

Supplementary Material

Seasonality and dietary diversity in flower and fruit consumption by birds: long-term dataset from a New Zealand wildlife reserve

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Appendix S1. Monthly summaries of bird-plant interactions in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Complete monthly visitation records for each species of bird and plant are published online ([athttps://doi.org/10.6084/m9.figshare.29832476.v3](https://doi.org/10.6084/m9.figshare.29832476.v3)).

Table S1.1 Summary of monthly flower visitation to ten native plant species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Each cell contains the total number of visits recorded per plant species for a given month. Blank cells indicate no recorded visits. Sampling hours per month are indicated in the last row.

Plant species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<i>Fuchsia excorticata</i>	2	1	1		12	36	48	136	175	189	139	12	751
<i>Geniostoma ligustrifolium</i>										30	3		33
<i>Hoheria sexstylosa</i>			9	1									10
<i>Knightia excelsa</i>											8		8
<i>Metrosideros excelsa</i>	4	1											5
<i>Phormium tenax</i>	18									2	51	88	159
<i>Pittosporum eugenioides</i>										7			7
<i>Pseudopanax arboreus</i>	1					5	59	95	19				179
<i>Schefflera digitata</i>	8	13	4					1					26
<i>Sophora microphylla</i>								3	44	99	3		149
Total	33	15	14	1	12	41	107	235	238	327	204	100	1327
Sampling hours	56	71	56	32	58	45	33	53	48	48	43	25	568

Table S1.2 Summary of monthly flower visitation by seven bird species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Each cell contains the total number of visits recorded per bird species for a given month. Blank cells indicate no recorded visits. Sampling hours per month are indicated in the last row.

Bird species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Korimako (<i>Anthornis melanura</i>)		1	2		6	13	19	34	12	20	8	3	118
Kākā (<i>Nestor merisionalis</i>)			1			1			6	4			12
Tīeke (<i>Philesturnus rufusater</i>)	1							2	1	1			5
Hihi (<i>Notiomystis cincta</i>)	7	3	2		5	17	19	17	7	11	6		94
Tūī (<i>Prothemadera novaeseelandiae</i>)	24	9	9	1		5	40	146	208	267	188	97	994
Tauhou (<i>Zosterops lateralis</i>)		1			1	3	27	33	3	24	2		94
Pōpokotea (<i>Mohoua albicilla</i>)	1	1				2	2	3	1				10
Total	33	15	14	1	12	41	107	235	238	327	204	100	1327
Sampling hours	56	71	56	32	58	45	33	53	48	48	43	25	568

Table S1.3 Summary of monthly fruit visitation to twenty native plant species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Each cell contains the total number of visits recorded per plant species for a given month. Blank cells indicate no recorded visits. Sampling hours per month are indicated in the last row.

Plant species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<i>Aristotelia serrata</i>	12	32	1										45
<i>Coprosma grandifolia</i>	27	90	73	27	13	1						3	234
<i>Coprosma robusta</i>	2	7	74	59	95	98	27	27	3	2	1		395
<i>Coriaria arborea</i>	27	24	8	1	15	13		1			1	8	98
<i>Elaeocarpus dentatus</i>		8			5	4							17
<i>Fuchsia excorticata</i>	21	11		1						1	5	8	47
<i>Gemistoma ligustrifolium</i>	1		20	97	176	73							367
<i>Hedycarya arborea</i>	5	14	3							1		5	28
<i>Melicytus ramiflorus</i>	16	119	113	61	75	20							404
<i>Meuhlenbeckia australis</i>			1	8	30	6	1						46
<i>Myoporum laetum</i>		1	21	31	37	16							106
<i>Myrsine australis</i>	20	38	21	12	30	16	1	2		2	14	16	172
<i>Piper excelsum</i>	4	39	30	8	3								84
<i>Pittosporum eugenioides</i>		2			17	65	15	5	1		1		106
<i>Pittosporum tenuifolium</i>					2	6	2						10
<i>Podocarpus totara</i>			2	8	24	3							37
<i>Pseudopanax arboreus</i>	37	86	113	38	55	22	7	10			1	2	371
<i>Ripogonum scandens</i>	2	5		1	2	3			1				14
<i>Rubus cissoides</i>	8	6											14
<i>Schefflera digitata</i>		2	13	29	102	125	9	7	3	1			291
Total	182	484	493	381	681	471	62	52	8	7	23	42	2886
Sampling hours	56	71	56	32	58	45	33	53	48	48	43	25	568

Table S1.4 Summary of monthly fruit visitation by eight bird species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Each cell contains the total number of visits recorded per bird species for a given month. Blank cells indicate no recorded visits. Sampling hours per month are indicated in the last row.

Bird species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Korimako (<i>Anthornis melanura</i>)	1	10	15	8	11	2							47
Kākā (<i>Nestor meridionalis</i>)	2	27	5		3	1			1			1	40
Kererū (<i>Hemiphaga novaeseelandiae</i>)	5	4		2	3	2				1	4	1	22
Tīeke (<i>Philestrunus rufusater</i>)	20	45	35	24	31	28	4	6	4	2		4	203
Hihi (<i>Notiomystis cincta</i>)	12	31	42	37	57	21	3	2			1		206
Tūi (<i>Prosthemadera novaeseelandiae</i>)	83	123	108	103	140	87	26	27	2	4	17	27	747
Tauhō (<i>Zosterops lateralis</i>)	49	229	273	202	411	314	26	14			5	2	1525
Pōpokotea (<i>Mohoua albigilla</i>)	10	16	14	5	25	16	3	3	1	1		2	96
Total	182	485	492	381	681	471	62	52	8	8	27	37	2886
Sampling hours	56	71	56	32	58	45	33	53	48	48	43	25	568

Appendix S2. Summaries of pairwise comparisons of circular distributions of bird-plant visitation for each species pair using Mardia-Watson-Wheeler's Test for Homogeneity of Means with Bonferroni correction.

