2017 Bat Survey Report

Saint Edward State Park

Kenmore, Washington

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Prepared for:

Washington State Parks and Recreation Commission
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1. INTRODUCTION

The Washington State Parks and Recreation Commission (WSP) contracted Owl Ridge Natural Resource Consultants, Inc. (Owl Ridge) to collect baseline data on bat species presence and activity at Saint Edward State Park (SESP) in Kenmore, Washington. Results of the study will assist WSP in natural resource planning for the SESP and assessing facility development consistent with natural resource needs.

The specific study objectives were:

- Determine the species composition and activity rates of the bat community that uses the ballfield east of the Seminary Building (passive acoustical monitoring).
- Determine the species composition and activity rates of the bat community that uses the edge of the open field (near the Grotto and Perimeter Trail) west of the Seminary building (passive acoustical monitoring).
- Monitor bat activity along the South Canyon Trail with emphasis on bat passage or roost exit (active acoustical monitoring).
- Monitor bat activity along the North Canyon Trail with emphasis on bat passage or roost exit (active acoustical monitoring).
- Search for maternity roosts associated with the Seminary building and adjacent buildings (Gymnasium and Swimming Pool) using a combination of visual and acoustical detection.
- Identify other locations that might support high bat activity.

2. SURVEY AREA AND METHODOLOGY

2.1. Survey Area

The SESP bat survey area includes the Saint Edward Seminary building and adjacent buildings, the open areas surrounding the buildings, the Main Trail and the two canyon trails (North Canyon and South Canyon) connecting the Seminary area to Lake Washington (Figure 1). The open areas are the Seminary perimeter, Ballfield, and Grotto. The Orchard, Detention Pond, and Lakeside locations were added after identifying high bat activity at these locations.

FIGURE 1: SURVEY AREA

2.2. Monitoring Methods

Acoustical monitoring occurred during two periods in summer 2017. Data were collected during four nights in late June and early July, and six nights in late July and early August (Table 1). Most local species give birth in late June and early July (Nagorsen and Brigham 1993); therefore, these two periods of monitoring were intended to represent the pupping and post-pupping periods.

Three types of surveys were conducted:

- Searches of the Seminary and Gymnasium buildings for evidence of bat roosting (including visual search for guano and exiting bats)
- Acoustical survey at fixed locations (stations),
- Walk-about (transect) acoustical surveys along trails and building perimeters.

TABLE 1: SURVEY METHOD BY LOCATION AND DATE

Location	Method	2017 Date									
		6/28	6/29	6/30	7/2	7/26	7/29	7/31	8/1	8/2	8/4
Seminary	Roost Search		x								x
Gymnasium	Roost Search		x								x
Ballfield	Station	x	x	x	x	x		x	x	x	
Grotto	Station	x			x						
Detention Pond	Station		x								x
Lakeside	Station				x		x	x		x	
Orchard	Station								x		x
Seminary	Transect		x								x
Main Trail	Transect				x						
South Canyon Trail	Transect	x						x			
North Canyon Trail	Transect	x		x							

Both passive and active acoustical methods were used to detect bat activity. Passive acoustical monitoring included placing acoustical detectors at specific locations (stations) prior to sunset, and operating them for approximately 1.5 hours after sunset (95% of the evening bat activity in western Washington occurs within 1 hour of sunset). Detectors used during passive monitoring included the Pettersson D500x, D240x, and M500/384, and the Wildlife Acoustics SM2.

Active acoustical monitoring involved walking transects around the Seminary and Gymnasium, along both the North Canyon and South Canyon trails, and along the Main Trail to Lake Washington, with a combination M500/384 microphone and tablet computer (operating SonoBat Live®) attached to a backpack system. The walking surveys focused on determining whether the canyons were important commuting routes between feeding and roosting habitat, and understanding general bat use within the forest, forest edge, and riparian ecosystems.

Searches were also conducted around the Seminary and Gymnasium building for evidence of bat roosting, especially the possible presence of a maternity roost. Search methods including surveying the walls and grounds around each building for bat guano, surveying the buildings at dusk for exiting bats using both binoculars and acoustical detector, and querying the park maintenance staff for any experience they may have had with bats.

