



Inventory for bats (Chiroptera) at Canyonlands National Park, Utah

A Preliminary Report

Submitted to: Elizabeth Nance, National Park Service, Northern Colorado Plateau Network, Moab, Utah

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In Fiscal Year 2004, the Northern Colorado Plateau Network of the National Park Service (NPS) and the Arid Lands Field Station of the U. S. Geological Survey agreed to cooperate on an inventory of bats (Chiroptera) of Canyonlands National Park (CANY). There has been some previous mammal work in CANY and in general the terrestrial, non-volant mammals, especially rodents, are moderately well-known (e.g., Armstrong 1979a, 1979b, 1982, Johnson 1981). Although some information is available on bats from CANY (Armstrong 1974, Bogan, unpublished data), additional work is needed to assess bat occurrence. Information is generally not sufficient to assess if there are selected species of local concern, although bats as a group are of concern.

Available evidence suggests that 16, perhaps 17, species of bats may occur at CANY (Mollhagen and Bogan 1997, Bogan and Ramotnik unpublished reports to NPS; Table 1). The one species not listed in Table 1 is *Myotis lucifugus*, the little brown bat. As noted by Mollhagen and Bogan, the status of this species needs clarification and existing specimens need to be re-examined. At this writing, we are not convinced that this species occurs in CANY but we hope to resolve this question by the end of the study. The remaining 16 species (Table 1) we deem likely to occur based on our previous work in southeastern Utah.

Although bats as a group can be of conservation concern, much of the existing data on supposed population trends is of limited use, either because of methodological problems involved in collecting the data, limited time periods when data were collected, or inadequate sample sizes for statistical analysis (O'Shea and Bogan 2004 and papers therein). We hope our work in CANY will provide some data that will assist NPS in identifying rare or uncommon species which might then become subjects of long-term monitoring so that appropriate data on population trends can be amassed.

This project is one component of a suite of biological inventories being conducted within the Northern Colorado Plateau Network as part of a national emphasis on inventory and monitoring by the NPS. Specifically, this inventory is intended to fill gaps that have been identified in our knowledge of bats in Canyonlands National Park (CANY). All data in this report should be considered preliminary pending final verification of data.

OBJECTIVES

Our goal was to conduct bat inventories at high-priority locations (generally but not exclusively at water sources, primarily open pools of water) on a park-wide basis (all three districts of the park) as well as within specific habitats. Where possible, we also worked at water sources on property adjacent to CANY (mostly Glen Canyon National Recreation Area [GLCA] or Hanksville District of the Bureau of Land Management [BLM]). In general the objectives of the project cannot be accomplished with the use of random surveys and so we worked with staff of NCPN and CANY to help select an initial set of sampling sites for examination.

The overall goals of the bat inventory are:

- 1) To document through existing, verifiable data and new, targeted field investigations the occurrence of at least 90 percent of the species of bats currently estimated to occur in the park;
- 2) To describe the distribution and abundance of bat species of special concern occurring within park boundaries;
- 3) To provide baseline information needed to develop a general monitoring strategy that can be implemented by parks once inventories have been completed;
- 4) To provide data in formats that are compatible with the Inventory and Monitoring Program, and that are easily accessible to park managers, resource managers, scientists and the public.

STUDY DESIGN AND METHODS

The basic inventory methods used in this study are based on, and consistent with, those detailed in the Northern Colorado Plateau Network Inventory Study Plan (USDI, 2000a). During the course of the study we intend to acquire available historical data on status and occurrence of bats at CANY by examining existing specimens where feasible, reviewing available information on bat studies at CANY (lists, data, theses, reports, etc.), and requesting lists of voucher specimens from appropriate museums. Species will be documented through field inventories; photographs, echolocation detection work, reliable reports of species observed by others; species reported by other agencies (e.g., state fish and game departments) and specimen vouchers collected as necessary.

High-priority sites for bat inventory included existing water tanks and pools; selected sites along or across rivers, streams, and arroyos; and other sites of likely bat occurrence. In general we did not search for roosts, although information on roosts will be sought from NPS personnel. The primary method of data collection relied on setting mist nets over water sources. We will also record bat echolocation calls at selected sites (e.g., along large bodies of water) in 2005 for later analysis. All sites will be evaluated during field studies and subsequent analyses for their potential to serve as long-term monitoring sites because of their uniqueness in terms of species composition, endemism, or presence of sensitive species.

