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Pacific Conservation Biology

Temporal and spatial activity of insectivorous bats in arid riparian woodland

Erin L. Westerhuis^{A,C}, Stephen R. Morton^A, Keith A. Christian^B and Christine A. Schlesinger^A

^AResearch Institute for the Environment and Livelihoods, Charles Darwin University, Alice Springs NT 0870, Australia.

^BResearch Institute for the Environment and Livelihoods, Charles Darwin University, Casuarina NT 0909, Australia.

^CCorresponding author. Email: erin.westerhuis@cdu.edu.au

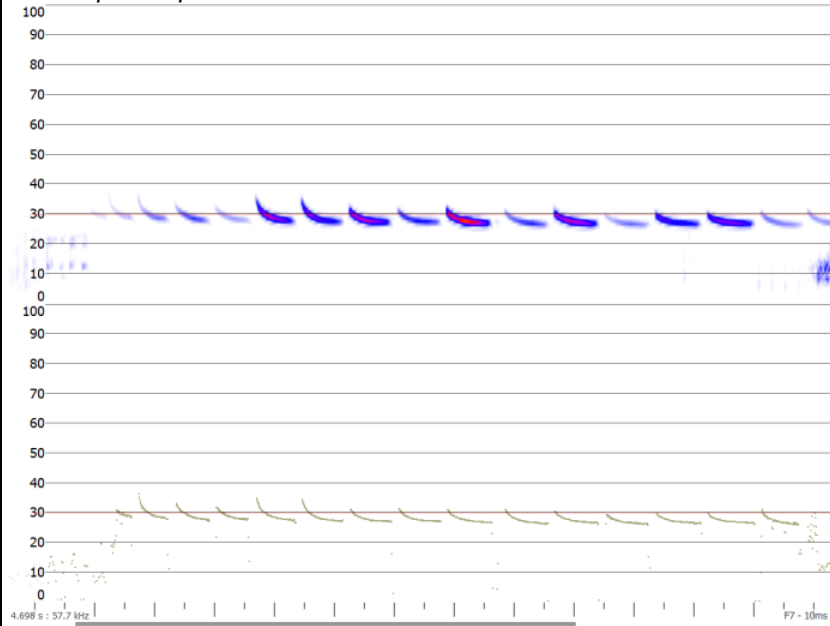
SUPPLEMENTARY MATERIAL

Table S1. Examples of species reference recordings used for call analysis in zero crossing and full spectrum.

Average parameters \pm SD for reference calls of each species is provided. Parameter code: Fc : characteristic frequency, Sc: characteristic frequency slope, Dur: duration of pulse, Fmax: maximum frequency, Fmin: minimum frequency, Fmean: mean frequency, TBC: time between calls, Fk: frequency of the knee, Tk: time of knee, Qk: quality of knee, Tc: time of characteristic, n= number of reference calls per species. For descriptions of parameters see <http://users.lmi.net/corben/parameters.htm#AnlookW%20call%20parameters>

