July 2014 Bat Inventory of Flathead River Valley, SW BC

Dr. Cori Lausen

Wildlife Conservation Society Canada

PO Box 606, Kaslo, BC V0G1M0 clausen@wcs.org

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Executive Summary

Eight sites were sampled for bats in the Flathead River Valley of SW BC 24 – 27 July 2014 using a combination of mistnetting and acoustic sampling. Due to close association of bats with riparian habitat, all sites were selected in close proximity to the Flathead River, or near its tributaries. Mistnet capture of bats confirmed the presence of 7 species of bats, all of which were suspected of occurring in the region. These species were as follows: *Eptesicus fuscu*s, big brown bat, *Myotis lucifugus*, little brown myotis, *M. evotis*, long-eared myotis, *M. volans*, long-legged myotis and *M. californicus*, Californian myotis, *Lasionycteris noctivagans,* silver-haired bat, *Lasiurus cinereus,* hoary bat. The latter two had not been captured in the 2013 bat blitz. Thirty-one bats were captured over the course of 4 nights of netting, and 1049 bat passes were recorded. An additional three species were thought possible in this region based on bat diversity in SW Alberta and the Montana Flathead area: *Lasiurus borealis* eastern red bat is found in Waterton Lakes National Park over the Continental Divide from the Flathead drainage, *Myotis yumanensis,* Yuma myotis*,* and *Myotis septentrionalis*, northern myotis have been found in the US Flathead drainage to the south of our sampling area. Neither of the latter 2 species has been found to be common in the northern regions of the US Flathead drainage. Acoustic recording suggested the possible occurrence of these 3 species in the Canadian Flathead, but if these species are present, they are in low densities and were thus not captured during the 8 nights of inventory (4 nights in each of 2013 and 2014). Of the 11 bat species thought to potentially occur in the Flathead, the only species not captured nor detected was *Corynorhinus townsendii*, Townsend's big-eared bat. This species is associated with talus slopes and rocky outcroppings, and this type of habitat was netted on only one of the 8 sampling nights (at Rose Canyon). This species has been found in the US Flathead.

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Front Cover:

Top: Group photo of Field Crew for Bat Blitz 2014, photo by Mark Worthing.

Bottom: Myotis volans, Long-legged myotis in Flathead river valley, BC; photo by Cory Olson

Introduction

The goal of this project was to inventory bat species, building on an initial 2013 BioBlitz in the Flathead River valley. Because the 2013 blitz was in June, cool and rainy weather negatively impacted the success of the 2013 bat inventory, and thus a summer inventory was conducted in 2014 in attempt to inventory during warmer weather when bats would be more active and thus more likely to be captured and/or recorded acoustically.

While the Canadian Flathead River valley had not been formally inventoried for bats, many bat survey nights have been conducted south of the border along the US portion of the Flathead River, and immediately to the east of the BC Flathead, in Waterton Lakes National Park, Alberta. Based on captures in the US Flathead and in Waterton Lakes National Park immediately the east of the study area, the following species were considered possible: *Eptesicus fuscus* , big brown bat, *Myotis lucifugus*, little brown myotis, *M. evotis*, long-eared myotis, *M. volans*, long-legged myotis and *M. californicus*, Californian myotis, *Lasionycteris noctivagans,* silver-haired bat, *Myotis yumanensis,* Yuma myotis*, Myotis septentrionalis*, northern myotis, *Corynorhinus townsendii*, Townsend's big-eared bat*, Lasiurus cinereus,* hoary bat, and *Lasiurus borealis,* eastern red bat (MT Natural Heritage database 2013; Glacier National Park database, C. Lausen unpublished data; Waterton Lakes National Park database, C. Lausen unpublished data). The latter two are foliage-roosting species, roosting mainly in clumps of leaves high in trees, often deciduous; the former 9 species are crevice-roosting bats. *Corynorhinus townsendii* prefers buildings or rocky talus slopes, caves or mines, whereas the other crevice-roosting bats will use buildings, rock crevices, or roost under sloughing bark or inside tree/snag cavities (Adams 2003).

