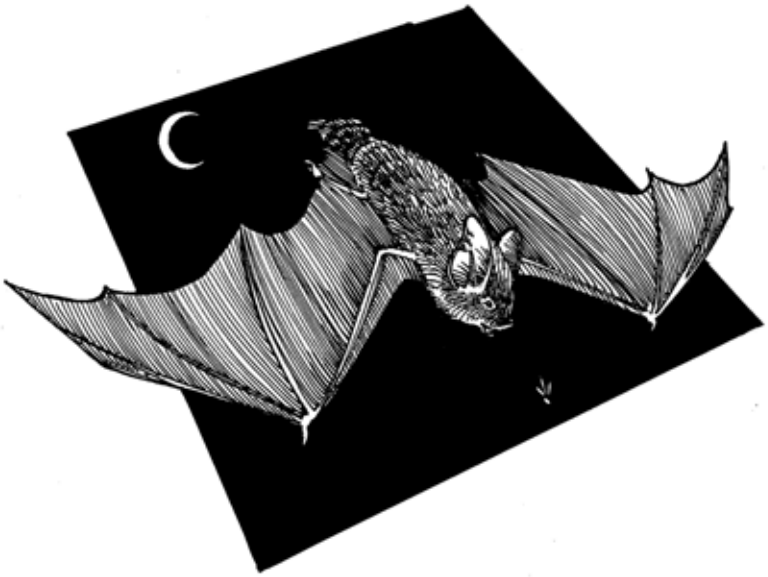
Fish & Wildlife Division

WILDLIFE CONSERVATION AND BIODIVERSITY SECTION

Survey of Bats in Northeastern Alberta



Alberta Species at Risk Report No. 68

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Survey of Bats in Northeastern Alberta

Anne Hubbs
and
Tim Schowalter

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EXECUTIVE SUMMARY

Little is known about the distribution, timing of occurrence, behaviour, and habitat requirements of bats in Alberta. In particular, studies are urgently required in the northeast portion of the province where rapid industrial development is occurring. This information is critical for determining species status and for developing management strategies. To address some of these data deficiencies, a survey was conducted in northeastern Alberta in late June and July in 2001. The specific objectives of the survey were to 1) identify species' occurrences, possible range expansions, and habitat associations, 2) evaluate a standard protocol for bat surveys (Vonhof 2000) and to provide recommendations as to its effectiveness, and 3) provide future direction for bat research in Alberta.

Surveys were conducted at eight study areas: Athabasca, Lac La Biche, Crow Lake, Anzac, Conklin, Fort McKay, La Butte Wildland Provincial Park, and Fidler-Greywillow Wildland Park. Standard protocols from Vonhof (2000) were used and were shown to be effective. Bats were captured using mist nests that were generally located across cutlines or over small waterbodies. Captured bats were identified according to species, and their sex, age (adult or juvenile), reproductive status, mass, and forearm length were recorded. In addition, bat detectors were used at most mist-netting sites during 21 nights to determine activity levels. Mist-netting and/or bat detector work took place at a total of 26 sites within the eight study areas.

Mist-netting occurred on 22 nights for a total of 66 hours (or 155.2 net hours; one net hour equates to 12m of net hung for 1hour). A total of 36 bats were captured (1.6 bats/night or 0.23 bats/net hour). These included 31 little brown bats (*Myotis lucifugus*; 86% of total), three northern long-eared bats (*Myotis septentrionalis*; 8%) and two silver-haired bats (*Lasionycteris noctivagans;* 6%). At every study area where females were captured, at least some were reproductive. Of the 19 female little brown bats captured and sexed in the study, 79% (n = 15) were reproductive (11% pregnant, 58% lactating, 11% post-lactating). Only four juveniles were caught (two little brown bats, one silver-haired bat and one northern long-eared bat). Bats were captured in all but three of the study areas (Crow Lake, Anzac, and Fidler-Greywillow). Records of little brown bats at Leismer (Conklin area) and Rock Island Lake (Athabasca area), where data had been lacking, were noteworthy. In addition, two northern long-eared bats were caught at Kearl Lake in the Fort McKay area and a single male was captured in the Conklin area. One male and one female silver-haired bat were captured near Heart Lake in the Lac La Biche area and in the Conklin area, respectively. A nursery colony of little brown bats was reported at Net Lake near Fort McMurray. This is the most northerly nursery colony in Alberta.

Based on bat detector work, *Myotis* spp., hoary bats (*Lasiurus cinereus),* silver-haired and/or big brown bats (*Eptesicus fuscus*) were widely distributed across the surveyed area. However, these results require verification due to equipment problems.

The data from this study have significantly advanced our knowledge of bats in northeastern Alberta. Distribution gaps were filled for all species and range extensions north were observed for little brown bats. Further research is however still required in this region to adequately address the objectives outlined previously.

1.0 INTRODUCTION

Although bats comprise a quarter of all mammal species worldwide, they have been the subject of relatively few studies. Nine of the 20 bat species found in Canada occur in Alberta where they fill a critical niche as the only major evening predator of insects. Some species are also valuable indicators of environmental change because of their dependency on mature forests and riparian habitats. Despite the important role they play in ecosystems, little is known about the distribution, timing of occurrence, behaviour, and habitat requirements of bats in Alberta, particularly in the north. This information is critical for determining species status and for developing management strategies. Currently in Alberta, the northern long-eared bat (*Myotis septentrionalis*) is listed as *May be at Risk*, the long-legged bat (*M. volans*) as *Status Undetermined*, and the western small-footed bat (*M. ciliolabrum*) as *Sensitive* (Alberta Sustainable Resource Development 2000), but these designations may change as more studies are undertaken.

Studies in Alberta have been limited primarily to the southern part of the province. However, bats in the north may experience different climatic conditions than their southern counterparts and these bats may differ both behaviourally and physiologically. The distribution of bats in the northern part of the province is almost unknown (Smith 1993) and few hibernation sites have been recorded. A recent study in central and northwestern Alberta proved beneficial in filling some distribution gaps in these regions (Vonhof and Hobson 2001). In the northeastern part of the province, detailed information is only available from the Lac La Biche area (Crampton 1995; Crampton and Barclay 1998; Mueller and Mueller 1999, 2001), and significant data gaps still remain. Habitat is rapidly being altered in this region through forestry, oil and gas, and agricultural developments, and baseline studies of bats across a wide geographic area are urgently required.

The need for standardization of bat studies in Alberta to facilitate identification of information gaps, population trends, and changes in distribution resulted in the development of a protocol for surveying bats within the province (Vonhof 2000). This protocol was field tested in 2000 in central and northwestern Alberta (Vonhof and Hobson 2001), but requires additional testing to determine its effectiveness and refine datasheets.

