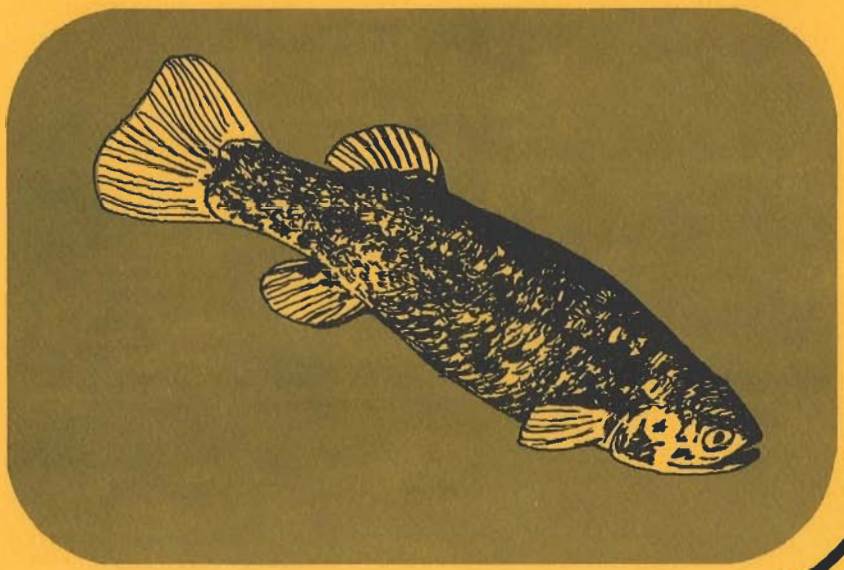
RECOVERY PLAN

Pahrump Killifish



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LITERATURE CITATIONS SHOULD READ AS FOLLOWS:

PAHRUMP KILLIFISH RECOVERY PLAN, DATED MARCH 17, 1980, PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE IN COOPERATION WITH THE RECOVERY TEAM COMPOSED OF THE FOLLOWING INDIVIDUALS:

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Additional copies of the Pahrump Killifish Recovery Plan are available through the Fish and Wildlife Reference Service, Unit 1, 3840 York Street, Denver, Colorado 80205.

RECOVERY PLAN FOR THE PAHRUMP KILLIFISH

Prepared by the

Pahrump Killifish Recovery Team

December, 1979

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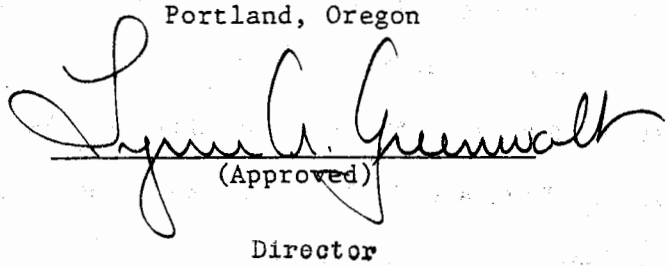
Published by

U.S. Fish and Wildlife Service

Endangered Species Program

Region I

Portland, Oregon



(Approved)

Director

(Title)

MAR 17 1980

(Date)

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PART I

INTRODUCTION

The funduline cyprinodont fish, Empetrichthys latos latos (Miller) is endemic to the Pahrump Valley in southern Nye County, Nevada. It is the only fish native to this valley and is one of two fish which constitute the genus Empetrichthys. The other form, the Ash Meadows killifish, Empetrichthys merriami Gilbert, became extinct in the late 1940's. There were three subspecies of Empetrichthys latos, each existing in a separate spring, E.l. latos, E.l. concavus, and E.l. pahrump. The last two fish are now extinct and E.l. latos disappeared from its native habitat at Manse Springs in August of 1975. This last representative of the genus Empetrichthys now exists only in transplanted populations.

Classification Relationships

The history of the classification of the genus Empetrichthys has been interesting. Gilbert (1893) correctly placed the genus in the family Cyprinodontidae. This practice was followed until Jordan and Evermann (1896), following Gill (1894), placed the genus along with closely-related forms in the family Poeciliidae. However, Jordan (1923) followed Eigenmann (1920) and placed Empetrichthys in the family Orestiidae. After this Jordan, Evermann, and Clark (1930) erected an entirely new family, the Empetrichthyidae, for the genus. Finally, Myers (1931) placed the genus Empetrichthys in the subfamily Fundulinae of the family Cyprinodontidae, where it remains today. Most authorities agree that the genus Empetrichthys, along with its closest living relative Crenichthys of eastern Nevada, are closely related to the genus Fundulus, and were

probably derived from a Fundulus type ancestor which lacked pelvic fins. Both Empetrichthys and Crenichthys lack pelvic fins.

Additional evidence for a funduline ancestor exists in the form of a fossil fish, Fundulus curryi, closely resembling Empetrichthys, from Death Valley, California (Miller 1945).

Miller officially described the species Empetrichthys latos in 1948 after determining that it was different from the Ash Meadows killifish Empetrichthys merriami Gilbert. Miller (1948) further divided the species into three subspecies: E.l. latos; E.l. pahrump; and E.l. concavus. The Pahrump killifish Empetrichthys latos latos is the only form existing today.

Description

The Pahrump killifish Empetrichthys latos latos is a small, relatively slender fish, reaching a maximum length of about 3 inches (77 mm). The fish has a broad mouth, a relatively short and slender head, and no pelvic fins. There are 29 to 33 scales in the lateral series, most commonly 30-32 (LaRivers 1962). The pharyngeal teeth are molar and tuberculate, while the jaw teeth are conical and biserial, or weakly triserial. Pahrump killifish are greenish above to silver-greenish below, with a narrow axial streak which tends to disappear in older, larger individuals. Males, during the spawning season, are washed lightly with blue.

Ecology

Manse Spring, the ancestral home of the Pahrump killifish, has a constant temperature of 76° F. Because of the long period of isolation in Manse Spring, it is assumed that 76° F. is the optimal temperature for the killifish.

However, recent investigations discovered that the fish retains a wide degree of temperature tolerance, and while 76° F. may be optimal, it is not the only temperature at which the fish can survive for extended periods. As an example, Latos Pools, a transplant site for the Pahrump killifish west of Lake Mohave, cools to ambient temperatures during the winter. Pahrump killifish lived and reproduced in these pools until a flood in the Fall of 1976 destroyed them. In addition, killifish survived under ice in a horse tank at Corn Creek Springs (FWS) during the Winter of 1976. Long-term effects on viability of living at temperatures well below 76° F. is not known. In their natural habitat, the Pahrump killifish utilized all areas of Manse Spring, with the larger fish using the more open and deeper waters. The young were found in shallower, more weedy areas, and utilized the near surface water layer. Observations on transplanted populations indicate that the young are more active during daylight hours, and the adults are more active at night (Selby, personal communications, 1976). The fish are omnivorous and eat a wide variety of available plant and animal material. Spawning activity of the Pahrump killifish appears to reach a peak in the spring, but they will apparently spawn at any time of the year if put into suitable habitat. Natural waters containing killifish are alkaline. During parts of their life cycle, especially during breeding periods, the females seek seclusion for egg-laying in the remote areas of the springs. The fry remain near the bottom or near other substrate which offers protection from predation and can be a source of food.

Historical Distribution

The Pahrump killifish was known only from Manse Spring on the Manse Ranch, Pahrump Valley, Nye County, Nevada. The subspecies, E.l. latos, is closely

related to two other fish of the same species from the same geographical area of Nevada. These two fish and the Pahrump killifish originally survived in three different springs in Pahrump Valley, Nevada, each population as an endemic subspecies.