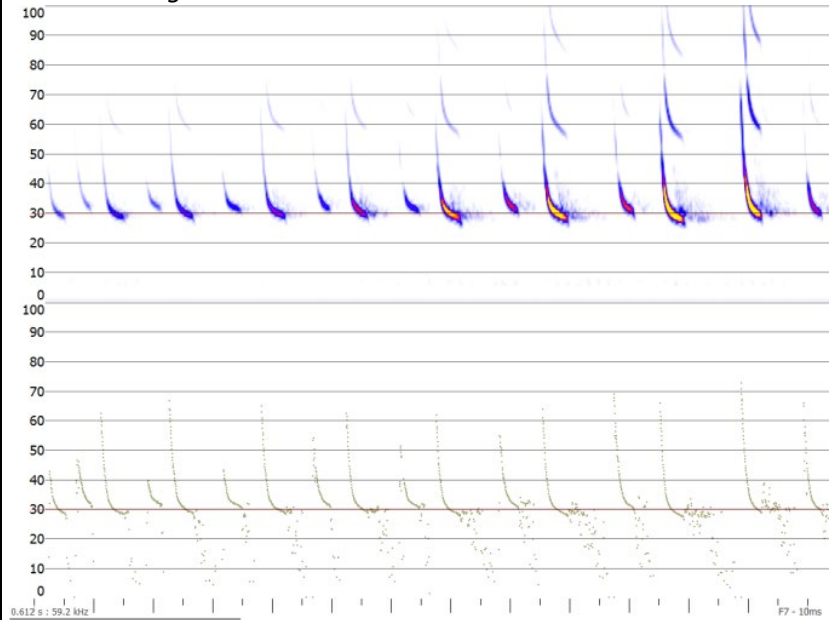
Species and Example Reference Call	Parameter	Average Values	SD
<p><i>Austronomus australis</i></p>	<p>Fc</p> <p>Sc</p> <p>Dur</p> <p>Fmax</p> <p>Fmin</p> <p>Fmean</p> <p>TBC</p> <p>Fk</p> <p>Tk</p> <p>Qk</p> <p>Tc</p> <p>Quality</p> <p>n</p>	<p>12.4</p> <p>9.7</p> <p>6.8</p> <p>15.0</p> <p>10.2</p> <p>12.5</p> <p>312.6</p> <p>12.9</p> <p>2.5</p> <p>4.3</p> <p>4.2</p> <p>2.1</p> <p>21</p>	<p>0.9</p> <p>58.3</p> <p>3.1</p> <p>2.7</p> <p>1.9</p> <p>1.2</p> <p>201.3</p> <p>1.1</p> <p>1.2</p> <p>3.1</p> <p>1.9</p> <p>0.7</p>
<p><i>Saccolaimus flaviventris</i></p>	<p>Fc</p> <p>Sc</p> <p>Dur</p> <p>Fmax</p> <p>Fmin</p> <p>Fmean</p> <p>TBC</p> <p>Fk</p> <p>Tk</p> <p>Qk</p> <p>Tc</p> <p>Quality</p> <p>n</p>	<p>16.8</p> <p>80.5</p> <p>6.7</p> <p>26.0</p> <p>15.5</p> <p>19.3</p> <p>206.9</p> <p>19.2</p> <p>3.2</p> <p>7.7</p> <p>5.9</p> <p>0.9</p> <p>16</p>	<p>1.3</p> <p>20.0</p> <p>0.7</p> <p>1.0</p> <p>0.7</p> <p>1.2</p> <p>51.6</p> <p>1.9</p> <p>1.0</p> <p>1.3</p> <p>0.9</p> <p>0.8</p>
<p><i>Taphozous hilli</i></p>	<p>Fc</p> <p>Sc</p> <p>Dur</p> <p>Fmax</p> <p>Fmin</p> <p>Fmean</p> <p>TBC</p> <p>Fk</p> <p>Tk</p> <p>Qk</p> <p>Tc</p> <p>Quality</p> <p>n</p>	<p>26.0</p> <p>19.8</p> <p>4.6</p> <p>26.7</p> <p>25.8</p> <p>26.2</p> <p>88.3</p> <p>26.4</p> <p>0.4</p> <p>0.4</p> <p>4.1</p> <p>0.2</p> <p>36</p>	<p>0.5</p> <p>10.9</p> <p>1.0</p> <p>0.6</p> <p>0.5</p> <p>0.5</p> <p>57.4</p> <p>0.6</p> <p>0.1</p> <p>0.1</p> <p>1.0</p> <p>0.0</p>

