Aerial Survey of Wetland Birds in Eastern Australia - October 2018 Annual Summary Report

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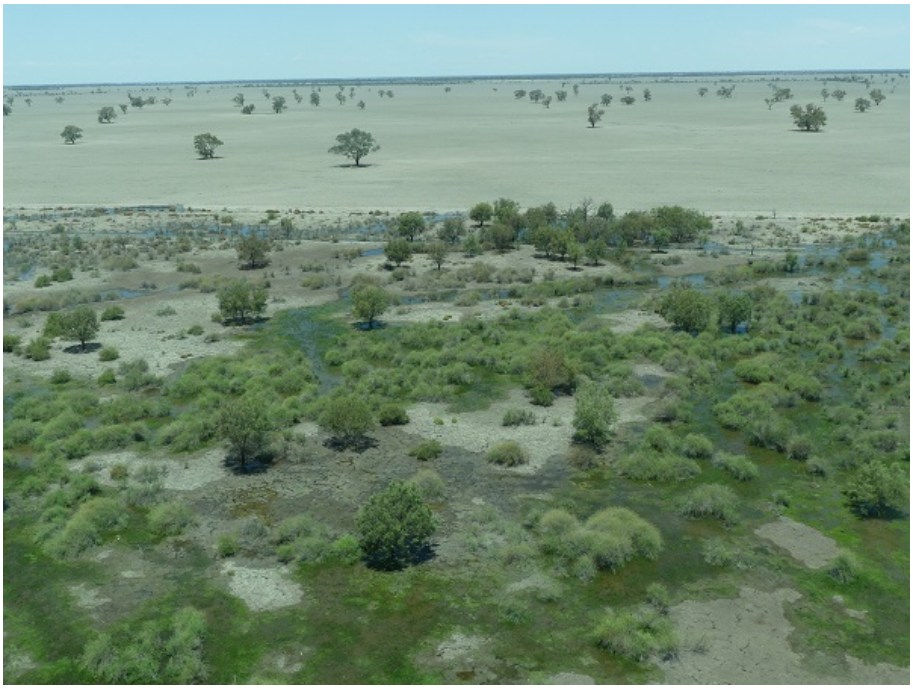

2018 Aerial Survey of Wetland Birds in Eastern Australia Summary

- The year 2018 has been exceptionally dry over the mainland southeast, with significant rainfall deficiencies continuing to affect large areas of eastern Australia. Year-to-date rainfall has been the third-lowest on record for the Murray–Darling Basin, fourth-lowest for New South Wales, and eighth-lowest for Victoria (BOM 2018).

- Most of NSW (79%) is drought affected or in drought, with a further 20% experiencing intense drought (DPI 2018). More than 58% of Queensland is drought affected or in drought, across most of the Lake Eyre, Bulloo-Bancannia and Murray Darling river basins (Qld Dept of Agriculture & Fisheries 2018). Rainfall was below to very much below average for southeast South Australia, and most of Victoria where drought conditions have intensified.

- As well as being very dry, 2018 has also been very warm. Australian maximum temperatures for the year to date have been the second warmest on record. New South Wales has experienced its warmest January–October period on record, while Victoria has tied for equal-warmest (with 2014; BOM 2018; Fig.7).

- All major indices (Total abundance, breeding index, number of species breeding and wetland area index) show significant declines over time; If 1983 & 84 peak years are omitted then 3 of the 4 major indices show significant decline (OLS regression at p=0.05; variables 4th root or log transformed where appropriate; Fig. 1; Table 1)

- Total waterbird abundance (n=192,906) decreased considerably from 2017 and remains well below average: the 9th lowest in 36 years. Waterbirds were most abundant in bands 2 and 10 (Figs 2, 5 & 7).

- Breeding species' richness, breeding abundance, and wetland area declined compared to the previous year. Despite some short term increases, there were continued long term declines in total abundance, wetland area and breeding species richness (Fig. 1; Table 1). Species functional response groups (feeding guilds) all showed significant long term declines (Fig. 3; Table 2). Long term changes were also observed in decadal averages of total abundance, wetland area index, breeding index and breeding species richness (Fig. 4)

- Wetland area index was well below the long term average. Most Cooper Creek wetlands in the Lake Eyre Basin, apart from Lake Dunn, were dry, including Lake Galilee. Other important wetlands in the Lake Eyre Basin including the Diamantina and Georgina rivers, supported low numbers of waterbirds. Lakes Torquinnie and Mumbleberry were dry (Fig. 7).

- The Macquarie Marshes and Lowbidgee wetlands were partially inundated with NSW Government and Commonwealth managed environmental water. These sites supported moderate numbers of waterbirds with very low breeding. Most of the large wetlands in the Menindee Lakes were dry or nearly dry with relatively few birds; Lake Cawndilla was the exception with large numbers of birds gathering on its shallow water as it dried. The Tallywalka lakes system was dry (Fig. 7). Waterbirds were concentrated in the southeast wetlands of South Australia.

- Waterbirds were less concentrated and more widely dispersed than in the previous year; Nine wetlands supported more than 5,000 waterbirds representing 47% of the total abundance (Fig. 5). These areas were distributed across bands 2-4 and 10 and generally supported high species diversity (Figs 2 & 7).

2018 Aerial Survey of Wetland Birds in Eastern Australia
Summary (continued)

- Total breeding index (nests + broods) of 200 (all species combined) declined from the previous year and remains well below the long term average (Fig. 1). Breeding species' richness was also low, with only two species recorded breeding: White Ibis (154) and Black Swan (46) (Fig. 6).

- Most game species abundances were well below long term averages, in some cases by an order of magnitude; Six out of eight species continue to show significant long term declines (Table 3). Hardhead was an exception with total abundance slightly above the long term average (Fig. 13).

- Across Eastern Australia overall abundance, breeding index and breeding species richness are positively related to available habitat (wetland area index). Conversely, declines in wetland area are likely to result in declines in waterbird abundance, breeding and breeding species richness (Fig. 8).

- Selected species distribution and abundances are shown in figures 9-18; Freckled duck and Plumed whistling-duck are included for comparison with game species. Map plots in these figures show 2018 distribution and trend plots show changes in abundance over time (1983-2018). Horizontal lines in trend plots indicates the long term average.

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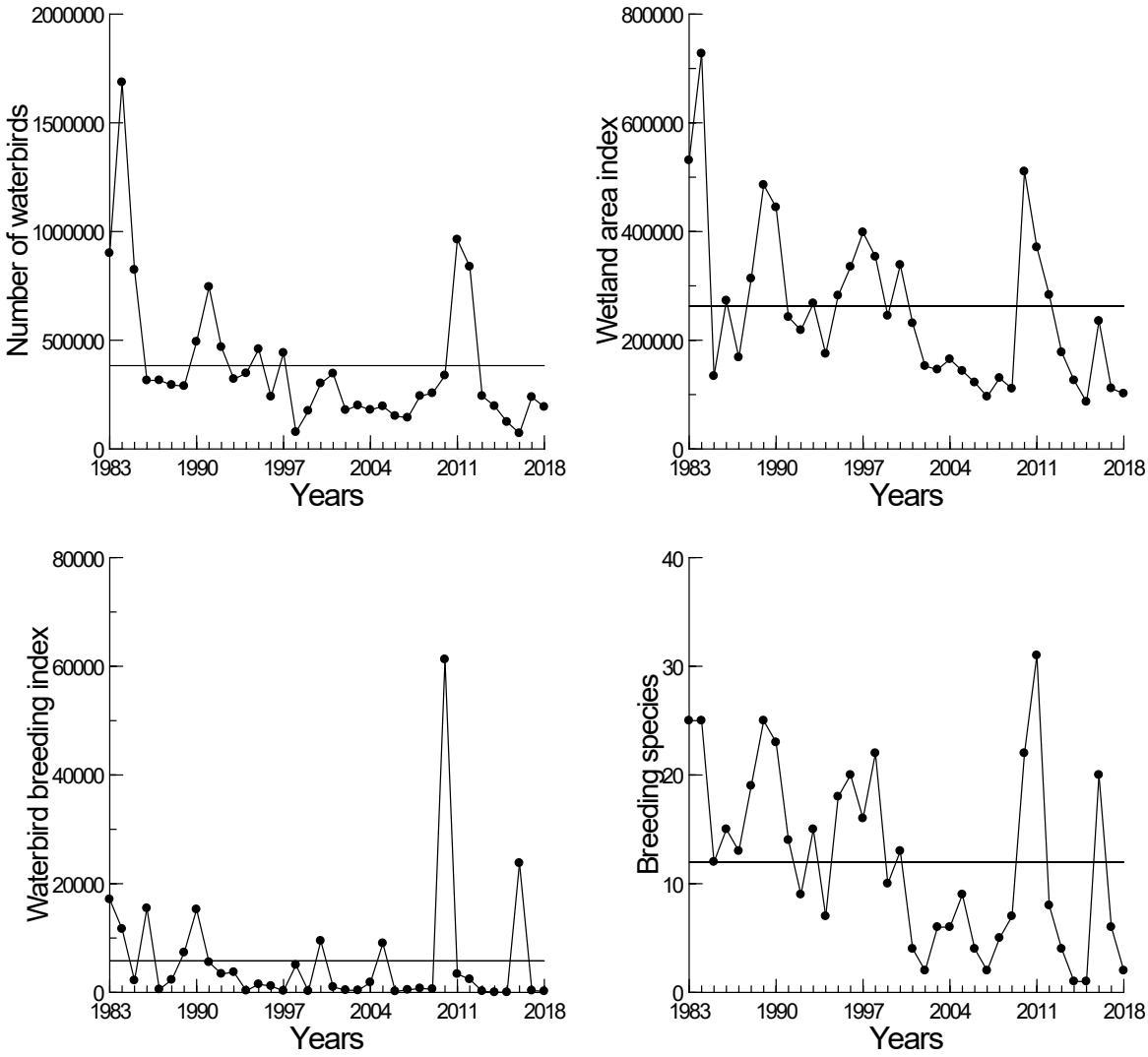

Figure 1. Changes over time in total abundance, wetland area, breeding and number of breeding species in the Eastern Australian Waterbird Survey (1983-2018); horizontal lines show long-term averages.