Riparian sites were selected for sampling, because riparian habitats are known to be important foraging and roosting sites for bats (Grindal et al. 1999). Focus was on the southern portion of the Flathead River valley due to its size, lower elevation, and the occurrence of cottonwood stands. Sampling sites were selected within the riparian corridor by the prevalence of roosting or foraging habitats, which entailed older growth trees with sloughing bark and/or old growth aspen/cottonwood, calm water bodies, or sites near buildings. Some sites lend themselves more to acoustics than to mistnet capture, as capture requires fly-ways that can be closed off, funnelling bats into the nets.

Methods

Mistnets were placed across likely fly-ways, including across trails/roads, over calm water bodies, and perpendicular to forest edges in forest clearings. Nets varied in length from 6 – 18 m and 2.6 – 7.8 m in height. At the mistnet sites, an EM3 (Wildlife Acoustics, MA) was used to record captured bats, capturing reference recordings and facilitating species identification (e.g. Yuma vs. little brown myotis). Two types of bat detectors were deployed passively: SM2Bat and SM3Bat (Wildlife Acoustics, MA). All acoustic and mistnet sites are listed in Table 1.

Captured bats were processed and released on site. Species, sex, and reproductive status were determined for each capture.

Pachadream Cave, located near Mount Doupe to the NW of the netting and acoustic sampling locations was sampled independently. Two Anabat Roostloggers (Titley, Columbia, Missouri) were deployed on 28 Sept 2013 by Jeremy Bruns, Alberta Speleological Society President in 2013, and were retrieved in July 2014 by Kathleen Graham, Alberta Speleological Society President in 2014. This cave is a very deep karst system (>2 km in length).

Results

Capture

Weather on night 1 was cool and rainy, and while rain was not a problem after night 1, cold temperatures at night occurred, and likely did result in lower bat activity due to lowered insect activity. For a list of weather conditions during mistnet sampling, refer to Table 1.

Nets were strung over 4 nights at 6 sampling sites in total (3 sites were netted on 25 July 2014). Thirty-one bats were captured of 7 species (Tables 2 and 3): *Eptesicus fuscu*s, big brown bat (1), *Myotis lucifugus*, little brown myotis (16), *M. evotis*, long-eared myotis (3), *M. volans*, long-legged myotis (3) and *M. californicus*, Californian myotis (2), *Lasionycteris noctivagans,* silver-haired bat (5), *Lasiurus cinereus,* hoary bat (1).

Acoustics

A total of 1049 bat passes were recorded at 7 sampling sites (Tables 3 and 4). No bats were detected by the 2 Anabat Roostloggers deployed in Pachadream Cave.

Table 1. 2014 inventory effort. Sampling sites for which mistnetting and/or acoustic monitoring was conducted.

SITE	N LAT	W LONG	Elev (m)	SAMPLING METHOD	Net nights	Acoustic Dates	Netting Weather	Netting Temps (°C)	Sampling Effort	MISC NOTES
CO Cabin Butts	49.00968	114.4836	1223	mistnet capture, acoustics	24-Jul	24, 25 July	Windy. New moon.	12°C start; 11.5°C end	22:00 - 2:30; ~250m^2 of netting; detector ran sunset to sunrise each night;	Had rained all day the night it was netted.
Cabin Creek	49.11965	114.5068	1290	mistnet capture	25-Jul	n/a	Clear; new moon	12°C start; 6°C end	22:00 - 1:00; ~50m^2 of netting	Netted across creek.
Flathead Bridge (South)	49.12127	114.4959	1293	mistnet capture, acoustics	25-Jul	25, 26, 27 July	Clear; new moon	12°C start; 8°C end	22:00 - 1:00; 140 m^2 of netting; detector ran each night sunset to sunrise	Netted under the bridge. Day roosting bats were present. Nets on road and south side of river.
Upper Sage Creek	49.09151	114.4598	1313	mistnet capture, acoustics	25-Jul	25-Jul	Clear; new moon	8.5°C start; 6°C end	22:00 - 2:00; 359 m^2 of netting	Flying squirrel captured in 2 nets
Rose Canyon	49.06179	114.2807	1335	mistnet capture, acoustics	26-Jul	26-Jul	Wind gusts to 6 km/hr; no moon effect.	12°C start; 6.7°C end	22:00 - 2:45; 382 m^2 of netting	Nets across bridge, across road, and across water in canyon.
NCC Ranch	49.00430	114.4791	1223	mistnet capture, acoustics	27-Jul	27-Jul	Calm weather; no	13°C start; 7.7°C	22:00 - 4:30; 408 m^2 of netting	

