WET BEAVER CREEK WILDERNESS
HERPETOFAUNA INVENTORY

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INTRODUCTION

The canyon created by Wet Beaver Creek cuts through the Mogollon Rim east of Cottonwood, Arizona. Its placement, which borders Sonoran desert scrub at low elevations and ponderosa pine forests at high elevations (Brown 1994), and orientation, which provides continuous north-facing and south-facing slopes, creates a complex and varied ecosystem providing habitats for many different species of flora and fauna.

Within the canyon, the old growth riparian deciduous forest is dominated by Arizona alder (*Alnus oblongifolia*) (Szaro 1989). Above the watered canyon bottom there is a thin belt of full-canopy Emory oak (*Quercus emoryii*) which gives way to interior chaparral dominated by shrub live oak (*Q. turbinella*). In the upper reaches of the canyon, interior chaparral gives way to juniper-pinyon woodland dominated by one-seed juniper (*Juniperus monosperma*), which, in the mesic soils of the highest elevations, is interspersed with ponderosa pine (*Pinus ponderosa*). In the terrain of the lower reaches of the canyon, interior chaparral intergrades with Sonoran desert scrub. This desert scrub is interspersed with elements of semidesert grassland invaders such as Engleman prickly pear (*Opuntia phaeacantha*), crucifixion thorn (*Canotia holacantha*), and wait-a-minute bush (*Mimosa biuncifera*). Throughout the Wet Beaver Creek Wilderness (= Wilderness), the interaction of elevational change, different soil types, and varying slopes and aspects create a mosaic of vegetation.

In addition to the more common herpetofauna species, species of special interest that potentially occur in and nearby the Wilderness include: Chiricahua leopard frog (*Rana chiricahuensis*), northern leopard frog (*R. pipiens*), lowland leopard frog (*R. yavapaiensis*), southwestern toad (*Bufo microscaphus*), narrowhead garter snake (*Thamnophis rufipunctatus*), Mexican garter snake (*T. eques*), and Gila monster (*Heloderma suspectum*). All species of special interest are listed as forest sensitive (U.S. Forest Service 1988), Wildlife of Special Concern (Arizona Game and Fish Department in prep.), or are federally listed by U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 1996)(Table 1).

The Wet Beaver Creek Wilderness encompasses 6,700 acres. The primary human use of the area is recreation, including angling for native and non-native fishes. It is estimated that more than 13,500 hikers visited the Wilderness in 1996 (Armiger pers. comm.). The majority use three major trails: Bell, Apache Maid, and White Mesa. To a lesser degree, Wet Beaver Creek is utilized beyond the reach of these trails. Approximately two to three percent of visitors travel beyond Bell Crossing into the back country of the main canyon (Armiger pers. comm).

In an effort to establish a baseline for all species of herpetofauna in the Wet Beaver Creek Wilderness, Arizona Game and Fish Department (AGFD) and Coconino National Forest (CNF) implemented this inventory under contract 43-8167-5-0291. In components 1 and 2, Sredl and Windes (1995) gathered information on historical distribution and developed a list of reptiles and amphibians potentially occurring in the Wilderness. In the latter phases of this project, which are presented here, we report the results of amphibian and reptile surveys conducted throughout much of the Wilderness during the 1996 field season.

METHODS

SURVEY METHODS

The general technique we employed was a modified visual encounter survey (= VES, Crump and Scott 1994). This method can be broadly applied to encounter many species of herpetofauna in a variety of habitats. The basic VES technique includes walking through an area while systematically searching for reptiles and amphibians for a given time period. In addition to searching with an unaided eye, we scanned rock piles and outcrops and other distant objects with binoculars. To sample non-surface active animals, we carefully lifted rocks and debris, searched underneath, and replaced those objects so as to reduce disturbance to the microhabitats which they create. Most of our surveys were conducted during daylight hours. When we surveyed at night, we used a flashlight to search for eye shine. In addition to this general approach, we listened for vocalizing anurans, dip netted aquatic pools, and checked the bottoms of the deepest pools by surface swimming while wearing a diving mask.

When necessary, specimens were captured for identification and photographed or euthanized and retained as voucher specimens. To make captures, we used lizard nooses, large rubber bands (to stun lizards), and dip nets (see Conant and Collins 1991; Heyer, et al. 1994 for description of details on methods of capture). We supplemented our modified VES with passive trapping methods using funnel traps and drift fence sets in selected areas.

