

SUPPLEMENTARY INFORMATION

McQueen et al.

Thermal adaptation best explains Bergmann's and Allen's Rules across ecologically diverse shorebirds

Table S1. List of shorebird species included in the study.

Common name	Scientific name
Curlew Sandpiper	<i>Calidris ferruginea</i>
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>
Red-necked Stint	<i>Calidris ruficollis</i>
Red Knot	<i>Calidris canutus</i>
Great Knot	<i>Calidris tenuirostris</i>
Sanderling	<i>Calidris alba</i>
Bar-tailed Godwit	<i>Limosa lapponica</i>
Far Eastern Curlew	<i>Numenius madagascariensis</i>
Whimbrel	<i>Numenius phaeopus</i>
Ruddy Turnstone	<i>Arenaria interpres</i>
Common Greenshank	<i>Tringa nebularia</i>
Terek Sandpiper	<i>Xenus cinereus</i>
Grey-tailed Tattler	<i>Heteroscelus brevipes</i>
Pacific Golden Plover	<i>Pluvialis fulva</i>
Grey Plover	<i>Pluvialis squatarola</i>
Lesser Sand Plover	<i>Charadrius mongolus</i>
Greater Sand Plover	<i>Charadrius leschenaultii</i>
Red-kneed Dotterel	<i>Erythronyx cinctus</i>
Red-capped Plover	<i>Charadrius ruficapillus</i>
Masked Lapwing	<i>Vanellus miles</i>
Common Tern	<i>Sterna hirundo</i>
Whiskered Tern	<i>Chlidonias hybrida</i>
Little Tern	<i>Sterna albifrons</i>
Caspian Tern	<i>Sterna caspia</i>
Great Crested Tern	<i>Sterna bergii</i>
Black-winged Stilt	<i>Himantopus himantopus</i>
Banded Stilt	<i>Cladorhynchus leucocephalus</i>
Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>
Pied Oystercatcher	<i>Haematopus longirostris</i>
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>

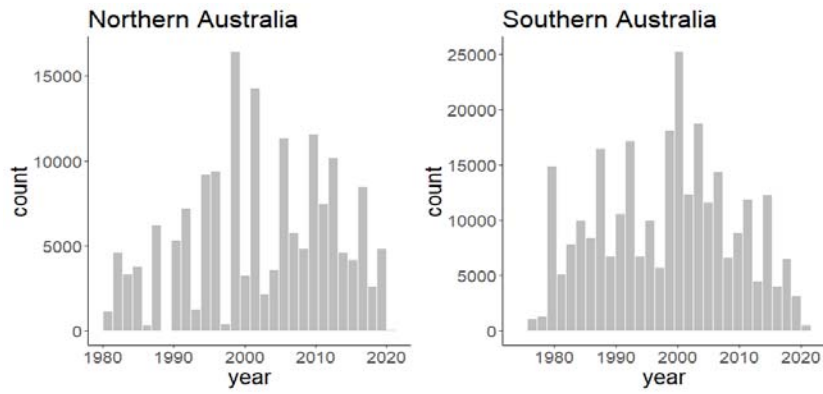


Figure S1. Sampling effort in northern Australia and southern Australia over time, showing samples collected are roughly consistent across years at the two locations.

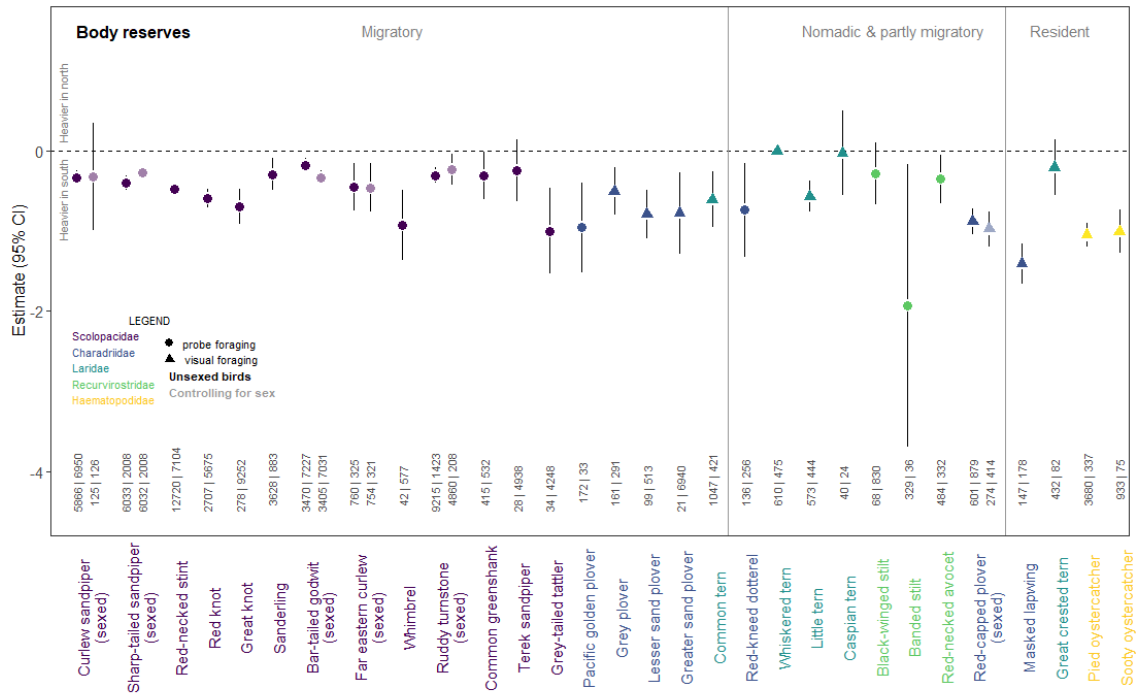


Figure S2. Estimates of energetic resources (assessed as differences in log-transformed mass while controlling for wing length) in northern populations relative to southern populations of 30 shorebird species. Points above the line indicate greater energetic resources in northern populations. Log-transformed mass was scaled and centred, so effect sizes are comparable across species. Points represent the estimates for effect of location derived from linear mixed models. Error bars show 95% confidence intervals. Effects are shown for species with different migration behaviours (migratory, nomadic/partially migratory, and residential) and foraging methods (probe and visual). Estimates controlling for sex differences in morphology are shown for species where individuals could be reliably sexed. Sample sizes are shown for birds caught at different locations (southern observations | northern observations).

