Aerial Survey of Wetland Birds in Eastern Australia - October 2019 Annual Summary Report

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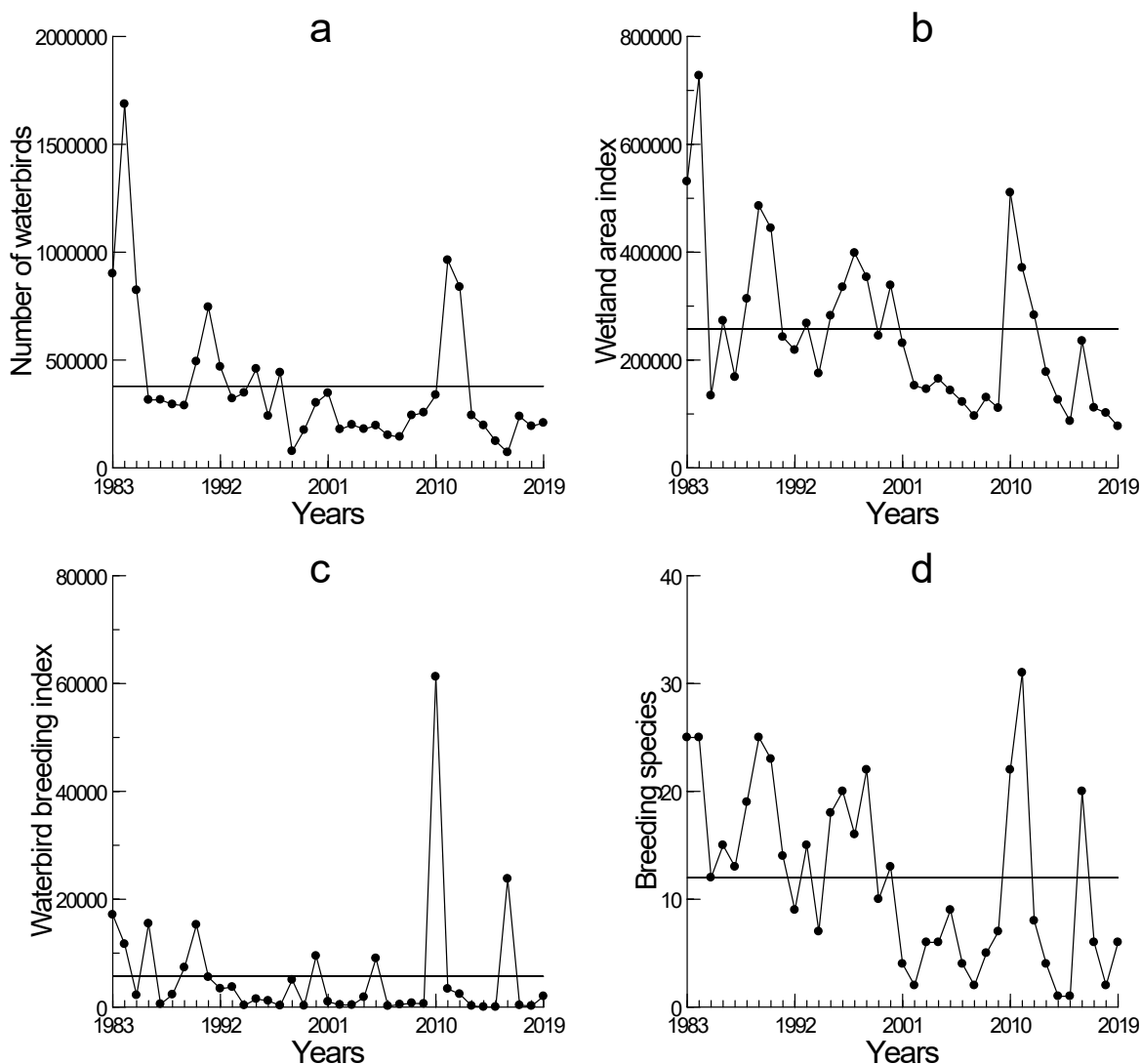# 2019 Aerial Survey of Wetland Birds in Eastern Australia

Summary

- The year 2019 has been exceptionally dry with significant rainfall deficiencies continuing to affect most of Australia. This years spring was the driest on record across Australia and the year-to-date rainfall has been the lowest on record for southern Australia. The Murray–Darling Basin has experienced its worst 2-3 year drought period in over 120 years.

- Almost all of NSW is drought affected (42%) or in drought (57.7%), with a significant portion of the state (14%) experiencing intense drought (DPI 2019). More than 66% 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 2019). Rainfall was below to very much below average with most of eastern South Australia drought affected (Primary Industries and Regions SA 2019), and northern Victoria where drought conditions have intensified.

- As well as being extremely dry, 2019 has also been very warm. Australian maximum temperatures for the year to date have been the second warmest on record, second only to 2014. New South Wales has experienced its warmest January–November period on record, while Victoria had its hottest day on record (BOM 2019). Queensland temperatures were also well above average with the third warmest year on record (BOM 2019).

- All major indices for waterbirds (total abundance, breeding index, number of species breeding and wetland area index) continue 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). Long term trends are more informative for predicting population status than year to year fluctuations.

- Total waterbird abundance (n=208,364) increased marginally from 2018 but remains well below average: the 13th lowest in 37 years. Waterbirds were most abundant in bands 2 and 9 (Figs 1, 2 & 5).

- Breeding species' richness and breeding abundance, increased compared to the previous year; however, breeding was heavily concentrated at one site – Rhyll Swamp in Band 1 (Fig. 6) and comprised mostly of Straw-necked ibis.

- 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 the lowest since surveys began. Some rivers and wetlands in the northern Lake Eyre Basin including the Diamantina and Georgina rivers, held small amounts of water and supported low numbers of waterbirds. Lakes Torquinnie and Mumbleberry held water and supported moderate to high numbers of waterbirds. Lake Galilee was shallow and drying and supported the largest concentration with more than 43,000 waterbirds (Fig. 5).

- The Macquarie Marshes were very dry with very low numbers of waterbirds and no breeding. The Lowbidgee wetlands had little water, but with some low environmental flows provided by the NSW Government and Commonwealth managed environmental water, but were drier than in 2018; they supported low numbers of waterbirds with no breeding recorded. Most of the wetlands in the Menindee Lakes system were dry except the small Copi Hollow and a small amount of water remaining in Lake Wetherell. Overall, there were few waterbirds and no breeding activity. This was the driest that the system has been in 37 years. The Tallywalka lakes system was also dry (Fig. 7).

## 2019 Aerial Survey of Wetland Birds in Eastern Australia Summary (continued)

- Waterbirds were concentrated on a small proportion of wetlands and less widely dispersed than in the previous year; 11 wetlands supported more than 5,000 waterbirds representing 50% of the total abundance – none of these occurred in the Murray Darling Basin (Fig. 5). These areas were distributed across bands 7-10 and 2 and generally supported high species diversity (Figs 2 & 7). More than 52% of surveyed wetlands supported no waterbirds (includes wetlands that were dry).

- Total breeding index (nests + broods) of 1,987 (all species combined) increased from the previous year but remains well below the long term average (Fig. 1). Breeding species' richness was low, with only 6 species recorded breeding: Straw-necked Ibis (1,800) and Black swans (133) comprised 97% of the total (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). Australian wood duck were an exception with total abundance slightly above the long term average (Fig. 19).

- Waterbird indices across river basins generally reflected declines in available of habitat and drought intensity; 2019 abundance and wetland area declined sharply in the Murray-Darling Basin compared to the previous year. Conversely abundance in the Lake Eyre basin increased by an order of magnitude after flooding earlier in the year that partially filled Lake Eyre (Fig. 8).

- 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. 9).

- Selected species distribution and abundances are shown in figures 10-19; Freckled duck and Plumed whistling-duck are included for comparison with game species. Map plots in these figures show 2019 distribution and trend plots show changes in abundance over time (1983-2019). Horizontal lines in trend plots indicates the long term average.

