

**HUALAPAI SPOTTED BAT SURVEYS**

**1994-1996**

**ARIZONA GAME AND FISH DEPARTMENT HERITAGE FUND**

**IIPAM PROJECT #I94011**

**Submitted by:**

**Hualapai Tribe  
Department of Natural Resources  
P.O. Box 300  
Peach Springs, Arizona 86434**

**Submitted to:**

**Arizona Game and Fish Department  
2221 West Greenway Road  
Phoenix, Arizona 85023-4312**

**October 5, 1996**



## **DISCLAIMER**

The findings, opinions, and recommendations in this report are those of the investigators who have received partial or full funding from the Arizona Game and Fish Department Heritage Fund. The findings, opinions, and recommendations do not necessarily reflect those of the Arizona Game and Fish Commission or the Department, or necessarily represent official Department policy or management practice. For further information, please contact the Arizona Game and Fish Department.

## TABLE OF CONTENTS

TABLE OF CONTENTS.....	i-ii
ACKNOWLEDGMENTS.....	iii
INTRODUCTION.....	1
METHODS.....	1-2
RESULTS.....	2-3
FUTURE MANAGEMENT AND RESEARCH.....	3
LITERATURE CITED.....	18

## LIST OF FIGURES

Figure 1. Location map of the Hualapai Spotted bat survey sites, Hualapai Indian Reservation, Arizona, 1994-1996.....	4
---	---

## LIST OF TABLES

Table 1. Location and habitat description of the 26 plateau sites for the Hualapai Spotted bat on the Hualapai Indian Reservation, Arizona, 1994-1996.....	5
Table 2. Location and habitat description of the 10 Colorado river sites for the Hualapai Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	6
Table 3. List of the 15 best plateau sites selected to be re-surveyed for the Hualapai Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	7
Table 4. List of bat species field captured and Anabat 2 detected during Hualapai Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	8
Table 5. Summary of classification and numbers of field captured and Anabat 2 detected bats during Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	9-14
Table 6. Hualapai Spotted bat survey raw data for the 26 plateau locations on the Hualapai Indian Reservation, 1994-1996.....	15

## LIST OF TABLES (cont.)

Table 7. Hualapai Spotted bat survey raw data for the 15 best plateau locations on the Hualapai Indian Reservation, Arizona, 1994-1996.....	16
Table 8. Species composition and average across all plateau locations for Hualapai Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	17
Table 9. Species list and sex ratios of field captured bats across all survey locations for Hualapai Spotted bat surveys on the Hualapai Indian Reservation, Arizona, 1994-1996.....	18

## LIST OF APPENDICES

Appendix A. List of survey locations and legal descriptions of the 26 plateau sites for the Hualapai Indian Surveys.....	20
Appendix B. Key to <u>Myotis</u> species of Northern Arizona.....	22-23
Appendix C. Key to the Bats of the Carlsbad Caverns (N.M.).....	25
Appendix D. Hualapai Bat Collection Data sheets.....	27

## ACKNOWLEDGMENTS

The Hualapai Tribe and Hualapai Department of Natural Resources would like to extend a great deal of gratitude to the Arizona Game and Fish Department and the AGF Heritage Fund staff for its cooperation and help throughout the project. A special "thank you" to Mike O'Farrell of O'Farrell Biological Consulting, Mike Herder of the Bureau of Land Management and Jim Pettersen of Grand Canyon National Park for their technical expertise, time and effort. Finally, a cheer to all the countless volunteers that helped out during those long and tiring spotted bat surveys.

**HUALAPAI SPOTTED BAT SURVEYS**  
**1994-1996**  
**HERITAGE - HIPAM I94011**

**INTRODUCTION**

The Hualapai Indian Reservation located in northwestern Arizona encompasses nearly 1 million acres and 108 miles of the Colorado River within the Grand Canyon corridor. The Hualapai Tribe initiated a bat research program in 1994 with the assistance of the Arizona Game and Fish's Heritage program to gather baseline information on the abundance and diversity of bats in vast rural areas particularly the Spotted bat (*Euderma maculatum*), Red bat (*Lasiurus borealis*), Southwestern myotis (*Myotis auriculus*) and the Western mastiff bat (*Eumops perotis*).

There are currently 28 species of bats which spend at least part of the year in Arizona. There has been no research on the Hualapai Indian Reservation to inventory bat species although there has been studies completed in northwestern Arizona by the Grand Canyon National Park (Pettersen, J., personal comm.) and the Bureau of Land Management (Herder, M., personal comm.).