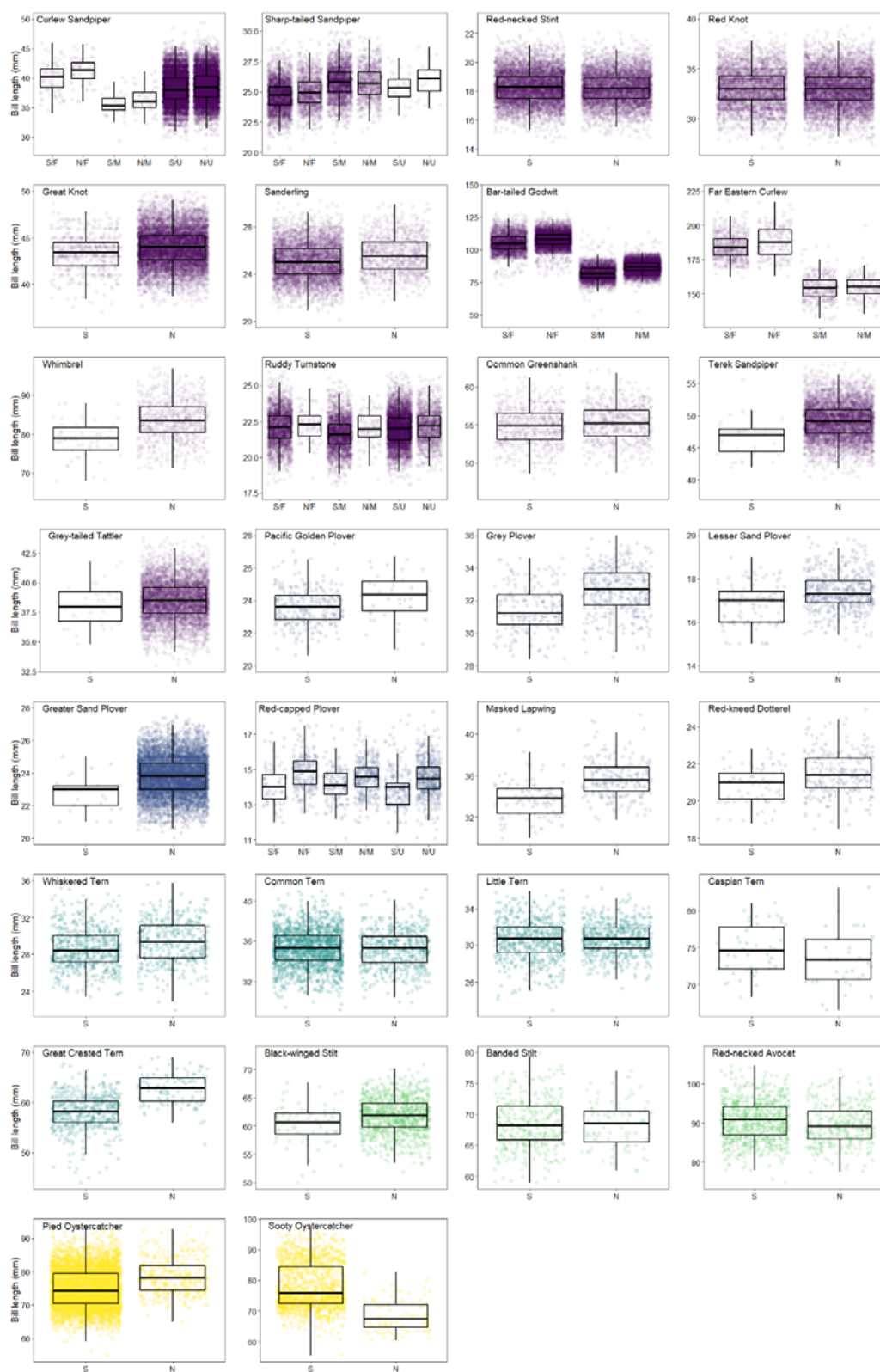


Figure S3. Boxplots showing median (centre), interquartile range (box), and maxima/minima minus outliers (whiskers) of bill length (mm) for shorebird populations in southern (S) and northern (N) Australia. Data are shown for 30 species. Where possible, data are shown separately according to sexes (F = female, M = male, U = unknown). Colours show representatives of different families (as indicated in Figure S1).

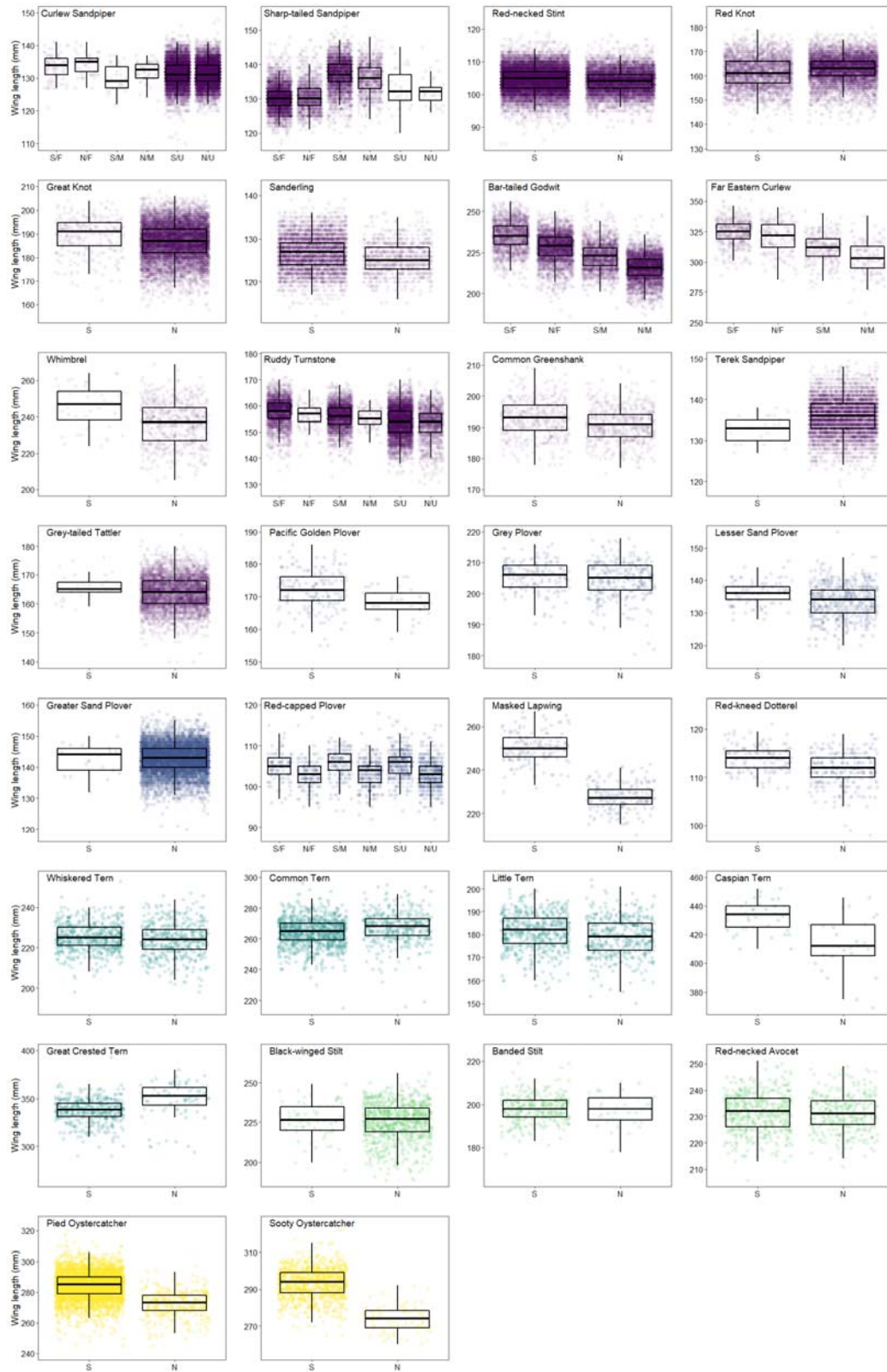


Figure S4. Boxplots showing median (centre), interquartile range (box) and maxima/minima minus outliers (whiskers) of wing length (mm) for shorebird populations in southern (S) and northern (N) Australia. Data are shown for 30 species. Where possible, data are shown separately according to sexes (F = female, M = male, U = unknown). Colours show representatives of different families (as indicated in Figure S1).