Table S2.1 Summary of results of Mardia-Watson-Wheeler's Test for Homogeneity of Means to compare circular distributions of flower visits by birds for each pair of plant species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Columns 'Species 1' and 'Species 2' represent the species pair, columns 'W', 'df', and '*p*' represent the test statistics for the Mardia-Watson-Wheeler test. The 'adjusted *p*' column represents the adjusted results using the Bonferroni correction to account for possible type-I error due to multiple comparisons. Values in bold represent significant results ($\alpha = 0.05$).

Species 1	Species 2	W	df	<i>p</i>	adjusted <i>p</i>
<i>Fuchsia excorticata</i>	<i>Geniostoma ligustrifolium</i>	97.20	2	7.810E-22	3.910E-21
<i>Fuchsia excorticata</i>	<i>Hoheria sexstylosa</i>	38.40	2	4.600E-09	9.400E-09
<i>Fuchsia excorticata</i>	<i>Knightia excelsa</i>	31.90	2	1.180E-07	2.130E-07
<i>Fuchsia excorticata</i>	<i>Metrosideros excelsa</i>	16.07	2	3.250E-04	3.560E-04
<i>Fuchsia excorticata</i>	<i>Phormium tenax</i>	848.20	2	6.540E-185	2.940E-183
<i>Fuchsia excorticata</i>	<i>Pittosporum eugenioides</i>	23.69	2	7.190E-06	9.800E-06
<i>Fuchsia excorticata</i>	<i>Pseudopanax arboreus</i>	450.97	2	1.180E-98	1.070E-97
<i>Fuchsia excorticata</i>	<i>Schefflera digitata</i>	79.62	2	5.140E-18	1.780E-17
<i>Fuchsia excorticata</i>	<i>Sophora microphylla</i>	244.01	2	1.030E-53	7.760E-53
<i>Geniostoma ligustrifolium</i>	<i>Hoheria sexstylosa</i>	41.04	2	1.220E-09	3.670E-09
<i>Geniostoma ligustrifolium</i>	<i>Knightia excelsa</i>	35.01	2	2.500E-08	4.880E-08
<i>Geniostoma ligustrifolium</i>	<i>Metrosideros excelsa</i>	17.01	2	2.030E-04	2.530E-04
<i>Geniostoma ligustrifolium</i>	<i>Phormium tenax</i>	142.56	2	1.110E-31	6.230E-31
<i>Geniostoma ligustrifolium</i>	<i>Pittosporum eugenioides</i>	0.36	2	0.840	0.840
<i>Geniostoma ligustrifolium</i>	<i>Pseudopanax arboreus</i>	152.43	2	7.960E-34	5.120E-33
<i>Geniostoma ligustrifolium</i>	<i>Schefflera digitata</i>	77.49	2	1.490E-17	4.790E-17
<i>Geniostoma ligustrifolium</i>	<i>Sophora microphylla</i>	18.03	2	1.220E-04	1.560E-04
<i>Hoheria sexstylosa</i>	<i>Knightia excelsa</i>	30.06	2	2.970E-07	4.610E-07
<i>Hoheria sexstylosa</i>	<i>Metrosideros excelsa</i>	16.33	2	2.840E-04	3.290E-04
<i>Hoheria sexstylosa</i>	<i>Phormium tenax</i>	39.18	2	3.100E-09	6.980E-09
<i>Hoheria sexstylosa</i>	<i>Pittosporum eugenioides</i>	26.28	2	1.960E-06	2.850E-06

<i>Hoheria sexstylosa</i>	<i>Pseudopanax arboreus</i>	39.41	2	2.770E-09	6.550E-09
<i>Hoheria sexstylosa</i>	<i>Schefflera digitata</i>	25.94	2	2.330E-06	3.280E-06
<i>Hoheria sexstylosa</i>	<i>Sophora microphylla</i>	39.76	2	2.320E-09	6.520E-09
<i>Knightia excelsa</i>	<i>Metrosideros excelsa</i>	16.33	2	2.840E-04	3.290E-04
<i>Knightia excelsa</i>	<i>Phormium tenax</i>	31.98	2	1.140E-07	2.130E-07
<i>Knightia excelsa</i>	<i>Pittosporum eugenoides</i>	26.28	2	1.960E-06	2.850E-06
<i>Knightia excelsa</i>	<i>Pseudopanax arboreus</i>	39.41	2	2.770E-09	6.550E-09
<i>Knightia excelsa</i>	<i>Schefflera digitata</i>	38.54	2	4.280E-09	9.180E-09
<i>Knightia excelsa</i>	<i>Sophora microphylla</i>	39.46	2	2.700E-09	6.550E-09
<i>Metrosideros excelsa</i>	<i>Phormium tenax</i>	15.93	2	3.480E-04	3.730E-04
<i>Metrosideros excelsa</i>	<i>Pittosporum eugenoides</i>	15.59	2	4.120E-04	4.310E-04
<i>Metrosideros excelsa</i>	<i>Pseudopanax arboreus</i>	16.24	2	2.980E-04	3.350E-04
<i>Metrosideros excelsa</i>	<i>Schefflera digitata</i>	4.63	2	0.100	0.100
<i>Metrosideros excelsa</i>	<i>Sophora microphylla</i>	16.33	2	3.000E-04	3.000E-04
<i>Phormium tenax</i>	<i>Pittosporum eugenoides</i>	30.70	2	2.150E-07	3.460E-07
<i>Phormium tenax</i>	<i>Pseudopanax arboreus</i>	730.07	2	2.930E-159	6.590E-158
<i>Phormium tenax</i>	<i>Schefflera digitata</i>	80.14	2	3.950E-18	1.480E-17
<i>Phormium tenax</i>	<i>Sophora microphylla</i>	587.85	2	2.230E-128	3.350E-127
<i>Pittosporum eugenoides</i>	<i>Pseudopanax arboreus</i>	30.90	2	1.950E-07	3.260E-07
<i>Pittosporum eugenoides</i>	<i>Schefflera digitata</i>	31.45	2	1.480E-07	2.560E-07
<i>Pittosporum eugenoides</i>	<i>Sophora microphylla</i>	19.97	2	4.620E-05	6.110E-05
<i>Pseudopanax arboreus</i>	<i>Schefflera digitata</i>	83.06	2	9.180E-19	3.760E-18
<i>Pseudopanax arboreus</i>	<i>Sophora microphylla</i>	468.63	2	1.730E-102	1.940E-101
<i>Schefflera digitata</i>	<i>Sophora microphylla</i>	84.02	2	5.710E-19	2.570E-18

