

## FINAL REPORT

### South Carolina State Wildlife Grant, SC-T-F19AF00722

South Carolina Department of Natural Resources

October 1, 2019 – September 30, 2020

Project Title: Upstate Bridge Use by Highest Priority Bat Species

The purpose of this grant was to fund the SCDNR bat biologist (herein referred to as the bat biologist) salary for 2 months as well as provide supplies to run an acoustic pilot project surveying Upstate bridges in SC. The goals of this project were to select bridges over Lake Hartwell, Lake Keowee, and the Chattooga River thought to be biologically important and/or in the State Transportation Improvement Program (STIP) and thus slated for repair, then to use acoustic devices to record bat calls at these sites to determine if and how SWAP bat species of highest concern (denoted with \* below) utilize these transportation structures. Species codes referred to throughout this document are as follows:

CORA\* = Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*), state endangered

EPFU\* = Big Brown Bat (*Eptesicus fuscus*)

LABO\* = Eastern Red Bat (*Lasiurus borealis*)

LACI\* = Hoary Bat (*Lasiurus cinereus*)

LANO\* = Silver-haired Bat (*Lasiurus notivagans*)

LASE\* = Seminole Bat (*Lasiurus seminolus*)

MYAU\* = Southeastern Bat (*Myotis austroriparius*)

MYGR = Gray Bat (*Myotis grisescens*), no SC records but 11 miles from border, federally endangered

MYLE = Eastern Small-footed Bat (*Myotis leibii*), state threatened

MYLU\* = Little Brown Bat (*Myotis lucifugus*), federal At-Risk-Species

MYSE\* = Northern Long-eared Bat (*Myotis septentrionalis*), federally threatened

NYHU = Evening Bat (*Nycticeus humeralis*)

PESU\* = Tri-colored Bat (*Perimyotis subflavus*), federal At-Risk-Species

TABR = Brazilian Free-tailed Bat (*Tadarida brasiliensis*)

Objective: Select twelve major bridges over Lake Hartwell, Lake Keowee, and the Chattooga River for acoustic bat surveys.

#### Accomplishments:

42 bridges were originally chosen for consideration (Appendix A) plus two additional bridges (#43 and #44; Table 1) were visited to determine if bridge features were similar to bridges known to harbor bats. For example, concrete hollow-core bridges, concrete precast panels, and other concrete bridge types have long expansion joints that can provide roosting space for bats. Also taken into consideration for acoustic surveys were STIP bridges, fair to poor condition bridges, and feasibility of acoustic detector set-up. Five additional, non-bridge sites next to open water at state parks were also considered for acoustic survey to help confirm species recorded in the area.

A total of 17 bridges over water were chosen for acoustic surveys, in addition to five non-bridge sites adjacent to open water (Table 1, Figure 1). Most bridge structure types are stringer/multi-beam or girder, except #31 which is a slab structure type. The main substrate of these bridges is concrete except for #16,

#21 and #43 which are steel. The deck structure type for most of these bridges are concrete cast-in-place except for #31 which has concrete precast panels.

Significant deviations:

There were no significant deviations.

Objective: Record bat calls for a two-week period near or under each bridge, and opportunistically inspect bridges if highest priority species are detected.

Accomplishments:

From the end of May through mid-September, Anabat Express or Anabat Swift bat detectors recorded calls for an average of 8 days at 17 total bridge sites and 5 additional sites over open water near bridges. Detectors were attached to trees at least 2.5-3 m above the ground with a directional microphone facing slightly toward or parallel to the bridge. Acoustic calls were analyzed using Kaleidoscope Pro (Kpro; version 5.1.9i) software. In the Kpro “Signal Params” tab for signal detection parameters, we kept automatic recommended settings except for frequency of interest. The recommended frequency range is 8 to 120 kHz in Kpro, but the minimum signal of interest appropriate for the expected bat community could be set at a slightly higher minimum of 12 kHz for better accuracy. Therefore, the minimum and maximum frequency range was set to 12- 120 kHz. In the “Auto ID for Bats” tab we chose Bats of North America 5.1.0, and the level of sensitivity “+1 More Accurate (Conservative)” out of the three levels available (-1 More Sensitive, 0 Balanced, +1 More Accurate). We selected South Carolina for the region and chose all the bat species seen in Table 2. Species calls were combined into complexes for species known to have indistinguishable calls, which are LABO/LASE and LANO/EPFU. Thus, total species counts are a minimum number of species.

