

Appendix A: Detection Function Modeling

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Appendix A Table 1. Model parameters and model-selection results for forest birds of the 2011 and 2018 National Park of American Samoa survey. Within each species analysis, models were sorted by differences in second-order Akaike's information criterion corrected for small sample size ($\Delta AICc$) between each candidate model and the model with the lowest $AICc$ value. Key models examined included half-normal (HN) and hazard-rate (HR) key detection functions and with cosine (Cos), Hermite polynomial (H-poly), and simple polynomial (S-poly) series adjustments. Covariates were incorporated with the most parsimonious key model to improve model precision. Covariates included the categorical variables cloud cover (Cloud), amount of rain (Rain), Beaufort wind scale (Wind), Beaufort gust scale (Gust), observer (Obs), survey year (Yr), and survey panel (Panel). Time of day (MinSS) was evaluated as a continuous variable. The number of estimated parameters (Num params), and negative log-likelihood (-LogL) are presented. The Akaike model weight ($AICc$ weights) is the likelihood that each model is the best of the converged models evaluated for each species.

Model	Series adjustment	Covariate	Num params	-LogL	AICc	Delta AICc	AICc weights
Blue-crowned Lorikeet¹ (<i>Vini australis</i>)							
HR	Key	None	2	182.72	169.56	0	1
HN	Key	None	1	185.18	372.4	202.84	8.99E-45
HR	Key	MinSS	3	183.25	372.72	203.16	7.66E-45
HR	Key	Obs	3	183.25	372.72	203.16	7.66E-45
HR	Key	Yr	3	183.25	372.72	203.16	7.66E-45
HR	Key	Rain	3	183.25	372.72	203.16	7.66E-45
HR	Key	Panel	3	183.25	372.72	203.16	7.66E-45
HR	Key	Wind	5	183.25	377.06	207.5	8.75E-46
Crimson-crowned Fruit Dove² (<i>Ptilinopus porphyraceus</i>)							
HR	Key	Obs	3	1895.19	3796.45	0	1
HR	Key	Gust	6	1895.09	3802.38	5.93	0.05156
HR	Key	Yr	3	1906.86	3819.78	23.33	8.59E-06
HR	Key	Wind	5	1915.49	3841.13	44.68	1.99E-10
HR	Key	None	2	1922.09	3848.21	51.76	5.76E-12
HR	Key	Panel	3	1922.08	3850.21	53.76	2.12E-12
HR	Key	MinSS	3	1922.08	3850.22	53.77	2.11E-12

HR	Key	Cloud	12	1913.17	3851.08	54.63	1.37E-12
HN	Key	None	1	1926	3854	57.55	3.19E-13

Pacific Imperial Pigeon³
(*Ducula pacifica*)

HR	Key	Cloud	12	1180.41	2386	0	1
HR	Key	Gust	6	1187	2386.31	0.31	0.856415
HR	Key	None	2	1191.8	2387.64	1.64	0.440432
HR	Key	Rain	4	1190.82	2389.79	3.79	0.150318
HR	Key	Panel	3	1192.83	2391.75	5.75	0.056416
HR	Key	MinSS	3	1192.83	2391.75	5.75	0.056416
HR	Key	Obs	3	1192.83	2391.75	5.75	0.056416
HR	Key	Yr	3	1192.83	2391.75	5.75	0.056416
HR	Key	Wind	4	1192.83	2393.81	7.81	0.020141
HN	Key	None	1	1198.27	2398.55	12.55	0.001883

Pacific Kingfisher⁴
(*Todiramphus sacer*)

HN	Key	Yr	2	438.74	881.61	0	0.520125
HN	Key	Wind	4	437.89	884.21	2.6	0.141751
HN	Key	None	1	441.33	884.69	3.08	0.111505
HN	Key	Obs	2	440.49	885.1	3.49	0.090837
HN	Key	MinSS	2	440.87	885.87	4.26	0.06181
HN	Key	Panel	2	441.23	886.59	4.98	0.043124
HR	Key	None	2	441.56	887.26	5.65	0.030848

