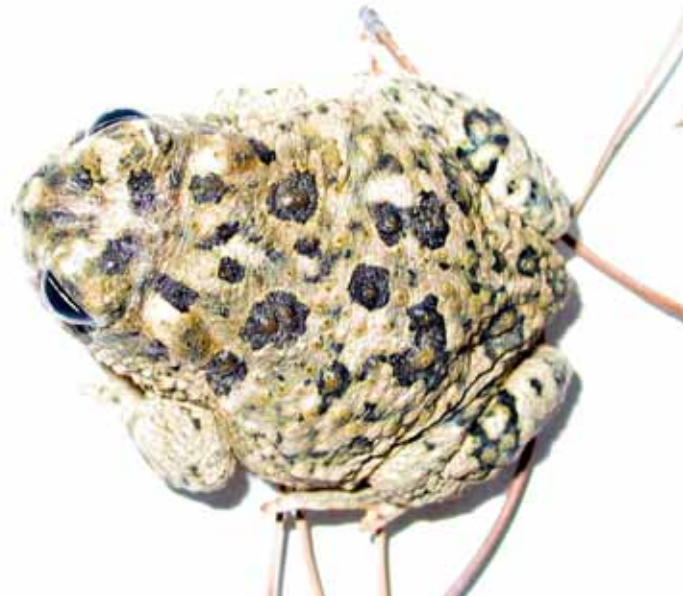


Monitoring arroyo toads (*Bufo californicus*) in the San Bernardino National Forest, 2004

Annual Report



Prepared for:

San Bernardino National Forest – Steve Loe
California State Parks – Alisa Ing

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Monitoring arroyo toads (*Bufo californicus*) in the San Bernardino National Forest, 2004

By: Cynthia J. Hitchcock¹, Adam R. Backlin¹, and Robert N. Fisher²

U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Annual Report

Prepared for:

San Bernardino National Forest – Steve Loe
California State Parks – Alisa Ing

¹San Diego Field Station – Carlsbad Office
USGS Western Ecological Research Center
6010 Hidden Valley Road
Carlsbad, CA 92009

²San Diego Field Station – San Diego Office
USGS Western Ecological Research Center
5745 Kearny Villa Road, Suite M
San Diego, CA 92123

Sacramento, California
2004

U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, SECRETARY

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

The use of firm, trade, or brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

For additional information, contact:

Center Director
U.S. Geological Survey
Western Ecological Research Center
3020 State University Drive East
Modoc Hall, Room 3006
Sacramento, CA 95819

TABLE OF CONTENTS

Introduction.....	1
Methods.....	1
Results.....	3
Cajon.....	3
Little Horsethief.....	3
Mojave Forks Dam.....	3
Cleghorn / Silverwood Lake.....	3
Discussion.....	4
Cajon.....	4
Little Horsethief.....	4
Mojave Forks Dam.....	5
Cleghorn / Silverwood Lake.....	5
Management Recommendations.....	5
Cajon.....	5
Little Horsethief.....	6
Mojave Forks Dam.....	6
Cleghorn / Silverwood Lake.....	6
Acknowledgments.....	7
Literature Cited.....	8
Tables	
Table 1. Summary of arroyo toad captures for 2004 with GPS locations.....	10
Table 2. Summary 2004 species found and sensitivity status.....	11
Figures	
Figure 1. Overview of USGS 2004 survey locations for arroyo toads.....	12
Figure 2. Cajon Wash survey sections.....	13
Figure 3. Little Horsethief reaches and arroyo toad locations.....	14
Figure 4. Little Horsethief habitat after the burn in 2003. Burned over story vegetation (top), and little water (bottom).....	15
Figure 5. Coast horned lizard (<i>Phrynosoma coronatum</i>) found at Little Horsethief 3.....	16
Figure 6. Mojave Forks Dam reaches. Arroyo toads were found along the Forest Service reach in 2004, (Kathie Mayer, pers. comm.).....	17
Figure 7. One of several arroyo toads found at Mojave Forks Dam by Kathie Meyer (USFS).....	18
Figure 8. Cleghorn / Silverwood Lake reach and arroyo toad location.....	19
Figure 9. Arroyo toad recaptured at Cleghorn / Silverwood Lake location, 2004 (believed to be the same toad caught in 2003).....	20

This report should be cited as:

Hitchcock, C. J., A. R. Backlin, and R. N. Fisher. 2004. Monitoring arroyo toads (*Bufo californicus*) in the San Bernardino National Forest, 2004. US Geological Survey final report. 20pp.

INTRODUCTION

The arroyo toad (*Bufo californicus*) is endemic to southern California. This nocturnal toad is a habitat specialist preferring low gradient perennial or intermittent streams with sandy banks, gravel / sand bars, and sandy terraces (Cunningham, 1961; Wright and Wright, 1995; Campbell *et al.*, 1996; Stebbins, 2003). Urban development and riparian habitat modifications (water diversion, impoundment, channelization) have resulted in the loss of much of this type of habitat (Sweet, 1992, 1993; Jennings and Hayes, 1994). Because of habitat loss and the subsequent decline of the arroyo toad throughout much of its historical range, this species was designated as Federally Endangered in 1994 (U.S. Fish and Wildlife Service, 1999a).