2.3. Analysis

All acoustical data were transferred to a computer hard-drive and analyzed using the software program SonoBat 4.2®. SonoBat 4.2® uses full-spectrum sonograms to classify bat call sequences (a series of pulses) using robust, high-resolution extraction to capture the subtle pulse features that distinguish species. Not all call sequences can be reliably classified automatically, usually due to call quality and minimum settings for fully accepting a call sequence classification. Call sequences that were not reliably confirmed by the auto-classifier were manually vetted by selecting and classifying the best pulses within the sequence to determine whether they support a reliable species classification. Also, call sequences that were classified as a species that is locally uncommon were manually vetted to ensure confidence in species presence.

3. RESULTS

3.1. Bat Detections

During all monitoring, eight bat species were confirmed occurring at SESP (Table 2). Bat distribution was not uniform. Silver-haired bats (*Lasionycteris noctivagans*) were the dominant species found at the open areas. Silver-haired bat activity was relatively high at the Ballfield during early July, when the number of fully accepted bat passes ranged from 10 to 36, but use declined significantly after the field dried up in late July. Light silver-haired bat activity was also recorded at the Grotto. Silver-haired bat activity was noted on July 31 at the Orchard when beginning a walking survey of the South Canyon Trail. Subsequent monitoring confirmed that this location is important to foraging silver-haired bats. Hoary bats (*Lasiurus cinereus*), big brown bats (*Eptesicus fuscus*), and myotis (*Myotis* spp.) were occasionally recorded in the open areas around the Seminary, but never in numbers comparable to silver-haired bats. The highest diversity of bats was recorded over the Detention Pond in early July and Lakeside in early August. Six species were confirmed at the Detention Pond, and eight species Lakeside. Activity around the Detention Pond appeared to decline as it dried up.

TABLE 2: CONFIRMED BAT SPECIES DETECTIONS

Location	Species							
	Lano	***Epfu***	***Laci***	***Mylu***	***Myca***	***Myyu***	***Myvo***	***Myev***
Seminary		x						
Ballfield	x		x			x	x	
Grotto	x	x						
Detention Pond	x	x	x	x	x	x		
Lakeside	x	x	x	x	x	x	x	x
Orchard	x		x					
Main Trail		x			x			
South Canyon								
North Canyon	x							

Lano = silver-haired bat, Epfu = big brown bat, Laci = hoary bat, Mylu = little brown bat, Myca = California myotis, Myyu = Yuma myotis, Myvo = long-legged myotis, Myev = long-eared myotis.

The cottonwood riparian along Lake Washington (Lakeside) also supported the highest amount of bat activity. Large numbers of little brown bats (*Myotis lucifugus*) were recorded near the picnic table at the end of the Main Trail leading to the lake. Lesser numbers of silver-haired bats, big brown bats, California myotis (*Myotis californicus*), and Yuma myotis (*Myotis yumanensis*) were also recorded feeding in the shoreline riparian. A couple of long-legged myotis (*Myotis volans*) and a single long-eared myotis (*Myotis evotis*) were also confirmed to be present. The latter species is generally recorded only in small numbers in the region.

A very few big brown bats and California myotis were recorded along the Main Trail proper, and all of the recordings were in areas of breaks in the overhead canopy. Virtually no bats were recorded along either the North Canyon or South Canyon trails. The denser forest probably provides lesser foraging opportunity for bats compared to other locations at SESP. It is also possible that bats in the canyon were flying above the trees at altitudes beyond the detection range (~30 meters) of the recorders (although no bats were visually detected during intensive viewing against a clear sky backdrop). There is no evidence that either

canyon is a significant flyway. A few large tree snags occur in the canyons that might provide bat roosting habitat, but probably less so as compared to the roosting opportunities provided by the large, decadent cottonwood trees along the lakeshore.

Both the Seminary and Gymnasium was intensively searched for existing bats, or sign of bat use (guano), on two separate occasions. These visual and acoustical searches failed to find any evidence of bat use of either building. If big brown bats or myotis were using the buildings, they should have been acoustically detected near them. The WSP maintenance staff also stated that they have found no evidence of bat use (such as guano buildup) of either building.