Figure 1. Changes over time in a) total abundance, b) wetland area, c) breeding and d) number of breeding species in the Eastern Australian Waterbird Survey (1983-2019); horizontal lines show long-term averages.
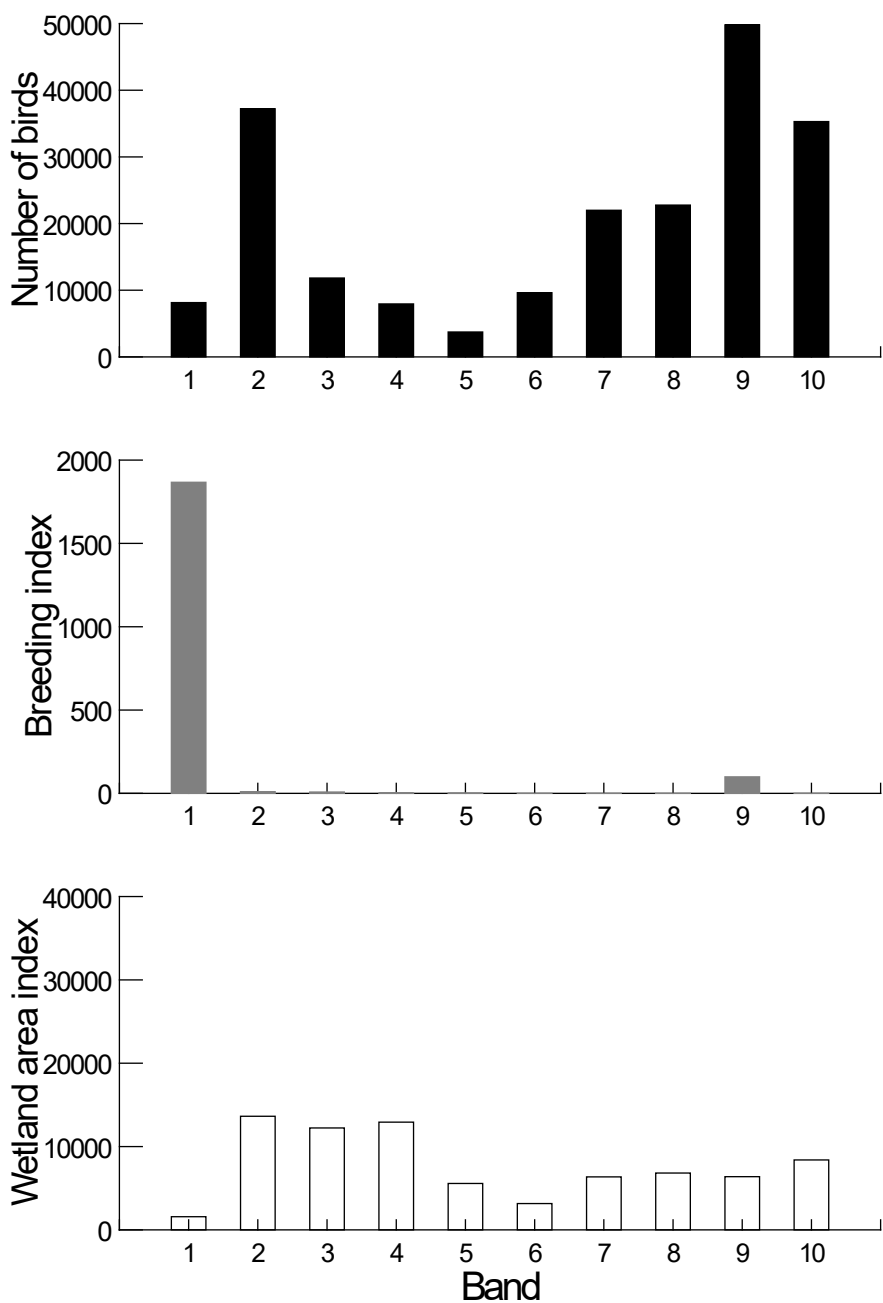
Figure 2. Waterbird abundance, breeding index and wetland area index in 10 survey bands of the Eastern Australian Waterbird Survey in 2019.
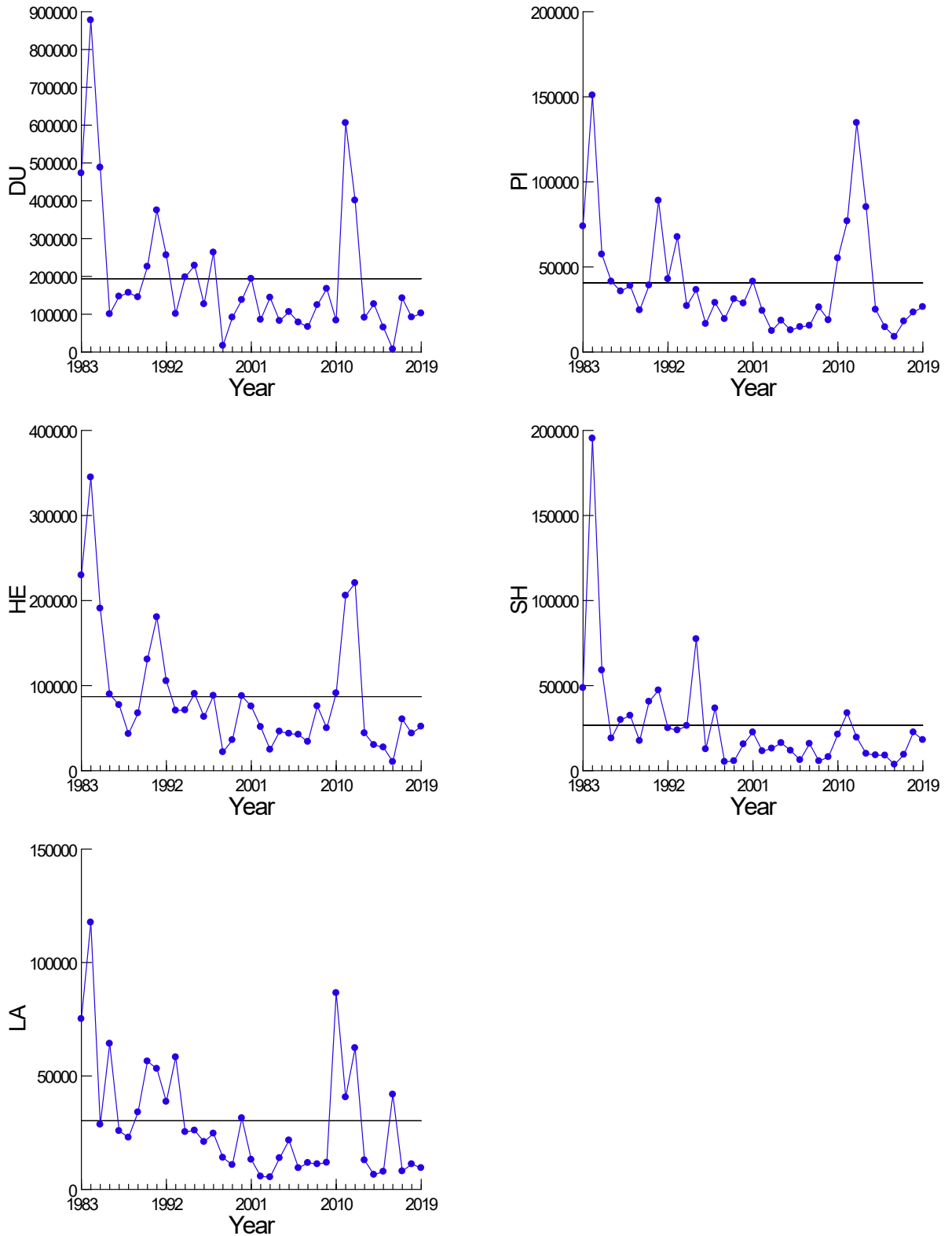
Figure 3. Changes in abundances of waterbird functional response groups (Du=ducks; Pi=piscivores; He=herbivores; Sh=shorebirds; La=large wading birds) over time in the Eastern Australian Waterbird Survey (1983-2019).
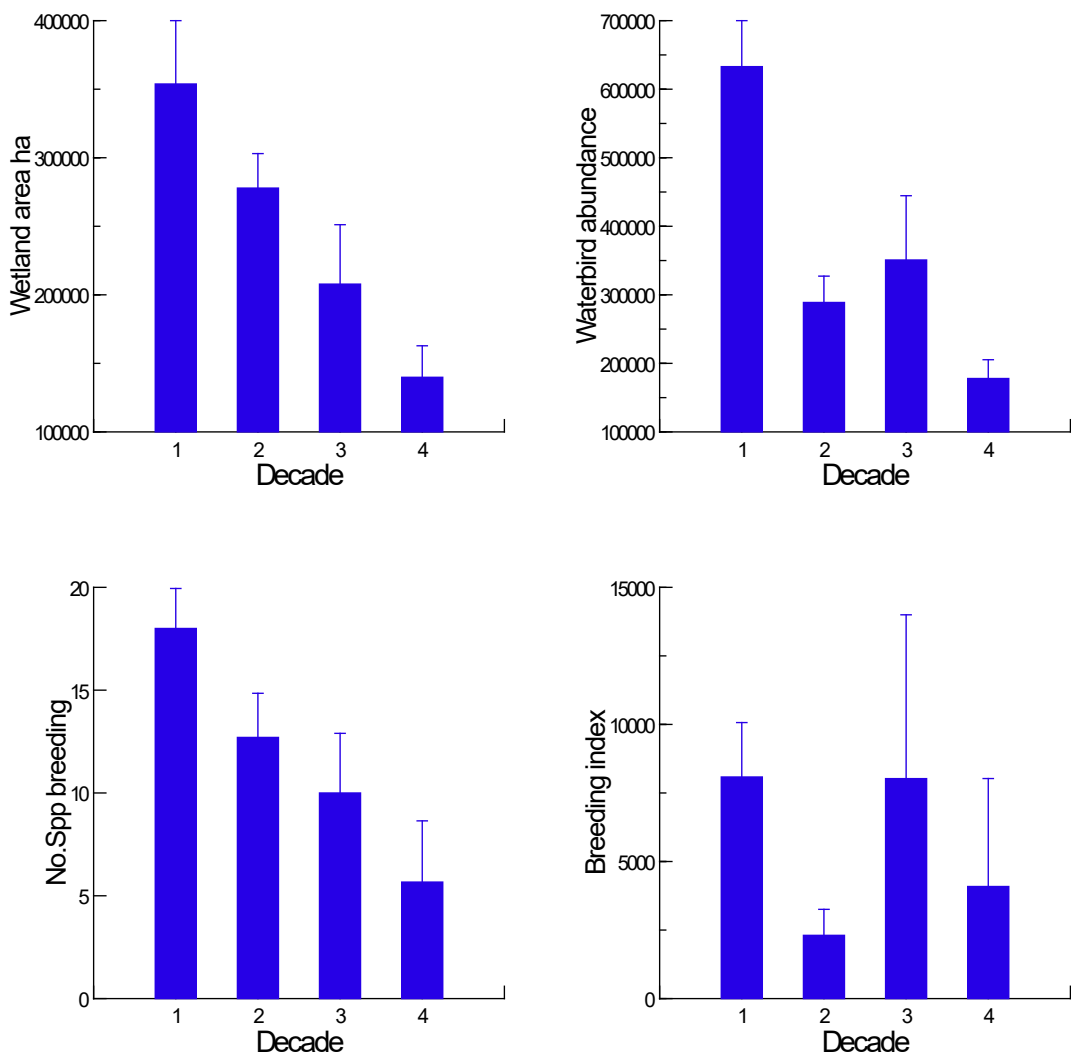
Figure 4. Decadal changes in indices including total abundance, wetland area, number of breeding species and breeding in the Eastern Australian Waterbird Survey (1983-2019).

Table 1. Trends in total waterbird abundance, wetland area index, breeding index and breeding species richness in the Eastern Australian Waterbird Survey (1983-2019).

Variable	1983-2019 All years		1985-2019 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 (1983-2019).

