RANID FROG SURVEY ON THE HUALAPAI NATION
1993-1995
ARIZONA GAME AND FISH DEPARTMENT HERITAGE FUND
IIPAM PROJECT # I93117

Submitted by:

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DISCLAIMER

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RANID FROG SURVEY ON THE HUALAPAI NATION
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INTRODUCTION

Hualapai Significance/Culture: Frog (Hinya)

The Frog is a creature of the night. He lives in the under world and upper world. He is aware of the goings on in both worlds, hence he can relate to messages before and after they happen. Once he was a human being, as all creatures were in Kathat-Ka'nave's time, he was a rain maker. It is said that he was responsible for the floods that covered the earth in that bygone time before creation. In the creation story, Hamatavila (the older) was told by Tudjupa (the younger) "Don't step on this frog (hinya)." But, Hamatavila did step on the frog and squashed out its excrement and viscera. This caused him to become ill in his bowels, from which he lost his excrement and viscera and died. It is also said, that to touch or carry the frog is sure to cause one to have warts just like the frog. (Personal Communication Susanyatame, R.)

Background:

In recent years, amphibian populations and the number of individuals within, have steadily declined at an alarming rate. Amphibians are known to be highly sensitive to environmental conditions. For example, Leopard Frogs once thrived in Glen Canyon during pre-dam times, and although there are still moderate-sized populations in the higher tributary streams of Lake Powell, it is speculated that most were destroyed by the formation of the reservoir (Drost and Sogge, 1993). Since the construction of Glen Canyon Dam, only two populations of Leopard Frogs could be found below the dam along the mainstem of the Colorado River to Lake Mead. In 1993, the National Park Service reported a small population of Leopard Frogs at "Horseshoe Bend" (RM -8.8L). A population was also discovered at Cardenas Marsh(RM 71.1L) in 1975, unfortunately, researchers did not find any frogs at this site in 1992 or 1993, and it is feared that the population has been lost. In the Lake Mead area, the Northern Leopard frog is widely distributed, but it is believed that many have been introduced (Drost and Sogge, 1993).

Records of past amphibian surveys or research has been minimal on the Hualapai Indian Reservation. Although surveys along the Colorado River have been preformed by various researchers. Carothers et al. in the 70's performed studies from Diamond Creek to Pearce Ferry. In April of 1993 biologists from the Hualapai Tribe and SWCA, Inc. identified two toads and one frog along the Colorado River between Diamond Creek and Pearce Ferry: ***Bufo woodhousei, Bufo punctatus,*** and ***Hyla arenicolor.***

In 1993 the Hualapai Tribe received a grant from the Arizona Game and Fish, Heritage Program to survey of ranid frogs throughout the Reservation. From 1993 to 1995 the Hualapai Tribe via

The Department of Natural Resources proposed to survey 46 sites on the Hualapai Indian Reservation for three (3) species of ranid frogs and one species of toad: northern leopard frog (*Rana pipens*), relict leopard frog (*Rana onca*), lowland leopard frog (*Rana yavapaiensis*) and Arizona toad (*Bufo m. microscaphus*). Only 33 sites of the 46 were surveyed due to drought conditions (lack of water) in the selected stock tanks.

The purpose of this survey was to establish baseline data for ranid frogs and arizona toads within northwestern Arizona specifically the Hualapai Indian Reservation.

METHODS
(Taken and modified from Sredl et. al. 1993)

We surveyed for ranid frogs and other amphibians by walking steadily along, around, or in aquatic habitats while looking and listening for herpetofauna activity. To maximize the chance of encounter during surveys, we constantly scanned the shoreline, embankments, or other appropriate area from one to ten meters from our position while we walked. We carried a long handled dip net to aid in capture of amphibians, and used the handle of the net to comb and probe dense bushes and grasses. We also looked under rocks, logs and other debris for amphibians and reptiles. Whenever possible, animals were captured and positively identified to species.

Animals were often photographed and released or retained as voucher specimens.

Most surveys were conducted during the day between dawn and dusk, from April through September. In December of 1994 an opportunity arose to fly to remote areas on the reservation. Understanding December was not an preferred time to survey for amphibians none the less habitat photographs were collected.