The number of recorded bat passes by species for each date and location is provided in Table 3.

TABLE 3: BAT PASSES BY SPECIES AND LOCATION

Location	Date	Species							
		Lano	***Epfu***	***Laci***	***Mylu***	***Myca***	***Myyu***	***Myvo***	***Myev***
Ballfield	06/28	34	0	0	0	0	1	0	0
Grotto	06/28	5	1	0	0	0	0	0	0
North Trail	06/28	0	0	0	0	0	0	0	0
South Trail	06/28	0	0	0	0	0	0	0	0
Ballfield	06/29	41	0	5	0	1	0	1	0
Detention Pond	06/29	13	2	10	6	1	2	0	0
Seminary	06/29	0	0	0	0	0	0	0	0
Ballfield	06/30	33	1	1	0	0	1	0	0
North Canyon	06/30	2	0	0	0	0	0	0	0
Ballfield	07/02	13	0	2	0	0	0	0	0
Grotto	07/02	5	2	0	0	0	0	0	0
Main Trail	07/02	0	3	0	0	1	1	0	0
Lakeside	07/02	0	0	0	46	11	7	0	0
Ballfield	07/26	1	0	1	0	0	0	0	0
Lakeside	07/29	0	1	0	15	1	1	4	0
Ballfield	07/31	0	0	0	0	0	0	0	0
South Canyon	07/31	0	0	0	0	0	0	0	0
Lakeside	07/31	21	12	25	147	4	3	5	0
Ballfield	08/01	2	0	0	0	0	0	0	0
Orchard	08/01	7	0	1	0	0	0	0	0
Ballfield	08/02	0	0	0	1	0	0	0	0
Lakeside	08/02	10	1	14	88	5	4	14	1
Seminary	08/04	0	0	0	0	0	0	0	0
Detention Pond	08/04	42	4	54	22	1	0	0	0
Orchard	08/04	31	0	1	0	1	0	0	0

Lano = silver-haired bat, Epfu = big brown bat, Laci = hoary bat, Mylu = little brown bat, Myca = California myotis, Myyu = Yuma myotis, Myvo = long-legged myotis, Myev = long-eared myotis.

4. CONCLUSIONS

Bat use at SESP followed known patterns. The larger silver-haired, big brown, and hoary bats were found foraging in forest edge pockets and clearings in the forest canopy, habitat typical for these species (Verboom and Huitema 1997, Erickson and West 2003, Morris et al. 2010). Forest edges can provide microhabitat for both forest and open area insects coupled with insects adapted specifically to forest edges (Deans et al. 2005). Silver-haired bats were prevalent at the wetter edge of the Ballfield in early July, but use declined as the area dried up. The wetland edge of the Ballfield appears to be important to this species while moist conditions exist (possibly providing an important microclimate for insect prey). Silver-haired bats were very active over the Orchard in August, possibly because the deciduous apple trees provided an additional suite of insect prey, and the location exhibited a diversity of edge habitat. The few big brown bats that were recorded were found in openings in forest canopy along the Main Trail and Lakeside, and hoary bats were most common over the Detention Pond and in the forest clearings at Lakeside.

Although the Detention Pond was relatively dry in August, it continued to be a focus of high bat use. Relatively high silver-haired and hoary bat activity occurred there, and it was the only location, excluding the Lakeside riparian, where significant myotis use occurred (in this case use by little brown bats). Bat activity was so concentrated over the pond that virtually no bats were detected 40 meters outside the pond perimeter.

With its combination of water, deciduous riparian, conifer forest, and forest clearings, the Lakeside station had both the highest species diversity and number of bat passes. Little brown bat activity was very high in the open flyways along the riparian edge, while relatively high silver-haired and hoary bat activity was recorded in August in the forest clearing at the end of the Main Trail (and lake edge). These species were not present at the Main Trail in early July, and may have shifted their use to this habitat as other moist habitat locations dried up. Lesser numbers of California, Yuma, long-legged, and long-eared myotis were also recorded using the riparian.