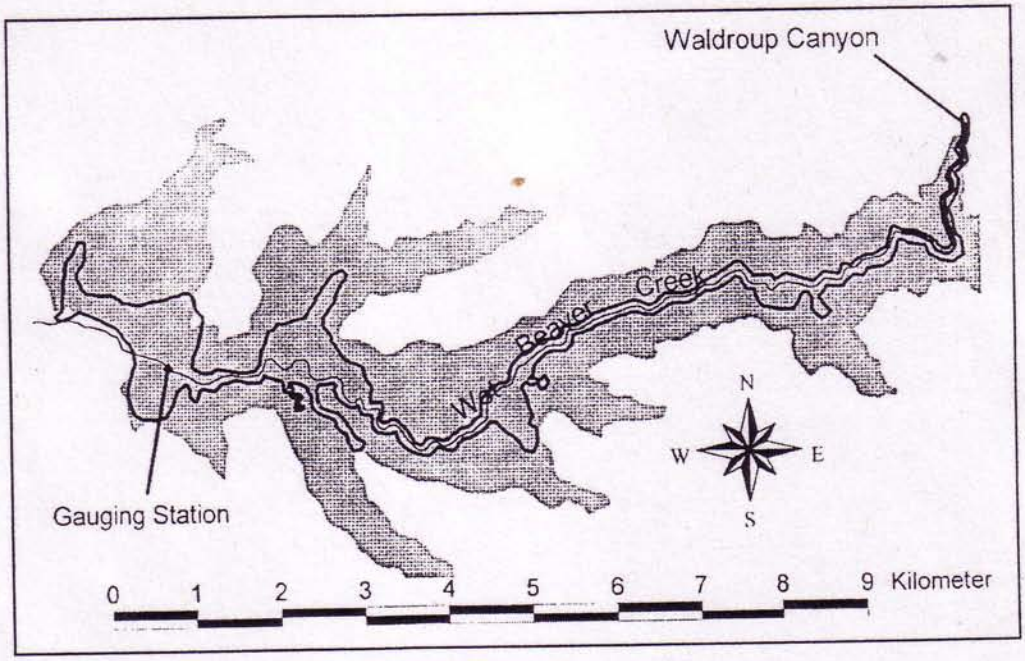
In Arizona, the summer monsoon is perhaps the best season for locating large numbers of species of amphibians and reptiles. It is a major breeding period for several amphibians, including most anurans (= frogs and toads). The concentration of various life stages (esp. larvae and newly metamorphosed juveniles, which often outnumber adults 100 to 1) during this period greatly increases the probability of encountering uncommon or elusive species. In addition, the increased moisture levels during the summer rains create favorable conditions for activity in many reptiles, increasing encounter rates for this group. Taking these factors into account and given the unusually dry spring and early summer in 1996 (which decreased herpetofaunal activity), we planned our surveys to encompass the monsoon. The first trip was scheduled to coincide with the start of the monsoon, while subsequent trips took place during the final weeks of the season.

We recorded data in a field note format. For most species encountered, we recorded time, temperature, relative humidity, weather conditions, substrate, behavior, and other information pertinent to the observation. A typical notation was: "1100 hr - *Cophosaurus texanus* basking on sandstone outcrop north of gauge. T air = 18.0 C, T substrate = 21.0 C".

AREAS SURVEYED

Three, five-day trips were completed within the Wilderness. The first survey included the main riparian corridor from Waldroup Place to the gauging station on the downstream wilderness boundary. The upper part of this area receives little recreational use. The second survey included the riparian zone and adjacent uplands in the lower third of the main canyon including selected tributaries in an area of high recreational use. The third survey sampled areas similar to survey two, but was directed at the uplands, an area of moderate recreational use (Fig. 1).

Figure 1. Map of Wet Beaver Creek Wilderness marked with areas surveyed. Wilderness is delineated by shading, while areas surveyed are marked by black lines. Trip 1 surveyed from the head of Waldroup Canyon to the gauging station.