Polynesian Starling⁵
(*Aplonis tabuensis*)

HN	Key	None	1	866.5	1735.02	0	1
HR	Key	None	2	866.88	1737.81	2.79	0.247833
HR	Key	Obs	3	867.53	1741.16	6.14	0.046421
HR	Key	Yr	3	867.61	1741.31	6.29	0.043067
HR	Key	Panel	3	867.7	1741.49	6.47	0.03936
HR	Key	MinSS	3	867.7	1741.5	6.48	0.039164
HR	Key	Wind	5	867.42	1745.08	10.06	0.006539
HR	Key	Rain	3	867.67	1745.59	10.57	0.005067
HR	Key	Cloud	12	862.16	1749.64	14.62	0.000669

Polynesian Wattled Honeyeater⁶
(*Foulehaio carunculatus*)

HR	Key	Yr	3	6250.79	12507.6	0	1
HR	Key	Gust	6	6250.21	12512.48	4.88	0.087161
HR	Key	None	2	6256.15	12516.32	8.72	0.012778
HR	Key	Rain	5	6255.72	12521.48	13.88	0.000968
HR	Key	Cloud	12	6251.43	12527.05	19.45	5.98E-05

HR	Key	MinSS	3	6261.9	12529.81	22.21	1.50E-05
HN	Key	None	1	6264.33	12530.67	23.07	9.78E-06
HR	Key	Panel	3	6263.25	12532.52	24.92	3.88E-06
HR	Key	Obs	3	6283.4	12572.8	65.2	6.95E-15
HR	Key	Wind	5	6282.43	12574.9	67.3	2.43E-15

Samoan Starling⁷
(*Aplonis atrifusca*)

HR	Key	Yr	2	2179.4	4362.81	0	1
HR	Key	Gust	5	2182.82	4375.74	12.93	0.001557
HR	Key	Obs	2	2193.9	4391.83	29.02	4.99E-07
HR	Key	Wind	4	2193.7	4395.47	32.66	8.09E-08
HR	Key	Cloud	11	2187.03	4396.53	33.72	4.76E-08
HR	Key	None	2	2196.49	4396.99	34.18	3.78E-08
HN	Key	None	1	2197.85	4397.72	34.91	2.63E-08
HR	Key	MinSS	2	2197.14	4398.3	35.49	1.97E-08
HR	Key	Panel	2	2197.61	4399.25	36.44	1.22E-08

¹ Models HN Cos, HN H-poly, HR Cos, HR S-poly, HR Cloud, and HR Gust failed to converge.

² Models HN Cos, HN H-poly, HR Cos, HR S-poly, and HR Rain failed to converge.

