

Considerations for the 2021 duck season

Current as at 15 December 2020

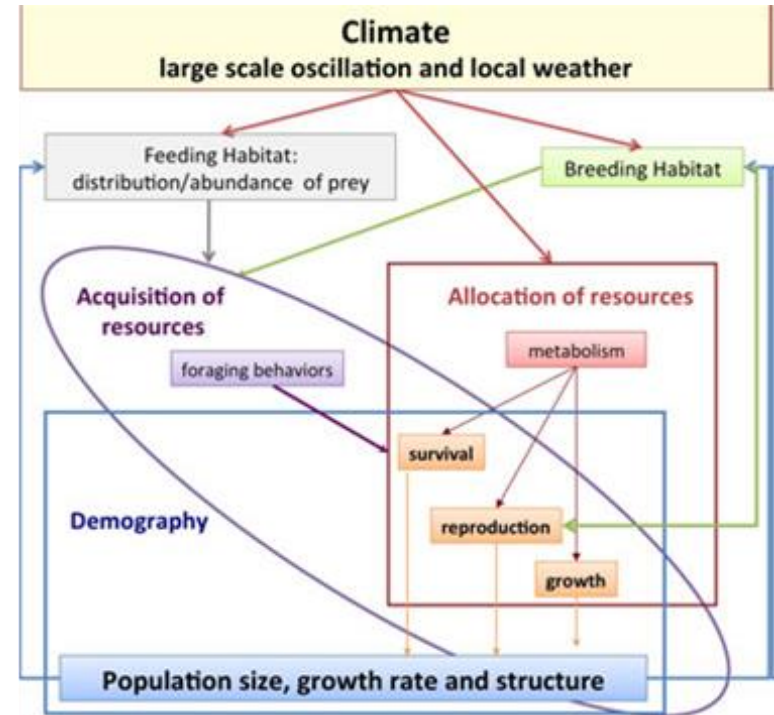
Climate

Past and present climatic conditions dictate present environmental conditions

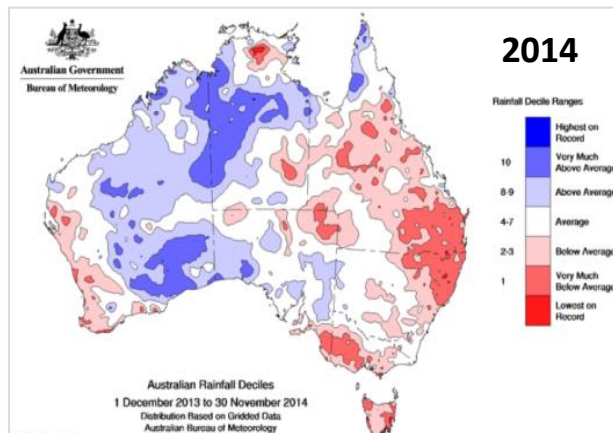
Climatic predictions can be used to consider whether environmental conditions will change into the future

Climatic conditions and waterfowl

- Climatic conditions, such as large scale oscillations (e.g. Southern Oscillation Index) and local weather (e.g. rainfall and temperature), can effect the distribution, productivity and size of waterfowl populations.
- In Australia, waterbird abundance is strongly related to river flows and rainfall (Kingsford *et al.* 2017).
- Large and extensive rainfall events can contribute to population increase as the conditions are enhanced to support breeding and recruitment. Conversely, during dry periods, breeding may be modified or greatly reduced (see Kingsford and Norman 2002).
- Hunting during periods when there is little recruitment (e.g. dry periods) removes breeding adults which can negatively affect subsequent recruitment and further drive declines in hunted species (Kingsford *et al.* 2017).