The Raycraft Ranch springfish (Empetrichthys latos concavus) formerly occurred in the Pahrump Valley; the habitat was destroyed in the mid-fifties. The Pahrump Ranch killifish (E.l. pahrump) also occurred in the Valley; its habitat was pumped dry in 1958. The remaining representative of the genus in Pahrump Valley, the Pahrump killifish (E.l. latos), became extinct in its native habitat in 1975, when Manse Spring dried due to excessive pumping of ground water for agrecultural development. Prior to this time, because of declining water levels and other potentially adverse activities which threatened this fish, a few of the fish were transplanted in June of 1970 into an isolated spring in southern Nevada as a safeguard, should their original habitat be lost.

The drying up of Manse Springs was not surprising to those familiar with desert springs, and had been predicted (Minckley and Deacon, 1968) after a review of demands on the water in the area. In fact, it is because of that prediction that the Pahrump killifish lives today, if only in transplanted locations. The location of Manse Springs, the type locality, and the two locations receiving transplants are shown in Figure I.

Because of the decline of the Pahrump killifish population and precarious state of its habitat, the [1]Federal Government and [2]Nevada State Department of Fish and Game declared this fish an endangered species.

1/ Department of the Interior, Federal Register: 11 March 1967, Vol.32 (48): 4001

2/ Nevada Fish and Game Department, classified as endangered under NRS, 1 July, 1969

Present Distribution

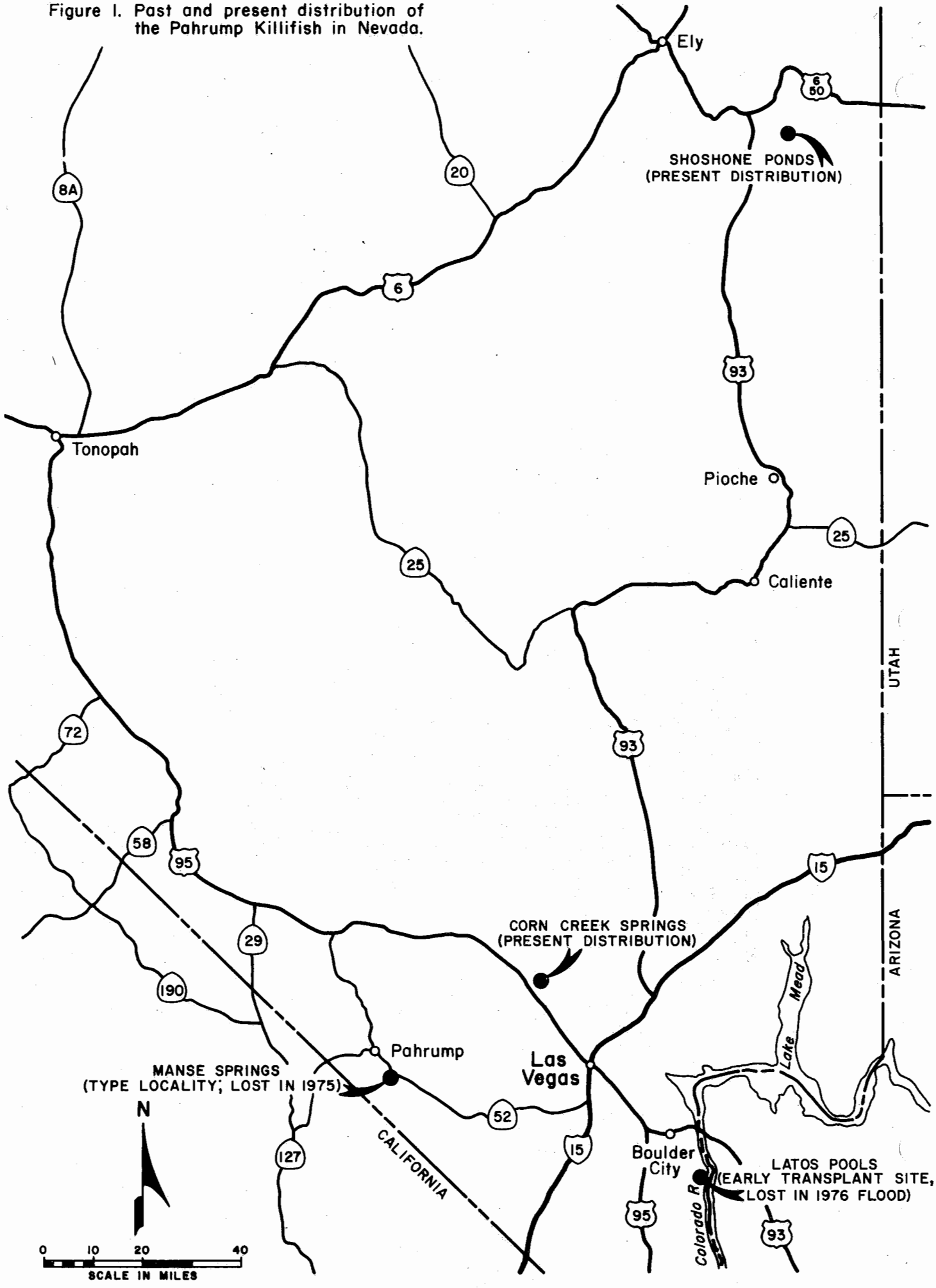
The Pahrump killifish is extinct in its native habitat at Manse Springs in the Pahrump Valley, Nye County, Nevada. It now (Sept. 1978) exists only in transplanted populations in the following two locations - (See Figure 1):

(1) Corn Creek Springs Pond, Clark County, Nevada, on the Desert National Wildlife Range, approximately 25 miles northwest of Las Vegas, Nevada. Location - T17S R59E NE1/4 Sec.34 (Mt. Diablo Meridian). This spring may be subject to future water problems as a result of ongoing development and growth in Las Vegas Valley.

(2) Shoshone Ponds, White Pine County, Nevada, on Bureau of Land Management area about 40 miles southeast of Ely, Nevada. Location - T12N R57E NE1/2 Sec.2 (Mt. Diablo Meridian).

Manse Ranch Springs, Pahrump Valley, Nye County, Nevada March 24, 1971. Photographer - C.H. Lostetter, Fish and Wildlife Service

Figure I. Past and present distribution of the Pahrump Killifish in Nevada.



PART II

THE RECOVERY PLAN

Objectives and Rationale

As the primary objective for the Pahrump killifish recovery effort, the Recovery Team feels that establishment of three sub-populations of this species to be minimal. Further, each of the sub-populations should have a minimum of 500 adults. With each of the sub-populations maintaining this number for three years, the species may then be considered for re-classifying to Threatened status. The habitat would have to be free of immediate and potential threats to permit this change in status. It is suggested that a three-year period, with a minimum adult population of 500 fish in each location each year, be considered an evaluation interval. If the population and habitat meet these evaluation parameters, the Recovery Team could make a recommendation for upgrading the species, if all else is satisfactory, to Threatened status. If, after an additional three-year interval, the population continues to sustain the 500 adult per year per location count, consideration should be given to delisting the species.

Because there are no populations of the Pahrump killifish in their natural habitat, the first recovery efforts should be directed toward protecting the transplanted populations and their new habitats. Thus, it is the rationale of this Recovery Plan to utilize the existing transplant sites and manage them to their maximum capability. In addition, as security to preservation of the species, new suitable transplant sites will be explored along with considering the restoration of the Manse Spring site. The Shoshone Pond is only a temporary holding site until other suitable permanent transplant locations can be acquired and developed.

