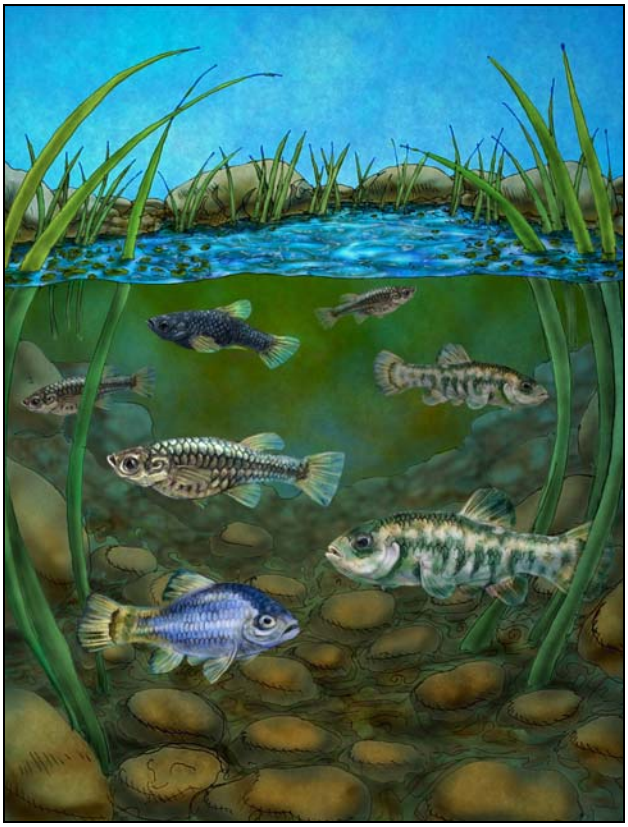
GILA TOPMINNOW AND DESERT PUPFISH MONITORING AND MANAGEMENT ACTIVITIES ON BLM LANDS IN ARIZONA – OCTOBER 2003 THROUGH OCTOBER 2004

Jeremy B. Voeltz, Wildlife Specialist
Robert H. Bettaso, Native Fish Program Manager

Nongame Branch, Wildlife Management Division
Arizona Game and Fish Department



Technical Report # 246
Nongame and Endangered Wildlife Program
Branch Chief: Leonard Ordway
Arizona Game and Fish Department
2221 West Greenway Road
Phoenix, Arizona 85023-4399

February 2005

CIVIL RIGHTS AND DIVERSITY COMPLIANCE

The Arizona Game and Fish Department prohibits discrimination on the basis of race, color, sex, national origin, age, or disability in its programs and activities. If anyone believes they have been discriminated against in any of the AGFD's programs or activities, including its employment practices, the individual may file a complaint alleging discrimination directly with the AGFD Deputy Director at:

Arizona Game and Fish Department
Office of the Deputy Director, DOHQ
2221 West Greenway Road
Phoenix, Arizona 85023-4399
(602) 942-3000

or

The Office for Diversity and Civil Rights
U.S. Fish and Wildlife Service
4040 North Fairfax Drive, Suite 130
Arlington, Virginia 22203

AMERICANS WITH DISABILITIES ACT COMPLIANCE

The Arizona Game and Fish Department complies with all provisions of the Americans with Disabilities Act. If you require this document in an alternative format, please contact the AGFD Deputy Director as listed above or by calling TTY at (800) 367-8939.

Recommended Citation

Voeltz, J.B. and R.H. Bettaso. 2005. Gila topminnow and desert pupfish monitoring and management activities on BLM Lands in Arizona – October 2003 through October 2004. Nongame and Endangered Wildlife Program Technical Report 246. Arizona Game and Fish Department, Phoenix, Arizona.

Acknowledgments

We thank the following agencies for their assistance and continued willingness to assist in the recovery of these species: U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, National Parks Service, U.S. Army Fort Huachuca, Arizona State Land Department, and Arizona State Parks Department. The following have assisted in surveying and monitoring for Gila topminnow and desert pupfish on BLM lands from October 2003 through October 2004 (in alphabetical order): Dave Billingsley, Bill Burger, Laura Canaca, Doug Duncan, Dean Foster, Keith Hughes, Joshua Hurst, Phil Rosen, Jeff Simms, John Sottilare, and Amanda Webb.

Cover Illustration

Marco Mazzoni

Project Funding

Funding for this project was provided by: the Arizona Game and Fish Department’s Heritage Fund; voluntary contributions to Arizona's Nongame Wildlife Checkoff; hunting and fishing license revenues; and U.S. Bureau of Land Management (Cooperative Agreement No. AAA990008).

TABLE OF CONTENTS

TABLES

APPENDIXES

GILA TOPMINNOW AND DESERT PUPFISH MONITORING AND MANAGEMENT ACTIVITIES ON BLM LANDS IN ARIZONA – OCTOBER 2003 THROUGH OCTOBER 2004

Jeremy B. Voeltz and Robert H. Bettaso

INTRODUCTION

The Arizona Game and Fish Department (AGFD) manages Gila topminnow (*Poeciliopsis occidentalis*) and desert pupfish (*Cyprinodon macularius*) as a project funded by AGFD, the U.S. Fish and Wildlife Service (USFWS), and other agencies. In October 2003, the U.S. Bureau of Land Management (BLM) and AGFD extended a Task Order where BLM provided funds to AGFD to monitor and manage topminnow and pupfish populations on BLM lands through October 2004.

This report provides background on management of these species, information collected from October 2003 through October 2004, and a summary of the status of populations of both species. Background information about the species and AGFD's management history of Gila topminnow and desert pupfish is summarized in Weedman and Young (1997) and Voeltz and Bettaso (2003).

METHODS

Abbreviations for species are used throughout this report. They are comprised of the first two letters of the genus and first two letters of the specific epithet (Table 1).

For this project we monitored Gila topminnow and desert pupfish populations on BLM lands in Arizona between October 2003 and October 2004, normally between the months of April and November. Sampling during these times was intended to maximize the probability of detecting topminnows at localities with few individuals present in complex habitats. All sampling was done by qualified biologists using dipnets, seines, minnow traps, or backpack electrofishers, as determined appropriate for the habitat being sampled. Mesh sizes for all seines and dipnets was 1/8-in (3.2-mm). Basic water quality parameters were recorded at all sites, including dissolved oxygen, pH, temperature, and conductivity. General notes were taken on habitat condition, riparian condition, impacts to fish or habitat, and potential threats to the fish population. Voucher specimens of fishes were collected wherever appropriate, positively identified, and accessioned into the ASU Vertebrate Museum. Digital photographs were taken at all sites during each monitoring event and, wherever possible, replicated earlier photographs. These photos are maintained by AGFD, and representative reprints were supplied to USFWS Arizona Ecological Services Field Office.

Table 1. Definitions for species abbreviations.