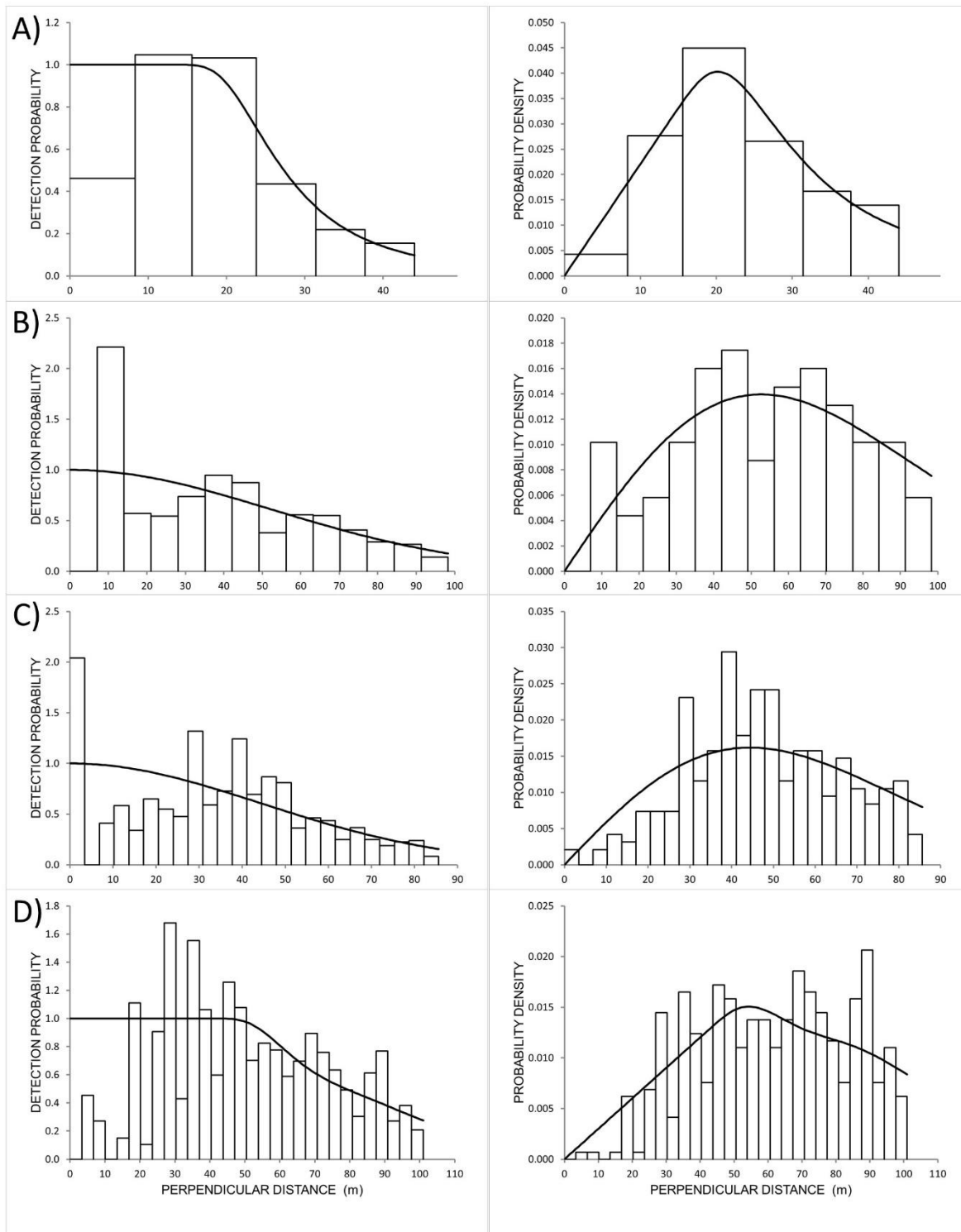
³ Models HN Cos, HN H-poly, HR Cos, and HR S-poly failed to converge.

⁴ Key model was selected for models HN Cos, HN H-poly, and HR Cos, and models HR S-poly, HN Cloud, HN Rain, and HN Gust failed to converge.