The Seminary, Gymnasium, and Swimming Pool were almost totally void of bat use. No roosting bats were observed exiting the buildings, and none were detected during acoustical monitoring of the structures. Even the bright security lights, which attracted large numbers of insects, were not actively used by big brown or hoary bats, the two species known to forage around lights (Nagorsen and Brigham 1993, Rich and Longcore 2006, Rydell 2006). The presence of a great horned owl (*Bubo virginianus*) may limit bat use of these buildings. (Myotis, and probably silver-haired bats, generally avoid bright lights and would not find lighting with enough UV component to attract insects as beneficial [Rydell 1992, 2006].)

The forested canyons were also void of high bat activity. Although the local bat species are expected to avoid the clutter (Verboom and Huitema 1997, Jantzen and Fenton 2013) under the forest canopy, some bat activity would have been expected in the forest clearing along both trails. However, bats were recorded only twice, and the call pulses were incomplete (but likely silver-haired bats) suggesting bat use was very low, or they were feeding over the canopy at heights beyond the 30-meter detection range of the microphone. There is certainly no evidence supporting either the north or south canyon as a major flyway.

In overall conclusion, the highest bat activity was associated with wetlands (the Ballfield in early July and the Detention Pond) and water (Lakeside), or pockets of forest edge (Orchard). These features provide microclimate habitat for concentrated insect prey and bats would benefit from preservation of these features. Older age-class trees provide roosting habitat for bats, especially the very large and decadent cottonwoods

along Lake Washington. Continued protection of these features will also benefit bats. Placement of artificial roosts would increase roosting opportunities for bats. However, there is no evidence that this habitat feature is lacking at the park.

Two of the three most commonly recorded bats, silver-haired and little brown bats, are not known to be attracted to artificial lighting and appear to avoid such lighting altogether. The complete lack of recording for any of these species near the security lighting at the Seminary and Gymnasium, despite large swarms of insects, suggests that the lighting is a deterrent. Adding further lighting of such extent might reduce the value of certain areas to bats.

