Seep is very light. Some incidental non-consumptive uses may occur and hunting probably occurs around the spring. Fishing occurs at several other impoundments in the area; however, no exotic game fish are present at Cold Spring Seep and the ponds are too small for likely stocking with game fish by the public.

The road providing access to Cold Spring Seep is located about 100 yards uphill from the seep and is separated from the seep by a fence. The road is one-track dirt and is maintained only by use and possible occasional blading by the grazing permittee.

Management for wildlife and native vegetation is carried out by BLM under a Habitat Management Plan (HMP) and includes planting of willow and other native plant species, maintaining existing impoundments for native fish, and water quality monitoring. Maintenance of the ponds may include draining, repair of earthen berms, dredging of sediment, and removal of excessive emergent and submergent vegetation. If extensive work is to occur in the ponds, desert pupfish and Gila topminnow will be removed from the pond, held temporarily in an off-site holding facility, and returned to the pond later. Foreseeable future activities include further native vegetation planting and cienega restoration, construction of additional ponds or pools for native fish reintroduction, and control of the exotic bullfrogs (Rana catesbeiana) (currently inhabiting Cold Spring Seep) or exotic fish species (none currently present at Cold Spring, but possibilities for invasion exist).

2. Existing and Foreseeable Uses at Big Spring

Existing human uses at and around Big Spring include cattle grazing, recreation, livestock watering, road access, and restoration and management for wildlife and native vegetation.

Cattle grazing was removed in 1980 from within the 2.5-acre exclosure around Big Spring. BLM's agreement with the grazing permittee allows him to let his cattle into the exclosure when water is insufficient to fill the outside trough. The permittee owns a 1917 State water right to 1000 miner inches of water of the spring. Big Spring is listed as a Public Water Reserve and BLM filed in 1982 for a water right of 0.862 acre-feet/year for livestock,

wildlife, and fisheries use. Cattle grazing in the area surrounding the exclosure is managed by BLM under an AMP. A livestock gathering corral is located on the flat just above the spring on the west. Maintenance of livestock at Big Spring includes fence repair, maintenance of the springbox, pipe, and trough, and outside of the exclosure also includes maintenance of the corral and gathering of livestock.

Recreational use of the Big Spring area is low. Some incidental non-consumptive uses, such as picnicking and dispersed camping, may occur and the area is probably used during hunting. No exotic game fish presently occur at Big Spring and the spring is unsuitable for game fish.

The road providing access to Big Spring ends at the corral on the west side of the wash. It is a dirt track and is maintained through periodic grading. A bladed track or "ranch road" leaves the road at the corral and crosses the wash in a steep, eroding pitch about 15 feet upstream from the caliche ledge from underneath which the spring originates. This track is maintained on an as-needed basis by the grazing permittee.

Management for wildlife and native vegetation is carried out by BLM under an HMP and includes planting of native vegetation, removal of exotic and undesirable terrestrial and emergent vegetation (salt cedar, cattails, etc.), construction and maintenance of the concrete dam, stocking of native fish (Gila topminnow and desert pupfish), and maintenance of owl nest boxes. Maintenance of the dam and its pool may include draining of the pool behind the dam; repair, removal, or replacement of the existing dam; dredging of sediment; and removal of excessive emergent and submergent vegetation. If extensive work is to occur in the spring, desert pupfish and Gila topminnow will be removed, held temporarily in an off-site holding facility, and returned to the spring later. Foreseeable future activities include further native vegetation planting, exotic plant removal, control of nonnative aquatic vertebrates that, although not currently present, may become established in Big Spring, and construction of sediment control structures in the drainage above the spring.

## IMPACTS OF THE ACTION

The proposed project, including existing and future foreseeable human activities as given above, is not expected to have a major effect on survival of the existing Gila topminnow populations, the desert pupfish to be stocked in Big Spring or Cold Spring Seep, the population of desert pupfish remaining at Flowing Wells High School, or the Dexter National Fish Hatchery desert pupfish stock. The overall effect of the project is expected to be beneficial to the survival of the desert pupfish. However, limited adverse effects may occur to either or both species from various ongoing or foreseeable land uses and BLM actions and adequate measures must be taken to minimize such adverse effects.

Direct and Indirect Effects of the Proposed Action

1. Effects of Removal from Donor Population and Stocking into Reintroduction Sites on Desert Pupfish.

The desert pupfish population at Dexter National Fish Hatchery is of sufficient size to provide the needed stock without sustaining any direct or indirect adverse effects. Removal of desert pupfish from Flowing Wells High School is not expected to have any substantial effect on that population. However, adverse effects through depletion of genetic variation could occur if only a small number of fish are left at the High School, particularly if the stock for transplant is removed during a period of low or no reproduction. Stocking of desert pupfish into Cold Spring Seep is expected to be beneficial to the species by establishing an additional self-sustaining population of this species in the wild, thus enhancing its conservation. Future removal of desert pupfish from Cold Spring Seep and stocking of those fish into Big Spring is also expected to have a beneficial effect on the species. Direct adverse effects to the Cold Spring Seep population could occur if stock for Big Spring or other sites is taken before the population at Cold Spring Seep has become sufficiently established.