This report documents the results of a survey of bats throughout northeastern Alberta in late June and July in 2001. The specific objectives of the survey were to:

1) identify species' occurrences, possible range expansions, and, to a lesser extent, habitat associations,
2) evaluate a standard protocol for bat surveys in Alberta (Vonhof 2000) and to provide recommendations as to its effectiveness, and
3) provide future direction for bat research in Alberta.

2.0 STUDY AREAS

Surveys were conducted at eight study areas in northeastern Alberta: Athabasca, Lac La Biche, Crow Lake, Anzac, Conklin, Fort McKay, La Butte Wildland Provincial Park, and Fidler-Greywillow Wildland Park (Fig. 1). These study areas occurred in the dry and central mixedwood subregions of the Boreal Forest. All the study areas, except the La Butte area, were dominated by sandy soils. Inclement weather, budgetary constraints, and logistical considerations limited the number of survey days. Consequently, the location of survey areas was determined by the need to fill in large gaps in the distribution of samples rather than focussing on sampling across ecological zones. Within each study area, 2-5 study sites were visited for a total of 26 study sites surveyed (Table 1). The limited number of survey days and large area surveyed did not permit re-surveying of individual study sites.

Table 1. Study areas surveyed for bats in 2001 in northeastern Alberta.

Study Area	No. of Study Sites Visited	Survey Dates	No. of Nights of Surveying
Athabasca	4	27-28 June, 30 June, 19 July	4
Lac La Biche	3	22-23 July	2
Crow Lake	2	2-3 July	2
Anzac	3	16-18 July	3
Conklin	2	24-25 July	2
Fort McKay	3	12-14 July	3
La Butte Wildland Prov. Park	5	6-9 July	4
Fidler-Greywillow Wildland Pk	4	23-26 July	4

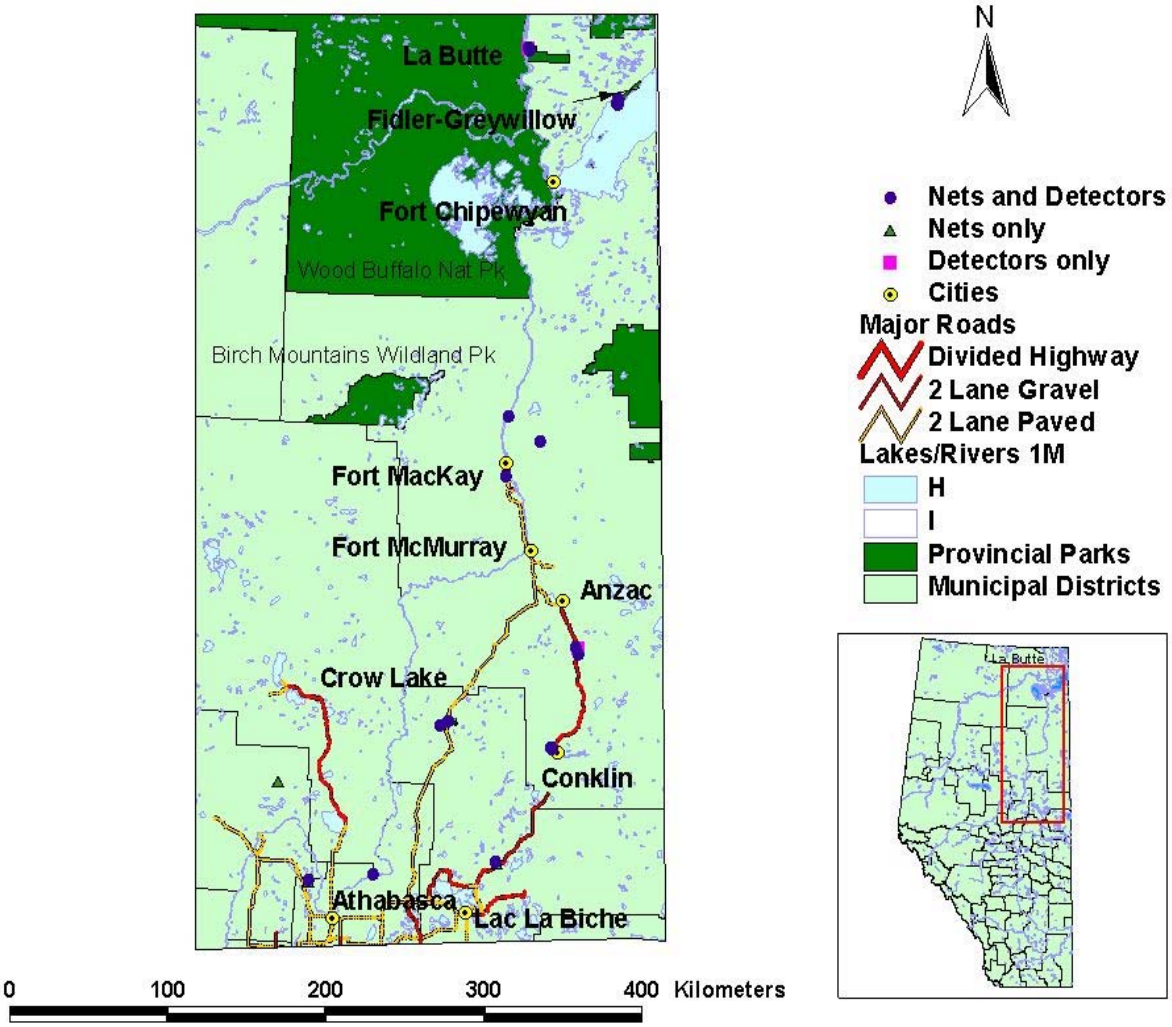

Figure 1 Location of study areas surveyed for bats in northeastern Alberta in 2002.

3.0 METHODS

3.1 Bat Captures

Study sites were selected based on their accessibility and the presence of suitable habitat and netting sites, including mature forest, ponds, streams, cutlines, and trails. Mist nets were stacked along cutlines and trails, usually under overhanging tree branches, which were used to funnel bats into the nets. When possible, different habitat types (e.g. open / closed mixed forest, open / closed conifer) were surveyed within the same study area. Surveys followed the protocols from Vonhof (2000).

Mist-netting occurred in each study area at 22 of a possible 26 study sites. At each study site, 2-5 nets were set out each night. The nets ranged in length from 6-12m and on average, a total of 20.8m of net were hung each night. Nets were set up for an average of 2.7 hours per night (range 0.8-4.5 hours per night). Overall, bats in this study were surveyed for a total of 66 hours or 155.2 net hours (1 net hour = 12m net per 60 min.). Approximately one-third of the total netting effort occurred over water (55 net-hours were over water). In addition, mist-netting took place on June 27th outside the County office in Athabasca.