Overall, SCDNR recorded a grand total of 17,774 calls of 10 species at 22 sites (Table 2). No bat species were seen roosting on any bridges during this pilot survey. Only CORA, MYLE and EPFU were SWAP species recorded during this study that have been known to use bridges during the summer. CORA do not use crevices and thus should be easier to observe. However, EPFU can use either crevices or roost in the open, and MYLE only use crevices, making these species more difficult to observe if present.

Highest priority species with calls identified by KPro were manually vetted by the bat biologist. Results showed MYAU and MYLU calls could not be verified in the study area (Table 3). However, MYGR calls were verified at one location: bridge #44. Calls at this site were sent to other bat acoustic call experts for verification. Dr. Joy O’Keefe, director at Indiana State University Center for Bat Research, Outreach, and Conservation heading gray bat projects in NC, agreed that at least 3 calls looked to be MYGR. Dr. Susan Loeb, SC Forest Service Research Ecologist, noted they could be MYGR calls but wasn’t certain due to the number of PESU calls (visually similar to MYGR calls) also recorded at the site.

The bridges with the highest number of species recorded were #16, #27 and #44, with 8 species recorded per bridge. The two bridges with the highest average number of calls per night were #13 at 475 calls per night, most of which were TABR; and #31 at 384 calls per night, most of which were PESU (Table 2 and Table 3). The top three species recorded in the study area were PESU (54.3%), TABR (24.7%), and the LABO/LASE complex (6.6%) (Table 3).

From highest to lowest, the bridges that recorded the highest number of priority species (in bold are known to use bridges in summer) were: bridge #44: PESU, LANO/**EPFU**, **MYGR**, **MYLE**, MYSE; bridge #16 (PESU, LANO/**EPFU**, **CORA**, **MYLE**), bridge #27 (PESU, LANO/**EPFU**, **CORA**, MYSE), and bridge #43 (PESU, LANO/**EPFU**, MYSE). Open water site #47 also had a good number of high priority species (PESU, LANO/**EPFU**, **MYLE**, MYSE), and its proximity to bridges #44 and #16 supports species confirmation for those sites. Images of these bridges can be found in Appendix B.

In terms of whether those priority species could be using these bridges, there are multiple factors to consider for each. Bridge #44 is located in a relatively undisturbed area just south of Jocassee Gorges Wilderness area. We noted urine staining on the sides of the beams underneath the bridge near the end, but MYLE and EPFU are known to roost at those locations on this bridge in winter. However, we also noticed the expansion joint seals of this bridge are falling out, and that space could provide a roost for species such as MYGR. The height of this bridge could allow for easy movement of MYGR, who need large dropping distances to catch air for their relatively long wings when leaving bridge roosts (Appendix A, page 12). Bridge #16 is steel so there are less expansion joints for EPFU and MYLE to roost in, but both EPFU and CORA could roost on the bridge itself (Appendix A, page 13). Bridge #27 has some interesting metal tubing that EPFU could potentially roost behind (Appendix A, page 14). Bridge #43 is also steel with less expansion joints for EPFU to roost in, but EPFU could roost on the bridge itself (Appendix A, page 15).