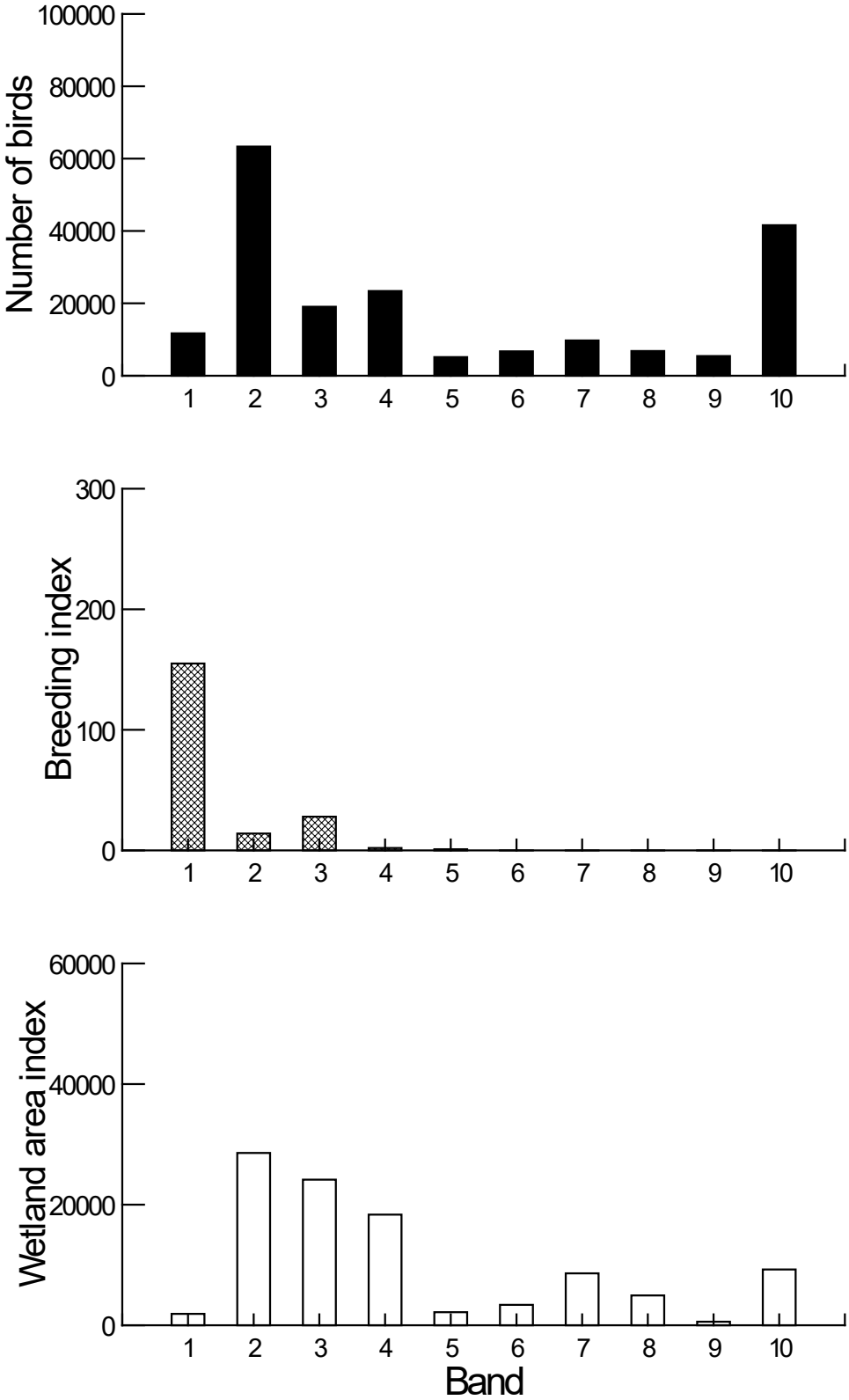

Figure 2. Waterbird abundance, breeding index and wetland area index in 10 survey bands of the Eastern Australian Waterbird Survey in 2018.

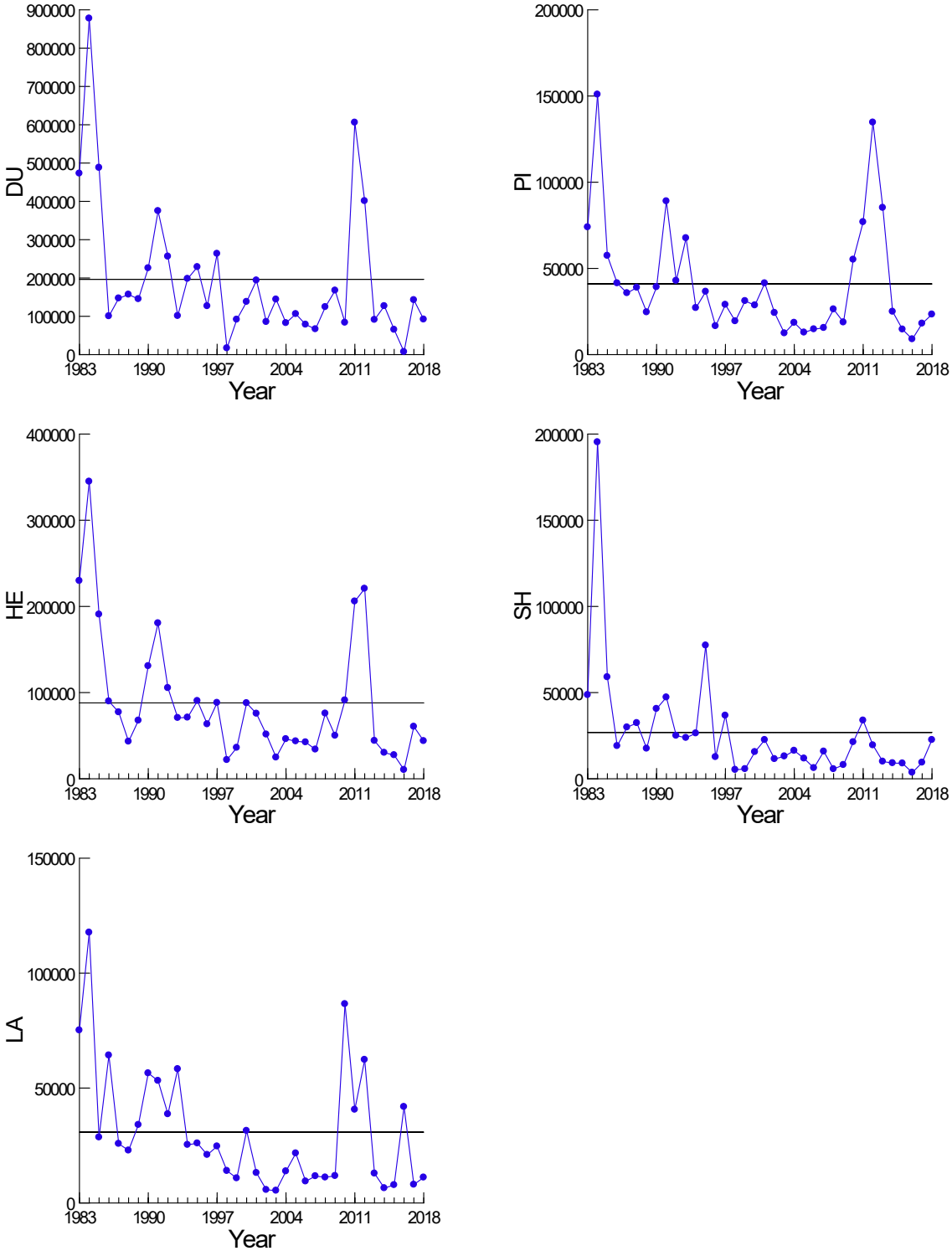

Figure 3. Changes in abundances of waterbird functional response groups (Du=ducks; Pi=piscivores; He=herbivores; Sh=shorebirds; La=large wading birds) over time in the Eastern Australian Waterbird Survey (1983-2018).

