Survey of the Bat Fauna Of the Yukon Territory 1997 Field Studies

A Survey of the Bat Fauna of the Yukon Territory

Brian G. Slough
35 Cronkhite Road
Whitehorse, YT Y1A 5S9
Phone: (867) 668-3295
Fax: (867) 633-3890
E-mail: bslough@yknet.yk.ca

Prepared for:
Northern Research Institute
Yukon College
Box 2799
Whitehorse, YT Y1A 5K4

February 25, 1998

Table of Contents

Introduction

Bats are a neglected yet vitally important component of many ecosystems. Almost ¼ of all mammal species are bats (about 950 species worldwide). Our local bats are insectivorous with a single little brown myotis eating as many as 1200 mosquito-sized insects in 1 hour. A nursing mother will eat up to 4500 insects in a night. Bats are declining worldwide due to habitat loss, the use of pesticides and wanton destruction by humans fueled by misinformation and fear. We have virtually no baseline data on Yukon bats that can be used to evaluate abundance, species richness, population trends, habitat use, or the impacts of human activities. Previous work on bats in the Yukon has included a taxonomic and distributional study by Youngman (1975) and the compilation of unpublished observations from various sources by the author. Youngman's (1975) work was based on 17 museum specimens and a few sightings.

Information on bats is needed for management purposes. Since bats are migratory and likely hibernate in Alaska (AK), British Columbia (BC) or other jurisdictions, inter-jurisdictional management efforts are required. There is also a steady demand for information on bats by the Yukon public for education, interpretive programs, bat conservation (i.e., construction of bat houses) and the removal of unwanted bats from buildings.

The primary objectives of the study were to conduct a systematic survey of the bat fauna of the Yukon to determine species composition and distribution. The little brown myotis (*Myotis lucifugus*) has been found in several Yukon (YT) locations as far north as Mayo and Dawson City. No other bat species have been identified but several species recently found in southeast AK (Parker 1996) and the Liard basin in northern BC (Wilkinson et al. 1995) likely range into the YT. As well, 3 bat species have been documented in the Northwest Territories (NT) (Fournier 1997).

Keen's long-eared myotis (*M. keenii*) is found in coastal southeast AK and has been observed inland at Telegraph Creek, BC (Nagorsen and Brigham 1993). The silver-haired bat (*Lasionycteris noctivagans*), California myotis (*M. californicus*) and long-legged myotis (*M. volans*) are found in southeast AK and northern BC. The big brown bat (*Eptesicus fuscus*), northern long-eared myotis (*M. septentionalis*) and western long-eared myotis (*M. evotis*) are also found in northern BC. The little brown myotis, northern long-eared myotis and, rarely, the hoary bat (*Lasiurus cinereus*) also occur in the southern NT (Fournier 1997). The big brown bat, found in northern AB (van Zyll de Jong 1985) is also expected to occur there.

Other study objectives were to investigate diurnal behaviour, migration routes, habitat associations, including natural and man-made roosting sites of maternal colonies and males, foraging sites, flyways (areas that bats funnel through while commuting from roosting to foraging sites) and hibernacula.

Materials and Methods

Many of the materials and methods described below are discussed in detail in Kunz (1988). The research protocol closely followed the standardized inventory methodologies for bats in BC (Garcia et al. 1997). The author attended a bat conservation and management workshop (sponsored by Bat Conservation International), May 27-June 1, 1997, Portal, AZ. The workshop covered many useful topics including hands-on bat handling and identification, mist netting and trapping.

Bat Detection

Visual Detection

During mid-summer in the YT, bats are highly visible when they emerge during the long twilight, usually within an hour of sunset. However, later in August and September they are less conspicuous in the darkness. A night vision scope (ITT, Model 160, Roanoke, VA) useful for viewing bats in poor

light conditions was obtained late in the field season and received limited use.

Acoustic Detection

In darkness or poor lighting conditions, such in forested areas, a tunable narrow band bat detector (Mini-3, made by UltraSound Advice, London, UK) was used to identify areas of bat activity for netting and trapping and to make field surveys for echolocating bats. Vocalization characteristics can help identify species and behaviour patterns. Bat species have different call frequencies (usually 20-110 kHz) and types (e.g., tonal "chirp", sharp "tick", "putt", etc.). "Feeding buzzes", or high pulse repetition of calls, indicate the attempted capture of prey.