Captured bats were held in cotton bat bags for a minimum of one hour to allow clearing of the digestive tract prior to taking measurements. Individuals were identified to species, sexed and aged as to adult or juvenile based upon the degree of ossification of the metacarpal phalange joints (Racey 1974). Reproductive condition was accessed (Racey 1974), and mass and forearm length recorded using Pesola scales and calipers, respectively. All data were recorded on standard data sheets from Vonhof (2000) and entered into the Biodiversity / Species Observation Database (BSOD) of the Fish and Wildlife Division of Alberta Sustainable Resource Development. To assist in other research studies, feces and ectoparasites were also collected, and a wing punch taken for DNA analysis.

3.2 Bat Detectors

Bat detectors were used at 23 study sites to quantify the number of passes and feeding buzzes (series of echolocation pulses emitted when navigating and foraging, respectively). Two Pettersson D200 hand held detectors were used throughout the survey while a Pettersson D230 hand held detector was available for part of the survey. When only two detectors were available, one detector was set at approximately 20 kHz for 15 min. to increase the likelihood of detecting hoary bats, which are difficult to capture. The second detector was set for 5 min. at 30 kHz and then at 40 kHz. When it became apparent that 5 min. was insufficient to detect bats at 30 kHz and 40 kHz, a 10 min. interval was used. When three detectors were available, each was set at 20, 30, or 40 kHz for 15 min. At Fidler-Greywillow, only a single detector was available and was alternated between 25 kHz and 40 kHz every 10 min. Species groups were distinguished based on the frequency at which they were detected as per Vonhof (2000). It was assumed that bats detected at 20 kHz were hoary bats (this was supported from visual observations; red bats may also be detected at this frequency but were not expected to occur in the region). Bats detected at

30 kHz were classified as big brown (*Eptesicus fuscus*) or silver-haired bats (*Lasionycteris noctivagans*) while bats detected at 40 kHz were recorded as *Myotis* spp.

4.0 RESULTS

4.1 Species Captured

A total of 36 bats from three species (little brown, northern long-eared, and silver-haired bats) were captured (1.6 bats/night or 0.23 bats/net hour). Little brown bats were captured most frequently, comprising 86% (n = 31) of captures, followed by northern long-eared bats (3 or 8.3%) and silver-haired bats (2 or 5.6%; Fig. 2). Overall, four juveniles were caught (two male little brown bats, one male silver-haired bat and one female northern long-eared bat).

The majority (79% or 15 of 19) of female little brown bats were reproductive (11% pregnant, 58% lactating, 11% post-lactating; Fig. 3). The one silver-haired bat that was captured was lactating. No adult female northern long-eared bats were captured. Table 2 shows the mean mass and forearm length of captured adults.

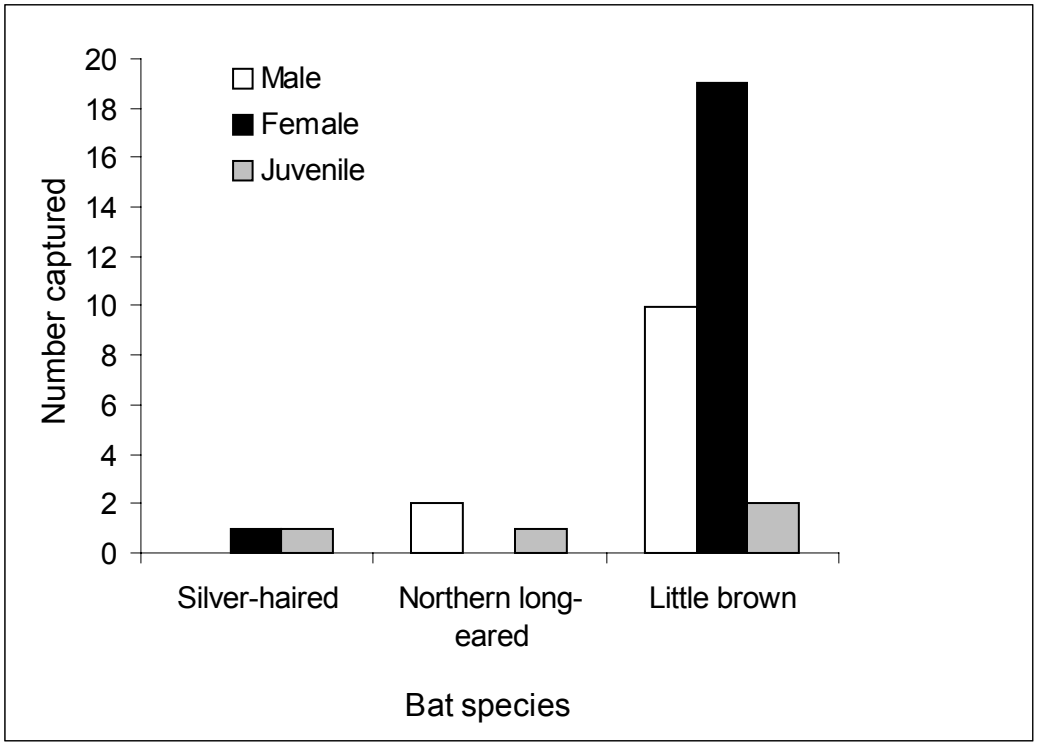

Figure 2 Number of adult and juvenile bats of each of three species captured in northeastern Alberta in 2001.

