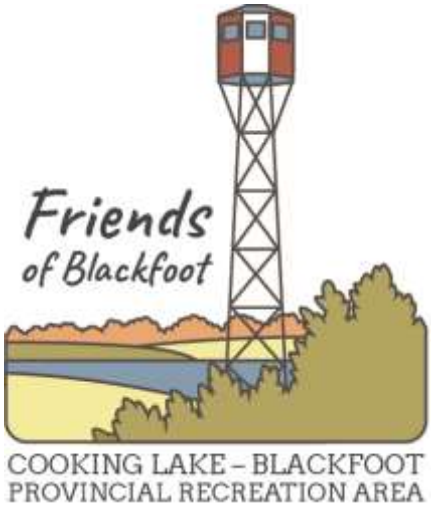
Friends of Blackfoot Bat House Project

2019 Year-end Report

April 2020

Friends of Blackfoot Society
52365 Range Road 210
c/o Cooking Lake - Blackfoot Provincial Recreation Area
Sherwood Park AB T8G 1A6



Background

In December 2017 the Friends of Blackfoot (FoB) received a research permit from Alberta Parks to test bat house designs relative to bat occupancy (project plan Appendix 1). In general the approach is to erect and monitor bat houses at Waskehegan staging area of the Cooking Lake Provincial Recreation Area (PRA), east of Ardrossan Alberta. The project is designed to document bat occupancy, compare use of two different house designs and sizes (single chamber, multiple chamber, large and small), and provide benefits to PRA visitors through natural history information and citizen science activities associated with bats and the project.

On July 31, 2018 four bat houses were installed on the communications tower adjacent to the FoB Heritage Interpretive Centre in conjunction and assisted by Alberta Parks and the Alberta Community Bat program (Figures 1-5). This location provided easy access for FoB members to monitor bat activities and a relatively high profile with the public. There was no evidence of bats using the houses in 2018, in part perhaps due to the delayed installation of the houses in late July. However, this was not the case in 2019. This report provides a summary of the data collected at the site from June 29 to October 7, 2019.

Methods

Observations and data records were standardized. FoB volunteers were asked to assess the research site whenever they were working at the information centre. Generally FoB members were on site at the centre each weekend between the long weekends in May and September. Additional site visits were made through September and until there were two consecutive visits with no evidence of bat activity.

A survey form (Appendix 2) was used to track site assessments and provide records of: date, observer(s), bat evidence (Yes/No), evidence type (guano, # flying, # in roost) and general comments. In addition, occurrence of guano was documented and mapped on a standardized image of the research site (Appendix 3). The image was partitioned by a vertical midline that delineated left and right, in direct association with the two large bat houses attached to the tower. **The large multiple chamber house occurs on the left and the large single chamber house on the right**.

Observers were asked to provide general descriptive comments about the droppings seen, document the number and location of all droppings on the image provided (including those on the concrete pad and the tower uprights and cross-pieces), and sweep the entire site clean after the counts were completed each observation day. On a few occasions dry bat droppings were collected in paper envelopes for DNA evaluation.

Ambient temperatures were recorded using three thermo-buttons in or on the two large bat houses from August 16 to September 28, 2019. One button was inside the single chamber house, the other two were inside or outside the multiple chamber house. Each button recorded temperature every 30 minutes.

The closest weather station to the research site is Elk Island National Park (EINP). Standard daily measurements for temperature, precipitation, and wind at EINP for 2019 were downloaded from the Environment Canada web pages.