PAHRUMP KILLIFISH

RECOVERY PLAN OUTLINE

PRIME OBJECTIVE: To restore the Pahrump killifish to non-endangered status; by establishing at least three viable, reproducing populations.

1. Preserve and protect existing transplanted Pahrump killifish populations and their habitats.

    11. Corn Creek Springs.

        111. Manage competing and predatory species.

            1111. Eliminate exotic fishes.
            1112. Control bullfrogs and turtles.
            1113. Control depredating birds.

        112. Manage vegetation and water.

            1121. Concrete line inflow ditches.
            1122. Provide shelter over spring heads.
            1123. Control submergent and emergent vegetation.
            1124. Construct artificial spring in middle pond.
            1125. Rehabilitate lower pond.
            1126. Secure acquifer.

        113. Monitor population

            1131. Establish censusing techniques.
            1132. Recommend censusing personnel.
            1133. Conduct census twice yearly.

    12. Shoshone Ponds.

        121. Monitor population.

            1211. Establish censusing techniques.
            1212. Recommend censusing personnel.
            1213. Conduct census twice yearly.

        122. Manage pools as necessary.

            1221. Control water inflow and outflow; pump and structures.
            1222. Control vegetation as necessary.
            1223. Secure acquifer.

2. Establish and protect viable self-sustaining Pahrump killifish populations in suitable new or restored habitats.

21. Establish Spring Mountain Ranch site (Krupp Ranch) population.

    211. Remove exotic species as required.
    212. Remove competing and predatory species.
    213. Control vegetation as necessary.
    214. Prepare and implement management plan.
    215. Assure protection of property and water rights.

22. Establish and restore Manse Spring population site, subject to #34.

    221. Restore habitat as necessary.
    222. Enhance biological factors (food supply, remove predators, etc.).
    223. Restore water supply and secure availability.
    224. Prepare and implement management plan.
    225. Acquire control of property and water rights.

23. Select and establish other suitable transplant sites and populations as needed.

    231. Select most suitable sites.

        2311. Examine candidate sites and evaluate.
        2312. Specify habitat selection (i.e, chemical, physical, biological).
        2313. Determine need for additional transplants.

    232. Manage site (i.e, restore and/or enhance chemical, physical or biological parameters).

        2321. Prepare management plan.
        2322. Assure protection of property and water rights.

    233. Select transplant stock.
    234. Perform transplant under proper authorization.

24. Monitor transplants.

    241. Determine population regime.
    242. Determine fecundity.
    243. Determine age-growth rate.
    244. Determine population size and seasonal flunctuation.

3. Conduct ecological studies and apply findings to management of Pahrump killifish and its habitats.

    31. Conduct habitat studies.

311. Determine productivity of habitat.
312. Investigate habitat diversity.
313. Investigate water chemistry.
314. Determine yearly temperature regime.
315. Determine volume configuration of habitat.

32. Conduct study of Pahrump killifish biology.

321. Study competitive interaction with fish, frogs, birds, etc.
322. Study food and feeding habits.
323. Study spawning ecology.
324. Determine water temperature preference.
325. Determine substrate requirements.

33. Analyze data from studies; prepare management recommendations and apply as appropriate.

34. Conduct study on feasibility of restoring the type locality at Manse Springs.

341. Investigate biological and physical factors in the area.
342. Determine socio-economic influences.
343. Prepare a feasibility report.

4. Delineate essential habitat for species preservation.

5. Enforce laws and regulations protecting Pahrump killifish and its essential habitat.

51. Enforce State and Federal regulations; protect Pahrump killifish.

52. Protect Pahrump killifish habitat; enforce trespass.

53. Coordinate action of enforcement personnel and others of Pahrump killifish status and recovery effort (interrelate with #6).

6. Inform public of Pahrump killifish Status and Recovery Plan objectives.

61. Provide public awareness of Pahrump killifish through audio-visual programs and publications.

611. Provide information for news media, TV and radio release.
612. Prepare and distribute brochure on recovery plan rationale.
613. Prepare appropriate articles for popular and scientific publications.

62. Install informational signs at essential habitat areas under State and/or Federal management.

PAHRUMP KILLIFISH

RECOVERY PLAN ACTION NARRATIVE [1]

As a primary goal for the Pahrump killifish recovery effort, the successful establishment of at least three populations, each with at least 500 adults, would permit consideration for upgrading these fish to delisted status. However, the habitats would have to be secure and the Pahrump killifish would be censused annually to be certain that the populations were viable, reproducing and maintaining adequate numbers to sustain the species. Following monitoring and evaluation of the population and habitat, the Recovery Team could make recommendations for the upgrading of the species to a delisted status, provided recovery has been demonstrated.

Because there are no populations of the Pahrump killifish in their natural habitat (i.e., Manse Springs), the first priority should be toward protection and management of the existing transplanted populations and their habitats at Corn Creek Springs and Shoshone Ponds (11, 12). Information gained from research and management studies will be used to maintain these populations in optimum conditions and at optimum numbers.

The aquatic system at Corn Creek Springs forms a complex of three ponds. Water flows from two spring heads into the upper pond, then overflows into the middle pond, and finally drains into the lower pond. This system presents a management problem in that any exotic species introduced into the upper pond will eventually find its way into all the ponds (111). Therefore, the timely removal of newly introduced exotics that adversely effect the fish are of primary importance.

1/ (Keyed to Outline)

Exotic fish and turtles have been removed, but vigilance against reintroduction should be maintained. Bullfrogs should receive high priority for removal as they can cause considerable damage to young fish (1111, 1112). Abnormally-large numbers of predatory fish-eating birds should be frightened away (1113). Fish cover should be maintained to minimize these losses.

Management of water at Corn Creek Springs is important because of its limited volume (112). Any controllable factor which reduces water volume should receive attention (1126). Therefore, removal of undesirable emergent aquatic vegetation is necessary to prevent excessive evapotranspiration (1123). Lining of inflow ditches with concrete irrigation flumes will help reduce seepage and enhance exotic species control (1121). Covering the main springheads and eliminating the dense vegetation from these areas will also help conserve water (1122). Construction of an artificial spring system in the middle pond will prevent encroachment of emergent vegetation over the entire pond (1124). Sealing the bottom of the lower pond so that it will hold water will allow the establishment of another population of Pahrump killifish (1125). Aquatic vegetation encroachment and control will not be as much of a problem in the lower pond because of its steep sides and depth.

Populations of Pahrump killifish in all three ponds at Corn Creek Springs should be censused twice yearly (in March at the beginning of the main spawning season and in late September at the end of the main growing season) (113). Personnel recommended by the Recovery Team should do the censusing, using established censusing techniques and analyses.

Because of the total artificiality of the system, Shoshone Ponds are somewhat easier to manage. Long-range plans call for transplanting the Pahrump killifish from this system to other suitable habitat when the populations located closer to the native habitat become established. However, until that time, the Shoshone Ponds should be carefully managed and the acquifer secured (122, 1223). Water control structures should be inspected regularly and vegetation control in the ponds undertaken when necessary. Trees should be planted nearby for shade (1221, 1222). Populations of Pahrump killifish at Shoshone Ponds should be censused twice yearly with established techniques and qualified personnel. (See 113 above) (121).

The goal of the recovery effort is to establish at least three populations of Pahrump killifish and because the Recovery Team looks upon the Shoshone population as a temporary situation, other suitable sites will have to be considered for establishing new or restored killifish populations (2).