The length of habitat searched depended on the size of the system surveyed. Shores of stock tanks, and springs were searched in their entirety by walking in and out of the water whenever possible. The shoreline of the Colorado River and tributaries were partially searched.

Numbers of individuals of target species encountered were recorded as exact numbers if possible. It was often impossible, however particularly with larvae and large populations of adults, to make an exact count. Non-target amphibians were noted. If more than one trip was made around the perimeter of an enclosed body of water (most stock tanks), encounters with herpetofauna were recorded only during the first walk around the perimeter, unless numbers and individuals encountered were clearly unambiguous. For linear aquatic systems (small lotic and narrow lentic systems), numbers of herps encountered were recorded while walking one direction only.

Upon completion of a survey, we filled out standard forms (Appendix B) for all sites. These forms reflect site specific locality information, habitat conditions, herpetofauna observations.

RESULTS

During our surveys only one of the four target species was found. Adult Arizona toads (*Bufo m. microscaphus*) were found at Milkweed Spring on the eastern portion of the Reservation. Four (4) voucher specimens were taken and are currently housed at the Arizona State University Vertebrate Collection.

Canyon treefrogs and red-spotted toads were the dominate species found during our surveys. Adult woodhouse toads were found at RM 181.2 left on the Colorado River. Voucher specimens were taken of each of the described species. These voucher specimens will be housed at the Hualapai Department of Natural Resources. Refer to Table 1 for a summary survey results.

With the exception of Milkweed Springs neither toads or frogs were found at any of the areas used by livestock.

RECOMMENDATIONS FOR FUTURE STUDY AND MANAGEMENT

Future research and studies on amphibians is recommended since this study was the first of its kind. There is a wealth of information to be collected. In particular the Arizona Toad population found at Milkweed Springs deserves further investigation. Remote springs found on the reservation that were not included in this survey should be studied. For example Diamond Spring, surveyed in December, seemed to be suitable habitat for rabid frogs.

Potential habitat and thus possible reintroduction sites could be created at several stock tanks throughout the reservation. This could be accomplished by fencing off a majority of a stock tank allowing a narrow assess for livestock. This techniques would allow riparian vegetation to reestablish.

Feral mule and horse populations could have impacts of amphibians if control measures are not taken. For example Meriwhitca Spring could see further degradation if feral mules are not removed.

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Appendix A. List of Specimen and Habitat Slides\Photographs of the Ranid Frog Survey 1993-1995, Hualapai Indian Reservation.

Slide\Photography No.	Description
1.	Truxton Wash, Valentine Az. 5-18-94, Looking Downstream
2.	Truxton Wash, Valentine Az. 5-18-94, Looking Upstream
3.	Truxton Wash, Valentine Az. 5-18-94, Looking Downstream
4.	Truxton Wash, Valentine Az. 5-18-94, Looking Downstream
5.	Truxton Wash, Valentine Az. 5-18-95, Toad Larvae
6.	Truxton Wash, Valentine Az. 5-18-95, Toad Larvae
7.	Diamond Creek 5-22-95, Looking Upstream
8.	Diamond Creek 5-22-95, Looking Downstream
9.	Diamond Creek 5-22-95, Looking Downstream
10.	Diamond Creek 5-22-95, Canyon Tree Frog
11.	Meriwhitica 12-7-94, Habitat
12.	Meriwhitica 12-7-94, Habitat
13.	Meriwhitica 12-7-94, Speckled Dace
14.	Meriwhitica 12-7-94, Habitat
15.	Meriwhitica 12-7-94, Habitat
16.	Meriwhitica 12-7-94, Habitat
17.	Meriwhitica 12-7-94, Speckled Dace
18.	Spencer Creek 12-7-94, Habitat
19.	Spencer Creek 12-7-95, Habitat
20.	Spencer Creek 12-7-95, Speckled Dace
21.	Quartermaster Creek 12-7-95, Habitat
22.	Quartermaster Creek 12-7-95, Looking Towards River
23.	Diamond Spring 12-9-95, Habitat
24.	Diamond Spring 12-9-95, Habitat
25.	Diamond Spring 12-9-95, Habitat
26.	Blue Mountain Canyon Spring 12-9-95, Habitat
27.	Blue Mountain Canyon Spring 12-9-95, Habitat
28.	Spencer Creek 4-22-95, Habitat
29.	Spencer Creek 4-22-95, Small pool with Canyon Tree larvae
30.	Spencer Creek 4-22-95, Small pool with Canyon Tree Frog Larvae
31.	Spencer Creek 4-22-95, Small pool with Canyon Tree Frog Larvae
32.	Spencer Creek 4-22-95, Habitat
33.	Spencer Creek 4-22-95, Small pool with Canyon Tree Frog Larvae
34.	Spencer Creek 4-22-95, Adult Canyon Tree Frog
35.	Spencer Creek 4-22-95, Small pool with Canyon Tree Frog Larvae
36.	Spencer Creek 4-23-95, Mating pair of woodhouse toads
37.	Spencer Creek 4-23-95, Mating pair of woodhouse toads
38.	Spencer Creek 4-23-95, Mating pair of woodhouse toads
39.	Spencer Creek 4-23-95, Mating pair of woodhouse toads
40.	Spencer Creek 4-23-95, Mating pair of woodhouse toads