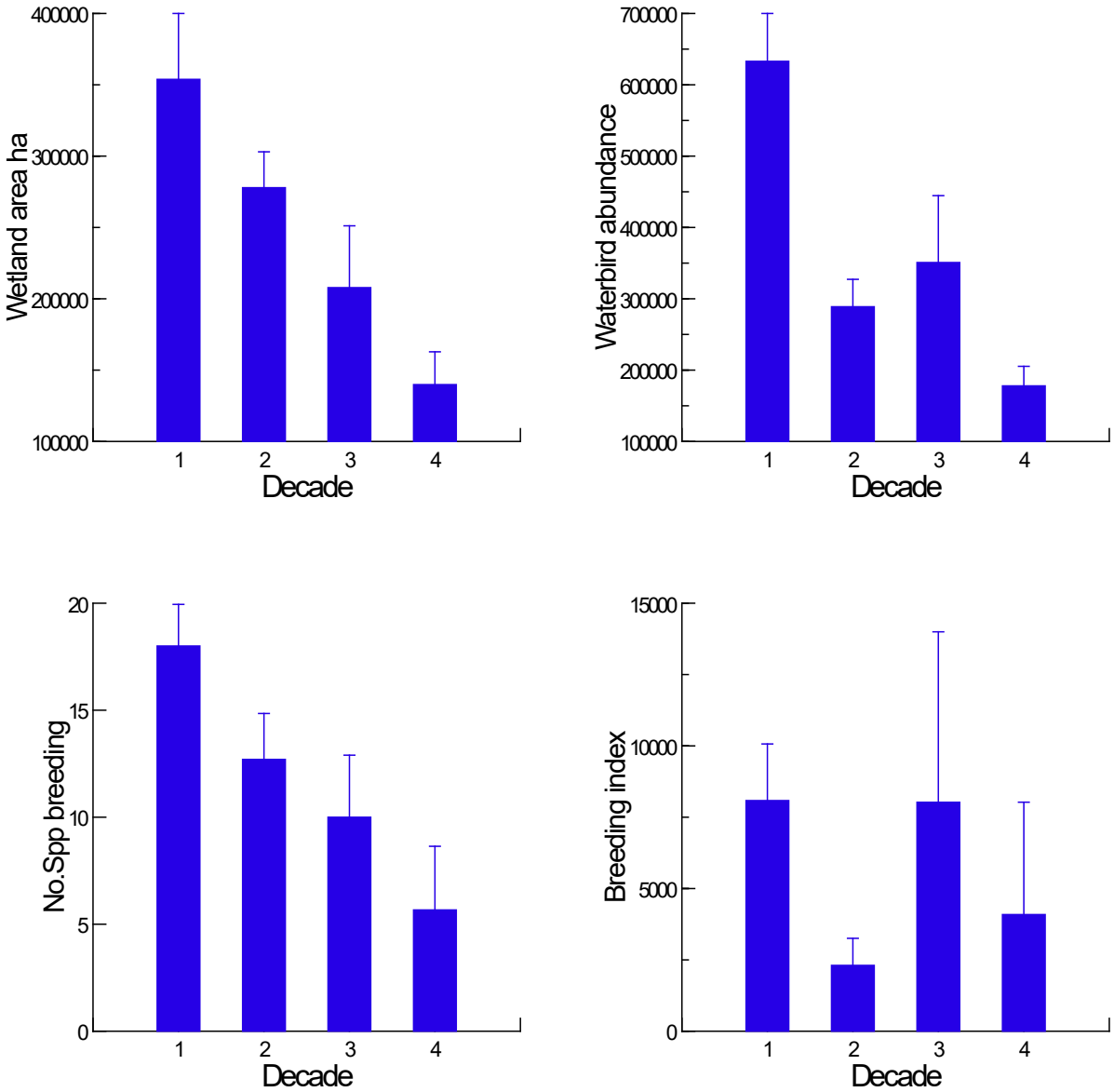

Figure 4. Decadal changes in indices including total abundance, wetland area, number of breeding species and breeding in the Eastern Australian Waterbird Survey (1983-2018).

Table 1. Trends in total waterbird abundance, wetland area index, breeding index and breeding species richness in the Eastern Australian Waterbird Survey (1983-2018).

Variable	1983-2018 All years		1985-2018 Omit 83-84	
	regression		regression	
Total waterbird abundance	decline	r^2=0.24, p=0.002	decline	r^2=0.13, p=0.034
Wetland area index	decline	r^2=0.24, p=0.002	decline	r^2=0.14, p=0.030
Breeding index	decline	r^2=0.12, p=0.041	no trend	r^2=0.06, p=0.158
Breeding species richness	decline	r^2=0.25, p=0.002	decline	r^2=0.16, p=0.017

Table 2. Trends in abundances of functional response (Fx) groups, in the Eastern Australian Waterbird Survey (1983-2018).

Fx group		Trend	Regression
Du	Ducks	decline	r^2=0.26, p=0.002
He	Herbivores	decline	r^2=0.29, p=0.001
La	Large wading birds	decline	r^2=0.30, p=0.001
Pi	Piscivores	decline	r^2=0.19, p=0.007
Sh	Shorebirds	decline	r^2=0.46, p<0.001

Table 3. Trends in abundances of game species from the Eastern Australian Waterbird Survey (1983-2018).

Species	Trend	Regression
Black duck	decline	r^2=0.32, p<0.001
Australasian shoveler	decline	r^2=0.60, p<0.001
Chestnut teal	decline	r^2=0.12, p=0.037
Grey teal	decline	r^2=0.20, p=0.006
Hardhead	no trend	r^2=0.02, p=0.375
Mountain duck	decline	r^2=0.43, p<0.001
Pink-eared duck	no trend	r^2=0.05, p=0.177
Australian Wood duck	decline	r^2=0.29, p=0.001

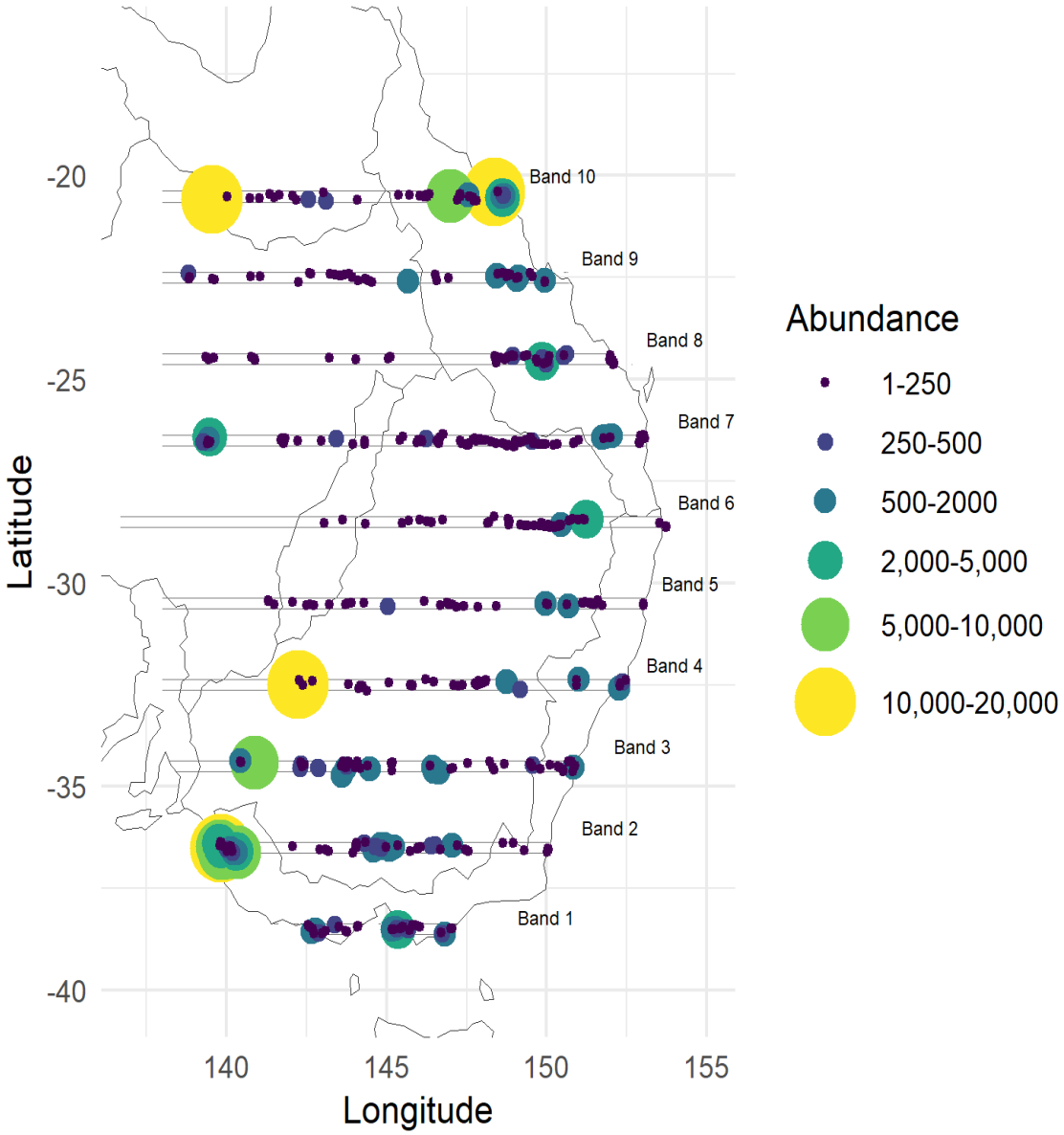

Figure 5. Distribution and abundance of waterbirds in the 2018 Eastern Australian Waterbird Survey. Dry wetlands and those with zero waterbirds not plotted.