Surveys for arroyo toads in the San Bernardino National Forest were a continuation of USGS arroyo toad monitoring from 2000 through 2003. Surveys at the Cleghorn / Silverwood Lake area were conducted for the California State Parks in continuation of our monitoring in 2003 when a single arroyo toad was discovered at this location for the first time in several decades (Brown *et al.*, 2003; Hitchcock *et al.*, 2004). Surveys were repeated in 2004 at Cleghorn / Silverwood Lake to gain a better understanding of arroyo toad distribution here.

Our goals for 2004 were to monitor known populations of arroyo toads, determine the current status of known recent arroyo toad populations, document threats to the remaining occupied sites and suggest management actions that would facilitate the persistence of this species. In addition we report on the habitat suitability of areas adjacent to the Cajon Wash and Little Horsethief study sites.

METHODS

Surveys for arroyo toads were conducted at or near locations with current or recent known populations on Forest Service and Park Service lands. An overview map of site locations surveyed has been provided (Figure 1). Surveys for arroyo toads were

conducted between May and August when this species is known to be active in southern California (Sweet, 1992). Surveys focused on suitable habitat situated around permanent and semi permanent low gradient water resources. One day and three nighttime surveys were conducted to monitor toad activity. All toad surveys were conducted in accordance with the US Fish and Wildlife Service protocol (US Fish and Wildlife Service, 1999b).

We assessed habitat at sites by walking the watercourse or sandy wash during the day recording habitat parameters every 100m. Parameters included riparian width, percent cover of over-story and under-story, dominant vegetation types, and number of sandy banks, sandy terraces or sand / gravel bars along the way. In general, if a site had a low gradient (< 3% for our study), and at least two of the following three habitat parameters (sandy banks, sand bars, sandy terraces), it was considered suitable for arroyo toads and surveyed three times at night. Site lengths were chosen based on the presence of these same habitat parameters (i.e., only areas of the creek that were considered suitable according to the habitat criterion described above were surveyed at night for toads).

We conducted nocturnal visual encounter surveys for toads. Walking along the drainage we searched for adult toads, egg strings, and larva, we listened for calling males, and we searched adjacent upland habitats for foraging juveniles and adults. We used Kohler[®] Wheat headlamps with 45,000-candle power to provide an adequate amount of illumination. The location of all arroyo toad detections (visible or audible), were recorded with a GPS (Table 1). When a permitted USGS employee was present, (US Fish and Wildlife Service permit # TE-045994-3), toads were captured by hand, weighed to the nearest 1.0 gram, and measured to the nearest 1.0 millimeter (Table 1). All toads were released at their point of capture in good condition after processing. Detections of non-target amphibians, reptiles and fish were also summarized for each site surveyed in 2004 (Table 2).

RESULTS

Cajon — No arroyo toads were found at Cajon Wash in 2004. The additional habitat surveyed (Cajon mid and Cajon lower; Figure 2) was not suitable for arroyo toads because there was no water. We documented California treefrogs (*Hyla cadaverina*) at the Cajon Wash Blue Cut section. This area appears to remain free from aquatic exotics (Table 2).

Little Horsethief — A total of 30 arroyo toads were documented over the course of three surveys at Little Horsethief in 2004. No toads were found at the additional habitat surveyed at Little Horsethief in 2004 (Little Horsethief 2 and Little Horsethief 3; Figure 3). Surface water was located in the easternmost section of Little Horsethief, whereas all other areas were dry. All live arroyo toads were found in the one wetted section. A single mummified arroyo toad was found in Little Horsethief 2, which had no surface water (Figure 3). Most of this canyon had burned since 2003 leaving little over story vegetation in 2004, although under story vegetation was returning by the time we conducted our 2004 surveys. Also, there was noticeably less water in 2004 at Little Horsethief than in 2003 (Figure 4). We documented bullfrogs and western toads in the wetted reach in 2004. A coast horned lizard (*Phrynosoma coronatum*) was recorded from Little Horsethief 3 in a dry sandy area (Figure 5). The coast horned lizard is a Department of Fish and Game species of special concern and a Forest Service sensitive species.

Mojave Forks Dam — Arroyo toads were not found in the USGS survey reach however, several toads were photo-documented in a section of creek just West of our designated survey area by Kathie Meyer (Figures 6 and 7). This small section is still Forest Service property and it abuts private lands, which appear to hold excellent arroyo toad habitat.

Cleghorn / Silverwood Lake — A single arroyo toad was found in 2004 in the same general location as in 2003 (Figures 8 and 9). No additional toads or toad larvae were documented in the USGS survey reach.

DISCUSSION

Cajon Wash — No arroyo toads were detected at Cajon Wash in 2001, 2002, 2003 or 2004 (Brown *et al.*, 2001, 2002; Hitchcock *et al.*, 2004). Arroyo toads were last documented from this area in 2000 (Brown *et al.*, 2001). Although there is arroyo toad habitat and no documented aquatic exotics, the toad population at Cajon Wash may be too small to detect or locally extirpated. However, we cannot be certain of a local extirpation because we have not had optimal survey conditions for several years. During the five years USGS has been surveying this area we have documented off road vehicle (ORV) use that cuts through the stream and along the sandy banks. While we cannot be certain of their ultimate decline cause, ORV use would pose a threat to burrowing toads and stationary egg masses and may have contributed to their recent disappearance at Cajon. In addition, the recent fires and low rainfall in this area in the past several years have undoubtedly contributed to the absence of toads at this site. The burned habitat is now vulnerable to scouring events caused by heavy rains and a lack of vegetation, which may change the future structure of the habitat.