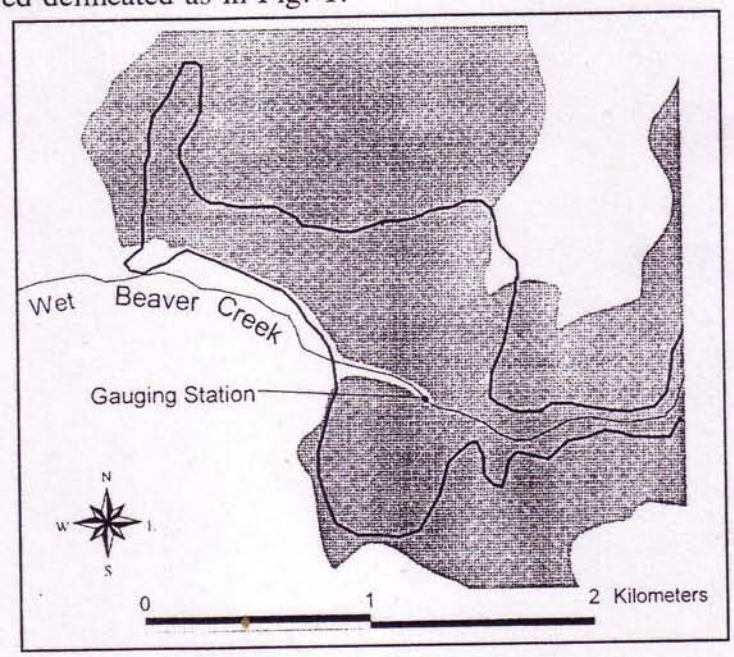


Trip 1 by J.E. Wallace and J.D. Windes: July 8-12. The first trip was a walk-through of the main riparian corridor along Wet Beaver Creek. While we walked, we surveyed for herpetofauna using VES. Our survey began at the head of Waldroup Canyon, just south of Apache Maid Mountain, and ended just downstream from the gauging station, ~0.5 mi. outside of the Wilderness (Fig. 1). Wet Beaver Creek canyon is rugged, remote, and without a trail from Waldroup Canyon to Bell Crossing. Hiking this portion of the canyon required much swimming and rock hopping. The deep pools, bordered by sheer rock walls required us to swim while we

floated our gear. We took advantage of this by searching these pools with the aid of a diving mask, for mud turtles, garter snakes, tadpoles, and fish.

During this survey, we concentrated on riparian areas which fit the habitat profile for target herpetofauna. In addition, we surveyed several upland areas in this portion of Wet Beaver Creek.

Figure 2. Enlargement illustrating area surveyed during Trip 2. Wilderness and areas surveyed delineated as in Fig. 1.



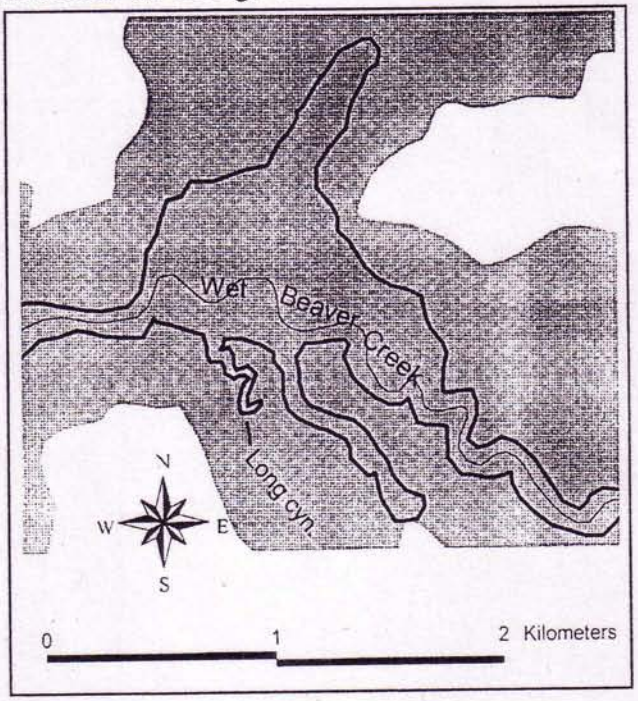
Trip 2 by J.E. Wallace and J.D. Windes: September 9-13. This survey concentrated on the lower reaches of the Wilderness where the most human activity occurs (Fig. 2). During this survey, we minimized travel time and devoted most of our efforts to sampling riparian habitats and the surrounding uplands.