5. REFERENCES

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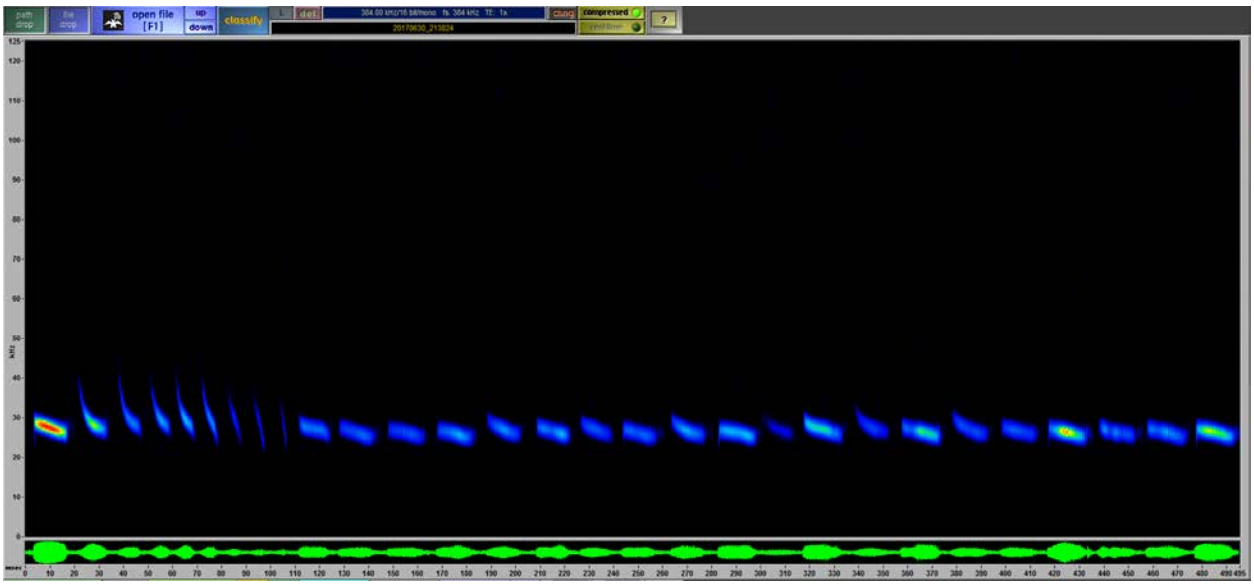
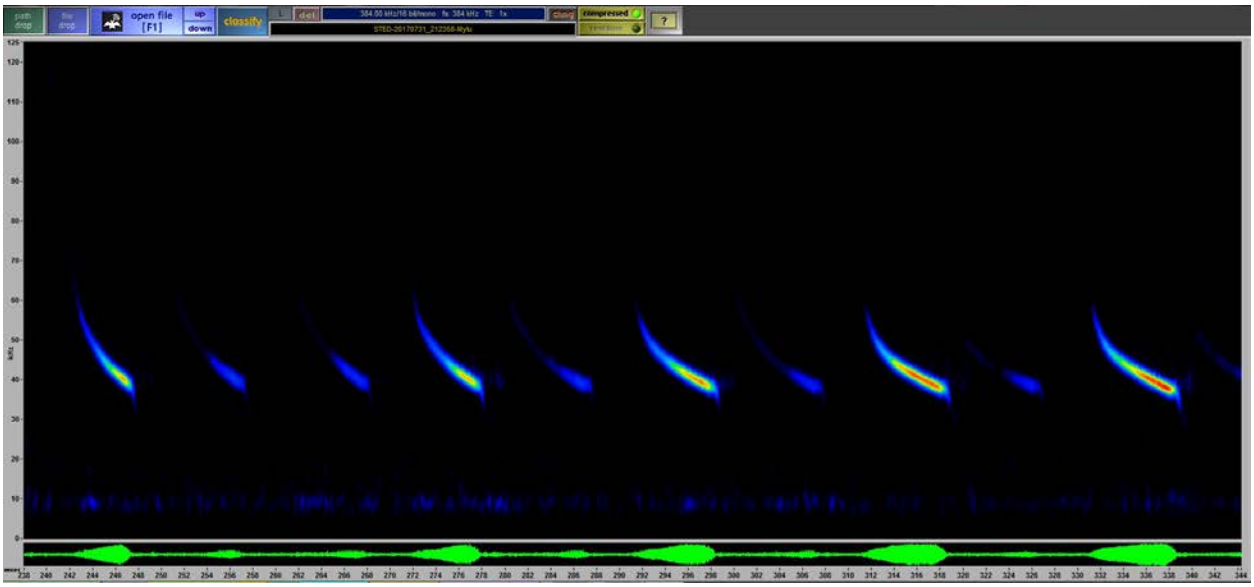
APPENDIX A