Mormopterus petersii



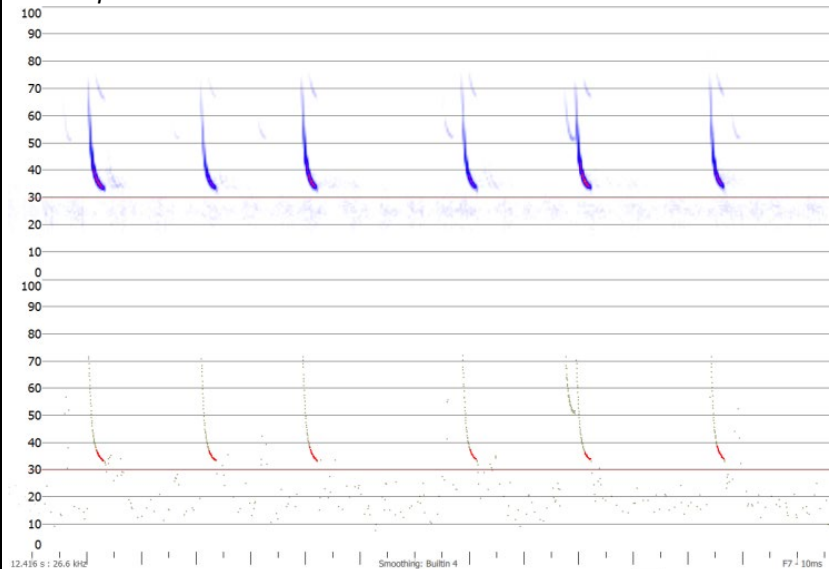
Fc	27.8	1.0
Sc	13.9	5.3
Dur	6.6	1.5
Fmax	30.5	1.6
Fmin	27.6	1.0
Fmean	28.6	1.1
TBC	183.8	93.8
Fk	29.1	1.1
Tk	1.5	0.4
Qk	1.7	0.9
Tc	5.5	1.2
Quality	0.3	0.0
n	15	

Chalinolobus gouldii



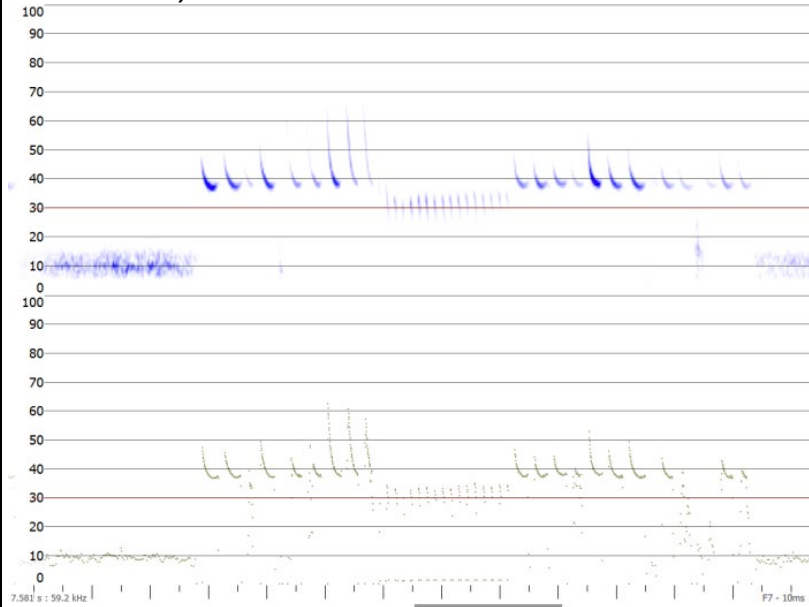
Fc	31.1	1.5
Sc	41.2	39.4
Dur	4.9	2.2
Fmax	41.2	5.2
Fmin	30.3	1.5
Fmean	32.9	1.9
TBC	92.4	64.7
Fk	32.6	2.1
Tk	2.0	1.0
Qk	7.2	3.8
Tc	4.2	2.1
Quality	0.6	0.5
n	54	