SITE	N LAT	W LONG	Elev (m)	SAMPLING METHOD	Net nights	Acoustic Dates	Netting Weather	Netting Temps (°C)	Sampling Effort	MISC NOTES
							moon effect.	end		
Howell Lake	49.09320	114.5188	1292	acoustics		25, 25, 27 July			sunset to sunrise monitoring	
Sage Creek Rocks	49.13364	114.3812	1370	acoustics		25, 25, 27 July			sunset to sunrise monitoring	

Table 2. Species codes and common names. Acoustic categories are also included here. Status is listed for the combined efforts of the netting that took place in 2013, in addition to the 2014 sampling.

A.

Species Name	Code	Common Name	Status and Comments
Eptesicus fuscus	EPFU	big brown bat	Captured both years
Myotis californicus	MYCA	Californian myotis	Captured both years
Myotis evotis	MYEV	long-eared myotis	Captured both years
Myotis lucifugus	MYLU	little brown myotis	Captured both years
Myotis volans	MYVO	long-legged myotis	Captured both years
Lasionycteris noctivagans	LANO	silver-haired bat	Captured in 2014
Lasiurus cinereus	LACI	hoary bat	Captured in 2014
Lasiurus borealis	LABO	eastern red bat	Suspected; acoustic evidence suggests possible presence
Myotis yumanensis	MYYU	Yuma myotis	Suspected; acoustic evidence suggests possible presence, although extensive netting for this species was done in 2014 and the lack of captures suggest it is either absent or rare.
Myotis septentrionalis	MYSE	northern myotis	Suspected; acoustic evidence suggests possible presence, although extensive netting for this species was done in 2014 and the lack of captures suggest it is either absent or rare.
Corynorhinus townsendii	COTO	Townsend's big-eared bat	No acoustic evidence of presence; netting in suitable habitat (Rose Canyon) was done for this species in 2014. The lack of captures suggest it is either absent or rare.

B. **Additional Categories in the Acoustic Analysis**

40kHz Myotis	MYVO or MYLU	Includes MYSE if present
50kHz Myotis	MYYU or MYCA	Includes MYSE if present
EPFULANO	EPFU or LANO, these species are difficult to differentiate acoustically	
LowF	Poor quality, low frequency recording. Species could be any of: LACI, EPFU, LANO, COTO	
HighF	Poor quality, high frequency recording. Species could be any of: MYLU, MYVO, MYCA, MYYU, MYEV, LABO, MYSE	
30-35kHz	When recording in high vegetation area, this recording could be interpreted as: EPFU, MYLU, MYEV	

Table 3. Bat capture data. Reproductive status: EPL = early post-lactation; NR = non-reproductive; NULLI = nulliparous [animal shows no signs of having ever reproduced]; ES = early scrotal (testes are just starting to swell for sperm production to occur); PAROUS = there are signs that animal has reproduced in the past; SS = super scrotal (testes are very swollen indicating sperm production is taking place); L = lactating (animal is nursing young); S = scrotal (testes are swollen and either are producing sperm, or about to produce sperm); VPG = very pregnant (late pregnancy; animal about to give birth). For scientific names, see Table 2.