Ultimately, the results from this pilot acoustic study indicate a few things. First, that the federally endangered gray bat, which has never been recorded in SC, may be roosting at bridge #44 in the Blue Ridge ecoregion. This seems possible for a few reasons: 1) a recently discovered summer 2020 NC roost (Katherine Caldwell Etchinson, pers comm) is only 31 km (19.5 miles) from bridge #44; 2) gray bats have been found using storm sewers/box culverts, abandoned mines, and bridges during the summer including those over waterways in GA (Elder and Gunier 1978; Whitaker 2001; Johnson et al. 2002; North Carolina State Parks 2019); and 3) this species has been known to disperse 27 km (16.8 mi) from roost sites simply to forage (LaVal et al. 1977). The acoustic results from this study also indicate the state threatened eastern small-footed bat is present and could potentially be using expansion joints, corners located between beams, and/or other crevices on some of these surveyed bridges. Lastly, the acoustic results from these surveys give us information on other SWAP species present in these areas. For example, tri-colored bats in a few key Upstate hibernacula have declined over 90% since White-nose Syndrome (WNS) arrived in 2013. However, at one of those hibernacula over the past two years, numbers have leveled off at around 30 individuals with some banded individuals returning multiple years post-WNS. The results from this acoustic effort, showing relatively high number of PESU calls recorded compared to other species, support the idea that other populations of PESU are still surviving in the Upstate as well. Also, of note were the confirmed MYSE calls at four sites in the study area. Northern long-eared bats have not been captured in the Upstate since WNS hit in 2013, likely due to the high WNS mortality rate for this species, so it is hopeful they may be surviving in the Upstate at numbers simply too low for capture. Finally, the fact that no calls could be confirmed for MYLU, another WNS affected species mostly found in the Upstate, is a bad sign the species is not doing well in our study area.

The major limitation of this pilot study was the inability to survey the entire length of each bridge. Since each bridge was over water, we had to record bat calls at the ends of bridges. However, we surveyed hoping that with a large maternity colony using the bridge, *Anabats* might have recorded some calls of

bridge roosting bats flying nearby, especially if individuals fly under the bridge as they emerge from their roost toward other protected forested areas at the ends of the bridges.

Significant deviations:

Due to logistical constraints from the COVID pandemic, we were forced to begin surveys 6 weeks past the original start date of mid-April. Therefore, we increased our effort over a shorter period of time, moving Anabats to a new bridge for an average of every 8 days (ranging from 4 – 15 days) instead of every 14 days, and extended our time frame into mid-September at a few non-bridge sites to help determine what species of concern might be in the area.

Objective: Conduct capture surveys if/when a bridge has both acoustic evidence of highest priority bat species and visual evidence of bats using the bridge.

Accomplishments:

The only bridge with both visual evidence of bats using the bridge and high priority species present was bridge #44. Past records have shown EPFU and MYLE confirmed at this site during winter, but the endangered MYGR (not yet recorded in SC but found near the border of NC; see Figure 1) would need to be captured for confirmation. Since this was the last bridge surveyed, calls were recorded late in the season (the end of July). By the time the calls were verified, it was too late to conduct capture surveys for maternity roosting bats. Currently however, SCDNR is working with SCDOT to survey this bridge next spring to attempt visual and/or in hand confirmation of MYGR.

Significant deviations:

There were no significant deviations.

Literature Cited:

- Elder, W. H., and W. J. Gunier. 1978. Sex Ratios and Seasonal Movements of Gray Bats (*Myotis grisescens*) in Southwestern Missouri and Adjacent States. *American Midland Naturalist* 99:463–472.
- Johnson, J. B., M. A. Menzel, J. W. Edwards, and W. M. Ford. 2002. Gray bat night-roosting under bridges. *Journal of the Tennessee Academy of Science* 1–7.
- LaVal, R. K., R. L. Clawson, M. L. LaVal, and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *Journal of Mammalogy* 58:592–599.
- North Carolina State Parks. 2019. Mammals of North Carolina: their Distribution and Abundance. Gray Bat. <<http://www.dpr.ncparks.gov/mammals/accounts.php>>. Accessed 3 Apr 2019.
- Whitaker, J. O. 2001. The Gray Bat, *Myotis grisecens*, in Indiana. *Proceedings of the Indiana Academy of Science* 110:114–122.