Scotorepens balstoni



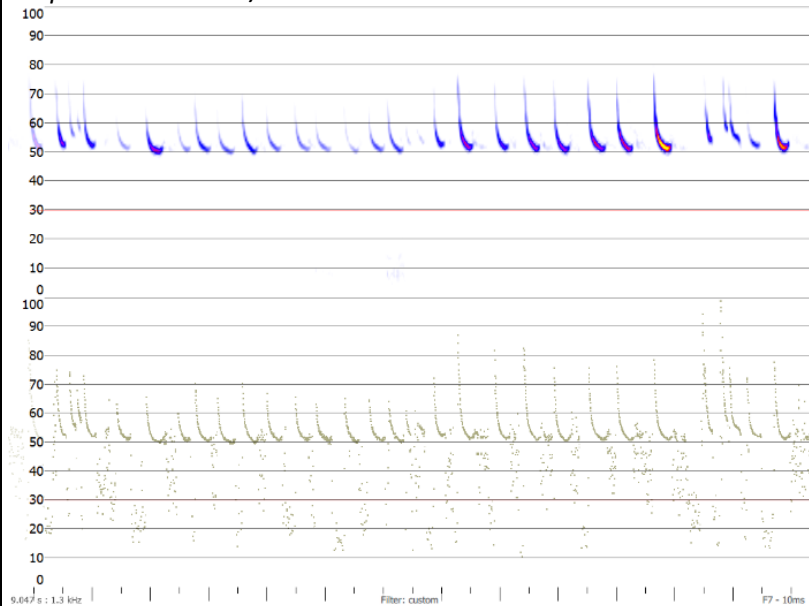
Fc	32.9	1.9
Sc	56.1	15.0
Dur	4.0	0.4
Fmax	44.3	5.2
Fmin	32.3	2.0
Fmean	35.6	2.8
TBC	101.6	33.4
Fk	35.1	2.7
Tk	1.8	0.3
Qk	6.6	3.1
Tc	3.1	0.5
Quality	0.4	0.2
n	20	

Setirostris eleryi



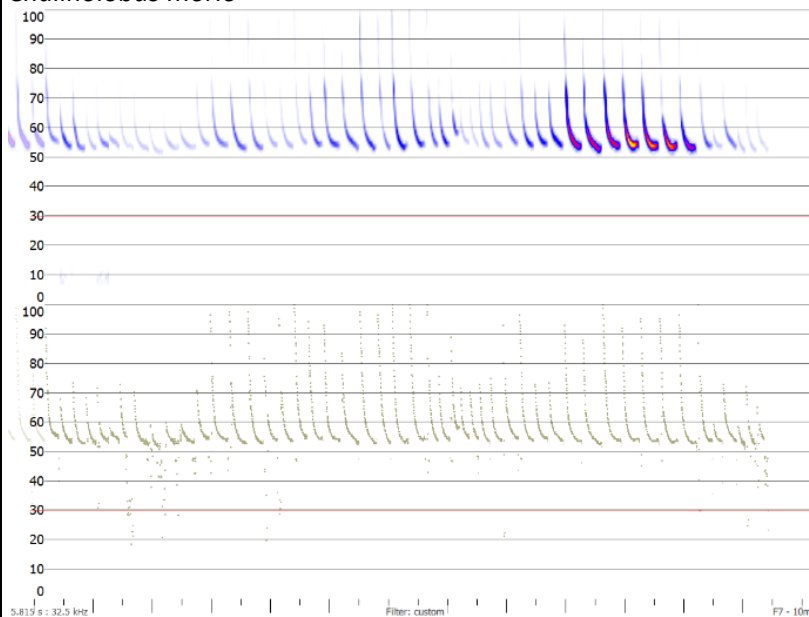
Fc	38.7	0.3
Sc	14.8	6.0
Dur	4.8	1.0
Fmax	44.8	1.7
Fmin	38.2	0.3
Fmean	39.6	0.4
TBC	202.6	108.5
Fk	39.8	0.5
Tk	1.4	0.3
Qk	4.4	1.6
Tc	3.9	0.9
Quality	0.4	0.3
n	4	