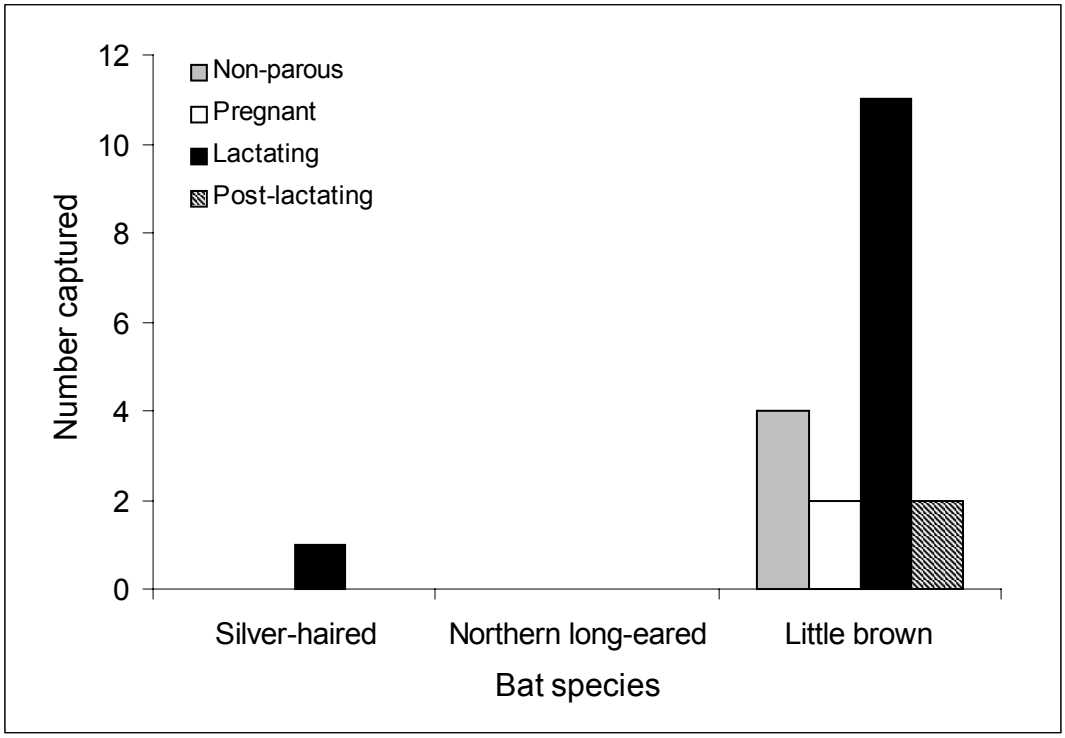

Figure 3 Reproductive condition of adult female bats captured in northeastern Alberta in 2001.

Table 2 Mean mass and forearm length of captured adult bats.

Species	Sex	Sample Size	Mean Mass (g) ± SE	Mean forearm length (mm) ± SE
Little brown	M	10	8.9 ± 0.3	38.2 ± 0.3
	F	19	9.8 ± 0.2	38.8 ± 0.2
Northern long-eared	M	2	7.5 ± 0.05	36.7 ± 0.6
	F	0	N/A	N/A
Silver-haired	M	0	N/A	N/A
	F	1	14.5 ± 0.0	40.7 ± 0.0

4.2 Location of captures

Bats were captured in all but three of the study areas (Crow Lake, Anzac, and Fidler-Greywillow; Fig. 4). One silver-haired bat was captured in each of the Lac La Biche and Conklin study areas (a juvenile male and lactating female, respectively). Two northern long-eared bats (adult male, juvenile female) were caught at Kearl Lake in the Fort McKay area. A single adult male was also captured at Leismer in the Conklin area. Little brown bats were captured in the Athabasca, Lac La Biche, Conklin, and La Butte study areas. Only adult females were caught in the Lac La Biche area (Fig. 5) of which 11 of 13 (85%) were reproductive. In the Athabasca area, 8 males and 4 females were captured. All but one female was reproductive.

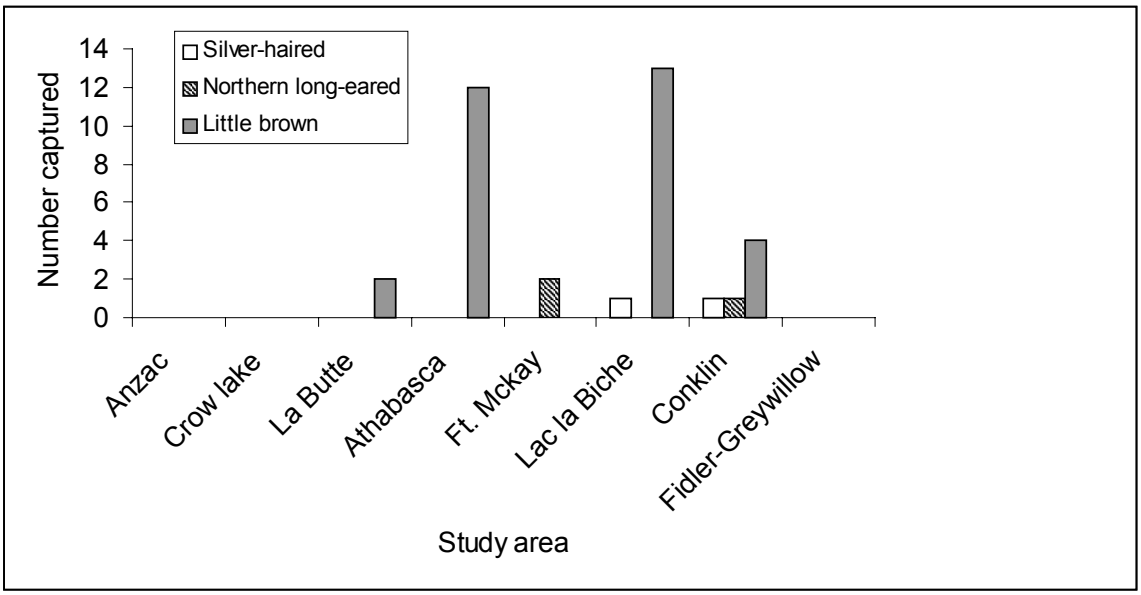

Figure 4 Number of bats captured in each study area according to species.