Abbreviation	Scientific Name	Common Name
AGCH	*Agosia chrysogaster*	longfin dace
CYCA	*Cyprinus carpio*	common carp
CYLU	*Cyprinella lutrensis*	red shiner
CYMA	*Cyprinodon macularius*	desert pupfish
GAAF	*Gambusia affinis*	mosquitofish
GIIN	*Gila intermedia*	Gila chub
LECY	*Lepomis cyanellus*	green sunfish
POOC	*Poeciliopsis occidentalis*	Gila topminnow
PORE	*Poecilia reticulata*	guppy

Potential reestablishment sites on BLM lands were visited and evaluated to determine suitability for topminnow or pupfish reestablishment. In addition, several sites were identified by BLM for future habitat assessments. These surveys will take place during 2005 collaboratively between AGFD and BLM. Data collected included identification of all fish species present, general description of the site, qualitative estimate of vulnerability to flooding, estimated size of available habitat, evidence of human activities, qualitative description of the condition of the aquatic and riparian communities, potential threats to topminnows or pupfish, recommended management actions to improve the site, and other information as appropriate to determine suitability for reestablishment of Gila topminnow or desert pupfish.

RESULTS AND DISCUSSION

An overview of the Gila topminnow and desert pupfish reestablishment and monitoring project on BLM lands from October 2003 through October 2004 is presented below. Appendix A identifies all Gila topminnow and desert pupfish populations reestablished on BLM lands and summarizes the management and survey history at each site.

STATUS OF NATURAL POPULATIONS ON BLM LANDS IN ARIZONA

Gila Topminnow

Of the 14 natural populations of Gila topminnow in Arizona, one is located on BLM land: Cienega Creek. Cienega Creek contains around 13-km of topminnow habitat, making it the largest remaining natural topminnow habitat in Arizona (Weedman 1999). Topminnows co-exist

with longfin dace and Gila chub, with no nonnative fishes present (see Appendix B for summary of monitoring results).

Desert Pupfish

No natural populations of *C. macularius* remain in Arizona (USFWS 1993), and Quitobaquito Spring on National Park Service Land contains the only natural population of *C. eremus* in Arizona.

STATUS OF REESTABLISHED POPULATIONS ON BLM LANDS IN ARIZONA

Gila Topminnow

A total of 23 sites on BLM land in Arizona have been stocked with Gila topminnow (Voeltz and Bettaso 2003). Five extant and one failed reestablished localities were monitored from October 2003 to October 2004 on BLM lands in Arizona (see Appendix C for summary of results). Of the six sites (one natural, five reestablished) known to support Gila topminnow on BLM lands in Arizona, one, Yerba Mansa, is outside of historic range.

Desert Pupfish

A total of nine sites on BLM land in Arizona have been stocked with desert pupfish (Voeltz and Bettaso 2003). The two extant reestablished localities on BLM land were monitored from October 2003 to October 2004 on BLM lands in Arizona (see Appendix C for summary of results). Of the two wild sites known to support desert pupfish in Arizona, both are on BLM lands.

LOCALITIES IDENTIFIED AND EVALUATED FOR FUTURE REESTABLISHMENT

Federal and state agencies have identified several new localities that potentially could support Gila topminnow or desert pupfish. A list of sites evaluated during this project with recommendations and comments is provided in Table 2. BLM has identified several sites that will be evaluated jointly by AGFD and BLM in 2005. Where appropriate, coordination with the land management agency to stock topminnow and pupfish is continuing.

AGFD has assisted BLM with preparation of an Environmental Assessment (EA) and Biological Assessment/Evaluation (BA/BE) for the establishment of Gila topminnow and desert pupfish within the south rim of the Aravaipa Creek watershed. We anticipate that these documents, and the section 7 consultation with USFWS, will be completed by spring 2005. AGFD will coordinate and conduct the topminnow and pupfish stocking and monitoring with BLM, USFWS, The Nature Conservancy, and other interested parties.

Table 2. Locations evaluated for Gila topminnow or desert pupfish reestablishment on BLM lands in Arizona.

Site Name	Management Agency	Location	Date evaluated, recommendations, and comments
Buckhorn Spring #2	BLM, Phoenix Office	T8N R2W Sec 28	1993 Jul 29. Stock POOC and CYMA. A small spring located on the side of Buckhorn Creek. Some habitat also available in creek. Creek may be adversely affected by flooding, but spring is out of flood channel. The area has been fenced to protect the riparian area.
Contention Wash Spring	BLM, Tucson Office		To be evaluated during spring 2005
Don Levy Pond #4	BLM, Tucson Office		To be evaluated during spring 2005
Frog Spring #2	BLM, Tucson Office		To be evaluated during spring 2005
Government Draw	BLM, Tucson Office		To be evaluated during spring 2005
Horse Thief Draw Spring	BLM, Tucson Office		To be evaluated during spring 2005
Larry Creek	BLM, Phoenix Office	T9N R3E Sec 9	2003 Apr 29. Stock POOC and CYMA. Larry Creek has supported a large population of GIIN since their stocking in 1995. We recommend stocking topminnow and pupfish pending completion of the BLM Agua Fria National Monument Management plan.
Lewis Spring	BLM, Tucson Office		To be evaluated during spring 2005
Little Joe Spring	BLM, Tucson Office		To be evaluated during spring 2005
Little Nogales Spring	BLM, Tucson Office	T18S R18E Sec 11	To be evaluated during spring 2005
McDowell-Craig Spring	BLM, Tucson Office		To be evaluated during spring 2005
Meusel Spring	BLM, Tucson Office		To be evaluated during spring 2005
Moson Spring	BLM, Tucson Office		To be evaluated during spring 2005
Murray Spring	BLM, Tucson Office		To be evaluated during spring 2005
Nogales Spring	BLM, Tucson Office	T18S R18E Sec 11	To be evaluated during spring 2005
Oak Grove Canyon	TNC, Aravaipa Preserve & BLM, Safford Office	T7S R18E Sec 13	2002 Jan 17. Stock POOC and CYMA. Habitat comprised of runs, pools, and some small waterfalls.
Parsons Grove	TNC, Aravaipa Preserve & BLM, Safford Office	T7S R18E Sec 14	2002 Jan 17. Stock POOC and CYMA. Spring consists of two pools separated by shallow stream segment.
Tule Creek	BLM, Phoenix Field Office	T8N R1E Sec 28	2003 Oct 22. Stock CYMA. Tule Creek has supported a large population of POOC since their stocking in 1981. We recommend stocking desert pupfish into the creek.
Unnamed Pond Near Bitter Creek	BLM, Phoenix Field Office	T7N R2W Sec 2	Re-evaluate suitability. Man-made pond filled by groundwater. In 1992 pH=3.9 and no aquatic insects or vegetation present.
Virgus Canyon at Sycamore Canyon Confluence	BLM, Safford Office	T7S R18E Sec 10	2002 Jan 17. Stock POOC and CYMA. Perennial stream segment about ¼ mile long before going subsurface. Limited access.

MANAGEMENT OPTIONS

Recovery of Gila topminnow and desert pupfish in Arizona is a continually evolving process through which we are attempting to reduce threats, stabilize, and reestablish populations of two of Arizona's endangered fishes.

FUTURE REESTABLISHMENT AND MANAGEMENT

As identified in the draft revised Gila Topminnow Recovery Plan (Weedman 1999) and the Desert Pupfish Recovery Plan (USFWS 1993), progress toward recovery and downlisting will include: protecting natural populations and their habitats through whatever means are available (State or Federal ownership, conservation agreements, etc.); reestablishing populations into historic range to meet each of the respective Recovery Plan requirements; designing and implementing a protocol for genetic exchange between reestablished populations; and developing and implementing plans to monitor populations and their habitats with periodic assessments of their biotic and genetic integrity. Recovery of Gila topminnow and desert pupfish should proceed primarily through reestablishment of these species to the wild.