Vespadelus balstoni / vulturnus



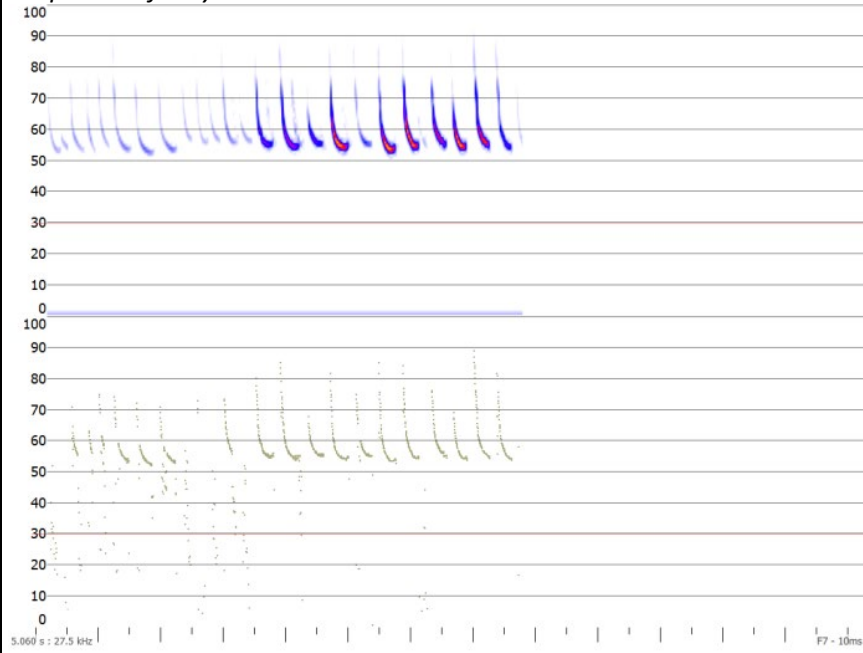
Fc	50.0	0.7
Sc	46.1	44.7
Dur	4.1	0.8
Fmax	65.2	5.3
Fmin	49.4	1.1
Fmean	52.6	1.4
TBC	83.0	30.8
Fk	52.1	0.9
Tk	1.4	0.2
Qk	7.7	2.7
Tc	3.6	0.8
Quality	0.5	0.2
n	16	

Chalinolobus morio



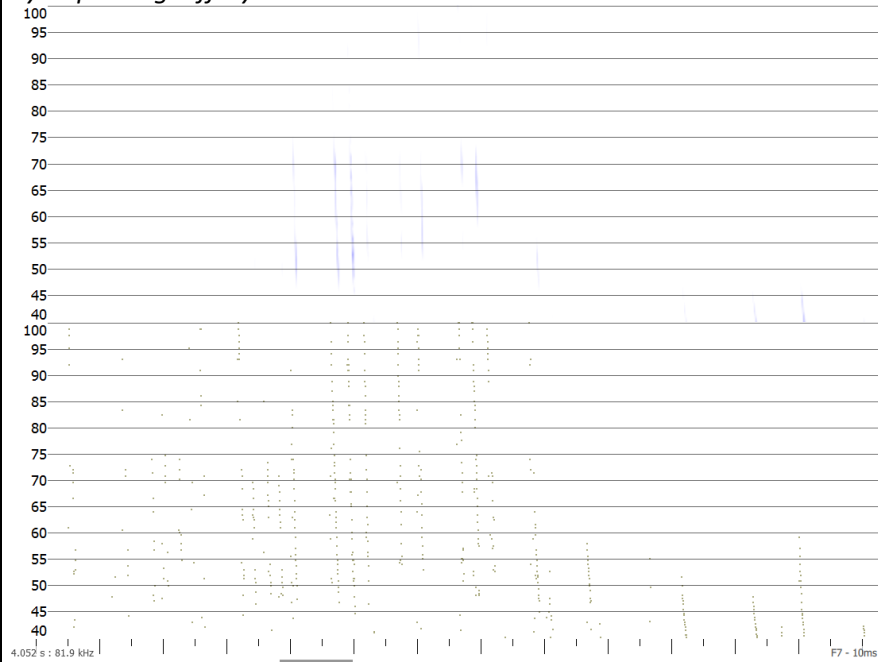
Fc	52.3	1.5
Sc	51.7	44.3
Dur	3.5	1.7
Fmax	74.6	8.5
Fmin	50.6	2.6
Fmean	56.5	1.0
TBC	92.4	30.3
Fk	55.1	1.7
Tk	1.3	0.3
Qk	8.5	4.4
Tc	2.5	0.9
Quality	0.6	0.3
n	27	