41. Spencer Creek 4-24-95, Habitat
42. Spencer Creek 4-24-95, Adult Canyon Tree Frogs
43. Spencer Creek 4-24-95, Adult Canyon Tree Frogs
44. Spencer Creek 4-24-95, Habitat
45. Spencer Creek 4-24-95, Adult Canyon Tree Frogs
46. Spencer Creek 4-24-95, Habitat
47. RM 181.2L 4-14-95, Habitat
48. RM 181.2L 4-14-95, Habitat
49. RM 181.2L 4-14-95, Habitat
50. RM 181.2L 4-14-95, Adult Woodhouse Toad
51. RM 181.2L 4-14-95, Adult Woodhouse Toad
52. RM 181.2L 4-14-95, Adult Woodhouse Toad
53. D.S. Tank 8-17-95, Habitat
54. D.S. Tank 8-17-95, Habitat
55. Pothole Tank 8-17-95, Habitat
56. Pothole Tank 8-17-95, Habitat
57. Mexican Tank 8-17-95, Habitat
58. Mexican Tank 8-17-95, Habitat
59. Mexican Tank 8-17-95, Habitat
60. North Laguna 8-17-95, Habitat
61. North Laguna 8-17-95, Habitat
62. North Laguna 8-17-95, Habitat
63. North Laguna (looking south) 8-17-95, Habitat
64. North Laguna (looking south) 8-17-95, Habitat
65. Twenty Pines 8-18-95, Habitat
66. Twenty Pines 8-18-95, Habitat
67. Pine Springs 8-18-95, Habitat
68. Pine Springs 8-18-95, Habitat
69. Pine Springs 8-18-95, Habitat
70. Pine Springs 8-18-95, Habitat
71. Pine Springs 8-18-95, Habitat
72. Sage Tank 8-18-95, Habitat
73. Sage Tank 8-18-95, Habitat
74. Shipley Tank 8-20-95, Habitat
75. Shipley Tank 8-20-95, Habitat
76. Valentine Wash 8-22-95, Habitat
77. USGS Gaging Station, Valentine 8-22-95
78. Valentine Wash 8-22-95, Habitat
79. Valentine Wash 8-22-95, Habitat
80. Valentine Wash 8-22-95, Habitat
81. Valentine Wash 8-22-95, Habitat
82. Valentine Wash 8-22-95, Habitat
83. Peach Springs Dam 8-2-95, Habitat