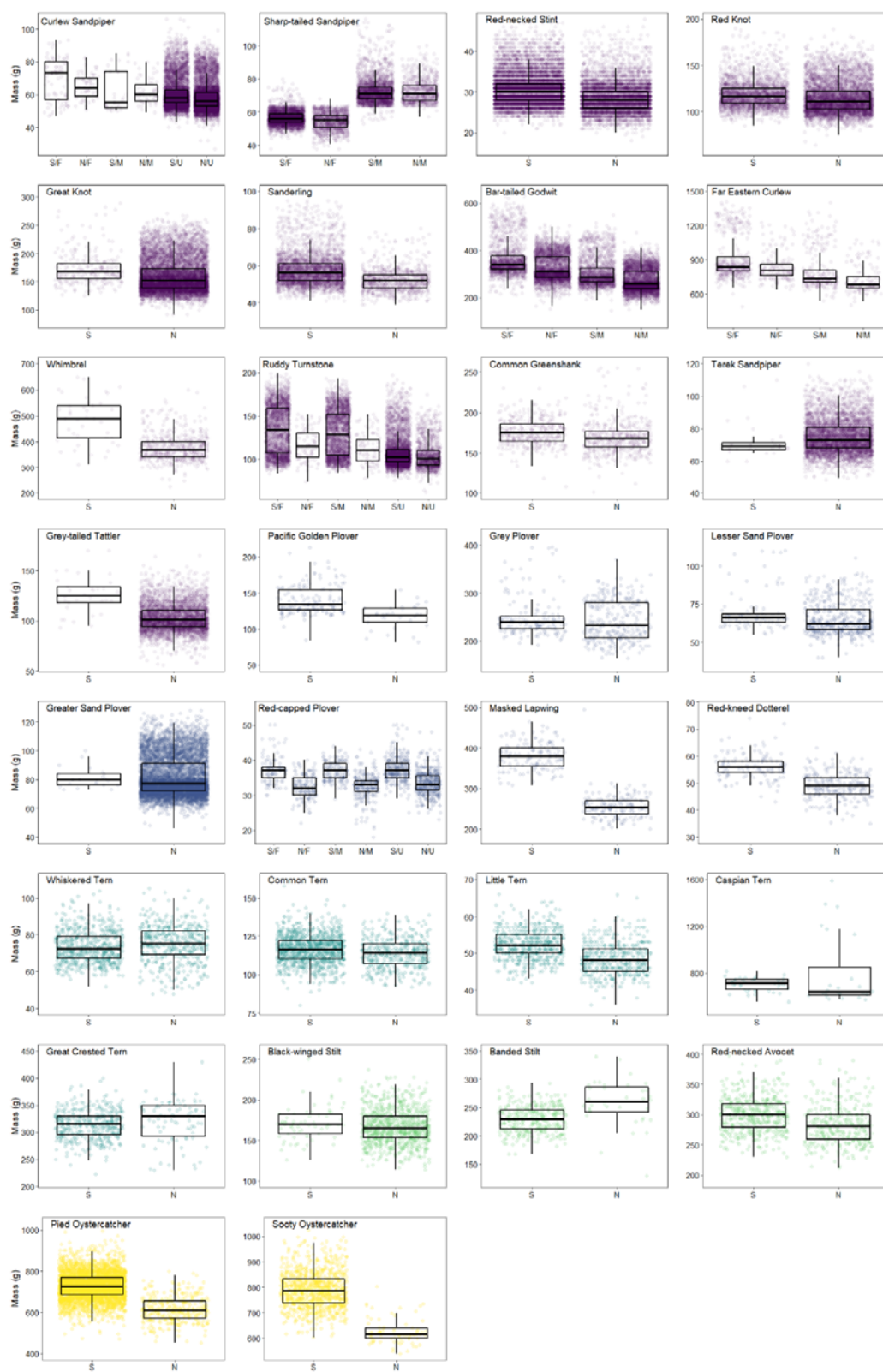


Figure S5. Boxplots showing median (centre), interquartile range (box) and maxima/minima minus outliers (whiskers) of mass (g) for shorebird populations in southern (S) and northern (N) Australia. Data are shown for 30 species. Where possible, data are shown separately according to sexes (F = female, M = male, U = unknown). Colours show representatives of different families (as indicated in Figure S1).

Table S2. Phylogenetic generalised linear mixed model output for predictors of relative bill length of Australian shorebirds. Bill length was log-10 transformed to improve normality; differences in bill length are shown controlling for wing length (as an indicator of body size). Effects are expressed relative to adult, migratory shorebirds in southern Australia, which use their bills to probe for prey, and were sampled during summer-spring or the wet season. Sample size is N = 99,443 observations from 30 shorebird species. Three model outputs show the (i) model without interactions, referenced in the main results, and models testing for an interaction between (ii) location and migration behaviour and (iii) location and foraging method.

Model showing main results				
Random effects		Variance		
Species	0.013			
Phylogeny	0.004			
Residual	0.001			
Fixed effects		Estimate	Lower CI	Upper CI
Intercept	0.017	-0.074	0.107	
Location (north)	0.008	0.007	0.008	
Log ₁₀ wing length	0.647	0.636	0.659	
Age (juvenile)	0.007	0.006	0.007	
Season (winter/dry)	-0.003	-0.003	-0.002	
Year	1 × 10 ⁻⁵	-1 × 10 ⁻⁵	3 × 10 ⁻⁵	
Migration (nomadic)	0.044	-0.129	0.217	
Migration (resident)	0.061	-0.117	0.238	
Foraging method (visual)	-0.121	-0.317	0.078	
Model including location*migration interaction				
Random effects		Variance		
Species	0.012			
Phylogeny	0.004			
Residual	0.001			
Fixed effects		Estimate	Lower CI	Upper CI
Intercept	0.016	-0.077	0.108	
Location (north)	0.007	0.006	0.007	
Migration (nomadic)	0.050	-0.124	0.225	
Migration (resident)	0.065	-0.119	0.247	
Log ₁₀ wing length	0.652	0.640	0.664	
Age (juvenile)	0.007	0.006	0.007	
Season (winter/dry)	-0.003	-0.003	-0.002	
Year	1 × 10 ⁻⁵	-1 × 10 ⁻⁵	3 × 10 ⁻⁵	
Foraging method (visual)	-0.127	-0.325	0.073	
Location (north) : migration (nomadic)	-1 × 10 ⁻⁴	-0.002	0.002	
Location (north) : migration (resident)	0.016	0.014	0.018	
Model including location*foraging interaction				
Random effects		Variance		
Species	0.012			
Phylogeny	0.004			
Residual	0.001			
Fixed effects		Estimate	Lower CI	Upper CI
Intercept	0.015	-0.078	0.107	
Location (north)	0.007	0.007	0.008	
Foraging method (visual)	-0.128	-0.326	0.072	
Log ₁₀ wing length	0.647	0.635	0.659	
Age (juvenile)	0.007	0.006	0.007	
Season (winter/dry)	-0.003	-0.003	-0.002	
Year	1 × 10 ⁻⁵	-1 × 10 ⁻⁵	3 × 10 ⁻⁵	
Migration (nomadic)	0.051	-0.123	0.226	
Migration (resident)	0.071	-0.112	0.254	
Location (north) : foraging method (visual)	0.005	0.003	0.006	

Table S3. Phylogenetic generalised linear mixed model output for predictors of absolute bill length of Australian shorebirds. Bill length was log-10 transformed to improve normality; differences in bill length shown are independent of differences in body size (i.e. without controlling for wing length, compare with Table S1 above). Effects are expressed relative to adult, migratory shorebirds in southern Australia, which use their bills to probe for prey, and were sampled during summer-spring or the wet season. Sample size is N = 99,443 observations from 30 shorebird species.

Random effects	Variance		
Species	0.024		
Phylogeny	0.011		
Residual	0.001		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.051	-0.079	0.182
Location (north)	0.005	0.004	0.005
Age (juvenile)	-0.001	-0.002	-0.001
Season (winter/dry)	-0.001	-0.001	-0.001
Year	2×10^{-5}	-2×10^{-6}	4×10^{-5}
Migration (nomadic)	0.037	-0.217	0.291
Migration (resident)	0.109	-0.152	0.368
Foraging method (visual)	-0.099	-0.381	0.181

Table S4. Phylogenetic generalised linear mixed model output for predictors of wing length of Australian shorebirds. Wing length was log-10 transformed to improve normality. Effects are expressed relative to adult, migratory shorebirds in southern Australia, sampled during summer-spring or the wet season. Sample size is N = 119,403 observations from 30 shorebird species. Model outputs show the model without interactions, referenced in the main results, and a model testing for an interaction between location and migration behaviour.