Vespadelus finlaysonii



Fc	55.5	1.8
Sc	38.9	12.2
Dur	2.8	0.4
Fmax	67.3	8.3
Fmin	54.5	1.9
Fmean	57.0	3.1
TBC	37.1	16.4
Fk	56.5	2.4
Tk	1.1	0.3
Qk	5.0	2.1
Tc	2.4	0.4
Quality	0.5	0.0
n	35	

Nyctophilus geoffroyi



Fc	39.7	1.8
Sc	193.8	87.4
Dur	2.7	0.2
Fmax	62.8	10.2
Fmin	35.7	1.0
Fmean	43.8	3.8
TBC	65.1	14.2
Fk	42.4	2.2
Tk	1.4	0.3
Qk	10.3	3.5
S1	417.3	418.0
Tc	2.1	0.4
Quality	1.0	0.3
n	5	

Table S2 Filter parameters used for each species in AnalookW for bat call analysis. Each filter output was examined individually and erroneous identification discarded.

Parameters	<i>Austronomus australis</i>	<i>Saccolaimus flaviventris</i>	<i>Taphozous hilli</i>	<i>Ozimops petersii</i>	<i>Chalino lobus gouldii</i>	<i>Nyctophilus geoffroyi</i>	<i>Scotorepens balstoni</i>	<i>Setirostris eleryi/ Scotorepens greyii</i>	<i>Vespadelus baverstocki/vulturinus</i>	<i>Chalino lobus morio</i>	<i>Vespadelus finlaysoni</i>
Fc min (kHz)	10	-	24	27	27	30	30	36	43	48	55
Fc max (kHz)	16	-	27	31	34	45	36	41	51	52	65
Fk min (kHz)	-	-	-	-	30	-	34	-	-	50	-
Fk max (kHz)	-	-	-	-	34	-	39	-	-	54	-
Tk min (ms)	-	-	-	-	-	0.1	-	-	-	-	-
Tk max (ms)	-	-	-	-	-	5	-	-	-	-	-
Sc min (OPS)	-	-	-	0	50	-	-	-	-	-	-
Sc max (OPS)	-	-	-	50	100	-	-	-	-	-	-
F min min (kHz)	-	-	-	-	-	35	-	-	47	48	-
F min max (kHz)	-	-	-	-	-	45	-	-	51	52	-
F max min (kHz)	-	20	-	-	-	55	40	-	-	-	-
F max max (kHz)	-	29	-	-	-	80	75	-	-	-	-
F mean min (kHz)	-	-	-	-	-	40	-	-	-	-	-
F mean max (kHz)	-	-	-	-	-	50	-	-	-	-	-
Sweep min (kHz)	1	2	0.5	1	-	40	-	-	-	-	-
Sweep max (kHz)	8	20	2	6	-	100	-	-	-	-	-
Exclude min (kHz)	-	-	-	-	-	0	-	-	-	-	-
Exclude max (kHz)	-	-	-	-	-	35	-	-	-	-	-
Slope min (OPS)	-	-	-	-	-	200	-	-	-	-	-
Slope max (OPS)	-	-	-	-	-	4000	-	-	-	-	-
Duratio n min (ms)	1	4	-	1	5	-	1	2	-	-	-
Duratio n max (ms)	100	20	-	999	10	-	5	999	-	-	-
Exclude kHz	-	-	-	-	-	0-30	-	-	-	-	-
Sequence min time between calls	5 - 5	5 - 2	5-3	3-1	5-1	5 - 1	-	5 - 2	5 - 1	5 - 1	5 - 1
Smoothness	400	5	-	100	-	1	-	-	-	-	-
Body Over (ms)	20	20	50	20	50	500	-	20	50	50	50
High Start	1000	1000	1000	2000	1000	2000	1000	2000	1000	1000	1000
	-	-	-	-	-	-	Yes	-	-	-	-