84. Peach Springs Dam 8-2-95, Habitat
85. Peach Springs Wash 8-2-95, Habitat
86. Peach Springs Wash 8-2-95, Habitat
87. Mesquite Springs 8-16-95, Habitat
88. Mesquite Springs 8-16-95, Habitat
89. Mesquite Springs 8-16-95, Habitat
90. Diamond Creek Road 8-16-95, Habitat
91. Diamond Creek 8-16-95, Habitat
92. Pinnacle Tank 8-17-95, Habitat
93. Pinnacle Tank 8-17-95, Habitat
94. Travertine Canyon 3-25-93, Habitat
95. Travertine Canyon 3-25-95, Habitat
96. Spencer Creek 4-1-95, Habitat
97. Lost Creek 4-2-93, Habitat
98. Peach Springs Dam 3-12-94, Habitat
99. Albers Wash 8-30-94, Habitat
100. Albers Wash 8-30-94, Habitat
**101. Park Dam, Habitat
102. Park Dam, Habitat
103. Milkweed Canyon,
104. Milkweed Canyon, Habitat
105. Milkweed Canyon, Habitat
106. Milkweed Canyon, Habitat
107. Milkweed Canyon, Habitat
108. Milkweed Canyon, Habitat
110. Milkweed Canyon, Habitat
111. Milkweed Springs, Habitat
112. Milkweed Springs, Habitat
113. XI Tank, Habitat
114. XI Tank, Habitat
115. XI Tank, Habitat
116. XI Tank, Habitat
117. XI Tank, Habitat
118. XI Tank, Habitat
119. XI Tank, Habitat
120. Youth Camp Tank, Habitat
121. Youth Camp Tank, Habitat
122. Youth Camp Tank, Habitat
123. Park Dam, Habitat
124. Leopard Frog Photo, RM -9.1 Colorado River
125. Leopard Frog Photo, RM -9.1 Colorado River
126. Leopard Frog Photo, RM -9.1 Colorado River
127. Leopard Frog Photo, RM -9.1 Colorado River

Appendix B. Survey and Identification Techniques Presented by Mike Sredl Arizona Game Fish Department, July 29-30, 1993

Identification and Survey Techniques for Ranid Frogs and Other Reptiles and Amphibians of Special Concern on the Hualapai Reservation

July 29-30, 1993

Mike Sredl, Amphibians and Reptiles Field Projects Coordinator
Nongame Branch, Arizona Game and Fish Department

A. Introduction

1. Loss of Biodiversity / Amphibian Decline
2. Herp projects of AGFD

B. Leopard Frogs

1. *Rana pipiens* Complex - a brief history
2. Leopard Frog Identification: visual aids - slides, keys, and preserved material
   a) Using materials provided, you will be able to identify ranids of the Hualapai Reservation
   b) Adults (live, slides, and preserved material)
   c) Tadpoles (pictures and preserved material)
3. Leopard Frog Habitat
   a) Range-wide distribution
   b) Arizona distribution
   c) Hualapai Reservation - known localities
4. Survey Techniques
   a) Searching and Capturing adult frogs and tadpoles
   b) Information to collect
      1) Occurrence
      2) Populations where the habitat may undergo a significant change
      3) Populations with high mortality

C. Arizona Toad

a) Searching and Capturing adult toads and tadpoles

b) Information to collect

1) Occurrence

2) Populations where the habitat may undergo a significant change

3) Populations with high mortality

D. Narrow-headed Garter Snake and Mexican Garter Snake

1. Arizona Garter Snakes - an overview
2. Garter Snake Identification: visual aids - slides, field guides, and preserved material

a) Using materials provided, you will be able to identify Arizona garter snakes of the Hualapai Reservation

b) Key characteristics (field guides, slides, and preserved material)