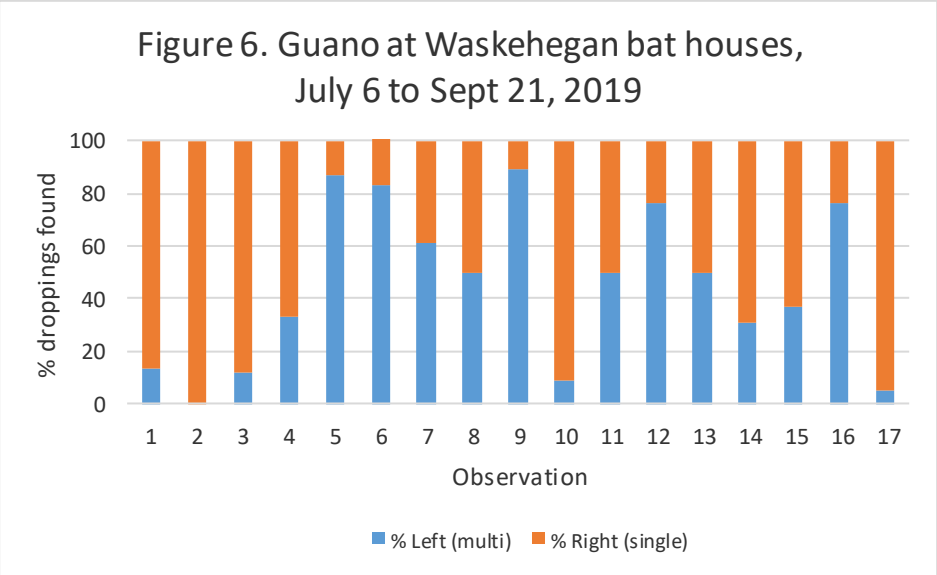
Results

Casual observation through May and June did not garner any evidence of bat presence at the site. However, on June 29 possible bat droppings were seen on the concrete below the houses. On July 6 the droppings were confirmed as bat origin and standardized observations began. Observations were made on 19 occasions from July 6 to October 7, 2019 (Table 1 observations). Nine FoB members were involved in the data collection. All volunteers were very diligent in recording and mapping their observations and an abundance of data was generated.

Evidence of bat activity (bat droppings below the houses) was seen on all observation dates except October 3 and October 7 (Table 2 – data). The interval between observations generally was a week, but involved consecutive one or two days in six occasions, and in one case an interval of 30 minutes. On August 17, the concrete was swept clean but revisited 30 minutes later. A fresh dropping was present on the right side of the concrete pad directly below the large single chamber house.

The great majority of bat droppings occurred on the concrete pad directly below one or both lower bat houses. The remaining droppings were stuck on the lower tower uprights and crosspieces below the houses. Although assessed only a few times, no droppings were seen on the roof of either of the lower houses (implying no bats used the small upper houses and all droppings came from bats in the large lower houses).

The proportion of droppings found on the left (below the multi-chambered bat house) or the right (below the single-chambered bat house) was determined as the percentage of total droppings on each occasion found to the left or right of the vertical median line (Figure 6).



Data are relatively sparse in this initial year and cannot be interpreted in depth. In general, the right (single) house had a higher percentage of the droppings than the left (multiple) in July but the pattern reversed in August. In September, droppings generally were more likely under the right house, as in July.

The differing intervals between observations precludes using the number of droppings for comparing patterns in individual house occupancy. However, on 6 situations of 1 or 2 day intervals the # of droppings were 5, 18, 19, 16, 7, and 39. Five droppings in ~24hrs is consistent with perhaps only one bat present – in this situation the bat was in the single house. Remaining 24hr observations seen to imply more than one bat present, altho we cannot use current data to determine actual number of bats present.

In-depth analyses of patterns of use relative to ambient temperatures (inside or outside, single vs mulit-chamber), wind, and precipitation is premature at this time. There are tantalizing suggestions that occupancy may correlate more with minimum daily temperature rather than maximum. And there appears to be little or no correlation with precipitation - heavy rain events coincided with bats in the large single chamber on July 14 and the multi chamber on July 27. However, such data will be collected across multiple years prior to more detailed analysis applied to this aspect of bat house occupancy.

Additional incidental observations at the site in 2019 included an owl pellet on the concrete pad below the bat houses on July 6 (contained remnants of snowshoe hare) and on September 21 (small bird bones and feathers). On September 1, high-pitch vocalizations were heard coming from the large single chamber bat house. Thermal imaging (FLIR) of both large houses on September 1 revealed two or three heat areas within the right (single) house.

A specific bat interpretive program was not delivered in 2019. However, the bat houses often were pointed out to the public during FoB activities at the Heritage Centre. Bat info materials also were provided in the centre.