In 2004 our methods relied on mist netting of open water sources on the park, and some sites on adjacent lands, each month from May through September during the time of the new moon when nights are darkest. We were unable to record bat calls in 2004 due to a delay in delivery of an Anabat recording system. This system will be deployed in 2005 and will be of particular use in the Island in the Sky and Maze districts of the park where water is limited.

Mist nets were deployed across and around bodies of water and sometimes in perceived flyways to capture bats coming in to drink or feed on insects flying over the water (Kunz and Kurta 1988). Size of nets ranged from 6-20 m (18-60 ft) and number of nets varied depending on the area of the body of water. Mist nets were set up shortly before sunset and tended for several hours until activity declined; in some cases nets were tended throughout the night. Nets were never left untended. Mistnetting for bats is especially

effective when sources of water in the landscape are limited, as this causes bats to be concentrated in a relatively small area where they are more susceptible to capture. Bats were quickly removed from nets following capture, data on time, species, sex, reproductive condition, and comments were collected, and bats were released unharmed within minutes of capture. Data were entered into an Access database provided by the network.

Each site where we netted was given a waypoint name, both a “shorthand” and more formal name, and GPS coordinates, elevation, EPE, and park district were recorded. In general, the GPS units used were Garmin 12s. The map datum was NAD27. Permits were provided by the state of Utah, CANY, and GLCA.

RESULTS

Following an initial coordination meeting in Moab on 18 May 2004, we commenced work in the Needles District; we returned to the park each month throughout the summer just before or during the new moon (Table 2). We amassed a total of 131 person-days in the field and a total of 96 net-nights of effort on the park. All observers were experienced and knowledgeable in capturing, handling, and identifying bats. Field work will recommence in May 2005 .

We netted bats at a total of 20 different sites (Table 3) in 2004. Four of these sites are off the park but nearby (e.g., French Spring at GLCA, Burro Seep on BLM lands). These sites were netted as they offered the opportunity to obtain information on bats when no nearby water source occurred on the park. We do not know if bats netted at off-park sites occur or roost on the park but there is a high likelihood that they do. Nor is there assurance that bats captured on the park aren’t foraging or roosting off the park.

Our efforts in 2004 resulted in capturing 1010 individuals of 14 (87.5%) of the 16 species believed to occur at CANY (Table 4). Additionally, we heard and identified the audible cries of another species, the spotted bat. Thus, we have been able to document the occurrence of 15 (94%) of the 16 species. Our average catch per night was 27 individuals of over 4 species; the maximum catch on a single night was 102 individuals of 9 species (at the junction of Salt and Horse creeks in the Needles District in June). Only once did we not capture any bats (Granary Spring, BLM, in June).

The most abundant species was the western pipistrelle (534 individual captures, Table 4), followed by the pallid bat (183) and California myotis (123). All three are arid-adapted species and would be expected to be common at CANY. There were six species for which we netted from 10 to 47 individuals and five species for which we netted fewer than 10 individuals. These least abundant species are hoary bat (3 captures), silver-haired bat (9), long-eared myotis (6), big free-tailed bat (2), and Mexican free-tailed bat (1). Perhaps not surprisingly, all but the long-eared myotis are known to be migratory in Utah although male hoary and silver-haired bats are resident in the mountains in the summer and maternity colonies of big free-tailed bats are known from sites near CANY (e.g.,

Arches National Park and Natural Bridges National Monument, Bogan et al., unpublished report to NPS). The status of the Mexican free-tailed bat in Utah is poorly unknown.

The most prevalent species across sites and netting episodes was the California myotis (84.2% of all netting episodes, Table 4), followed by the western pipistrelle (76.3%) and pallid bat (71.1%). Again, there was a suite of species that was present at from 15 to 44% of episodes, including Allen's big-eared bat (37%), a species often regarded as uncommon. We captured this species every month and at most sites. The least prevalent species included the hoary bat, silver-haired bat, and both species of free-tailed bats. As noted, these species are migratory and numerically uncommon. It also is possible that some of these species find it difficult to maneuver at many of the relatively small pools of water and seek water and insects elsewhere.

Digital photographs of netting sites and selected individuals of all but one captured species (Table 1) were taken. These images will be provided with later project reports. One museum voucher specimen of a Townsend's big-eared bat was prepared. This bat suffered a wing injury when it struck the net or while it was entangled in the net and was sacrificed. Overall, 1009 bats were captured and released unharmed.