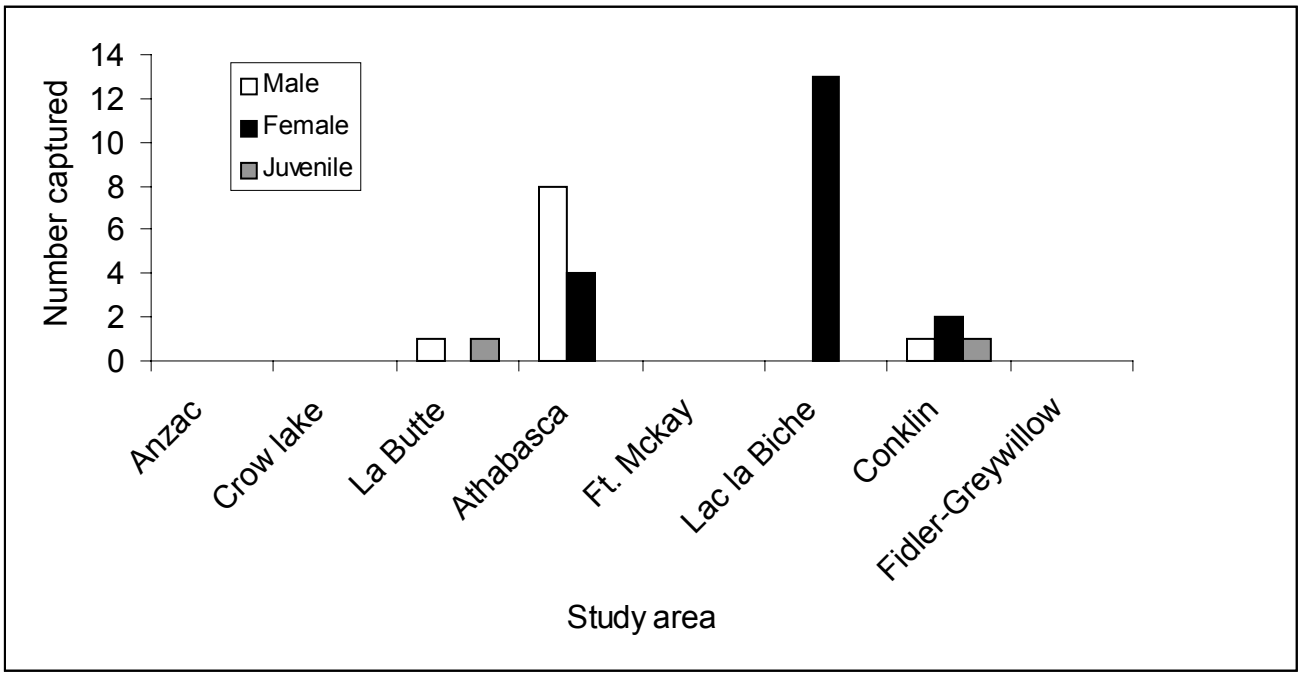

Figure 5 Number of adult and juvenile little brown bats captured in each study area.

Twenty-three of 36 bats (64%) were captured over water including 21 little brown bats and 2 silver-haired bats. Thirteen bats (3 northern long-eared, 10 little brown) were caught along cutlines or trails. A total of 55 net-hours were used in capturing bats over water (0.42 bats/net hour) compared with 100.2 net hours to capture bats along cutlines and trails (0.13 bats/net-hour).

4.3 Exposed Diurnal Roosts

Two adult (1 male, 1 female) little brown bats were captured outside the Athabasca County office on June 27th. Reproductive condition was not assessed.

A Fish and Wildlife Division biologist reported a nursery colony of little brown bats under the shutters of a cabin at Net Lake (Township 105, Range 5) in the Fort McMurray area.

4.4 Bat Detection

All species groups (*Myotis* spp., big brown / silver-haired and hoary bats) were detected at each study area with the exception of Lac La Biche and Fidler-Greywillow. Only *Myotis* spp. were detected at Fidler-Greywillow while no bats were recorded at Lac La Biche on the one night of detector work. *Myotis* spp. were most frequently detected followed by big brown / silver-haired

and then hoary bats. The highest level of activity of Myotis spp. occurred in the Conklin area (Fig. 6). Conklin also had the highest activity levels for big brown / silver-haired bats as did La Butte (Fig. 7). Hoary bat activity was relatively similar among study areas (Fig. 8). For all species groups, foraging bats were only detected at the Conklin, La Butte, Fidler-Greywillow, and Anzac study areas.

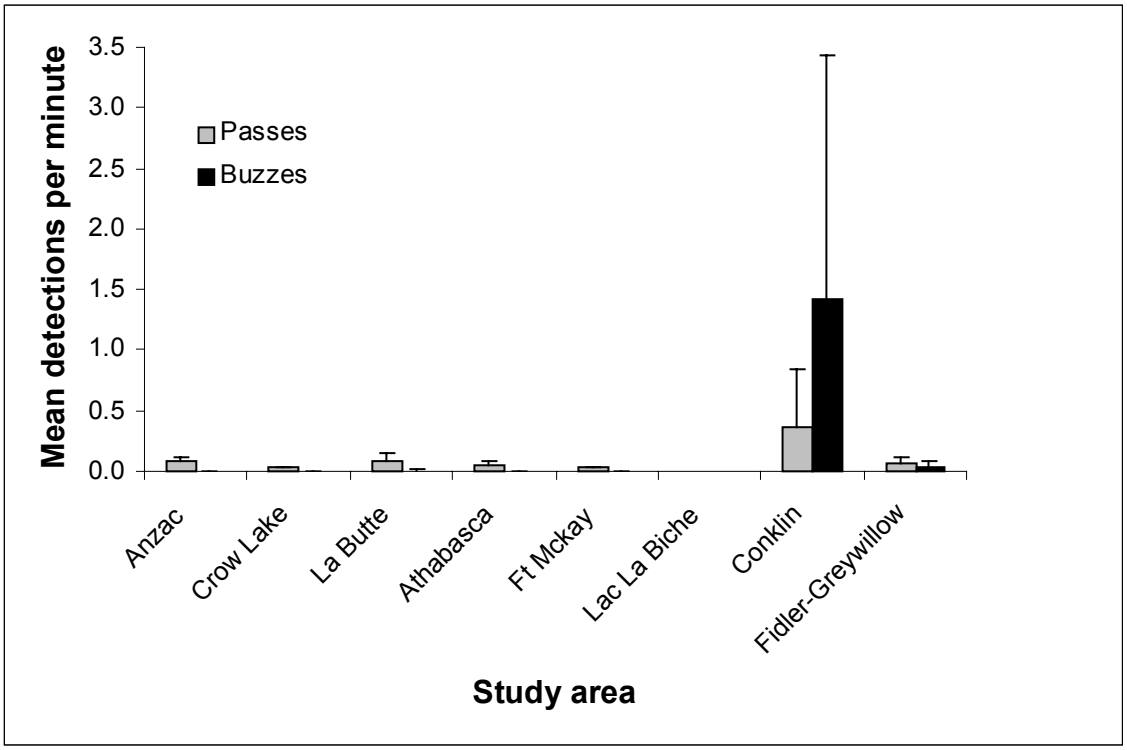

Figure 6 Number of passes and feeding buzzes (± 1 std) by *Myotis* spp. in each study area.