Calls were recorded on a (voice actuated) cassette tape recorder (Genexxa [Radio Shack] model CTR-96, InterTAN, Barrie, ON). Attempts were made to couple the bat detector with the voice actuated tape recorder and a talking alarm clock used as a time stamp (Radio Shack model 63-913, InterTAN, Barrie, ON) to leave the detector unattended in the field and increase the sample size. It was difficult to calibrate the instruments so that all bat calls would be recorded and background noise such as rain or wind would not be recorded. This technique was abandoned after several nights of experimentation. Also, since this type of tunable detector can detect only a narrow frequency range at a time, it can not be used to identify species when set up remotely. More advanced detectors allow the recording of high frequency output which corresponds to the ultrasound itself and is suitable for detailed analysis (e.g., amplitude, duration, power spectra and frequency-time analyses [sonograms] by computer). When an operator is present, frequencies between 20 and 160 kHz were manually scanned.

Capture

Mist nets

Bats were captured using a 4-shelved nylon mist net (Avinet model A26N-2, 50 denier, 2.1m x 12.8m, Dryden, NY) set in flyways between roosting and foraging sites and in foraging sites. Flyways are ideal sites to set nets because bats fly by "memory" without the constant use of echolocation, making them more vulnerable to capture. The mist net was set on 2.7m poles (Avinet model 10536C), 0.5m above ground. Additional tent poles were used to set the net in an "L"-shaped configuration.

Dip-nets

Bats were also captured from visible roosts and a bat house in an amphibian-style dip-net mounted on a telescoping pole.

Harp traps

A harp trap, with an area of $1m^2$, was constructed at the end of the field season using plans from Palmeirim and Rodruigues (1993). The catching surface was about 50cm above ground. It was also placed or hung directly adjacent to bat roosts. The harp trap is a particularly effective trap for some bat species and in some sets (such as inside buildings used as night roosts). No bats were captured in it during limited use.

Handling

Captured bats were placed in cloth holding bags or other suitable container and held until the end of the trapping session. They were aged, sexed, assessed for reproductive condition, weighed (Avinet scale S30, 30g x 0.2g), and forearm length was measured.

A numbered aluminum split-ring band was attached with finger pressure to the forearm (5.5 x 0.38mm with anodized colours, Lambournes, Ltd., Birmingham, UK) to identify recaptures both in the Yukon and in hibernacula suspected to be in coastal AK. Bands for males were red with blue reflective tape and bands for females, gold with yellow reflective tape. A plagiopatagium (wing membrane) sample was taken with a 2mm diameter leather punch (Osborne, model 153 w/#1 screw tube, Oregon Leather Co., Portland, OR) and placed in a 1.8ml

cryotube vial (NUNC, Denmark)` filled with 70% ethanol. The technique is quicker and simpler than blood sampling resulting in less pain and stress to the bats. Bats frequently tear wing membranes on branches and other objects, and the wounds heal rapidly. The membrane sample provides sufficient DNA for polymerase chain reaction based analyses. Samples were sent to the Alaska Frozen Tissue Collection, University of Alaska, Fairbanks, for genetic studies to determine migration patterns. The banding and tissue sampling were done in collaboration with Stephen Lewis, Ph.D. candidate, University of Alaska, Fairbanks, who is studying bats in southeast AK, and Dr. Tony Fischbach, U.S. Fish and Wildlife Service, Anchorage, AK.

Permits required

Permits required for the work included YT and BC sundry permits issued by the Yukon Department of Renewable Resources and the B.C. Ministry of Environment, and a Yukon Scientists and Explorers License from the Heritage Branch, Department of Tourism. Yukon Wildlife Export Permits were required to send tissue samples to AK and a specimen skull to BC.

Study Sites

Several man-made roosts and natural foraging habitats were investigated as study sites. Two main sites were selected, one at a cabin on Chadburn Lake in the City of Whitehorse, and another at a cabin in the Judas Creek subdivision on Marsh Lake. Several remote areas were searched extensively for bats, including Tagish Lake in northern BC and the Bonnet Plume River in the northern YT.