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 (1983-2019).

| Species	Trend	Regression
Black duck	decline	r^2=0.32, p<0.001
Australasian shoveler	decline	r^2=0.39, p<0.001
Chestnut teal	decline	r^2=0.12, p=0.036
Grey teal	decline	r^2=0.19, p=0.006
Hardhead	no trend	r^2=0.03, p=0.326
Mountain duck	decline	r^2=0.42, p<0.001
Pink-eared duck	no trend	r^2=0.06, p=0.153
Australian Wood duck	decline	r^2=0.24, p=0.003

2019 Total abundance 208,364
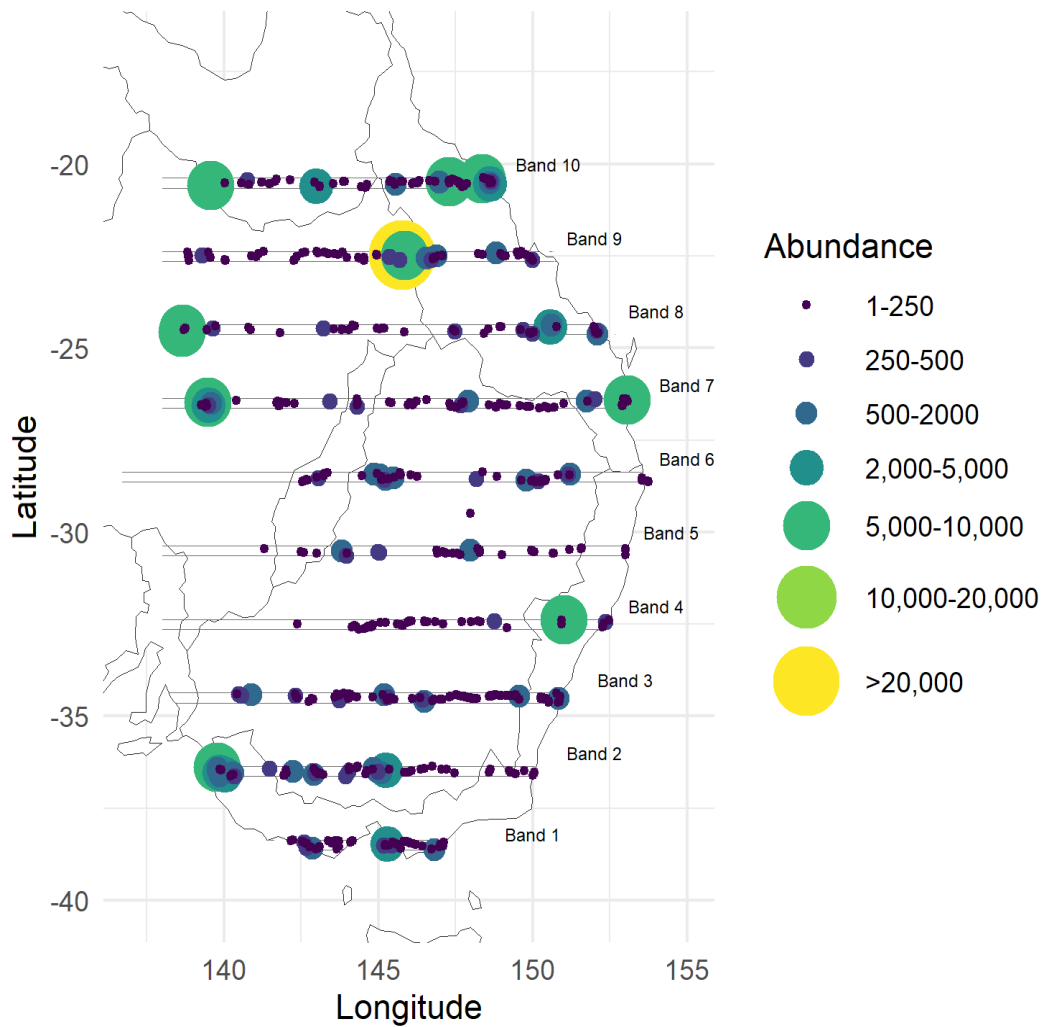
Figure 5. Distribution and abundance of waterbirds in the 2019 Eastern Australian Waterbird Survey. Dry wetlands and those with zero waterbirds not plotted.