It is, perhaps, a matter of opinion how many species new to the park were documented during 2004 as it depends on what point in time is taken as a starting point. The now dated work by Durrant (1952) does not list any records from areas that are in CANY although several species were taken at a point 5mi E Moab, including the small-footed myotis. Given our failure to take this species in the area, this specimen needs to be re-examined. Relative to Durrant, we have documented 14-15 species. Armstrong (1982:41) considered 11 species were documented from the park with the possibility that an additional seven species also might occur. One species of interest is the little brown bat, which he took at French Spring (GLCA). We will re-examine this specimen to verify its identity. In the species accounts Armstrong (1982), appears to unequivocally consider only the following eight species to have been documented from the park: long-eared myotis, fringed myotis, California myotis, western pipistrelle, big brown bat, Townsend's big-eared bat, Allen's big-eared bat, and pallid bat. He notes that the hoary bat was observed at Cave Spring.

Thus, using Armstrong (1982) as a reliable and moderately recent starting point, we have documented somewhere between three to seven additional species for the park. Conversely, our recent work on bats in southeastern Utah strongly suggested that the bat fauna of CANY was likely to consist of 16 to 17 species and to date our results are consistent with this hypothesis.

In terms of bat habitat at CANY, several sites stand out as being areas where bats congregate. Preeminent among them is lower Salt Creek, starting at the large pool above Peekaboo campground and extending downstream to the junction of Salt and Horse creeks. Almost 60% of individuals captured came from our four sites in this area. Undoubtedly, there is more water available to net in this area than most other areas of the park and we exploited this abundance of water. The fact that bats were often abundant in

lower Salt Creek, even though water also was abundant, suggests that it may be the presence of nearby roosting sites and good foraging areas that make the area attractive to such an array of bats. Other sites of note are the alcove pond on the 2.3 mile loop trail (one night of 46 bats), the graywater pool at the maintenance facility (29 and 77 bats on consecutive nights), Burro Seep (27), lower Horseshoe Canyon (2, 30), and Robber's Roost (10, 26, and 35 bats on different occasions). Some of these sites are relatively isolated and may provide the only water available in the immediate area.

Likewise, the sites in lower Salt Creek tended to exhibit relatively high species diversity (2-9 species, average of 6); other sites with good diversity included Water Canyon, "2.3mi loop," Burro Seep, Horseshoe 1, Lavender 1, and Robber's Roost. Tim Graham first alerted us to the uniqueness of Salt Creek; the presence of a large and diverse bat community there is worth noting in the development of future management plans.

PLANNED WORK IN 2005

In 2005 we will conduct acoustic surveys using a bat detector and zero-crossing analysis interface module (ZCAIM; Anabat II hardware, Anabat software version 6.3f; Titley Electronics, Ballina, New South Wales, Australia) with a compact flashcard to record echolocation calls which can then be downloaded to a computer. A bat detector produces audible output from the ultrasonic calls emitted by echolocating bats. The ZCAIM interfaces the audio-frequency signal from the detector to the storage media. Analyses will use Analook software (version 4.8n, Titley Electronics, Ballina, New South Wales, Australia). The frequency-time display generated by the software from detected echolocation call sequences can then be used to identify species based on qualitative analysis of call parameters compared to reference calls from known individuals. This method is useful when no water is available over which to net or when water is too ample to effectively concentrate bats over a small enough area for capture. Acoustic surveys are also useful for detecting species that are not easily captured in mist nets.

Additionally, we plan on visiting selected museums to examine specimens of bats from CANY to confirm identifications, focusing on catching the two species we have not yet captured (western small-footed myotis and spotted bat, although we have heard the latter species), and working in areas that we were not able to study in 2004.

ACKNOWLEDGMENTS

We greatly appreciate the knowledgeable assistance of Charlie Schelz (CANY) in helping to identify possible netting sites and for assistance in obtaining permits at the park. Others at CANY who provided assistance include Gary Cox, Cynthia Beyer, and Bahia Mar at the Hans Flat Ranger Station, who provided insights and directions to netting and camping sites on the west side of the Colorado River. Bill Sloan assisted us with logistics in the Needles and shared his knowledge of some of the park's wildlife. Elizabeth Nance, Margaret Beer, and Thomas O'Dell in the NCPN first approached us about this work, helped develop the Interagency Agreement between NPS and USGS that supports the project, and kept us in tune with network needs. Margaret also developed

the Access database and was helpful in responding to our various requests for changes. Suzanne Grayson, Bureau of Land Management, Hanksville, provided local knowledge on netting sites on BLM lands and also helped with logistics. Tim Graham (USGS) not only helped with logistical matters but enlightened us on the ecology of the park, a result of his years of research in the area. Our efforts were greatly enhanced by the assistance of other biologists from the Arid Lands Field Station, including Keith Geluso, Justin Hoffman, Rusty Ligon, Jeff Mink, Cindy Ramotnik, and Christa Weise. In particular, the aging PIs appreciate the extraordinary willingness of Dave Worthington of Capital Reef National Park to join us in the field, carry poles on formidable hikes, remain in good humor throughout, and provide unexpected culinary delights at surprising times.