2. Effects of Stocking Desert Pupfish on Gila topminnow.

No adverse effects to the Gila topminnow population in Cold Spring Seep or Big Spring are expected from the stocking of desert pupfish into those sites. Historically, both species were distributed throughout much of the Gila River system and records show the two species living sympatrically at some sites. The Gila topminnow spends much of its time in the top of the water column, while the desert pupfish tends to utilize the mid-column and bottom. Both species are omnivorous with wide food utilization. Production in both reintroduction sites should be sufficient to support large numbers of both species.

3. Effects of Existing Livestock Grazing, its Maintenance, and Foreseeable Future Grazing Management Actions on Gila Topminnow and Desert Pupfish.

Livestock grazing generally has many direct and indirect effects on aquatic habitat. However, the current ephemeral grazing at Cold Spring Seep appears to have minimal impact on the Gila topminnow and impacts to the desert pupfish are expected to be likewise minimal. The spring system at Big Spring is not grazed, except under drought conditions, a situation which has resulted in a good condition aquatic habitat. Grazing under the existing AMPs appears compatible with the survival of the Gila topminnow and desert pupfish.

Maintenance or replacement of the livestock water springbox and pipeline at Big Spring may result in adverse effects on the Gila topminnow and desert pupfish if significant disturbance of soil, vegetation, water, and substrate occur during those activities or if pollutants are introduced into the water. High turbidity may adversely affect topminnow and pupfish through depression of dissolved oxygen levels and respiratory inhibition and may result in substantial mortality. Removal of vegetative cover may affect turbidity, water temperature, and water chemistry, and allow increased growth of invasive vegetation, such as cattails.

Livestock gathering may adversely affect the desert pupfish and Gila topminnow if large concentrations of stock are placed into the immediate area of the spring, seep, or any wetted area. Such concentrations would result in increased bank trampling, vegetation damage and cropping, increased nutrient loading, and other factors.

Other livestock maintenance activities addressed earlier in this biological opinion are not expected to have any adverse effects on either the topminnow or pupfish.

4. Effects of Existing Recreation, its Maintenance, and Foreseeable Future Recreation Management Actions on Gila Topminnow and Desert Pupfish.

The existing recreational use at both springs is very light and is not expected to have adverse effects on either the desert pupfish or Gila topminnow. The potential for unauthorized introduction of nonnative fish by recreationists appears to be very low. Such introduction would have severe adverse impacts on the two native fish due to predation by and competition with the nonnative fish.

5. Effects of Existing Vehicular Access, its Maintenance, and Foreseeable Future Vehicular Management Actions on Gila Topminnow and Desert Pupfish.

The existing roads leading to Cold Spring Seep and Big Spring and their maintenance at existing levels are not expected to have any adverse effects on Gila topminnow or desert pupfish. The existing bladed track which crosses the dry wash just upstream from the headspring of Big Spring adversely affects the Gila topminnow and desert pupfish. Because of its primitive construction and steep grade, this track is a likely source of substantial turbidity and sediment to the spring. Excessive sediment in the Big Spring system is an ongoing problem causing filling in of pool habitat and directly reducing habitat available to the fish.

6. Effects of Existing Wildlife and Native Vegetation Management, its Maintenance, and Foreseeable Future Management Actions on Gila Topminnow and Desert Pupfish.

Ongoing wildlife enhancement projects at Big Spring are expected to have long term beneficial effects on the Gila topminnow and desert pupfish. However, adequate care must be exercised to ensure that short term adverse effects are minimized.

Removal of exotic vegetation and planting of native vegetation is expected to have overall beneficial effects on the topminnow and pupfish at both Cold Spring Seep and Big Spring through restoration of the ecosystem to near-natural conditions. Potential adverse effects include: excessive soil disturbance and introduction of turbidity and sediments into the stream and pools; loss of shading, thereby increasing growth of invasive emergent plants such as cattails; and possible introduction of plant species which may invade watered areas, clog flows, and cause loss of open water aquatic habitat.