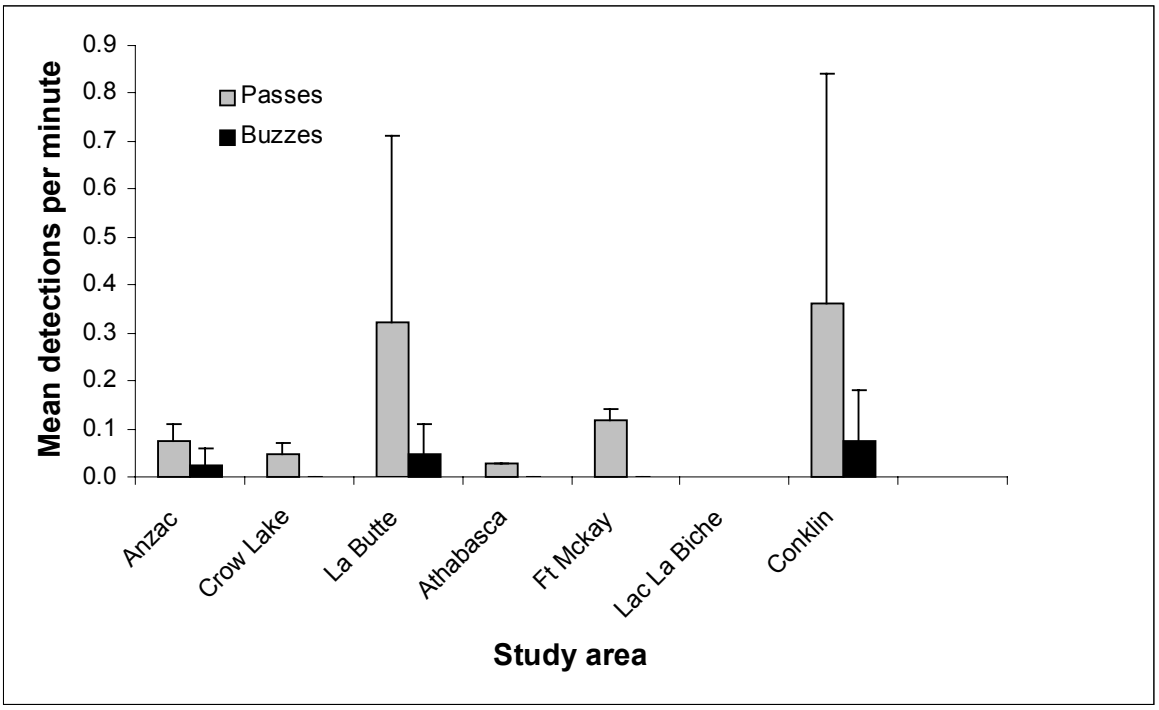

Figure 7 Number of passes and feeding buzzes by big brown / silver-haired bats in each study area.

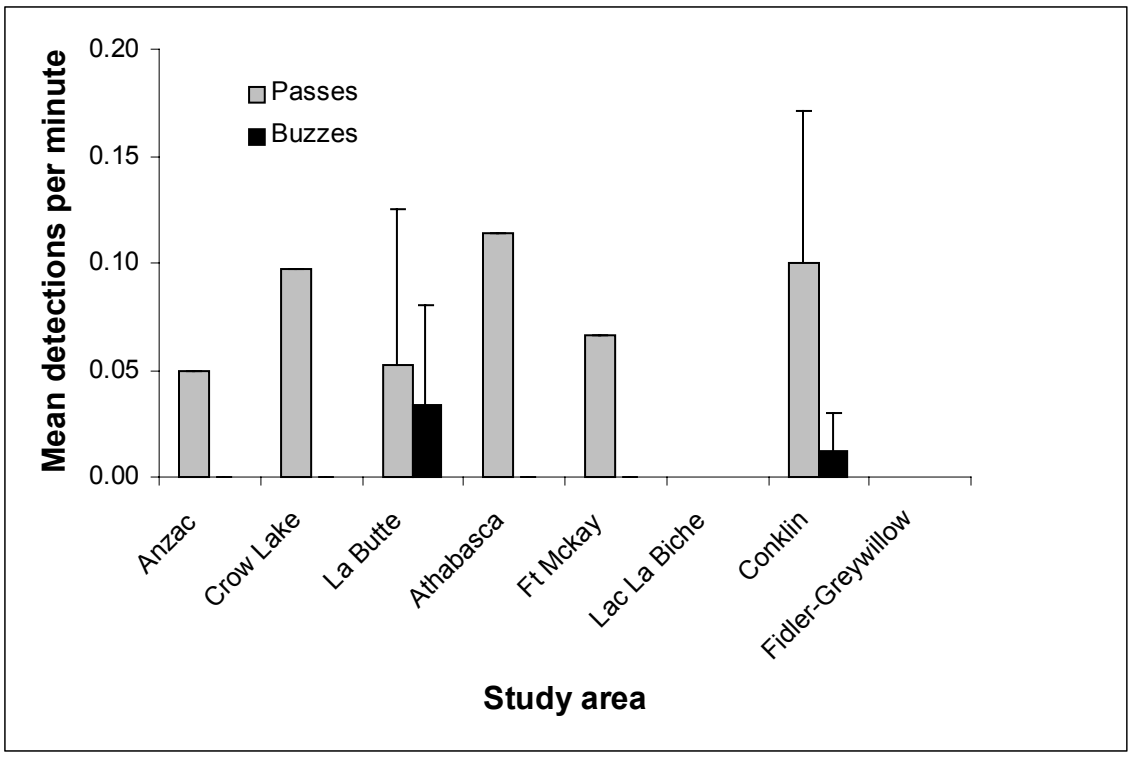

Figure 8 Number of passes and feeding buzzes by hoary bats in each study area.

5.0 DISCUSSION

The state of knowledge of bats in northeastern Alberta continues to need further attention, however, this study produced valuable new information. The capture records reported here of little brown bats support the widely held suppositions (e.g. Smith 1993) that the species is likely to be relatively abundant in the northeast boreal region. The data from this study, and in particular that from the Conklin, Athabasca, La Butte, and Fidler-Greywillow areas, have also filled in a number of gaps in the known distribution of this species. Previously, little brown bats were only known from surveys in northeastern Alberta in Wood Buffalo National Park (Smith 1993), Fort McMurray (Schowalter et al. 1979), Lac La Biche area (Crampton 1995), and Crackingstone Point on the north side of Lake Athabasca in Saskatchewan (Beck 1964). Specimen records were available only from northwest of Wandering River (Smith 1993) and La Ronge, Saskatchewan (Nero 1957, Beck 1958). Although a number of nursery colonies were known in the Lac La Biche – Cold Lake area (Schowalter et al. 1979), the colony at Net Lake is significant because it is the most northerly known nursery colony in Alberta and occurs in an area south of Lake Athabasca previously lacking records of little brown bats. Captures of northern long-eared bats in this study near Leismer (Conklin area) and Kearl Lake (Fort Mackay) have filled distribution gaps and supplemented existing data. The distribution of northern long-eared bats in northeastern Alberta is known from records from Wood Buffalo National Park, Fort Mackay area, and Lac La Biche Area (Caceres and Pybus 1997, Crampton 1995). To the east, there is a specimen from Buffalo Narrows, Saskatchewan (Novakowski 1956, van Zyll de Jong 1985). Vonhof and Hobson (2000) report captures in the Wabasca River area to the west. The two silver-haired bats captured in the Conklin and Lac La Biche areas supplemented the limited existing data that exist for this species in the northern boreal region. In northwestern Alberta, the species has been reported north of Hotchkiss (van Zyll de Jong 1985) and near Peace River (Schowalter et al. 1978). Moreover, silver-haired bats are relatively abundant during migration at Lesser Slave Lake (Vonhof and Hobson 2000) and were the second most frequently captured species in a study of forest utilization by bats in the Lac La Biche area (Crampton and Barclay 1998). Smith (1993) reported a specimen from further north along the Athabasca River. At this time, there are no records of the species in the Fort McMurray region or further to the northeast. While silver-haired bats are to be expected there, the lack of records points to the need for additional survey work.