Table S2.2 Summary of results of Mardia-Watson-Wheeler's Test for Homogeneity of Means to compare circular distributions of fruit visits by birds for each pair of plant species in Zealandia ecosanctuary in Wellington, New Zealand, between 2006 and 2015. Columns 'Species 1' and 'Species 2' represent the species pair, columns 'W', 'df', and '*p*' represent the test statistics for the Mardia-Watson-Wheeler test. The 'adjusted *p*' column represents the adjusted results using the Bonferroni correction to account for possible type-I error due to multiple comparisons. Values in bold represent significant results ($\alpha = 0.05$).

Species 1	Species 2	W	df	<i>p</i>	adjusted <i>p</i>
<i>Aristotelia serrata</i>	<i>Coprosma grandifolia</i>	48.339	2	3.190E-11	6.370E-11
<i>Aristotelia serrata</i>	<i>Coprosma robusta</i>	140.124	2	3.740E-31	1.510E-30
<i>Aristotelia serrata</i>	<i>Coriaria arborea</i>	52.535	2	3.910E-12	7.900E-12
<i>Aristotelia serrata</i>	<i>Elaeocarpus dentatus</i>	15.000	2	5.532E-04	6.488E-04
<i>Aristotelia serrata</i>	<i>Fuchsia excorticata</i>	39.059	2	3.300E-09	5.550E-09
<i>Aristotelia serrata</i>	<i>Geniostoma ligustrifolium</i>	143.810	2	5.920E-32	2.680E-31
<i>Aristotelia serrata</i>	<i>Hedycarya arborea</i>	20.463	2	3.600E-05	4.530E-05
<i>Aristotelia serrata</i>	<i>Melicytus ramiflorus</i>	91.043	2	1.700E-20	3.940E-20
<i>Aristotelia serrata</i>	<i>Muehlenbeckia australis</i>	125.909	2	4.560E-28	1.640E-27
<i>Aristotelia serrata</i>	<i>Myoporum laetum</i>	141.691	2	1.710E-31	7.210E-31
<i>Aristotelia serrata</i>	<i>Myrsine australis</i>	100.939	2	1.210E-22	3.180E-22
<i>Aristotelia serrata</i>	<i>Piper excelsum</i>	28.784	2	5.620E-07	8.090E-07
<i>Aristotelia serrata</i>	<i>Pittosporum eugenioides</i>	145.630	2	2.380E-32	1.130E-31
<i>Aristotelia serrata</i>	<i>Pittosporum tenuifolium</i>	47.140	2	5.800E-11	1.090E-10
<i>Aristotelia serrata</i>	<i>Podocarpus totara</i>	115.212	2	9.600E-26	3.040E-25
<i>Aristotelia serrata</i>	<i>Pseudopanax arboreus</i>	97.341	2	7.290E-22	1.800E-21
<i>Aristotelia serrata</i>	<i>Ripogonum scandens</i>	9.920	2	7.013E-03	7.658E-03
<i>Aristotelia serrata</i>	<i>Rubus cissoides</i>	8.219	2	1.642E-02	1.782E-02
<i>Aristotelia serrata</i>	<i>Schefflera digitata</i>	144.892	2	3.440E-32	1.600E-31
<i>Coprosma grandifolia</i>	<i>Coprosma robusta</i>	326.784	2	1.100E-71	2.310E-70
<i>Coprosma grandifolia</i>	<i>Coriaria arborea</i>	124.301	2	1.020E-27	3.590E-27
<i>Coprosma grandifolia</i>	<i>Elaeocarpus dentatus</i>	23.309	2	8.680E-06	1.130E-05
<i>Coprosma grandifolia</i>	<i>Fuchsia excorticata</i>	128.458	2	1.280E-28	4.750E-28
<i>Coprosma grandifolia</i>	<i>Geniostoma ligustrifolium</i>	404.867	2	1.210E-88	5.770E-87