Results and Discussion

Field activities are summarized in Appendix I. The time available for fieldwork before August was limited by difficulties obtaining equipment (Avinet will not sell mist nets without a permit, and permits were not issued until early June) and other professional obligations. Also, I had hoped to

combine this project with a biodiversity survey on Tagish Lake in BC, however no bats were found on the survey.

A total of 13 bats were captured, 7 in dip-nets and 6 in mist nets (Table 1). None were captured in harp traps. The total effort was 13 hours mist netting and 3.5 hours harp trapping. Nets and traps were set for 2 to 3 hours post-emergence, the time of greatest foraging activity. An additional 4 specimens were obtained from other sources; one live bat taken during "pest control", 2 bats which had been killed by house cats, and one found dead in am underground parking garage in downtown Whitehorse. All 17 bats were identified as little brown myotis (*Myotis lucifugus*), 13 were males (4 not sexed), and 13 were adults and one a juvenile (3 not aged). The juvenile bat is believed to be a little brown myotis, however it was in poor condition and exhibited some characteristics of long-legged myotis (*M. volans*) and was sent to the Royal British Columbia Museum for positive identification. 14 bats were banded and tissue samples were obtained from 13. A simplified key to potential Yukon bats was adapted from Nagorsen and Brigham (1993) (Appendix III).

Males have lower energy requirements than females and, hence, are able to exploit marginal habitats. Females generally occupy large colonies of 200 or more, and prefer warmer roost sites. The large aggregations are, to some extent, self-heating, a fact important to both non-volant young which are left alone at night, and lactating females which must remain active during the day and night. Males are able to go into torpor, or a hibernation-like stage, during the day. This and the fact they don't have the extra burden of lactation allow them to occupy marginal habitats and roosts alone or in small groups. Maternal colonies are much less common than male aggregations.

Bats began emerging from roosts to forage between 11 and 51 minutes after sunset. Emergence was earlier on overcast nights and on dates with less

twilight (i.e., further from the summer solstice). All bats had emerged within 19 to 41 minutes of the first to emerge.

The success of at least 3 bat houses in the Yukon (Appendix II) is an important finding. At least 2 of the houses resembled the larger "nursery house" design of Bat Conservation International (Tuttle and Hensley 1993). Important design features for northern areas include:

- The taller the better. At least 60cm tall with 3 or more chambers.
- Dark colour.
- South or southwest exposure (to obtain daytime heating, including early morning hours).
- Partial closer of the bottom entryway to reduce cooling drafts. Remove for cleaning.
- No venting. Seal all air leaks with caulking.
- Mount on building if possible.

Some generic design features include:

- 10 to 15cm landing area on bottom.
- Place in mixed habitat (such as forest, meadows, riparian, water).
- Landing area and chamber walls need to be roughened or covered in material such as plastic mesh for grip
- Mount at least 3.5-4.5m above ground with unobstructed flyway for 6 to 9m.
- 2 to 2.5cm-wide crevices
- Tarpaper on top to increase warmth

It is very difficult to estimate the number of bats or maternal colonies in YT. Bats make extensive use of the large number of buildings, especially cabins and outbuildings (such as sheds), built on rivers, lakeshores and ponds in the southern Yukon. Examples are subdivisions at Marsh Lake, Tagish Lake, Haines Junction and the Haines Road. It is not known whether the advantageous use of these structures has led to an artificial increase in the population of

bats in the territory. Only 2 natural roosts, both behind the peeling bark of dead trees, have been reported from the YT (Appendix II). Bats have also been observed foraging in areas apparently void of artificial habitats, such as the Teslin River, Sheslay River (BC), and Aishihik Road. Two maternity roosts in artificial habitats have been reported near Haines Junction and Hootalinqua.

Some observations on migration and hibernation have been obtained from other observers (Appendix II). Bats arrive in the YT in early May and continue arriving until early June. There is no evidence of successful hibernation in the YT, but there have been reports of attempted overwintering in heated buildings, leading to mortality. Bats begin to leave the YT between early August and mid-September. During the fall migration bats may temporarily use habitats and roosts used less extensively in the summer, such as forested habitats in the Whitehorse area. There are at least 3 records of group migration in the spring and fall. Migration can apparently be risky by bats encountering high mountains and/or unfavourable weather/wind directions.