In addition to extensive VES surveys in both upland and riparian habitats, we set two 30-foot drift fences. These were constructed of polyethylene sheeting with wire-screen funnel traps at each end. One was set parallel to a small spring creek which emptied into Wet Beaver Creek. Another was set in leaf litter in the understory of the oak strip between the riparian zone and chaparral. We also set 12 funnel traps along natural "drift fences" of sandstone, downed logs, and other similar objects. Traps were open September 9-13, and checked twice daily.

Trip 3 by M.J. Sredl and B.L. Christman: September 16-20. This trip concentrated on the lower reaches of the canyon (Fig. 3), an area less visited for recreation, but nevertheless

receiving some pressure. No traps were used, but VES was more intensive and covered much more upland area than Trips 1 and 2.

Figure 3. Enlargement illustrating area surveyed during Trip 3. Wilderness and areas surveyed delineated as in Fig. 1.



RESULTS

HERPETOFAUNA SURVEYS

Table 2 lists species found through this inventory, and compares these results to those of Nowak (unpubl. data) from Montezuma Castle and the Riparian Herpetofauna Database (Arizona Game and Fish unpubl. data).

In the family Phrynosomatidae, the tree lizard (*Urosaurus ornatus*) was, by far, the most frequently encountered and widespread herpetofauna species. Numerous adults, juveniles, and hatchlings were encountered from Waldroup Canyon to the gauging station and were found in all habitat types. Side-blotched lizards (*Uta stansburiana*) were found in small numbers in the lower elevations. The southern plateau lizard (*Sceloporus undulatus tristichus*) was found only in the upper reaches of the Wilderness. Clark's spiny (*S. clarki*) and greater earless lizards (*Cophosaurus texanus*) were found only in the lower reaches. The greater earless lizard was abundant where present.

The banded gecko (*Coleonyx variegatus*: Gekkonidae), was represented by a single individual found on a south-facing slope under a piece of loose sandstone near the gauge. The desert grassland whiptail (*Cnemidophorus uniparens*: Teiidae) was sporadically abundant in the lower half of the Wilderness. We observed other whiptails which may have represented other species but which we were unable to capture for positive identification.

Several colubrid snake species were observed: the blackneck garter snake (*Thamnophis cyrtopsis*) was observed in Waldroup and Casner canyons. The Sonoran whipsnake (*Masticophis bilineatus*) was observed in several localities in both riparian and upland habitats in the mid to lower reaches. The ringneck snake (*Diadophis punctatus*) was represented by a single individual found underneath a large piece of basalt on a north-facing slope in the upland habitat north of the gauge. The gopher snake (*Pituophis catenifer*) was represented by a single individual found on the Bell Trail just west of the gauge.

Of the amphibians, various life stages of two species were encountered. Only canyon treefrogs (*Hyla arenicolor*) were observed in the upper to middle sections of the Wilderness. Eggs and newly hatched tadpoles were found in ephemeral rain pools in Waldroup Canyon. Adults were occasionally observed throughout the canyon, including a small breeding chorus heard alongside the mainstream in the middle section. Larger late-staged tadpoles (Gosner 1960) were found in a spring pool adjacent to Wet Beaver Creek. Red-spotted toad (*Bufo punctatus)* tadpoles and newly metamorphosed juveniles and late-stage canyon treefrog tadpoles were found in and around ephemeral rain pools in Casner Canyon.

No amphibians or reptiles were caught in funnel traps. Night searches produced observations of several canyon treefrogs. All other herpetofauna observed were found through diurnal searches.

Observations of Other Organisms

In addition to herpetofaunal observations, incidental observations were made on native and non-native fishes during the first back country trip because survey effort focused on the aquatic habitat. The fathead minnow (*Pimephales promelas*), a non-native fish, was observed in bedrock plunge pools in the upper reaches of Waldroup Canyon. The native speckled dace (*Rhinichthys osculus*) was found at the headwater springs in Wet Beaver Creek just below the confluence of Waldroup Canyon. This is where permanent surface water begins and continues throughout the length of the canyon. Approximately 200 m below these springs we observed Sonora suckers (*Catostomus insignis*), roundtail chubs (*Gila robusta*), and brown trout (*Salmo trutta*) in large pools of the main stream. The former two are native, while the latter is non-native. A possible observation was made of the native longfin dace (*Agosia chrysogaster*) in a side channel approximately 2 stream km below the headwater springs. Our first observation of the introduced smallmouth bass (*Micropterus dolomieui*) occurred in this same area. Four of the last five fishes mentioned (excluding *A. chrysogaster*), all were observed in large pools throughout the remaining sections of Wet Beaver Creek surveyed. The occurrence of roundtail chub seemed to decrease as we went downstream while the occurrence of smallmouth bass seemed to increase.