Site Name	Date	Scientific Name	Gender (M or F)	Reproductive Status	Age (Adult or Juvenile)
CO CABIN	24-Jul-14	MYCA	F	EPL	A
		MYEV	M	NR	A
		MYLU	F	NULLI	A
		MYLU	M	ES	A
		MYLU	M	NR	A
		MYVO	M	NR	A
Butts Cabin	25-Jul-14	MYVO	F	NULLI	J
Flathead Bridge	25-Jul-14	MYEV	F	NULLI	J
				NR PARO	
		MYLU	F	US	A
		MYLU	F	NULLI	J
		MYLU	M	ES	A
				NR PARO	
		MYVO	F	US	A
Upper Sage Creek	25-Jul-14	LANO	M	ES	A
		MYLU	M	ES	A
		MYLU	M	NR	VJ
Rose Canyon	26-Jul-14	EPFU	M	SS	A
		LACI	M	ES	A
		MYCA	M	NR	A
		MYEV	F	L	A
		MYLU	M	NR	A
		MYLU	M	NR	A
		MYLU	M	ES	A

Site Name	Date	Scientific Name	Gender (M or F)	Reproductive Status	Age (Adult or Juvenile)
		MYLU	M	NR	A
				NULLIPARO	
NCC Ranch	27-Jul-14	LANO	F	US	A
		LANO	M	S	A
		LANO	M	S	A
		LANO	M	S	A
		MYLU	F	VPG	A
				NR	
				PARO	
		MYLU	F	US	A
		MYLU	F	L	A
		MYLU	F	L	A

Table 4. Acoustic inventory. Bats were recorded using bat detectors and data were analyzed using a combination of manual identification, KaleidoscopePro 2.10 (Wildlife Acoustics, Massachusetts) and filters in AnalookW 4.1c (C. Corben, Missouri).

SITE	HIGHF	50k Myotis	MYCA	40k Myotis	MYVO	MYLU	Possible LABO	MYEV	30-35k	EPFU	LANO	EPFU/LANO	LACI	LOWF
CO Cabin	2	40	18	195	1	24		6	2	1	8	3	23	
Flathead River Bridge	3	3	6	314	1	57	4	6	14		5	12	29	1
Howell Lake	26	4	8	139		59			7		66	8	50	1
NCC Ranch		1		12		8		3	0		8	16	5	
Roses Canyon Anabat		0		19				3	0			8		2
Sage Creek Rocks	1	0	1	20		25		7	12	1	17	8	71	
Upper Sage Creek		0		1					0		3		9	2
Grand Total	32	48	33	700	2	173	4	25	35	2	107	55	187	6

Discussion

This was the first formal bat inventory in the Flathead River Valley of BC. Bat inventories along the US Flathead drainage have found 12 species of bats (MT Natural Heritage Program 2013), and directly to the east of the Flathead in Waterton Lakes National Park have found 7 species, 6 of which overlap with the US Flathead drainage. Based on suitability of habitat for all species in surrounding areas, 11 species of bats could potentially occur in the Flathead of BC: little brown myotis, long-legged myotis, long-eared myotis, Californian myotis, big brown bat, hoary bat, silver-haired bat, Yuma myotis, eastern red bat, northern myotis, and Townsend's big-eared bat. Of these 11 potential species, 7 were captured in this inventory. Acoustic recordings suggest the possible presence of Yuma myotis, northern myotis and eastern red bat, but these species were not captured, and thus, if present, are in low densities. Townsend's big-eared bats (Special Concern in B.C.; BC Conservation Data Centre 2013) were neither detected nor captured but this species is often quiet and must approach the detector closely to be recorded. Only one sampling location in this survey focussed on rocky habitat, the type of habitat required by Townsend's big-eared bats. This was because of the difficulty in finding suitable sites for mistnetting near rocky outcrops. Windy conditions also limited the extent that nets could be strung on rocky outcrops. All netting sites were riparian along the Flathead River or its tributaries.