Table 1. FoB Bat house project observations 2019.

		Evidence ?	Evidence Type - if bats seen, provide # bats		
Date checked	***Observer(s)***	**Y/N**	***Guano***	***# flying***	***Comments– describe observation***
June 29/19	Jim & Ruth	Y	Y		Quite a bit of guano on concrete/ Not cleaned off.
Jul 6/19	Margo	Y	Y		Quite a few droppings on concrete & cross rails. Largely on right side.. Took pictures. Removed all. OWL PELLET on concrete— SSHare Swept
Jul 7/19	Margo Jim Ruth	Y	Y		New droppings on right side on concrete & cross rails. Removed all.
July 14/19	Margo Maria	Y	Y		Lots of droppings especially below the rt 1-rm bat house. Guano **collected**. Cleared all.
July 20/19	Cathie	Y	Y		Droppings below rt 1-rm house especially
July 27/19	Maria	Y	Y		Droppings below 2-rm house all except 1 look fresh.
Aug 3/19	Ruth/Jim	Y	Y		Most droppings on left side
Aug 4/19	Gerry	Y	Y		Droppings on concrete and rails
Aug 5/19	Cathie Herb	Y	Y		Not sure if Gerry swept yesterday. Collected 18 droppings. Swept.
Aug 10/19	Mary Cliff	Y	Y		Droppings equal on both sides. 3 on rails. 19 on concrete. All look fresh except 1 or 2. **Photo**
Aug 11/19	Maria	Y	Y		Lots of droppings in 24 hours. Swept
Aug 17/19	Margo	Y	Y		Lots of droppings under rt side and rt rails. Very few on left side. **Collected** sample. Swept clean.
Aug 18/19	Ruth Jim	Y	Y		8 droppings on each side
Aug 24/19	Gerry	Y	Y		Lots of droppings on concrete and rails
Aug 31/19	Margo	Y	Y		Lots of soggy droppings (been raining for days). Primarily on left side.
Sept 1/19	Ruth/ Jim	Y	Y		7 droppings on both sides. Peeping noises from house. Swept.
Sept 2/19	Cathie Herb	Y	Y		Droppings dry. Most on rt side. **Collected**
Sept 9/19	Jim/ Ruth	Y	Y		Most droppings on rt side
Sept 15/19	Margo	Y	Y		Most on left side. Swept clean.
Sept 21/19	Margo	Y	Y		Tight cluster droppings below rt side of rt house. OWL PELLET (small bird). Droppings **collected**.
Oct 3/19	Margo	Y	Y		Zip
Oct 7/19	Margo	Y	Y		Relatively warm days this week but no bat sign at the site. Closed down for season.

Table 2. Location of droppings below the bat houses.

				LEFT			RIGHT						
		Time Interval	Swept?	Concrete	Rails	Left Total	Concrete	Rails	Right Total	total	% Left (multi)	% Right (single)	
July 6/19	cumulative for few days. Largely on rt on concrete. Only rt rails.	few days	Y	2	0	2	11	2	13	15	13	87	6-Jul
07-Jul	a few droppings on rt side, rails & concrete	1 day	Y	0	0	0	3	2	5	5	0	100	7-Jul
14-Jul	lots of droppings, rt side	7 days	Y	3	1	4	26	3	29	33	12	88	14-Jul
20-Jul	mostly on rt. All on concrete	6 days	Y	7	0	7	14	0	14	21	33	67	20-Jul
27-Jul	all fresh except 1	7 days	Y	11	2	13	2	0	2	15	87	13	27-Jul
03-Aug	most on left	7 days	Y	50+	2	50+	7	4	11	60+	83	18	3-Aug
05-Aug	collected & swept	2 days	Y	6	5	11	3	4	7	18	61	39	5-Aug
10-Aug	equal #s each side. Took photo	5 days	Y	13	1	14	13	2	15	29	50	50	10-Aug
11-Aug	most on left	1 day	Y	13	4	17	2	0	2	19	89	11	11-Aug