I gave 2 public presentations and one newspaper media interview on bats during or following the field studies. This level of demand is an indication of the interest the public has in bats. On July 12 I gave a nature appreciation talk, sponsored by the Yukon Conservation Society at the Chadburn Lake cabin. 20 persons attended. I also spoke to 30 grade 5 students (October 30) at Selkirk Street School. Another talk is scheduled with the Yukon Bird Club (March 5, Whitehorse Public Library). A newspaper article written by Claire Eamer was published in the Yukon News (October 31, "Your Yukon" series by Environment Canada). In response to the article I received several requests for more information and additional reports of bat sightings.

The bat colony in the Chadburn Lake Cabin, in the City of Whitehorse, is ideally situated for interpretive talks. Unfortunately, vandalism and possible exclusion of the bats from the cabin by the City may result in the loss of this colony. I believe that this is a very valuable resource, and

recommended options for the City to retain or enhance the colony. Options included design and placement modifications to 2 existing but unoccupied bat houses, construction of new bat houses, and modifications to the cabin itself. The latter option would necessitate the dedication of the cabin for this use.

Recommendations

This was a preliminary study with very little agency support. Clearly more intensive bat surveys are necessary to meet the initial objectives. Some specific recommendations for future work are:

- More equipment, such as bat detectors, mist nets, and harp traps, is required. The author proposes to obtain a broadband bat detector to monitor all frequencies simultaneously (such as the AnaBat II, Titley Electronics, Ballina, Australia) and a delay switch (such as the AnaBat II Delay Switch) to automate the detector for remote use. The delay switch turns on the tape recorder on detecting a signal and transmits the signal, a calibration tone and time stamp to the recorder. The author has obtained another mist net (Avinet model CH6, 50 denier, 2.6m x 6m, Dryden, NY) and a night vision scope (ITT, model 160, Roanoke, VA) for future studies.
- More funding and manpower is needed. A technician should be employed to assist the biologist and conduct concurrent studies. A higher level of funding is required to adequately pay the researchers and justify the purchase of equipment.
- Maternal colonies and colonies living in natural habitats should be located and studied.

Acknowledgements

Financial support was provided in part by a Northern Research Endowment Fellowship from the Northern Research Institute, Yukon College. I thank those who shared their local knowledge of bats and bat

roosts, especially Bryan Stanley of A-Z Pest Control and Judy Beaumont. Lawrence Vano, Karla Davidson and Paul Sparling gave me access to their bat colonies, and Wendy Baker, Al Hodgson, and Lee Kirkpatrick kindly provided specimens. Lee Mennell and Paul Sparling assisted with mist netting. The University of Alaska Museum provided cryotube vials for the wing membrane samples. Special thanks go to Stephen Lewis, my Alaskan collaborator, for his assistance and advice. He also supplied the wing bands.

References

Fournier, M. 1997. Bats in the Northwest Territories. Environment Canada, Canadian Wildlife Service, Yellowknife, NT. Draft ms.

Garcia, P.F.J., and R.M.R. Barclay. 1997. Standardized inventory methodologies for components of British Columbia's biodiversity: Bats (Version 1.1). BC Ministry of Environment, Lands and Parks, Resource Inventory Branch, for the Terrestrial Ecosystem Task Force, Resources Inventory Committee, Victoria, BC. 36pp.

Kunz, T.H. (editor). 1988. Ecological and behavioral methods for the study of bats. Smithsonian Institution, Washington, D.C. 533pp.

Nagorsen, D. W., and R.M. Brigham. 1993. The Bats of British Columbia. Royal B.C Mus. Handbook. Vol. 1: The Mammals of British Columbia. UBC Press in collaboration with the Royal B.C. Mus., Vancouver, B.C. 164pp.

Palmeirim, J.M., and L. Rodrigues. 1993. The 2-minute harp trap for bats. Bat Res. New. 34:60-64.

Parker, D.I. 1996. Forest ecology and distribution of bats in Alaska. Unpubl. M.Sc. Thesis, Univ. of Alaska, Fairbanks. 73pp.