Maintenance, repair, and replacement of the earthen berms, concrete dams, and maintenance of the pools through sediment dredging and vegetation control are expected to have overall beneficial effects on the topminnow and pupfish at both Cold Spring Seep and Big Spring. These structures provide all of the habitat for the two fish species at Cold Spring Seep and a portion of the habitat at Big Spring. Their maintenance is vital to the survival of the two fish in these sites. However, many adverse effects are possible from such activities, including increased turbidity, introduction of pollutants (oils, concrete, wet cement, etc.), loss of the ponded water, lowered productivity due to removal of bottom sediments, loss of cover due to vegetation removal, and direct mechanical mortality of fish. If extensive work becomes necessary, BLM has proposed to remove and hold a stock of both Gila topminnow and desert pupfish to be returned to the springs following completion of the project. Removal and holding would be conducted in conjunction with Arizona Game and Fish Department (AGFD) and the Fish and Wildlife Service (FWS).

High turbidity may adversely affect topminnow and pupfish through depression of dissolved oxygen levels and respiratory inhibition. Sediment dredging from the pond bottom may adversely affect both species by substantially depressing food availability. The top layer of substrate is important as a source of food and productivity and its removal may heavily influence success of Gila topminnow and desert pupfish populations (Brooks 1985). Removal of vegetation may have short term adverse effects including increased turbidity, lowered food availability, and reduction in cover. Presence of aquatic plants appears to be an important factor in success of introduced topminnow populations (Brooks 1985 and 1986) and is an important habitat factor for pupfish (Kynard 1976). Both topminnow and pupfish use the vegetation as cover to escape from predators, such as bullfrogs and giant water bugs (Belostomatidae). Loss of a portion of the vegetative cover may result in a short term increase in predation losses.

Construction of additional ponded water at Cold Spring Seep is expected to provide additional habitat for Gila topminnow and desert pupfish. This will benefit both species.

Construction of sediment control structures in the wash upstream from Big Spring is expected to have overall beneficial effects on both Gila topminnow and desert pupfish. Potential adverse effects of this construction include short term increases in sedimentation and turbidity in the spring and introduction of pollutants during construction.

Removal of exotic animals, such as the bullfrogs currently present at Cold Spring Seep, will be of long term benefit to both desert pupfish and Gila topminnow. Adverse effects on the two fish species from such removals are dependent upon the methods used and may vary substantially from method to method.

## INCIDENTAL TAKE

Section 9 of the Act, as amended, prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species 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. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered taking within the bounds of the Act provided that such taking is in compliance with the incidental take statement.

The FWS anticipates that the proposed project may result in incidental take of Gila topminnow and desert pupfish due to the following:

1. Direct loss of individual fish during capture, transport, holding, and stocking.

2. Direct loss of individual fish during pond draining, dam/berm repair, dredging, vegetation removal, exotic animal removal, or any work in the water itself.

3. Indirect loss of individuals during actions causing increases in predation, habitat loss, or harassment, such as springbox repair or replacement, vegetation removal, exotic animal introduction, and actions creating high levels of turbidity and sedimentation.

Because reliable estimates of populations of Gila topminnow and desert pupfish are not obtainable due to sampling difficulties and to the rapid population changes inherent in short-lived species with high fecundity, the incidental take anticipated as a result of the various aspects of this project cannot be quantified. Therefore, we have defined the following population parameters as indicators of a greater incidental take than anticipated. Occurrence of any one or more of the following would trigger reinitiation of formal consultation.

1. Mortality of greater than 20 percent of the Gila topminnow or desert pupfish being captured, stocked, held, or transported during any given action.

2. Rapid declines in the gross abundance (abundant, moderate, low, scarce) of Gila topminnow or desert pupfish in Cold Spring Seep or Big Spring following initiation of any given BLM action or slower declines continuing over the year following project initiation.

3. Lack of detectable reproduction in the Gila topminnow or desert pupfish populations during the next reproductive season following completion of any given BLM action.

Loss of individual fish or the entire population of desert pupfish and/or Gila topminnow in Cold Spring Seep and Big Spring due to drying of the sites or failure of the water source will not constitute incidental take so long as the loss of water is a result of natural forces and is not a result of direct BLM action or BLM authorized or regulated action. No action will be required of BLM to prevent or mitigate such natural losses.

Reasonable and Prudent Measures

The FWS believes the following reasonable and prudent measure is necessary and appropriate to minimize the incidental take.

As many Gila topminnow and desert pupfish as possible (but not less than 200 of each species or all fish present, whichever is less) will be captured and held during any action involving draining, dredging, emergent or submergent vegetation removal, dam/berm repair or replacement, or any other action addressed in this biological opinion which has a potential for substantial direct or indirect incidental take (except stocking or restocking of Gila topminnow and/or desert pupfish). The holding facilities for these fish must be of adequate size, water chemistry, and temperature to sustain the captured fish during the period of the action and until turbidity and other water disturbances have returned to near post-project levels; at which time the fish will be returned to the springs. The fish must not be held in any location where the potential exists for contamination of the stock with any other fish species. Captured stock will contain a representative sample of adult females, males, and juveniles of both species.