17-Aug	lots on right side. Fresh dropping 30 min after I swept!	6 days	Y	5	0	5	41	8	49	54	9	91	17-Aug
18-Aug	equal each side	1 day	Y	8	0	8	8	0	8	16	50	50	18-Aug
31-Aug	lots on left. Less on rt	13 days	Y	~130	14	~144	`40	8	~48	~190	76	24	31-Aug
01-Sep	few on both sides. Peeping rt side. Used FLIR -2-3 heat areas in rt house	1 day	Y	4	0	4	2	1	3	7	50	50	1-Sep
02-Sep	more on rt. Quite a few high on rails	1 day	Y	8	4	12	10	7	27	39	31	69	2-Sep
09-Sep	raining. More on rt.	8 days	Y	24	3	27	36	10	46	73	37	63	9-Sep
15-Sep	warm, dry most on left	6 days	Y	26	8	34	6	5	11	45	76	24	15-Sep
21-Sep	owl pellet on left. Droppings on rt (??)	6 days	Y	2	0	2	36	2	38	40	5	95	21-Sep
03-Oct	no sign	12 days	N										3-Oct
07-Oct	no sign, warm dry days	4 days	N										7-Oct

Discussion

Alberta is home to nine species of bats during the summer months (Pybus 1994). The most likely local species to make transient roosts or establish maternal colonies in bat houses are *Myotis lucifugus* (little brown bat) or *Eptesicus fuscus* (big brown bat). Both species are known to occur on the Cooking Lake moraine and in the Elk Island area (VonHoff and Hobson 2001) These species establish permanent maternal colonies in trees, buildings, or bat houses where females return year after year to give birth to the next generation. In Alberta maternal colonies range from 10s to 100s of females (Pybus 1994). There is high site fidelity to maternal sites and bats rarely switch to new sites as long as the original colony site is available. Conversely, other than young-of-year, males rarely occur at maternal colonies. One or a few males tend to use multiple temporary roosts for a single or a few consecutive days throughout the summer. Forest-dwelling hoary or silver-haired bats occasionally use bat houses as temporary day roosts, particularly during migration in May/June and September/October.

Given the site fidelity of females to their maternal colonies, it is most likely that the bats using the houses at Waskehegan are transient males of either little brown or big brown bats. The bat guano collected at the site on four occasions has been forwarded for analyses and should help sort out which species were present, at least on those four occasions. Duration of stay of individual bats is unknown and this can perhaps be addressed in future observation years.

Consistency in the data suggest continual or at least repeated temporary occurrence of bats roosting in the houses throughout the summer. Detailed analyses are confounded by multiple days between observations. But the 6 cases of consecutive daily observations documented fresh bat droppings on the second and third day on each occasion, suggesting that bats were present in the houses that day or were at least present during the previous 24 hours. Cumulatively it is apparent that an unknown number of bats used the houses throughout the summer period. It is likely that one or more male bats may have established a summer roost or temporarily used the houses for one or more consecutive days.

It is an interesting sidebar that bats continued to use the houses despite occasional presence of an owl, most likely a Great Horned Owl, using the tower. Owls are known predators of bats.

The proportion of droppings under the single or multi-chambered houses seemed to differ across the months. It may be that as conditions change in terms of heat build-up (perhaps equivalent to degree days) may make the different house designs more amenable under different conditions. While the current data suggest a relationship between house design and temperature, they are too limited to draw definitive conclusions. Additional data in coming years may clarify any such patterns.

With regards to comparing the size of houses relative to occupancy by bats, we recognize a significant limitation in the installation design. Unfortunately the design was controlled by the physical setup of the tower and could not be avoided. The most we can say is that there is a flaw in the design that precludes accurate data collection but there was no evidence of droppings on top of either of the lower houses whenever this was assessed. This implies bats did not use the two upper smaller houses and is consistent with results based on other studies. The small houses likely do not meet basic environmental or microclimatic needs of the bats.