EXAMPLE BAT CALL SEQUENCES

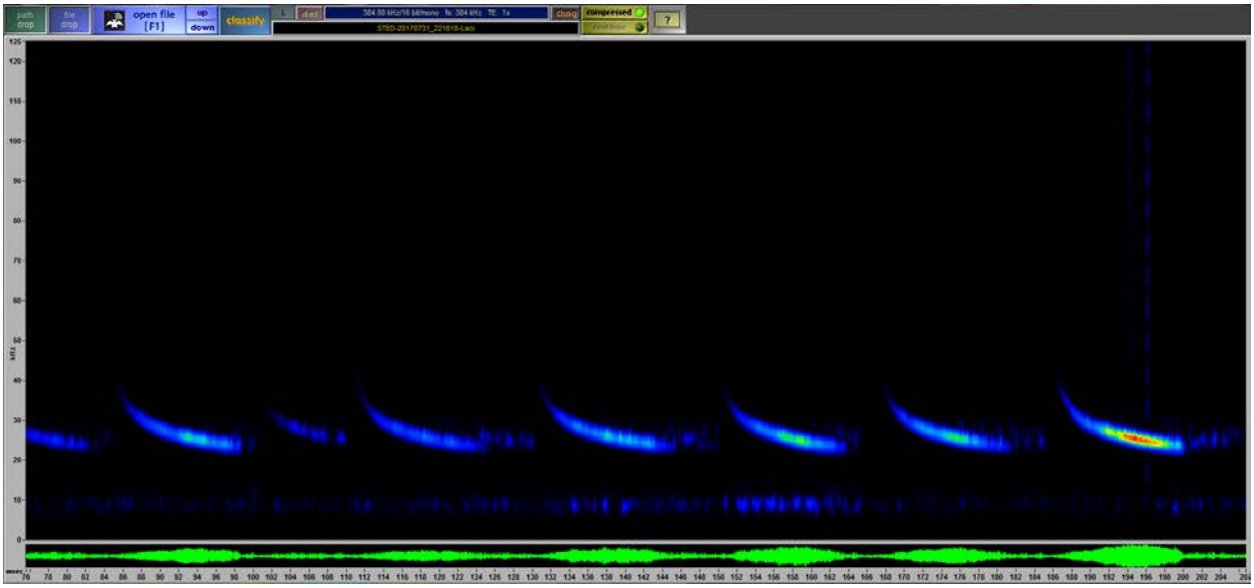
Silver-haired Bat



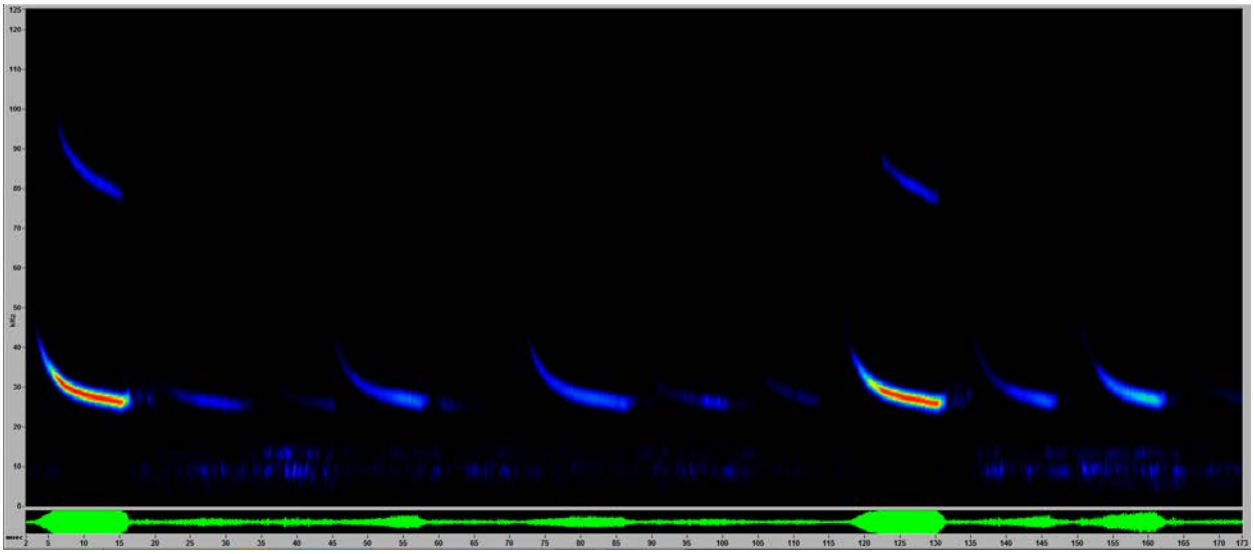
Little Brown Bat