AGFD proposes to pursue reestablishment and management activities on BLM lands at the sites previously identified or other suitable site identified in the future. AGFD will work with BLM in completing all NEPA and ESA compliance procedures prior to restocking. These consultations will identify all known current and future land use practices and actions, and evaluate those uses for their effects on the reestablished fishes and other listed species. Gila topminnow or desert pupfish may then be reestablished to the site following consultation with USFWS. This approach should allow BLM to implement any and all practices identified in the consultation without the need for further consultation. These consultations may be done on a site-by-site basis, watershed basis, allotment or management unit basis, or any other basis.

More sites should be stocked than are required by the respective Recovery Plans to allow for unanticipated disappearance of one or more populations. Additional potential reestablishment sites should continue to be identified in the future in the event that attempts to reestablish wild populations at these known sites fail to maintain the numbers of reestablished populations needed.

LITERATURE CITED

Bettaso, R.H., D.B. Dorum, and K.L. Young. 1995. Results of the 1992-1994 Aravaipa Creek fish monitoring project. Nongame and Endangered Wildlife Program Technical Report 73. Arizona Game and Fish Department, Phoenix, Arizona.

Brooks, J.E. 1986. Status of natural and introduced Sonoran topminnow (*Poeciliopsis o. occidentalis*) populations in Arizona through 1985. Report to U.S. Fish and Wildlife Service, Office of Endangered Species, Albuquerque, New Mexico. Arizona Game and Fish Department, Phoenix, Arizona.

Brown, M. and F.J. Abarca. 1992. An update status report of the Sonoran topminnow (*Poeciliopsis occidentalis*) and desert pupfish (*Cyprinodon macularius*) in Arizona. Project E5-2 Job 9. Arizona Game and Fish Department, Phoenix, Arizona.

Collins, J.P., C. Young, J. Howell, and W.L. Minckley. 1981. Impact of flooding in a Sonoran desert stream, including elimination of an endangered fish population (*Poeciliopsis o. occidentalis*, Poeciliidae). The Southwestern Naturalist 26(4):415-423.

Hedrick, P.W., K.M. Parker, and R.H. Lee. 2001. Using microsatellite and MHC variation to identify species, ESUs, and MUs in the endangered Sonoran topminnow. Molecular Ecology 10:1399 –1412.

Minckley, W.L. 1969. Attempted re-establishment of the Gila topminnow within its former range. Copeia (1) 193-194.

Minckley, W.L. and J.E Brooks. 1985. Transplantations of native Arizona fishes: Records through 1980. Journal of the Arizona-Nevada Academy of Science 20(2): 73-89.

US Fish and Wildlife Service. 1993. Desert pupfish Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Voeltz, J.B. and R.H Bettaso. 2003. 2003 Status of the Gila Topminnow and Desert Pupfish in Arizona. Nongame and Endangered Wildlife Program Technical Report 226. Arizona Game and Fish Department, Phoenix, Arizona.

Weedman, D.A. 1999. Draft Gila topminnow, *Poeciliopsis occidentalis occidentalis*, revised Recovery Plan. Prepared by Arizona Game and Fish Department for U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Weedman, D.A. and K.L. Young. 1997. Status of the Gila topminnow and desert pupfish in Arizona. Nongame and Endangered Wildlife Program Technical Report 118. Arizona Game and Fish Department, Phoenix, Arizona.

Appendix A. Index to reestablished populations of Gila topminnow and desert pupfish on BLM lands in Arizona (information primarily from Weedman and Young [1997] and Voeltz and Bettaso [2003]).

CONTENTS OF APPENDIX

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona

Cold Springs Site #85 (Category 2)
Graham County, Bureau of Land Management, Safford Field Office, T5S R24E S17 NE4
STOCKED: 1985 Jul 22 with 500 Gila topminnows from Dexter originally from Monkey Spring.
1990 Apr 21 with 200 desert pupfish, 50 from Flowing Wells Jr. High School and 150 from Dexter, both originally from Santa Clara Slough.

Dates	Surveyor	Methods	Fish
1986 Mar 31	Parker	unknown	POOC
1986 Aug 22	Parker	unknown	POOC
1986 Sept 05	Bamman	unknown	POOC
1987 Jul 23	Simons	unknown	POOC
1987 Oct 22	Parker	unknown	POOC
1988 Sept 09	Bamman	unknown	POOC
1989 Jul 04	Bagley	dipnet	POOC
1989 Oct 23	S. Stefferud	unknown	POOC
1990 Aug 07	S. Stefferud	unknown	POOC, CYMA
1991 Feb 10	Brown	dipnet	POOC
1993 Feb 12	Robles	visual	POOC, CYMA
1993 May 14	Robles	visual	POOC, CYMA
1993 Jul 13	Weedman	dipnet	POOC, CYMA
1993 Aug 05	Robles	visual	POOC, CYMA
1993 Nov 18	Robles	visual	POOC, CYMA
1996 May 15	Zalaznik, Voeltz	dipnet	POOC, CYMA
1998 Jun 17	Timmons	dipnet, seine	POOC, CYMA, CYLU
1998 Oct 07	Timmons, Weedman	dipnet	POOC, CYMA, CYLU
1999 Jun 17	Weedman, Robles	seine	POOC, CYMA
2000 Jul 13	Jontz, R. Billingsley	dipnet	POOC, CYMA
2001 Mar 21	Blasius	visual	POOC, CYMA

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona (continued)

Cold Springs Site #85 (continued)

Dates	Surveyor	Methods	Fish
2002 Apr 29	Blasius	visual	POOC, CYMA
2003 Apr 02	Voeltz, Bettaso	dipnet	POOC, CMYA
2004 Apr 16	Billingsley	visual	POOC, CYMA

Cold Springs consists of two spring-fed pools, an upper and a lower pool, each approximately 15-ft (4.6-m) in diameter. The upper pond was constructed in 1983 and the lower pond in 1985. Topminnows were originally stocked only in the upper pool, which appeared to provide more reliable and suitable habitat. By 1989, topminnows were present in both pools. Pupfish were then stocked into both pools in 1990. In 1998, red shiners were collected (their origin was unknown). Mechanical removal via seines and electroshocking in autumn 1998 appears to have eliminated the red shiners, as they have not been observed since. In 2003, the lower pool contained only topminnows. Bullfrogs and mud turtles have also been observed in the area. In 2004, the lower pool was fishless and nearly dry.

Empire Gulch Site #339 (Category 1)

Pima County, Bureau of Land Management, Tucson Field Office, Las Cienegas National Conservation Area, T19S R17E S17 NE4

STOCKED: 2001 Oct 27 with 689 Gila topminnows from Cienega Creek; augmented with 70 topminnows from Cienega Creek on 2003 May 19, and with 475 topminnows from Cienega Creek on 2003 Oct 20.