Recommendations:

- continue standardized observations in coming years

- begin observations in early May and continue at least each weekend into October, or until no evidence is found on two consecutive occasions

- set up a remote motion-activated trail camera to try to document actual bat activity at the houses

- collect additional guano, perhaps more frequently

- modify the timing of temperature readings in line with similar projects by ACBP

- develop interpretative materials for the info centre, including a sort summary and this full report

- consider some acoustic sampling at the site at dusk to shed light on species using the houses

Acknowledgements

A project such as ours needs many forms of support. First, the members and Executive of the Friends of Blackfoot for suggesting, encouraging, and supporting the project. The Alberta Community Bat Program, particularly Cory Olson, made significant contributions to the project design, installation of the houses, and installation and data from the thermo buttons. The four bat houses were donated by FoB and ACBP. The installation backboard was prepared by Cam Mcgregor. Alberta Parks had a critical role in approving the project and arranging for installation of the houses.

Special recognition goes to the FoB members who voluntarily made diligent observations through the summer: Maria Basaraba, Cathy and Herb Gale, Mary Martens, Jim and Ruth Shewfelt, Cliff Smith, and Gerry Thorpe.

Prepared by Margo Pybus, on behalf of FoB

Literature Cited

Pybus, M.J. 1994. *Bats of Alberta – the real story*. Alberta Environmental Protection & Alberta Agriculture, Food, and Rural Development. Edmonton. 16 pp.

Vonhof, M.J. and D. Hobson. 2001. *Survey of the bats of central and northwestern Alberta*. Alberta Sustainable Resource Development, Fisheries & Wildlife Management Division, Resource Status and Assessment Branch.

Figures 1 – 5. Erecting four bat houses at Waskehegan, July 2018.

Appendix 1

Bat House Project

Friends of Blackfoot

Summer 2017

Executive Summary

Bats are common native components of functioning ecosystems. Yet they are often misunderstood or taken lightly for their significant contributions to ecosystem integrity. This project uses the energies and interests of a volunteer group dedicated to conservation and education associated with the Cooking Lake Moraine to deliver enhanced public education and citizen science in one of Alberta's popular parks. The Friends of Blackfoot (FoB) will construct, erect, and monitor bat houses, in conjunction with and subject to approval by Alberta Parks, within the park. Initially, activity will be limited to the Waskehegan trailhead to facilitate monitoring of the houses as well as broader public education about bats. Summer use in two/three different styles of bat houses will be compared over a number of years. Once the houses are erected, there is no subsequent disruption to the park or any bats that may use the houses.

Purpose

To facilitate ongoing public education about bats and collect valid citizen science data regarding use of bat houses in central Alberta habitats.

Goals

Establish suitable bat roosting habitat in locations visible to the public as a means of increasing public knowledge and enjoyment of a group of native wild species.

Lay a foundation for public support of species currently common in central Alberta but facing considerable risk of future population declines associated with White-nose Syndrome (WNS).

Engage the public and the Friends of Blackfoot in a citizen science research project to compare use of different styles of houses specifically in aspen parkland habitats and central Alberta environments.

Objectives

1) Information & Education:

Supplement ongoing AB Parks and FoB education programs.

Display info and materials within the Waskehegan Interpretive Centre.

Signage at the bat house site?

2) Citizen Science

In concert with Alberta's Community Bat Program

Engage volunteers in making structured natural history observations

Lead by example to profile citizen science participation in such programs as Christmas Bird Counts, Bluebird Trails, Nocturnal Owl Monitoring, RANA monitoring, BHI, and other projects underway in the moraine area.

3) Monitoring

Provide ongoing documentation of bat house use

Compare two (or three??) different house styles

Use non-invasive method of checking for droppings below the bat houses

Data will be recorded in an organized and consistent manner.

Collect guano sample and provide to Community Bat Program for DNA and possible food habits studies

4) Beaverhills Initiative (BHI)

Coordinate with similar activities undertaken through BHI and member groups. E.g., Friends of Elk Island

Highlight and support specific BHI initiatives on the moraine or in the Blackfoot, as appropriate and as feasible within the limits of volunteer participation

Methods

1) Information and Education

Develop materials relating to bats and associated concerns for bat populations to add to current on-site displays in the centre.