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Table 1. Current master list of bats (Chiroptera) of Canyonlands National Park and status of documentation following the 2004 field season. Scientific and common names follow Baker et al. 2003). All but two species were captured, as noted.

Myotis californicus (California myotis)
M. ciliolabrum (Western small-footed myotis) Not captured in 2004
M. evotis (Long-eared myotis)
M. volans (Long-legged myotis)
M. thysanodes (Fringed myotis)
M. yumanensis (Yuma myotis)
Lasionycteris noctivagans (Silver-haired bat)
Lasiurus cinereus captured, (Hoary bat) Captured but not photographed
Pipistrellus hesperus (Western pipistrelle)
Eptesicus fuscus (Big brown bat)
Euderma maculatum (Spotted bat) Not captured but heard audible cries
Corynorhinus townsendii (Townsend's big-eared bat)
Idionycteris phyllotis (Allen's big-eared bat)
Antrozous pallidus (Pallid bat)
Tadarida brasiliensis (Mexican free-tailed bat)
Nyctinomops macrotis (Big free-tailed bat)

Table 2. Field schedule for 2004 bat inventories, in chronological order, indicating dates, districts visited, observers, and effort. Sampling methods in 2004 consisted of mist nets. Dates include travel time from Albuquerque.

Dates 2004	Districts visited	Observer(s)	Person days	Net nights
17-27 May	Needles, Maze, Island (recon only)	Bogan, Mollhagen, Worthington	27	15
11-21 June	Maze, Needles, Island (recon only)	Mollhagen, Bogan	22	17
8-14 July	Needles, Maze	Bogan, Ramotnik, Geluso, Ligon, Hoffman, Mink	40	25
14-21 August	Needles, Maze	Mollhagen, Geluso, Weise	24	23
9-16 Sept.	Needles, Maze	Bogan, Mollhagen, Worthington	18	16
		Totals	131	96

Table 3. Descriptors for the 20 capture sites visited in the 2004 field season in and near Canyonlands National Park. All sites were netted at least once. The same waypoint name for each site is utilized on GPS devices, capture summary (Table 3), and original datasheets.

