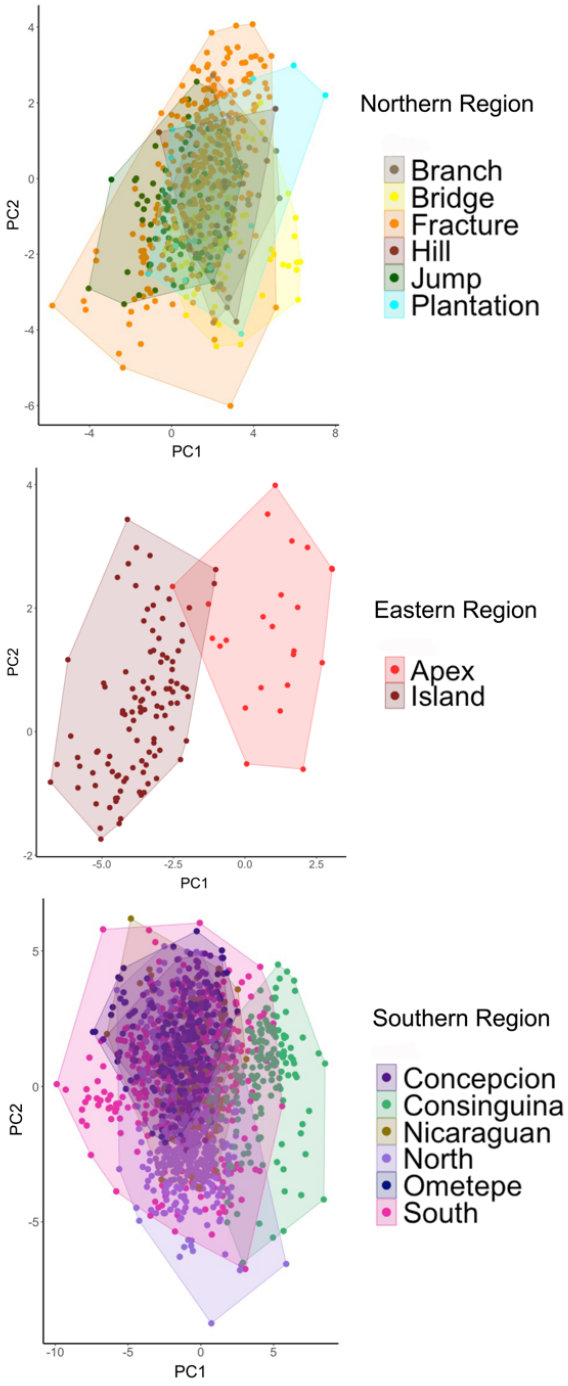
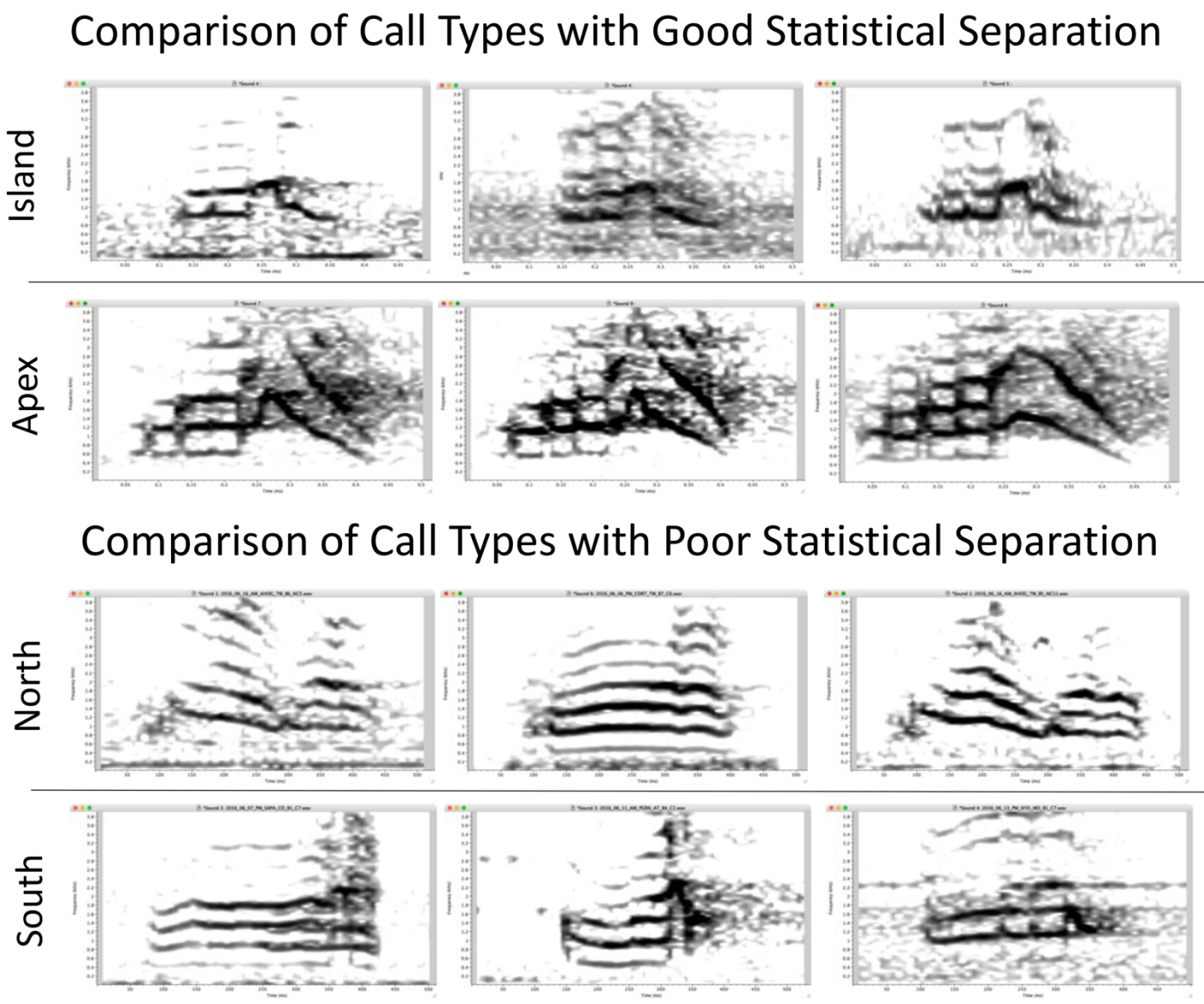
Supplementary Figures