Terms and Conditions for Implementation

In order to be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measure described above, must be complied with. Gila topminnow and desert pupfish populations and habitat in Cold Spring Seep and Big Spring will be checked following completion of any action of the type specified in the reasonable and prudent measure above. That follow-up will occur at a minimum of the following approximate time periods: one week, one month, six months,

and one year following completion of the action. To provide a baseline, information will be recorded prior to beginning any such action on gross abundance of Gila topminnow and desert pupfish, presence or absence of young topminnow and pupfish, general distribution of topminnow and pupfish throughout the pools, ponds, and stream, water level and turbidity, general habitat condition, and other pertinent data. Post-project information will include collection of the same data as for the baseline. Copies of all baseline, project, and follow-up records will be furnished to the FWS immediately after completion of each step. This information may be collected by BLM under the direct authority of this biological opinion or may be arranged for with other agencies, organizations, or individuals which hold or obtain appropriate Federal and State permits.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term conservation recommendations has been defined as suggestions of the FWS regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The following constitute FWS conservation recommendations:

1. Leave at least 100 desert pupfish in the Flowing Wells High School population following removal of stock for transplant to Cold Spring Seep. Augment the stock taken from Flowing Wells with Dexter National Fish Hatchery pupfish to make up the approximately 200 fish to be stocked into Cold Spring Seep.

2. Remove desert pupfish from Cold Spring Seep to stock Big Spring or other sites only after the population in Cold Spring Seep has at least tripled in numbers from that originally stocked.

3. Conduct livestock gathering in such a way that large concentrations of stock are never present in the immediate area of the springs or any of the wetted area at Cold Spring Seep and Big Spring.

4. Conduct springbox and pipeline repair, maintenance, or replacement at Big Spring in a manner to minimize soil and vegetation disturbance and to minimize turbidity and substrate disturbance in the headspring pool. Replacement or reconstruction of the springbox should not result in a structure which occupies a substantially larger portion of the pool than at present.

5. Do not permit diversion of spring flow at Cold Spring Seep and do not allow the diversion at Big Spring to exceed the amount currently being diverted. The FWS recognizes that implementation of this recommendation must consider State-issued water rights as well as BLM special use permitting procedures.

6. Take steps to ensure that no pollutants (oils, cement, wet concrete, pesticides, etc.) enter the stream during any activities in the vicinity of Cold Spring Seep and Big Spring.

7. Avoid any action which would substantially increase the likelihood of introduction of nonnative fish or other aquatic life. Such actions include increasing the recreational use at the springs by improving access or locating recreational facilities nearby, and construction of ponds which would be desirable for stocking with and fishing for game fish.

8. Close the existing bladed vehicular track (ranch road) which crosses the wash just upstream from the headspring at Big Spring. If vehicular access to the area across the wash is deemed necessary, the track could be replaced with a new track further removed from the spring area, preferably downstream. Any track or road crossing the wash should have provisions for minimizing erosion on the crossing.

9. Remove existing salt cedar on a gradual basis aimed at allowing the planted native trees to thrive and replace the shading currently provided by the salt cedar. Do not remove the rootwads of the salt cedar. Removal of those rootwads would cause erosion and contribute sediment to the spring. The rootwad of the large salt cedar at the headsprings of Big Spring is probably an important factor in creating backwater habitat that allows the fish to survive large floods.

10. Do not introduce any plant species, native or otherwise, that may result in substantial losses of open water habitat through vegetation encroachment.

11. Continue the existing cattail control program at Big Spring and institute a similar program at Cold Spring Seep, if it becomes necessary. Control methods should be chosen and implemented in a way that will minimize turbidity and substrate disturbance.

12. Coordinate methods for removal of exotic aquatic animals from Cold Spring Seep and Big Spring with the FWS and the AGFD prior to implementation. Methods should be mutually agreed upon between the three agencies. Chemical eradications may result in loss of the entire fish population and would require additional specific Section 7 consultation.

13. In general, conduct actions which may affect the Gila topminnow and desert pupfish during the spring, summer, or fall when reproduction is occurring. Population reduction and stress during the non-reproductive period, especially when cold weather stress is also occurring, may result in larger adverse impacts than otherwise anticipated and may force the population through a genetic bottleneck.

14. Take measures to minimize turbidity and sedimentation during actions at Cold Spring Seep and Big Spring. Such measures may include partitioning the action area from the remainder of the water by berms, plastic, cloth or mesh barriers, and monitoring of turbidity and dissolved oxygen levels. Measures should be carefully tailored to the specific action.