3. Garter Snake Habitat / Distribution

a) Habitat

b) Range-wide distribution

c) Arizona distribution

d) Hualapai Reservation - known localities

4. Survey Techniques

a) Searching and capturing garter snakes

b) Information to collect

1) Occurrence

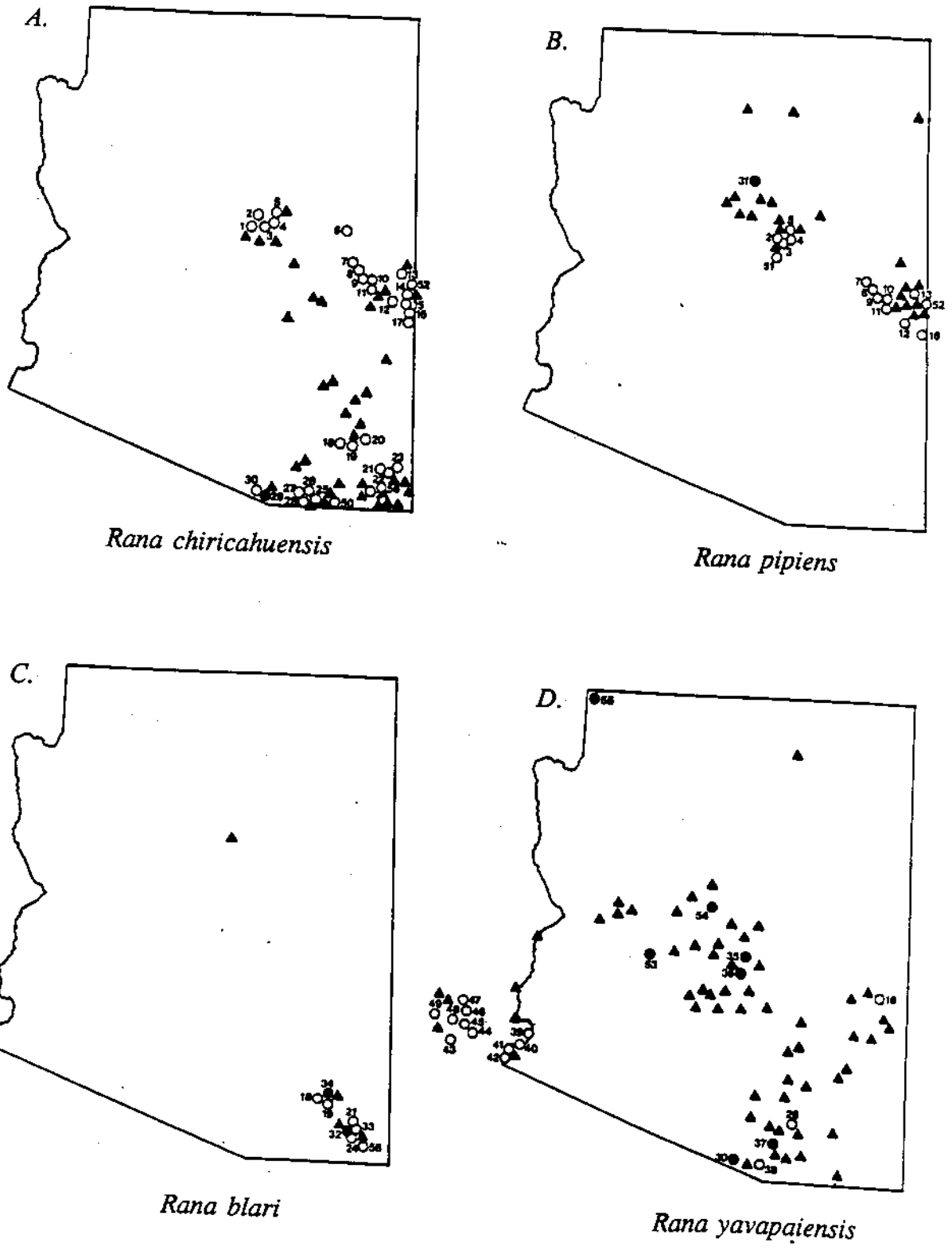
2) Locality

3) Populations where the habitat may undergo a significant change

E. Additional sources of information

G. Field Trip (July 30)

Figure 1. Distribution of Arizona leopard frogs (modified from Clarkson and Rorabaugh 1989).



Rana chiricahuensis

Rana pipiens

Rana blari

Rana yavapaiensis

Rana berlandieri: This species is exotic to Arizona introduced around 1965. As of 1984 it had been found in the Gila River from its confluence with the Colorado River to southwest of Buckeye, Maricopa Co., and the Colorado River below the Colorado-Gila confluence (see Platz

True Frogs of Coconino National Forest

Michael Sredl and Jeff Howland
Arizona Game and Fish Department

True frogs, or ranids, may be distinguished from other frogs of the area by their ability to leap great distances (often to water or cover), smooth skin, and well-developed webbing on hind limbs. They often possess paired, glandular ridges, or dorsolateral folds, running along each side of the back, may be poorly defined (fig. 1).