Dates	Surveyor	Methods	Fish
2001 Oct 27	Davidson, Voeltz, Simms	stocking	AGCH, POOC
2002 Feb 15	Davidson, Voeltz, Duncan	dipnet	AGCH, POOC
2002 Jul 10	Voeltz	dipnet	AGCH, POOC
2003 May 19	Voeltz, Duncan	dipnet/stocking	AGCH, POOC
2003 Oct 20	Voeltz, Duncan, Simms, et al.	dipnet/stocking	AGCH, POOC
2004 May 17	Voeltz	dipnet	AGCH
2004 Sept 02	Simms, Rosen	seine/dipnet	AGCH, POOC (n=1)

Empire Gulch, tributary to Cienega Creek, was stocked with Gila topminnow and longfin dace during the dedication of BLM's Las Cienegas National Conservation Area. Empire Gulch flows for approximately 3600-ft (1100-m) from the spring source before going subsurface. The surface

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona (continued)

flow originates at the base of a 10-ft (3-m) deep head cut that is held by roots from mature cottonwoods found upstream. The habitat consists mainly of shallow marshland, with some small pools and some flowing runs. In 2002 duckweed covered nearly 100% of all surface water. Flooding during the summer of 2003 removed much of the duckweed and improved the habitat by scouring some of the thicker vegetation and creating open pool habitat. In May of 2004, thick mats of duckweed and watercress made sampling the pools difficult, although when vegetation was removed, careful observation failed to detect topminnows. During Chiricahua leopard frog surveys conducted by BLM and UofA in September of 2004, only one topminnow was collected. It is possible that the abundance of watercress and duckweed mats, and abundance of predaceous insects may be negatively impacting the topminnow population in Empire Gulch. BLM, AGFD, and USFWS are currently planning to amend the biological opinion to allow for subsequent topminnow stockings in Empire Gulch.

Lousy Canyon Site #306 (Category 1)
Yavapai County, Bureau of Land Management, Phoenix Field Office, T9N R3E S5 NW4
STOCKED: 2000 Sept 9 with 650 Gila topminnows from Coal Mine Spring. 2001 Oct 10 with 71 desert pupfish from the Cibola and Imperial National Wildlife Refuges (originally from El Doctor Marsh, Mexico).

Dates	Surveyor	Methods	Fish
2000 Sept 12	Bettaso, L. Young, K. Young, Weedman, Davidson, Duncan	stocking	POOC
2000 Oct 18	Davidson, Weedman	dipnet, visual	None
2001 Jan 03	Davidson, Voeltz, Sorensen	dipnet, seine	POOC, GIIN
2001 Mar 27	Davidson, Weedman, Sorensen	visual	POOC, GIIN
2001 Oct 17	K. Young, L. Young, Bettaso	stocking	POOC, CYMA
2001 Nov 26	Davidson, Voeltz, Duncan	dipnet, visual	POOC, CYMA
2002 Apr 10	Voeltz, Dockens	dipnet, visual	POOC, CYMA
2002 Oct 22	Voeltz, Lutz, L. Young	dipnet, visual	POOC, CYMA
2003 Apr 29	Lutz, Sorensen, Hughes	dipnet	POOC, CYMA, GIIN
2004 Apr 12	Voeltz, Billingsley, Burger	dipnet	POOC, CYMA, GIIN

Lousy Canyon is a spring-fed perennial stream that flows through a steep, narrow boulder-strewn gorge with several waterfalls. The habitat is located on the BLM-administered Agua Fria National Monument. Gila chub were stocked into the stream in 1995 below the large ~30-ft (9-

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona (continued)

m) waterfall. In 2000, Gila topminnow from Coal Mine Spring were stocked above the waterfall and have subsequently become established throughout the creek. Desert pupfish from Cibola and Imperial National Wildlife Refuges (originally from El Doctor Marsh, Mexico) were stocked in 2001. Surveys conducted through 2004 have documented the reproduction and recruitment of all three species in the canyon.

Tule Creek Site #75 (Category 1)
Yavapai County, Bureau of Land Management, Phoenix Field Office, T8N R1E S28 NW4 SW4
STOCKED: 1981 Sept 30 with 1000 Gila topminnows from BTA.

Dates	Surveyor	Methods	Fish
1982 Aug 17	Brooks	unknown	POOC
1983 Jun 01	Kepner	unknown	POOC
1985 Jun 06	Brooks	unknown	POOC
1986 Aug 28	Simons	unknown	POOC
1987 Mar 06	Simons	unknown	POOC
1988-1997	BLM, AGFD, USFWS biologists	varied	POOC
1998 May 15	Timmons	dipnet	POOC
1999 May 18	Weedman, Duncan, Watson	dipnet	POOC
2000 May 30	Weedman, L. Young	dipnet	POOC
2001 Apr 18	Davidson, Voeltz, L. Young	dipnet	POOC
2002 Oct 11	Voeltz, Lutz	dipnet	POOC
2003 May 07	L. Young, T. Hughes	dipnet	POOC
2003 Oct 22	Voeltz, Hurst	dipnet	POOC
2004 Jan 09	Billingsley	dipnet	none

Tule Creek was originally stocked with Gila topminnow in 1968 (Minckley and Brooks 1985). They persisted until eliminated by flooding in 1978 (Collins and others 1981). Gila topminnow has persisted since restocking in 1981. In 1991 an exclosure fence was constructed around a portion of the creek to control grazing. The exclosure resulted in an immediate increase in emergent vegetation. Later in 1991 a pipeline was constructed to deliver water outside the exclosure for cattle use. In 1992 a fish barrier was also constructed on lower Tule Creek about 0.25 mi (0.4-km) upstream from the high water elevation of Lake Pleasant, which increased in

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona (continued)

size as a result of the New Waddell Dam. Surveys in June 1992 reported Gila topminnow and longfin dace distributed throughout Tule Creek and several tributaries from the exclosure downstream to the barrier. Immediately below the barrier green sunfish were collected. It appears that the timely construction of the barrier will protect Tule Creek from nonnative fishes invading from the Agua Fria River and Lake Pleasant. Tule Creek was again hit by a major flood event in January 1993 that scoured and removed the vegetation within the exclosure (D. Langhorst pers. comm. *in* Weedman and Young [1997]). Langhorst estimated the flow was 50-ft (15-m) wide and up to 8-ft (2.4-m) deep and reported that Gila topminnow were much reduced from previous visits, only about 100 could be found. Later in 1993 topminnows were distributed throughout the exclosure and appeared to successfully rebound from this flood. The area within the exclosure continues to support thick growths of aquatic and emergent vegetation and topminnows continue to be abundant. Pupfish and Gila chub should also be stocked into Tule Creek. The 2004 survey was conducted downstream of the exclosure to determine if topminnow are established in that stretch of the creek. There was suitable habitat, but no fish were present.

Yerba Mansa Site #44 (Not Categorized)
La Paz County, Bureau of Land Management, Phoenix Field Office, T11N R11W S21 NW4
STOCKED: 1984 Dec 20 with 250 Gila topminnows and 1985 May 29 with 600 Gila topminnows, both from Tule Creek, which originated from BTA. Also stocked 1988 Aug 9 with 250 Gila topminnows from Dexter originally from Sharp Spring and 250 desert pupfish from DNFHTC originally from Santa Clara Slough.