Little Horsethief Canyon — Arroyo toads were detected at Little Horsethief Canyon in 2004 in the same general location as they were found in 2003. The burn that occurred in this canyon in 2003 has left the area with virtually no canopy cover and some under story vegetation that has been able to grow back since the fire. Although there was considerably less surface water at the site than in 2003, we documented bullfrogs for the first time in 2004. It is unclear where the bullfrogs came from but there are several possibilities. Bullfrogs could have migrated from nearby ponds on private lands that abut the survey area, or they may have been washed into the area in high flows from the Mojave Forks River, which is known to have numerous bullfrogs. It is likely that the bullfrogs will all perish in this area because there were no pools and very little surface water this year.

Mojave Forks Dam — In 2004 arroyo toads were found at Mojave Forks Dam by Kathie Meyer (USFS) in a separate section of creek than the USGS has been monitoring. A

single toad was found on one occasion in the USGS designated monitoring reach in 2003, but no toads were found here in 2004. The current USGS reach was chosen based on previous surveys and Forest Service modeled habitat maps, however the habitat has changed over the years and the majority of the toad population appears to have shifted further downstream. Therefore, the survey reach needs to be modified for future surveys.

Cleghorn / Silverwood Lake — A single arroyo toad was detected at Cleghorn / Silverwood Lake in 2004. We believe this to be the same toad documented twice in 2003 because of its large size and unique markings (Figure 9). There is no evidence of additional toads in the immediate area. We are unable to determine if this toad is a remnant from a local population or a migrant from a nearby, undiscovered population.

MANAGEMENT RECOMMENDATIONS

Most monitoring years have been poor rainfall years. Therefore we recommend waiting for an above average rainfall year before monitoring these populations again to determine status and distribution. Instead, we suggest several management actions outlined for each site below:

Cajon — Because Cajon Wash burned recently we need to make sure that exotic vegetation does not begin to overtake the area. The Blue Cut area of Cajon Wash should be checked every couple of years and exotic plants removed, otherwise the surface water flows and open sandy banks may be reduced limiting the arroyo toad breeding and foraging habitat. The OHV and vagrant use of Cajon Wash should be reduced or, if possible, eliminated. Both of these activities cause physical and chemical habitat modification that are likely adversely impacting the toad population. Because we have not sampled this area for toads during optimal conditions, we recommend waiting to monitor toads again until there have been substantial rains.

Little Horsethief Canyon — Bullfrogs were found in the Little Horsethief arroyo toad habitat for the first time since we have been surveying the area. Although we do not

think they pose an immediate threat (due to the dry year and lack of surface water to sustain them), we recommend finding out where the bullfrogs immigrated from so that we may control a potential future problem with these exotic invasive predators.

Mojave Forks Dam — This reach was one of several Forest Service modeled habitat sections in Deep Creek. Habitat in this reach has been altered by beavers and is now more pooled rather than shallow and braided. Areas to the West of this reach are currently more suitable for arroyo toads and therefore we should shift the survey area in this direction. In addition we recommend removing the beavers from the Forest Service modeled habitat section and facilitating the restoration of the habitat in this area to a shallow stream channel by deconstructing beaver dams. Restoring the habitat to have fewer pools and more braided shallow areas will also make this section of creek less desirable for other aquatic exotics such as bullfrogs and green sunfish which now occupy the area. Because beavers are present in other sections of Deep Creek, this area will have to be managed so that beavers do not return. There is excellent arroyo toad habitat just outside of the Forest Service property boundary to the west of our survey area. This habitat contains numerous arroyo toads but is also heavily used by off-road vehicles (ORV's)(pers. obsvn.; Chris Brown, pers. comm.). By restoring the Mojave Forks Dam reach we would be providing the toads an area that they could expand into and be protected from ORV's.

Cleghorn / Silverwood Lake — Because we have consistently found only a single toad at this location, there will likely be no arroyo toads here in the near future. If we want to continue to have arroyo toads at Silverwood Lake we need to heavily manage the habitat. Habitat in this area could be restored by first, constructing a fish barrier between the lake and the stream in which the toad was found, and second, by removing exotics from the stream. Any future fish stocking by California Department of Fish and Game (CDFG) would have to occur below the barrier, therefore an agreement would have to be made with CDFG. Toads would then have to be translocated into the area to establish a viable population. Little Horsethief could serve as a possible source population.

ACKNOWLEDGMENTS

We thank the many people and organizations for their interest and participation in these surveys. Financial support was given by the Angeles National Forest and California State Parks. We also thank Steve Kilgore (SBNF Ranger) for accompanying us on several surveys for safety. In addition, we also extend our gratitude to ???? and ???? their thorough review of this report.