Ask Community Bat Project for any available materials already prepared.

Include links to AB bat groups and initiatives, as well as broader bat info contacts such as *Bat Conservation International*

2) Citizen Science

Group of volunteers with expressed interest in bat house project.

Coordinate with AB Community Bat Project to receive bat house kits.

Organize workshop to build and paint bat houses.

Build houses of two?? Or three? different styles

Season completed bat houses with guano from local bats.

Could make this a public event to profile bats and bat houses?? At Waskehegan or in Sherwood Park ??

3) Monitoring

Organize specific monitoring schedule and data recording

Develop project data recording sheet

Submit data to Bat Watch

4) BeaverHills Initiative (BHI)

Work with BHI Executive Director to facilitate interagency cooperation and support for mutual programs.

Reporting

The FoB will provide ongoing updates to AB Parks local staff, specifically at the annual FoB AGM.

Raw ongoing data will be provided to Bat Watch (www.batwatch.ca)

Background

Alberta is home to nine, possibly ten, species of native bats. All are insectivorous. Bat species are the only primary predator of night-flying insects and as a group their cumulative ecosystem value in removing vast numbers of forest and agriculture pests is in the order of many millions of $$ across north America.

Various bat species are distributed across central Alberta and, while relatively inconspicuous, their presence is essential to the natural harmony in local ecosystems. Specific to the Cooking Lake Moraine, little brown bats (*Myotis lucifugus*) and big brown bats (*Eptesicus fuscus*) are the local primary species. Both species use colonial summer roosts in buildings and treed areas.

Maternal colonies have a particularly strong fidelity to their home roosts and generally use bat houses only in conjunction with loss or exclusion from an occupied site. However, males and juvenile bats are much more transient and thus more likely to make use of bat houses, and are known to use bat houses.

Bats across Alberta face serious current and future threats. Mortality at wind farm installations can be significant, particularly during spring and fall migrations. Large-scale timber harvest removes suitable habitat for tree-dwelling bats and significantly changes the insect community in forested areas.

White nose syndrome (WNS), an exotic fungal disease inadvertently introduced to North America from Europe (ref) continues to devastate bat populations across eastern North America (www.wns.org , and was recently identified in Washington state. The mortality associated with WNS has reduced previously common species to the point of being listed on Canadian and US endangered species lists. Wildlife agencies and non-profit groups are diligently trying to document current species occurrence and population abundance as baseline data prior to a possible WNS-event in western N. America. Summer activity patterns and habitat use are among the aspects being documented. Further to this, use of bat houses as alternative habitat to monitor trends in summer populations is a key area of investigation.

Public attitudes also are key to security for bat populations. Some bat species often roost in anthropogenic structures (e.g., buildings, bridges), on the sides of buildings, or are seen as they forage through yards or at street lights after sunset. As such, public appreciation and understanding is important in minimizing disturbance of individual bats while enhancing support for overarching bat conservation. We need to encourage people to leave bats alone, and simply appreciate them for the natural wonder that they are.

Appendix 2:

Friends of Blackfoot BAT ROOST SURVEY FORM

Bat houses installed July 2018. Monitoring began May 2019.

		Evidence ?	Evidence Type - if bats seen, provide # bats		
Date checked	***Observer(s)***	**Y/N**	***Guano***	***# flying***	***Comments– describe observation***

Purpose: Document comparative roost use at Waskehegan bat house site

Appendix 3. Guano location Record

Date	***Comments:*** ***Describe locations & approx. # of droppings*** ***Please pay particular attention to whether droppings occur on the left or right of centre line drawn on picture*** ***Draw ALL droppings on the tower image.***

Methods*:*

Please
1. ***Record your observations in the running survey form (see separate sheet)***
2. ***Show droppings on a copy of the tower picture. Please pay particular attention to whether droppings occur on the left or right of centre line.***

If guano present:

- *Record date and describe observation in comment section above*
- *Mark approx amount & location on the photo. Include any droppings on concrete pad AND on tower uprights or cross pieces.*
- ***Sweep away ALL droppings so the slate is clean for the next observation***