Supplementary Fig. 1. Figures showing PCA results sorted regionally (Northern = Mexico and Guatemala, Eastern = Honduras, Southern = Nicaragua and Costa Rica).



Supplemental Figure 2. A figure showing a comparison of two call types that were statistically distinguishable (Island and Apex), and two call types that were not statistically distinguishable (North and South). All calls are depicted using the same time and frequency axes.

Supplementary Tables

Supplementary Table 1. A comprehensive list of all 47 sites where yellow-naped amazons were recorded. Site names with an asterisk* were removed from the dataset after initial processing because they had fewer than 3 birds. The column "Average number of calls per bird" was calculated by dividing the number of calls included in analysis by the number of birds included in analysis.

Site Name	Country	Year	Number of birds isolated from field recordings	Number of birds included in analysis	Number of calls isolated from field recordings	Number of calls included in analysis	Average number of calls per bird	Number of calls excluded from analysis
Cuajiniquil	Costa Rica	2016	8	8	68	68	9	0
Curu	Costa Rica	2016	4	4	41	41	10	0
Enseñada*	Costa Rica	2016	2	-	19	0	-	19
Finca Ahogados	Costa Rica	2016	6	6	48	48	8	0
Hacienda Inocentes	Costa Rica	2016	7	6	57	54	9	3
Horizontes	Costa Rica	2016	3	3	22	22	7	0
Las Trancas	Costa Rica	2016	6	6	44	44	7	0
Murcielago	Costa Rica	2016	7	7	54	54	8	0
Palenque	Costa Rica	2016	8	4	49	43	11	6
Palo Verde*	Costa Rica	2016	2	-	21	0	-	21
Parcelas Santa Elena	Costa Rica	2016	7	7	78	78	11	0
Pelon Altura	Costa Rica	2016	8	8	83	83	10	0
Pelon Bajura*	Costa Rica	2016	2	-	23	0		23
Peñas Blancas	Costa Rica	2016	6	6	76	76	13	0
Playa Cabuyal	Costa Rica	2016	7	7	61	61	9	0
Playa Grande	Costa Rica	2016	7	7	63	63	9	0
Puerto San Pablo	Costa Rica	2016	7	6	51	49	8	2
San Fidel	Costa Rica	2016	4	4	38	38	10	0
Santa Rosa	Costa Rica	2016	3	3	26	26	9	0
Taboga-Cortijo	Costa Rica	2016	6	6	64	64	11	0