LITERATURE CITED

- Brown, C., L. Lyren, and R. N. Fisher. 2001. Summary of arroyo toad surveys in the Angeles and San Bernardino National Forests. US Geological Survey Report to US Forest Service, San Bernardino, CA. 26pp.
- Brown, C. W., and R. N. Fisher. 2002. Survey results for the arroyo toad (*Bufo californicus*) in the San Bernardino National Forest, 2001. US Geological Survey Report prepared for US Forest Service, San Bernardino, CA. 53pp.
- Brown, C. W., R. N. Fisher, and C. D. Haas. 2003. Herpetofaunal inventory and monitoring at Silverwood Lake State Recreation Area, April 2000 - July 2002. US Geological Survey Report prepared for California State Parks, San Bernardino, CA. 81pp.
- Campbell, L. A., T. B. Graham, L. P. Thibault, and P. A. Stine. 1996. The arroyo toad (*Bufo microscaphus californicus*), ecology, threats, recovery actions, and research needs. Technical Report prepared for US Fish and Wildlife Service NBS/CSC-96-01, California Science Center of the National Biological Service, Ventura, CA. 46pp.
- Cunningham, J. D. 1961. Observations on the natural history of the California toad, *Bufo californicus* Camp. Herpetologica 17:255-261.
- Hitchcock, C.J., A. R. Backlin, and R.N. Fisher. 2004. Surveys for arroyo toads (*Bufo californicus*) throughout the San Gabriel, San Bernardino, and San Jacinto Mountains, 2003. US Geological Survey final report. 41pp.
- Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report prepared for the California Department of Fish and Game Inland Fisheries Division, Rancho Cordova, CA. 255pp.
- Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Third edition. Houghton Mifflin Company, Boston, Massachusetts.
- Sweet, S. S. 1992. Initial report on the ecology and status of the arroyo toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California, with management recommendations. Contract Report U.S.D.A. Forest Service, Los Padres National Forest. 198pp.
- Sweet, S. S. 1993. Second report on the biology and status of the arroyo toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California. Contract Report prepared for USDA Forest Service, Los Padres National Forest Department of Biological Sciences, University of California, Goleta, CA. 72pp.
- U.S. Fish and Wildlife Service. 1999a. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon. vi

+ 119 pp.

U.S. Fish and Wildlife Service. 1999b. Survey Protocol for the Arroyo Toad. Ventura Fish and Wildlife Office, Ventura, California.

Wright, A. H., and A. A. Wright. 1995. Handbook of frogs and toads of the United States and Canada, Third edition. Comstock Publishing, Ithaca, New York.

Table 1. Summary of arroyo toad captures for 2004 with GPS locations. (All GPS coordinates were recorded in WGS 84).

Site Name	Date	Latitude	Longitude	Sex	Age	Weight	Length
Little Horsetheif	19-May-04	34.31240	117.39855	M	A	28	63
		34.31275	117.39893	F	J	9	44
		34.31277	117.39955		J	9.5	43
		34.31279	117.39983	F	A	27	63
		34.31281	117.39904	M	A	32	67
		34.31255	117.39874	M	A	27	60
		34.31218	117.39855	F	A	55	74
	21-Jun-04	34.31277	117.39897	F	A	17	50
		34.31440	117.40328		A	10	45
		34.31418	117.40267	F	A	45	64
		34.31332	117.40025	F	A	51	71
		34.31330	117.40025	F	A	14	50
		34.31286	117.39999	M	A	16	52
		34.31282	117.39926	F	A	15	54
		34.31282	117.59946	F	A	15	53
		34.31284	117.39907	F	A	16	52
		34.31361	117.40145	M	A	18	52
12-Jul-04	34.31333	117.40055		A			
	34.31283	117.39893		A			
	34.31283	117.39905		A			
	34.31280	117.39958		A			
	34.31308	117.40040		A			
	34.31308	117.40052		A			
	34.31312	117.40068		A			
	34.31322	117.40083		A			
	34.31325	117.40088		A			
	34.31348	117.40158		A			
	34.31312	117.40062		A			
	34.31310	117.40057		A			
	Little Horsetheif 2	19-May-04	34.31689	117.40940		J*	
Silverwood Lake	09-Aug-04	34.28658	117.35040		A		

* This toad was mummified and found in a reach with no water.

Table 2. Summary 2004 species found and sensitivity status.

Site Name	Date	Common Name	Scientific Name	Age	Sensitivity Status
Cajon Wash Blue Cut	24-May-04	California treefrog	<i>Hyla cadaverina</i>	adults	
	12-Jul-04	California treefrog	<i>Hyla cadaverina</i>	adults	
	23-Jul-04	California treefrog	<i>Hyla cadaverina</i>	tadpoles	
	19-Aug-04	California treefrog	<i>Hyla cadaverina</i>	adults	
Little Horsetheif	21-Jun-04	bullfrog	<i>Rana catesbeiana</i>	juveniles	exotic
		Western toad	<i>Bufo boreas</i>	adults	
		Western rattlesnake	<i>Crotalus viridis</i>	adult	
	12-Jul-04	bullfrog	<i>Rana catesbeiana</i>	adults	exotic
		Western toad	<i>Bufo boreas</i>	adult	
	19-May-04	bullfrog	<i>Rana catesbeiana</i>	juveniles	exotic
Western toad		<i>Bufo boreas</i>	adults and juveniles		
Pacific treefrog		<i>Hyla regilla</i>	adults		
Little Horsethief 3	19-May-04	coast horned lizard	<i>Phrynosoma coronatum</i>	juvenile	DFG: speciec of special concern FS: sensitive
Mojave Forks Dam	17-May-04	Western toad	<i>Bufo boreas</i>	adults	
		bullfrog	<i>Rana catesbeiana</i>	adults and juveniles	exotic
		crayfish	<i>Procambarus clarkii</i>	adults and juveniles	exotic
	13-Jul-04	Green sunfish	<i>Lepomis cyanellus</i>	adults	exotic
		crayfish	<i>Procambarus clarkii</i>	adults	exotic
		Western toad	<i>Bufo boreas</i>	adults	
Silverwood Lake	09-Aug-04	bullfrog	<i>Rana catesbeiana</i>	adults and juveniles	exotic
		Western toad	<i>Bufo boreas</i>	juvenile	
	19-Aug-04	Western toad	<i>Bufo boreas</i>	metamorph	