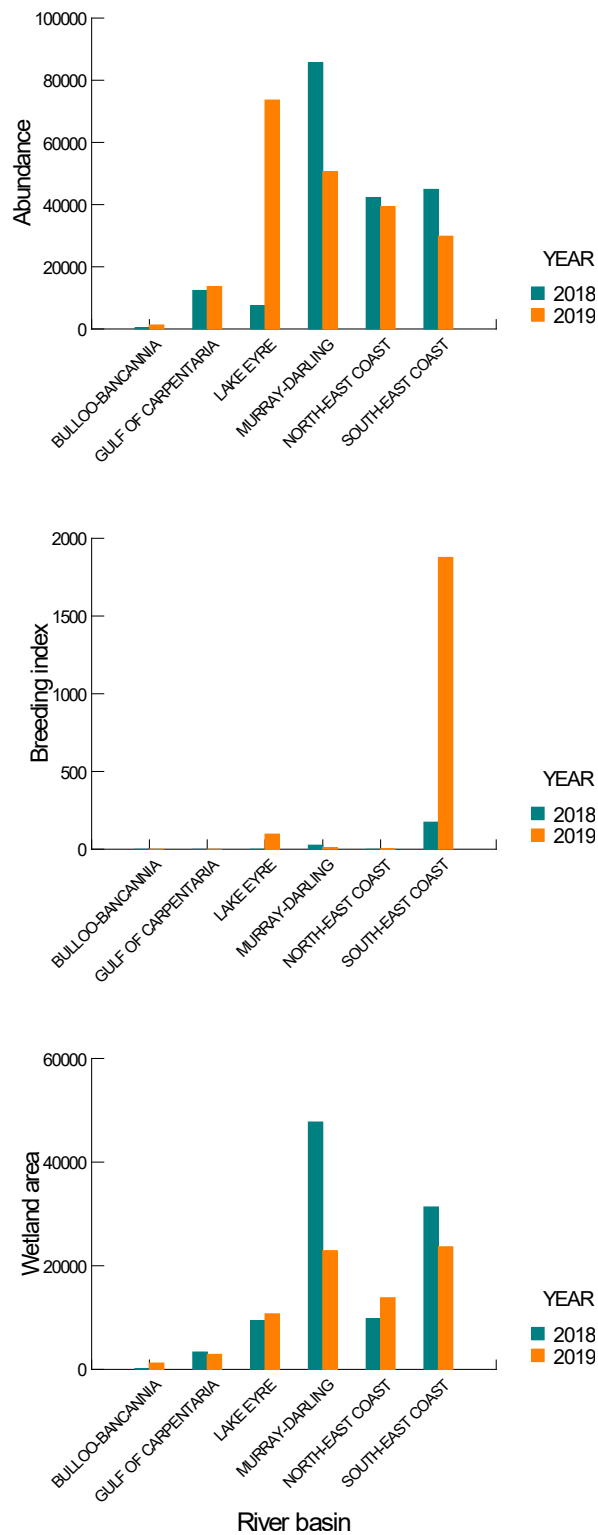
2019 Breeding index 1,987
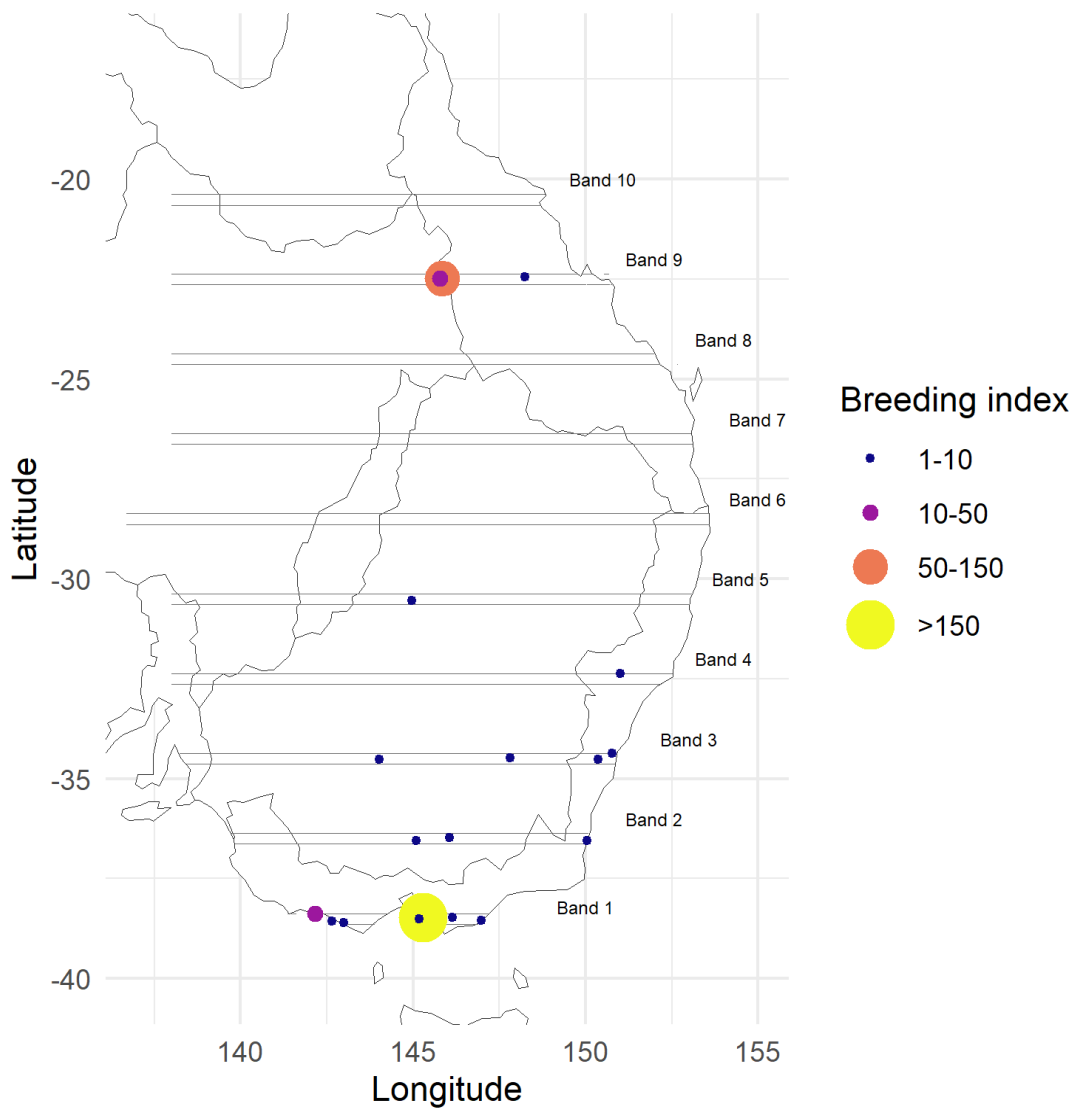
Figure 6. Distribution of waterbird breeding in the 2019 Eastern Australian Waterbird Survey. Only wetlands with breeding recorded are plotted.
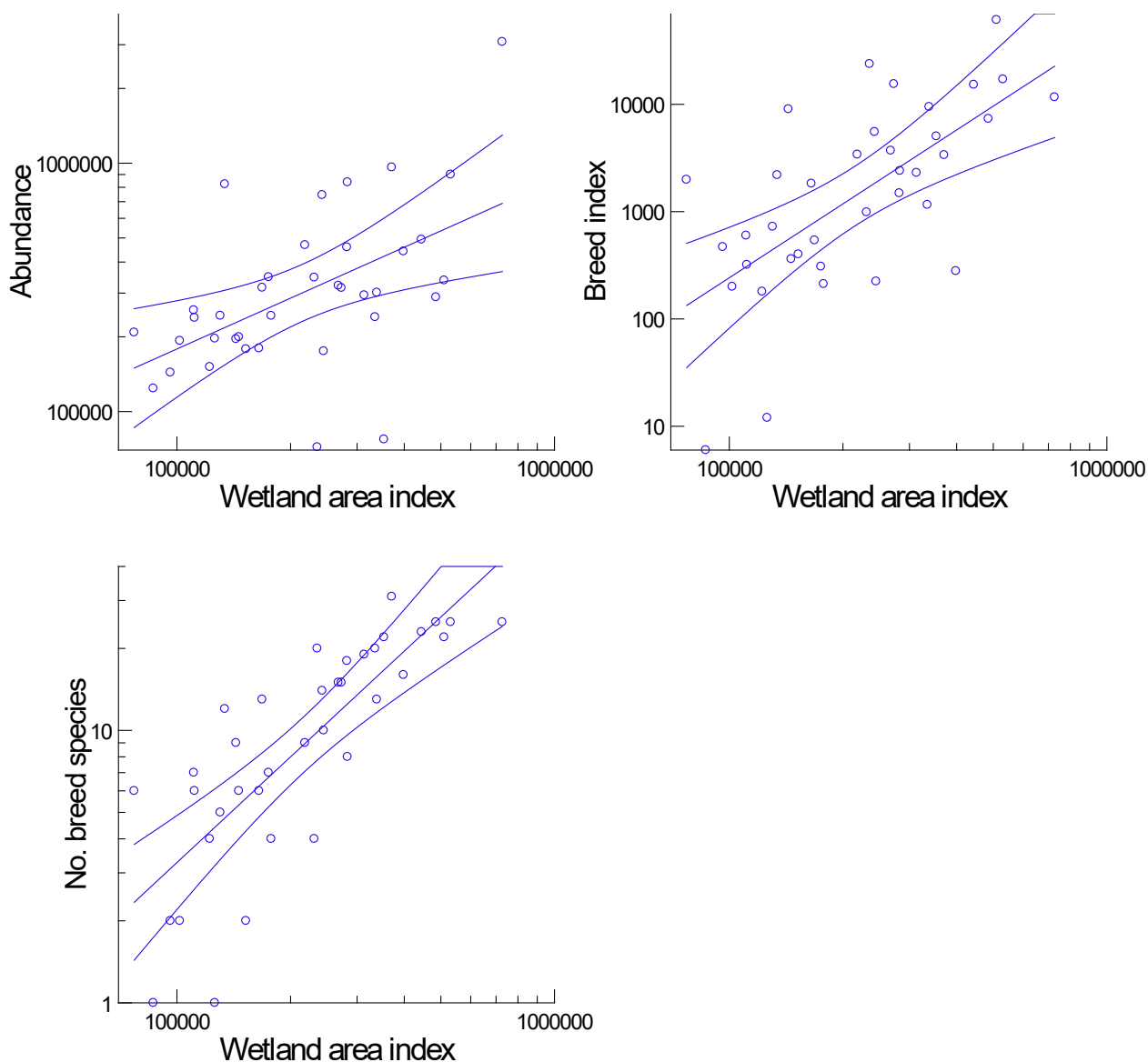
2019 Wetland area index 75,239 ha
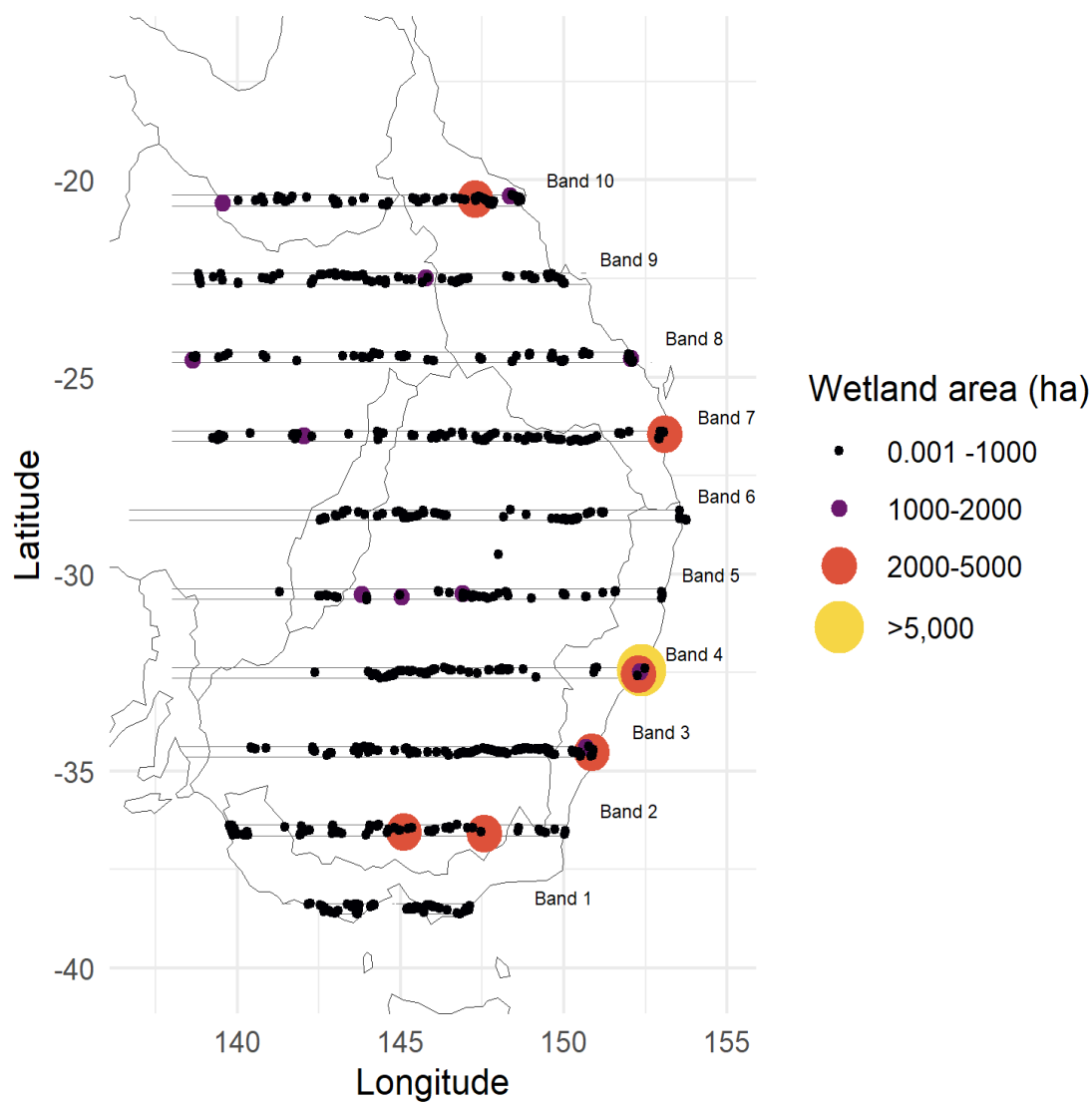
Figure 7. Distribution of wetland area in the 2019 Eastern
Australian Waterbird Survey. All surveyed wetlands with
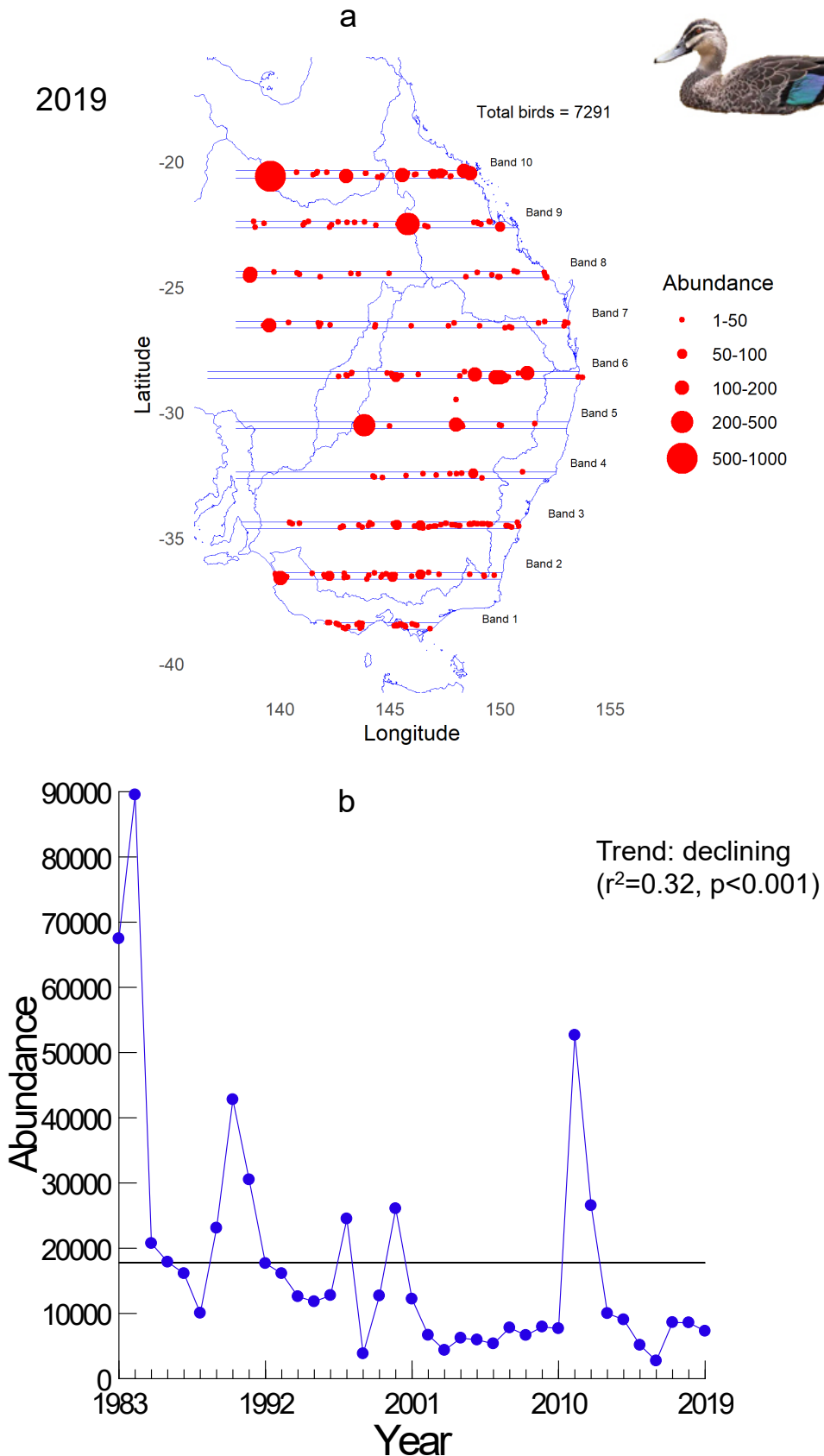surface water present are plotted; dry wetlands not plotted.