<i>Coprosma grandifolia</i>	<i>Hedycarya arborea</i>	26.819	2	1.500E-06	2.100E-06
<i>Coprosma grandifolia</i>	<i>Melicytus ramiflorus</i>	28.658	2	5.980E-07	8.550E-07
<i>Coprosma grandifolia</i>	<i>Muehlenbeckia australis</i>	142.299	2	1.260E-31	5.440E-31
<i>Coprosma grandifolia</i>	<i>Myoporum laetum</i>	163.075	2	3.880E-36	2.110E-35
<i>Coprosma grandifolia</i>	<i>Myrsine australis</i>	183.252	2	1.610E-40	1.130E-39
<i>Coprosma grandifolia</i>	<i>Piper excelsum</i>	10.872	2	4.358E-03	4.786E-03
<i>Coprosma grandifolia</i>	<i>Pittosporum eugenioides</i>	434.918	2	3.620E-95	3.440E-93
<i>Coprosma grandifolia</i>	<i>Pittosporum tenuifolium</i>	45.611	2	1.250E-10	2.210E-10
<i>Coprosma grandifolia</i>	<i>Podocarpus totara</i>	99.153	2	2.950E-22	7.460E-22
<i>Coprosma grandifolia</i>	<i>Pseudopanax arboreus</i>	31.245	2	1.640E-07	2.480E-07
<i>Coprosma grandifolia</i>	<i>Ripogonum scandens</i>	16.839	2	2.205E-04	2.652E-04
<i>Coprosma grandifolia</i>	<i>Rubus cissoides</i>	26.107	2	2.140E-06	2.970E-06
<i>Coprosma grandifolia</i>	<i>Schefflera digitata</i>	533.374	2	1.510E-116	2.870E-114
<i>Coprosma robusta</i>	<i>Coriaria arborea</i>	99.982	2	1.950E-22	5.000E-22
<i>Coprosma robusta</i>	<i>Elaeocarpus dentatus</i>	2.637	2	0.268	0.275
<i>Coprosma robusta</i>	<i>Fuchsia excorticata</i>	204.055	2	4.900E-45	4.650E-44
<i>Coprosma robusta</i>	<i>Geniostoma ligustrifolium</i>	174.908	2	1.050E-38	6.850E-38
<i>Coprosma robusta</i>	<i>Hedycarya arborea</i>	112.531	2	3.670E-25	1.120E-24
<i>Coprosma robusta</i>	<i>Melicytus ramiflorus</i>	160.334	2	1.530E-35	8.060E-35
<i>Coprosma robusta</i>	<i>Muehlenbeckia australis</i>	76.878	2	2.020E-17	4.470E-17
<i>Coprosma robusta</i>	<i>Myoporum laetum</i>	63.340	2	1.760E-14	3.760E-14
<i>Coprosma robusta</i>	<i>Myrsine australis</i>	141.359	2	2.010E-31	8.320E-31
<i>Coprosma robusta</i>	<i>Piper excelsum</i>	155.854	2	1.430E-34	7.370E-34
<i>Coprosma robusta</i>	<i>Pittosporum eugenioides</i>	170.371	2	1.010E-37	6.190E-37
<i>Coprosma robusta</i>	<i>Pittosporum tenuifolium</i>	20.578	2	3.400E-05	4.310E-05
<i>Coprosma robusta</i>	<i>Podocarpus totara</i>	47.315	2	5.320E-11	1.010E-10
<i>Coprosma robusta</i>	<i>Pseudopanax arboreus</i>	192.071	2	1.960E-42	1.550E-41
<i>Coprosma robusta</i>	<i>Ripogonum scandens</i>	6.116	2	0.047	0.049
<i>Coprosma robusta</i>	<i>Rubus cissoides</i>	44.841	2	1.830E-10	3.160E-10
<i>Coprosma robusta</i>	<i>Schefflera digitata</i>	109.565	2	1.620E-24	4.720E-24

<i>Coriaria arborea</i>	<i>Elaeocarpus dentatus</i>	11.397	2	3.351E-03	3.702E-03
<i>Coriaria arborea</i>	<i>Fuchsia excorticata</i>	29.841	2	3.310E-07	4.880E-07
<i>Coriaria arborea</i>	<i>Geniostoma ligustrifolium</i>	220.442	2	1.350E-48	1.510E-47
<i>Coriaria arborea</i>	<i>Hedycarya arborea</i>	3.758	2	0.153	0.159
<i>Coriaria arborea</i>	<i>Melicytus ramiflorus</i>	182.678	2	2.150E-40	1.460E-39
<i>Coriaria arborea</i>	<i>Muehlenbeckia australis</i>	105.619	2	1.160E-23	3.200E-23
<i>Coriaria arborea</i>	<i>Myoporum laetum</i>	186.231	2	3.630E-41	2.660E-40
<i>Coriaria arborea</i>	<i>Myrsine australis</i>	12.274	2	2.161E-03	2.444E-03
<i>Coriaria arborea</i>	<i>Piper excelsum</i>	120.004	2	8.740E-27	2.910E-26
<i>Coriaria arborea</i>	<i>Pittosporum eugenioides</i>	186.495	2	3.190E-41	2.420E-40
<i>Coriaria arborea</i>	<i>Pittosporum tenuifolium</i>	34.560	2	3.130E-08	4.870E-08
<i>Coriaria arborea</i>	<i>Podocarpus totara</i>	98.788	2	3.540E-22	8.840E-22
<i>Coriaria arborea</i>	<i>Pseudopanax arboreus</i>	104.747	2	1.800E-23	4.880E-23
<i>Coriaria arborea</i>	<i>Ripogonum scandens</i>	2.563	2	0.278	0.284
<i>Coriaria arborea</i>	<i>Rubus cissoides</i>	18.549	2	9.380E-05	1.165E-04
<i>Coriaria arborea</i>	<i>Schefflera digitata</i>	142.740	2	1.010E-31	4.460E-31
<i>Elaeocarpus dentatus</i>	<i>Fuchsia excorticata</i>	47.718	2	4.350E-11	8.430E-11
<i>Elaeocarpus dentatus</i>	<i>Geniostoma ligustrifolium</i>	14.693	2	6.448E-04	7.516E-04
<i>Elaeocarpus dentatus</i>	<i>Hedycarya arborea</i>	17.050	2	1.985E-04	2.402E-04
<i>Elaeocarpus dentatus</i>	<i>Melicytus ramiflorus</i>	23.186	2	9.230E-06	1.190E-05
<i>Elaeocarpus dentatus</i>	<i>Muehlenbeckia australis</i>	11.796	2	2.745E-03	3.068E-03
<i>Elaeocarpus dentatus</i>	<i>Myoporum laetum</i>	22.994	2	1.020E-05	1.300E-05
<i>Elaeocarpus dentatus</i>	<i>Myrsine australis</i>	5.964	2	0.051	0.053
<i>Elaeocarpus dentatus</i>	<i>Piper excelsum</i>	27.160	2	1.270E-06	1.780E-06
<i>Elaeocarpus dentatus</i>	<i>Pittosporum eugenioides</i>	22.255	2	1.470E-05	1.880E-05
<i>Elaeocarpus dentatus</i>	<i>Pittosporum tenuifolium</i>	16.164	2	3.090E-04	3.670E-04
<i>Elaeocarpus dentatus</i>	<i>Podocarpus totara</i>	23.480	2	7.970E-06	1.070E-05
<i>Elaeocarpus dentatus</i>	<i>Pseudopanax arboreus</i>	15.333	2	4.684E-04	5.527E-04
<i>Elaeocarpus dentatus</i>	<i>Ripogonum scandens</i>	7.427	2	2.439E-02	2.603E-02
<i>Elaeocarpus dentatus</i>	<i>Rubus cissoides</i>	14.399	2	7.471E-04	8.655E-04