Tuttle, M.D., and D.L. Hensley. 1993. The Bat House Builder's Handbook. Bat Conservation International, Austin, TX. 34pp.

van Zyll de Jong, C.G. 1985. Handbook of Canadian Mammals - 2. Bats. National Museum of Natural Sciences, National Museum of Canada. Ottawa, ON. 212pp.

Wilkinson, L.C., P.F.J. Garcia, and R.M.R. Barclay. 1995. Bat survey of the Liard watershed in northern British Columbia. Unpubl. Rep., Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria, BC. 41p.

Youngman, P.M. 1975. Mammals of the Yukon Territory. National Museum of Canada, Publ. in Zool., No. 10. Ottawa, ON. 192pp.

Table 1 Summary of Data Collected on 1997 Bat Specimens

Site[1]	Date	Specimen No.	Species[2]	Sex[3]	Age[4]	Mass (g)	Forearm length (mm)	Band No.	AF No.[5]
CL	Jul 12	97-1	MYLU	M	A	6.8	39	1951	20701
MLa	Aug 7	97-2	MYLU	M	A	9.8	37	1952	20702
MLb	Aug 8	97-3	MYLU	U	U	-	-	-	-
MLb	Aug 8	97-4	MYLU	U	U	-	-	-	-
CL	Aug 10	97-5	MYLU	M	A	7.4	39	1953	20703
CL	Aug 10	97-6	MYLU	M	A	7.6	37	1954	20704
CL	Aug 10	97-7	MYLU	M	A	8.8	38	1955	20705
CL	Aug 10	97-8	MYLU	M	A	7.6	38	1999	20706
CL	Aug 10	97-9	MYLU	M	A	8.9	39	1956	20707
CL	Aug 10	97-10	MYLU	M	A	7.4	38	1957	20708
CL	Aug 10	97-11	MYLU	M	A	6.8	38	1958	20709
CL	Aug 10	97-12	MYLU	M	A	6.4	39	1960	20710
CL	Aug 10	97-13	MYLU	M	A	6.6	38	1961	20711
WC	~Aug 11	97-14	MYLU	U	U	-	-	-	-
JC	Aug 26	97-15	MYLU	M	A	6.2	39	1962	20712
LAL	~ Sep.	97-16	MYLU	M	A	8.4	37	-	20713
WH	~ Sep.	97-17	MYLU	U	J	-	37	-	-

[1] CL=Chadburn Lake, MLa=Marsh Lake, marsh, MLb=Marsh Lake forest, WC=Wolf Creek, JC=Judas Creek, LAL=Little Atlin Lake, WH=Whitehorse

[2] MYLU=*Myotis lucifugus*

[3] M=Male, U=Unknown

[4] A=Adult, U=Unknown

[5] Alaska frozen tissue collection number

Appendix I Summary of 1997 Field Activities

1. **Date:** June 6/7 and 9/10. **Activity:** Remote acoustic detection. Tried unsuccessfully to calibrate voice-actuated tape recorder to remotely record bat activity. This was attempted several other times over the summer in areas where bats were known to be active.

2. **Date:** June 18/19. **Activity:** Visual and acoustic detection. **Location:** Cabin on Chadburn Lake (60° 39'N, 134° 58'W). Habitat mixed lodgepole pine, white spruce, and trembling aspen forest. Bat houses (one green, one black, on aspen tree at 3m level). **Weather:** Mainly clear, full moon (Jun 20), moderate breeze. **Start temp.:** 16°C. **End temp.:** 6°C. **Observations:** About 12 *Myotis lucifugus* roosting at high point of eaves in cabin.

11:37 - Sunset.
11:39 to 12:11 - Bats flying in cabin and consolidating into 2 groups.
12:28 to 12:59 - Bats emerging from cabin and flying to lake 100m south. Feeding extensively in bay and adjacent forest sheltered from wind 0-10m above ground, mostly 3-6m. Cabin used as night roost.
1:40 to 1:52 - Walking back to parking lot through forest, 3 passes detected within 500 m of cabin. One pass near lake at trailhead 1 km from cabin.
2:07 to 2:42 - 6 locations along 10 km transect between Schwatka Lake and Wolf Creek checked for bats, none detected.