Figure 8. Comparison of waterbird abundance, breeding index and wetland area in major river basins in 2018 to 2019.
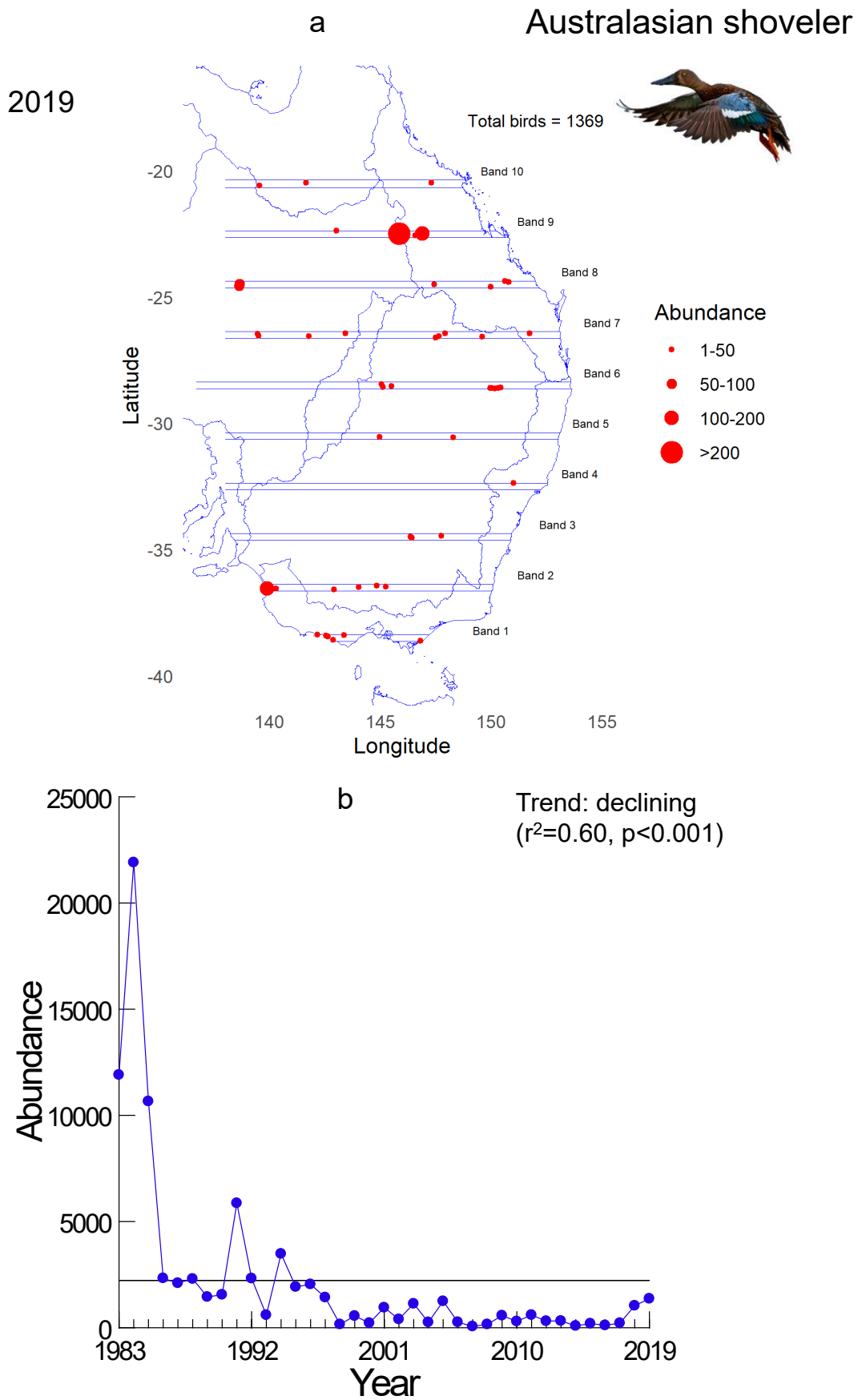
Figure 9. Interactions – mean abundance, breeding and number of breeding species with wetland area index (ha) for the Eastern Australian Waterbird Survey (1983-2019).

Pacific black duck

a

2019

Total birds = 7291

Band 10
Band 9
Band 8
Band 7
Band 6
Band 5
Band 4
Band 3
Band 2
Band 1

Abundance

- 1-50
- 50-100
- 100-200
- 200-500
- 500-1000

Latitude

Longitude

b

Trend: declining
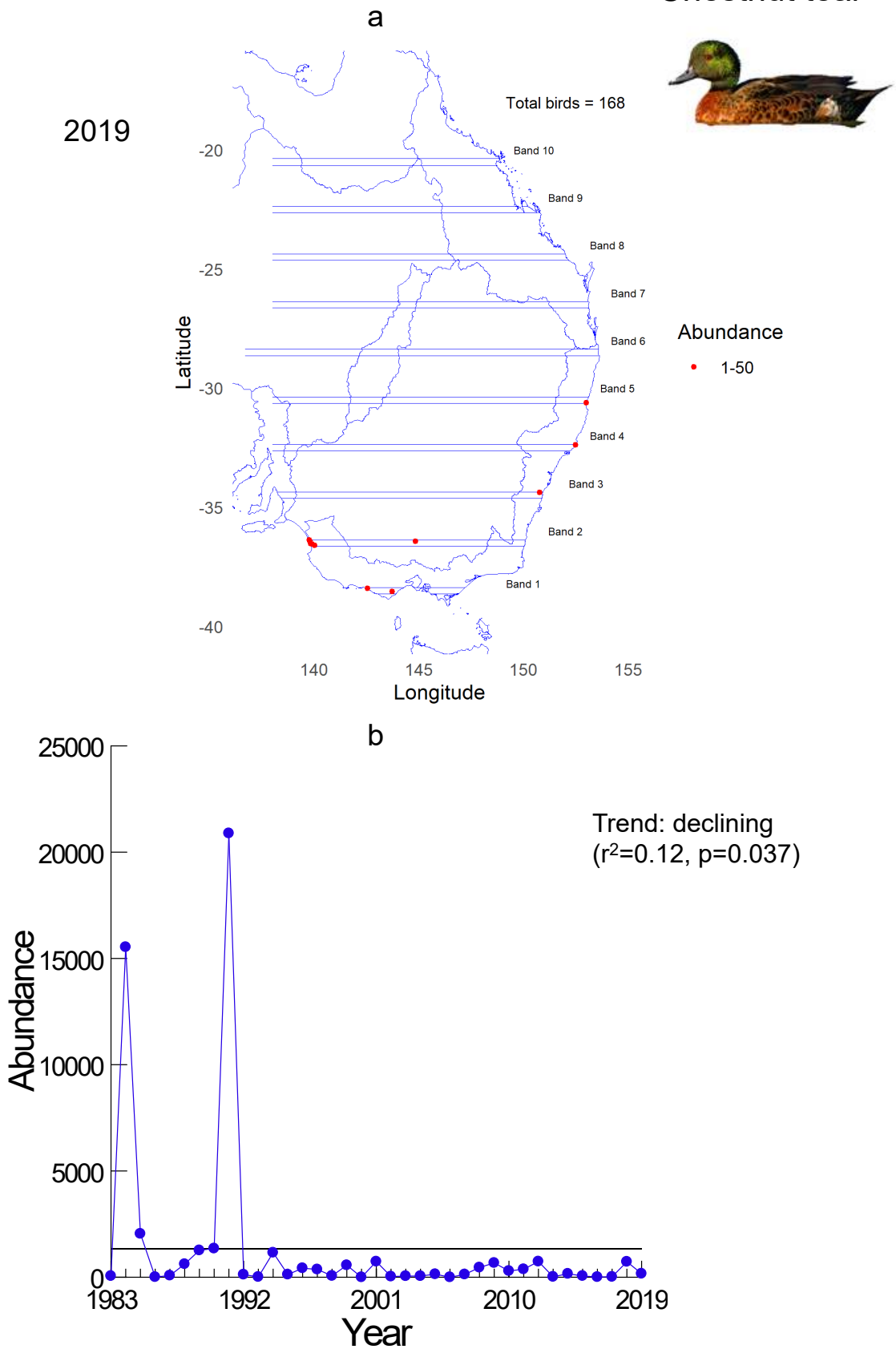(r^2=0.32, p<0.001)