Model showing main results			
Random effects	Variance		
Species	0.009		
Phylogeny	0.003		
Residual	2×10^{-4}		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.077	0.023	0.130
Location (north)	-0.005	-0.005	-0.004
Age (juvenile)	-0.012	-0.013	-0.012
Season (winter/dry)	0.003	0.003	0.003
Year	-2×10^{-5}	-3×10^{-5}	1×10^{-5}
Migration (nomadic)	0.001	-0.148	0.150
Migration (resident)	0.085	-0.070	0.241
Model including location*migration interaction			
Random effects	Variance		
Species	3×10^{-4}		
Phylogeny	0.005		
Residual	2×10^{-4}		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.079	0.023	0.134
Location (north)	-0.004	-0.004	-0.004
Migration (nomadic)	-0.005	-0.161	0.151
Migration (resident)	0.083	-0.080	0.246
Age (juvenile)	-0.012	-0.013	-0.012
Season (winter/dry)	0.003	0.003	0.003
Year	-2×10^{-5}	-3×10^{-5}	1×10^{-5}
Location (north) : migration (nomadic)	5×10^{-4}	-5×10^{-4}	0.002
Location (north) : migration (resident)	-0.010	-0.011	-0.009

Table S5. Phylogenetic generalised linear mixed model output for predictors of body mass of Australian shorebirds. Mass was log-10 transformed to improve normality. Effects are expressed relative to adult, migratory shorebirds in southern Australia, sampled during summer-spring or the wet season. Sample size is N = 202,647 observations from 30 shorebird species. Model outputs show the model without interactions, referenced in the main results, and a model testing for an interaction between location and migration behaviour.

Model showing main results			
Random effects	Variance		
Species	0.043		
Phylogeny	0.061		
Residual	0.003		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.185	0.027	0.344
Location (north)	-0.030	-0.031	-0.029
Age (juvenile)	-0.052	-0.052	-0.051
Season (winter/dry)	0.046	0.046	0.047
Year	-1×10^{-4}	-1×10^{-4}	-1×10^{-4}
Migration (nomadic)	-0.008	-0.451	0.435
Migration (resident)	0.274	-0.194	0.741
Model including location*migration interaction			
Random effects	Variance		
Species	0.042		
Phylogeny	0.067		
Residual	0.003		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.186	0.031	0.343
Location (north)	-0.029	-0.030	-0.029
Migration (nomadic)	-0.013	-0.449	0.420
Migration (resident)	0.277	-0.184	0.733
Age (juvenile)	-0.051	-0.052	-0.051
Season (winter/dry)	0.046	0.045	0.046
Year	-1×10^{-4}	-1×10^{-4}	-1×10^{-4}
Location (north) : migration (nomadic)	0.002	-0.001	0.005
Location (north) : migration (resident)	-0.020	-0.024	-0.017

Table S6. Phylogenetic generalised linear mixed model output for predictors of body stores (i.e. mass controlling for wing length as an indicator of body size) of Australian shorebirds. Mass was log-10 transformed to improve normality. Effects are expressed relative to adult, migratory shorebirds in southern Australia, sampled during summer-spring or the wet season. Sample size is N = 118,017 observations from 30 shorebird species. Model outputs show the model without interactions, referenced in the main results, and a model testing for an interaction between location and migration behaviour.

Model showing main results			
Random effects	Variance		
Species	0.011		
Phylogeny	0.011		
Residual	0.003		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.028	-0.046	0.100
Location (north)	-0.028	-0.029	-0.027
Log ₁₀ wing length	1.752	1.732	1.772
Age (juvenile)	-0.026	-0.027	-0.025
Season (winter/dry)	0.037	0.036	0.038
Year	2×10^{-4}	2×10^{-4}	2×10^{-4}
Migration (nomadic)	-0.027	-0.231	0.180
Migration (resident)	0.111	-0.101	0.324
Model including location*migration interaction			
Random effects	Variance		
Species	0.011		
Phylogeny	0.011		
Residual	0.003		
Fixed effects	Estimate	Lower CI	Upper CI
Intercept	0.028	-0.046	0.101
Location (north)	-0.028	-0.029	-0.027
Migration (nomadic)	-0.032	-0.237	0.175
Migration (resident)	0.113	-0.100	0.326
Log ₁₀ wing length	1.750	1.730	1.770
Age (juvenile)	-0.026	-0.027	-0.026
Season (winter/dry)	0.037	0.036	0.038
Year	2×10^{-4}	2×10^{-4}	2×10^{-4}
Location (north) : migration (nomadic)	0.010	0.007	0.014
Location (north) : migration (resident)	-0.004	-0.008	-0.001

Supplementary Note 1: DATA CLEANING METHODS

Cleaning morphometric data

Community scientists of the VSWG and AWSG have expert knowledge of shorebird ecology and considerable experience in taking morphological measurements. Nevertheless, with so many observations of shorebirds taken over 45 years by numerous volunteers, it is inevitable that there will be occasional errors in the raw data. Hence, we cleaned our data prior to analysis to remove instances of clear errors. We removed errors for bill length, head-and-bill (HB) length, wing length and mass data while blind to sample location. HB length was not included in our analysis but was used to compare against bill length while cleaning the morphometric data. HB length is measured from the back of the skull to the tip of the bill using callipers. Firstly, we corrected measurements that appeared to be out by a factor of ten, for example, due to measurements recorded in centimetres instead of millimetres or because a decimal point was missed when transcribing the data. Secondly, we removed 'extreme' outliers (i.e. with values that were clearly impossible) from the entire dataset, irrespective of species: We excluded all bill lengths below two millimetres and above half a metre, HB lengths below 20 millimetres and above 0.8 of a metre, wing lengths below 50 millimetres and above 1.5 metres, and mass values below 5 grams and above two kilograms. For bill and HB lengths, we next used a multivariate outlier removal approach. Given the strong, predicted relationship between bill length and HB length for the same individual, we calculated the Mahalanobis distance from the estimated relationship between the two variables and removed points beyond the 'adjusted quartile' for the Mahalanobis distance (Filzmoser, 2004; Filzmoser et al., 2005). This approach enabled us to determine inaccurate values due to their departure from the expected relationship between the two variables. This includes errors for bill length, HB length, and where the combination of bill and HB lengths for the same individual gives unlikely values for head length, suggesting one or both measurements are inaccurate. The adjusted quartile is an adaptive indicator that attempts to distinguish between extreme values and true outliers based on departures from the predicted relationship (Filzmoser, 2004; Filzmoser et al., 2005). We calculated Mahalanobis distances and

adjusted quartiles using the package 'mvoutlier' in R (Filzmoser & Gschwandtner, 2018). We excluded likely errors for wing length and mass using set cut-offs for each species based on visual inspection of the data.

Data were initially recorded in datasheets, with 'Datasheet ID' assigned to a given species and capture event, where the same group of people typically completed individual datasheets. We therefore removed all data points for bill length, wing length and mass from datasheets with over 30% of measurements classed as outliers for bill length, wing length and mass respectively. We reasoned that if a sampling group made errors for at least 30% of their measurements, other measurements by the same group were likely inaccurate, even if they fell within the expected range of values.