The site receiving highest priority for reintroduction of the Pahrump killifish is their ancestral home, Manse Springs (22). In order to accomplish this, the Recovery Team recommends that an area on Manse Ranch and the water right to Manse Spring be acquired, subject to a favorable conclusion of a site feasibility study (34). Should the property be secured (225), a management plan would be prepared that included complete recommendations for the restoration and management of Pahrump killifish at Manse Springs (224). These recommendations should include such items as removal of exotic species, vegetation and water control, biological enhancement and other items as necessary (221, 222, 223).

Another site recommended by the Recovery Team for introduction of Pahrump killifish is the pond at Spring Mountain Ranch. This pond is located on property (formerly the Krupp Ranch) owned by the Nevada State Parks Department. An agreement to perform this transplant and manage the pond would be negotiated between the State agencies concerned and the Fish and Wildlife Service (21).

All other aspects of the Spring Mountain Ranch project as detailed in the removal of exotics, removal of competing and predatory animal species, preparing and implementing a site management plan consistant with the State Park recreation objectives and the Endangered Species Act, and assuring protection of the property and water rights will be necessary in this preservation effort.

In addition to the two sites mentioned above, the Recovery Team recommends that additional sites be considered and evaluated for possible introduction of Pahrump killifish as a safeguard, should other habitats fail to sustain a viable population of killifish (23). In addition to determining the need for additional transplants, any prospective sites will have to be evaluated on the basis of their water chemistry, physical and biological elements. When a suitable area (habitat) has been selected (231), access to the site will have to be arranged either through purchase or agreement, management plans drawn up (232), and finally transplants made (with all the necessary permits) from suitable parental stocks (233, 234).

Any introduced population (transplant) will be monitored. Such monitoring will determine the population's regime, fecundity, age-growth rate, as well as its size and seasonal fluctuation (24).

In light of the foregoing discussions on existing Pahrump killifish populations and any proposed new populations, it is clear that a solid basis of information on this fish's ecology is necessary before making management recommendations. This needed information can most effectively be gathered through investigative efforts on the habitats now sustaining killifish and through studies on the fish itself. The Recovery Team recommends that the biological, physical and chemical parameters of Corn Creek Springs be characterized (3).

These habitat study elements include, but are not limited to: 1) determination of habitat productivity, 2) habitat diversity, 3) water chemistry investigation, 4) determination of yearly temperature regime and 5) determining the volume configuration of the habitat (31).

Studies on all aspects of the ecological life history of the fish in Corn Creek Springs Ponds should also be done (32). These biological investigations on the killifish include a study of: 1) competitive interaction with fish, frogs, birds, etc., 2) food and feeding habits, 3) spawning ecology, 4) determining water temperature preferences and 5) determining substrate requirements. As this information is gathered, it will be analyzed for its pertinence to and use in the management of the killifish and its habitats (33).

As a necessary part of the Pahrump killifish recovery effort, the Recovery Team will make recommendations for essential habitat which will be later considered by the Secretary of the Interior as Critical Habitat for this endangered species. (See attached essential habitat recommendation) (4).

The Pahrump killifish, whether an endangered or threatened species, or delisted completely will need the protection of Federal and State laws

and regulations. Enforcement of the regulations protecting the fish and its habitat, including trespass violations, is necessary. The Recovery Team recommends the coordination of recovery effort information be given to the proper law enforcement people so they will be able to provide necessary protection (5).

Informing the public is one of the more important aspects of the entire recovery effort (6). The Recovery Team recommends a strong and lively education program to inform the public, through various publications, the value of the Pahrump killifish and the efforts being taken to preserve it. These efforts include the preparation of slide presentations on the killifish recovery effort, development of a brochure depicting the need for Pahrump killifish preservation and preparation of material for media release (61). Informational signs will be posted at killifish habitat locations advising the public of the value of that site to the restoration of the endangered Pahrump killifish (62).

PART III

SCHEDULE OF PRIORITIES, RESPONSIBILITIES AND COSTS

Table I, which follows, is a summary of scheduled actions and costs for the Pahrump killifish recovery program. It is a guide to meet the objectives of the Pahrump Killifish Recovery Plan, as elaborated upon in Part II, Action Narrative Section. This table indicates the priority in scheduling tasks to meet the objectives, which agencies are responsible to perform these tasks, a time-table for accomplishing these tasks, and lastly, the estimated costs to perform them. Implementing Part III is the action of the recovery plan, that when accomplished, will bring about the recovery of this endangered species.

PART III

Schedule of Priorities, Responsibilities and Estimated Costs

Table I. Summary of Scheduled Actions and Costs - Pahrump Killifish Recovery Program

Action Priority	Name of Action	Plan Designation	Responsibility Lead	Responsibility Cooperators	Target Date	Estimated Costs (in M$): 1	2	3	4	FY*
A. Habitat - Preserve, Maintain										
	Corn Creek Springs									
2	1. Eliminate exotic fishes	1111	FWS	NDW	----	----	Completed	1977		
2	2. Control bullfrogs & turtles	1112	FWS	NDW	Ongoing	.5	.3	.3	.3	
2	3. Control depredating birds	1113	FWS	NDW	Ongoing	----	.3	.3	.3	
2	4. Concrete inflow ditch	1121	FWS	----	Completed	----	----	Completed	----	1977
2	5. Cover springs	1122	FWS	----	1978	----	----	Completed	----	1978
2	6. Control vegetation	1123	FWS	----	Ongoing	.8	.4	.5	.5	
2	7. Construct 2nd pond	1124	FWS	----	1978	.7	----	Completed	----	1978
2	8. Rehabilitate lower pond	1125	FWS	----	1983	----	.8	1.8	----	
2	9. Acquire acquifer	1126	FWS	----	1981	Unknown				
	Shoshone Ponds									
2	10. Control water	1221	BLM	FWS	Ongoing	.8	.8	.7	.7	

* = FY 1, 2, 3, 4 corresponds to FY'81, '82, '83, and '84

Table I. (continued)

Action Priority		Name of Action	Plan Designation	Responsibility Lead	Responsibility Cooperators	Target Date	Estimated Costs (in MS): FY 1	2	3	4
2	11.	Control vegetation	1222	BLM	FWS	Ongoing	.7	.7	.6	.6
		Spring Mountain Ranch								
2	12.	Remove exotics	211	FWS	NDW	1984	----	.8	1.2	.6
2	13.	Remove predators	212	FWS	NDW	Ongoing	----	1.2	.9	.6
3	14.	Delineate essential habitat	4	FWS	BLM/NDW	1983	1.4	1.5	1.5(in progress)	
3	15.	Control vegetation	213	NSP	NDW/FWS	Ongoing	----	1.5	.9	.9
3	16.	Acquire ranch	215	NSP	----		----	Done		----
3	17.	Prepare management plan	214	NDW	NSP/FWS	1984	----	2.5	1.5	.6
		Manse Springs								
2	18.	Restore habitat	221	FWS	NDW	1984	----	3.0	2.0	1.5
2	19.	Restore water supply	223	FWS	NDW	1984	----	30.0	25.0	8.0
2	20.	Enhance biological factors	222	FWS	NDW	1984	----	1.5	1.2	.6
2	21.	Acquire & control property	225	FWS	NDW	1983	----		1,500.0	----
2	22.	Prepare & implement management plan	224	FWS	NDW	1984	----	2.5	1.5	1.5
		Other Areas								
2	23.	Acquire transplant site & manage	2322	FWS	NDW		----	----	Undetermined	----

Table I. (continued)