Estimated Federal Cost: \$12,457

Recommendations:

Close the grant. Beyond the life of this grant, we recommend continued mist netting and acoustic survey efforts for SWAP species in the Upstate hit hardest by WNS, as well as continue to survey for potential MYGR. Future studies should focus on surveying concrete hollowcore bridges and concrete precast panel bridges, which have long expansion joints in which bats are known to roost.

Table 1: Upstate bridges (1-44) or open water sites (45-49) chosen for acoustic surveys.

Site	Site Desc	Condition	Length (m)	ID or Structure #	Route	RTE_LRS	Crossing	LatDecimal	LonDecimal
1	STIP Bridge	GOOD	1135	410008510000	I-85 N	04010008500N	SENECA RIVER	34.53772	-82.82270
2	STIP Bridge	GOOD	1064	410008530000	I-85 N	04010008500S	SENECA RIVER	34.53786	-82.82291
3	STIP Bridge	FAIR	739	3710008510000	I-85 N	37010008500N	HARTWELL RESERVOIR	34.48376	-83.02838
5	STIP Bridge	GOOD	700	410008530000	I-85 N	04010008500S	THREE & TWENTY CREEK	34.55188	-82.79343
6	STIP Bridge	GOOD	680	410008510000	I-85 N	04010008500N	THREE & TWENTY CREEK	34.55171	-82.79337
7	STIP Bridge	FAIR	656	3710008530000	I-85 N	37010008500S	FAIRPLAY CREEK	34.49271	-83.01601
8	STIP Bridge	FAIR	655	3710008510000	I-85 N	37010008500N	FAIRPLAY CREEK	34.49252	-83.01604
13	Poor Bridge	POOR	107	3770006500000	S-65 N	37070006500N	MARTIN CREEK	34.64412	-82.87445
16	Fair Bridge	FAIR	301	3740001100000	SC11 N	37040001100N	KEOWEE RIVER	34.91894	-82.90831
21	Fair Bridge	FAIR	141	3740013000000	SC130 E	37040013000E	N.CANAL-LAKE KEOWEE	34.78813	-82.90363
27	Fair Bridge	FAIR	78	420017800000	US178 E	04020017800E	SIX & TWENTY CREEK	34.56922	-82.68785
31	Other Bridge	GOOD	27	470023600000	S-236 E	04070023600E	BEAVERDAM CREEK	34.52623	-82.87427
32	Other Bridge	GOOD	101	3940018300000	SC183 N	39040018300N	KEOWEE RIVER	34.79180	-82.88350
38	Other Bridge	GOOD	213	3740009330000	S-4E	37070000400W	SENECA RIVER	34.68116	-82.85625
39	Other Bridge	GOOD	213	3740009310000	S-4E	37070000400E	SENICA RIVER	34.68110	-82.85636
43	NEW Russel Bridge	FAIR	61	000000000010093	SC 28	<Null>	CHATTOOGA RIV-GA. LINE	34.91937	-83.16867
44	NEW Hwy 11 Bridge	GOOD	110	000000000005836	SC 11	00SC000110	LITTLE EASTATOE	34.94634	-82.85564
45	Devils Fork SP 05	NA	NA	Not a bridge	NA	NA	NA	34.96712	-82.95384
46	Devils Fork SP 01	NA	NA	Not a bridge	NA	NA	NA	34.96291	-82.95084
47	Devils Fork SP 02	NA	NA	Not a bridge	NA	NA	NA	34.95566	-82.94542
48	Devils Fork SP 04	NA	NA	Not a bridge	NA	NA	NA	34.95547	-82.94940
49	Lake Hartwell SP	NA	NA	Not a bridge	NA	NA	NA	34.48721	-83.03093