15. Maintenance of existing pools and construction of new pools should be planned to achieve a generally U-shaped bottom profile. Saucer-shaped profiles encourage vegetation encroachment and are not typical of most natural Gila topminnow and desert pupfish habitats. Habitat diversity should be maintained through construction of deep-water areas with vertical pond sides as well as construction of shallower areas.

16. Maintain a record of any actions taken at Cold Spring Seep and Big Spring, including documentation of actions taken, sketches of before and after water configurations and profiles, and before and after photographs. This will enable future managers to analyze the effect and success of various activities. Please furnish a copy of this record to the FWS. The presence of such information in the recovery record is invaluable.

In order for the FWS to be kept informed of actions that either minimize or avoid adverse effects or benefit listed species or their habitats, the FWS is requesting notification of the implementation of any conservation recommendations.

This concludes formal consultation on this action. Reinitiation of formal consultation is required if the amount or extent of incidental take is exceeded, if new information reveals effects of the action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion, if the 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 if a new species is listed or critical habitat designated that may be affected by the action. This opinion applies only to actions specifically evaluated in this document. All other actions, ongoing or future, require additional consultation if they may affect either Gila topminnow or desert pupfish.

In addition to issues addressed in the above biological opinion concerning effects to the Gila topminnow and desert pupfish, other biological concerns exist regarding this project. Samples of snails taken during a site visit on October 23, 1989 to Cold Spring Seep were confirmed as Apachecoccus arizonae, and Tryonia gilae is also known from Cold Spring Seep. Both species are category 2 Federal candidates. Although we have no present records of either snail from Big Spring, it is likely that one or both occur there also. We would appreciate your consideration of the needs and survival of these species in any action taken at either spring.

If we can be of further assistance, please contact Sally Stefferud or me (Telephone: 602/261-4720 or FTS 261-4720).

Sincerely,

Ronald M. McKinney
for Sam F. Spiller
Field Supervisor

cc: Director, Arizona Game and Fish Department, Phoenix, Arizona
Hatchery Manager, Dexter National Fish Hatchery, Dexter, New Mexico
Assistant Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico (FWE/HC and SE)
Field Supervisor, Ecological Services Office, Albuquerque, New Mexico
Director, Fish and Wildlife Service, Washington, D.C. (EHC)

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FIGURE 1. General location of Cold Springs Seep. (Taken from BLM Nov. 3, 1989 Biological Assessment)

FIGURE 2. Schematic diagram of Cold Springs Seep. (Taken from BLM Nov. 3, 1989 Biological Assessment)

FIGURE 3. General location of Big Spring. (Taken from BLM Nov. 3, 1989 Biological Assessment)

FIGURE 4. Schematic diagram of Cold Springs Seep. (Taken from BLM Nov. 3, 1989 Biological Assessment)