Abundance

Year

Figure 10. a. Distribution and abundance of Pacific black duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

a   Australasian shoveler

2019

Total birds = 1369

Band 10
Band 9
Band 8
Band 7
Band 6
Band 5
Band 4
Band 3
Band 2
Band 1

Abundance

· 1-50
● 50-100
● 100-200
● >200

Latitude

-20
-25
-30
-35
-40

140   145   150   155

Longitude

b   Trend: declining
(r^2=0.60, p<0.001)

25000

20000

15000

10000

5000

0

Abundance

1983   1992   2001   2010   2019

Year

Figure 11. a. Distribution and abundance of Australasian shoveler during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.
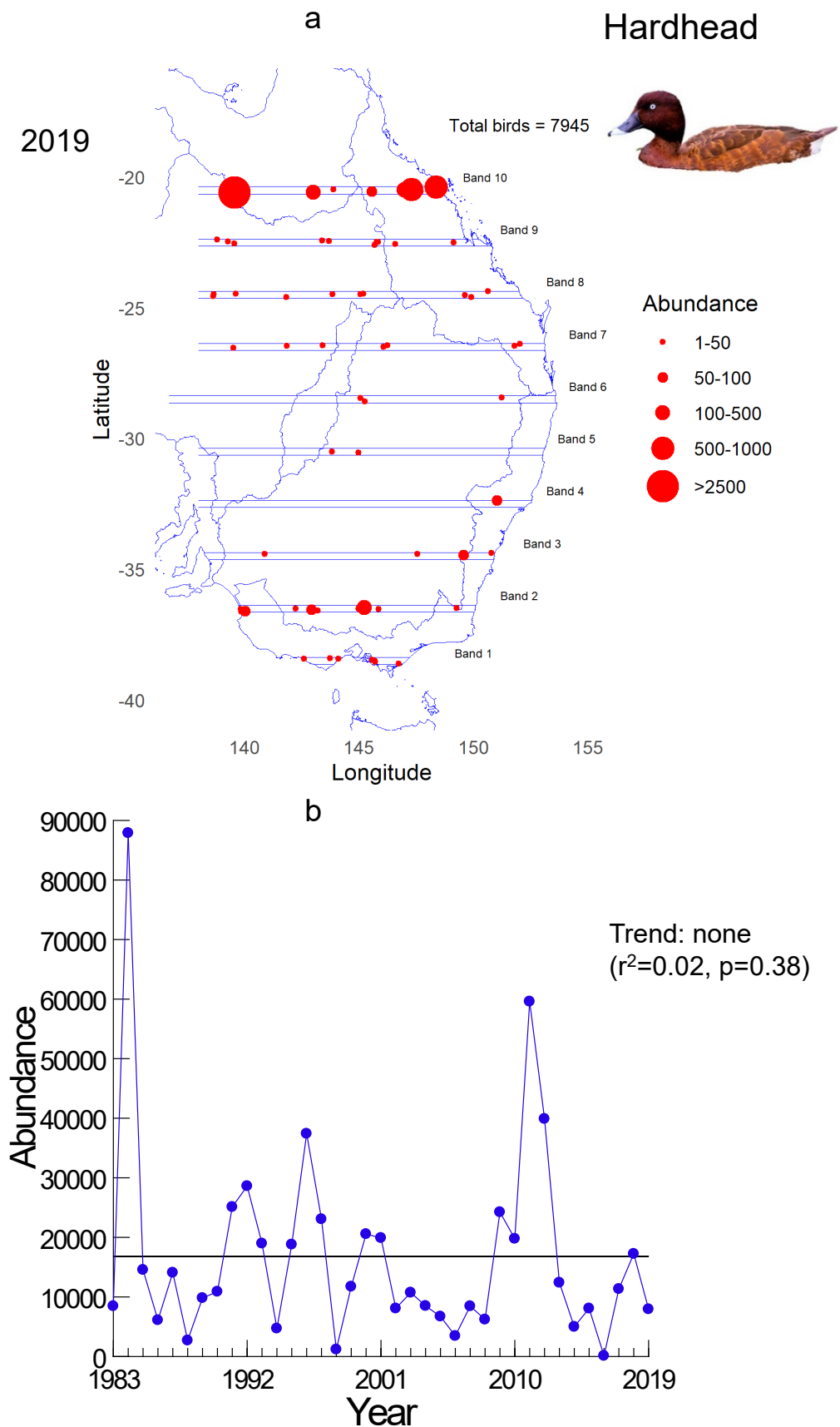
Figure 12. a. Distribution and abundance of Chestnut teal during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.
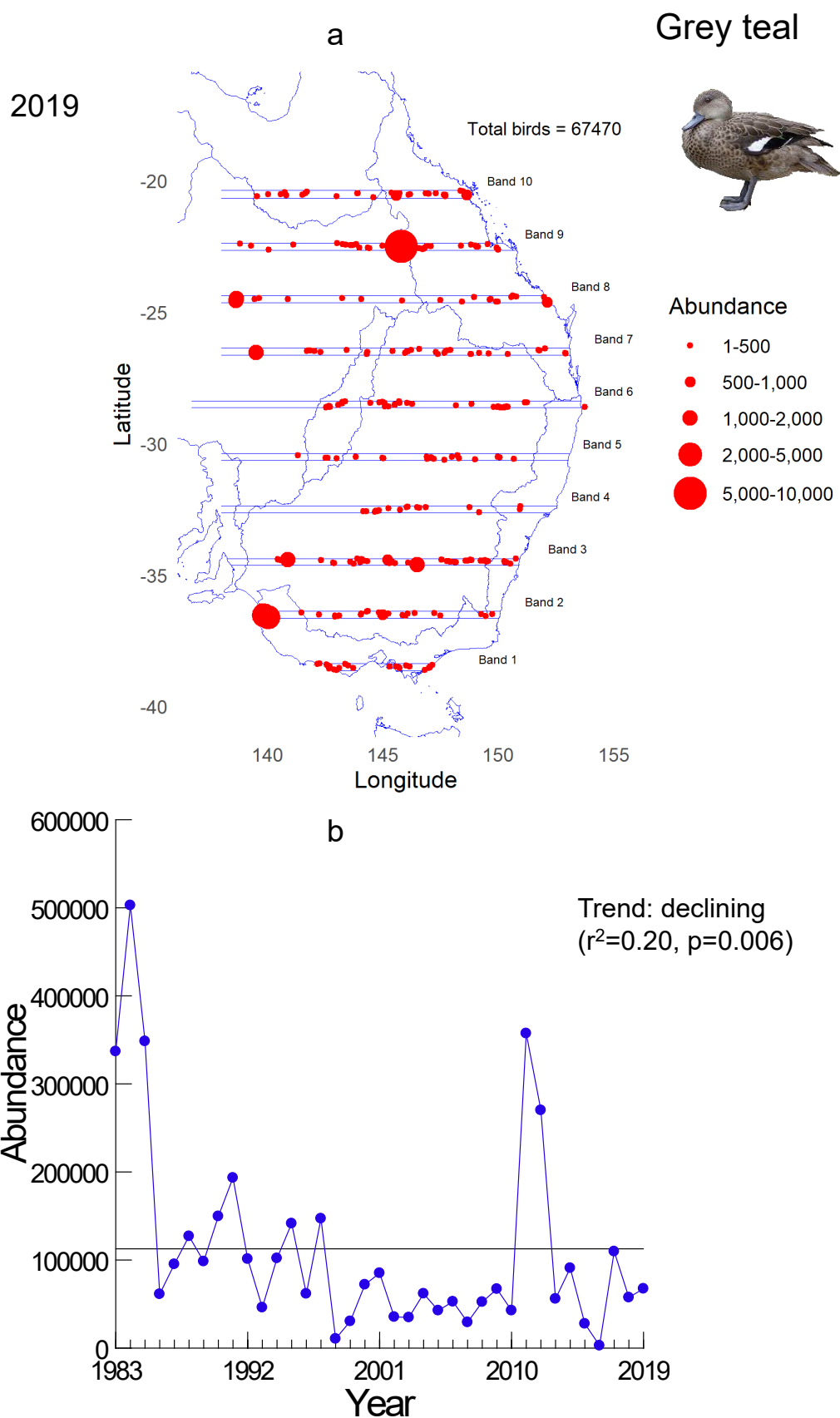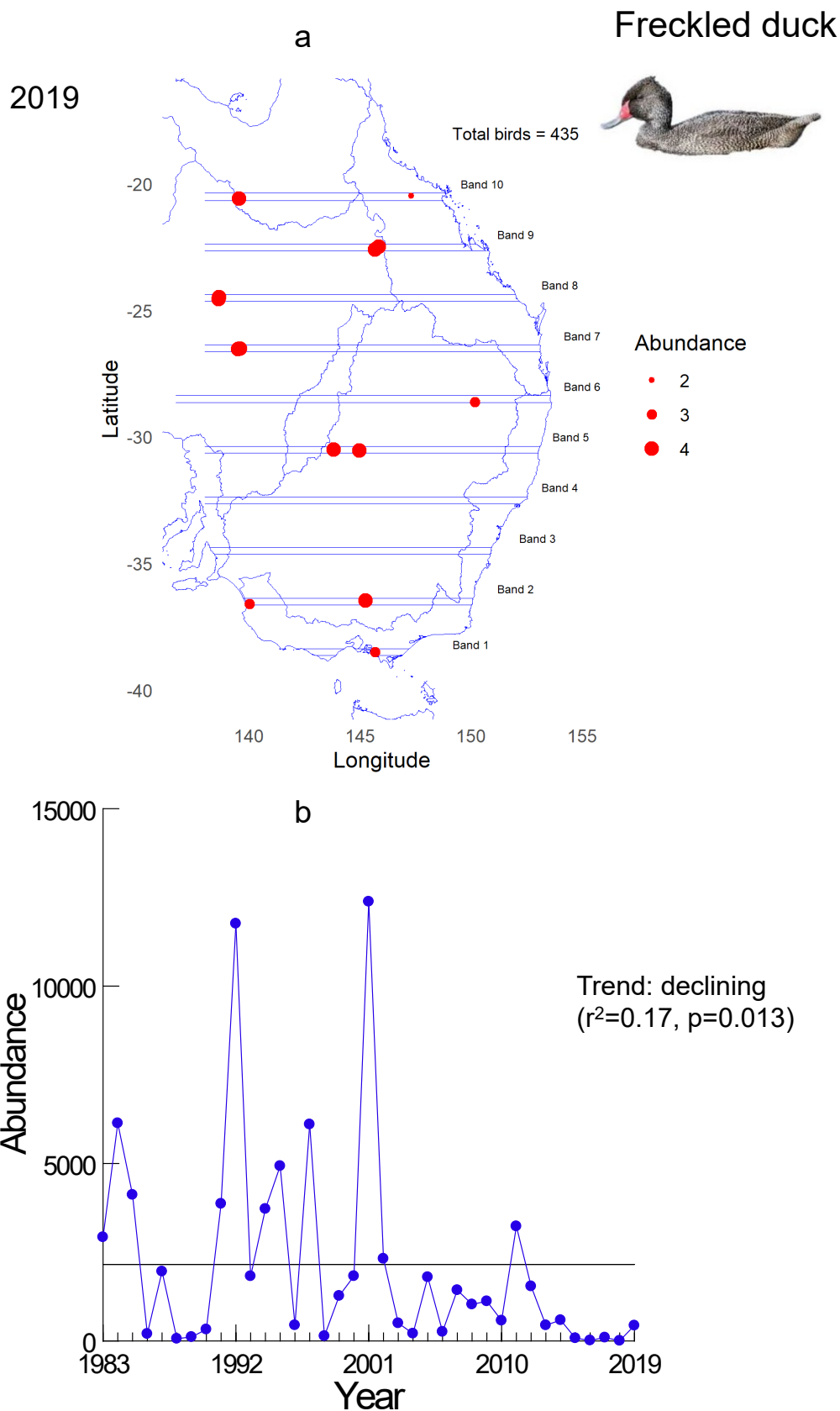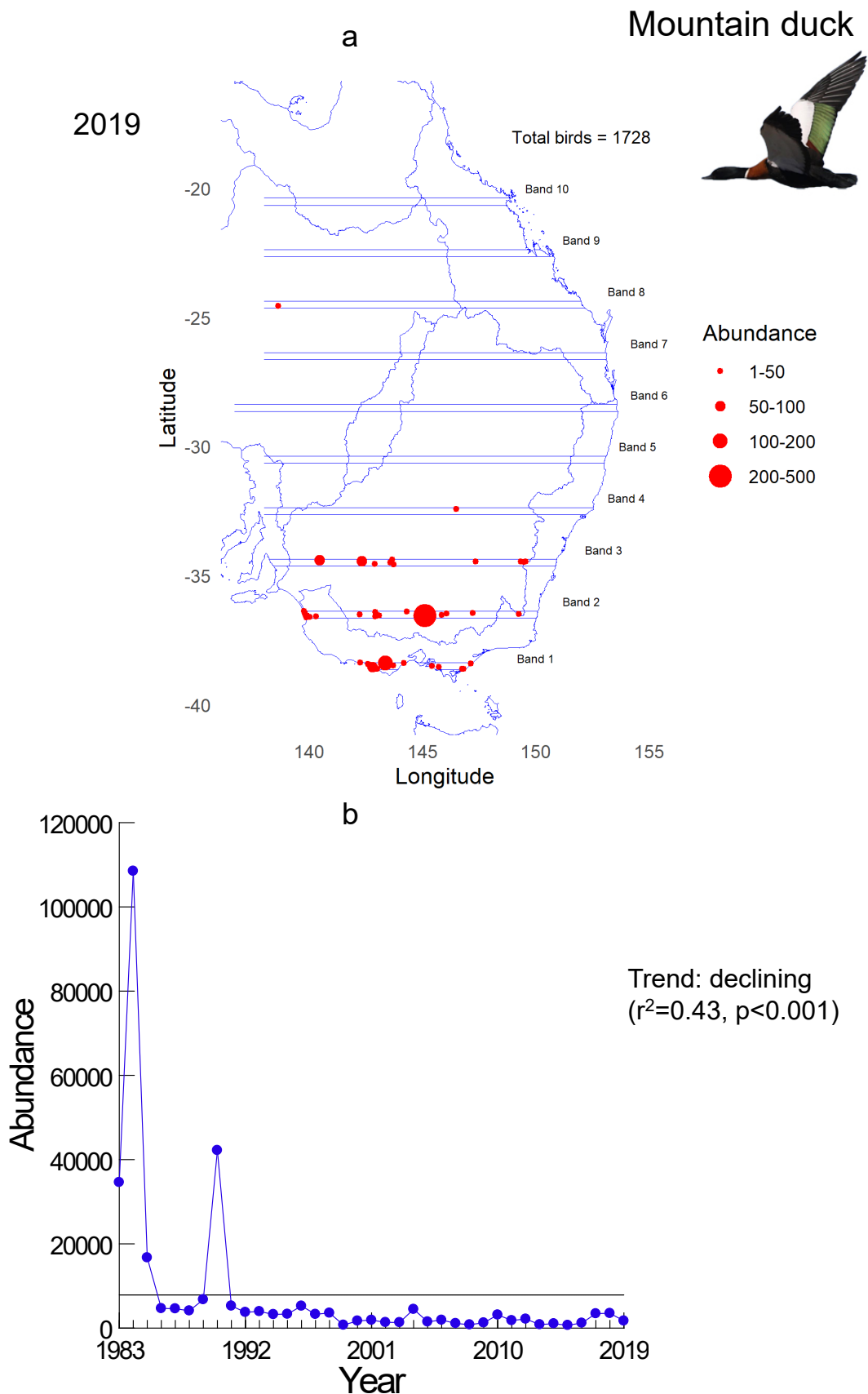
Figure 13. a. Distribution and abundance of Grey teal during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.
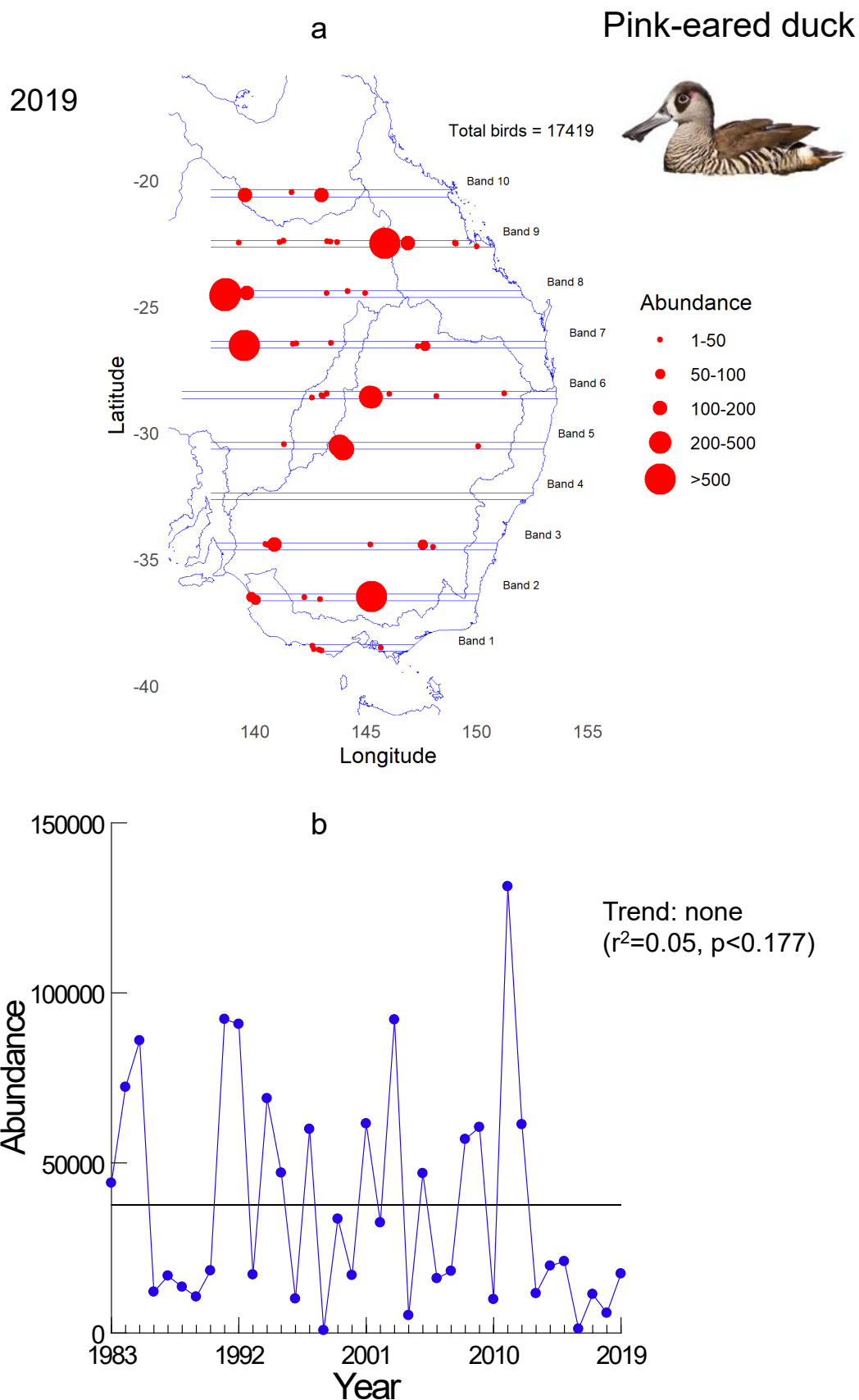
Figure 14. a. Distribution and abundance of Hardhead during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