Table S3 Sequential test results from DistLM Forward selection with adjusted R2 values

SEQUENTIAL TESTS		Summer 2017					
<i>Variable</i>	<i>Adj R²</i>	<i>SS(trace)</i>	<i>Pseudo-F</i>	<i>P</i>	<i>Prop.</i>	<i>Cumul.</i>	<i>res.df</i>
Cattle	0.22	2777.9	6.290	0.010	0.22	0.22	22
Hugh River	0.31	1045.3	2.532	0.067	0.08	0.31	21
Channel Habitat	0.34	457.6	1.114	0.313	0.04	0.34	20
Elevation variance	0.37	398.5	0.969	0.379	0.03	0.37	19
Canopies < 2m	0.41	396.6	0.962	0.389	0.03	0.41	18
Fire Impact	0.44	403.7	0.978	0.375	0.03	0.44	17
Roe Creek	0.46	296.2	0.705	0.546	0.02	0.46	16
Distance to water	0.48	208.0	0.479	0.723	0.02	0.48	15
Plant diversity	0.49	156.7	0.345	0.837	0.01	0.49	14
Canopies > 5m	0.50	164.6	0.346	0.826	0.01	0.50	13
Canopies 2-5m	0.51	100.3	0.198	0.928	0.01	0.51	12

SEQUENTIAL TESTS		Summer 2018					
<i>Variable</i>	<i>Adj R²</i>	<i>SS(trace)</i>	<i>Pseudo-F</i>	<i>P</i>	<i>Prop.</i>	<i>Cumul.</i>	<i>res.df</i>
Channel	0.319	5772.0	11.328	<0.001	0.350	0.350	21
Ground Cover (Litter)	0.372	1294.5	2.753	0.014	0.079	0.429	20
Canopies 2-5m	0.425	1230.1	2.859	0.032	0.075	0.504	19
Ground Cover (Buffel grass)	0.455	826.5	2.024	0.052	0.050	0.554	18
Hugh	0.481	737.6	1.897	0.074	0.045	0.599	17
Cattle	0.491	508.1	1.332	0.249	0.031	0.629	16
Distance to Water	0.501	495.9	1.327	0.246	0.030	0.660	15
Fire impact	0.532	705.8	2.016	0.057	0.043	0.702	14
Elevation	0.533	354.5	1.014	0.426	0.022	0.724	13

SEQUENTIAL TESTS		Channel Sites					
<i>Variable</i>	<i>Adj R²</i>	<i>SS(trace)</i>	<i>Pseudo-F</i>	<i>P</i>	<i>Prop.</i>	<i>Cumul.</i>	<i>res.df</i>
Elevation variance	0.228	408.2	4.240	0.025	0.298	0.298	10
Average NDVI	0.331	212.9	2.555	0.055	0.155	0.453	9
Ross	0.488	239.5	3.753	0.030	0.175	0.628	8
High Fire impact	0.542	79.0	1.383	0.258	0.058	0.667	8
Cover 5-10m	0.547	61.5	1.087	0.383	0.045	0.711	7
+Cover 3-5m	0.548	57.7	1.025	0.397	0.042	0.754	6

Table S4 All environmental variables. Superscript denotes which model variables were used in. ¹Summer 2017 DistLM,²Summer 2018 DistLM and ³Channel DistLM