These fish notes should be considered as casual observations and localities not considered as absolute as no fish sampling techniques were utilized except for visual observations, both above and below water, and dip netting. Notes were not considered valid unless identification was free of any question. Specimens of speckled dace and fathead minnows were field collected and preserved to verify identification upon return to the lab. Fish collected will be deposited in the Arizona State University Vertebrate Collection.

Crayfish, a non-native crustacean implicated in possible declines of native aquatic vertebrates (Fernandez and Rosen in prep.), were first observed in the vicinity of Bell crossing. They may occur upstream.

DISCUSSION

SPECIES POTENTIALLY OCCURRING IN WET BEAVER CREEK WILDERNESS

Twenty four species of snakes belonging to 4 families potentially occur in the Wet Beaver Creek Wilderness, making this the largest group of herpetofauna which potentially occur there. The abundance of snake species is followed by that of lizards, potentially represented by 17 species in 6 families. The next most abundant group is the anurans, with 12 species belonging to 4 families. The Sonoran mud turtle, Family Kinosternidae, is the sole turtle representative.

OUTCOME OF 1996 HERPETOFAUNA SURVEYS

The results of our inventory by no means constitute a comprehensive inventory of herpetofauna occurring within the Wet Beaver Creek Wilderness. It is rather, with a few exceptions, a list of the most common, and least elusive species one would expect to encounter. Unlike some vertebrates which may be easily located visually (either by counts of individuals or large conspicuous sign) or aurally or have predictable activity patterns, the majority of herpetofauna are inconspicuous, do not vocalize, and have activity patterns which are brief and/or highly seasonal.

Visual surveys are common techniques employed to estimate the abundance of many vertebrates (Davis and Winstead 1980). The more conspicuous and predictable an animal's activity pattern is, the better these techniques work. For large, conspicuous vertebrates (e.g. deer, elk, and most waterfowl), visual techniques work better than for more secretive vertebrates (e.g. small mammals, some passerine birds, reptiles, and amphibians). The western blind snake (*Leptotyphlops humilis*), a small fossorial snake, which possesses vestigial eyes and seldom ventures above the surface, exemplifies the lower end of delectability.

Wilderness herpetofauna that vocalize, namely anurans, do so for only brief periods of breeding which are often weather dependent. Even when vocalizing and abundant, they can still be difficult to locate. For example, the western chorus frog (*Pseudacris triseriata*) breeds in early spring, often before snowmelt. Loud choruses of these frogs can be heard at this time, and it would not be uncommon to hear hundreds of vocalizing males. But, in spite of these large

numbers, it is often difficult to locate and capture an individual in this chorus, even after a careful search of the area. In late summer, when our surveys were conducted, this species is largely undetectable.

Most of the reptiles and amphibians in the Wilderness hibernate through winter and estivate during the hot, dry pre-monsoon period. In general, their periods of activity fall between February and October, although there is considerable variation with respect to species and local conditions (elevation, aspect, etc.). Activity is often tied to short-term changes in weather (e.g. unpredictable summer storms, warming trends, etc.). This short-term burst of activity makes sampling of reptile and amphibian populations a long-term endeavor, and one which requires multiple approaches.

During VES, recent weather is, perhaps, the most important factor affecting survey outcome for reptiles and amphibians. Because they are ectotherms, they have reduced surface activity during cool weather. Unfortunately, during each of our three trips, the Wilderness experienced cool, cloudy, and rainy weather which often lasted for a 24-hour period. During these trips there were a few clear, cloudless days, and the majority of our observations were made on such days, or during a few hours of warm, sunny weather on otherwise cool, cloudy days.

We chose a modified VES as our primary sampling technique, because it is a method that can be broadly applied to many species in a variety of habitats at minimal cost. However, as we outline below, other techniques would be more effective to comprehensively sample the herpetofauna of the Wilderness. In spite of its shortcomings, VES is a good choice for an initial evaluation of habitat and potential herpetofauna occurrence.