	Waypoint	Name	Unit	Easting	Northing	EPE	Elev (ft)	Elev. (m)	Publication Locality
1	2PONT3	Pool on 2.3 mi. Reach	NEED	06 03 300	42 20 114	10M	5240	1597	Utah: San Juan Co., Canyonlands NP, Big Spring Canyon, 5240'.
2	BIGSG1	Big Spring Canyon	NEED	06 03 489	42 26 020	10M	4800	1463	Utah: Wayne Co.: Canyonlands NP, Big Spring Canyon, 4800'.
3	BUROSP	Burro Seep	BLM	05 71 693	42 36 559	Map	6035	1839	Utah: Wayne Co.; Horseshoe Canyon, Spur Fork, Burro Seep, 6035'
4	DUGTMN	Mine Entrances on Dugout Ranch	PRIV	06 25 188	42 15 189	14M	5275	1608	Utah: San Juan Co., Indian Creek, mine entrances on former Dugout Ranch, 5275'.
5	FRCHSG	French Spring	GCNRA	05 74 649	42 32 189	6M	6530	1990	Utah, Wayne Co., Glen Canyon National RA, Millard Canyon, French Spring, 6530'.
6	GRANSG	Granary Spring	BLM	05 62 095	42 43 810	7M	5850	1783	Utah: Wayne Co., San Rafael Desert, Granary Spring, 5850'.
7	GRWATR	Graywater Pond at Maint. Facility	NEED	06 07 517	42 23 332	8M	4995	1522	Utah: San Juan Co., Canyonlands NP, SE flank Squaw Butte, 4995'.
8	HRSHU1	Horseshoe Canyon, Lower 1	MAZE	05 70 628	42 58 406	7M	4680	1426	Utah: Wayne Co., Canyonlands NP, Horseshoe Canyon, 4680'.
9	HRSHU2	Horseshoe Canyon, Lower 2	MAZE	05 70 749	42 58 431	11M	4650	1417	Utah: Wayne Co., Canyonlands NP, Horseshoe Canyon, 4650'.
10	LAVEN1	Lavender Canyon, West Fork	NEED	06 14 743	42 06 627	11M	5590	1704	Utah: San Juan Co., Canyonlands NP, W. fork Lavender Canyon, 5590'.
11	LITSG1	Little Spring	NEED	06 05 361	42 24 570	5M	4965	1513	Utah: San Juan Co.; Canyonlands NP, Little Spring Canyon, 4965'.
12	LITSG2	Little Spring Canyon Bridge	NEED	06 05 177	42 24 298	5M	4995	1522	Utah: San Juan Co., Canyonlands NP, Little Spring Canyon, 4995'.
13	LOSCN1	Lost Canyon	NEED	6 07 541	42 19 942	5M	5080	1548	Utah: San Juan Co., Canyonlands NP, Lost Canyon, 5080'.
14	ROROSG	Robbers Roost Spring	BLM	05 54 846	42 45 722	7M	5430	1655	Utah: Wayne Co.; San Rafael Desert, Robbers Roost Spr., 5430'.
15	SALTC1	Salt Creek 1	NEED	06 09 618	42 19 538	8M	4970	1515	Utah: San Juan Co., Canyonlands NP, Salt Creek, 4970'.
16	SALTC2	Salt Creek 2	NEED	06 09 445	42 19 456	5M	5060	1542	Utah: Wayne Co.: Canyonlands NP, Salt Creek, 5060'.
17	SALTC3	Salt Creek 3	NEED	06 08 971	42 18 981	7M	5065	1544	Utah: San Juan Co., Canyonlands NP, Salt Creek, 5065'.
18	SALTHO	Salt, Horse Canyons, jct.	NEED	06 09 585	42 20 429	12M	5005	1526	Utah: San Juan Co.; Canyonlands NP, Salt Creek, 5005'.
19	SQUCN1	Squaw Canyon	NEED	06 06 008	42 22 303	6M	5040	1536	Utah: San Juan Co.; Canyonlands NP, Squaw Canyon, 5040'.
20	WTRCN1	Water Canyon 1	MAZE	05 69 932	42 56 781	7M	4860	1481	Utah: Wayne Co.; Canyonlands NP, Water Canyon, 4860'.

Table 4. Capture summary for bats in 2004 at Canyonlands National Park. Descriptors of the waypoints (capture sites) are in Table 3. Multiple visits to each site are arranged in chronological order. Bat species captured (in alphabetical order) are identified as follows: Anpa, *Antrozous pallidus*; Coto, *Corynorhinus townsendii*; Epfu, *Eptesicus fuscus*; Euma, *Euderma maculatum*; Idph, *Idionycteris phyllotis*; Laci, *Lasiurus cinereus*; Lano, *Lasionycteris noctivagans*; Myca, *Myotis californicus*; Myci, *M. ciliolabrum*; Myev, *M. evotis*; Myth, *M. thysanodes*; Myvo, *M. volans*; Myyu, *M. yumanensis*; Nyma, *Nyctinomops macrotis*; Pihe, *Pipistrellus hesperus*; and Tabr, *Tadarida brasiliensis*. The columns on the right side of the table indicate the total number of bats and total bat species captured for each combination of locality and date. Summaries at the bottom of the table include the total individuals of each species captured, the percentage that species comprises of the 1,010 total bats captured, and the percentage of times at least one individual of that species was captured among the 38 combined sampling locations and dates (prevalence). Also at the end of the table is a small matrix describing the maximum, average, and minimum sampling event. Note that all data are preliminary.