Of interest are the acoustic detections of eastern red bat. No acoustic recordings were diagnostic of this species in either year, and more potential recordings were made in 2013 than in 2014. This species is thought to be increasing in numbers in western Canada, moving westward in distribution (Willis and Brigham 2003), and was just recently discovered to be in B.C., as evidenced by wind turbine carcasses in NE B.C. (Nagorsen and Paterson 2012). Inventories of Waterton Lakes National Park have found this species relatively abundant throughout the summer in low elevation deciduous stands (Lausen 2013), despite being listed as 'Accidental' in Alberta ' until 2005 (AESRD 2010). Alberta now lists eastern red bats as Sensitive (AESRD 2010), and Waterton Lakes represents the most westerly record of them in the province, with capture and detection locations only 40 km east of the Flathead sampling locations. If eastern red bat is in the B.C. Flathead, this would represent a provincial range extension of 850 km south for this species in B.C., however, this inventory yielded no conclusive evidence of the presence of this species.

One bat species captured has a noteworthy federal conservation status listing, as does one of the suspected species recorded; little brown myotis and northern myotis have been emergency assessed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2012) as Endangered, due to the massive population declines in eastern North America due to White Nose Syndrome (USFWS 2013).

While Californian myotis was captured in this inventory at multiple sites, Yuma myotis was not captured. Both species produce high frequency (calls ending at 45-50 kHz) and thus are not always acoustically distinguishable. These species are distinct from each other in the hand. As we determined in this inventory, Californian myotis are present in the Canadian Flathead River

valley, and specifically were captured in Rose Canyon, a location only ~17 km west of a site in Waterton Lakes National Park where 50 kHz high frequency bats were recorded (Cameron Lake, Akamina Trail; Lausen 2013). In the Waterton Lakes National Park inventory, this 50 kHz species was not assigned an identity because it was not captured, and thus was suggested to be either Californian or Yuma myotis, but Alberta's bat diversity was not previously known to include any 50 kHz bat species. Based on the results of this 2014 Flathead bat inventory, it is most likely that Californian myotis are found further west than the Flathead, just into Alberta, and are thus the 50 kHz bat species that was recorded in that Park's bat inventory that took place in 2011 and 2012.This would add a 10th species to Alberta's bat diversity.

Recommendations

The Flathead River Valley of BC has been logged, and this is extensive in some areas. This area is also of relatively high elevation, making night temperatures colder, insect prey potentially less available to bats, resulting in lower bat densities than found in lower elevation areas of the province and of the Flathead River drainage. Effects of logging and elevation are likely to concentrate the bats into remnant patches of relatively lower elevation older growth riparian habitats, placing even greater emphasis on unlogged areas for bat roosts. Because bats roost in trees that have defects (e.g. large trees with broken limbs, sloughing bark, etc.) or in early stage decay snags, retention of these forest features are necessary to retain habitat for many bat species. Some species can also use rock crevice roosts, but these roosts are limiting in this region due to the fact that most are high elevation and would be too cold for raising young. It is strongly recommended that forest practices in this region consider bat roosting habitats and because of the large scale extent of logging that has already taken place, it is likely that the best approach at this stage may be through mitigation in the form of roost habitat enhancement.

As White Nose Syndrome (WNS) is a fungal disease that kills bats while they hibernate, it is critical to locate bat hibernacula. To date, all mitigation and prevention strategies that have come out of research into this disease require that the roosts used by hibernating bats be known (e.g. Cornelison 2013). No large bat hibernacula are currently known in B.C. and yet the Flathead area is surrounded by karst, including the deepest cave in Canada (Kirkby 2013). Future inventory to fully describe bat diversity and understand the winter habitats that are important to bats in the Flathead will be of some urgency given the relatively rapid westward spread of the WNS fungus (USFWS 2013). Searching the karst of the Flathead for bat hibernacula should continue as large clusters of bats may be present but undiscovered to date due to the extensive nature of the karst systems and the tendency to explore these caves in summer months when they are most accessible, rather than in winter.

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