**METHODS**

**Mist Net Surveys:**

All survey locations were pre-determined on the basis of existing water sources such as earthen tanks, water troughs or perennial springs. Nylon mist nets were set along the water's edge using two rebar (½ in. X 3 ft.), two electrical conduit pipe (¾ in. x 15 ft.) and a hammer. First, the net size and placement of net is selected. All nets are 7 ft. high and vary in length of 18, 30, 42 and 60 ft. The net loops are placed around the electrical conduit pipes securing the net at each end. Next, the two rebars are hammered into the ground and the electrical conduit pipe is inserted over the rebar to keep the mist net/pipes in an upright position. The nets are kept closed until all bird activity stops around the water source which is normally at sundown.

Once the nets are opened and a bat is captured it is carefully and immediately removed from the net. The surveyor remove bats wearing leather gloves to protect his/ her hands from being bitten. Once a bat is removed from the net it is taken to a processing station to be weighed, measured and identified. Once all data is recorded and identification of the bat is complete it is released into a holding container to prevent recapture. Upon completion of the night's survey the captured bats are released.

### Anabat 2 Bat Detector surveys:

The Anabat 2 bat detector system includes a detector, Zero Crossing Analysis Interface Module (ZCAIM) and Anabat 5 software. The system is placed at each location along the beach either overlooking the water or near vegetation in order to detect bats drinking or feeding. This system is used to analyze bat echolocation calls to identify bat species (Titley Electronics, 1996). The survey usually begins at dusk. The surveyor scans the area with the detector in hand and once bats are detected the frequency-time graph is analyzed and the bat is identified.

This type of survey was utilized on the majority of river locations due the ineffectiveness of mist net surveys. The lack of success may be attributed to the vast amounts of water in the area or the relatively small nets in proportion to the canyon corridor.

## **RESULTS**

A total of 44 locations (20 plateau, 10 river and 14 "best" sites) were surveyed for bats on the Hualapai Indian Reservation (Table 1,2 and 3). We were unable to survey the remaining 7 locations identified as survey locations (in the initial proposal) due to the lack of water in those areas. The plateau locations were surveyed using mist nets and the majority of river locations used the Anabat 2 system to detect bats. A total of 19 different species of bats were recorded throughout the Hualapai Spotted bat surveys including the spotted bat, red bat and the Western mastiff bat (Table 4). The Southwestern myotis was the only target species not to have been recorded during the surveys.

### Plateau locations:

A total of 360 bats were captured representing 18 species of bats during the first 20 plateau surveys (Table 6). One male spotted bat was captured at Mexican tank in Prospect Canyon on June 19, 1996. Long-legged myotis, pallid and big-brown bats were the most frequently captured with 62, 69 and 90 recorded, respectively. The cave myotis and Western mastiff bat were the least captured with only one each.

A total of 269 bats were recorded during the next 14 "best" plateau sites (Table 7). Fifteen species of bats were represented including the Hoary bat (*Lasiurus cinereus*) which was not detected during the first surveys. The most common captured bat species were the pallid and big-brown bat with 79 and 58 individuals, respectively. The long-eared, cave, and Yuma myotis and spotted bat were not detected during the last set of surveys.

Overall, a total of 659 individuals were recorded and 19 bat species were represented during 34 surveys (Table 8). The pallid bat and long-legged myotis population account for approximately 45% of the total individuals captured throughout the surveys. The spotted bat only represents only .15% of the total captured population.

### **River locations:**

A total of 3 individuals representing 3 bat species were captured at 4 locations along the Colorado River (Table 5) using mist nets. All the bats were caught at Diamond Creek just upstream from the river.

A total of 8 bat species were detected at the remaining 6 sites using the Anabat 2 system. The spotted bat was detected at 4 of 6 the locations surveyed. The Mexican free-tail bat and Yuma myotis were detected at all 6 river sites. Overall, a total of 10 bat species were detected at the 10 river locations.

### **FUTURE MANAGEMENT AND RESEARCH**

The abundance and diversity of bats have been in decline for many years in the United States largely because of man's activities including mining, recreation, timber harvesting, etc.. Nine bat species designated by the Arizona Game and Fish as "Federal Candidate Species of Arizona" occur within the boundaries of the Hualapai Indian Reservation. Understanding the abundance of these bats and their habitat use and home range is important to understanding their level of endangerment, potential causes of their decline and development of conservation measures are crucial. By initiating the Hualapai bat research program in 1994, the tribe has taken its first step to understanding the basic attributes of their bat population.

However, there is a need to establish an advanced research program to monitor habitat use and home range characteristics of the resident bat population. The Hualapai Tribe will focus its next project to answer some of these questions by utilizing radio telemetry and Anabat II bat detecting system as well as continuing mist net surveys to describe behavior and habitat requirements of bats on the reservation. This will ultimately develop into a management plan providing protection and enhancement of the species. This focus will also fill large gaps in the bat database not only on the Hualapai Indian reservation and the southwest but in the United States in general.