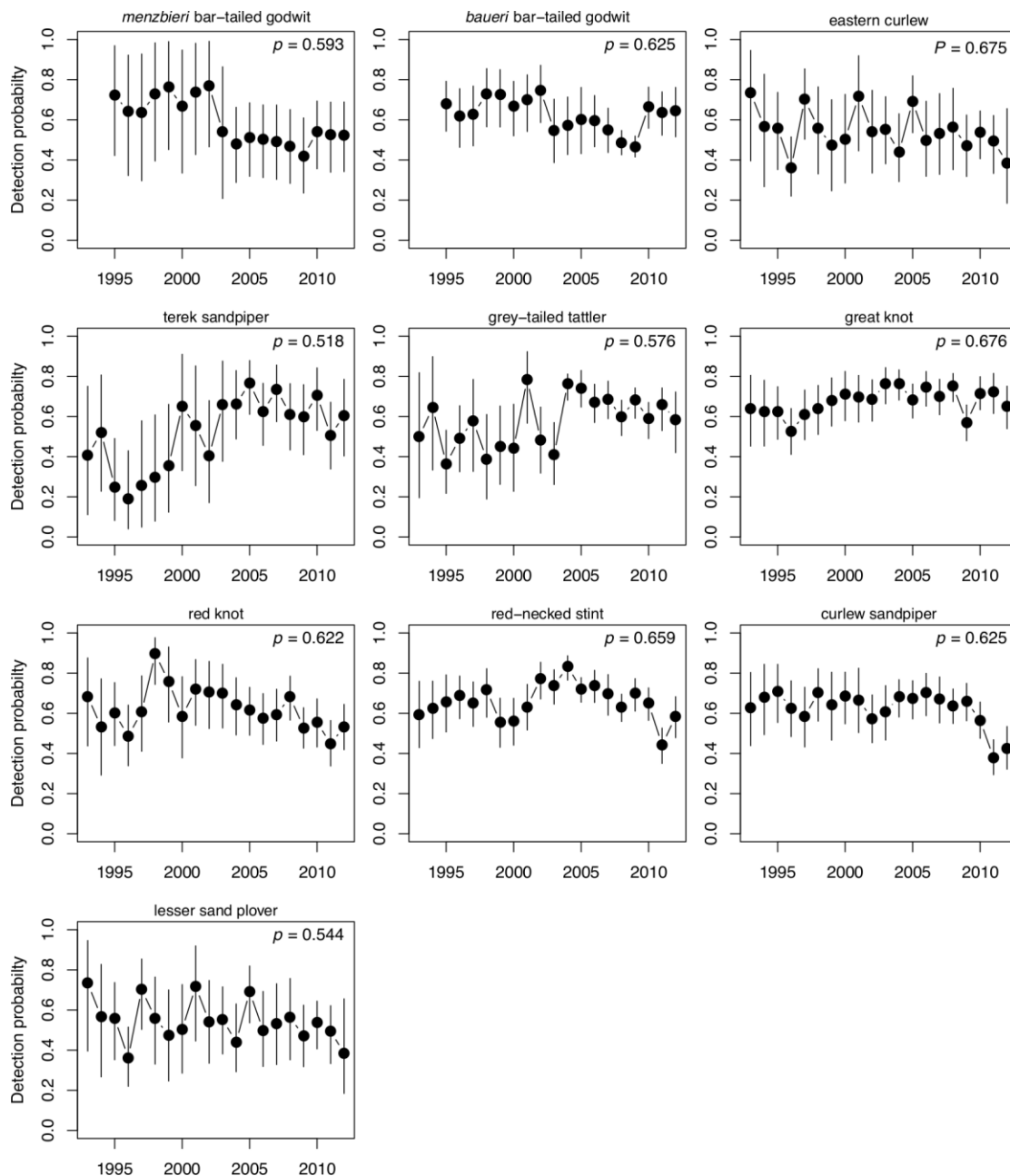