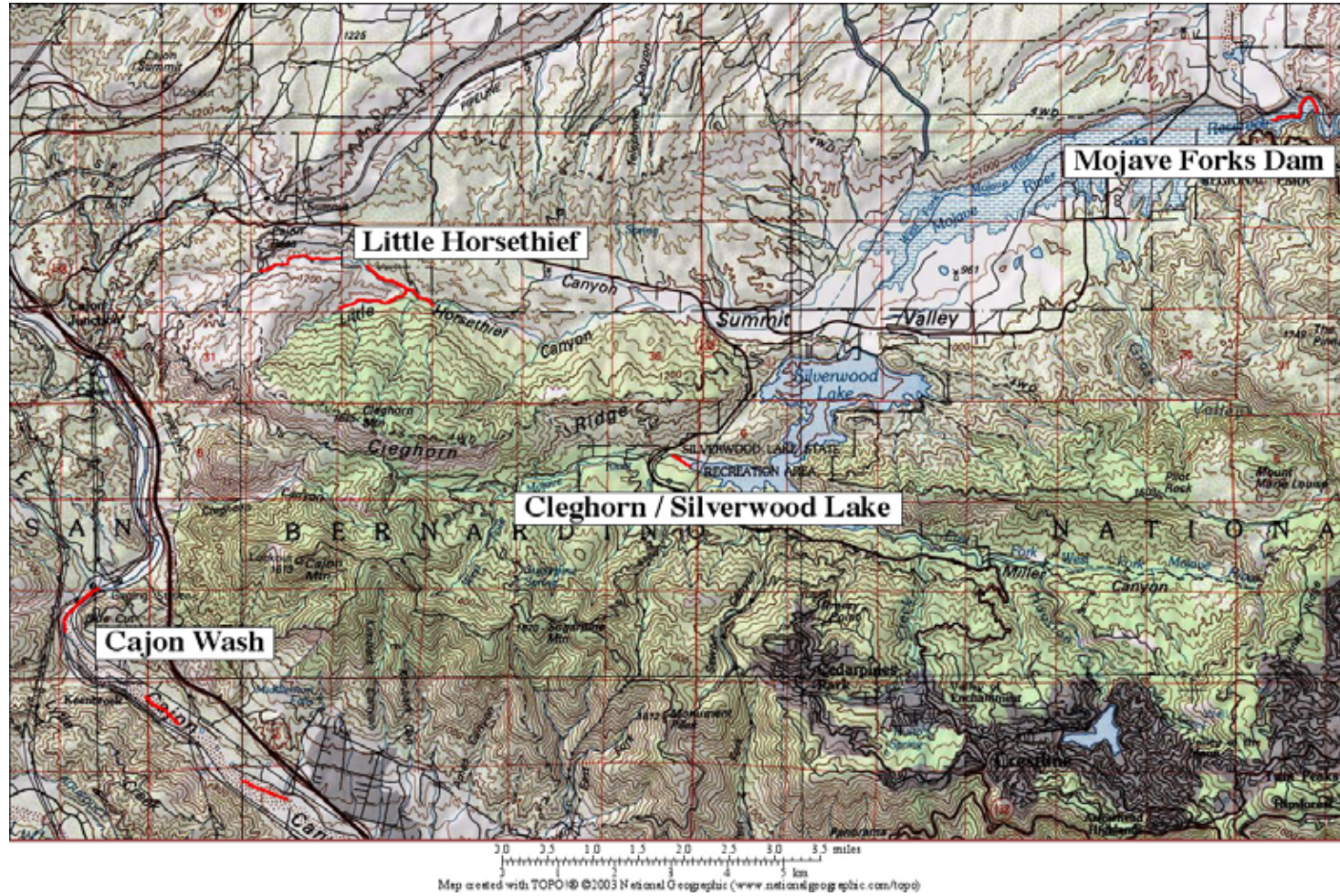


Figure 1. Overview of USGS 2004 survey locations for arroyo toads.