<i>Elaeocarpus dentatus</i>	<i>Schefflera digitata</i>	0.864	2	0.649	0.653
<i>Fuchsia excorticata</i>	<i>Geniostoma ligustrifolium</i>	199.838	2	4.030E-44	3.650E-43
<i>Fuchsia excorticata</i>	<i>Hedycarya arborea</i>	3.745	2	0.154	0.159
<i>Fuchsia excorticata</i>	<i>Melicytus ramiflorus</i>	166.706	2	6.310E-37	3.530E-36
<i>Fuchsia excorticata</i>	<i>Muehlenbeckia australis</i>	151.997	2	9.870E-34	4.930E-33
<i>Fuchsia excorticata</i>	<i>Myoporum laetum</i>	194.260	2	6.560E-43	5.420E-42
<i>Fuchsia excorticata</i>	<i>Myrsine australis</i>	76.734	2	2.170E-17	4.750E-17
<i>Fuchsia excorticata</i>	<i>Piper excelsum</i>	106.483	2	7.540E-24	2.140E-23
<i>Fuchsia excorticata</i>	<i>Pittosporum eugenioides</i>	210.139	2	2.340E-46	2.340E-45
<i>Fuchsia excorticata</i>	<i>Pittosporum tenuifolium</i>	47.797	2	4.180E-11	8.270E-11
<i>Fuchsia excorticata</i>	<i>Podocarpus totara</i>	135.035	2	4.760E-30	1.810E-29
<i>Fuchsia excorticata</i>	<i>Pseudopanax arboreus</i>	148.980	2	4.460E-33	2.170E-32
<i>Fuchsia excorticata</i>	<i>Ripogonum scandens</i>	29.912	2	3.200E-07	4.740E-07
<i>Fuchsia excorticata</i>	<i>Rubus cissoides</i>	17.746	2	1.401E-04	1.718E-04
<i>Fuchsia excorticata</i>	<i>Schefflera digitata</i>	216.694	2	8.820E-48	9.310E-47
<i>Geniostoma ligustrifolium</i>	<i>Hedycarya arborea</i>	116.906	2	4.110E-26	1.320E-25
<i>Geniostoma ligustrifolium</i>	<i>Melicytus ramiflorus</i>	262.204	2	1.160E-57	1.690E-56
<i>Geniostoma ligustrifolium</i>	<i>Muehlenbeckia australis</i>	7.955	2	1.873E-02	2.022E-02
<i>Geniostoma ligustrifolium</i>	<i>Myoporum laetum</i>	12.178	2	2.268E-03	2.550E-03
<i>Geniostoma ligustrifolium</i>	<i>Myrsine australis</i>	285.206	2	1.170E-62	2.020E-61
<i>Geniostoma ligustrifolium</i>	<i>Piper excelsum</i>	173.705	2	1.910E-38	1.210E-37
<i>Geniostoma ligustrifolium</i>	<i>Pittosporum eugenioides</i>	236.755	2	3.880E-52	4.610E-51
<i>Geniostoma ligustrifolium</i>	<i>Pittosporum tenuifolium</i>	28.644	2	6.030E-07	8.550E-07
<i>Geniostoma ligustrifolium</i>	<i>Podocarpus totara</i>	4.748	2	0.093	0.097
<i>Geniostoma ligustrifolium</i>	<i>Pseudopanax arboreus</i>	403.051	2	3.010E-88	1.140E-86
<i>Geniostoma ligustrifolium</i>	<i>Ripogonum scandens</i>	29.522	2	3.880E-07	5.680E-07
<i>Geniostoma ligustrifolium</i>	<i>Rubus cissoides</i>	45.011	2	1.680E-10	2.930E-10
<i>Geniostoma ligustrifolium</i>	<i>Schefflera digitata</i>	120.463	2	6.950E-27	2.400E-26
<i>Hedycarya arborea</i>	<i>Melicytus ramiflorus</i>	62.797	2	2.310E-14	4.880E-14
<i>Hedycarya arborea</i>	<i>Muehlenbeckia australis</i>	110.000	2	1.300E-24	3.860E-24