We calculated repeatability of measurements taken from the same individuals following Nakagawa and Schielzeth (2010), dividing variance explained by individuals (band number) by the residual variance and individual variance combined. Variances were estimated for repeat captures using a linear mixed model with bill length, wing length or mass as the response variable, sample year, age (adult/juvenile) and season (summer-wet vs winter-dry) as fixed terms, and species and band ID as random effects. Repeatability for bill length = 0.92, and wing length = 0.72, for N = 3317 samples of 1583 individual shorebirds (band numbers) captured in the same year. Repeatability for mass = 0.78, for N = 3168 samples of 1567 individuals captured in the same month and year. Lower repeatability of wing length and mass are to be expected, as measurements are likely influenced by factors such as recent foraging success prior to capture and feather wear and tear. By comparison, bill lengths, though impacted by growth and wear, are expected to remain relatively consistent and this is likely reflected in the higher repeatability scores. Repeatability scores may underestimate true measurement accuracy due to possible errors in reading band numbers. We note that measurement error will most likely add noise to the dataset rather than systematic bias, because many of the same people collected shorebird data in both northern and southern Australia (the AWSG was founded by members of the VSWG), using consistent methods.

Assigning sex

Sex was initially estimated in the field based on a combination of plumage characteristics and sex differences in morphology for bar-tailed godwits, curlew sandpipers, far-eastern curlews, ruddy turnstones and sharp-tailed sandpipers. Taking advantage of the relatively substantial differences in the size and shape of males and females, we later estimated the sex of unsexed bar-tailed godwits and far eastern curlews, based on differences in bill length, and sharp-tailed sandpipers, based on differences in mass (Figure S6). This approach is consistent with previous shorebird research and necessary where molecular sexing methods are unfeasible (Higgins & Davies, 1996). However, we acknowledge such an approach is imperfect and likely to add noise to the dataset due to misclassified sexes. Nevertheless, including an estimate of sex in our analyses enables us to test for latitudinal patterns in morphology while controlling for possible effects of differential migration between the sexes in sexually dimorphic species (see Discussion in the main text). We did not use similar post-hoc methods to assign sexes to unsexed curlew sandpipers and ruddy turnstones due to the greater overlap of morphology between the sexes.

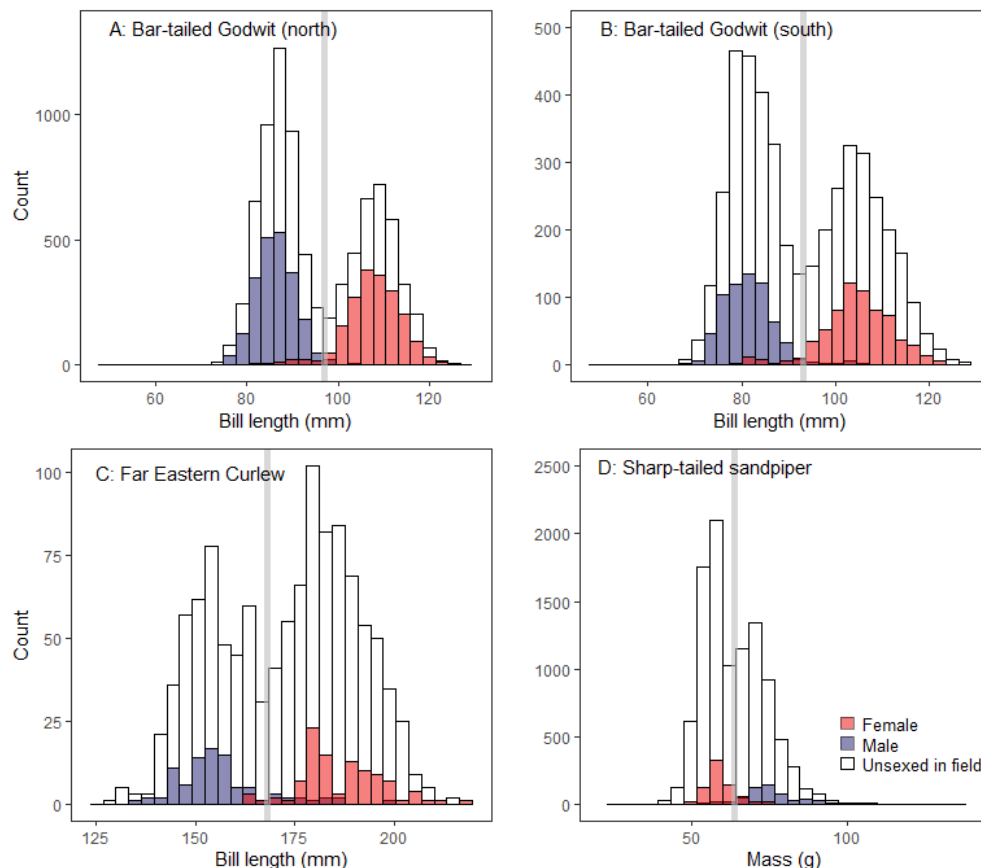


Figure S6. Bar plots showing cut-offs used to assign sexes to unsexed individuals (white bars) based on patterns from individuals initially sexed in the field (red = female; blue = male). Cut-offs are shown for the (A) northern Australian population of bar-tailed godwit (bill length > 97 mm = female), (B) southern Australian population of bar-tailed godwit (bill length > 93 mm = female), (C) far eastern curlew (bill length > 168 mm = female) and (D) sharp-tailed sandpiper (mass > 64 g = male). Separate cut-offs were used for northern and southern bar-tailed godwit populations due to consistent morphological differences between northern and southern Australian sub-species.

Supplementary References

- Filzmoser, P. (2004). A multivariate outlier detection method. *Seventh International Conference on Computer Data Analysis and Modeling*, 1(1989), 18–22. <http://computerwranglers.com/com531/handouts/mahalanobis.pdf>
- Filzmoser, P., Garrett, R. G., & Reimann, C. (2005). Multivariate outlier detection in exploration geochemistry. *Computers and Geosciences*, 31(5), 579–587. <https://doi.org/10.1016/j.cageo.2004.11.013>
- Filzmoser, P., & Gschwandtner, M. (2018). *Package 'mvoutlier': multivariate outlier detection based on robust methods* (2.0.9). <http://cstat.tuwien.ac.at/filz/NeedsCompilation>
- Higgins, P. J., & Davies, S. J. J. F. (Eds.). (1996). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons*. Oxford University Press.
- Nakagawa, S., & Schielzeth, H. (2010). Repeatability for Gaussian and non-Gaussian data: A practical guide for biologists. *Biological Reviews*, 85(4), 935–956. <https://doi.org/10.1111/j.1469-185X.2010.00141.x>

Supplementary Note 2: CONSORTIA MEMBERSHIPS

The following individuals are the members of the two consortia who have contributed to multiple field trips over the collection data period

Victorian Wader Study Group

Bev Abbott	Rose Baulch	Kate Buchanan
Geoff Abbott	Graham Beal	Anna Buchhorn
Rick Aitchison	Jenny Beal	Paul Buchhorn
Kahlid Al Dabbagh	Lauren Beasley	Alan Burbidge
Ruby Albury	Andy Bennett	Mavis Burgess
Margaret Alcorn	Margaret Bennett	Nigel Burgess
Richard Alcorn	Mark Bennett	Barbara Burns
Heather Alexander	Gail Berry	Tanya Butcher
Charles Allen	Rob Berry	Hannah Buys
Jocelyn Allen	Mark Bezuijen	Bill Bygott
Malcolm Allen	Robert Bezuijen	Ian Cairns
Terri Allen	Steve Bianchi	Dawn Cameron
Stephen Ambrose	Steven Bianchi	Gordon Cameron
Mark Anderson	David Billingham	Margaret Cameron
Deborah Andrew	Pat Bingham	Aiden Campbell
Peter Anton	Margaret Blakers	Jeff Campbell
George Appleby	Robin Borland	Sarah Campbell
Gabrielle Archard	Janine Bossel	Thomas Cansse
Allen Archbold	John Bowden-Perry	Peter Carr
Max Arney	Adrian Boyle	Catherine Cavallo
Basil Artimedes	John Brandenberger	Jo Chadwick
Bruce Atkin	Suzanne Brandenberger	Richard Chamberlain
Steve Atkinson	Amanda Breidahl	Andrew Chapman
David Ball	Stephen Brend	Ann Chappel
Tony Ball	Robert Brinkman	Anne Chappel
Alex Barisic	Judy Brown	Mervyn Chappel
Ryan Barnaby	Malcolm Brown	Christina Cheers
Lisa Barter	Prudence Brown	Kim Chen
Mark Barter	Andrew Browne	June Cherrey
Terry Barter	Sue Bryceson	Smathie Chong
Kevin Bartram	Susanna Bryceson	Alan Clarke