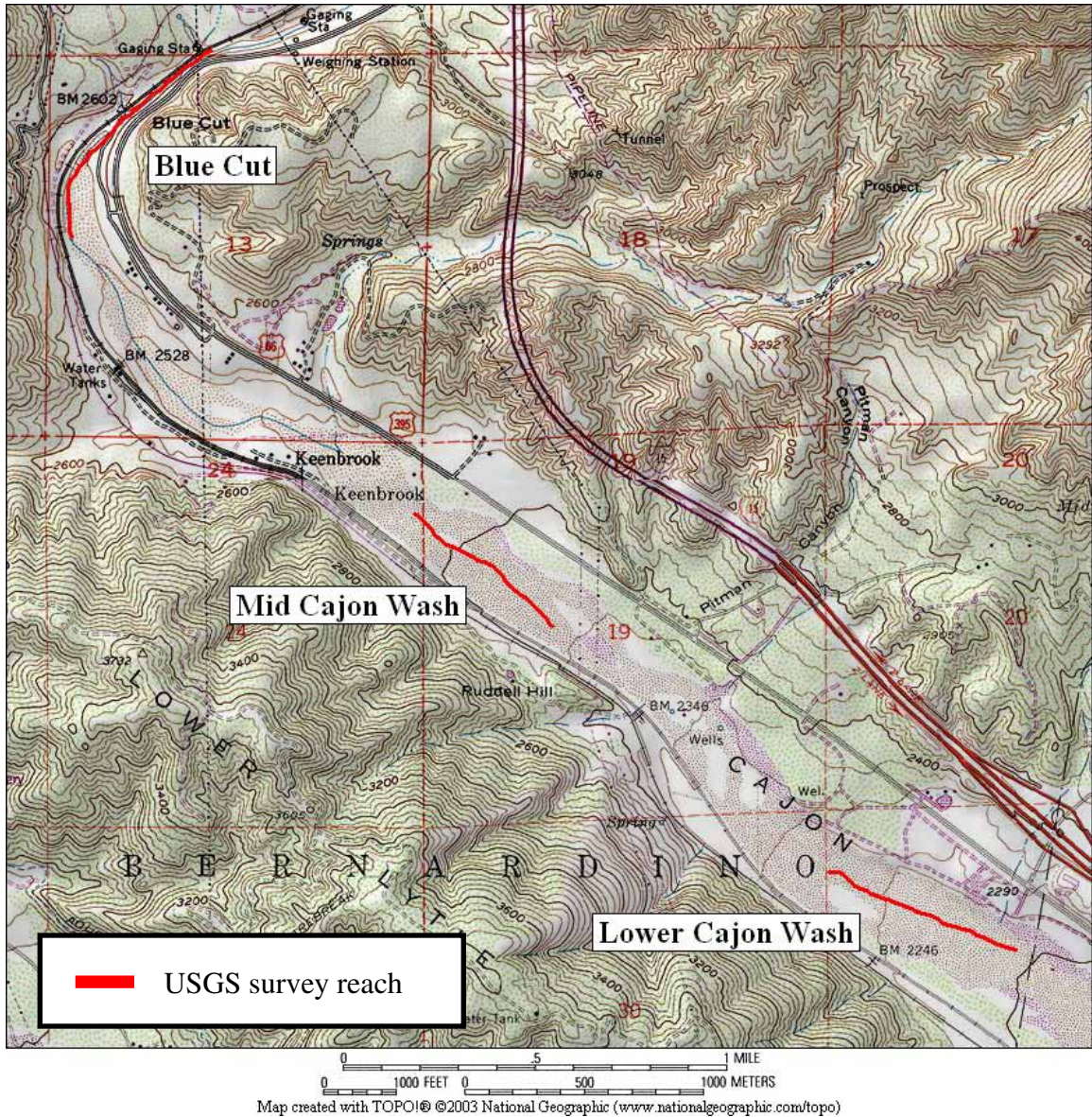


Figure 2. Cajon Wash survey sections.