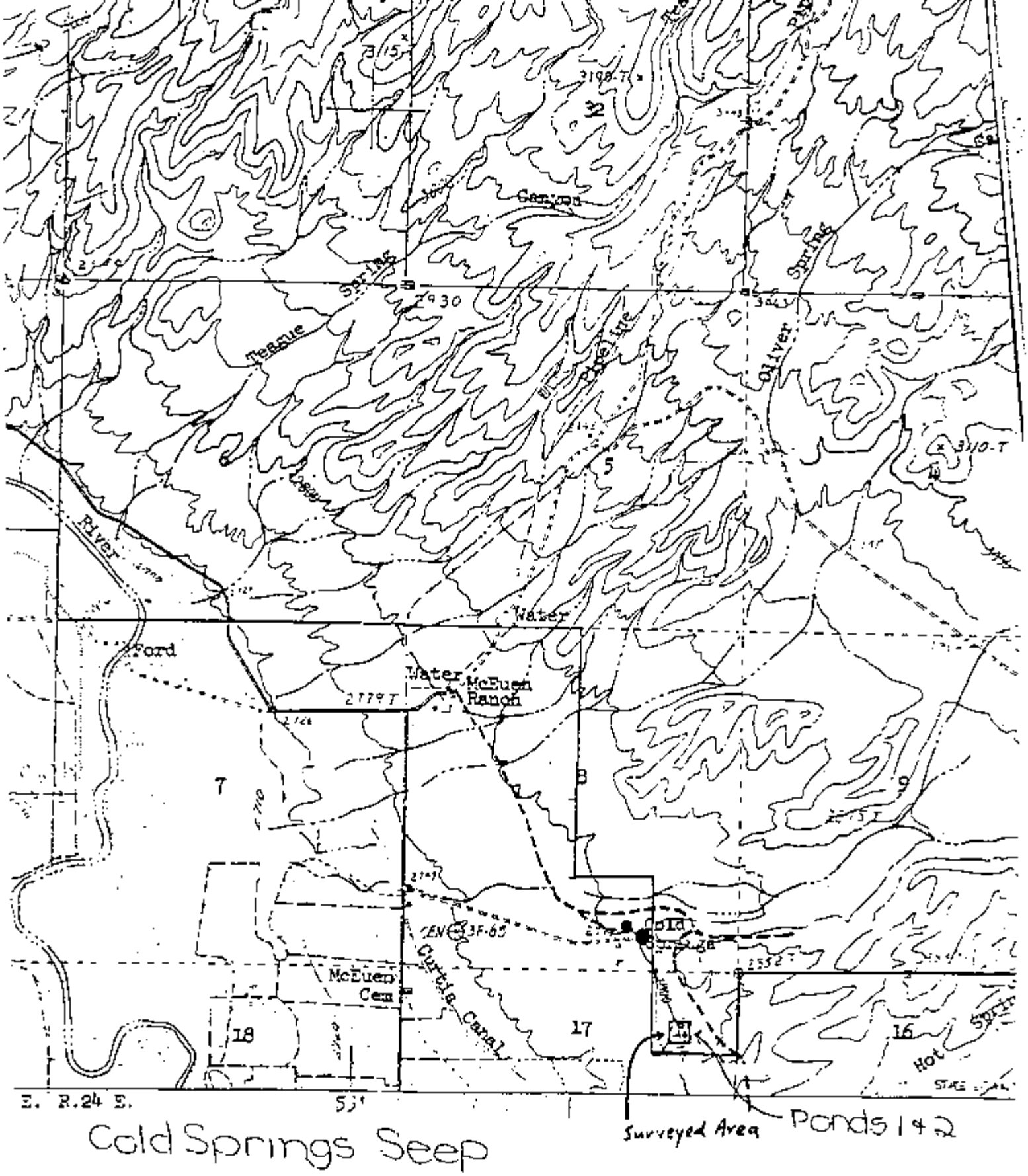


FIGURE 1. General location of Cold Spr
Seep (Taken from BLM Nov. 3,
Biological Assessment).