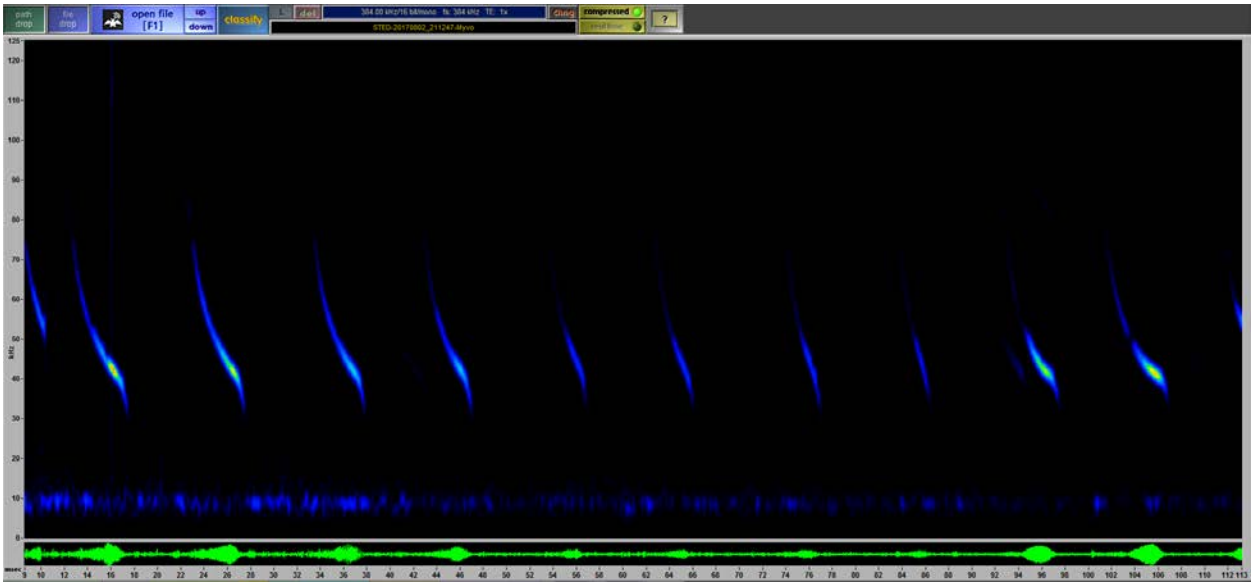
Hoary Bat



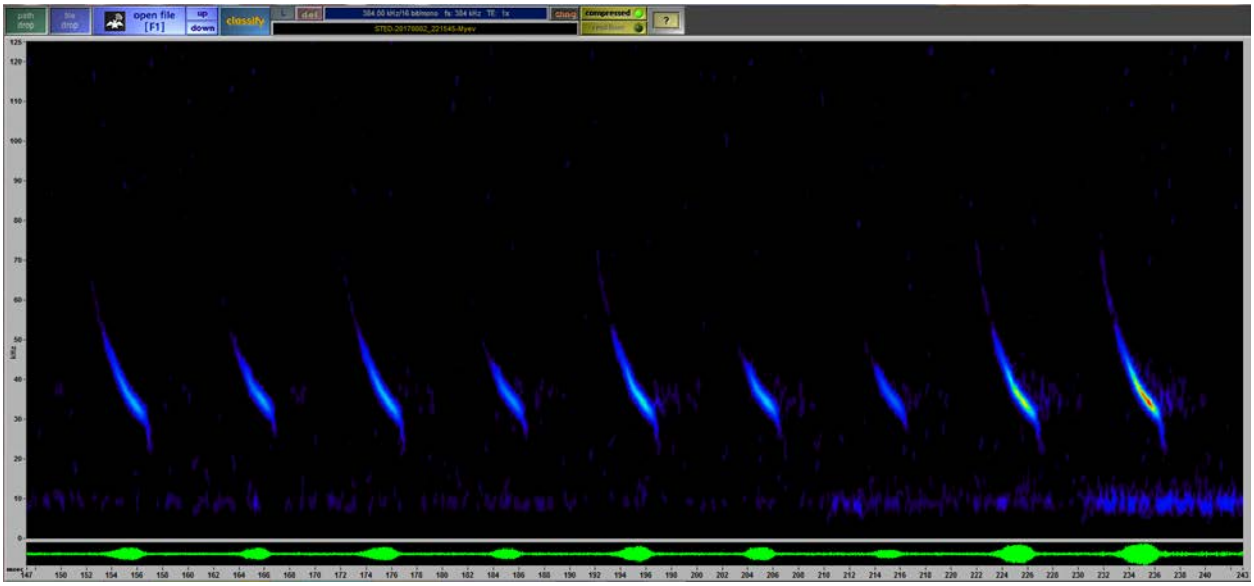
Big Brown Bat



Long-legged Myotis



Long-eared Myotis



California Myotis