Action Priority		Name of Action	Plan Designation	Responsibility Lead	Responsibility Cooperators	Target Date	Estimated Costs (in M$): FY 1	2	3	4
B. Investigations										
2	1.	Corn Creek, establish censusing technique	1131	FWS	NDW	Ongoing	.5	.8	.6	.6
2	2.	Corn Creek, recommend censusing personnel, conduct census	1132 1133	FWS	NDW	Ongoing	.6	.6	.6	.6
2	3.	Shoshone Ponds; establish censusing techniques	1211	BLM	FWS	Ongoing	.6	.9	.9	.5
2	4.	Shoshone Ponds; recommend censusing personnel, conduct census	1212 1213	BLM	FWS	Ongoing	.4	.5	.5	.5
1	5.	Determine need for additional transplants	2313	FWS	BLM/NDW	Ongoing	.7	.7	.7	.7
1	6.	Transplant site, prepare management plan	2321	FWS	BLM/NDW	Ongoing	-	.8	.8	-
1	7.	Transplant site selection i.e., chemical, physical	2312	FWS	BLM/NDW	Ongoing	.3	.6	.6	.4
1	8.	Transplant site, acquire property and water	2322	FWS	BLM/NDW	Ongoing	.3	.6	.8	.4
1	9.	Transplant site, evaluate candidate sites	2311	FWS	BLM/NDW	Ongoing	-	.4	.4	.3
1	10.	Determine transplant population regime	241	FWS	BLM/NDW	Ongoing	-	.5	.5	.5

Table I. (continued)

Action Priority		Name of Action	Plan Designation	Responsibility Lead	Responsibility Cooperators	Target Date	Estimated Costs (in M$): FY 1	2	3	4
1	11.	Determine transplant fecundity	242	FWS	NDW/BLM	Ongoing	-	.5	.5	.5
1	12.	Determine transplant age-growth rate	243	FWS	NDW/BLM	Ongoing	-	.6	.6	.6
1	13.	Determine transplant population size, etc.	244	FWS	NDW/BLM	Ongoing	-	.5	.5	.5
1	14.	Determine water temp. preference	324	FWS	NDW/BLM	1984	-	.8	.8	.5
1	15.	Determine yearly temperature regime	314	FWS	NDW/BLM	Ongoing	-	.6	.6	.6
1	16.	Study spawning ecology	323	FWS	NDW/BLM	Ongoing	-	.6	.6	.6
1	17.	Determine food habits	322	FWS	NDW/BLM	Ongoing	-	1.4	1.0	.9
1	18.	Determine habitat diversity	312	FWS	NDW/BLM	Ongoing	-	.9	.9	.9
1	19.	Determine interaction of killifish vs. bullfrogs	321	FWS	NDW/BLM	1984	-	1.0	.9	.6
1	20.	Investigate water chemistry of habitat	313	FWS	NDW/BLM	1984	-	1.2	1.0	.9
1	21.	Determine substrate requirements	325	FWS	NDW/BLM	1984	-	1.0	1.0	.6
1	22.	Determine volume configuration of habitat	315	FWS	NDW/BLM	1984	-	.8	.8	.5
1	23.	Determine productivity of habitat	311	FWS	NDW/BLM	1984	-	.9	.9	.7
1	24.	Conduct feasibility study at Manse Springs	34	FWS	NDW	1981	2.0			
1	25.	Analyze data from studies, prepare management recommendations as appropriate	33	FWS	NDW/BLM	1984			1.0	1.0

Table I. (continued)

Action Priority		Name of Action	Plan Designation	Responsibility Lead	Responsibility Cooperators	Target Date	Estimated Costs (in M$): FY 1	2	3	4
C. Transplants										
1	1.	Select transplant seed stock	233	FWS	NDW	1984	-	1.0	1.0	.6
2	2.	Perform transplants	234	FWS	NDW	1984	-	1.0	1.2	.8
D. Law Enforcement										
1	1.	Enforce State & Fed. regls., protect fish	51	FWS	NDW	Ongoing	.4	.5	.5	.5
				BLM			.4	.4	.4	.4
1	2.	Protect habitat; enforce trespass	52	FWS	NDW	Ongoing	.4	.4	.4	.4
				BLM			.5	.5	.5	.5
1	3.	Coordinate action of enforcement	53	FWS	NDW/BLM	Ongoing	.5	.5	.5	.5
E. Public Information										
2	1.	Provide info. to news media, TV and radio	611	FWS/NDW		Ongoing	.6	.6 (each agency contribution)	.6	.6
2	2.	Prepare & distribute brochure on recovery effort	612	FWS	NDW/BLM	1983	-	1.2	.4	-
2	3.	Prepare articles for publication	613	FWS/NDW/BLM		Ongoing	-	.6	.6	.5
2	4.	Install information signs at Fed. & State areas	62	FWS	NDW/BLM	1984	-	1.2	.8	.8
				NDW	FWS/BLM			.9	.9	.7
				BLM	FWS/NDW			1.2	.8	.8
							13.1	69.7	1,541.7	37.7

Agency abbreviations:

1. FWS - U.S. Fish and Wildlife Service
2. NDW - Nevada Department of Wildlife
3. BLM - Bureau of Land Management
4. NSP - Nevada State Parks

Action Priority :

1 Action absolutely essential to prevent extinction.

2 Action necessary to maintain current population status.

3 All other actions necessary to provide full recovery of the species

PART IV
ESSENTIAL HABITAT
FOR THE PAHRUMP KILLIFISH

Section 7 of the Endangered Species Act of 1973 (P.L. 93-205) instructs the Secretary of the Interior to take appropriate action to prevent destruction or modification of habitat considered critical to the survival of any endangered or threatened species. The Secretary, after consultation with individuals and organizations aware of the needs of the species, proposes that certain lands and waters be considered critical habitat for the survival of the Pahrump killifish (Empetrichthys latos latos). The following information is provided to assist the Secretary in delineating that habitat.

On the basis of the best information currently available, these lands and waters appear to comprise the most important habitat the species needs for survival. Any proposal for changed use or modification of these lands and/or waters should be carefully evaluated for possible effects on the survival of the Pahrump killifish. These waters contain almost all of the world's population of (E.l. latos) and, as essential habitat, contain the following vital needs:

1. Space for normal growth, movements, or territorial behavior;
2. Nutritional requirements such as food, water or minerals;
3. Sites for breeding, reproduction, or rearing of young;
4. Cover or shelter; or
5. Other biological, physical, or chemical requirements such as water of proper temperature and chemical composition.