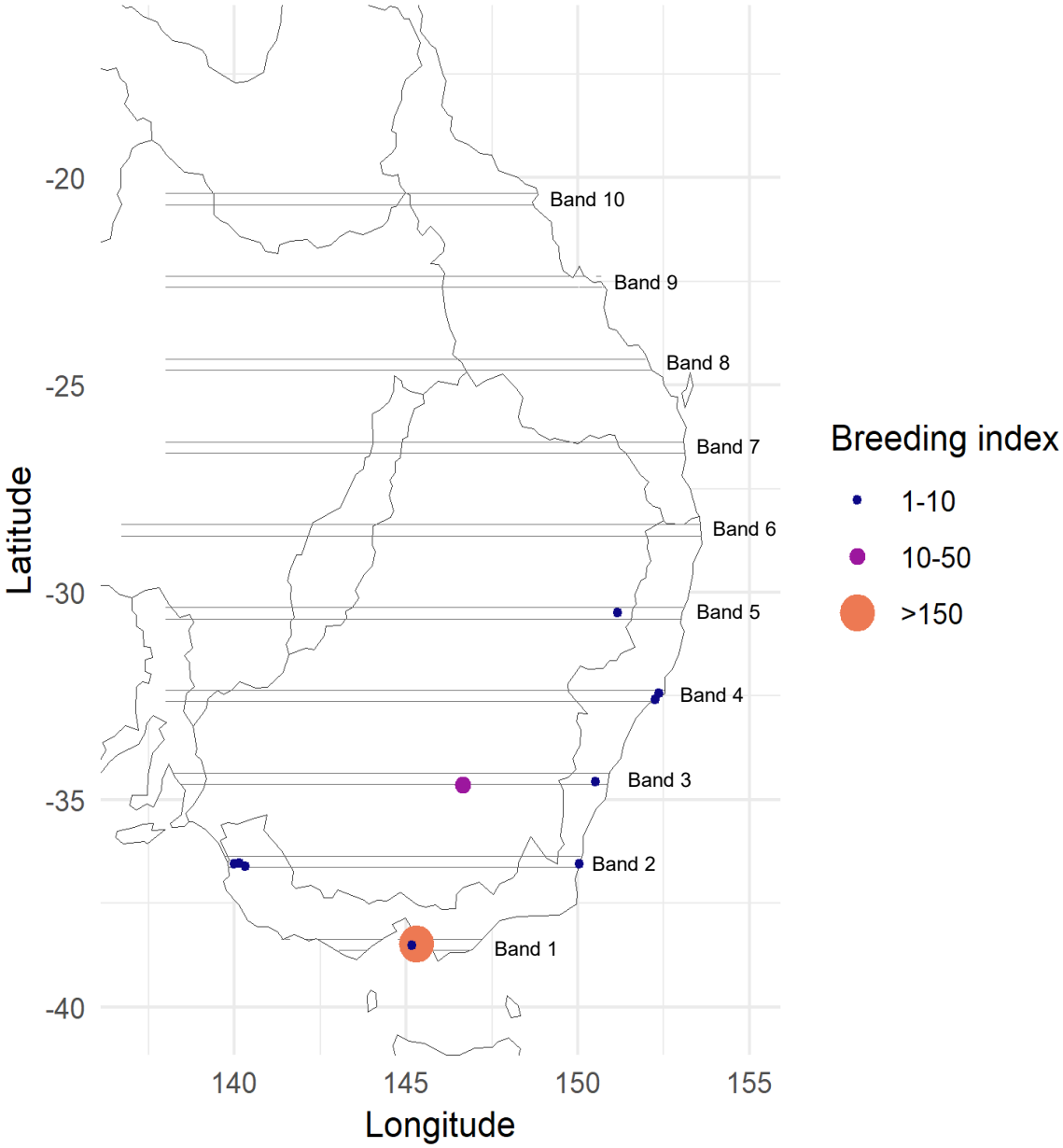

Figure 6. Distribution of waterbird breeding in the 2018 Eastern Australian Waterbird Survey. Only wetlands with breeding recorded are plotted.

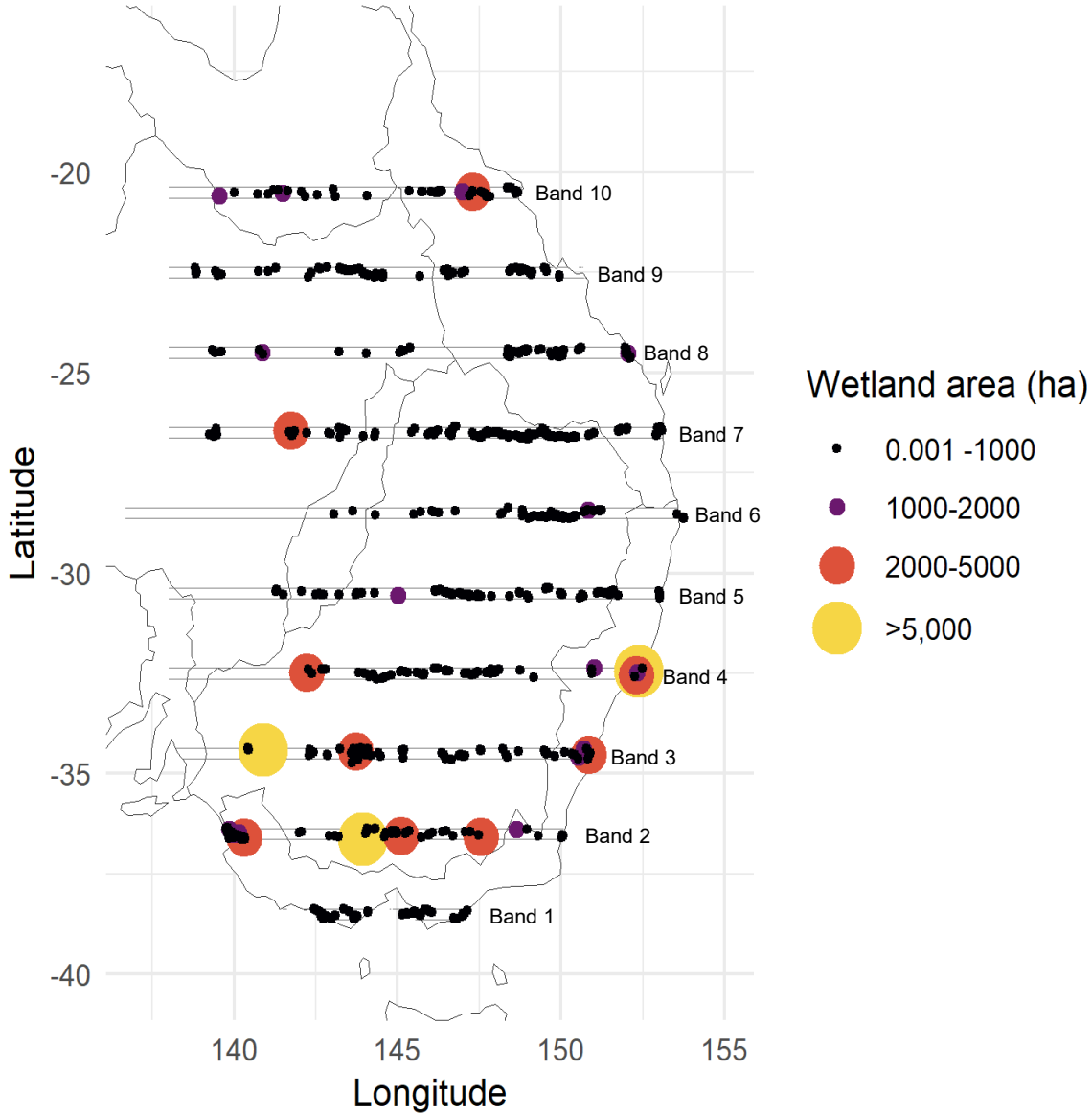

Figure 7. Distribution of wetland area in the 2018 Eastern Australian Waterbird Survey. All surveyed wetlands with surface water present are plotted; dry wetlands not plotted.

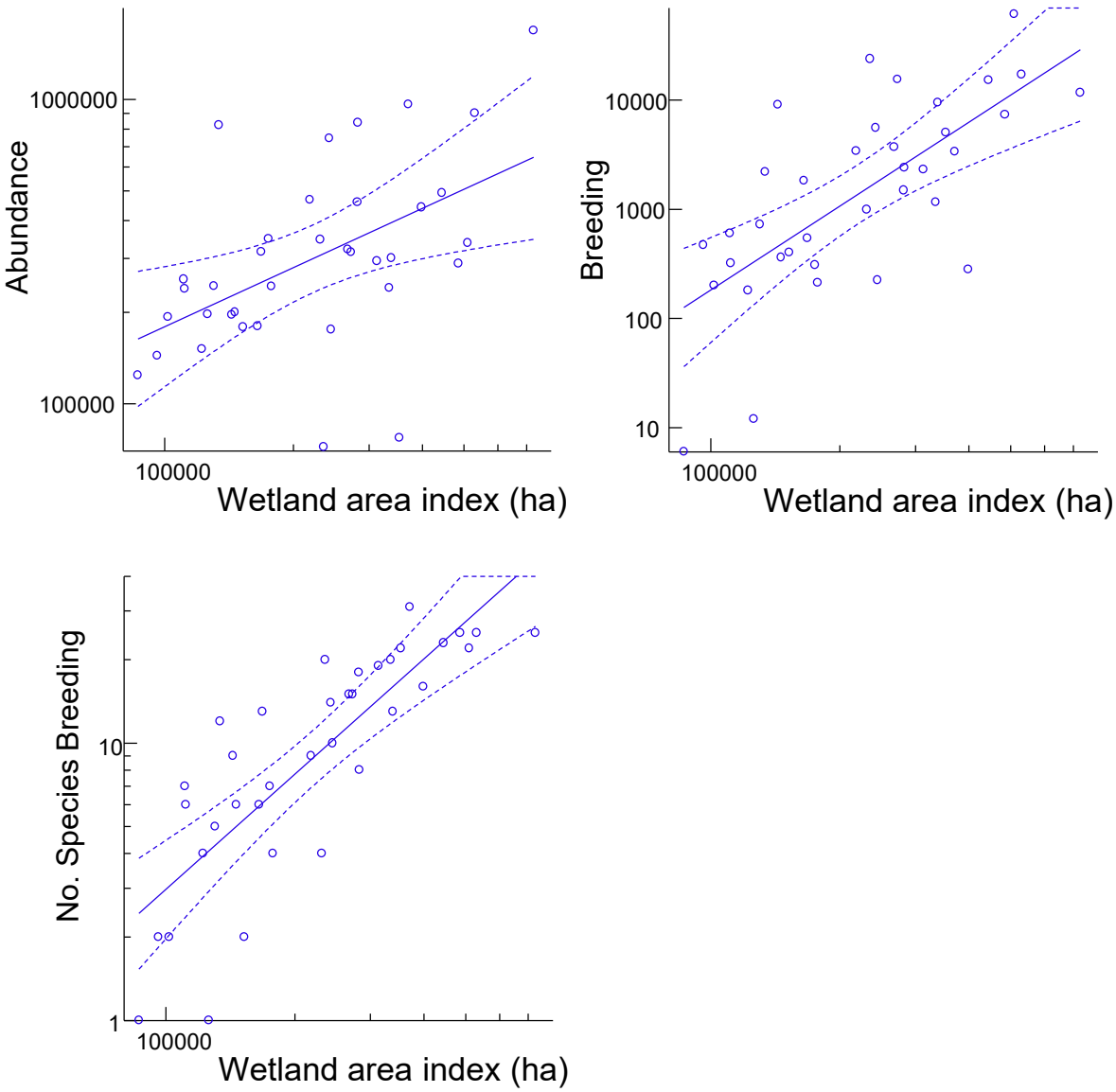

Figure 8. Interactions – mean abundance, breeding and breeding species with wetland area index (ha) for the Eastern Australian Waterbird Survey (1983-2018).