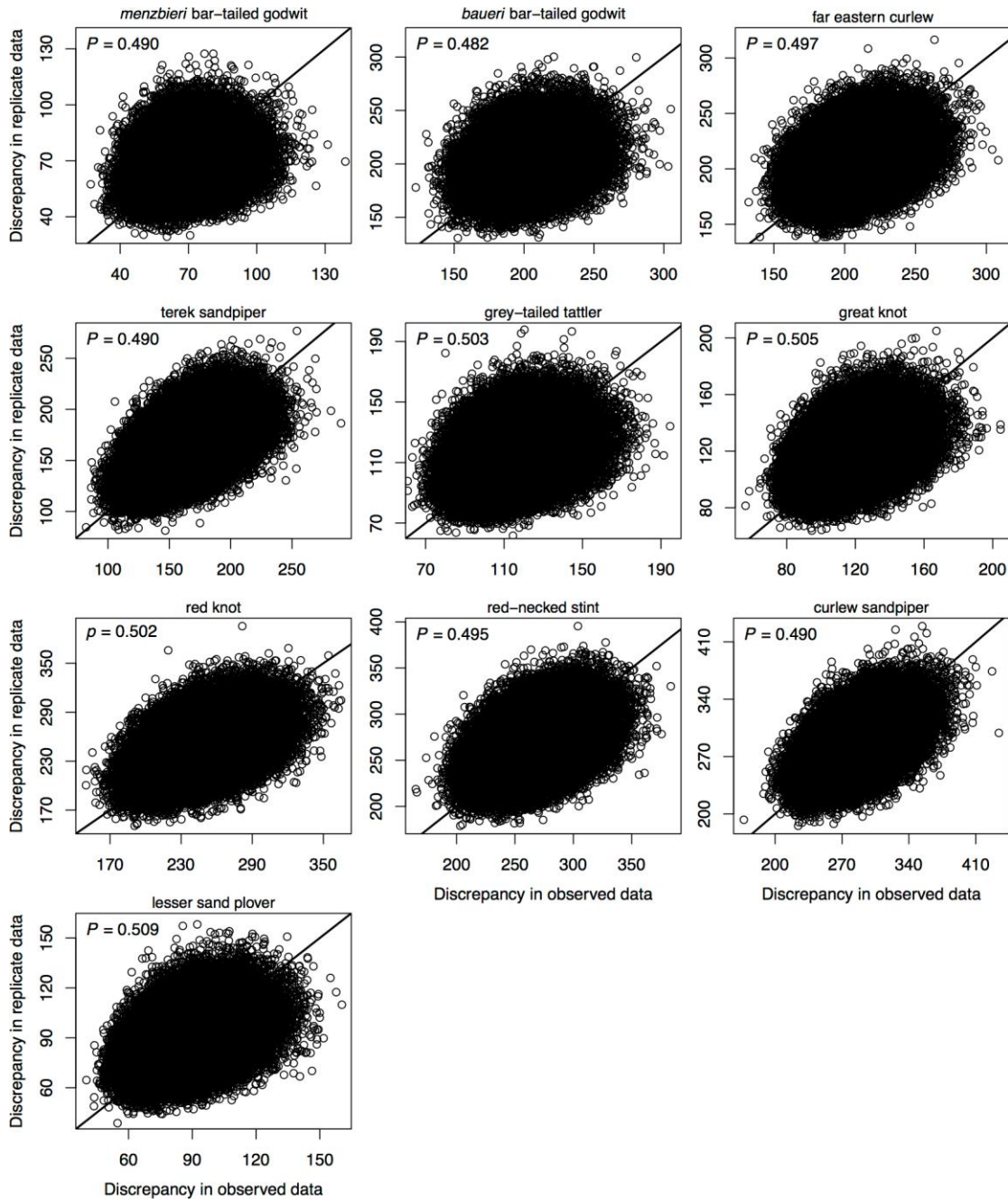