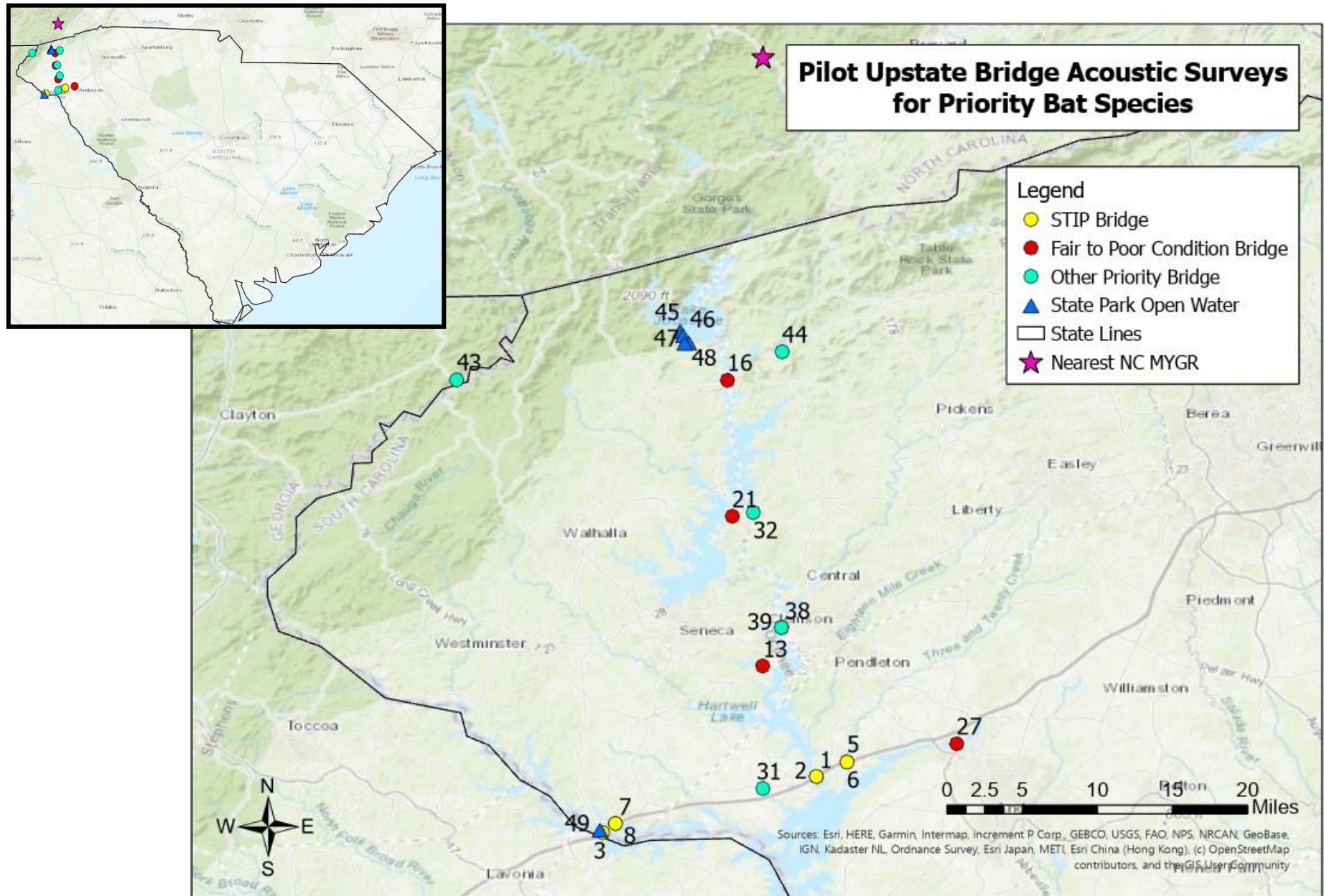


Figure 1: Anabat locations at bridges (circles) and over open water at state parks (triangles). Star in NC shows nearest gray bat roost.

Table 2: Number of species, total calls, and percentage of non-identified calls compiled from KPro analysis, with number of nights and average calls per night per site. Sites 1 – 44 are bridge sites; 45-49 are open water sites at state parks; 44 was highlighted due to potential MYGR (see Table 3).