Allan Clarke	Jeff Davis	Robin Fitzgerald
Allen Clarke	Michael Dawkins	Jason Flesch
Rohan Clarke	Bob Dawson	Mernie Foley
Sue Clegg	John Dawson	Melinda Ford
Rob Clemens	Geoff Deason	Berrice Forest
Prue Clements	Norma DeGaris	Amelia Formby
Bretan Clifford	Ren DeGaris	Richard Forster
David Close	Julie Deleyev	Richard Forster
Lisa Collins	Jill Dening	Charles Francis
Peter Collins	Xenia Dennett	Andrea Fullagar
Charles Compton	Mary Dharmarajah	Rob Gail
Christine Connelly	Meridith Dharmarajah	Batbayar Galbalt
Heather Connor	Vero Dharmarajah	Tim Gale
James Connor	Victoria Dharmarajah	Brett Gardner
Mike Connor	Barbara Dickson	Stephen Garnett
Robin Connor	Jenna Diehl	Bev Geoff
Cecilia Cook	Alexandra Djurovich	Dave Gerard
Elizabeth Cook	Michael Douglas	Elizabeth Gerard
Marguerite Cordell	Joris Driessen	Angela Gibbs
Julian Correia	Lee Duclos	Colin Gibbs
Trish Corrie	Graham Duell	Gail Gibbs
Mary Cowling	James Dunlop	Heather Gibbs
Dave Cropley	Andrew Dunn	Melanie Gibbs
Shirlene Cropley	Elizabeth Dunn	Peter Gibbs
Tahlia Cruise	John Eckert	Margie Gibson
Mark Cullen	Dianne Emslie	Don Gillespie
Peter Curry	Alice Ewing	Joyce Gillespie
Monika Czastka	John Fallan	Belinda Gillies
Wendy D'Amore	Rebecca Fallan	Dave Gillison
Amanda Dalglish	Jon Fallaw	Kate Gorringer-Smith
Sue Danjko	Erin Farmer	Carlene Gosbell
Peter Dann	Susie Farquhar	Ken Gosbell
Steve Darby	David (Frankie) Farrar	Andrew Gosden
Louise Dargaville	Rory Ferguson	Kath Gosden
Rosemary Davidson	Alf Finch	Olivia Gourley
Stephen Davidson	Maureen Fitzgerald	Kathryn Goyen

Doris Graham	Ron Hedley	Keith Jones
Bob Green	Barbara Henderson	Silvia Jones
Nathan Gregory	David Henderson	Peter Kasper
Nicole Grenfell	Heather Hermans	Daphne Keller
Patrick-Jean Guay	Peter Hermans	Ralph Keller
Jim Gunn	Tony Hertog	Matthew Kennedy
Surong Gunn	Marilyn Hewish	Greg Kerr
Tim Gunn	Oki Hidayat	Barbara Khalifa
Jane Gurling	Faye Hill	Debbie King
Julie Gurling	Bindi Hillen	Steve Klose
Susie Guthrie	Jenny Hiscock	Irma Kluger
Angie Gutowski	Trevor Hodson	Vivien Kluger
Tony Habraken	Andrej Hohmann	Joy Knight
Paul Hackett	David Hollands	Leona Knight
Elizabeth Haines	Margaret Hollands	Femmie Kraaijeveld
Nola Haines	Patsy Holmen	Ken Kraaijeveld
Peter Hamilton	Stewart Holohan	Angus Lamin
Graham Hancock	Jamie Holyoake	Tessa Lamin
Petra Hanke	Vivien Holyoake	Geoff Lamour
Birgita Hansen	Yvonne Honey	Brett Lane
Daniel Harley	Tracey-Ann Hooley	S.G. (Bill) Lane
Sue Harris	Peter Houston	Rowena Langston
Susan Harris	Damian Howard	Bruce Lavender
Trish Hart	Bethany Hoye	John Lawson
Neville Hatten	Tania Ireton	Rick Lebenhole
Robyn Hatten	Digger Jackson	Casey Lee
Ruby Hatten	Gavin Jackson	Hannah Lee
Tim Hatten	Don Jeans	Kit Lee
Heather Haughton	Peter Jenkins	Daniel Lees
Peter Haughton	Angela Jessop	David Legg
Peter Haward	Suzanne John	Alan Leishman
Jenny Hawkins	Murray Johns	Sally Leonard
Michael Hawkins	Penny Johns	John Lesku
Becky Hayward	Steve Johnson	Mark Lethlean
Brian Hayward	Peter Johnstone	David Lewis
Toni Hayward	Eric Jones	Jutta Leyrer

Shan Wei Rachel Liew
Amanda Lilleyman
Janet Limb
Simeon Lisovski
Laurie Living
Rodney Long
Moirra Longden
Andy Longmore
Sue Longmore
Gabriel Low
Kim Lowe
Andrew Lowther
Sam Lowther
Debbie Loyn
Debby Loyn
Richard Loyn
Callum Luke
John Lyons
Susie Lyons
Donald MacMillan
Meg Macmillan
Grace Maglio
Bruce Male
Ben Malseed
Katrina Malseed
Kathryn Manago
Jan Mangan
Piper Mangan
Ila Marks
Brian Martin
John Martindale
Gary Matthews
Nigel Matthews
Golo Maurer
Bernie McCarrick
Ellen McCulloch

Clare McCutcheon
Geoff McDonald
Joan McDonald
Rodney McFarlane
John McKean
Mark McKinnon
Anne McMillan
Pat McWhirter
Krystii Melaine
Peter Melanie
Tove Melgaard
David Melville
Jan Merkel-Stol
Glynn Mihan
Eric Miller
Heidi Miller
Jannette Miller
Clive Minton
Ida Minton
Nigel Minton
Pat Minton
Roger Minton
Anthony Mitchell
Peter Mitchell
Stewart Monckton
Lorraine Moore
Chris Morris
Frank Morris
Helen Morris
Barbara Moss
Rowan Mott
Emma Moysey
Zebedee Isaac Muller
Melanie Mumford
John Munro
Lynn Murdoch

Brenda Murlis
Mick Murlis
Luke Naismith
Tracy Neilson
John Newman
Mike Newman
Bridget Nicholson
Philip Norman
Mathew Northward
Ghillies Nott
Jordan O'Neill
Maureen O'Neill
Paul O'Neill
Kim O'Riley
Rory O'Brien
Joanne Oldland
Ben Oliver
Geoff Osler
Juria Ozols
Joy Pagon
Michael Pagon
Priscilla Park
Graham Parkyn
Vicki Parkyn
Ian Pascoe
Penelope Pascoe
Linda Patrick
Rob Patrick
Robert Patterson
Reece Pedler
Simon Pender
Peter Penny
Petina Pert
Sara Petrovic
Hugo Phillipps
Jeremy Phillipps