Dates	Surveyor	Methods	Fish
1984 Dec 20	Brooks, Fredlake	stocking	POOC
1985 May 29	Jacobson	stocking	POOC
1985 Aug 10	Brooks	unknown	POOC
1988 Aug 9	Kepner	stocking	CYMA
1988 Sept 22	Hughes	unknown	POOC
1989 Jan 3	Bagley, Hughes	unknown	POOC
1989 Jun 27	Bagley, Jakubos	snorkel & dipnet	POOC
1990 Apr 19	Jakubos	visual	POOC
1990 Sept 4	S. Stefferud, Jakubos	dipnet	CYMA, POOC
1991 Jan 27	Brown	dipnet	POOC
1992 Apr 24	L. Young, Langhorst	dipnet	POOC

Reestablished Localities Supporting Gila Topminnow or Desert Pupfish on BLM lands in Arizona (continued)

Yerba Mansa Site #44 (continued)

Dates	Surveyor	Methods	Fish
1992 May 26	Weedman	dipnet	POOC
1992 Nov 21	L. Young	visual	POOC
1993 Feb 24	L. Young	visual	POOC
1996 May 8	Weedman, Zalaznik	dipnet	POOC
1998 May 13	Timmons	dipnet	POOC
1999 May 27	Weedman, Timmons	dipnet	POOC
2000 Jul 11	Allen, R. Billingsley	dipnet	POOC
2001 Jul 25	Davidson	dipnet	POOC
2002 Oct 10	Voeltz, Lutz	dipnet	POOC
2003 Oct 28	Voeltz	dipnet	POOC

Yerba Mansa Spring is located in the Bill Williams River drainage upstream of Alamo Lake. It lies outside of historic range for the Gila topminnow. Habitat consists of a large man-made, spring-fed pond with extensive cattail growth around it. The thick vegetation makes sampling difficult, but topminnows continue to persist. Desert pupfish were reported as extirpated (USFWS 1993). This population does not contribute as a Level-2 Gila topminnow population, because it is outside of historic range.

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation

Aravaipa Creek Site #177 (Category 1)
Graham and Pinal Counties, Bureau of Land Management and Private
T7S R20E; Tributary to the San Pedro River
STOCKED: Gila topminnow were stocked 3 times; in 1967 at a marsh near the creek in Pinal County and directly into the creek in Graham County both from Monkey Spring, and in 1977 at the upper Klondyke area of Aravaipa Creek from BTA.

According to Minckley (1969), the fish stocked during 1967 in Pinal County were established in 1968 and reproducing with some topminnows collected from the creek channel and those stocked in Graham County, near Klondyke, were reproducing and possibly established. According to Minckley and Brooks (1985) all three introductions failed and Gila topminnow were extirpated from Aravaipa Creek. Monthly monitoring was conducted by AGFD, TNC, and BLM biologists and ASU students from August 1992 through April of 1994 (Bettaso and others 1995). Surveys were conducted at nine stations located throughout the perennial portions of Aravaipa Creek and involved extensive seining and electroshocking efforts along 650-ft (200-m) at each station and included all habitats. Also, in October 1993 an exhaustive seining effort by biologists and student volunteers was conducted to search for red shiners. No topminnows were collected during any of these efforts. This stream continues to support 7 other native fish species. Most of the perennial stream is protected as wilderness area by the BLM or is in private ownership by The Nature Conservancy. Additional attempts at reestablishment should be pursued.

Big Spring Site #84 (Category 2)
Graham County, Bureau of Land Management, Safford District, T6S R25E S5 NE4 SE4
STOCKED: 1985 Jul 22 with 500 Gila topminnows from DNFHTC originating from Monkey Spring.

Dates	Surveyor	Methods	Vouchers	Fish
1986 Sept 26	Simons	unknown	ASU 10700	POOC
1987 Jul 23	Simons, Bagley	unknown	No	POOC
1989 Jul 03	Bagley	seine	No	POOC
1989 Oct 23	S. Stefferud	unknown	No	POOC
1991 Jan 07	Brown	seine, dipnet	No	POOC
1993 Jul 13	Weedman, J. Young	dipnet	No	None
1994 Jul 19	J. Young, S. Johnson	dipnet, visual	No	None
1996 May 15	Zalaznik, Voeltz	dipnet	No	None

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

The spring drainage is a very narrow steep-walled gully that occasionally floods. At the time of stocking, habitat consisted of a short reach of spring-fed stream flow in which a 5-ft (1.5-m) dam had been re-constructed in 1984. A small pool was present above the dam and a plunge pool had formed below the dam. Brown and Abarca (1992) reported that severe flooding in 1990 Aug removed most topminnows from the pool above the dam. Only one topminnow was collected in January 1991. The pool above the dam had silted in, and the only significant pool habitat was in the plunge pool below the dam. The pool above the dam was dredged in spring 1991 to remove accumulated sediment. Topminnows were present in May (BLM data) and August 1991 (M. Sredl pers. comm. *in* Weedman and Young [1997]). In May 1996, the only suitable topminnow habitat was the plunge pool below the dam. The drainage above the dam upstream to the caliche ledge and downstream from the dam for only a few tens of meters consisted of very shallow, muddy pools and trickles. Recent drought conditions eliminated all but one small pool. This site will require occasional dredging to maintain suitable topminnow habitat, but reestablishment of Gila topminnow should be pursued.

Cow Creek Site #72 (Category 1)
Yavapai County, Bureau of Land Management, Phoenix Field Office and Private, T7N R1E S6
STOCKED: September 1981 with an unknown number of Gila topminnow from Tule Creek originating from Monkey, Cocio, and Bylas springs.

Dates	Surveyor	Methods	Fish
1985 Aug 21	Stringer, Brooks	unknown	POOC, AGCH
1986 Aug 28	Simons	unknown	POOC, AGCH
1989 Jun 25	Bagley	dipnet	POOC, AGCH, LECY
1991 Apr 29	Brown	seine	AGCH
1991 Aug 22	Brown	dipnet, seine	POOC, AGCH, LECY
1992 May 27	Weedman	seine	None
1992 Jun 23	Langhorst	unknown	POOC (above dam)
1993 Mar 25; 1993 May 05; 1993 Jul 16; 1993 Jul 28	(BLM Endangered Species Annual Report 1993)	unknown	No POOC, but likely other species that were unreported
1993 Jul 28	Weedman	dipnet	AGCH
1997 Jun 03	Weedman	seine, dipnet	AGCH, LECY

Cow Creek consists of many miles of stream that has reaches of interrupted perennial water. Topminnows were found downstream in Humbug Creek as a result of dispersal from Cow Creek. Topminnows persisted in Cow Creek possibly until severe flooding in January 1993. The 1993

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

surveys included all areas formerly occupied by topminnow. The presence of topminnows above the dam on 1992 Jun 23 invalidates the previous negative survey result; therefore, this population was resampled in 1997. In 1997, 2.5 miles (4-km) of Cow Creek was sampled. The habitat contained several areas of isolated water that appeared perennial and supported fish. Longfin dace were very abundant in isolated reaches from an old dam near the Crown King Road downstream about one mile (1.6-km). At this point a boulder-formed waterfall creates a fish barrier. Below that, green sunfish were very abundant and longfin dace were less abundant than above. Both species continued to be present down to the confluence with Humbug Creek. Additional attempts should be made to re-establish a population in Cow Creek.