VARIABLE	MIN.	MAX.	AV.	INDICATOR
Elevation variance ^{1, 2, 3}	4	38	20	Abiotic
Run	0	1	1	Abiotic
Slope	0	2	0	Abiotic
Distance to Water ^{1, 2}	0	6778	4205	Abiotic
All weeds	0	3	2	Disturbance
Buffel grass	0	3	2	Disturbance
Cattle disturbance ^{1, 2, 3}	0	3	0	Disturbance
Fire impact ^{1, 2, 3}	0	3	1	Disturbance
Time Since Fire ^{1, 2, 3}	0	20	8	Disturbance
Plant Diversity ^{1, 2}	10	36	23	Diversity
Bare ground % Cover	5	98	38	Ground Cover
Boulders % Cover	0	10	1	Ground Cover
Couch grass	0	3	1	Ground Cover
Crust % cover	0	100	25	Ground Cover
Fallen logs	0	10	2	Ground Cover
Ground layer % cover	10	70	29	Ground Cover
Ground layer height	0	1	0	Ground Cover
Ground cover complexity ³	7	40	18	Ground Cover
Ground Cover herbaceous < 1m	0	20	7	Ground Cover
Ground Cover bare ground	0	50	24	Ground Cover
Ground Cover buffel	0	50	20	Ground Cover
Ground Cover forb (includes graminoids)	0	35	9	Ground Cover
Ground Cover hummock grass	0	40	2	Ground Cover
Ground Cover litter	4	20	8	Ground Cover
Ground Cover loose rock	0	60	13	Ground Cover
Ground Cover outcrop	0	20	4	Ground Cover
Ground Cover tussock grass annual	0	15	4	Ground Cover
Ground Cover tussock grass perennial	0	30	11	Ground Cover
Litter % Cover	0	40	10	Ground Cover
Outcrop % Cover	0	20	4	Ground Cover
Pebbles/Small Stones(<6mm-20mm))	0	90	20	Ground Cover
Rock/Stone%	0	86	13	Ground Cover

ROCKS/(20-200cm)	0	20	4	Ground Cover
Stones/Small Rocks(20-200mm)	0	50	12	Ground Cover
Canopies <2m ^{1, 2, 3}	5	274	90	Horizontal structure
Canopies >5m ^{1, 2, 3}	0	103	31	Horizontal structure
Canopies 2-5m ^{1, 2, 3}	7	260	52	Horizontal structure
Cover of River red gums (Ha)	0	14	4	Horizontal structure
Density of large RRGs ³	0	18	3	Horizontal structure
Edge distance ³	25	170	84	Horizontal structure
No of canopies	0	22	6	Horizontal structure
Number of Large Hollow bearing trees ³	0	108	23	Horizontal structure
Flowering score	0	4	2	Temporal
Fruiting score	0	3	1	Temporal
Maximum temperature	21	39	30	Temporal
Normalised Difference Vegetation Index	0	0	0	Temporal
Rain days past 3 months	3	46	25	Temporal
Rain days past 6 months	1	27	12	Temporal
Lower shrub layer % Cover	0	20	5	Vertical Structure
Lower shrub layer height	0	2	1	Vertical Structure
Tree layer % cover	0	50	17	Vertical Structure
Tree layer height	0	20	10	Vertical Structure
Upper shrub layer % cover	0	50	9	Vertical Structure
Upper shrub layer height	0	10	4	Vertical Structure
Vegetation profile % cover > 10m	0	50	12	Vertical Structure
Vegetation profile % cover < 0.5m	10	55	29	Vertical Structure
Vegetation profile % cover 3-5m	0	20	8	Vertical Structure
Vegetation profile % cover 0.5-1m	0	50	10	Vertical Structure
Vegetation profile % cover 5-10m	0	50	12	Vertical Structure
Vegetation profile % cover 1-3m	0	25	6	Vertical Structure