Tarcoles	Costa Rica	2016	3	3	31	31	10	0
Tivives	Costa Rica	2016	9	8	63	61	8	2
Argentina	Nicaragua	2016	5	4	47	40	10	7
Escamequita	Nicaragua	2016	10	10	100	94	9	6
La Guinea	Nicaragua	2016	3	3	57	36	12	21
La Piscina	Nicaragua	2016	3	3	35	34	11	1
Los Placeres	Nicaragua	2016	8	8	91	84	11	7
Merida	Nicaragua	2016	9	8	83	83	10	0
Peña Inculta	Nicaragua	2016	9	6	86	49	8	37
Pul	Nicaragua	2016	9	9	93	63	7	30
San Ramone	Nicaragua	2016	5	5	55	55	11	0
Aztlan site 1	Mexico	2018	6	3	25	17	6	8
Aztlan site 2	Mexico	2018	3	3	18	18	6	0
Aztlan site 3	Mexico	2018	4	4	44	42	11	2
Las Brisas de Hueyate	Mexico	2018	6	6	110	107	18	3
Ponte Duro	Mexico	2018	5	3	51	48	16	3
Rancho el Piñon	Mexico	2018	4	3	30	28	9	2
Roberto Barrios Mapastapec	Mexico	2018	8	8	112	105	13	7
Salto de Agua	Mexico	2018	3	3	48	41	14	7
Aztlan Town Roost	Mexico	2019	7	6	17	58	10	2
Las Palmas	Mexico	2019	6	6	24	80	13	0
Los Tarrales	Guatemala	2019	4	3	59	15	5	2
Pineapple Plantation	Guatemala	2019	6	3	25	20	7	4
Guava Grove	Honduras	2019	6	6	50	59	10	0
Port Royal National Park	Honduras	2019	3	3	86	24	8	1
Sandy Bay	Honduras	2019	6	5	60	48	10	2
Undisclosed					80			

Supplementary Table 2. A factor loading table showing the 26 acoustic parameters examined in our PCA, and the first 5 principal components from the analysis. Detailed descriptions of each acoustic parameter can be found in the RDocumentation for the function specan in the warbleR package (version 1.1.9). *Spectral entropy is a product of time and spectral entropy (Araya-Salas & Smith-Vidaurre, 2017).