Cold Spring Seep
Ponds 1 + 2

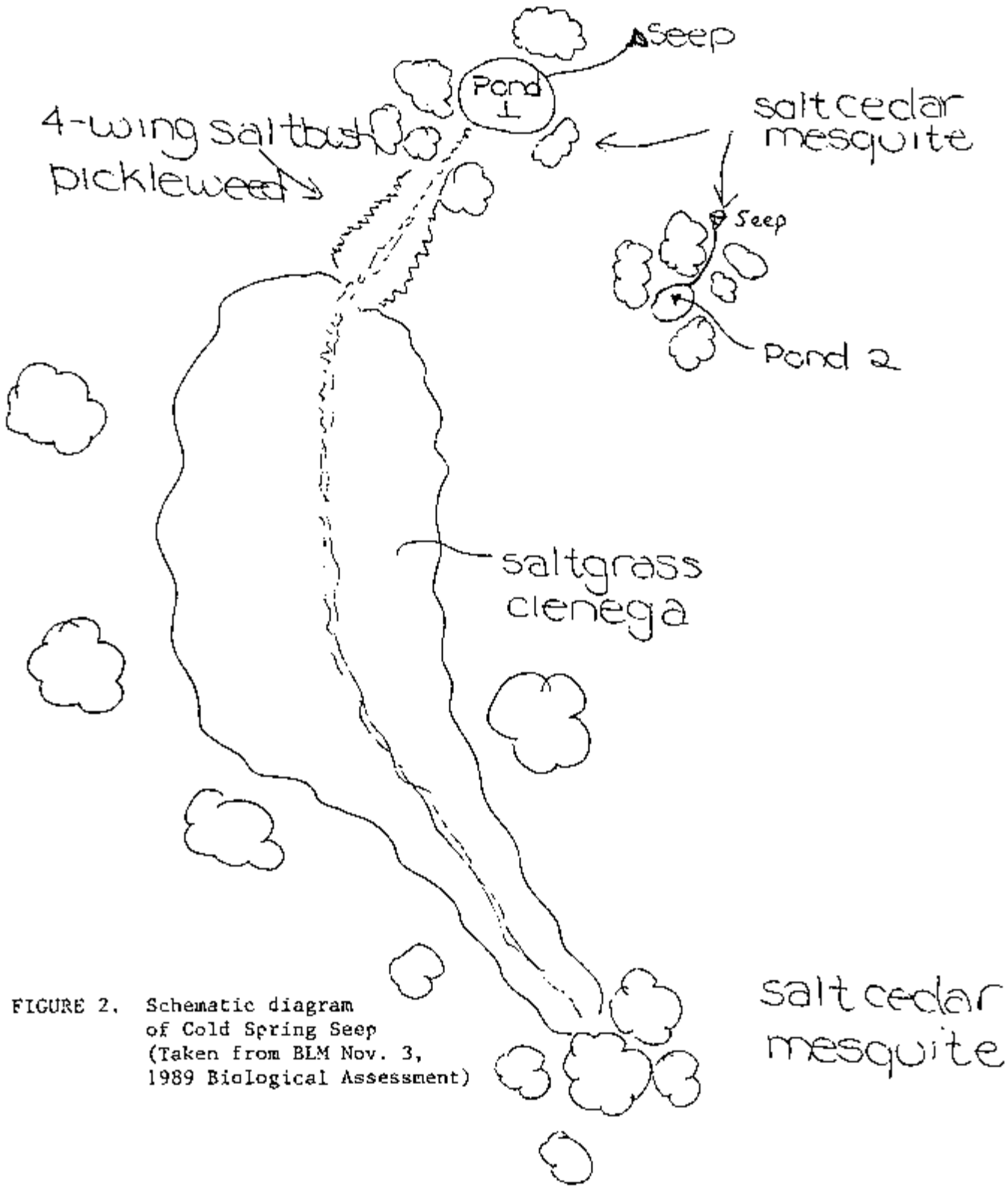


FIGURE 2. Schematic diagram of Cold Spring Seep (Taken from BLM Nov. 3, 1989 Biological Assessment)