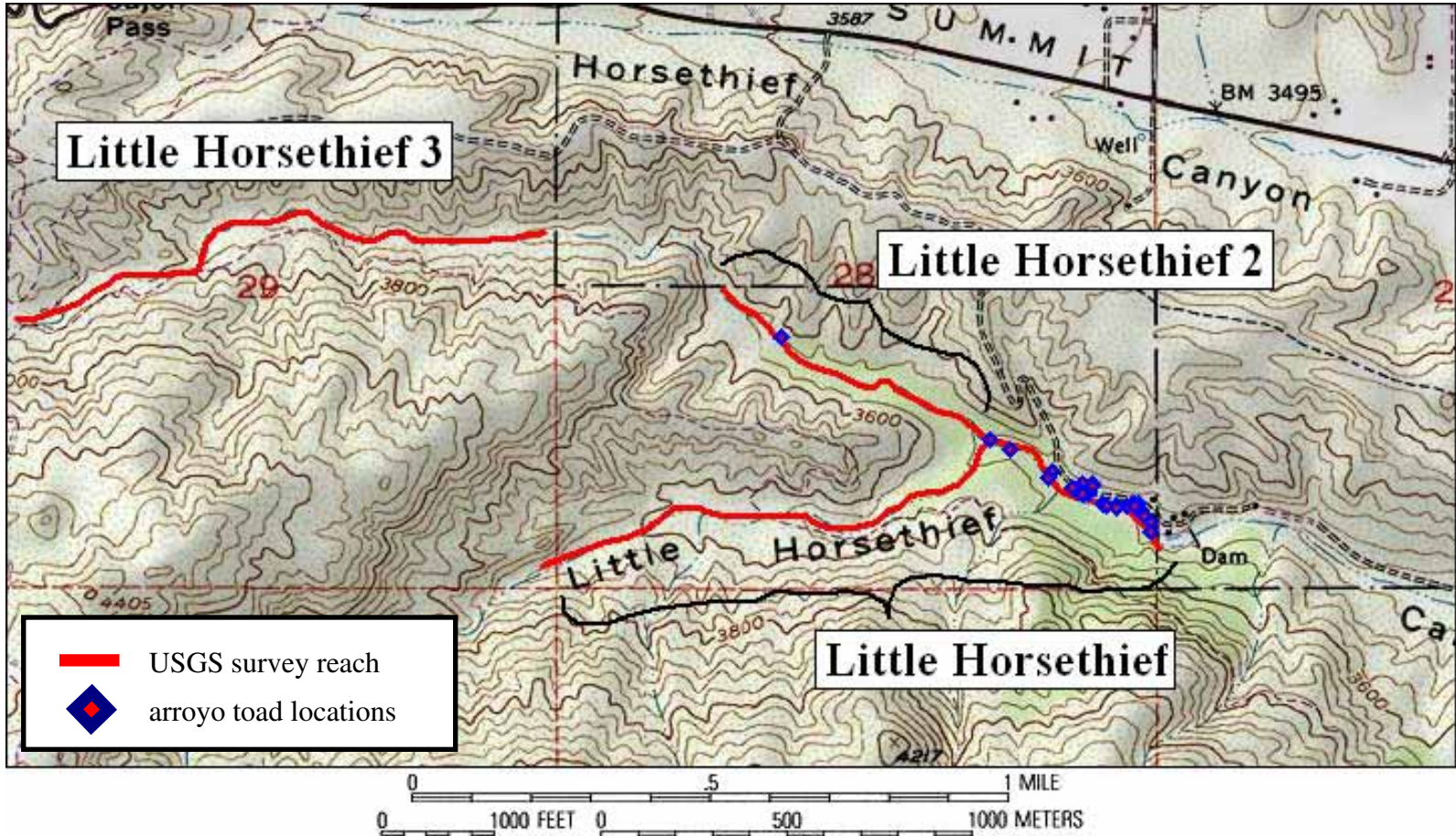


Figure 3. Little Horsethief reaches and arroyo toad locations.



Figure 4. Little Horsethief habitat after the burn in 2003. Burned over story vegetation (top), and little water (bottom).



Figure 5. Coast horned lizard (*Phrynosoma coronatum*) found at Little Horsethief 3.