Waypoint	Date	Anpa	Coto	Epfu	Euma	Idph	Laci	Lano	Myca	Myci	Myev	Myth	Myvo	Myyu	Nyma	Pihe	Tabr	Bats Capt.	Spec. Capt.
2PONT3	11-Jul-04	18	1	16	-	2	-	-	4	-	-	1	-	-	-	4	-	46	7
	17-Aug-04	1	-	-	-	-	-	-	4	-	-	-	-	-	-	7	-	12	3
	11-Sep-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	13	1
BIGSG1	8-Jul-04	-	-	-	-	-	-	-	2	-	-	-	-	-	-	6	-	8	2
BUROSP	14-Sep-04	4	-	1	-	-	-	-	2	-	-	-	1	1	-	18	-	27	6
DUGTMN	12-Sep-04	-	6	-	-	-	-	-	4	-	-	1	-	-	-	-	-	11	3
FRCHSG	19-Aug-04	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	3	3
	15-Sep-04	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2	2
GRANSG	14-Jun-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
	19-Aug-04	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	1
GRWATR	11-Jul-04	11	-	-	-	-	-	-	5	-	-	-	-	-	-	13	-	29	3
	12-Jul-04	27	-	-	-	-	-	-	6	-	-	-	-	-	-	44	-	77	3
HRSHU1	20-Aug-04	4	1	-	-	-	-	-	2	-	-	1	-	2	-	5	-	15	6
HRSHU2	13-Sep-04	12	-	-	-	2	-	-	2	-	-	2	-	-	-	12	-	30	5
LAVEN1	19-Jun-04	5	-	2	-	1	-	-	2	-	-	-	1	-	-	9	-	20	6
LITSG1	21-May-04	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	1
LITSG2	11-Jun-04	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
LOSCN1	11-Jul-04	-	-	-	-	1	-	-	3	-	1	-	-	-	-	-	-	5	3
ROROSG	13-Jun-04	-	1	-	-	-	-	-	4	-	-	4	-	1	-	-	-	10	4
	18-Aug-04	4	-	-	-	-	-	-	15	-	-	3	-	2	-	2	-	26	5
	15-Sep-04	9	1	-	-	1	-	-	10	-	-	13	-	-	-	1	-	35	6

Table 4 continued.

Table 4 continued.

Waypoint	Date	Anpa	Coto	Epfu	Euma	Idph	Laci	Lano	Myca	Myci	Myev	Myth	Myvo	Myyu	Nyma	Pihe	Tabr	Bats Capt.	Spec. Capt.
SALTC1	22-May-04	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	3	3
	16-Jun-04	4	-	1	-	-	-	2	-	-	1	-	-	-	-	13	-	21	5
	10-Jul-04	4	-	-	-	-	-	-	6	-	1	2	-	-	-	22	-	35	5
SALTC2	18-Jun-04	3	-	-	-	-	-	-	5	-	-	1	-	2	-	51	-	62	5
	10-Jul-04	3	-	-	-	-	-	-	-	-	-	-	-	-	-	34	-	37	2
	14-Aug-04	12	-	-	-	1	-	-	5	-	1	2	4	-	1	56	-	82	8
	9-Sep-04	-	2	-	-	1	-	-	3	-	1	2	1	1	-	6	-	17	8
SALTC3	17-Jun-04	3	-	-	-	-	-	-	-	-	-	-	1	1	-	27	-	32	4
	13-Jul-04	21	1	1	-	-	1	-	6	-	-	3	-	-	1	27	-	61	8
	16-Aug-04	1	-	1	-	2	-	-	6	-	1	3	-	-	-	20	-	34	7
	10-Sep-04	-	-	-	-	-	-	-	2	-	-	-	-	-	-	7	-	9	2
SALTHO	20-May-04	4	-	-	-	2	-	1	3	-	-	1	-	1	-	14	-	26	7
	15-Jun-04	2	-	1	-	2	2	6	2	-	-	-	2	3	-	82	-	102	9
	10-Jul-04	15	2	5	-	5	-	-	8	-	-	1	-	-	-	31	-	67	7
SQUCN1	19-May-04	1	-	2	-	1	-	-	2	-	-	1	-	-	-	6	-	13	6
WTRCN1	24-May-04	6	-	2	-	-	-	-	1	-	-	-	-	1	-	-	1	11	5
	9-Jul-04	6	-	5	-	3	-	-	2	-	-	6	-	-	-	2	-	24	6
Total		183	15	37	0	25	3	9	123	0	6	47	10	15	2	534	1	1010	
% of Grand Total		18.12	1.49	3.66	0.00	2.48	0.30	0.89	12.18	0.00	0.59	4.65	0.99	1.49	0.20	52.87	0.10		
Prevalence (%)		71.1	21.1	28.9	0.0	36.8	5.3	7.9	84.2	0.0	15.8	44.7	15.8	26.3	5.3	76.3	2.6		

	Bats	Spec.
Maximum Catch	102	9
Average Catch	26.6	4.4
Minimum Catch	0	0

(Next page) Fig. 1. Portrait of big free-tailed bat, *Nyctinomops macrotis*. This young-of-the-year male was captured on 14 August at 2211h at netting site Salt Creek 2 in lower Salt Creek, Needles District.