1A. **Dorsolateral folds poorly defined or absent; eardrum large** (as large or larger than eye) **with conspicuous fold from eye around the eardrum**; body lacking spots with well defined borders (fig. 2)

. . . . . bullfrog (*Rana catesbeiana*)

1B. **Dorsolateral folds well-developed at least on anterior and middle of body**; prominent dorsal spots with well defined borders (fig.3)

. . . . . 2 (leopard frog)

2A. **Dorsolateral folds well-developed and continuous; posterior thigh with dark spots**; dorsal spots with light, conspicuous halos

. . . . . northern leopard frog (*R. pipiens*)

2B. Dorsolateral folds discontinuous and broken into short segments toward rear; dorsal spots usually lack halos or halos poorly defined

. . . . . 3.

3A. **Posterior thigh "salt and pepper" - small white dots each on a tubercle scattered over dark ground color**; dorsal spots small, numerous; a stockier frog with shorter limbs and blunter snout than other leopard frogs

. . . . . Chiricahua leopard frog (*R. chiricahuensis*)

3B. **Posterior thigh with reticulate pattern that has more dark than light** (contrast between dark and light areas not great); **reticulation with distinct margins; yellow in axillary region;**

. . . . . lowland leopard frog (*R. yavapaiensis*)

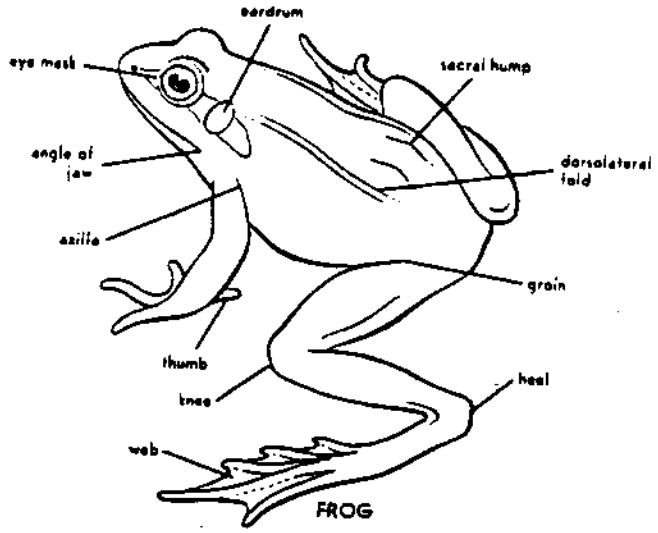


Figure 1. External anatomy of frogs and toads (from Stebbins 1985).

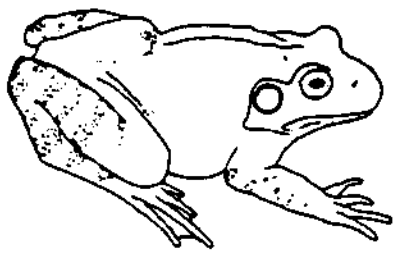


Figure 2. Bullfrog (modified from Stebbins 1985).

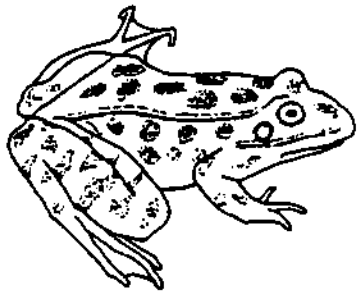


Figure 3. Leopard frog (modified from Stebbins 1985).