3. **Date:** July 1-8. **Activity:** Several locations on Tagish Lake from the BC-YT border (60° 00'N) to Wann River (59° 26'N) were surveyed by boat. No bats or bat sign were observed, and so mist netting was not attempted. Bats did not occupy the many cabins and outbuildings on lake. Several buildings and mine portals at Engineer showed no sign of bat use. Long term residents on lake (J. and M. Brook since 1962, and L. Roland since 1982) knew nothing of bats in the area. Several caves midslope on mountain on north shore of Talaha Bay may be worthy of further inspection.

4. **Date:** July 12. **Activity:** A single *Myotis lucifugus* captured live in Carmacks (62° 06' N, 136° 17'W) on July 10 by pest control officer was released at Chadburn Lake cabin (Specimen 97-1).

5. **Date:** July 12/13. **Activity:** Nature appreciation talk given for the Yukon Conservation Society at the Chadburn Lake cabin. 20 persons attended. **Observations:** Colony size about 12 bats.

11:18 - Sunset
11:52 - First bat emerged.
12:22 - Active emergence.

6. **Date:** July 15-August 4. **Activity:** Several locations on the Bonnet Plume and Peel rivers between Bonnet Plume Lake (64° 19'N, 131°56'W) and the Trail/Peel confluence (66° 42'N, 134° 42'W) were surveyed by boat. No bats or bat sign were observed, and so mist netting was not attempted.

7. **Date:** August 7/8. **Activity:** Mist Netting. **Location:** Marsh near Cabin in Judas Creek subdivision, Marsh Lake (60° 27'N, 134° 15'W). Habitat mixed lodgepole pine, white spruce, and trembling aspen forest, sedge marsh with small pond, 150m from cabin, 30m from Marsh Lake. **Weather:** Winds calm,

overcast, some rain showers. **Start temp.**: 16°C. **End temp.**: 13°C. **Observations:** Unknown number of bats roosting in roof of gable.
10:18 - Sunset.
10:15 to 12:15 - Mist net set in marsh, 30m from lake. One bat captured (Specimen 97-2).
10:52 - First bat detected over pond.
11:08 to 11:25 - Intense activity with 10 to 20 bats feeding over marsh.

8. **Date:** August 8/9. **Activity:** Mist netting. **Location:** Marsh Lake cabin. **Weather:** Gentle breeze, mainly clear. **Start temp.**: 16°C. **End temp.**: 11°C. **Observations:**
10:11 - Sunset.
10:15 to 12:45 - Mist net set in forest beside cabin. Two bats captured (Specimens 97-3 and 97-4), however both escaped from holding bag.
10:45 to 11:25 - About 25 bats emerged from cabin.

9. **Date:** August 10/11. **Activity:** Mist netting and dip-netting. **Location:** Chadburn Lake cabin. **Weather:** Breezy, overcast. **Start temp.**: 19°C. **End temp.**: 17°C. **Observations:** Estimate 10 bats present.
10:09 - Sunset.
9:00 to 10:00 - Captured 6 bats in cabin with dip-net.
10:00 to 12:30 - Mist net set in front of cabin door and window in "L" shape. Three bats captured between 10:35 and 10:45 (Specimens 97-5 to 97-13).
12:45 to 1:00 - Nothing detected on forest walk to trailhead.
11:08 to 11:25 - Intense activity with 10 to 20 bats feeding over marsh.

10. **Date:** August 11/12. **Activity:** Mist netting. **Location:** Marsh Lake cabin. **Weather:** Moderate to fresh breeze, partly cloudy. **Start temp.**: 16°C. **End temp.**: 15°C. **Observations:**
10:07 - Sunset.
10:00 to 12:30 - Mist net set in forest beside cabin.
10:18 to 10:56 - An estimated 27 bats emerged. None were captured. Bats did not feed around cabin as on August 8. Only one feeding pass was detected.