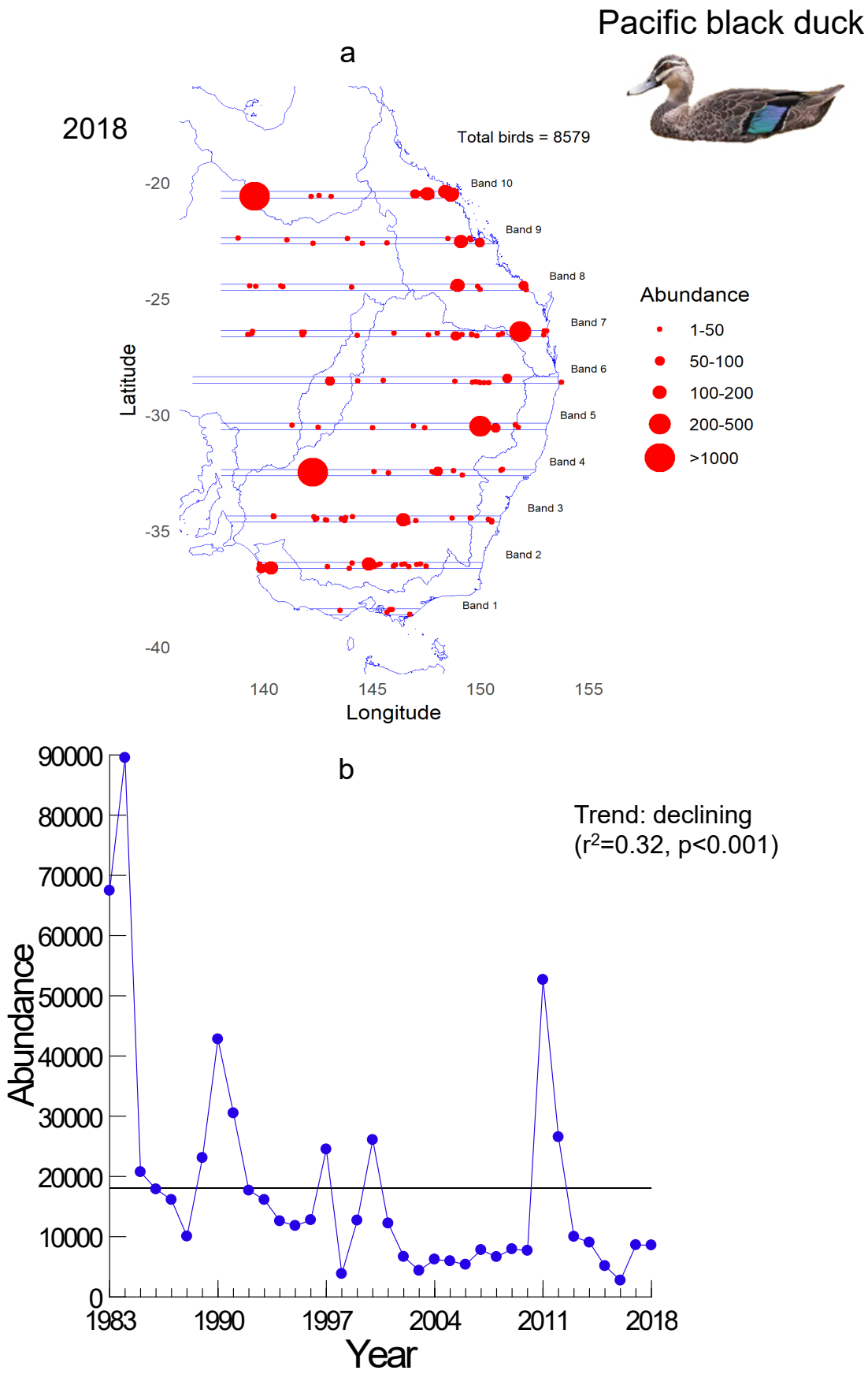

Figure 9. a. Distribution and abundance of Pacific black duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

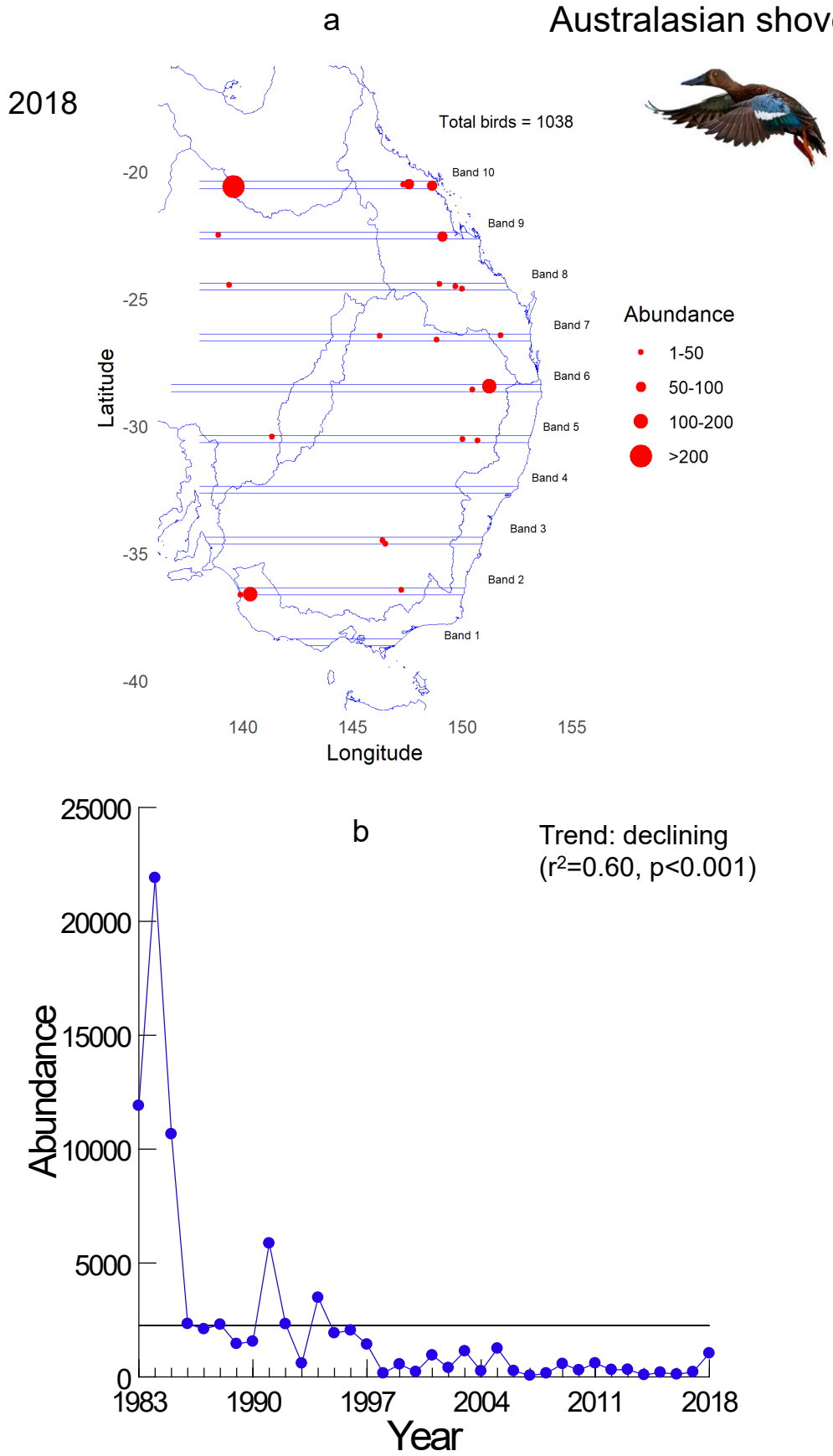

Figure 10. a. Distribution and abundance of Australasian shoveler during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