Herpetologists have developed many ways to sample reptile and amphibian populations (see Campbell and Christman 1982; Jones 1986; Heyer et al. 1994). Like VES, many of these techniques have advantages and disadvantages. Methods such as pit-fall and funnel-trapping are very labor and time intensive; traps need to be checked often and left set for an entire field season. Even then, many species may go undetected. Alternatively, artificial cover boards can be set in a more standardized arrangement in a variety of habitats. This technique also entails considerable labor and would be difficult to implement in an area such as the Wilderness but has the additional advantage of not requiring daily checking.

Because of the inclement weather during our surveys, the modified VES performed less well than we expected. Even so, we encountered many of the most common species in the Wilderness, and have compiled information that will aid the future management of the herpetofauna in the Wilderness. However, if there is a desire to: 1) develop a comprehensive list or to measure 2) relative abundance, 3) habitat associations, or 4) human impacts on the herpetofauna of the Wilderness, techniques in addition to VES would need to be implemented.

Introduced sport fish have been well-documented as voracious predators on native aquatic vertebrates (Moyle 1986) and have been implicated in the declines and/or eventual extirpations of various species throughout the West (Bradford et al. 1993; Jennings and Hayes 1994). The absence of observations of mud turtles, garter snakes, and ranid frogs along the main stream of Wet Beaver Creek could be linked to the high number of trout and bass present in these habitats. The persistence of canyon treefrogs throughout the canyon could be related to the fact that they utilize ephemeral pools out of the main stream where these predators thrive.

Crayfish have been documented as having both primary and secondary effects on aquatic flora and fauna, thus potentially impacting entire aquatic systems (Fernandez and Rosen in prep.). It is possible that crayfish in Wet Beaver Creek have affected distribution and abundance of native aquatic herpetofauna.

Of the perennial water in the Wilderness, most is confined to the main stream channel of Wet Beaver Creek. Aquatic sites with low flow, such as side channels and pools, oxbows, and backwaters, are generally considered highest quality habitats for ranid frog reproduction, and are nearly non-existent. The lack of such habitats decreases the likelihood that large numbers of ranids could occur in the Wilderness, especially since the available low-flow aquatic habitats are main channel pools, occupied by introduced predaceous organisms.

The most likely habitat for leopard frogs was in the upper section of the Wilderness, from the headwater springs to approximately 300 m downstream. This area would benefit from further surveys in order to detect the presence of leopard frogs; however, it is also one of the most inaccessible parts of the Wilderness.

Recent Status of Species of Special Concern in the Beaver Creek Ranger District

This inventory did not find any Special Status Species (Table 2) in the Wet Beaver Creek Wilderness. The status and distribution of the amphibians and reptiles of Coconino National Forest has been evaluated and reported by Sredl and Howland (1992), Sredl et al. (1993), and Sredl et al. (1995). We report an update of that review below, concentrating on the occurrences of those species in the Beaver Creek Ranger District (BCRD).

Leopard Frogs

Localities where leopard frogs have been recorded in BCRD include lakes, springs, stock tanks, streams, and rivers. There are recent records of Chiricahua leopard frogs (*R. chiricahuensis*) from Mud Tank #2, Kewitt Tank, Tanque Aloma, Divide Tank, and Unmarked Tank SW of Divide Tank in the BCRD, although surveys in 1995-6 indicate that those populations may now be extirpated (Arizona Game and Fish unpubl. data). Lowland leopard frogs (*R. yavapaiensis*) have historically inhabited Dry Beaver Creek, West Clear Creek, Fossil Springs, Verde River, and Wet Beaver Creek in the BCRD. The northern leopard frog (*R. pipiens*) is known from Stoneman Lake, Drum Tank, T-Bar Tank #2, and Hunting Tank in the BCRD, and several

localities near Stoneman Lake in Long Valley Ranger District (Arizona Game and Fish unpubl. data)

Many of these localities are reported by Sredl et al. (1995). Supplementary information on leopard frogs and additional CNF and BCRD localities may be found in Platz and Platz (1973), Platz (1976), Platz and Mecham (1979), Frost and Platz (1983), Platz and Frost (1984), Scott and Jennings (1985), Clarkson and Rorabaugh (1989), and Windes (1990).