11. **Date:** August 18. **Activity:** Dip netting and harp trapping. **Location:** House at Wolf Creek subdivision (60°37'N 134°59'W). Habitat mixed forest next to rural residential lots. **Weather:** Light air, high broken overcast, full moon. **Start temp.**: 14°C. **End temp.**: 11°C. **Observations:** Bat foraging had been observed here but roost locution was unknown. House cat had killed a bat and the carcass was recovered (Specimen 97-14).
9:46 - Sunset.
10:30 to 12:00 - Mist net and harp trap set in yard. No bats captured.
10:26 to 11:40 - 5 feeding passes detected.

12. **Date:** August 19. **Activity:** Harp trapping. **Location:** Cabin at Marsh Lake. **Weather:** Clear, light air. Start temp.: 13°C. **End temp.**: end 11°C. **Observations:** Bat colony has declined from about 27 to 3 individuals.
9:40 - Sunset.
10:00 to 11:30 - Harp trap set on side of gable where bats were roosting. Nothing captured.
10:11 to 10:30 - An estimated 3 bats emerged.
10:50 to 11:20 - 2 passes detected on marsh near cabin.

13. **Date:** August 26. **Activity:** Mist netting, dip-netting, harp trapping. **Location:** Cabin near Judas Creek (60°23'N,.134°09'W). Habitat mixed, near

ponds and creek. **Weather:** Clear calm. **Start temp.** 11°C. **End temp.:** 9°C. **Observations:** Bat house occupied by 6 bats and about 3 more were in a west facing eave. Bat house 5m above ground on side of balcony, dimensions 1m high, 0.5m wide, 15cm deep, with 3 chambers, painted green.

9:18 - Sunset.

9:30 to 11:30 - Set harp trap near an eave exit point and mist net 3m from cabin in clearing. One bat captured in dip-net while exiting from bat house (Specimen 97-15).

10:05 - First bat emerged from bat house.

14. **Date:** August 28. **Activity:** Visual detection. **Location:** Chadburn Lake cabin. **Weather:** Noon, 19°C, clear, fresh breeze. **Observations:** No bats present. Sticks and rocks on cabin floor indicate probable vandalism.

15. **Date:** October 1. **Activity:** Specimen 97-16, fresh frozen bat, obtained from A. Hodgson. It had been killed by housecat in September at Little Atlin Lake (60°15'N, 133°55'W).

16. **Date:** November 6. **Activity:** Specimen 97-17, frozen, partly decomposed and dehydrated bat, obtained from L. Kirkpatrick. It had been found in the Law Courts underground parking garage, downtown Whitehorse (60°43'N, 135°03'W) in September.

Appendix II Other Bat Observations

- 1980s. Group of several dead bats found on St. Elias Icefields in southwest Yukon in spring (M. Williams, pers. commun.).
- 1980s. Group of several dead bats found on Keele Peak (63° 27'N, 130° 19'W) (R. Markel, pers. commun). They were frozen in ice so time of death could not be determined.
- August 23, 1990. Several hundred bats in maternal colony under deck of SS Evelyn at Hootalinqua (confluence of Teslin and Yukon rivers) (R. Ingram, pers. commun.).
- May 21, 1993. Reports of bats for past 2 weeks at Little Atlin and Marsh lakes.
- 1994. A bat was roosting behind the black peeling bark of standing dead tree in a burn near Mayo (S. Gilbert, pers. commun.).
- 1990s. A bat was roosting behind the bark of a dead balsam poplar tree along the Yukon River near Whitehorse (anon., pers. commun.).
- 1990s. Bats have been seen at Minto Lake (63° 42'N, 136° 09'W) and Mayo (63° 36'N, 135° 54'W) (S. Moses and K. Sinnot, pers. commun.).
- August 9, 1997. 2 bats foraging at dusk on Sheslay River in narrow valley with rock canyons and open pine forests (B. Walden, pers. commun.).
- Several nights up to and including August 28, 1997. Bats seen at Giltana Lake, Km 45 of the Aishihik Road. Abundant large dead trembling aspen trees with peeling bark near camp 3-km south of lake (S. Gilbert, pers. commun.).
- September 2, 1997. 1 bat in house in Wolf Creek subdivision.
- September 8, 1997. 1 bat seen in Wolf Creek subdivision.
- Several bats observed 3 km north of 100 Mile River on the Teslin River in riparian balsam poplar habitat (1997) (P. Sparling, pers. commun.).
- Cabin on Marsh Lake was swarmed by about 200 bats in September (P. Sparling, pers. commun., year unknown).
- 1997. Other reports of bats from Watson Lake aiport, Rock Creek (20 km east of Dawson City), Mary Lake (Whitehorse), Paddy's Pond (Whitehorse), Lake Laberge, Judas Lake, Km 10 of South Canol Road, and mouth of Kathleen River.