Green Tanks (Rattlesnake Spring) Site #81 (Category 1)
Gila County, BLM, Safford Field Office and Arizona State Land Department, T3S R15E S7 NE4
STOCKED: 1985 Jul 22 with 500 Gila topminnows from DNFHTC originating from Monkey Spring.

Dates	Surveyor	Methods	Vouchers	Fish
1986	Bamman	unknown	No	"small fish" reported
1987 Mar 18	Simons	unknown	ASU 11411	POOC
1988	Escobedo	visual	No	None
1988 Dec 05	Bagley, Escobedo	visual	No	None
1993 Aug 12	Weedman, Paradzick	dipnet, visual	No	None
1994 Jul 18	J. Young, Johnson	dipnet, visual	No	None

This site consists of 2 pools located below a large dirt stock tank with a high dirt dam. Monitoring conducted in 1986 indicated only "small fish" were present. Topminnows were abundant in 1987. Surveyors in 1988 concluded that the stock tank and both lower pools dried in summer 1987. Discussions were initiated in 1988 with the local rancher to pipe water from Sheep Spring. It is unknown why the project was discontinued. In December 1988, the pools were very shallow. Abundant water and apparently suitable topminnow habitat was observed in 1993 and 1994. Desiccation of the pools is believed to have eliminated topminnow. Pending current habitat assessments, this site should be stocked with topminnow and pupfish.

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

Howard Well Site #83 (Category 2)
Graham County, Bureau of Land Management, San Simon Resource Area, T11S R29E S36 NW4
STOCKED: 1983 Dec 28 with 150 desert pupfish from BTA originating from Santa Clara Slough, and 1985 Jul 22 with 500 Gila topminnows from DNFHTC originating from Monkey Springs.

Dates	Surveyor	Methods	Vouchers	Fish
1984 Feb 17	Brooks, Kepner	water quality testing	No	No report
1987 Jul 24	Simons, Bagley	dipnet	No	CYMA
1987 Aug	unknown	unknown	No	CYMA
1988 Jan 06	Kepner (reported by Gacey, Simons)	unknown	No	POOC
1988	Gacey	unknown	No	CYMA
1989 Jul 03	Bagley, Gacey	seine	No	CYMA
1990 Nov	Brown	dipnet or seine	No	CYMA
1990 Nov	Dunham	unknown	ASU (no #)	CYMA
1991 Feb 08	Brown	dipnet	No	CYMA
1991 Aug 07	Gacey, J. Simms	water quality testing	No	CYMA
1992 Mar 13	Weedman, J. Simms, S. Stefferud	unknown	No	None collected
1993 Jul 14	Weedman	dipnet	No	None
1994 Dec	J. Simms	unknown	No	unknown
1996 May 15	Zalaznik, Voeltz	visual	No	None

The 1984 survey was conducted to evaluate the habitat for potential topminnow stocking, and to monitor introduced desert pupfish. In 1987, desert pupfish were scarce. Low water or desiccation was the probable reason for failure around 1992. The well was almost completely overgrown with tules, and almost no water was present. Water flow was restored in late 1987. Monitoring efforts in 1988 remain questionable. J. Gacey (BLM biologist, Safford) told Simons a field crew reported topminnows abundant and pupfish absent. Simons suggested mosquitofish may have invaded Howard Well from nearby, heavily infested Martin Well, and the field crew may have misidentified the topminnows (Simons memo, 1988 Jan 7). However, no subsequent topminnow or mosquitofish collections were made. The field crew most likely went to Martin Well, which is located in the vicinity of Howard Well.

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

BLM dredged Howard Well in 1988 to reduce cattail growth (J. Gacey pers. comm. *in* Weedman and Young [1997]). In 1989, pupfish were abundant (mostly juveniles), and more than 20 bullfrogs were observed. Vegetation was thick and a constant maintenance concern. In 1990, moderate numbers of pupfish were reported. In 1991, small pupfish were present in low numbers, but concentrated at the southern end of the well in an area with no bullfrogs. Bullfrogs and tadpoles were numerous. AGFD, BLM, and USFWS met at Howard Well in 1992 to discuss habitat management and sample for pupfish. The well was overgrown with cattails, very shallow, and bullfrogs were very abundant. Jeff Simms (BLM Tucson) reported that in December 1994 artesian flow was diminishing. All ponds fed by artesian wells in that area were having the same problem, possibly due to water table depletion by deep agricultural wells near Bowie. In 1996, leopard frogs (probably misidentified bullfrogs) were abundant and the water was very shallow.

Howard Well has a documented history of cattail growth problems coupled with often low water levels. Also, most local aquatic areas contain illegally stocked nonnative fishes. If Howard Well is completely renovated, it is possible that this area would also be illegally stocked. Installation of informational signs near Howard Well are recommended as are attempts to limit or restrict public access if the site is restocked with topminnow and pupfish.

Humbug Creek Site #95 (Category 4)
Yavapai County, Bureau of Land Management, Phoenix District, T7N R1E S6, 7, 8, & 17
STOCKED: The site became populated by Gila topminnow after 1982 when they dispersed from Cow Creek, which was stocked with Gila topminnow from BTA.

Dates	Surveyor	Methods	Vouchers	Fish
1987 Mar 06	Simons, Schwalbe	unknown	No	POOC, GAAF, LECY
1989 Jun 25	Bagley, Clark	seine	No	POOC, AGCH, LECY, CYLU
1991 Mar 18	Brown, Williams	seine, dipnet	No	LECY
1991 Apr 30	Brown	unknown	ASU 12831-33	AGCH, CYCA, LECY, GAAF, CYLU
1991 Aug 22	Brown, Williams	dipnet	No	LECY
1992 May 27	Weedman, J. Young	seine	No	AGCH, LECY
1993 Jul 28	Weedman, Paradzick	dipnet	No	AGCH, LECY

Humbug Creek is deeply incised in places with good riparian cover present in others. Substrates were mostly bedrock and cobble with sand, gravel, and silts in pool habitats. Water is perennial for an unknown distance before reaching Lake Pleasant. Some perennial water must be present throughout the year in either Cow or Humbug creeks to maintain longfin dace. Only one green

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

sunfish was found in March 1991, and only small sunfish was taken in August 1991. BLM, Phoenix Resource Area, Endangered Species Subpermit Report for 1993 reported "extreme flooding" occurred in the area in January 1993. Humbug Creek should be restocked with topminnows whenever flooding eliminates them.

Little Nogales Spring Site #125 (Category 3)
Pima County, BLM, Tucson Field Office, T18S R18E S11
STOCKED: 1988 Aug 19 with 172 Gila topminnows from Cienega Creek, near Sanford Canyon.