Big brown or hoary bats were not captured in the study area. This is not suprising given that these are high-flying species that are typically under represented in captures. Big brown bats are known to hibernate in Wood Buffalo National Park (Schowalter 1979) while hoary bats have been recorded in the Athabasca (Smith 1993, Engley and Norton 2000), Lesser Slave Lake (Vonhof and Hobson 2000), and the Peace River areas (Schowalter and Dorward 1978). Specimens from northwestern Saskatchewan are lacking; however, there is a specimen from Fort Resolution, Northwest Territories (Anderson 1946).

Caution is needed when interpreting the results from bat detection sessions because of variability of time of detection sessions, length of detection sessions, uncertainties as to functioning of detectors, and the differing number of detectors available. The following results should be considered highly provisional until post-season calibration of the detectors is completed. If

correct, the bat detectors indicated that *Myotis* spp., hoary bats, silver-haired and/or big brown bats were widely distributed in the study area. The highest level of activity for all species (except hoary bats) occurred in the Conklin and La Butte areas. Feeding buzzes were only detected in these areas and the Anzac and Fidler-Greywillow areas. Detector observations suggest that either one or both of silver-haired or big brown bats were present in several areas they were not captured (e.g. Athabasca, Crow Lake, La Butte, Fort Mackay, Anzac) and where data were previously lacking. In addition, detector monitoring indicated that hoary bats were not only widely distributed in the study area but were relatively abundant. This may be one of the most significant results of the survey as hoary bats are unknown from most of the northeast region (Smith 1993, Engley and Norton 2000). Of the observations of hoary bats reported here, those at Crooked Lake and Beaver Creek are particularly compelling as the detector readings were supported by multiple observations of large, swift, high-flying bats.

Observations of bats flying during the well lighted nights at the northern locations and the accompanying detector observations suggest a variety of productive studies can be carried out in these areas. The ability to observe bat behavior on the wing offers considerable advantages to behavior studies as compared to studies carried out in darkness further south. In addition, there are opportunities to relate changes in echolocation sounds to such activities as feeding swoops, interaction with other bats, and interactions with nets is potentially a rich field of study. Also, bats were observed to fly in strong enough light that electronic tracking and photography might be possible as an aid to identification without capture of the bats.

Approximately 65% of bats were captured over water as compared to capture along cutlines or trails. Netting over water was more effective in capturing bats than netting along cutlines or trails in this study (0.42 bats/net hour compared with 0.13 bats/net-hour, respectively). Interestingly, both capture locations of northern long-eared bats were along cutlines in tall forest stands. This is consistent with previous studies (e.g. Vonhof and Wilkinson 1999) in which northern long-eared bats were captured more frequently in forest habitat than over water. However, capture of bats in northeastern Alberta in 2001 along cutlines and over water differed from that observed in the northwest the previous summer. In the northwest, Vonhof and Hobson (2000) found mist-netting along cutlines to be more effective than netting over water. They suggested that this might be related to the abundance of standing water in the region. In the northeast region, there was comparatively little open water in much of the area sampled. Overall, capture rates were similar between this study and that of Vonhof and Hobson (2000; 0.23 bats/net hour versus 0.21 bats/net-hour, respectively).

In general, the standard protocol for bat research in Alberta (Vonhof 2000) was a very useful tool for conducting a bat inventory. Three minor revisions to the protocol are recommended and will be reviewed by the provincial bat committee. First, habitat characteristics should be assessed in the general area of the study site rather than just at the immediate site as the protocol indicates. Second, the size of the testes and epididymides should be recorded in studies where obtaining information on reproductive condition is important. Both the pale testes and dark epididymides can be seen through the skin of some species (Myotis spp.). The absolute and relative size of those organs have been important in evaluating reproductive activity of male bats in Alberta (Schowalter 1980). Third, the measurements in the standard protocols should be increased for northern parts of the province as many individuals from this study exceeded the measurements

given in Vonhof (2000). Heavier bats with larger forearms have been described in other northern studies (e.g. Wilkinson et al. 1995).

6.0 MANAGEMENT IMPLICATIONS AND FUTURE DIRECTIONS

The data from this study have significantly advanced our knowledge of bats in northeastern Alberta. Distribution gaps were filled for all species and range extensions north were observed for little brown bats. Further research is however still required in this region as discussed below.

1. Large-scale habitat modification by forestry, conventional oil and gas exploration, and oil sands development was observed in much of the area surveyed. Research to establish baseline observations of the distribution and biology of the bats in the region are urgently needed if the effect of this development is to be assessed. Study sites visited during this survey should be revisited in the future.

2. Significant gaps remain in our knowledge of the distribution of the various species of bats in northeastern Alberta. Additional surveys are needed, especially to examine the extent of distribution and migratory movements of silver-haired and hoary bats. Surveys of hibernacula and roosting sites should be a high priority. Sample areas should be small enough to allow sites to be revisited within a single season.

3. Bats fly during the rather well lighted mid-summer nights in the northern part of the area surveyed. This provides opportunities to observe bat behavior that cannot be done at study areas further south. Proposals to undertake research into the behaviour of bats in the northern part of the province should be actively supported.

4. Recording of length and relative size of testes of male bats should be encouraged in studies where knowledge of reproductive condition is important.

5. In general, the standard protocol (Vonhof 2000) was a very useful tool for conducting bat inventories and should continue to be utilized in future surveys.