Variable	*PC1*	*PC2*	*PC3*	*PC4*	*PC5*
duration	0.2711	-0.2954	0.0804	-0.0535	0.054
mean frequency	0.2774	0.297	-0.0336	-0.0661	0.029
standard deviation of frequency	0.1399	0.0003	-0.1991	0.1831	-0.4798
median frequency	0.2525	0.2975	-0.0089	-0.0687	0.0782
first quartile frequency	0.2232	0.2861	0.0559	-0.1454	0.2236
third quartile frequency	0.2763	0.2491	-0.0966	0.0191	-0.1752
interquartile frequency	0.1039	-0.0027	-0.1884	0.1898	-0.4805
median time	0.2749	-0.2596	0.102	0.0313	0.0795
first quartile time	0.2671	-0.1909	0.1174	0.1007	0.1257
thrid quartile time	0.2723	-0.303	0.0828	-0.017	0.064
interquartile time	0.2142	-0.3205	0.0372	-0.1041	0.0016
skewness	0.0474	0.0353	0.3741	0.089	-0.3078
kurtosis	0.0507	0.0174	0.3321	0.1	-0.3091
spectral entropy	0.0593	-0.1274	-0.4383	-0.0451	0.096
time entropy	-0.2533	0.2554	-0.065	0.0093	-0.0132
spectral entropy*	-0.0048	-0.0626	-0.4575	-0.0431	0.0928
spectral flatness	0.0349	-0.102	-0.4205	-0.0155	-0.0311
average of dominant frequency	0.2915	0.2347	0.0001	-0.1167	0.0616
minimum of dominant frequency	-0.0166	0.0782	0.0107	-0.4566	-0.1565
maximum of dominant frequency	0.2645	0.1482	-0.1355	0.083	-0.1327
range of dominant frequency	0.2198	0.0672	-0.114	0.3577	-0.0049
modulation index	0.1861	-0.2028	-0.0316	-0.1444	-0.0135
dominant frequency at start	0.0351	0.0132	0.0042	-0.4881	-0.2183
dominant frquency at end	0.0818	0.0999	0.0555	0.141	0.1339
slope of change	-0.0063	0.0956	0.0302	0.4559	0.2551
mean peak frequency	0.2059	0.2197	0.0553	-0.0936	0.1902
% variation explained	26.7	17.6	15.98	8.707	8.412
cumulative variation	26.7	44.3	60.28	68.987	77.399

Supplementary Table 3. P-values generated from Tukey post-hoc tests on the ANOVA for PC1 and PC2. Significant p-values are in bold. All values greater than 0.001 were standardized to three significant decimal figures.

Tukey test p-values on ANOVA values from PC2	Tukey test p-values on ANOVA values from PC1													
		Apex	*Branch*	*Bridge*	*Concepcion*	*Consinguina*	*Fracture*	*Hill*	*Island*	*Jump*	*Nicaraguan*	*North*	*Ometepe*	*Plantation*	*South*
	Apex	-	0.937	0.906	**< .001**	**< .001**	**< .001**	1.00	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	1.00	**< .001**
	Branch	0.131	-	1.00	**< .001**	**< .001**	**< .001**	0.998	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	1.00	**< .001**
	Bridge	**< .001**	0.258	-	**< .001**	**< .001**	**< .001**	0.999	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	1.00	**< .001**
	Concepcion	0.00236	**< .001**	**< .001**	-	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	0.998	1.00	0.0250	**< .001**	1.00
	Consinguina	1.000	0.360	**< .001**	**< .001**	-	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	0.00350	**< .001**
	Fracture	0.758	0.763	**< .001**	**< .001**	0.994	-	0.698	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	0.875	**< .001**
	Hill	0.282	1.00	0.915	**< .001**	0.533	0.834	-	**< .001**	0.00156	**< .001**	**< .001**	**< .001**	1.00	**< .001**
	Island	1.00	0.278	**< .001**	**< .001**	1.00	0.971	0.438	-	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**
	Jump	**< .001**	0.999	0.626	**< .001**	**< .001**	0.00132	1.00	**< .001**	-	0.0603	**< .001**	**< .001**	0.0122	**< .001**
	Nicaraguan	0.990	0.00653	**< .001**	0.276	0.633	0.0346	0.0428	0.917	**< .001**	-	0.943	**< .001**	**< .001**	0.743
	North	**< .001**	0.457	0.998	**< .001**	**< .001**	**< .001**	0.992	**< .001**	0.870	**< .001**	-	**< .001**	**< .001**	1.00
	Ometepe	**< .001**	**< .001**	**< .001**	1.00	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	0.0331	**< .001**	-	**< .001**	0.00335
	Plantation	0.558	1.00	0.947	0.00121	0.793	0.957	1.00	0.711	1.00	0.164	0.995	**< .001**	-	**< .001**
	South	1.00	0.0717	**< .001**	**< .001**	1.00	0.242	0.249	1.00	**< .001**	0.838	**< .001**	**< .001**	0.549	-

References

Araya-Salas, M. and Smith-Vidaurre, G. (2017), *warbleR: an r package to streamline analysis of animal acoustic signals*. Methods Ecol Evol. 8, 184-191.