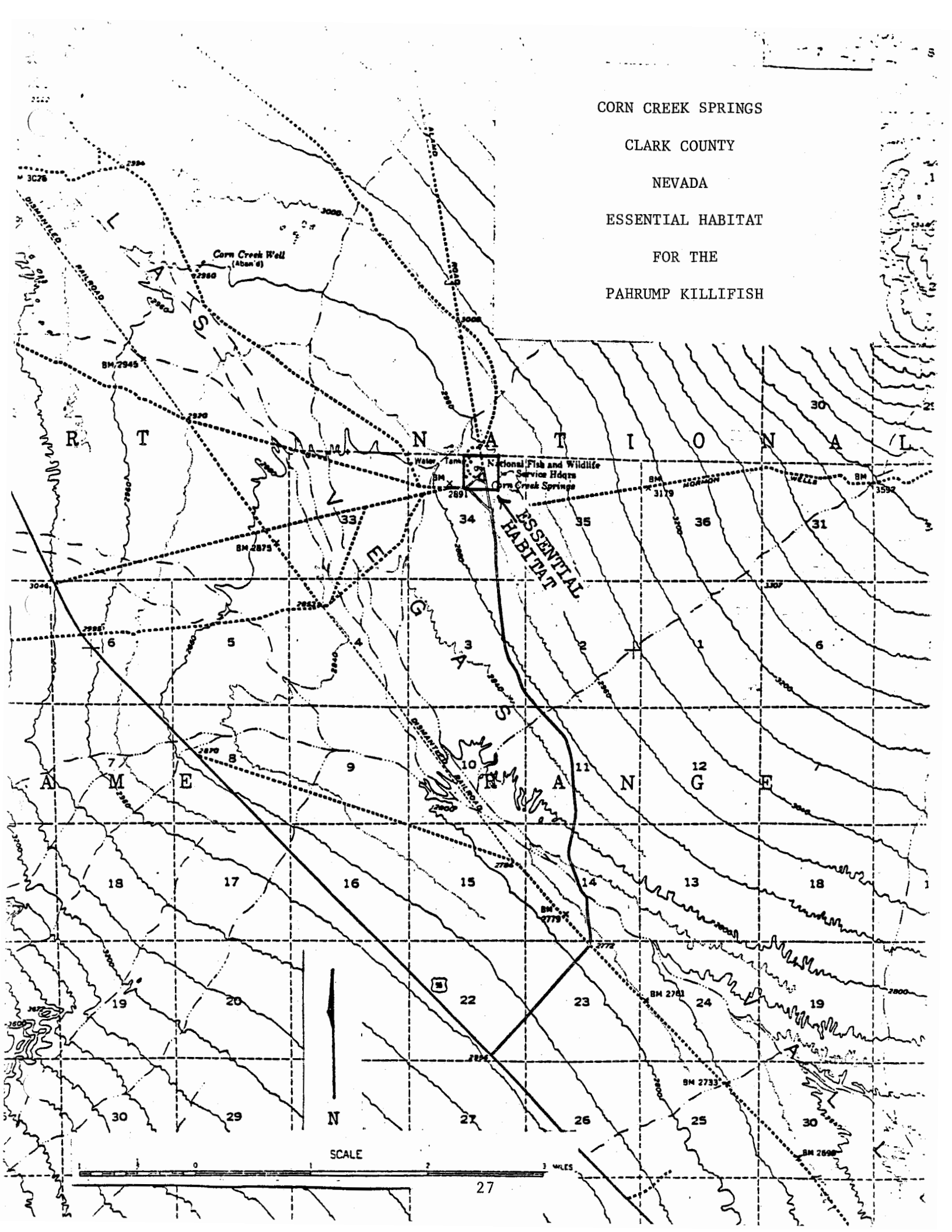
With the present knowledge of the requirements of the Pahrump killifish, the Pahrump Killifish Recovery Team recommends that the following listed

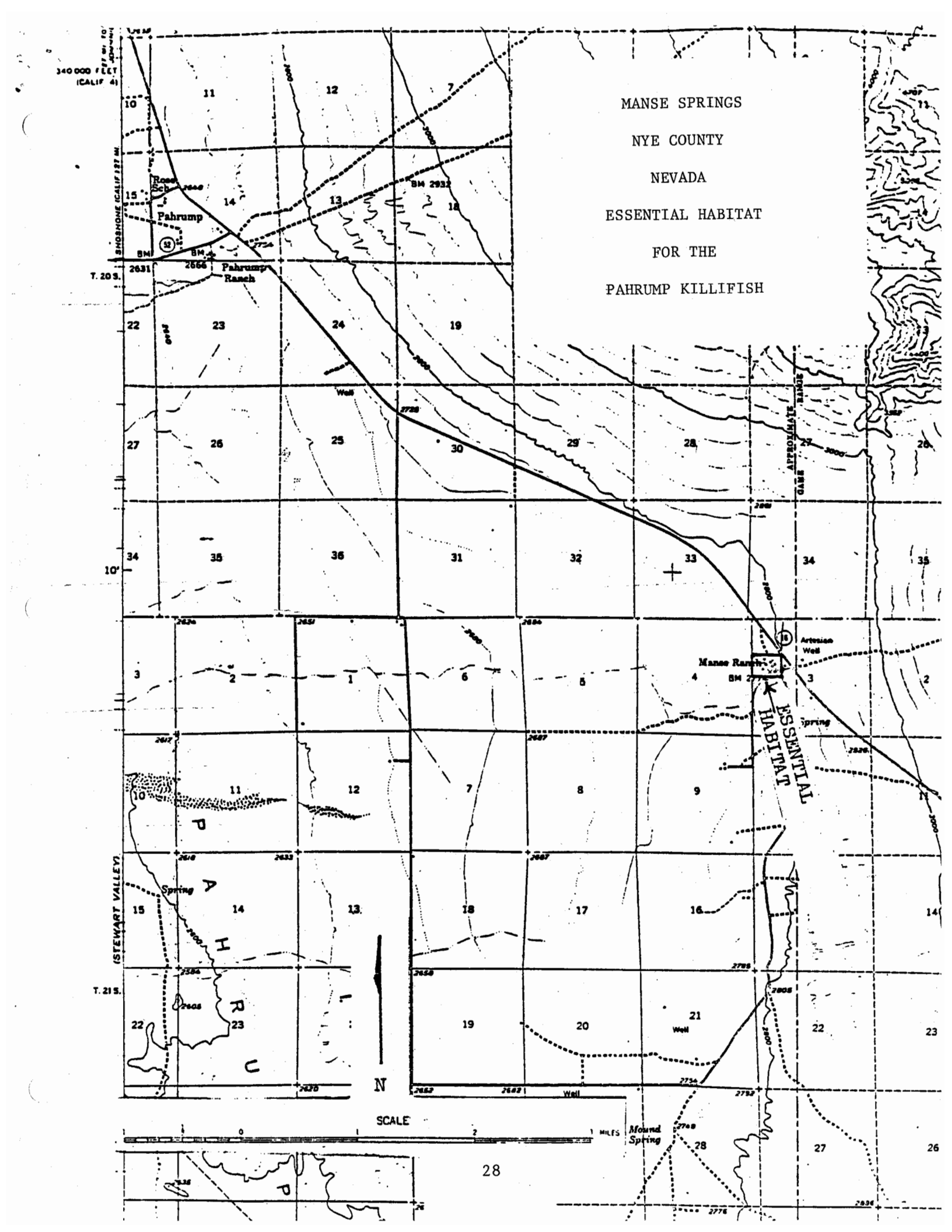
areas are essential to the survival and recovery of the Pahrump killifish. Although several transplants have been made, only one transplant site is considered stable. Other transplants have been made to sites as insurance in the event that something would happen to any of these populations; they are not considered permanent populations. Manse Spring is considered essential habitat by the Recovery Team, even though no killifish exist there now. Many of the necessary habitat elements are present at Manse Spring. It may therefore be possible to sufficiently rehabilitate the spring to justify releasing Pahrump killifish stock and establish a viable population at the ancestral site.

The following habitats are considered essential for the continued existence of the Pahrump killifish:

(1) Corn Creek Springs Ponds, Clark County, Nevada
T17S R59E NE 1/4 Sec.34, M.D.B.& M.
Approximately 40 acres - Government land.

(2) Manse Spring on Manse Ranch, Pahrump Valley, Nye County, Nevada. T21S R54E SW 1/4 of NW 1/4 Sec.3, M.D.B.& M.
Approximately 40 acres - Private land.