Site	# Species	Ave Calls/Night	Total Calls	Nights
01	6	5	78	15
02	4	2	9	5
03	6	18	129	7
05	5	3	18	7
06	3	2	6	4
07	7	21	148	7
08	6	38	267	7
13	6	475	2376	5
16	8	66	531	8
21	6	7	110	15
27	8	46	690	15
31	6	384	1920	5
32	6	6	77	13
38	6	182	1273	7
39	5	32	227	7
43	7	91	726	8
44	8	156	1408	9
45	6	396	3564	9
46	7	284	2271	8
47	7	22	172	8
48	7	94	750	8
49	7	128	1024	8
Total	10	96	17774	185



Table 3: Acoustic results for each site compiled from KPro analysis ordered by total species percentage from high to low. Data bars within table show percentage of calls per species per site. NoID is the percentage of bat calls unidentified by KPro per site. Outlined in black are SWAP species (plus MYGR) manually vetted and verified. The site with MYGR is highlighted yellow. <sup>1</sup>All MYGR calls were manually vetted; only site #44 calls could be verified. <sup>2</sup> All MYAU and MYLU calls were manually vetted; none could be verified.

CORA = Rafinesque's Big-eared Bat

LASE = Seminole Bat

MYSE = Northern Long-eared Bat

EPFU = Big Brown Bat

MYAU = Southeastern Bat

NYHU = Evening Bat

LABO = Eastern Red Bat

MYGR = Gray Bat

PESU = Tri-colored Bat

LACI = Hoary Bat

MYLE = Eastern Small-footed Bat

TABR = Brazilian Free-tailed Bat

LANO = Silver-haired Bat

MYLU = Little Brown Bat

Site	PESU	TABR	MYGR <sup>1</sup>	LABO/LASE	LANO/EPFU	NYHU	LACI	CORA	MYLE	MYSE	MYAU <sup>2</sup>	MYLU <sup>2</sup>	Total	NoID
01	1.3%	52.6%	1.3%	33.3%	5.1%		5.1%	1.3%					100%	35.0%
02		55.6%		11.1%	11.1%		22.2%						100%	47.1%
03	58.1%	16.3%		9.3%	10.9%	4.7%	0.8%						100%	48.2%
05	22.2%	44.4%		11.1%	16.7%	5.6%							100%	53.8%
06	50.0%	33.3%				16.7%							100%	57.1%
07	62.8%	10.1%	3.4%	10.8%	6.1%	4.1%	1.4%	0.7%				0.7%	100%	50.2%
08	47.6%	4.1%	3.0%	31.8%	4.5%	7.9%	0.4%					0.7%	100%	58.4%
13	5.8%	88.4%		1.7%	2.5%	0.2%	1.4%						100%	20.8%
16	51.0%	4.0%	5.5%	18.1%	14.9%	1.3%	1.3%	0.9%	0.4%	0.4%	0.2%	2.1%	100%	51.6%
21	10.0%	10.9%		33.6%	20.0%	22.7%	2.7%						100%	59.9%
27	64.5%	3.5%	12.5%	5.4%	6.7%	3.0%	0.3%	2.9%		0.1%	0.1%	1.0%	100%	46.4%
31	61.6%	23.4%	8.4%	5.0%	0.7%	0.3%	0.7%						100%	28.5%
32	37.7%	9.1%		23.4%	9.1%	14.3%	5.2%					1.3%	100%	53.3%
38	51.3%	33.2%	0.3%	2.2%	4.2%	1.6%	7.1%					0.08%	100%	22.7%
39	44.9%	22.0%		0.4%	10.6%	15.0%	6.6%	0.4%					100%	42.8%
43	79.6%	0.7%	1.4%	4.8%	3.2%	7.6%	1.1%			0.1%	0.3%	1.2%	100%	30.4%
44	45.7%	0.1%	45.2%	4.8%	0.7%	1.6%			0.4%	0.1%	0.1%	1.2%	100%	30.9%
45	52.2%	13.7%	8.1%	9.4%	11.1%	3.9%	1.4%	0.06%				0.1%	100%	30.1%
46	80.4%	0.2%	6.4%	8.5%	0.8%	2.0%	1.5%		0.04%	0.04%		0.2%	100%	21.9%
47	79.1%	1.2%	6.4%	0.00%	7.0%	1.7%	2.9%		0.6%	0.6%	0.6%		100%	25.2%
48	89.5%	0.1%	4.9%	1.2%	0.8%	2.8%	0.3%		0.1%		0.3%		100%	17.2%
49	80.3%	0.3%	12.5%	3.4%	0.6%	1.3%	1.3%		0.1%		0.1%	0.2%	100%	20.4%
Total	54.3%	20.7%	8.7%	6.6%	4.6%	2.8%	1.6%	0.2%	0.06%	0.04%	0.06%	0.3%	100%	30.2%