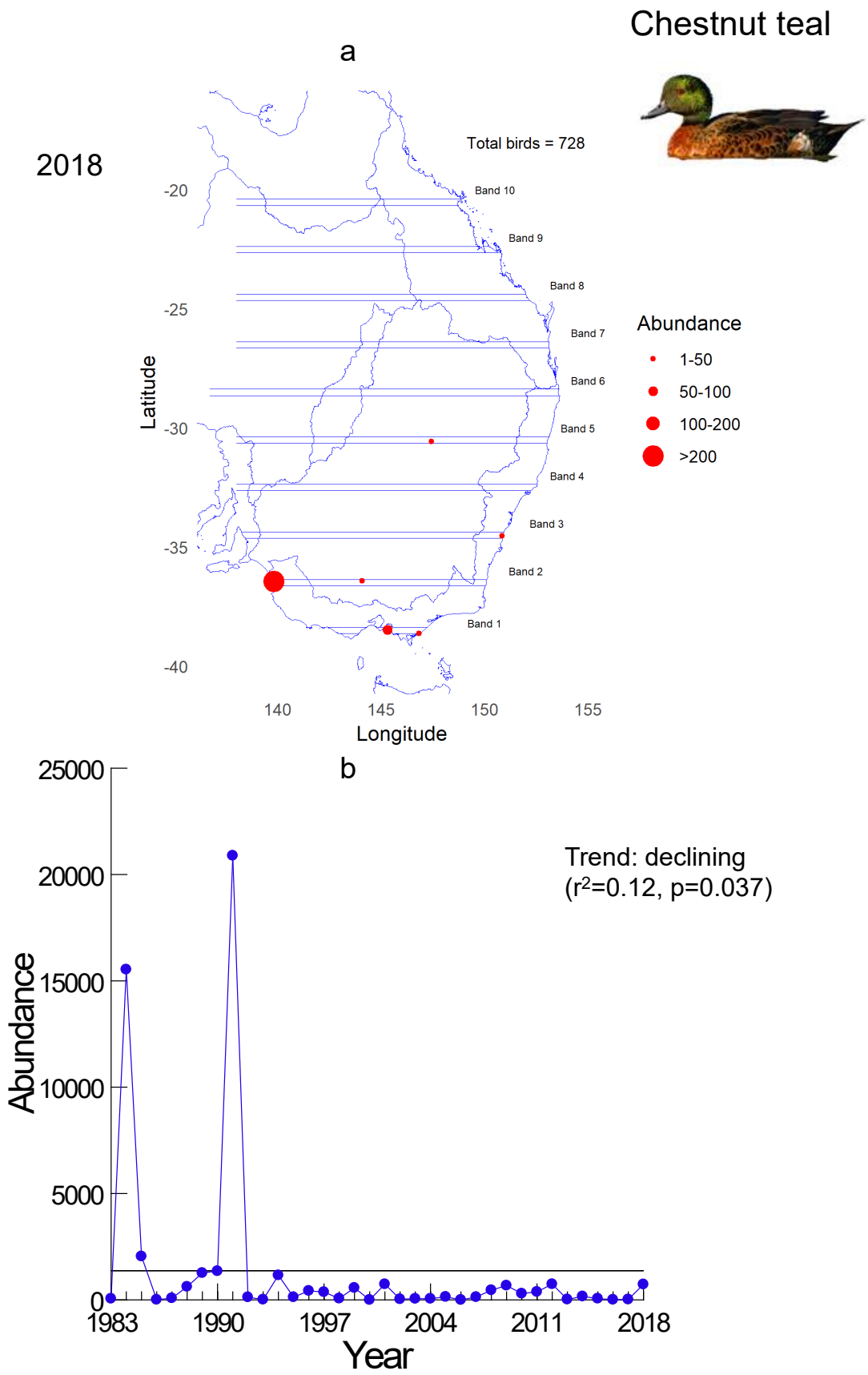

Figure 11. a. Distribution and abundance of Chestnut teal during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

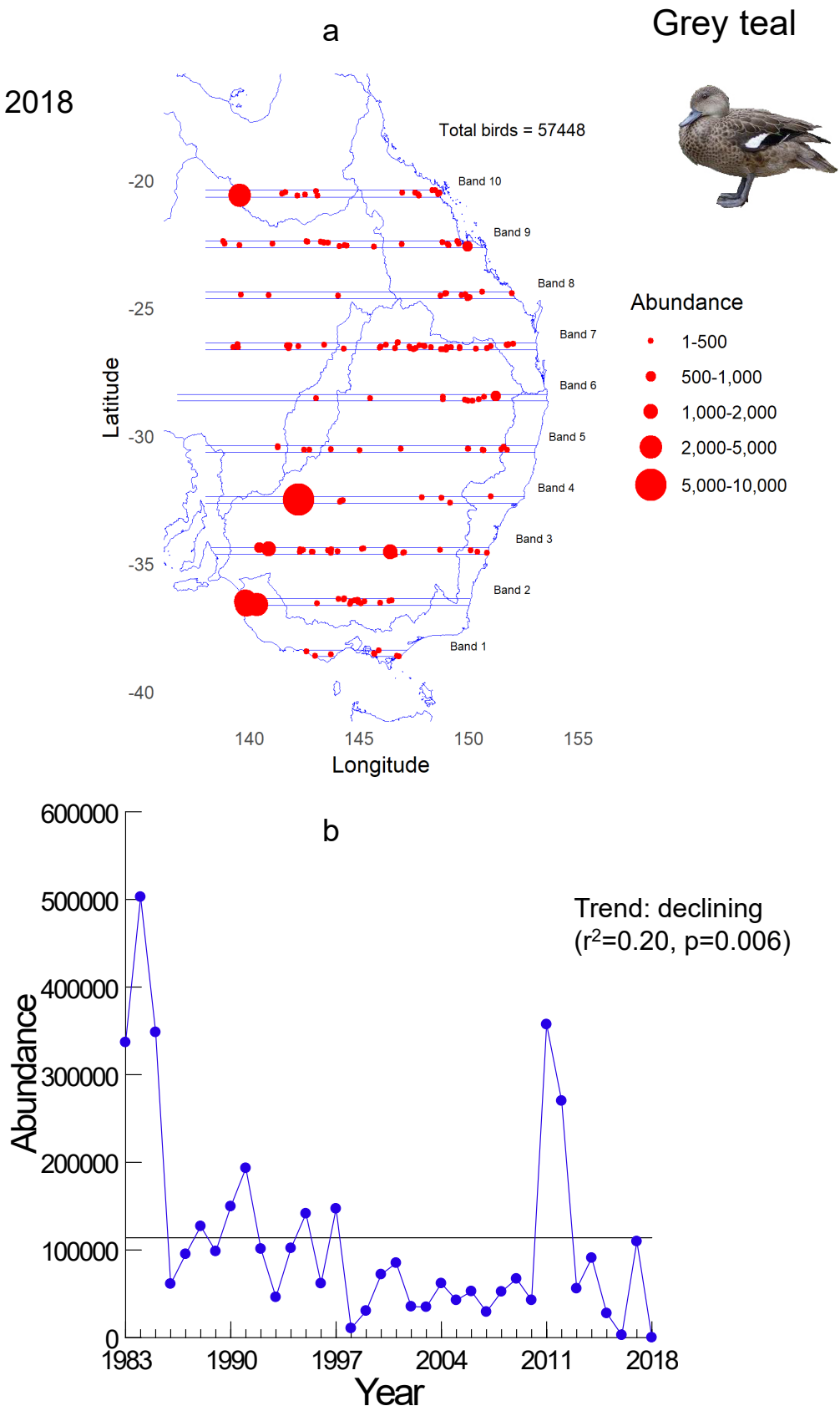

Figure 12. a. Distribution and abundance of Grey teal during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

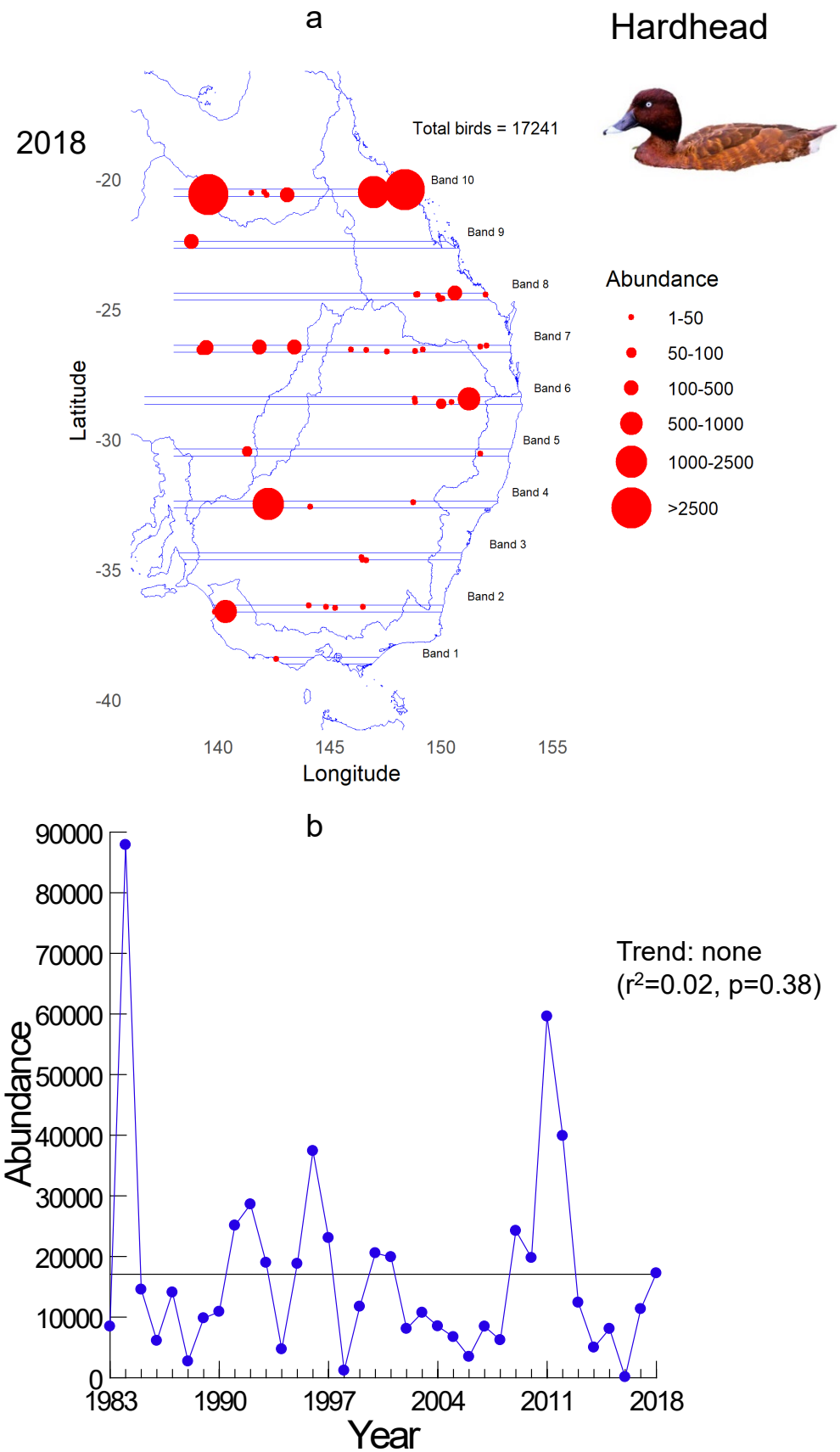

Figure 13. a. Distribution and abundance of Hardhead during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