Maria Philipps	Don Ripper	Liz Sarraillhe
Alexander Phillips	Jude Ripper	Stuart Sarraillhe
Gareth Phillips	Alice Risely	Ira Savage
Roxanne Phillips	Anthony Roberts	Debra Saxon-Campbell
Shoreh Phillips	Bruce Robertson	Clinton Schipper
Gordon Phillips-Ross	David Robertson	Tom Schmidt
David Phillipson	Don Robertson	Chris Scholz
Heather Phillipson	Greta Robertson	Martin Schultz
Jim Phillipson	Minnie Robertson	Nicole Schumann
Alan Pilkington	Annie Rogers	Samantha Setterfield
Wendy Pilkington	Danny Rogers	Kelly Shannon
Lois Platt	Ken Rogers	Laurie Sharp
Warren Platt	Maryam Rogers	Cameron Sharpe
Murray Portbury	Joanne Rolland	Julie Shaw
Carolyn Pradun	Thierry Rolland	Kathy Shurcliff
John Pratt	Jade Ronke	Andrew Silcocks
Philip Pratt	Natalia Rose	Andrew Silcocks
Phillip Pratt	Paul Rose	Charles Silveira
Mike Preston	Bob Ross	Howard Simco
David Purchase	Diane Ross	Holly Sitters
Steven Putt	Toby Ross	Jenny Skewes
Thomas Putt	Oliver Rosznay	Jenny Skewes
Susan Quirk	Margaret Rotherham	Rod Slater
David Rantall	Yaara Rotman	Sue Slater
Rebecca Rawlings	Nancy Roussac	Alex Slavenko
Marj Reni	Neville Roussac	Marta Slawuta
Ann Renkin	Matt Rowan	Alan Smith
John Renowden	Chris Rowe	Charles Smith
April Reside	Graeme Rowe	Colin Smith
Jenny Reside	Margaret Rowe	Hannah Smith
Jim Reside	Michael Rowe (NSW)	Mark Smith
Shane Reside	Michael Rowe (VIC)	Mem Smith
Laura Rhodes	Luke Rozek	Ron Smith
Annabel Richards	Megan Rush	Shirley Smith
Roger Richards	Michelle Sabto	Anita Smyth
Bruce Ridgeway	Sonia Sanchez Gomez	Bell Snow

Terry South	Deryn Thomas	Hazel Watson
Vicki South	Lynne Thomas	Marion Weaving
Roger Standen	Claire Tingate	Will Webster
Jon Starks	Amy Tipton	Dan Weller
Philip Starks	Pavel Tomkovich	Andrew Wells
Angela Steele	Dale Tonkinson	Andrea West
Bill Steele	Leon Trembath	Mike Weston
Will Steele	David Trudgen	Norman Wettenhall
Kieran Stephenson-Banks	Wendy Trudgen	Anthea Whitelaw
Kate Stevens	Lyn Turner	Jim Whitelaw
Ian Stevenson	Lindsay Tyler	David Wilbraham
Jonathon Stevenson	Stephanie Tyler	Jean Wilbraham
Anna Stewart	Megan Underwood	Michelle Wille
Iain Stewart	Jim Vadolas	Jennifer Williams
James Stewart	John Vaitkunas	Ross Williamson
Sally Stewart	Connor Van Doorn	Kailash Willis
Sandy Stewart	Gloria Van Duyne	Annette Wills
James Stockton	Kay Van Loon	David Wilson
Tony Stokes	Paul Van Loon	Jeannine Wilson
Annie Stoney	Mary-Ann Van Trigt	Jim Wilson
John Stoney	David Van Veldhuisen	Jack Winterbottom
Julie Strudwick	Helen Vaughan	Bob Winters
Deb Sullivan	Inka Veltheim	Diannne Winters
Alisa Swan	Cameron Villani	Jerry Wong
Bob Swindley	Joanne Walker	Peter Woodall
Robert Swindley	Mark Walker	Sharon Woodend
Sally Symonds	Pam Walker	Avron Woolf
Naeko Takeuchi	Ray Wallace	Prue Wright
Naoko Takeuchi	Caroline Walmsley	Dallas Wyatt
Laura Tan	John Walmsley	Jude Wyatt
Andrew Taylor	Diane Walton	Celine Yap
Christine Taylor	Nick Walton	Bruce Yu
Jane Taylor	Keith Ward	Meijuan Zhao
Susan Taylor	Doug Watkins	Elizabeth Znidersic

Australasian Wader Studies Group

Sue Abbotts	Malcolm Brown	Patricia Croft
Nigel Adam	Rebucca Brugman	Ruth Croger
Joan Adams	Bee (Birgitta) Buche	Vicki Cronan
John Allcock	Simon Buckell	Mike Crone
Barbara Allen	Anna Buckhorn	Dave Cropley
Charles Allen	Paul Buckhorn	Mike Crowley
Terri Allen	Robert Bush	Candy Curran
Debbie Andrew	Andrew Cadman	Alastair Cuthbert
Rudy Anto	Rainy Cai	Anne Cuthbert
Claire Appleby	Jeff Campbell	Lucy Dadour
Alexandra Appleman	Michael Campbell	Delip Das
Alan Archbold	Sarah Campbell	Chris Davey
Howard Armstorng	Peter Challinor	Rosemary Davidson
Thais Armstrong	Ginny Chan	Simon Davies
Zulfi Arsan	Simba Chan	Alison Dawes
Jon Avon	Ray Chatto	Mike Dawkins
Allan Baker	Andiball Chen	Sarah Dawkins
Bala Balachandran	Chih-Hao Chen	Peter de Boer
Paul Barden	Fion Cheung	Petra de Goej
John Bardsley	Chung-Yu Chiang	Loes de Jong
Yahkat Barshep	Eric Ching-Chih	Nicki de Prue
Cam Bates	Rebekah Christensen	Tom Delaney
Chris Bell	Igor Chupin	Julie Deleyev
Terry Bell	Alan Clarke	Xenia Dennett
Keith Bellchambers	Allan Clarke	Roy Dennis
Maria Bello	Tom Clarke	Belinda Dettmann
Loyd Berry	Bretan Clifford	Mandy Dey
Rob Berry	Jon Coleman	Alison Dick
Demetrios Bertzeletos	Peter Collins	Jamie Dick
Rachel Blakey	Jesse Conklin	William Dick
Adrian Boyle	Ian Connell	Barbara Dickson
Nicholas Branson	Graham Couchman	Leon Dijkstra
Dave Bridges	Phil Craven	Petra Dijkstra
Bob Brinkman	Peter Crighton	Jing Jing Ding
Judy Brown	Tony Crocker	Steve Dodd

Mark Dodds
David Douglas
Tegan Douglas
Penny Drake-Brockman
Joris Driessen
David Drynan
Richard du Feu
Andre Duiven
James Dunlop
Jodie Dunn
Kathryn Dyball
Leander Dykstra
John Eckert
Dennis Elphick
Rick Else
Glen Emkie
Dianne Emslie
Josh Engel
Brian Etheridge
Simon Etheridge
Lee Eun Soo
Alice Ewing
Toby Fagerstrom
Qian Fawan
Iwan "Londo" Febrianto
Meng-Chie Feng
Bruce Ferry
Mark Field
Don Finch
Louise Finch
Kathy Fletcher
Milly Formby
Simon Foster
Diane Fraser
Don Fraser
Pat French

Joan Fried
Graham Fry
Peter Fullagar
Daphne Fullager
Ash Furneaux
James Gan
Rob Ganly
John Geale
Les George
David Gerard
Yuri Gerasimov
Colin Gibbs
Dominic Gibbs
Gail Gibbs
Heather Gibbs
Betty Gilbert
Victor Glupov
Patricia Gonzalez
Carlene Gosbell
Ken Gosbell
David Goulding
Olivia Gourley
Doris Graham
Gordon Graham
Keith Grant
Mark Grantham
Ros Green
Nathan Gregory
Zang Guangming
Patrick Guay
Tim Gunn
Chu Guozhong
Daniel Gustafsson
Angie Gutowski
Kerry Hadley
Hugh Hanmer