Appendix A: Bridges visited within the study area to determine if they had features like bridges known to harbor highest priority bat species.

DESIGNATION	BRIDGE_ID	ROUTE	RTE_LRS	CROSSING	LatDecimal	LonDecimal	LENGTH	ConditionR
STIP	410008510300	I-85 N	04010008500N	SENECA RIVER	34.537715	-82.822704	1135	GOOD
STIP	410008530300	I-85 N	04010008500S	SENECA RIVER	34.537864	-82.82291	1064	GOOD
STIP	3710008510100	I-85 N	37010008500N	HARTWELL RESERVOIR	34.483764	-83.028377	739	FAIR
STIP	3710008530100	I-85 N	37010008500S	HARTWELL RESERVOIR	34.483862	-83.028548	738	FAIR
STIP	410008530400	I-85 N	04010008500S	THREE & TWENTY CREEK	34.551875	-82.793426	700	GOOD
STIP	410008510400	I-85 N	04010008500N	THREE & TWENTY CREEK	34.551709	-82.793365	680	GOOD
STIP	3710008530200	I-85 N	37010008500S	FAIRPLAY CREEK	34.492714	-83.016006	656	FAIR
STIP	3710008510200	I-85 N	37010008500N	FAIRPLAY CREEK	34.492515	-83.016037	655	FAIR
Bio Important	3720007600100	US76 E	37020007600E	CHATTOOGA RIV-GA. LINE	34.814186	-83.306629	N/A	GOOD
Bio Important	3720012300100	US123 N	37020012300N	TUGALOO RIVER	34.611154	-83.227002	N/A	GOOD
Poor Conditions	3770016000100	S-160 E	37070016000E	TUGALOO RIVER	34.647712	-83.27954	N/A	POOR
Poor Conditions	3740018800100	SC188 E	37040018800E	LAKE KEOWEE (CANE CK)	34.731101	-82.973838	N/A	POOR
Poor Conditions	3770006500100	S-65 N	37070006500N	MARTIN CREEK	34.644116	-82.87445	N/A	POOR
Fair Conditions	3770018400100	S-184 E	37070018400E	CONEROSS CREEK	34.595849	-82.907337	N/A	FAIR
Fair Conditions	3970029100101	S-291 N	39070029100N	KEOWEE RIVER	34.737015	-82.874054	N/A	FAIR
Fair Conditions	3740001101500	SC11 N	37040001100N	KEOWEE RIVER	34.918936	-82.908311	N/A	FAIR
Fair Conditions	490016000100	L-160 E	04090016000E	LAKE HARTWELL	34.508734	-82.855202	N/A	FAIR
Fair Conditions	470002300100	S-23 N	04070002300N	LAKE HARTWELL	34.5003	-82.920907	N/A	FAIR
Fair Conditions	470007100300	S-71 N	04070007100N	LAKE HARTWELL	34.550563	-82.756047	N/A	FAIR
Fair Conditions	3740018800200	SC188 E	37040018800E	LAKE KEOWEE (CROOKED CK)	34.752843	-82.957529	N/A	FAIR
Fair Conditions	3740013000200	SC130 E	37040013000E	N.CANAL-LAKE KEOWEE	34.788127	-82.903632	N/A	FAIR
Fair Conditions	420002900100	US29 N	04020002900N	SAVANNAH RIV/CO RD IN GA	34.354185	-82.815497	N/A	FAIR
Fair Conditions	3770003700100	S-37 N	37070003700N	SENECA RIVER	34.653364	-82.851212	N/A	FAIR
Fair Conditions	3920007600100	US76 E	39020007600E	SENECA RIVER	34.692793	-82.850616	N/A	FAIR
Fair Conditions	440002400200	SC24 E	04040002400E	SENECA RIV-HARTWELL RES.	34.526656	-82.815254	N/A	FAIR
Fair Conditions	440002400400	SC24 E	04040002400E	SIX & TWENTY CREEK	34.525579	-82.783483	N/A	FAIR
Fair Conditions	420017800300	US178 E	04020017800E	SIX & TWENTY CREEK	34.569215	-82.687852	N/A	FAIR
Fair Conditions	3740013000300	SC130 E	37040013000E	STAMP CREEK	34.842093	-82.940598	N/A	FAIR