CORN CREEK SPRINGS
CLARK COUNTY
NEVADA
ESSENTIAL HABITAT
FOR THE
PAHRUMP KILLIFISH
Corn Creek Well
(Aban'd)
National Fish and Wildlife
Service Hdqrs
Corn Creek Springs
ESSENTIAL HABITAT
SCALE
N


MANSE SPRINGS
NYE COUNTY
NEVADA
ESSENTIAL HABITAT
FOR THE
PAHRUMP KILLIFISH
ESSENTIAL HABITAT
Pahrump
Pahrump Ranch
Manse Ranch
Artesian Well
Spring
Mound Spring
Well
T. 20 S.
T. 21 S.
SCALE
MILES
N

A P P E N D I X A

Literature Cited

Eigenmann, C.H. 1920. On the genera Orestias and Empetrichthys. Copeia, 89:103-6, 1 fig.

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Myers, George Sprague. 1931. The primary groups of oviparous cyprinodont fishes. Stanford Univ. Publ. Univ. Ser., Biol. Sci., 6 (3):1-14.

A P P E N D I X B

LETTERS OF COMMENT

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

XAFA

SE Log #80-143

In Reply Refer To:
FWS/OES 310.6

Memorandum

MAR 17 1980

To: Regional Director, Region 1

From: Director

Subject: Approval of Pahrump Killifish Recovery Plan

I am pleased to approve the subject Recovery Plan and sign the attached title sheet to so indicate. I have a few minor comments on the Plan as follows:

Page 3, line 5--change "cool" to "cools."

Page 8, #121--the subobjectives are misnumbered.

Page 14, line 10--the word "favorable" should not be capitalized.

Page 15, line 3--one of the words "other" should be deleted.

Page 15, line 19--"recommends" is misspelled.

Page 18--the fiscal years should be added to the Implementation Schedule.

Pages 19 and 20--task number 2322 is listed on the Implementation Schedule twice. Are these two different sites, are two sites required, or is there a need for a transplant site for each existing population?

Page 21, #25--change "date" to "data."

Add some wording to the Disclaimer Sheet similar to the following: "Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints."

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

We are trying to standardize the assignment of recovery plan priorities and it would be advantageous if you could assign a priority number of one through three to each recovery task on the Implementation Schedule. Assign priority one to those tasks necessary to prevent extinction, priority two for those necessary to maintain the current population, and priority three for all other actions necessary for complete recovery.

Please send us 20 copies of the Recovery Plan after incorporating the signed title sheet and these comments.

Lynn A. Greenwalt

Attachment

United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
PACIFIC SOUTHWEST REGION
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

SEP 12 1979

Memorandum

To: Regional Director, Fish & Wildlife Service, Portland, Oregon

From: Regional Director

Subject: Recovery Plan for Pahrump Killifish

We have reviewed the subject plan as requested in your July 25, 1979 letter, and generally support the objectives and actions proposed. We believe, however, that recovery plans such as this could be strengthened by indicating why fee simple acquisition is more desirable and feasible than other acquisition alternatives in securing proposed essential habitat for the survival and recovery of rare and endangered species. For instance, we note that the costs of acquiring the 40-acre Manse Ranch property (projected in the "Schedule of Priorities, Responsibilities and Estimated Costs" (Part III) at $1,500,000.00 are by far the highest in the entire schedule of estimated costs. An indication that less-than-fee acquisition alternatives were considered in the development of the plan and why such approaches would be less desirable or feasible than fee simple acquisition would be beneficial.

We are also confused about the method of acquisition to be used in securing killifish habitat on the Spring Mountain Ranch property. Though not proposed as an essential habitat for the recovery program, the pond on this property is recommended for killifish introduction, and is discussed in the "Action Narrative" section. The narrative (21) indicates that the property is already under State ownership and that an agreement between the State and the Fish and Wildlife Service for transplant and management would be negotiated, but the schedule of estimated costs tabulated in Part III indicates that the property would be acquired at a total cost of $150,000.00. Again, we believe it would be beneficial if an explanation would be provided of what acquisition method is to be used and why it was selected over other methods.

We also note the presence of previous Land & Water Conservation Fund activity in the Spring Mountain Ranch area. A $525,000

grant from the L&WCF in 1973, amended in 1974 to $1,625,000, enabled the Nevada State Park System to acquire 515 acres of land, appurtenances, and water rights for a state park at Spring Mountain Ranch. Later, in 1975, the Park System was granted an additional $20,000 from the Fund to develop a three-acre picnic day-use area at Red Rock, located near the corral complex, between the main park entrance and the main ranch house/visitor's center, in Spring Mountain Ranch. L&WCF assistance precludes uses other than recreational (the uses for which the two grant projects were approved). There is a possibility that the killifish transplant and management activities suggested for the Spring Mountain Ranch area could conflict with existing recreational uses, particularly if public use of the killifish habitat is to be severely restricted in order to allow for fish survival and recovery.

Finally, we are supportive of the recovery plan's proposal to include public information and interpretation as an integral part of the recovery effort (6, 21, 613, 612, 611, and 62). Preparation of public information materials and the posting of informational signs at habitat locations to indicate the site's value to the survival and recovery of endangered species are specific actions that will enhance the restoration program and can benefit the public, as well.

Thank you for allowing us the opportunity to review and comment on the Pahrump Killifish Recovery Plan.

John D. Cherry

United States Department of the Interior

NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063

SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

N1621
(WR)RNR

September 11, 1979

Memorandum

To: Assistant Regional Director, Fish and Wildlife Service, Federal Assistance, Region 1, Portland, Oregon

From: ACTING Regional Director, Western Region

Subject: Review of Draft Recovery Plan for Pahrump Killifish

We appreciate your providing us with a review copy of the subject plan. Our comments follow:

GENERAL COMMENTS:

1. Overall this plan appears to be well written, comprehensive and viable. The largest conflict will probably focus on excessive withdrawal of ground water which in the past dried out Manse Springs. Tremendous growth in Las Vegas Valley without appropriate controls may in the future lead to loss of water in Corn Creek Springs.

2. The draft plan lacks any mention or involvement of land or resources in Death Valley National Monument. Thus, it seems logical to assign the vacant team membership from Death Valley to another agency, such as for example a Fish and Wildlife Service employee at Corn Creek.

3. In about 1971 Fish and Wildlife Service, Nevada Fish and Game, and Bureau of Reclamation introduced pahrump killifish to Latos Pools. In summer 1976 Gail Kobetich returned to the pools and found some pahrump killifish there. However, subsequently several severe storms in September 1976 hit the Willow Beach area. Again in 1977 Kobetich checked Latos Pools and was unable to locate any fish. The storms had washed much debris into the pools and likely eliminated the fish there. These pools should be checked again to verify the absence of these pahrump killifish.

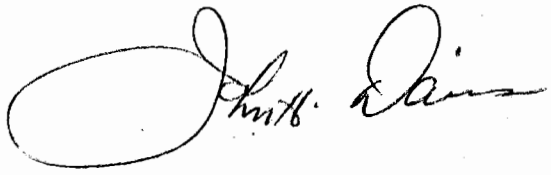
Apparently Latos Pools holds little potential as an interim habitat for this species. However if this site or any other at Lake Mead National Recreation Area can serve as an important temporary holding site, National Park Service will cooperate with the recovery team in evaluating future use of such a habitat.

SPECIFIC COMMENTS:

1. An ABSTRACT would be a valuable addition to the Plan. It would provide a summary of the document for those readers desiring only an overview of the Plan.

2. On Figure 1 indicate where pahrump killifish now occur and where they occurred in the past. Although explained in the text, this figure will then stand by itself and be self-explanatory.