Depending on elevation and weather, leopard frogs may be active and encountered from late February until November. Lowland leopard frogs, found below 1692 m (5500 ft) elevation, have a much longer active period than Chiricahua leopard frogs and northern leopard frogs, which occur at higher elevations. There is significant overlap in elevational ranges and habitat requirements of lowland and Chiricahua leopard frogs and Chiricahua and northern leopard frogs. These species pairs have been known to occur in sympatry (Platz and Mecham 1979; Platz and Frost 1984). Elevational ranges and other relevant ecological data may be found in Sredl et al. (1995), Appendix A, or Stebbins (1985). For assistance in identifying the leopard frogs of CNF and BCRD, refer to Sredl et al. (1995), Appendix B, or Stebbins (1985).

Southwestern Toads

In BCRD, southwestern toads have been reported from the Verde River (Arizona Game and Fish unpubl. data). These toads breed in gently flowing water, usually with well-developed riparian vegetation. They are often found in the same habitats as leopard frogs. Southwestern toads breed from late February to June (Sullivan 1994), depending on weather and elevation. It is easiest to survey adult southwestern toads while they are breeding, by listening for calling males and censusing breeding adults. Calling and mating most commonly begin at sunset and last for two to four hours. Southwestern toad tadpoles metamorphose in May-August. Metamorphs are identified by their yellow feet, oval parotoid glands, and light bar across the eyelids. For assistance in identifying southwestern toads and further description of southwestern toad habitat see Sullivan (1994), Stebbins (1985), and keys in Sredl et al. (1995). For additional information on historical localities, see Sullivan (1994).

Garter Snakes

Rosen and Schwalbe (1988) examined the statewide distribution of narrowhead and Mexican garter snakes in Arizona. Both species are closely tied to riparian habitats. While we know of no BCRD records for the narrowhead garter snake, it is known from numerous localities in Oak Creek, and has been noted near BCRD in the Sedona and Peaks ranger districts (Arizona Game and Fish unpubl. data). Narrowhead garter snakes are highly aquatic, and are confined to large streams and rivers. They leave the water only to bask (especially gestating females) or to seek cover (Rosen and Schwalbe 1988).

Like the narrowhead garter snake, the Mexican garter snake is highly aquatic. This species has been found in the Verde River at West Clear Creek confluence in BCRD and localities near

BCRD (Spring Creek, Verde River at Cottonwood, and Oak Creek) (Arizona Game and Fish Department unpubl. data). Rosen and Schwalbe (1988) searched museum collections for records of both garter snake species, and include a comprehensive list of historical localities, some of which are in or near BCRD. For assistance in identification of narrowhead and Mexican garter snakes, and how to differentiate these species from the more common wandering and blackneck garter snakes, see Rosen and Schwalbe (1988) and keys in Sredl et al. (1995).

For additional historical locality information and updates on the above or any Species of Special Concern, refer to the Heritage Data Management System (HDMS, Habitat Branch, AGFD) or contact the Nongame Branch, Amphibians and Reptiles Program, AGFD.

RECOMMENDATIONS:
We found the Wet Beaver Creek Wilderness Area and the wildlife within it unique, and we make the following recommendations for conservation and management of its herpetofauna.

1. Continue herpetofauna inventories of the Wilderness, paying particular attention to the riparian corridor and the amphibians, reptiles, and other species of interest which inhabit that area. (Development of a pamphlet soliciting such information from visitors might be a cost-effective way to help do this.)
2. If funding becomes available, conduct studies to examine: 1) relative abundance, 2) effect of human activities, and 3) habitat associations of the herpetofauna of the Wilderness.
3. If angler use is low, or values of the Wilderness for native species management are determined to be high, consider: no fish stocking and measures to eradicate non-native aquatic organisms or at least prevent their spread (e.g. fish barrier, etc.).

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Table 1. State, Federal, and U.S. Forest Service status designations of target riparian amphibian and reptile species [AGFD = Arizona Game and Fish Department (in prep.); USFWS = U.S. Fish and Wildlife Service (1996), C = Candidate; USFS = U.S. Forest Service (1988), S = sensitive].

Species	AGFD	USFWS	USFS
Chiricahua leopard frog (*Rana chiricahuensis*)	X	C	
Northern leopard frog (*R. pipiens*)	X		S
Lowland leopard frog (*R. yavapaiensis*)	X		
Southwestern toad (*Bufo microscaphus*)			
Mexican garter snake (*Thamnophis eques*)	X		S
Narrow-headed garter snake (*T. rufipunctatus*)	X		S

Table 2. List of amphibians and reptiles potentially occurring or known to occur in Wet Beaver Creek Wilderness and surrounding geographic region. Species potentially occurring or known to occur in Wet Beaver Creek Wilderness and surrounding geographic region are marked with X by source. Montezuma Castle = observations from Nowak (unpubl. data). This Study = observations from current report. AGFD unpubl. data = observations obtained from database search of Riparian Herpetofauna Database, Amphibians and Reptiles Program, Arizona Game and Fish Department. Note: The focus of this database is primarily riparian herpetofauna.