## Appendix A (cont.)

DESIGNATION	BRIDGE_ID	ROUTE	RTE_LRS	CROSSING	LatDecimal	LonDecimal	LENGTH	ConditionR
Fair Conditions	440002400300	SC24 E	04040002400E	THREE & TWENTY CREEK	34.527086	-82.787528	N/A	FAIR
Fair Conditions	470055500100	S-555 N	04070055500N	TRIB TO SAVANNAH RIVER	34.323259	-82.787103	N/A	FAIR
Good Conditions	470023600100	S-236 E	04070023600E	BEAVERDAM CREEK	34.526229	-82.874266	N/A	GOOD
Good Conditions	3940018300100	SC183 N	39040018300N	KEOWEE RIVER	34.791799	-82.8835	N/A	GOOD
Good Conditions	3740018300600	SC183 N	37040018300N	LAKE KEOWEE	34.811328	-82.922285	N/A	GOOD
Good Conditions	3740013000100	SC130 E	37040013000E	LAKE KEOWEE (S. CANAL)	34.801745	-82.904257	N/A	GOOD
Good Conditions	410008500200	I-85 N	04010008500S	LITTLE BEAVERDAM CREEK	34.519596	-82.865675	N/A	GOOD
Good Conditions	410008500200	I-85 N	04010008500N	LITTLE BEAVERDAM CREEK	34.519451	-82.865616	N/A	GOOD
Good Conditions	440018400100	SC184 E	04040018400E	SAVANNAH RIVER	34.255183	-82.745461	N/A	GOOD
Good Conditions	3740009330100	S-4E	37070000400W	SENECA RIVER	34.681163	-82.856251	N/A	GOOD
Good Conditions	3740009310100	S-4E	37070000400E	SENICA RIVER	34.681099	-82.85636	N/A	GOOD
Good Conditions	3770032500100	S-325 N	37070032500N	TRIB CHATOOGA RIVER	34.984969	-83.069207	N/A	GOOD
Good Conditions	3940013300100	SC133 N	39040013300N	TWELVE MILE CREEK	34.713491	-82.831633	N/A	GOOD

**Appendix B:** Images of bridges that recorded the highest number of priority bat species.

Bridge #44. Species recorded were PESU, LANO/**EPFU**, **MYGR**, **MYLE**, and MYSE. Species in bold are known to use bridges in summer.





Bridge #16: Species recorded were PESU, LANO/**EPFU**, **CORA**, and **MYLE**. Species in bold are known use bridges in summer.



Bridge # 27: Species recorded were PESU, LANO/**EPFU**, **CORA**, and MYSE. Species in bold are known to use bridges in summer.





Bridge #43: Species recorded were PESU, LANO/**EPFU**, and MYSE. Species in bold are known to use bridges in summer.