Supplementary Figure 1 | Detection probabilities from Bayesian N-mixture models of abundance from 1993-2012 for 10 EAAF migratory shorebird taxa. Points show posterior mean estimates of detection probability for each year of the time series. Error bars represent 95 % credible intervals (CRI) around annual detection probability. The mean detection probability for the time series (p) appears in the upper right of each panel.



Supplementary Figure 2 | Posterior predictive checks for Bayesian N-mixture models of abundance from 1993-2012 for 10 EAAF shorebird taxa. Points represent the relationship between the discrepancies in the observed data and the discrepancies in replicate data simulated from the posterior distribution of 100,000 model iterations. Discrepancy is a chi-squared goodness of fit statistic. Solid lines show the 1:1 relationship in discrepancy between observed and replicated data. Bayesian P -values (P), the proportion of model iterations where discrepancies in the observed data exceed those of the replicate data, appear in the upper left of each panel. P -values should be near 0.50 when model fit is adequate.

Supplementary Table 1 | Spatial and temporal distribution of count data used to estimate abundance and population trends from 1993-2012 for 10 EAAF migratory shorebird taxa.

Site	Node	Months counted	Roosts counted	Taxon									
				menziesi/bar-tailed godwit	baueri/bar-tailed godwit	far eastern curlew	Terek sandpiper	gray-tailed tattler	great knot	red knot	red-necked stint	curlew sandpiper	lesser sand plover
Albany Harbours	1	Jan-Mar	1						•	•	•		
Boucat Bay	1	Mar	NA						•				
Bush Point	1	Oct-Dec	1	•		•	•	•	•	•	•	•	
Chambers Bay	1	Dec	NA				•						
East Alligator Creek	1	Dec	NA				•						
Eighty Mile Beach	1	Oct-Dec	12	•		•	•	•	•	•	•	•	
Elcho Island	1	Nov-Dec	NA	•									
Fog Bay	1	Nov-Dec	NA				•		•				
Millingimbi Coast	1	Mar	NA	•			•						
Lake MacLeod	1	Sep-Nov, Jan, Mar	NA							•	•	•	
North Darwin	1	Nov-Feb	NA						•	•			•
Roebuck Bay	1	Oct-Dec	15	•		•	•	•	•	•	•	•	
Botany Bay	2	Nov-Feb	12			•		•			•	•	
Cairns Area	2	Jan-Feb	6			•		•			•	•	•
Great Sandy Strait	2	Jan-Feb	29		•	•	•	•			•	•	•
Hunter Estuary	2	Jan-Feb	15		•	•					•	•	•
Mackay	2	Nov-Feb	18			•	•	•	•		•	•	•
Moreton Bay	2	Jan-Feb	37		•	•	•	•	•	•	•	•	•
Swan Bay & Mud Islands	2	Jan-Feb	9			•			•	•	•	•	•
Townsville	2	Nov-Feb	1			•		•	•		•	•	•
Cape Portland	3	Nov-Feb	2							•	•	•	
Coorong	3	Nov-Feb	3								•	•	
Corner Inlet	3	Jan-Feb	27		•	•			•	•	•	•	
George Town	3	Nov-Feb	1			•					•	•	
Gulf of St. Vincent	3	Nov-Feb	12							•	•	•	•
Lake Connewarre	3	Nov-Feb	6			•					•	•	
Laverton / Altona	3	Jan-Feb	7								•	•	
Moolap Saltworks	3	Jan-Feb	1								•	•	
Robbins Passage	3	Jan-Feb	10		•	•				•	•	•	
Southeast Tasmania	3	Jan-Feb	1			•					•	•	
Werribee / Avalon	3	Jan-Feb	1			•					•	•	
Western Port Bay	3	Nov-Feb	15			•				•	•	•	
Farewell Spit	4	Nov, Feb	NA		•					•			
Firth of Thames	4	Nov, Feb	NA		•					•			
Kaipara Harbour	4	Nov, Feb	NA		•					•			
Kawhia Harbour	4	Nov, Feb	NA		•								
Manukau Harbour	4	Nov, Feb	NA		•					•			
Ohiwa Harbour	4	Nov	NA		•								
Parengarenga Harbour	4	Nov, Feb	NA		•					•			
Rangau Harbour	4	Nov, Feb	NA		•					•			
Tasman Bay	4	Nov, Feb	NA		•								
Tauranga Harbour	4	Nov, Mar	NA		•								
Whangarei Harbour	4	Nov, Feb	NA		•					•			