Characteristics of Arizona Leopard Frogs

Species	Above							Posterior (concealed) Thigh	Below	Male Oviduct	Misc
	Dorsal Coloration	Dorsal Spots	Dorsolateral Folds	Supralabial Stripe	Snout Spot	External Vocal Sacs	Tympanum Spot				
Rio Grande leopard frog *Rana berlandieri*	grayish brown, brownish olive to green; even blue-green or bronze	light halo	*segmented in front of groin;* displaced medially toward rear	incomplete; wide, light-colored; fades or absent in front of eyes	usually absent	yes	usually absent	reticulation on posterior thigh bold and contrasting	dusky, especially on chest; may be mottled; groin yellow	present	*eyes large*; body robust; lower lip frequently mottled
plains leopard frog *R. blairi*	generally pale colored; light buffy brown to dull green with brown to olive-green spots	halos narrow or absent	*usually not continuous* (segmented on lower back); displaced medially toward rear	complete; whitish stripe	usually present	yes	*well defined*	less contrasting than *berlandieri*; reticulation more light than dark with indistinct margins	white, sometimes with fine dark mottling on throat; yellow may be present in groin;	usually absent	variable
Chiricahua leopard frog *R. chiricahuensis*	greenish or brown; face usually green	usually lack halos; spots smaller and more numerous than in other leopard frogs	*usually broken into short segments* and displaced medially toward rear	diffuse or absent in front of eyes; incomplete	variable	yes, pea-sized	usually absent	*"salt and pepper", small white dots each with a tubercle* scattered over dark ground color	dull whitish or yellowish; yellow in groin and on lower abdomen; usually with gray mottling on throat and chest	variable	rounded head, shorter limbs and upturned eyes; skin rougher with more tubercles
northern leopard frog *R. pipiens*	green or brownish	usually well defined halos; *pale bordered oval or round dark spots on its back*	well defined and are *continuous and not displaced medially* toward rear	usually complete; whitish stripe	usually present	no	nearly always absent	dark spots on lighter ground color	white to cream	usually present	-
lowland leopard frog *R. yavapaiensis*	tan, gray-brown on light gray-green	usually lack light halos	broken into short segments and displaced medially toward rear	incomplete; usually vague	usually absent	no	faint	*reticulation* with distinct upper margin; less diffuse, less contrasting than *berlandieri*	yellow in groin, color often extends onto belly and underside of legs; tend to lack chin mottling	usually absent	tuberculate skin as in *chiricahuensis*

True Toads of Coconino National Forest

Michael Sredl
Arizona Game and Fish Department

True toads, may be distinguished from other anurans (=frogs and toads) of Coconino National Forest (CNF) by the presence of parotoid glands (round or oval glands located behind the eye, figure 1). True toads, unlike true frogs, have warty skin and are not great leapers; they often walk rather than jump and, if they jump, they are unable to jump long distances (a typical leap may be less than 25-50 cm or 10-20 inches). Except when breeding, toads may be found far from water. If your anuran has parotoid glands, you've got a true toad!

1A. **Parotoid glands round** (fig. 1)
. . . . . red-spotted toad (*Bufo punctatus*)

1B. Parotoid glands oval (fig. 1)
. 2

2A. Well-developed cranial crests
. 3

2B. **Weakly developed cranial crests**; middorsal stripe poorly developed or absent; light-colored bar across the head, including the anterior of the eyelids; anterior of the parotoid glands also pale
. . . . . Arizona toad (*B. microscaphus*)

3A. **Cranial crests divergent toward the rear and convergent toward the front of the animal** (fig. 2); paired dark blotches down back; middorsal stripe, if present, faint
. . . . . Great Plains toad (*B. cognatus*)

3B. **Cranial crests form right angle and do <u>not</u> converge** (fig. 2); middorsal stripe whitish and conspicuous
. . . . . Woodhouse toad (*B. woodhousei*)

Note: The bright yellow feet and light eye bar make metamorph Arizona toads relatively easy to distinguish from metamorphs of other CNF anurans.

Ecological Information for Arizona's Leopard Frogs

Breeding seasons in Arizona:

Nearly all of Arizona's leopard frogs are opportunistic breeders to a certain degree. However, there are some trends.

Rana yavapaiensis - early spring
R. pipiens - late spring
R. blairi - early summer
R. chiricahuensis - < 1800 m elevation spring, > 1800 m summer

Elevation trends:

Rana yavapaiensis - 600-1800 m
R. chiricahuensis - 1000-2600 m
R. blairi - 1300-1800 m
R. pipiens - 1800-2750 m

Species found sympatrically in Arizona

R. chiricahuensis - *R. yavapaiensis*
R. chiricahuensis - *R. pipiens*
R. chiricahuensis - *R. blairi*
(*R. yavapaiensis* - *R. pipiens*?)