We look forward to cooperating with Fish and Wildlife Service and the recovery team in improving the outlook for pahrump killifish.



Nevada Department Of Fish And Game

GLEN K. GRIFFITH
DIRECTOR

ROBERT LIST
GOVERNOR

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

August 20, 1979

Mr. Kahler Martinson
Regional Director
Fish and Wildlife Service
Lloyd 500 Building, Suite 1692
500 N.E. Multnomah Street
Portland, Oregon 97232

Dear Kahler:

We have reviewed the Draft Recovery Plan for the Pahrump killifish. Generally the plan is acceptable. Our participation within the plan will be based upon availability of funds, primarily endangered species funding and matching legislative appropriations.

Specific comments concerning the document - Part III - A. Habitat - Item 15 should be deleted since the property is already in State ownership.

Sincerely,

Glen K. Griffith
Director

cc: Cal Allan,
Region III

Division of State Lands
State Land Office
State Land Use Planning Agency
(702) 885-4363

Address Reply to
Division of State Lands
201 S. Fall Street
Capitol Complex
Carson City, Nevada 89710

STATE OF NEVADA

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Division of State Lands

August 10, 1979

M E M O R A N D U M

TO: Roland Westergard, Director

FROM: Division of State Lands, Land Use Planning Agency

BY: Mike Del Grosso MD

SUBJECT: SAI #80300004 - Recovery Plan - Pahrump Killifish

This office has had an opportunity to review the draft Recovery Plan for the Pahrump killifish. We share the concern for the welfare of the killifish, and generally agree with the need for affirmative action.

Since a portion of the recovery plan suggests acquisition of private land we would like to reserve comment on that aspect of the plan until further details are provided. We would suggest that all alternatives to land acquisition be evaluated in further studies and that any economic impacts that may occur be considered.

MD/lc

cc: Mike Nolan, Planning Coordinator's Office

1. Preserve and protect existing transplanted Pahrump killifish populations and their habitats.

11. Corn Creek Springs

111. Manage competing and predatory species.

1111. Eliminate exotic fishes.

1112. Control bullfrogs and turtles.

1113. Control depredating birds.

112. Manage vegetation and water.

1121. Concrete line inflow ditches.

1122. Provide shelter over spring heads.

1123. Control submergent and emergent vegetation.

1124. Construct artificial spring in middle pond.

1125. Rehabilitate lower pond.

1126. Secure acquifer.

113. Monitor population

1131. Establish censusing techniques.

1132. Recommend censusing personnel.

1133. Conduct census twice yearly.

12. Shoshone Ponds.

121. Monitor population.

1211. Establish censusing techniques.

1212. Recommend censusing personnel

1213. Conduct census twice yearly.

122. Manage pools as necessary.

1221. Control water inflow and outflow; pump and structures.

1222. Control vegetation as necessary.

1223. Secure acquifer.

21. Establish Spring Mountain Ranch site (Krupp Ranch) population.

211. Remove exotic species

212. Remove competing and predatory species

213. Control vegetation as necessary.

214. Prepare and implement management plan.

215. Assure protection of property and water rights.

22. Establish and restore Manse Spring population site, subject to #34.

221. Restore habitat as necessary.

222. Enhance biological factors (food supply, remove predators, etc.)

223. Restore water supply and secure availability.

224. Prepare and implement management plan.

225. Acquire control of property and water rights.

231. site

2311. Examine c sites and evalua

2312. Specify h lection (i.e., c physical, biolog

2313. Determine additional trans

PRIME OBJECTIVE: Restore the Pahrump killifish to non-endangered status; by establishing at least three viable, reproducing populations.

- 2. Establish and protect viable self-sustaining Pahrump killifish populations in suitable new or restored habitats.
  - 22. Establish and restore Manse Spring population site, subject to #34.
    - 221. Restore habitat as necessary.
    - 222. Enhance biological factors (food supply, remove predators, etc.)
    - 223. Restore water supply and secure availability.
    - 224. Prepare and implement management plan.
    - 225. Acquire control of property and water rights.
  - 23. Select and establish other suitable transplant sites and populations as needed.
    - 231. Select most suitable sites.
      - 2311. Examine candidate sites and evaluate.
      - 2312. Specify habitat selection (i.e., chemical, physical, biological).
      - 2313. Determine need for additional transplants.
    - 232. Manage site (i.e., restore and/or enhance chemical, physical or biological parameters).
      - 2321. Prepare management plan.
      - 2322. Assure protection of property and water rights.
    - 233. Select transplant stock.
    - 234. Perform transplants under proper authorization.
  - 24. Monitor transplants.
    - 241. Determine population regime.
    - 242. Determine fecundity.
    - 243. Determine age-growth rate.
    - 244. Determine population size and seasonal fluctuation.
- 3. Conduct ecological studies and apply findings to management of Pahrump killifish and its habitats.
  - 31. Conduct habitat studies.
    - 311. Determine productivity of habitat.
    - 312. Investigate habitat diversity.
    - 313. Investigate water chemistry.
    - 314. Determine yearly temperature regime.
    - 315. Determine volume configuration of habitat.
  - 32. Conduct study of Pahrump killifish biology.
    - 321. Study competitive interaction with fish, frogs, birds, etc.
    - 322. Study food and feeding habits.
    - 323. Study spawning ecology.
    - 324. Determine water temperature preference.
    - 325. Determine substrate requirements.
  - 33. Analyze data studies; prepare recommendations a as appropriate.
    - 341. Investigate biological and physical factors in the area.
    - 342. Determine socio-economic influences.
    - 343. Prepare a feasibility report.
- 4. Delineate esse itat for species p
- 34. Conduct stu ibility of resto type locality a Springs.

JECTIVE: Restore the Pahrump killifish to non-
ed status; by establishing at least three viable,
ing populations.

3. Conduct ecological studies and apply findings to management of Pahrump killifish and its habitats.

4. Delineate essential habitat for species preservation.

5. Enforce laws and regulations protecting Pahrump killifish and its essential habitat.

6. Inform public of Pahrump killifish Status and Recovery Plan objectives.

24. Monitor transplants.

31. Conduct habitat studies.

32. Conduct study of Pahrump killifish biology.

33. Analyze data from studies; prepare management recommendations and apply as appropriate.

34. Conduct study on feasibility of restoring the type locality at Manse Springs.

51. Enforce State and Federal regulations; protect Pahrump killifish.

52. Protect Pahrump killifish habitat; enforce trespass.

53. Coordinate action of enforcement personnel and others of Pahrump killifish status and recovery effort (interrelate with #6).

61. Provide public awareness of Pahrump killifish through audio-visual programs and publications.

62. Install informational signs at essential habitat areas under State and/or Federal management.

233. Select transplant stock.

234. Perform transplants under proper authorization.

241. Determine population regime.

242. Determine fecundity.

243. Determine age-growth rate.

244. Determine population size and seasonal fluctuation.

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321. Study competitive interaction with fish, frogs, birds, etc.

322. Study food and feeding habits.

323. Study spawning ecology.

324. Determine water temperature preference.

325. Determine substrate requirements.

341. Investigate biological and physical factors in the area.

342. Determine socio-economic influences.

343. Prepare a feasibility report.

611. Provide information for news media, TV and radio release.

612. Prepare and distribute brochure on recovery plan rationale.

613. Prepare appropriate articles for popular and scientific publications.

ACTION DIAGRAM

FOR THE

PAHRUMP KILLIFISH RECOVERY PLAN

JULY 1980