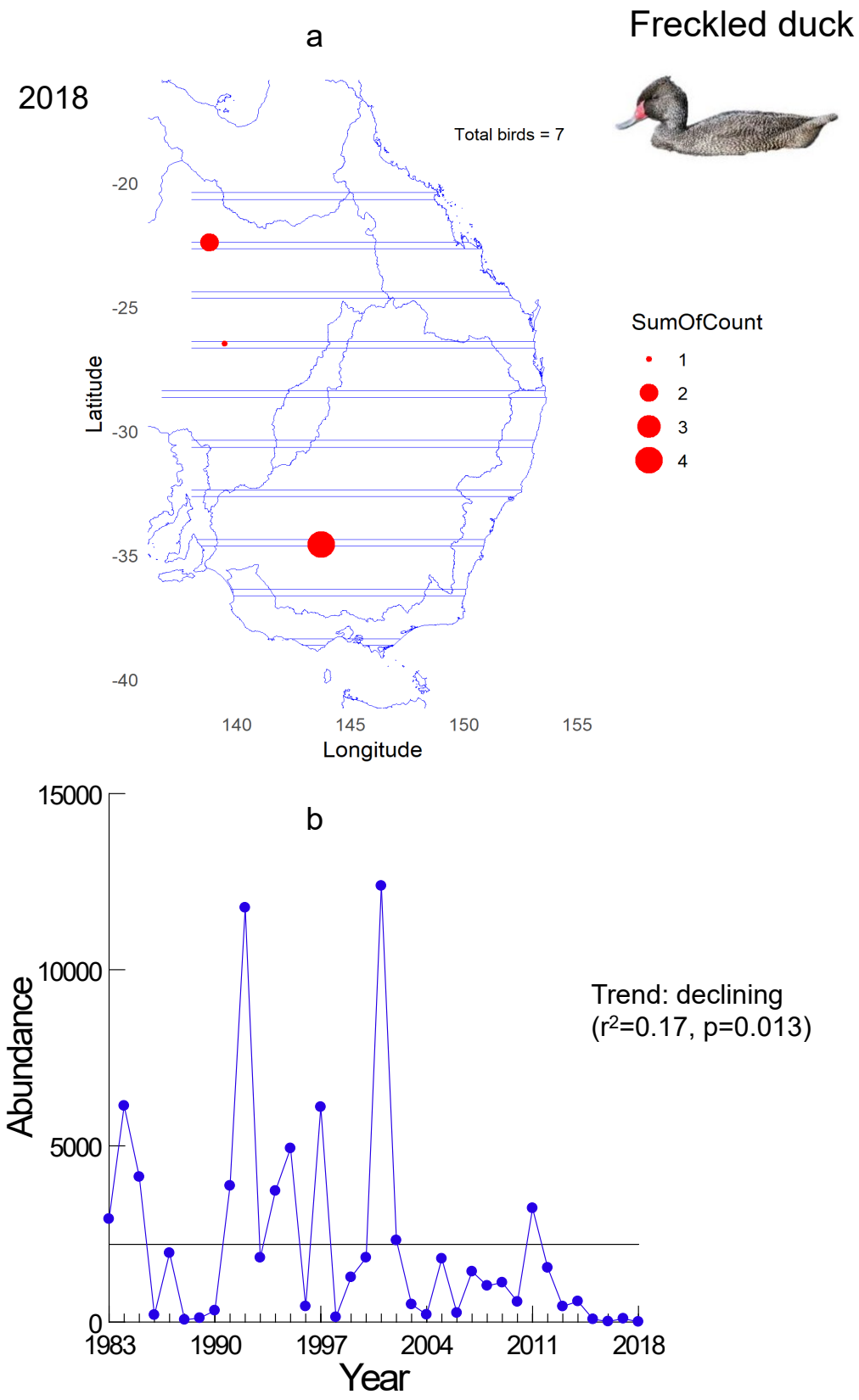

Figure 14. a. Distribution and abundance of Freckled duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

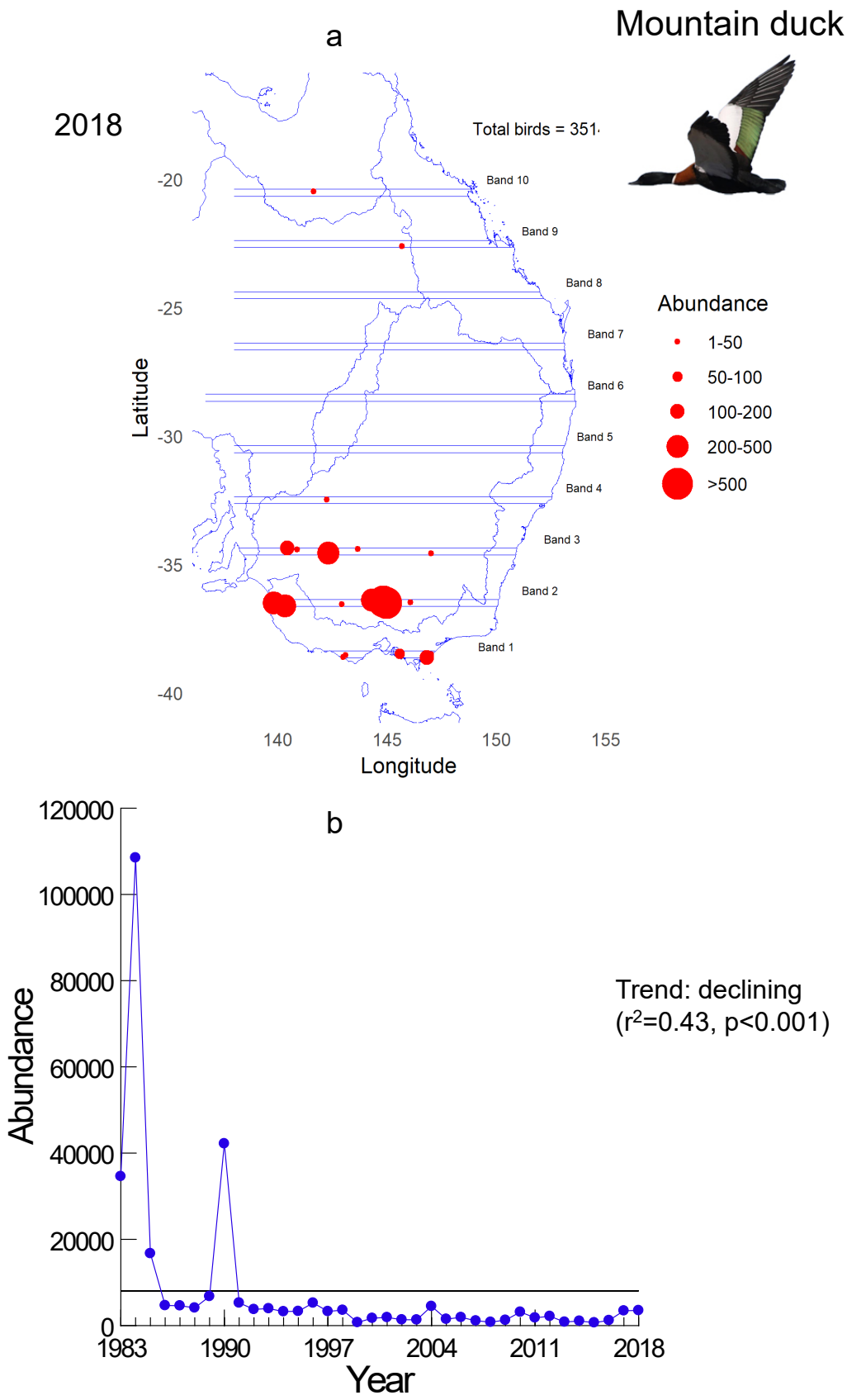

Figure 15. a. Distribution and abundance of Mountain duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