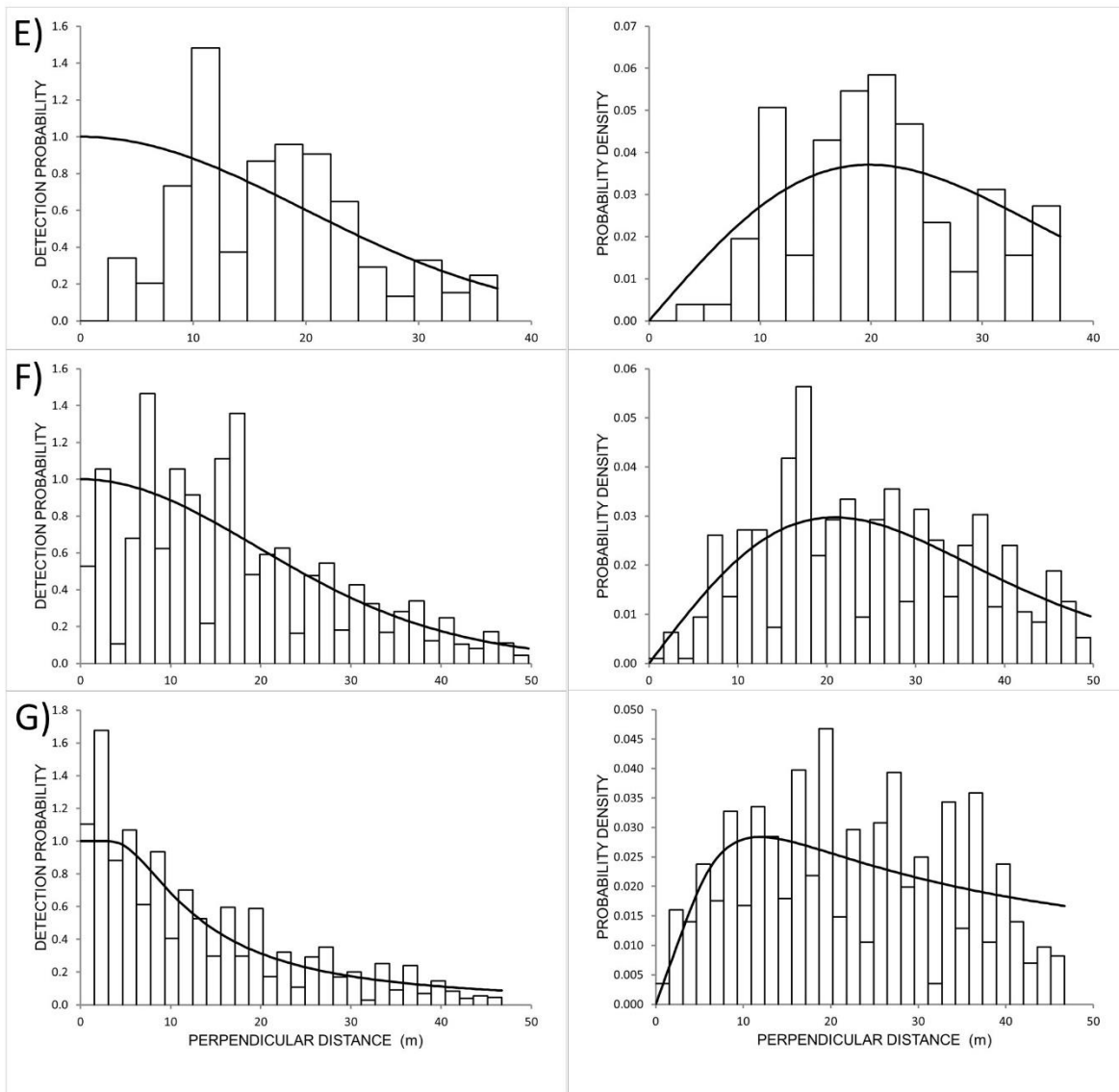
⁵ Key model was selected for models HN Cos, HN H-poly, HR Cos, and HR S-poly, and model HR Gust failed to converge.

⁶ Models HN Cos, HN H-poly, HR Cos, and HR S-poly failed to converge.

⁷ Key model was selected for models HN Cos, HR Cos, and HR S-poly, and models HN H-poly and HR Gust failed to converge.



Appendix A Figure 1. Detection probability and probability density from best-fit models used to estimate density for (A) Blue-crowned Lorikeet, (B) Crimson-crowned Fruit Dove, (C) Pacific Imperial Pigeon, (D) Pacific Kingfisher, (E) Polynesian Starling, (F) Polynesian Wattled Honeyeater, and (G) Samoan Starling.



Appendix A Figure 1. Continued.