A list of key contributors to the collection and management of these data is in the Acknowledgements and in the Supplementary Note 1.

Supplementary Table 2 | Population trend estimates and 95%credible intervals (CRI) from 1993-2012 for 8 EAAF migratory shorebird taxa across four non-breeding population nodes in Australia and New Zealand.

Taxon	Node			
	north Western Australia	Queensland	southeastern Australia	New Zealand
far eastern curlew	-0.023 (-0.065, 0.020)	-0.052 (-0.069, -0.035)	-0.067 (-0.084, -0.061)	–
curlew sandpiper	-0.019 (-0.088, 0.059)	-0.075 (-0.098, -0.053)	-0.028 (-0.113, -0.052)	–
great knot	-0.057 (-0.096, -0.020)	-0.035 (-0.064, -0.004)	–	–
red knot	-0.044 (-0.095, 0.006)	–	-0.041 (-0.073, -0.007)	-0.042 (-0.069, -0.015)
<i>baueri</i> bar-tailed godwit	–	–	-0.010 (-0.025, 0.004)	-0.015 (-0.024, -0.005)
Terek sandpiper	-0.058 (-0.118, -0.001)	0.006 (-0.043, 0.053)	–	–
red-necked stint	0.033 (-0.025, 0.086)	-0.013 (-0.030, 0.004)	0.018 (-0.010, 0.045)	–
grey-tailed tattler	0.004 (-0.067, 0.072)	0.010 (-0.024, 0.042)	–	–

Boldface estimates indicate credibly declining populations.

Supplementary Table 3 | Pairwise odds ratios and 95% credible intervals (CRI) comparing population trends among non-breeding nodes for 8 EAAF shorebird taxa found on multiple nodes.

Taxon	Node comparison				
	1v 2	1v 3	1v 4	2v 3	3v 4
far eastern curlew	1.03 (0.99, 1.08)	1.04 (1.00, 1.09)	–	1.01 (0.99, 1.04)	–
curlew sandpiper	1.06 (1.00, 1.14)	1.05 (1.00, 1.13)	–	1.01 (0.98, 1.04)	–
great knot	1.03 (0.98, 1.07)	–	–	–	–
red knot	–	1.00 (0.94, 1.06)	1.00 (0.95, 1.05)	–	1.00 (0.96, 1.04)
<i>baueri</i> bar-tailed godwit	–	–	–	–	1.01 (0.99, 1.02)
Terek sandpiper	1.06 (1.00, 1.15)	–	–	–	–
red-necked stint	1.01 (0.99, 1.07)	1.05 (0.99, 1.10)	–	1.04 (1.00, 1.07)	–
grey-tailed tattler	1.00 (0.93, 1.08)	–	–	–	–

Lesser sand plover and the *menzbieri* subspecies of bar-tailed godwit were not included in these analyses because they occurred on only one node.

Supplementary Note 1 | List of key contributors to the shorebird datasets used in this paper.

Organizations.

Albany Bird Club, Atlas of Australian Birds, Broome Bird Observatory, Esperance Bird Observers Club, Eyre Bird Observatory, Global Flyway Network, New South Wales Wader Study Group, Sunraysia BOCA, Western Australia Wader Study Group, Shorebirds 2020 program.

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