David Han-Po Chang
Birgita Hansen
Joyce Harding
Sandra Harding
Anne Hardman
Joe Hardman
Daren Harris
Ken Harris
Heather Haughton
Peter Haughton
Robina Haynes
Peng He
Jacquie Heaton
Nicola Hedges
Klaus Hein
Henke Heinekamp
Andrew Hemsley
Barbara Henry
Dennis Henry
Josie Hewitt
Richard Holmes
Vivien Holyoake
Zang (Rick) Hongxi
Jiang Hongxing
Amy Huang
Falk Huettmann
Kuan-Chieh Hung
James Hutchinson
Liz Huxtable
Gemma Insley
Hugh Insley
Phil Ireland
Digger Jackson
Gavin Jackson
Micha Jackson
Don Jeans

Peter Jenkins	Brett Lane	Richard Loyn
Angela Jessop	Rowena Langston	Helen Macarthur
Xin Jin	Elana Lappo	Rosemary Macarthur
Tony John	Keith Larsen	Meme Macdonald
Steve Johnson	Anna Lashko	Mark MacFadden
John Jones	Arnaud Laudelot	Meg MacMillan
Phil Joy	Sam Lawrence	Trixi Maddon
Hiroataka Kantani	Eila Lawton	Peter Madvig
Minoru Kashiwagi	Adam Leavesley	Kajonori Maehara
Sharon Kast	Roger Lee	Grace Maglio
Antti Kause	Alan Leishman	Joyce Magor
Mianjuan Ke	Ning Le-Ning Chang	Bruce Male
Steve Kendall	Sally Leonard	Jan Mangan
James Kennerley	Katherine Leung	Tohru Manu
Greg Kerr	Jan Lewis	Ila Marks
Nicole Kerr	Jenny Lewis	Kevin Marshall
Justine Keuning	Jutta Leyrer	John Martindale
Lindall Kidd	David Li	Tashiyuki Matsumura
Han-Byal Kim	Jing Li	Takeyoshi Matsuo
Debbie King	Ma Li	Gary Matthews
Phil Kingston	Tz-Yu Liao	Andrew McCreery
Hiroataka Kitani	Amanda Lilleyman	Jim McGuiness
Wally Klau	Haw Chuan Lim	Leonie McMahon
Margrit Klein	Charlene Lin	Pat McWhirter
Steve Klose	Hung-Ju Lin	David Melville
Irma Kluger	Mu-Ming Lin	Julia Melville
Kristen Knight	Geoff Linkleter	Glynn Mihan
Eva Kok	Simeon Lisovski	Nigel Milius
Ramakrishnan Kolandavelu	Brian Little	Eric Miller
Shigemoto Komeda	Greg Little	Heidi Miller
Christian Kouroumihalis	Judy Little	Ken Mills
Jan Kube	Wei-ting Liu	Ruth Mills
Murray Kun-Chang Li	Mike Lofthouse	David Milton
Martin Kunze	Wendy Lofthouse	Christopher Minton
Emilia Lai	Moira Longdon	Clive Minton
Ken Lance	Samantha Lostrom	Nicholas Minton

Nigel Minton	Pat Oldham	Kelly Rayner
Pat Minton	Kim Onton	Judith Read
Roger Minton	Jake Owens	Magda Remisiewicz
Amare Mitamura	Kikyoaki Ozaki	Marj Reni
Kimiko Mohri	Noai Ozaki	John Renowden
Vladimir Morozov	Duncan Parish	Kathryn Renowden
Nadezda Morozova	Jin-Young Park	April Reside
Amdrew Moss	Graeme Parkyn	Zoya Reviakina
Dorian Moss	Ian Paterson	Steve Reynolds
Gillian Moss	Rob Patrick	Sue Rice
Martin Moss	Rattapan Pattararangsarn	Annabel Richards
Otto Mueller	Iain Patterson	Brooke Richards
Tadao Muira	Martina Patterson	Roger Richards
Lys Muirhead	Vaughan Patterson	Allan Richardson
Gabriele Muller	Grant Pearson	Adrian Riegen
Taej Mundkur	Mark Peck	Henry Robb
John Munro	Reece Pedler	Antony Roberts
Brenda Murlis	Hannes Pehlak	Vivienne Roberts
Mick Murlis	Hebo Peng	Billy Robin
Barbara Myers	Ali Pentalow	Kate Robin
Jeong-Yeon Myung-Suk	David Pentalow	Libby Robin
Noboru Nakamura	Petina Pert	Tom Robin
Bruce Neimann	Ilse Pickerd	Rob Robinson
Peter Newberry	Anne Pienkowski	Annie Rogers
Larry Niles	Mike Pienkowski	Danny Rogers
Somchai Nimnuan	Theunis Piersma	Ken Rogers
Misao Nishimra	Sioux Plowman	Liz Rosenberg
Mas Noerdjito	Anne Preston	Jill Rowbottom
Heidi Nore	David Price	Chris Rowe
Richard Norman	Elizabeth Price	Graham Rowe
Ian Northcott	Ma Qiang	Claudia Ruby
Frank O'Connor	Ji Qui	Mavis Russell
Maurice O'Connor	Bai Quiquan	Beck Ryan
Takeshi Ogura	Wendy Radford	Alex Sapoznikov
Takashi Okumura	Kelly Rainer	Ira Savage
Dave Oldham	Chelsea Ralls	Andrea Schafer

Frances Schmeckel	Rob Stone	Petra Verburg
Francoise Schmidt	Eugeny Strekrikov	Mo Verhoeven
Axel Schmidt	Vera Struenson	Yvonne Verkuil
Jonny Schoenjohn	Ed Stubbing	Diane Walton
Rob Schuckard	Dieter Stürmer	Mitchell Walton
David Seay	George Swan	Natalie Walton
Betty Seddon	Bob Swindley	Nick Walton
Kawaguchi Sentaro	Barbara Swinfen	Rachel Walton
Hila Shamir	Roger Swinfen	Junyan Wang
Ian Shann	Sally Symonds	Lorine Wang
Simon Shih Han	Eugene Syroechovski	Xaun Wang
Jarunee Siengsan	Yukio Takeda	Sawai Wanghona
Andrew Silcocks	Masabumi Takeshita	Lim Wanho
Howard Simco	Naoko Takeuchi	Joan Ward
Holly Sitters	Kun Tan	Nik Ward
Humphrey Sitters	Susan Taylor	Robin Ward
Ederic Slater	Bobbie Telford	Barbara Warren
Matt Slaymaker	Brian Thompson	Alistair Watson
Annabel Slettenhaar	Clare Thomson	Daphnie Watson
Jenny Smart	LeDinh Thuy	Hazel Watson
Mark Smart	Chiao (Judy) Ting	Katherine Watson
Harry Smit	Allen To	Mike Watson
Hannah Smith	Pavel Tonkovich	Toni Webster
Roy Smith	Tony Tree	Wu Wei
Janet Sparrow	Declan Troy	Jing Weiguo
Brian Speechley	Chia-yang Tsai	Bryce Wells
Robyn Spencer	Augustine Tuuga	Gale Wells
David Spreadbury	Yasuo Ueki	Xue Wenjie
Roger Standen	Loes van den Bremer	Mike Weston
Claire Stevenson	Joop van Eerbeek	Norman Wettenhall
Anna Stewart	Hoang van Thang	Nell White
Iain Stewart	Mary-Ann van Trigt	David Wilbraham
James Stewart	Gillian Vaughan	Jean Wilbraham
Sally Stewart	Mary Vaughan	Carole Williams
Sandy Stewart	Dick Veitch	Craig Williams
Susie Stockwell	Inka Veltheim	David Williams

Anne-Marie Wilson
Jim Wilson
Rob Wilson
Jamie Wood
Sharon Woodend
Prue Wright
Prue Wright
Wang Xiaofei

Feng Xuesong
Jeong-Yeon Yi
Chan Ying Chi
Erina Young
Gao Yu-ren
Alexander Yurlov
Sabine Zelz
Kejia Zhang

Shoudong Zhang
Xuan (Brenda) Zhang
Ma Zhijun
Qianyan Zhou
Bingrun Zhu
Liz Znidersic
Vladimir Zykov