<i>Hedycarya arborea</i>	<i>Myoporum laetum</i>	111.105	2	7.480E-25	2.260E-24
<i>Hedycarya arborea</i>	<i>Myrsine australis</i>	36.319	2	1.300E-08	2.130E-08
<i>Hedycarya arborea</i>	<i>Piper excelsum</i>	35.257	2	2.210E-08	3.560E-08
<i>Hedycarya arborea</i>	<i>Pittosporum eugenioides</i>	120.033	2	8.620E-27	2.910E-26
<i>Hedycarya arborea</i>	<i>Pittosporum tenuifolium</i>	46.259	2	9.020E-11	1.620E-10
<i>Hedycarya arborea</i>	<i>Podocarpus totara</i>	100.405	2	1.580E-22	4.100E-22
<i>Hedycarya arborea</i>	<i>Pseudopanax arboreus</i>	56.208	2	6.230E-13	1.290E-12
<i>Hedycarya arborea</i>	<i>Ripogonum scandens</i>	11.728	2	2.840E-03	3.155E-03
<i>Hedycarya arborea</i>	<i>Rubus cissoides</i>	17.612	2	1.498E-04	1.825E-04
<i>Hedycarya arborea</i>	<i>Schefflera digitata</i>	118.375	2	1.970E-26	6.460E-26
<i>Melicytus ramiflorus</i>	<i>Muehlenbeckia australis</i>	82.189	2	1.420E-18	3.180E-18
<i>Melicytus ramiflorus</i>	<i>Myoporum laetum</i>	69.186	2	9.470E-16	2.050E-15
<i>Melicytus ramiflorus</i>	<i>Myrsine australis</i>	168.741	2	2.280E-37	1.310E-36
<i>Melicytus ramiflorus</i>	<i>Piper excelsum</i>	31.776	2	1.260E-07	1.910E-07
<i>Melicytus ramiflorus</i>	<i>Pittosporum eugenioides</i>	390.528	2	1.580E-85	4.990E-84
<i>Melicytus ramiflorus</i>	<i>Pittosporum tenuifolium</i>	40.630	2	1.500E-09	2.550E-09
<i>Melicytus ramiflorus</i>	<i>Podocarpus totara</i>	61.813	2	3.780E-14	7.890E-14
<i>Melicytus ramiflorus</i>	<i>Pseudopanax arboreus</i>	12.806	2	1.657E-03	1.885E-03
<i>Melicytus ramiflorus</i>	<i>Ripogonum scandens</i>	23.323	2	8.620E-06	1.130E-05
<i>Melicytus ramiflorus</i>	<i>Rubus cissoides</i>	37.905	2	5.880E-09	9.790E-09
<i>Melicytus ramiflorus</i>	<i>Schefflera digitata</i>	376.163	2	2.080E-82	5.630E-81
<i>Muehlenbeckia australis</i>	<i>Myoporum laetum</i>	23.326	2	8.610E-06	1.130E-05
<i>Muehlenbeckia australis</i>	<i>Myrsine australis</i>	113.245	2	2.570E-25	7.990E-25
<i>Muehlenbeckia australis</i>	<i>Piper excelsum</i>	128.302	2	1.380E-28	5.040E-28
<i>Muehlenbeckia australis</i>	<i>Pittosporum eugenioides</i>	93.487	2	5.010E-21	1.200E-20
<i>Muehlenbeckia australis</i>	<i>Pittosporum tenuifolium</i>	25.133	2	3.490E-06	4.770E-06
<i>Muehlenbeckia australis</i>	<i>Podocarpus totara</i>	0.681	2	0.712	0.712
<i>Muehlenbeckia australis</i>	<i>Pseudopanax arboreus</i>	108.054	2	3.440E-24	9.900E-24
<i>Muehlenbeckia australis</i>	<i>Ripogonum scandens</i>	24.926	2	3.870E-06	5.250E-06
<i>Muehlenbeckia australis</i>	<i>Rubus cissoides</i>	47.772	2	4.230E-11	8.290E-11

<i>Muehlenbeckia australis</i>	<i>Schefflera digitata</i>	34.863	2	2.690E-08	4.220E-08
<i>Myoporum laetum</i>	<i>Myrsine australis</i>	169.180	2	1.830E-37	1.090E-36
<i>Myoporum laetum</i>	<i>Piper excelsum</i>	102.059	2	6.890E-23	1.840E-22
<i>Myoporum laetum</i>	<i>Pittosporum eugenioides</i>	197.364	2	1.390E-43	1.200E-42
<i>Myoporum laetum</i>	<i>Pittosporum tenuifolium</i>	30.497	2	2.390E-07	3.570E-07
<i>Myoporum laetum</i>	<i>Podocarpus totara</i>	23.760	2	6.930E-06	9.340E-06
<i>Myoporum laetum</i>	<i>Pseudopanax arboreus</i>	135.632	2	3.530E-30	1.370E-29
<i>Myoporum laetum</i>	<i>Ripogonum scandens</i>	20.219	2	4.070E-05	5.090E-05
<i>Myoporum laetum</i>	<i>Rubus cissoides</i>	46.729	2	7.130E-11	1.300E-10
<i>Myoporum laetum</i>	<i>Schefflera digitata</i>	87.739	2	8.870E-20	2.010E-19
<i>Myrsine australis</i>	<i>Piper excelsum</i>	138.198	2	9.790E-31	3.870E-30
<i>Myrsine australis</i>	<i>Pittosporum eugenioides</i>	293.297	2	2.050E-64	3.890E-63
<i>Myrsine australis</i>	<i>Pittosporum tenuifolium</i>	35.508	2	1.950E-08	3.160E-08
<i>Myrsine australis</i>	<i>Podocarpus totara</i>	94.521	2	2.990E-21	7.270E-21
<i>Myrsine australis</i>	<i>Pseudopanax arboreus</i>	89.397	2	3.870E-20	8.860E-20
<i>Myrsine australis</i>	<i>Ripogonum scandens</i>	1.667	2	0.434	0.439
<i>Myrsine australis</i>	<i>Rubus cissoides</i>	33.970	2	4.200E-08	6.440E-08
<i>Myrsine australis</i>	<i>Schefflera digitata</i>	260.336	2	2.940E-57	3.990E-56
<i>Piper excelsum</i>	<i>Pittosporum eugenioides</i>	273.386	2	4.310E-60	6.830E-59
<i>Piper excelsum</i>	<i>Pittosporum tenuifolium</i>	46.748	2	7.060E-11	1.300E-10
<i>Piper excelsum</i>	<i>Podocarpus totara</i>	91.979	2	1.060E-20	2.530E-20
<i>Piper excelsum</i>	<i>Pseudopanax arboreus</i>	37.593	2	6.870E-09	1.130E-08
<i>Piper excelsum</i>	<i>Ripogonum scandens</i>	34.198	2	3.750E-08	5.790E-08
<i>Piper excelsum</i>	<i>Rubus cissoides</i>	23.403	2	8.280E-06	1.100E-05
<i>Piper excelsum</i>	<i>Schefflera digitata</i>	249.154	2	7.890E-55	9.990E-54
<i>Pittosporum eugenioides</i>	<i>Pittosporum tenuifolium</i>	2.021	2	0.364	0.370
<i>Pittosporum eugenioides</i>	<i>Podocarpus totara</i>	105.620	2	1.160E-23	3.200E-23
<i>Pittosporum eugenioides</i>	<i>Pseudopanax arboreus</i>	373.986	2	6.160E-82	1.460E-80
<i>Pittosporum eugenioides</i>	<i>Ripogonum scandens</i>	13.684	2	1.068E-03	1.222E-03
<i>Pittosporum eugenioides</i>	<i>Rubus cissoides</i>	46.367	2	8.540E-11	1.550E-10