Glossary

Above:

Dorsal Coloration: the background color of the dorsal surface

Dorsal spots: round or oval spots on the dorsal surface, sometimes surrounded by light halos

Dorsolateral folds: glandular folds that run lengthwise on the dorsal surface, between the midline of the back and the side; may be broken, displaced inward, or medially toward the thigh

Supralabial stripe: a light stripe above the lip, varies in presence, completeness, and intensity

Snout spot: a faint spot in front of the eye

Tympanum spot: a light spot on the external eardrum

Posterior thigh: the portion of the thigh usually concealed when frog is at rest; there is great variation in patterning of the posterior thigh

Below:

Male oviducts: vestigial oviducts, seen only when dissected

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Appendix C. Standard Survey Form

Riparian Herp Survey: Locality Information

Locality:
Date:
Time begin:
Time end:

*Num:
*County:
*QuadName:
*FS_Map:

*TownRange:
*Section:
*TRSComm:
*Latitude:
*Longitude:
*LastObs:
*BestSou:

Directions:

Site Description:

Survey effort:

Conditions:
- T_{air}
- T_{water}
- RH
- pH
- dO_2
- cond
- wind
- weather
- moon

Habitat:
- elev
- depth
- width
- clarity
- water type
- temporal stat
- substrate
- % floating veg
- % sub veg
- % emerg veg
- % perim veg
- canopy/exposure

Predators:
- crayfish
- fish
- bullfrog
- macroinvert
- other

disease

misc

habitat photo Y/N?
photo voucher Y/N?

land owner
land use

Anurans:
- eggs
- tads
- adults

Reptiles:

Other:

Figure 1. Parotoid glands of anurans: (A) rounded, (B) oval, (C) absent (from Miller et al. 1982).

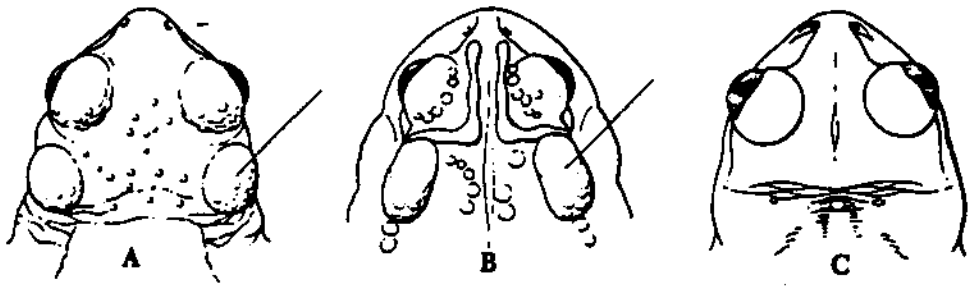
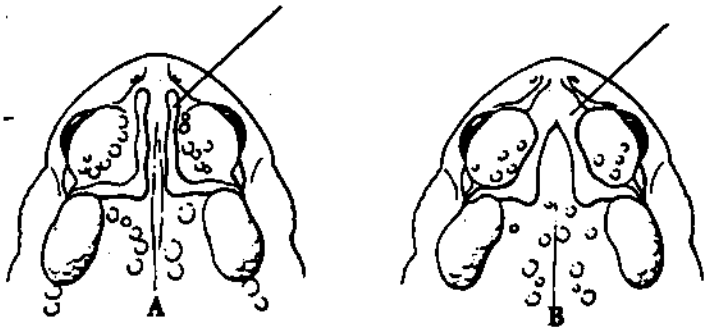


Figure 2. Cranial crests of toads: (A) right angled, non-convergent, (B) convergent (from Miller et al. 1982).



Reference

Miller, D.M., R.A. Young, T.W. Gatlin, and J.A. Richardson. 1982. Amphibians and reptiles of the Grand Canyon. Grand Canyon Natural History Association, Monograph 4.