Dates	Surveyor	Methods	Fish
1989 Sept 12	Bagley	dipnet	POOC
1991 Apr 01	Brown	dipnet	None
1992 Jun 18	Weedman, J. Young, S. Stefferud	dipnet	None
1994 Jul 21	J. Young, Johnson	dipnet	None

The spring is a tributary to Wakefield Canyon that then drains into Cienega Creek. The drainage is steep, fairly narrow, and overgrown with vegetation. Surface water is present at least 650-ft (200-m) below the source, and a 10-ft (3-m) drop is present about 330-ft (100-m) below the source. Some travertine formations were present. A waterfall prohibits fish movement above the stocking site. The aquatic habitat is mostly swift, shallow riffles with few pools present. In 1989, surface water flowed for at least 3/4 mile (1.2-km) below the windmill, but only 30 adult topminnows were collected. The spring should be restocked with topminnows from Cienega Creek.

Martin Well Site #132 (Category 4)
Graham County, BLM, Safford Field Office, T11S R29E S36 NW4 SW4
STOCKED: Topminnows were discovered in 1989, their origin is unknown.

Dates	Surveyor	Methods	Vouchers	Fish
1986 Sept 26	Simons	unknown	ASU 10694	GAAF
1989 Jul 03	Bagley	seine	Yes	POOC, GAAF, LECY
1991 Feb 08	Brown	seine	ASU 12835 & 12834	GAAF, LECY
1993 Jul 14	Weedman, Paradzick	dipnet	ASU 14217	GAAF, LECY
1994 Jul 19	J. Young, Johnson	dipnet	No	GAAF

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

Martin Well is a large pond fed by an artesian well. There is no apparent natural outflow from the pond, but the well feeds several cattle drinkers. Aquatic vegetation and cattails were dense. The ASU Museum of Fishes catalog contains mosquitofish specimens collected on 1986 Sept 29 by Simons. However, neither Simons field notes, nor AGFD files contain any further information. One topminnow was found when preserved fish were identified in a lab in 1989. It is unknown where the topminnow came from, but it is likely that some individuals were illegally moved from Howard Well, 1/2 mile (800-m) to the north, before 1989. About 500 mosquitofish and no topminnow were identified in 1991. In 1993, 112 mosquitofish were preserved along with one green sunfish. In 1994, 153 mosquitofish were identified. In 1993, the pond was reported as being 160-ft by 100-ft (50-m by 30-m), and in 1994 as 130-ft by 80-ft (40-m by 25-m) with noted cattail removal. In 1990, Al Bamman (pers. comm. *in* Weedman and Young [1997]) indicated that illegal nonnative fish stockings into the pond were a constant concern. Martin Well became a topminnow site based on the discovery of one specimen. This site should be reevaluated for topminnow and pupfish habitat suitability.

Mescal Warm Spring Site #82 (Category 2)
Gila County, Bureau of Land Management, Phoenix District, T3S R17E S20 NW4 SW4
STOCKED: 1985 Jul 22 with 500 Gila topminnows from Dexter National Fish Hatchery originally from Monkey Spring.

Dates	Surveyor	Methods	Fish
1987	Simons	unknown	POOC
1989 Jul 08	Bagley	dipnet	POOC
1991 May 22	Brown	dipnet	POOC
1992 Feb	BLM Biologists	unknown	None
1992 Aug	BLM Biologists	unknown	None
1994 Jul 18	J. Young	dipnet/visual	POOC (n=1)
1996 Sept 05	Weedman	dipnet	POOC
2001 Jun 28	Davidson	dipnet	None
2003 Apr 28	Voeltz, Brouder	dipnet	None

Mescal Warm Spring is located on a small mesa located above Mescal Creek near the Gila River. The spring surfaces near two large cottonwoods inside a cattle exclosure and flows through thick grass and riparian vegetation before going subsurface near the edge of the mesa where it drops into Mescal Creek. Sampling is very difficult in the thick brush, the water is very shallow, less than 4 inches (10-cm) deep and no pools were found. Topminnows were either very rare or too difficult to sample because few were captured in 1994, only one was collected in 1996, and none

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

were captured in 2001 or 2003. There is a perennial stream east of the mesa that, although rather steep, could provide better habitat. It has several plunge pools and small travertine dams present and also flows into Mescal Creek, which should also be evaluated for reestablishment. Digging of small pools may provide additional habitat for topminnow.

Nogales Spring Site #124 (Category 3)
Pima County, BLM, Tucson Field Office, T18S R18E S11
STOCKED: 1988 Aug 19 with 258 Gila topminnows from Cienega Creek.

Dates	Surveyor	Methods	Fish
1989 Sept 12	Bagley	dipnet	POOC
1991 Apr 01	Brown	dipnet	None
1992 Jun 18	Weedman, J. Young, S. Stefferud	dipnet	None
1994 Jul 21	J. Young, Johnson	dipnet	None

The spring drains into Wakefield Canyon and then into Cienega Creek. The watershed above the spring is relatively small. The drainage is steep, narrow, and completely overgrown, primarily with thick acacia-mesquite. The substrate is mostly bedrock and stream flow is swift and shallow. Dense vegetation precludes intensive downstream surveying, thus surface water flows for an unknown distance downstream. Topminnows were stocked into the pools below two different travertine falls below the springhead. A small dense population was present in 1989 at the 13-ft by 10-ft by 2-ft (4-m by 3-m by 0.6-m) and 10-ft by 10-ft by 16-in (3-m by 3-m by 0.4-m) stocking sites. Topminnows may have been eliminated by flooding or temperature extremes. Construction of pools should be investigated and topminnows from Cienega Creek restocked.

Tule Creek (Unnamed Spring 1E) Site #74 (Category 3)
Yavapai County, Bureau of Land Management, Phoenix Resource Area, T8N R1E S28 SW4
STOCKED: 1982 with Gila topminnow from Tule Creek (Site #75) that came from BTA.

Dates	Surveyor	Methods	Vouchers	Fish
1985 Jun 06	Brooks, Stringer	unknown	No	POOC
1986 Aug 28	Simons	unknown	ASU 10665	POOC
1987 Mar 06	Simons	unknown	No	POOC
1989 Jun 24	Bagley	dipnet	No	None

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

Tule Creek (Unnamed Spring 1E) Site #74 (continued)

Dates	Surveyor	Methods	Vouchers	Fish
1991 Apr 30	Brown	dipnet	No	None
1993 Jul 28	Weedman	dipnet	No	None
1998 May 15	Timmons	dipnet, visual	No	None

Topminnows were found in a small 3-ft by 3-ft (1-m by 1-m) pool in a small drainage to Tule Creek. Additional water upstream does not have topminnow. In 1998, perennial habitat was limited and cattle impacts were heavy. This site should be reevaluated for topminnow and pupfish habitat suitability.

Tule Creek Seep (2E) Site #73 (Category 3)
Yavapai County, Bureau of Land Management and Private, T8N R1E S28 SW4 SE4
STOCKED: 1982 with an unknown number of Gila topminnow from Tule Creek originally from BTA.

Dates	Surveyor	Methods	Fish
1985 Jun 06	Brooks, Stringer	unknown	POOC
1986 Aug 28	Simons	dipnet	None (almost dry)
1987 Mar 06	Simons	dipnet	None (almost dry)
1989 Jun 24	Bagley, Clark	visual	None (dry)
1991 Apr 30	Brown	dipnet	None
1993 Jul 28	Weedman	dipnet	None
1998 May 15	Timmons	dipnet	None

In 1985, topminnows occupied 2 pools in Tule Creek Seep (2E). Heavy cattle use was observed. In 1993, the grazing seepage area was muddy with no pools present. This site does not maintain sufficient water to support fish in dry years (Brown and Abarca 1992; Voeltz and Bettaso 2003), however, habitat improvements could provide suitable fish habitat.