Bryan Stanley's Observations (E-Z Pest Control)

- October 17, 1995. Dead bat hanging from rafters of house in Watson Lake, YT.
- Believes that he has seen 3 bat species on pest control job: *Myotis lucifugus*, *Eptisicus fuscus* and possibly *M. volans*.
- Has had requests for bat exclusion services from Watson Lake, Whitehorse, Haines Junction, Mayo, Ross River, Carmacks, Dawson City, and Marsh Lake.

Art Pearson's Observations (Cabin on Haines Road, Km 234)

- August 11, 1965. About 200 bats in maternity colony. 3 bats remaining on August 14 and none on September 17.
- May 28, 1966. 10 adult females. June 12, about 200, no young.
- June 1, 1967. 10 adult bats. June 15, about 200, no young.

Bat House Observations

Judy Beaumont has constructed and sold bat houses to several customers, over the past several years. She knows of none that are occupied. At least 3 other homemade bat houses were occupied in 1997:

- A large bat house at Judas Creek had 6 bats on August 27, 1997. It was well placed and in good habitat.
- A large bat house in good habitat in Haines Junction was occupied in 1997 (R. Markel, pers. commun.).
- A bat house near shore of Nares Lake was occupied in 1997 (G. Van Deft, pers. commun.).

Appendix III Key to Bats of Northwestern North America

1. Ear length less than 28 mm, fur not orange or rusty red 2

2a. Fur on back with frosted or silver-tipped hairs 3

2b. Fur on back without frosted or silver-tipped hairs 4

3a. Upper surface of tail membrane covered with fur, forearm length 50-57mm
Lasiurus cinereus (Hoary Bat) Northern AB & Southwestern NT

3b Upper surface of tail membrane furred at base, forearm length 39-44 mm
***Lasionycteris noctivagans* (Silver-haired Bat)** Southeast AK & northern BC

4. No fringe of hairs on outer edge of tail membrane 5

5a. Calcar with a prominent keel 6

5b. Calcar without a prominent keel 9

6a. Forearm length greater than 35 mm, hind foot greater than 9 mm 7

6b. Forearm length less than 35 mm, hind foot less than 9 mm 8

7a. Underwing furred outward to a line extending from knee to elbow, forearm length 34-44 mm
***Myotis volans* (Long-legged Myotis)** Southeast AK & northwesterm BC

7b. Underwing not furred outward to a line extending from knee to elbow, forearm length 43-52 mm
***Eptisicus fuscus* (Big Brown Bat)** Southeast AK, interior AK (incidental), northern BC, northern AB & southern NT (suspected).

8. Fur on back chestnut to brown, not in sharp contrast to colour of ears, face and wings; length of bare area on snout about equal to width across nostrils
***Myotis californicus* (California Myotis)** Southeast AK & northern BC (unconfimed)

9a. Ears long (14-22 mm), extending well beyond tip on nose when pushed forward 10

9b. Ears short (10-16 mm), not extending well beyond tip on nose when pushed forward 12

10a. Ears black, 22-25 mm, extending >5 mm beyond tip of nose when pushed forward
***Myotis evotis* (Western Long-eared Bat)** Northern BC

10b. Ears dark but not black, extending less than 5 mm beyond nose when pushed forward 11

11a. Poorly defined dark spot on shoulders, minute hares on edge of tail membrane (visible with hand lens)
***Myotis keenii* (Keen's Long-eared Myotis)** Southeast AK

11b. No dark spot on shoulders, few or no hares on edge of tail membrane
***Myotis septentriolnalis* (Northern Long-eared Myotis)** Northeastern BC & southwestern NT

12a. Fur on back long, sleek and glossy, forearm length usually 36-41 mm
***Myotis lucifugus* (Litle Brown Myotis)** Southern and central YT, southeast AK, northern BC & southern NT