<i>Pittosporum eugenoides</i>	<i>Schefflera digitata</i>	54.006	2	1.870E-12	3.830E-12
<i>Pittosporum tenuifolium</i>	<i>Podocarpus totara</i>	29.171	2	4.630E-07	6.710E-07
<i>Pittosporum tenuifolium</i>	<i>Pseudopanax arboreus</i>	40.769	2	1.400E-09	2.400E-09
<i>Pittosporum tenuifolium</i>	<i>Ripogonum scandens</i>	16.598	2	2.488E-04	2.973E-04
<i>Pittosporum tenuifolium</i>	<i>Rubus cissoides</i>	34.914	2	2.620E-08	4.150E-08
<i>Pittosporum tenuifolium</i>	<i>Schefflera digitata</i>	6.815	2	3.312E-02	3.515E-02
<i>Podocarpus totara</i>	<i>Pseudopanax arboreus</i>	91.746	2	1.200E-20	2.800E-20
<i>Podocarpus totara</i>	<i>Ripogonum scandens</i>	25.347	2	3.130E-06	4.310E-06
<i>Podocarpus totara</i>	<i>Rubus cissoides</i>	47.489	2	4.870E-11	9.350E-11
<i>Podocarpus totara</i>	<i>Schefflera digitata</i>	46.890	2	6.580E-11	1.220E-10
<i>Pseudopanax arboreus</i>	<i>Ripogonum scandens</i>	13.932	2	9.435E-04	1.086E-03
<i>Pseudopanax arboreus</i>	<i>Rubus cissoides</i>	34.938	2	2.590E-08	4.140E-08
<i>Pseudopanax arboreus</i>	<i>Schefflera digitata</i>	415.566	2	5.770E-91	3.650E-89
<i>Ripogonum scandens</i>	<i>Rubus cissoides</i>	18.526	2	9.490E-05	1.170E-04
<i>Ripogonum scandens</i>	<i>Schefflera digitata</i>	7.771	2	0.021	0.022
<i>Rubus cissoides</i>	<i>Schefflera digitata</i>	45.251	2	1.490E-10	2.620E-10

Appendix S3. Summary of results of pairwise relationships between circular means, circular standard deviations, and visitation rates for both flower and fruit resources. The “resource” column represents the interaction type (flower or fruit), ‘Figure’ column represents the corresponding figure in the main text, ‘(y ~ x)’ represents the variables that were compared, ‘R²’, ‘F’, and ‘p’ represent the results of the model fit. The sine transformation of the circular mean in the first two rows represents the fit of a sinusoidal curve to the data to test for the mid-season peak in resource use. Values in bold represent significant results ($\alpha = 0.05$).

Resource	Figure	(y ~ x)	R ²	F	p
Flower	2a	Circular standard deviation ~ sin(Circular mean)	-0.124	0.008	0.932
Fruit	2b	Circular standard deviation ~ sin(Circular mean)	0.203	5.832	0.027
Flower	2c	Circular mean ~ visitation rate	0.186	3.056	0.119
Fruit	2d	Circular mean ~ visitation rate	1.385	0.020	0.255
Flower	2e	Circular standard deviation ~ visitation rate	0.477	9.197	0.016
Fruit	2f	Circular standard deviation ~ Visitation rate	-0.015	0.722	0.407

Appendix S4. Sampling accumulation curves and estimates of sampling completeness for each calendar month.

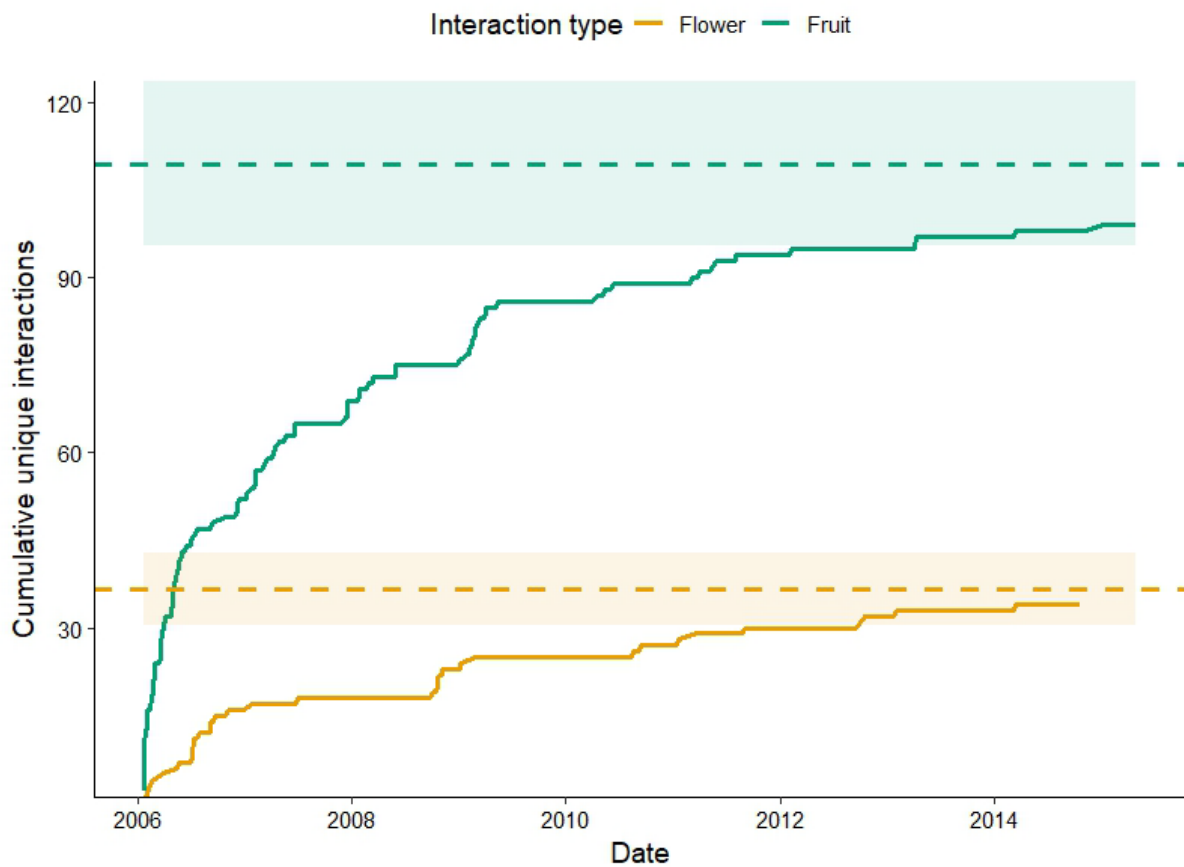


Figure S4.1 Sampling accumulation curves showing cumulative unique bird-plant interactions for flower and fruit visits separately, sampled from Zealandia ecosanctuary, Wellington, New Zealand, between 2006 and 2015. Dashed lines represent Chao1 asymptotic richness estimates, and coloured bands represent 95% confidence intervals.