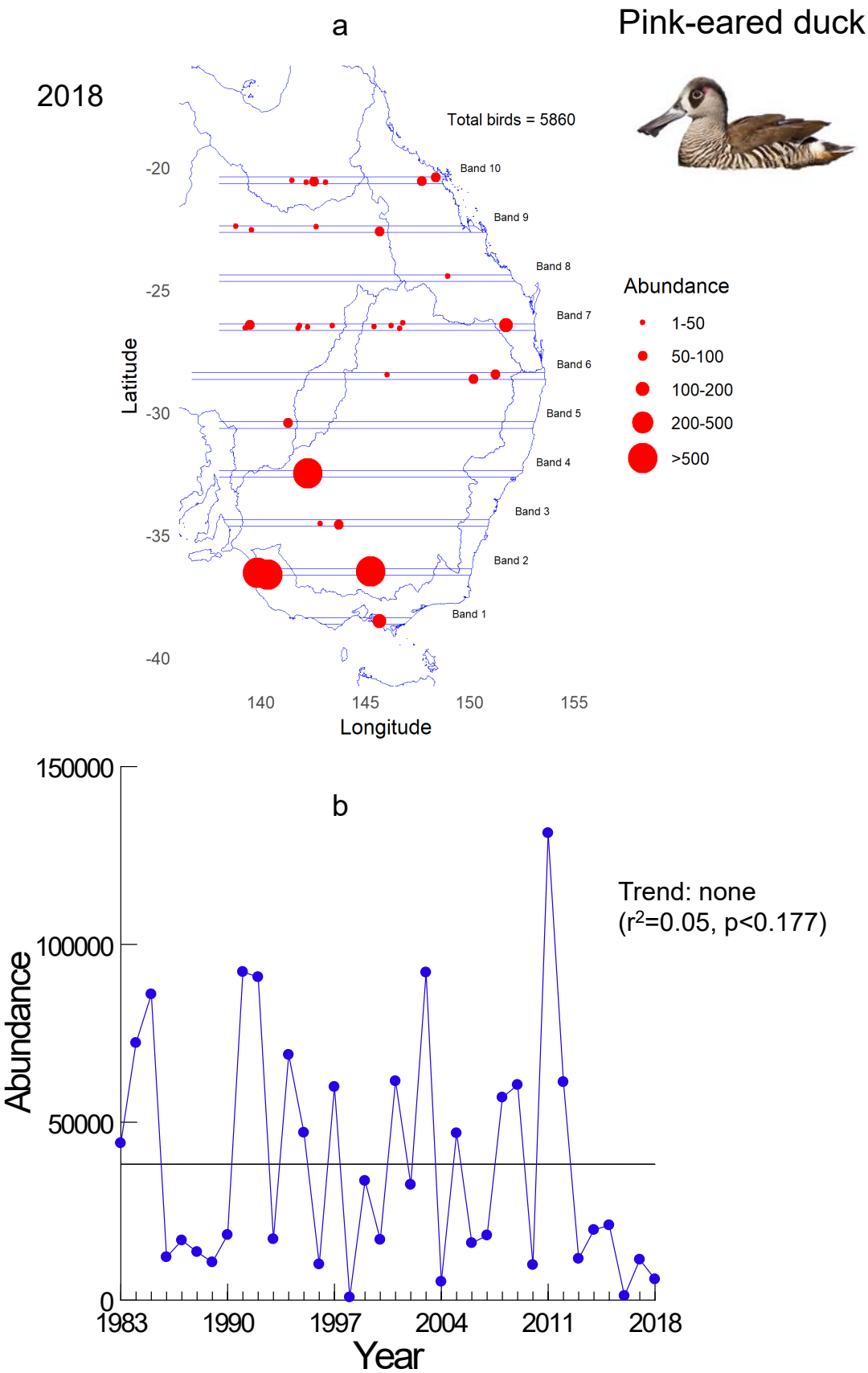

Figure 16. a. Distribution and abundance of Pink-eared duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

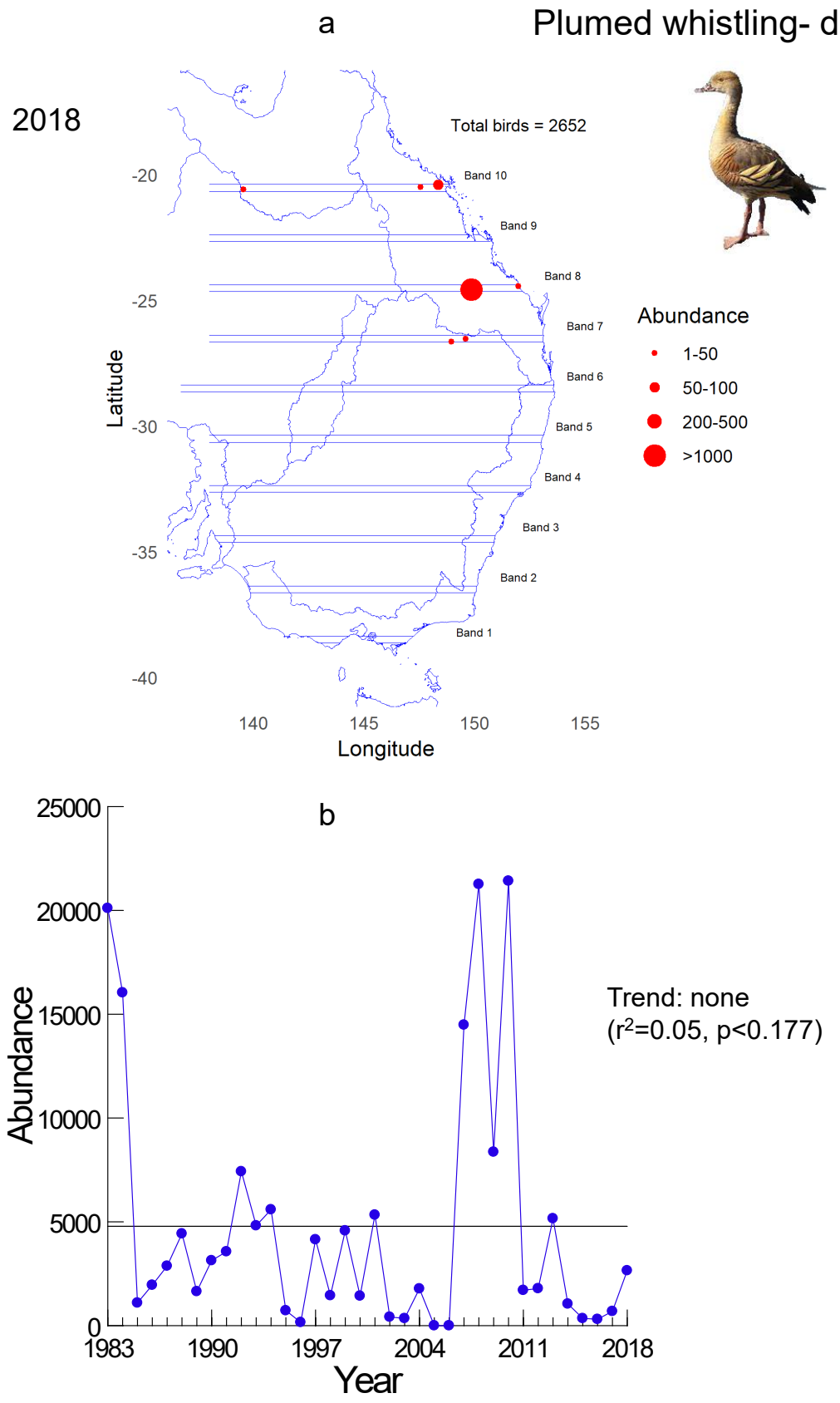

Figure 17. a. Distribution and abundance of Plumed whistling-duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

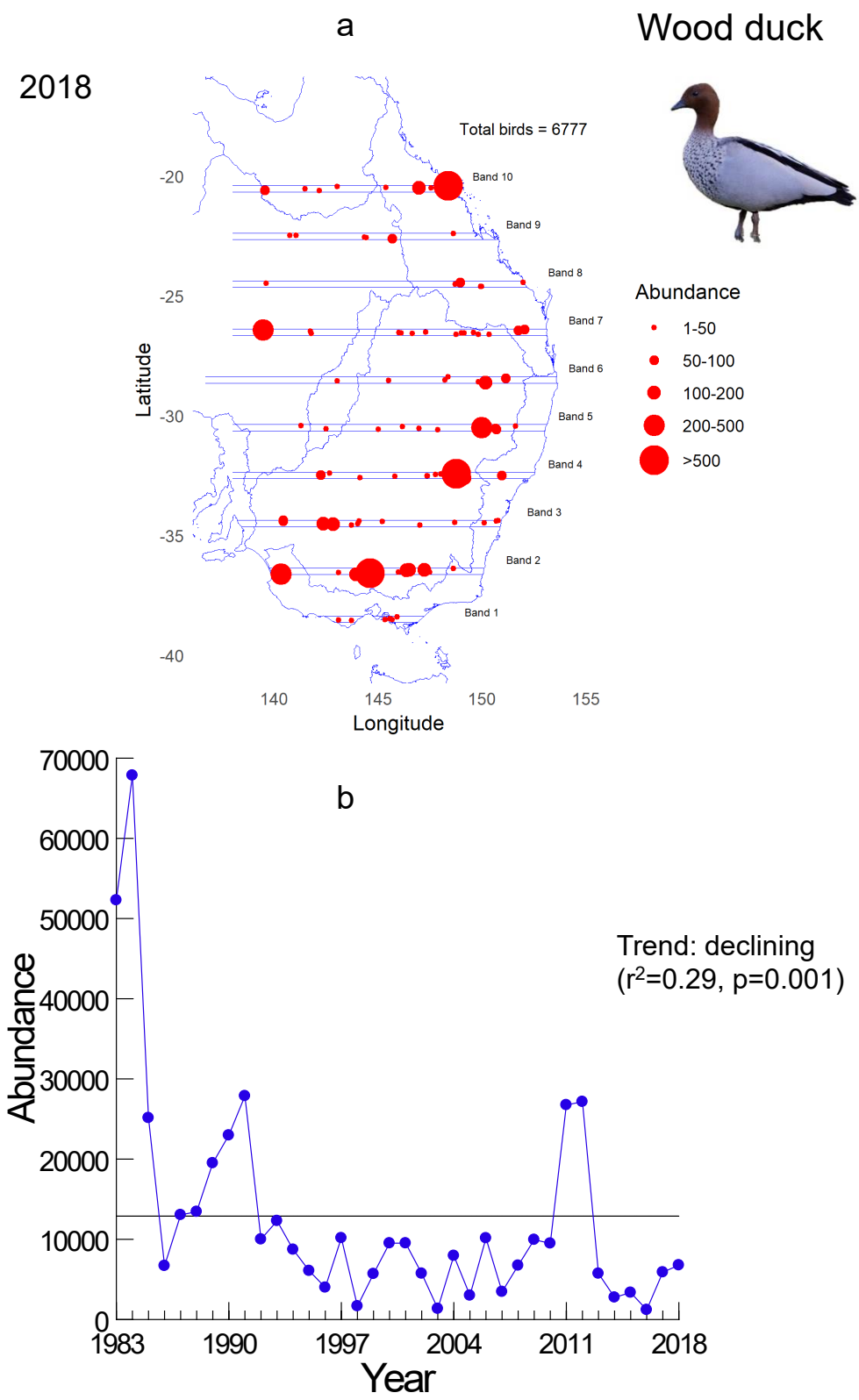

Figure 18. a. Distribution and abundance of Australian wood duck during the 2018 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2018). Horizontal line indicates long term average.

References

1. Bureau of Meteorology (BOM) 2018 Monthly Weather review. Australian Government. Accessed 20/11/2018 http://www.bom.gov.au/climate/drought/
2. Queensland Government 2018 Drought declarations (Department of Agriculture and Fisheries). Accessed 20/11/2017 https://www.longpaddock.qld.gov.au/drought/drought-declarations/
3. Department of Primary Industries (DPI) 2018 https://edis.dpi.nsw.gov.au/