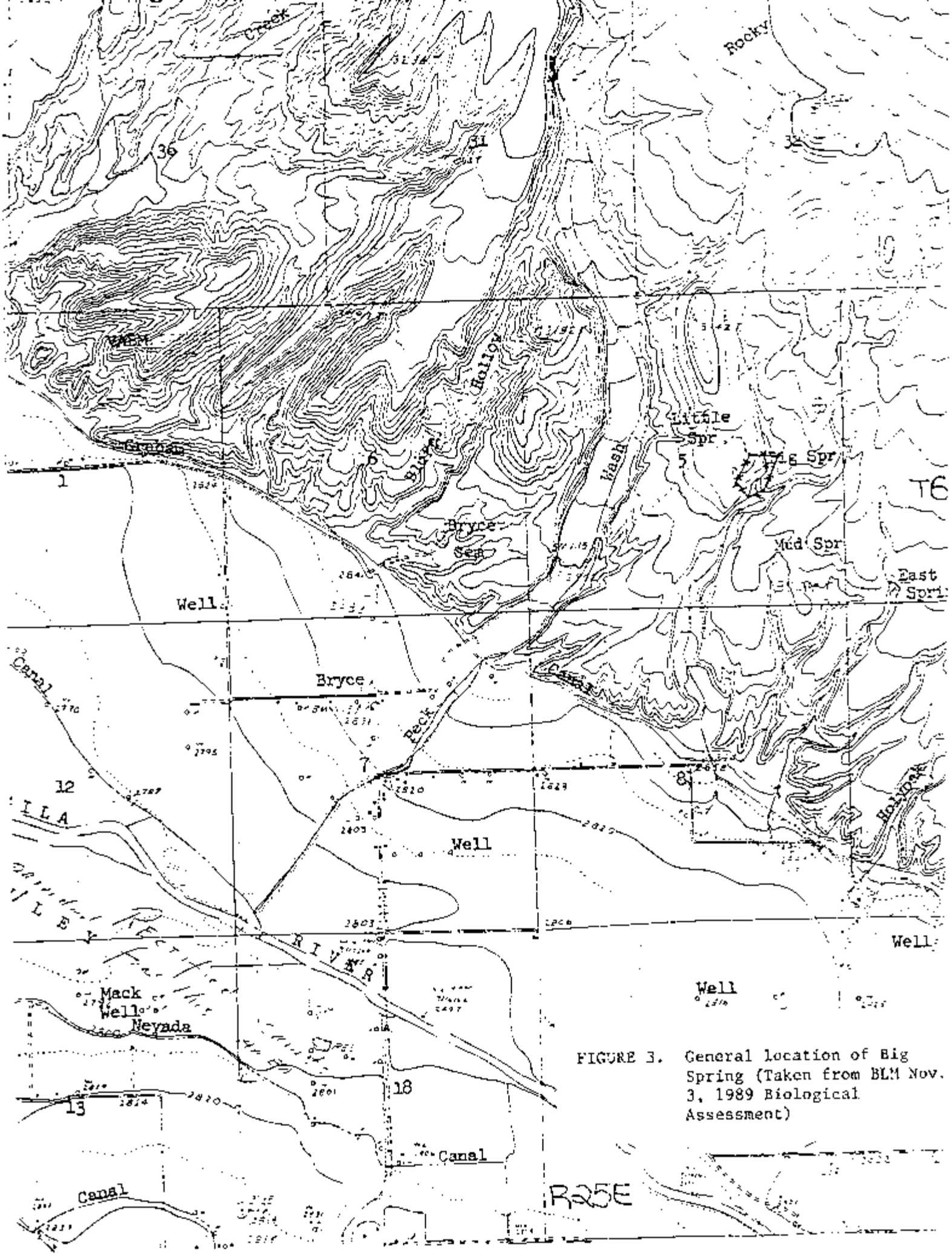


FIGURE 3. General location of Big Spring (Taken from BLM Nov. 3, 1989 Biological Assessment)

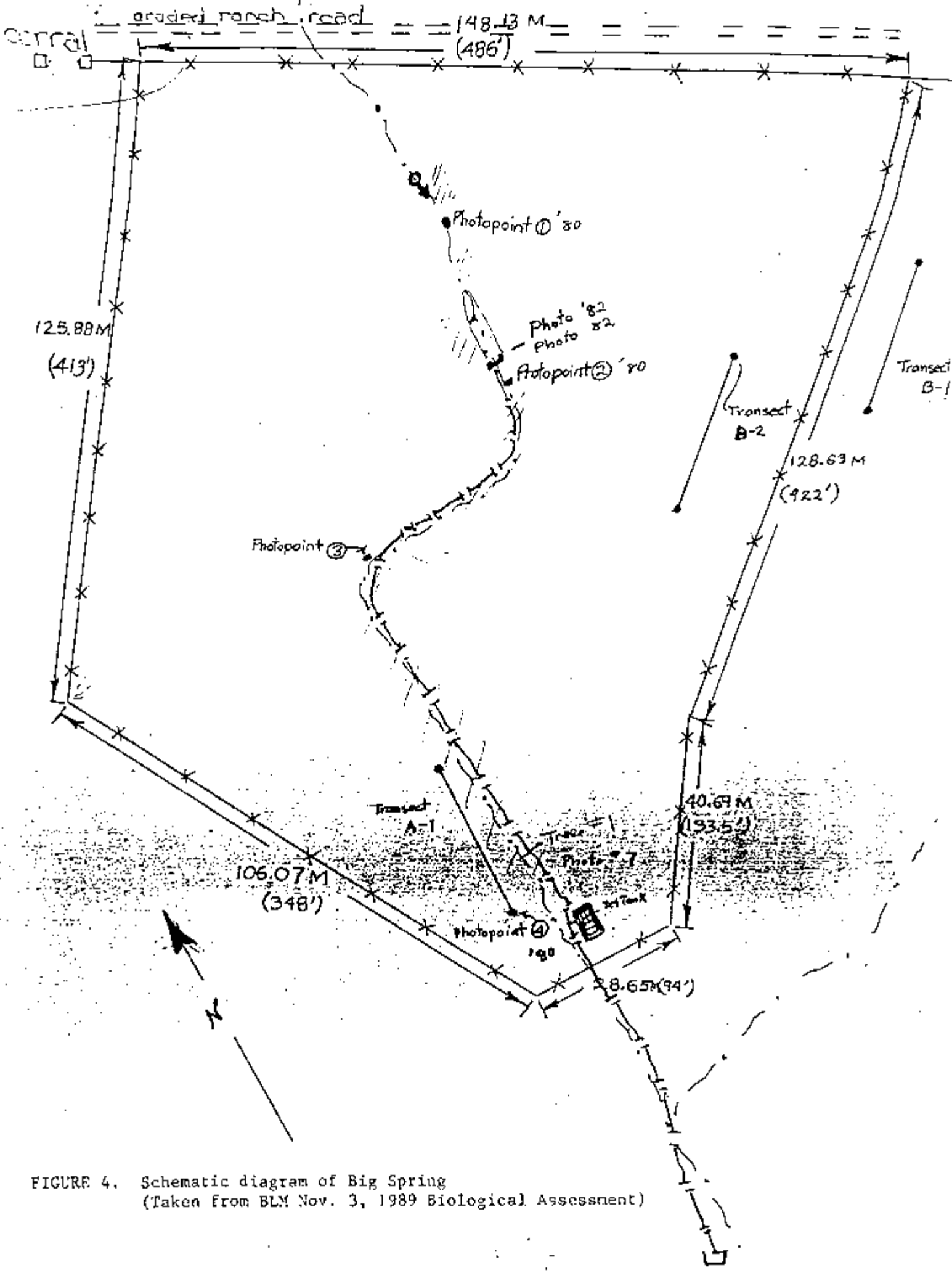


FIGURE 4. Schematic diagram of Big Spring
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