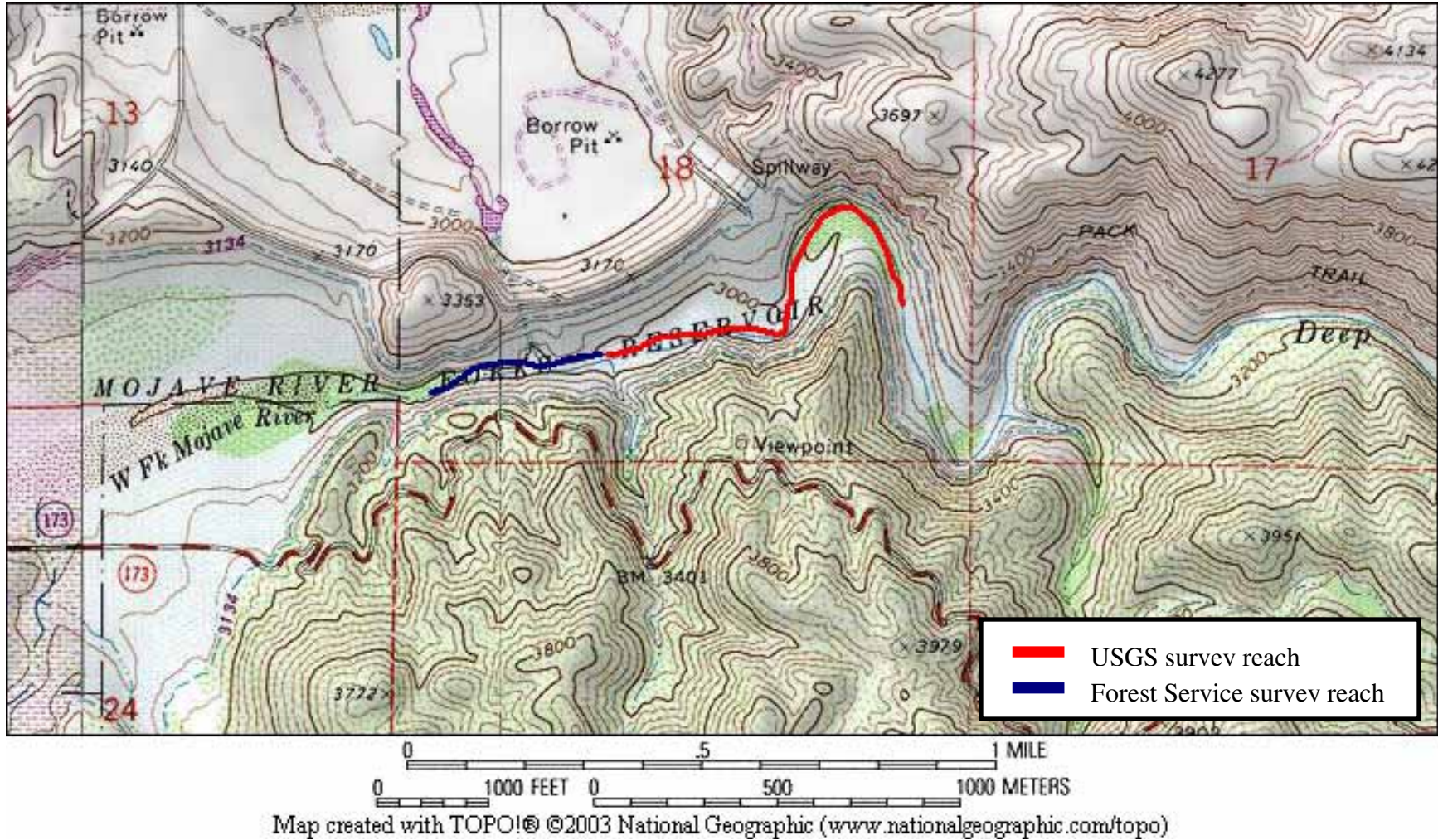


Figure 6. Mojave Forks Dam reaches. Arroyo toads were found along the Forest Service reach in 2004, (Kathie Mayer, pers. comm.).



Photo by Kathie Mayer, USFS

Figure 7. One of several arroyo toads found at Mojave Forks Dam by Kathie Meyer (USFS).

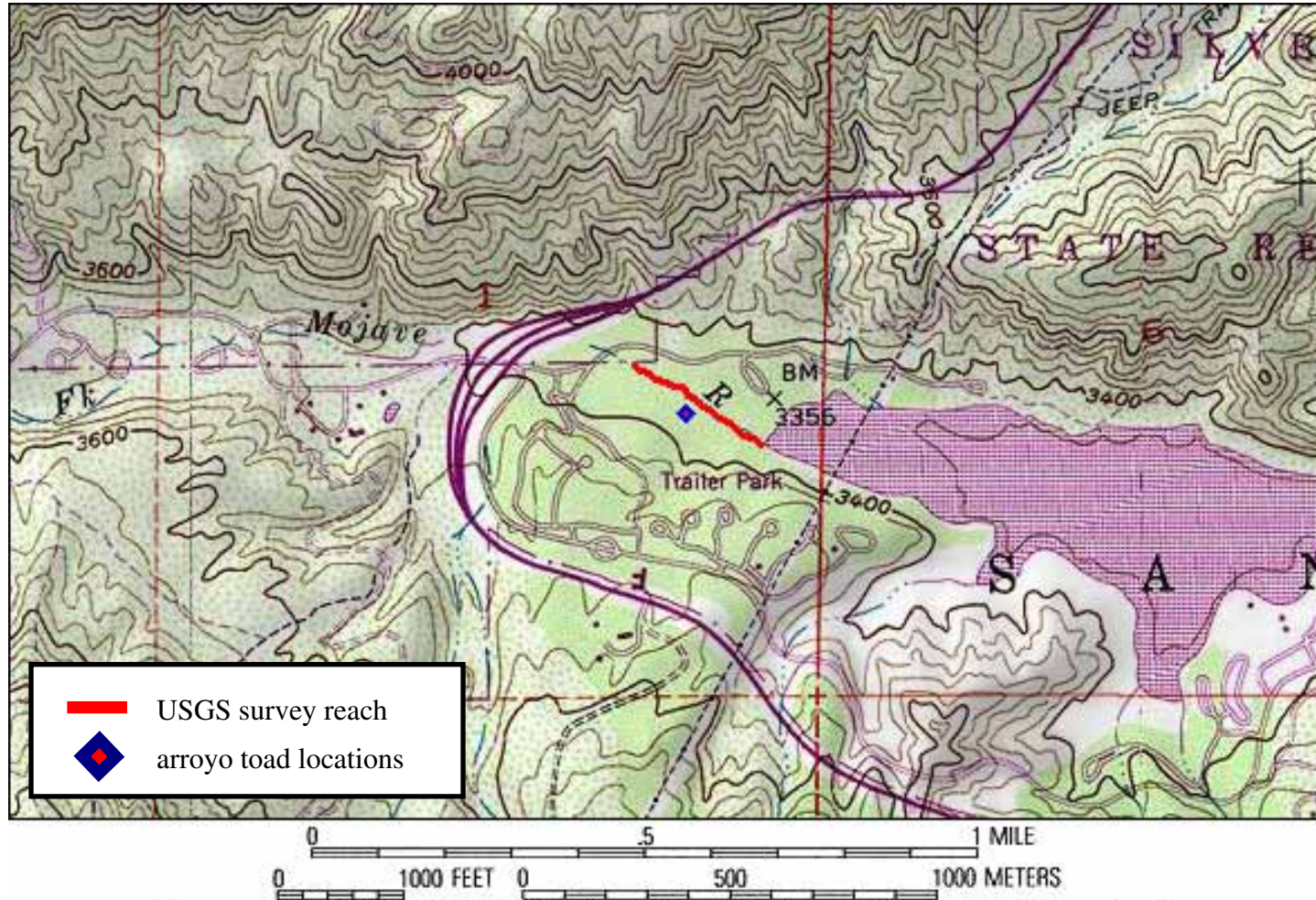


Figure 8. Cleghorn / Silverwood Lake reach and arroyo toad location.



Figure 9. Arroyo toad recaptured at Cleghorn / Silverwood Lake location, 2004 (believed to be the same toad caught in 2003).