Failed Sites on BLM Lands in Arizona Recommended for Reevaluation (continued)

Watson Wash Site #134 (Category 4)
Graham County, Bureau of Land Management, Safford Field Office, T6S R25E S23 NW4
STOCKED: Gila topminnow were discovered here on 1989 Jul 6 as a result of an undocumented stocking although their origin is likely from BTA (Hedrick and others 2001). In addition, Jim Brooks (pers. comm. *in* Hedrick and others [2001]) thought that BLM personnel stocked Watson Wash in the late 1980s using fish from BTA.

Dates	Surveyor	Methods	Fish
1989 Jul 06	Bagley	seine	POOC, CYLU, PORE
1990 Aug 08	Abarca, S. Stefferud	unknown	POOC plus others
1991 Jan 07	Brown	dipnet	POOC, CYLU, PORE
1993 Jul 13	Weedman	dipnet	POOC, PORE
1994 Jul 19	J. Young	dipnet	POOC, PORE
1995	J. Simms	unknown	POOC, PORE
1996 Sept 04	Weedman	dipnet	POOC, PORE
1997 Jul 31	AGFD interns	dipnet	POOC, PORE
1998 Jun 17	Timmons	dipnet	POOC, PORE
1998 Oct 28	Weedman, Duncan, Simms	dipnet, seine	POOC, CYLU, GAAF, PORE
1999 Jul 17	Weedman, Robles	dipnet, seine	GAAF, PORE
2000 Jul 13	Jontz, R. Billingsley	dipnet	GAAF, PORE
2003 Apr 02	Voeltz, Bettaso	dipnet, seine	GAAF, PORE
2004 Apr 16	Billingsley	dipnet	GAAF, PORE

Watson Wash is a thermal artesian well with surface flow for several hundred meters before drying. The well was drilled illegally in the 1950s. Guppies were first found in 1984 but topminnows were not detected until 1989, as were red shiners. Their origins were unknown. This well is the focus of intensive recreational use. In 1993 a masonry tub was illegally constructed for recreational use. Between 1999 and 2003 only guppies and mosquitofish have been collected. BLM has discussed a variety of management options for the Watson Wash area, including capping the well and drying the habitat. If BLM decides not to manage Watson Wash as a Gila topminnow habitat, they must provide additional sites in the Safford District as mitigation.

Failed Populations on BLM Lands in Arizona

The following sites are considered failed, but have not met the extirpation criteria. The sites need to be reevaluated to determine if they hold potential value for recovery.

Mesquite Spring Site #129 (Never Categorized)
Pinal County, Bureau of Land Management, Phoenix Field Office, T3S R11E S21 SE4 SW4
STOCKED: 1983 Dec 28 with 200 desert pupfish from BTA originally from Santa Clara Slough.
Failed and attempted restocking on 1991 Oct 10 with 100 pupfish from BTA.

Dates	Surveyor	Methods	Fish
1984 Oct	BLM Phoenix Field Office biologist	unknown	CYMA
1989 Jul 02	Bagley	seine	None
1991 Aug	Pool dredged and exclosure fencing repaired and replaced		
1992	BLM	unknown	None
1993 Jul 12	Weedman	dipnet	None
1993 Nov 24	BLM	unknown	None
1994 Jul 05	Weedman	dipnet	None

Cause of the failure of this site between 1984 and 1989 is unknown. In 1991 the pond was dredged, vegetation removed and exclosure fencing removed. Following this work, desert pupfish were again stocked. Two hundred pupfish were transported to the spring but when the first 100 were stocked they immediately began exhibiting stress. The other 100 were returned to the arboretum pond. Low oxygen levels were believed responsible for loss of all 100 pupfish stocked. Additional investigations into the suitability of this site are needed.

Pupfish Spring Site #120 (Never Categorized)
Yavapai County, Bureau of Land Management, Phoenix District, T7N R1W S18 NE4 NE4
STOCKED: 1977 Nov 2 with 15 desert pupfish from BTA originating from Santa Clara Slough

This site was also known as Garfias Wash and is located northwest of Lake Pleasant. Minutes from the September 1979 desert pupfish working group meeting indicate that flooding eliminated pupfish. A survey was conducted on 1997 May 28 and included about 3-mi (5-km) of dry wash and narrow bedrock canyons with isolated pools and little surface flow. No fish were collected and the wash appeared to be very flood prone and unsuitable for either topminnows or pupfish. This spring will be resurveyed again and evaluated for extirpation under the established criteria.

Appendix B. Results of monitoring of natural populations of Gila topminnow from October 2003 through October 2004 on BLM lands in Arizona.

Site # and Site Name	Date Sampled	Fish species present	Comments on sampling effort, abundance, and habitat conditions
#5 Cienega Creek	2003 Oct 20	AGCH, POOC	POOC abundant at Pump Canyon (over 1000 POOC in one seine haul); AGCH infested with yellow grub; 475 POOC transported and stocked in Empire Gulch
	2004 Oct 13	None	Survey conducted 0.75 miles above concrete road crossing; deep pools covered in ice
	2004 Oct 18	AGCH, POOC	POOC and AGCH common upstream and downstream of Mattie Canyon; 12 POOC collected for genetic assessment

Appendix C. Results of monitoring of reestablished populations of Gila topminnow and desert pupfish on BLM lands in Arizona during October 2003 through October 2004.

Site #, Site Name, Category, and Species Stocked (Origin)	**Date Sampled**	**Fish species present**	**Comments on sampling effort, abundance, and habitat conditions**
Cold Springs (#85), Category 2, POOC (Monkey Spring) and CYMA (Santa Clara Slough)	2004 Apr 16	CYMA, POOC	POOC and CYMA common in upper pool, lower pool nearly dry
Empire Gulch (#339), Category 2, POOC (Cienega Creek)	2003 Oct 20	AGCH, POOC	POOC (n=475) stocked from Cienega Creek near Pump Canyon; recent flooding appears to have washed out duckweed and watercress
	2004 May 17	AGCH	AGCH abundant; pools difficult to survey because of thick mats of duckweed and watercress
Lousy Canyon (#306), Category 1, POOC (Coal Mine Spring) and CYMA (El Doctor Marsh)	2004 Apr 12	CYMA, GIIN, POOC	POOC abundant above waterfall, CYMA common above waterfall, POOC & GIIN common below waterfall
Tule Creek (#75), Category 1, POOC (BTA)	2003 Oct 22	POOC	POOC and Sonoran mud turtles abundant in upper bedrock pools, lower area of exclosure muddy
	2004 Jan 09	None	Survey conducted below exclosure to determine if topminnow are established downstream
Watson Wash (#134), Category 4, POOC (unknown)	2004 Apr 16	GAAF, PORE	PORE and GAAF abundant, bullfrogs present; lots of trash and debris
Yerba Mansa (#44), Not categorized, POOC (BTA, Sharp Spring) and CYMA (Santa Clara Slough)	2003 Oct 28	POOC	POOC present along shoreline; majority of habitat difficult to sample due to thick *Typha* growth; bullfrogs abundant