Freckled duck

a

2019

Total birds = 435

Abundance
- 2
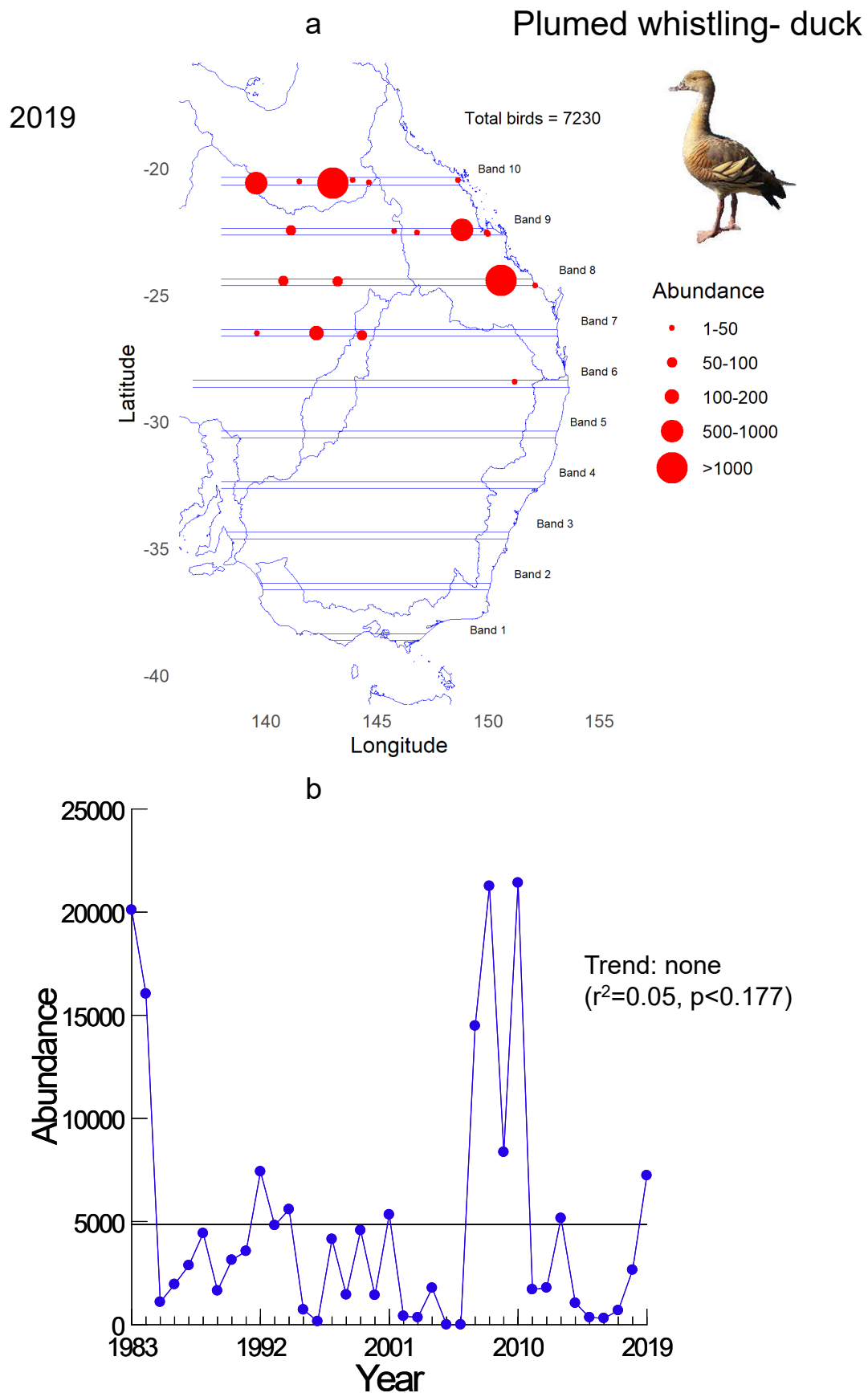- 3
- 4

b

Trend: declining
(r^2=0.17, p=0.013)

Figure 15. a. Distribution and abundance of Freckled duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

Mountain duck

a

2019

Total birds = 1728

Band 10
Band 9
Band 8
Band 7
Band 6
Band 5
Band 4
Band 3
Band 2
Band 1

Abundance
- 1-50
- 50-100
- 100-200
- 200-500

Latitude

Longitude

b

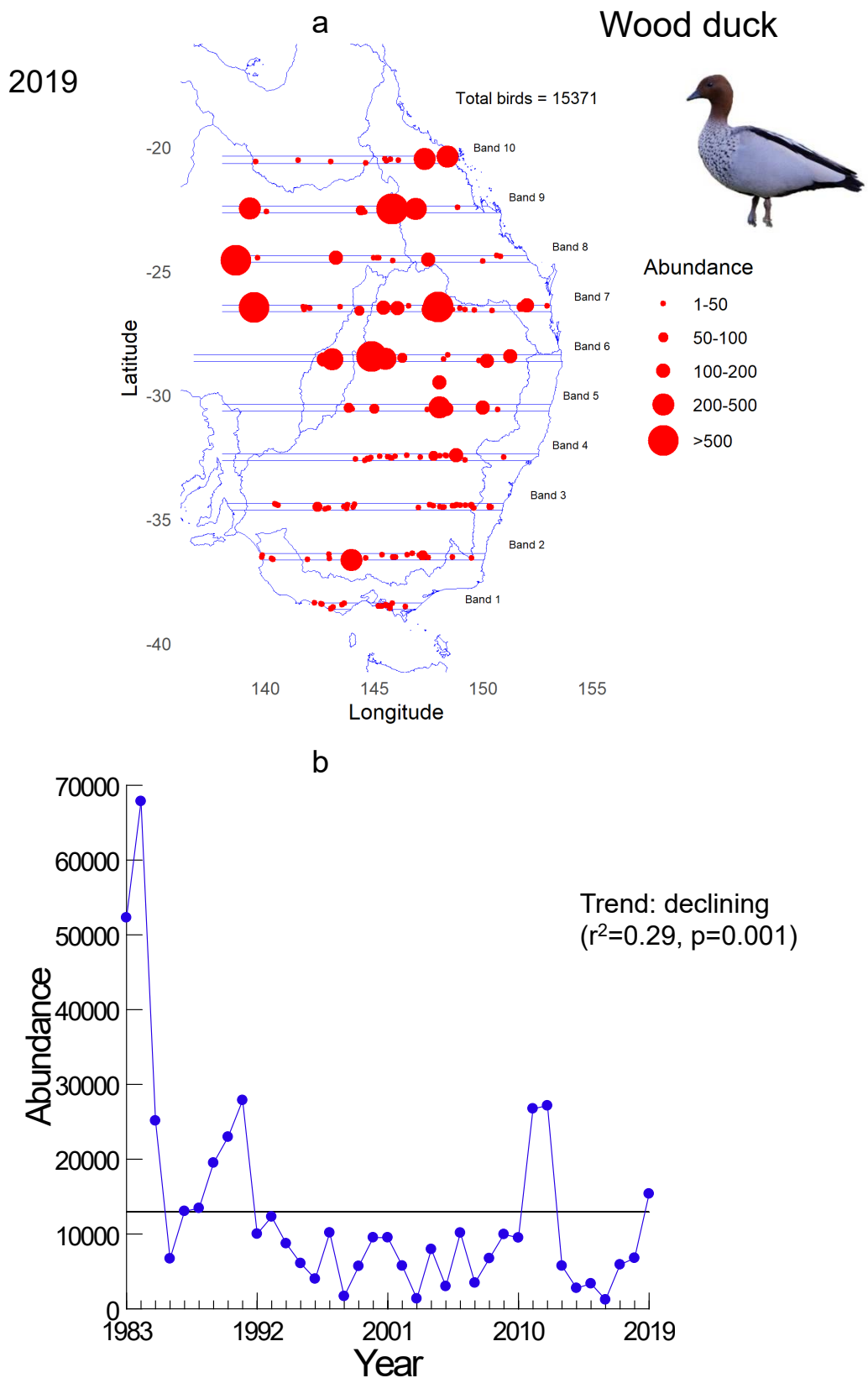Trend: declining
(r^2=0.43, p<0.001)

Abundance

Year

Figure 16. a. Distribution and abundance of Mountain duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

a
Pink-eared duck

2019

Total birds = 17419

Figure 17. a. Distribution and abundance of Pink-eared duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

Figure 18. a. Distribution and abundance of Plumed whistling-duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

Figure 19. a. Distribution and abundance of Australian wood duck during the 2019 Eastern Australian Waterbird Survey. b. Changes in abundance (1983-2019). Horizontal line indicates long term average.

References

1. Bureau of Meteorology (BOM) 2019 Monthly Weather review. Australian Government. Accessed 20/11/2019 http://www.bom.gov.au/climate/drought/

2. Department of Primary Industries (DPI) 2019 https://edis.dpi.nsw.gov.au/

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