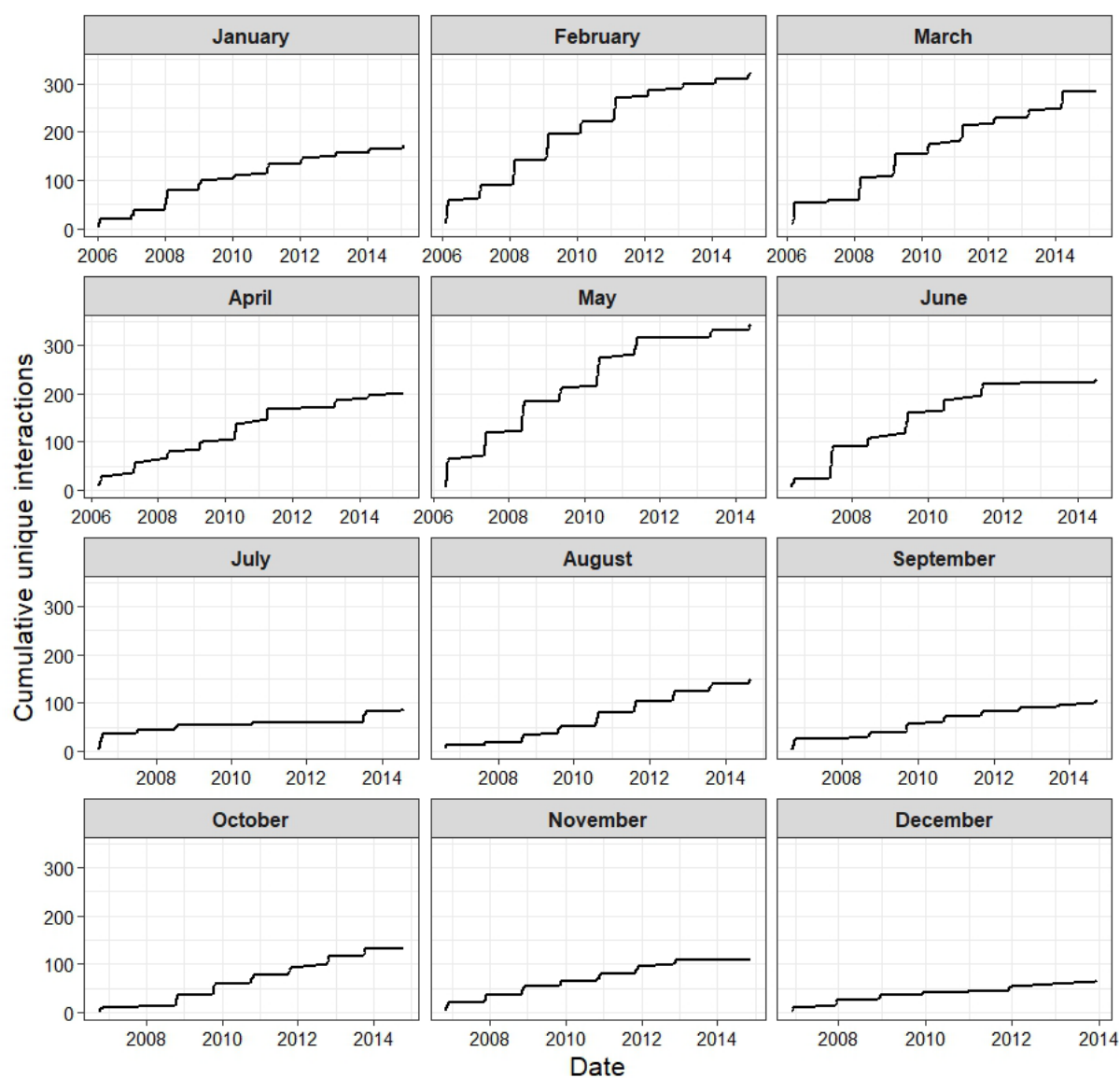


Figure S4.2 Sampling accumulation curves of cumulative unique bird-plant interactions (flower and fruit visits combined) for each calendar month, recorded in Zealandia ecosanctuary, Wellington, New Zealand, between 2006 and 2015.

Table S4.1 Summary of results of Chao1 asymptotic richness estimates of sampling completeness of bird-plant interactions for each calendar month recorded in Zealandia ecosanctuary, Wellington, New Zealand, between 2006 and 2015. Completeness represents the ratio between observed and estimated interactions in percentage. Higher percentage of sampling completeness indicates higher likelihood of having recorded all possible interactions. Thus, the sampling effort in August captured most of the estimated species interactions (94% sampling completeness), while some interactions were likely missed in November (33% sampling completeness).

Month	Observed interactions	Chao1 estimates	Standard error	Completeness (%)
January	52	61.5	6.6	84.5
February	67	86.3	10.9	77.7
March	61	84.1	13.1	72.5
April	45	60.0	10.3	75.0
May	61	82.9	13.9	73.6
June	49	66.0	11.0	74.2
July	24	30.0	5.4	80.0
August	24	25.4	1.9	94.4
September	17	24.0	7.1	70.8
October	21	30.0	8.0	70.0
November	18	54.0	25.6	33.3
December	16	23.0	7.1	69.6