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Appendix 1. Bat study sites in northeastern Alberta during summer 2001 (NAD 83, Zone 12)

Study Area	Site No.	Study Site	Date	UTM N	UTM E	Loc Type	Nets	Detectors
Athabasca	1	Crooked Lake	27-Jun-01	6087960	337505	Cutline	x	
Athabasca	2	Crooked Lake	28-Jun-01	6088415	337884	Cutline	x	x
Athabasca	3	Rock Island Lake	30-Jun-01	6147410	318350	Pond	x	
Athabasca	4	Poacher's Landing	19-Jul-01	6091802	378346	Cutline	x	x
Crow Lake	5	Crow Lake	2-Jul-01	6183240	425961	Trail Cut	x	x
Crow Lake	6	Exploration Road	3-Jul-01	6180745	420770	Pond	x	x
La Butte	7	Buffflehead Pond	6-Jul-01	6586402	476551	Pond		x
La Butte	8	Sapsucker Pond	6-Jul-01	6586465	476513	Pond		x
La Butte	9	La Butte Creek	6-Jul-01	6586450	476513	River		x
La Butte	8	Sapsucker Pond	7-Jul-01	6586465	476513	Pond	x	x
La Butte	10	Stream Channel	8-Jul-01	6585430	477682	Pond/crk	x	x
La Butte	11	River	9-Jul-01	6584209	477640	River	x	x
Ft. McKay	12	Kearl Lake	12-Jul-01	6350995	484467	Cutline	x	x
Ft. McKay	13	Bitumont	13-Jul-01	6365634	464428	Cutline	x	x
Ft. McKay	14	Beaver Creek	14-Jul-01	6330230	462029	Pond	x	x
Anzac	15	Engstrom Lake	16-Jul-01	6227843	506652	Trail	x	x
Anzac	16	Conklin Road Sa	17-Jul-01	6227604	508138	Cutline		x
Anzac	17	Conklin Road Sb	18-Jul-01	6223105	508100	Cutline	x	x
Lac La Biche	18	Conklin Road	22-Jul-01	6098472	456979	Creek	x	
Lac La Biche	19	Mission	23-Jul-01	6075699	429901	Building		
Lac La Biche	20	AlPac Connector	23-Jul-01	6099805	455724	Cutline	x	x
Conklin	21	Leismer Intersection	24-Jul-01	6166425	491575	Pond	x	x
Conklin	22	Leismer Road	25-Jul-01	6167696	490492	Cutline	x	x
Fidler-Greywillow	23	Fidler 1	23-Jul-01	6552592	533099	Pond	x	x
Fidler-Greywillow	24	Fidler 2	24-Jul-01	6552592	533099	Trail	x	x
Fidler-Greywillow	25	Fidler 3	25-Jul-01	6552592	533099	Forest edge	x	x
Fidler-Greywillow	26	Fidler 4	26-Jul-01	6552592	533099	Trail	x	x

Appendix 2. Data on bat captures in northeastern Alberta during the summer of 2001. Study site numbers correspond to Appendix 1. Taxon codes: LANO = *Lasionycteris noctivagans*, MYLU = *Myotis lucifugus*, MYSE = *Myotis septentrionalis*. Sex: M= male, F = female. = nonparous, P = pregnant, L = lactating, Pl = postlactating, Age: A = adult, J = juvenile. Blanks indicate missing values.

Study Site No.	Date	Observation	Capt. Time	Taxon Code	Sex	RC	Age	Mass (g)	Forearm (mm)
3	31-Jun-01	01-06-31-3	23:13	MYLU	M		A	7.25	37.6
3	31-Jun-01	01-06-31-4	23:42	MYLU	F	P	A	11.0	41.1
3	31-Jun-01	01-06-31-5	23:49	MYLU	M		A	8.25	38.4
3	31-Jun-01	01-06-31-6	23:42	MYLU	F	P	A	10.5	37.8
3	31-Jun-01	01-06-31-7	23:42	MYLU	M		A	11.0	39.9
3	31-Jun-01	01-06-31-8	23:42	MYLU	M		A	9.25	39.0
3	31-Jun-01	01-06-31-9	23:59	MYLU	M		A	8.75	38.1
3	31-Jun-01	01-06-31-10	23:42	MYLU	F	L	A	8.75	40.2
3	31-Jun-01	01-06-31-11	00:07	MYLU	F	Np	A	9.0	38.5
3	31-Jun-01	01-06-31-12	00:12	MYLU	M		A	8.5	38.2
3	31-Jun-01	01-06-31-13	00:50	MYLU	M		A	8.5	37.3
3	31-Jun-01	01-06-31-14	01:39	MYLU	M		A	9.25	37.5
8	7-Jul- 01	01-07-07-15	23:55	MYLU	M		J	7.6	37.5
8	7-Jul-01	01-07-07-16	00:50	Escape					
8	7-Jul-01	01-07-07-17	01:23	MYLU	M		A	8.6	38.4
12	12-Jul-01	01-07-12-18	01:15	MYSE	M		A	7.4	37.3
12	12-Jul-01	01-07-12-19	01:12	MYSE	F	Np	J	7.5	37.3
18	22-Jul-01	01-07-22-19[2]	22:37	MYLU	F	L	A	9.5	39.0
18	22-Jul-01	01-07-22-20	22:19	MYLU	F	L	A	10.5	39.0
18	22-Jul-01	01-07-22-21	22:30	MYLU	F	L	A	9.25	37.9
18	22-Jul-01	01-07-22-22	22:43	MYLU	F	Np	A	9.5	39.7
18	22-Jul-01	01-07-22-23	23:05	MYLU	F	Pl	A	10.5	38.0
18	22-Jul-01	01-07-22-24	23:05	MYLU	F	Np	A	9.5	38.1
18	22-Jul-01	01-07-22-25	23:05	MYLU	F	L	A	9.0	38.3
18	22-Jul-01	01-07-22-26	01:17	MYLU	F	L	A	11.25	39.1
20	23-Jul-01	01-07-23-27	22:35	MYLU	F	L	A	9.75	38.3
20	23-Jul-01	01-07-23-28	22:50	MYLU	F	L	A	9.0	38.6
20	23-Jul-01	01-07-23-29	22:50	MYLU	F	L	A	9.0	39.6
20	23-Jul-01	01-07-23-30	22:50	MYLU	F	L	A	9.5	39.5
20	23-Jul-01	01-07-23-31	00:10	LANO	M		J	8.25	38.9
20	23-Jul-01	01-07-23-32	00:10	MYLU	F	L	A	10.25	37.7
21	24-Jul-01	01-07-23-33	23:34	MYLU	M		A	9.9	37.5
21	24-Jul-01	01-07-23-34	00:05	LANO	F	L	A	14.5	40.7
21	24-Jul-01	01-07-23-35	00:19	MYLU	M		J	8.5	36.7
21	24-Jul-01	01-07-23-36	01:21	MYLU	F	Pl	A	10.5	37.8

22	25-Jul-01	01-07-25-37	23.12	MYLU	F	Np	A	10.5	39.2
22	25-Jul-01	01-17-26-38	23.23	MYSE	M		A	7.5	36.1

1. Mass very small, may be measurement or recording error.
2. Number 19 used twice in field, but on different dates.

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