Common Name	Scientific Name	Montezuma Castle	This Study	AGFD unpubl. data
Order Anura				
Family Pelobatidae				
southern spadefoot toad	*Spea multiplicata*			
Family Bufonidae				
southwestern toad	*Bufo microscaphus*	X		
Great Plains toad	*B. cognatus*			
red-spotted toad	*B. punctatus*	X	X	
Woodhouse's toad	*B. woodhousii*	X		X
Family Hylidae				
canyon treefrog	*Hyla arenicolor*		X	X
mountain treefrog	*Hyla eximia*			
western chorus frog	*Pseudacris triseriata*			X
Family Ranidae				
Chiricahua leopard frog	*Rana chiricahuensis*	X		X
lowland leopard frog	*R. yavapaiensis*			X
northern leopard frog	*R. pipiens*			
bullfrog	*R. catesbeiana*	X		X
Order Testudines				
Family Kinosternidae				

Common Name	Scientific Name	Montezuma Castle	This Study	AGFD unpubl. data
Sonoran mud turtle	*Kinosternon sonoriense*	X		X
Order Squamata				
Family Helodermatidae				
Gila monster	*Heloderma suspectum*			
Family Phrynosomatidae				
greater earless lizard	*Cophosaurus texanus*	X	X	
collared lizard	*Crotaphytus collaris*	X		
short-horned lizard	*Phrynosoma douglassii*	X		
Clark's spiny lizard	*Sceloporus clarki*	X	X	
eastern fence lizard	*S. undulatus*	X	X	
tree lizard	*Urosaurus ornatus*	X	X	
side-blotched lizard	*Uta stansburiana*	X	X	
Family Gekkonidae				
western banded gecko	*Coleonyx variegatus*	X	X	
Family Scincidae				
many-lined skink	*Eumeces multivirgatus*			
Great Plains skink	*E. obsoletus*			
Family Teiidae				
western whiptail	*Cnemidophorus tigris*	X		
Gila spotted whiptail	*C. flagellicaudus*	X		
little striped whiptail	*C. inornatus*	X		
desert grassland whiptail	*C. uniparens*	X	X	
plateau striped whiptail	*C. velox*	X		
Family Anguidae				
Madrean alligator lizard	*Elgaria kingii*	X		

Common Name	Scientific Name	Montezuma Castle	This Study	AGFD unpubl. data
Family Colubridae				
glossy snake	*Arizona elegans*	X		
longnose snake	*Rhinocheilus lecontei*			
western patchnose snake	*Salvadora hexalepis*	X		
ground snake	*Sonora semiannulata*	X		
ringneck snake	*Diadophis punctatus*	X	X	
night snake	*Hypsiglena torquata*	X		
common kingsnake	*Lampropeltis getula*	X		
Sonoran mountain kingsnake	*Lampropeltis pyromelana*			
coachwhip	*Masticophis flagellum*	X		
striped whipsnake	*M. taeniatus*	X		
Sonoran whipsnake	*M. bilineatus*	X	X	
gopher snake	*Pituophis catenifer*	X	X	
lyre snake	*Trimorphodon biscutatus*	X		
wandering garter snake	*Thamnophis elegans*			X
blackneck garter snake	*T. cyrtopsis*	X	X	
Mexican garter snake	*T. eques*			
narrowhead garter snake	*T. rufipunctatus*			
SW blackheaded snake	*Tantilla hobartsmithi*			
Family Viperidae				
western rattlesnake	*Crotalus viridis*			
W diamondback rattlesnake	*C. atrox*			
blacktail rattlesnake	*C. molossus*	X		
Mojave rattlesnake	*C. scutulatus*	X		

Common Name	Scientific Name	Montezuma Castle	This Study	AGFD unpubl. data
Family Elapidae				
Arizona coral snake	*Micruroides euryxanthus*			
Family Leptotyphlopidae				
western blind snake	*Leptotyphlops humilis*			