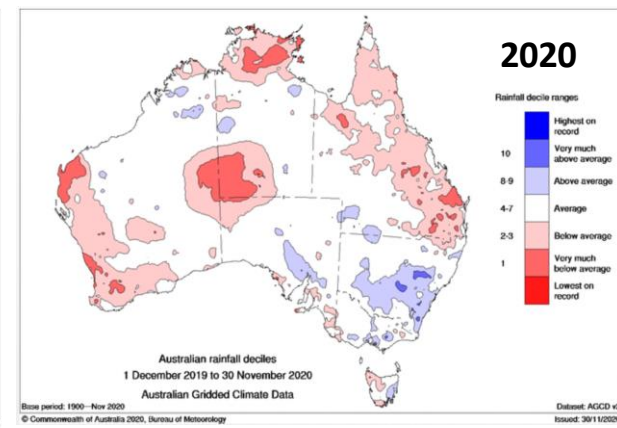
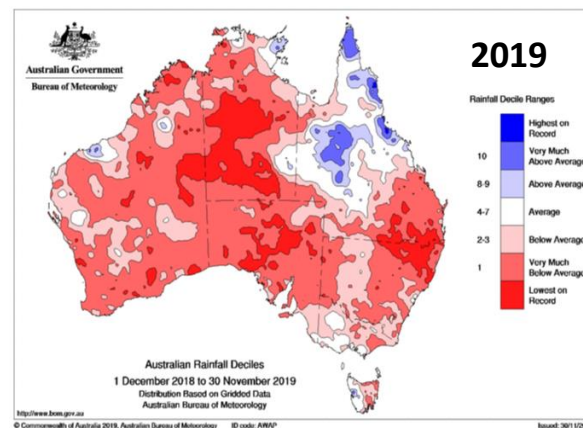
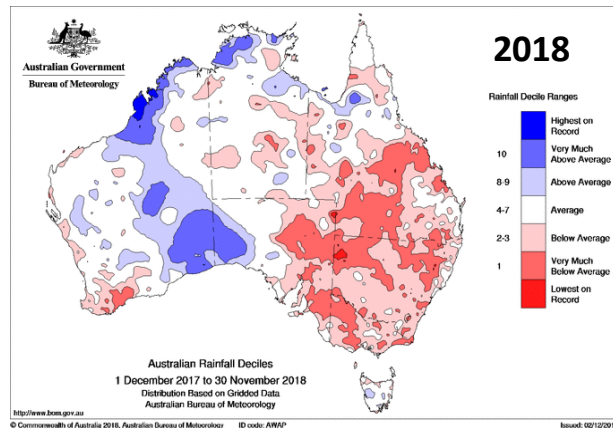
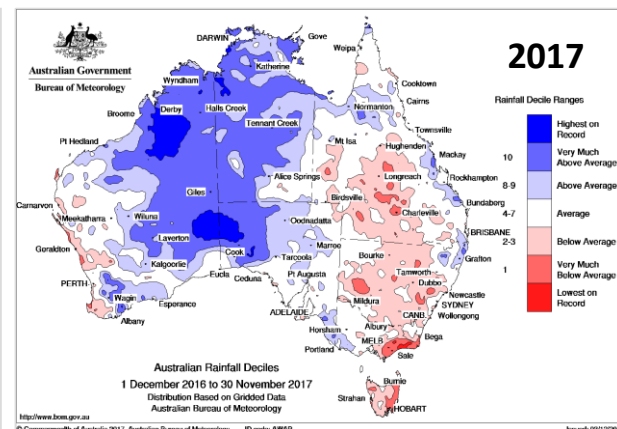
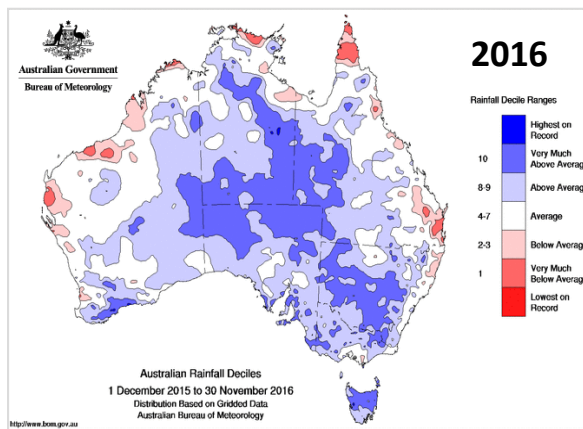
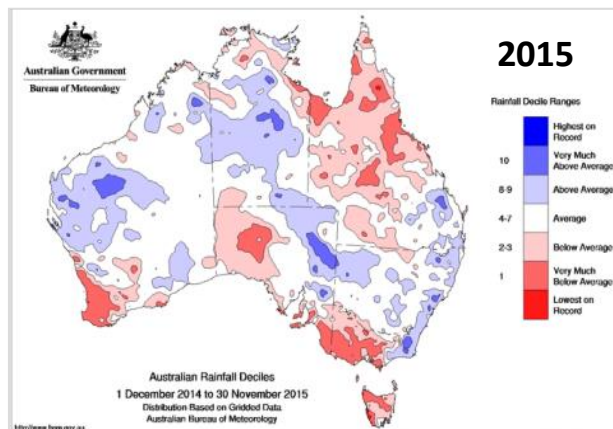


Climate effect on waterbird populations. Source: Jenouvrier 2013

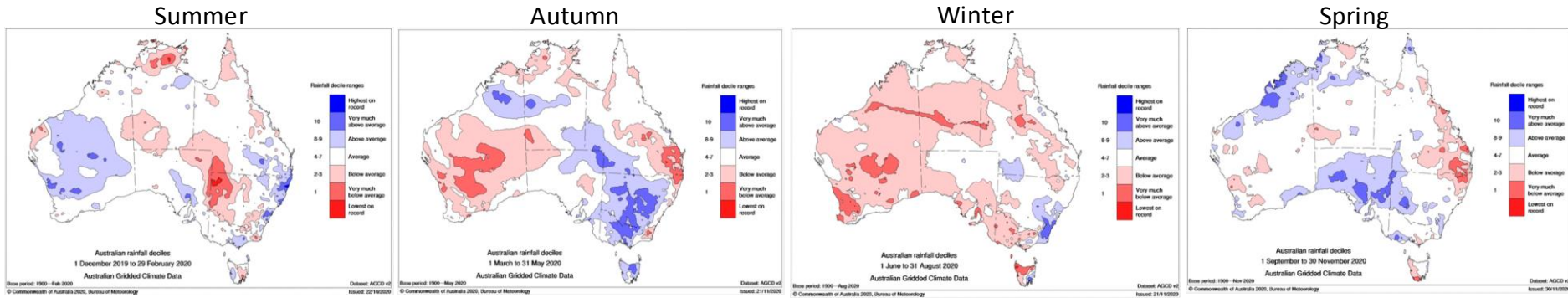


Annual rainfall deciles 2014 to 2020

(Deciles = rainfall received compared to historical averages)



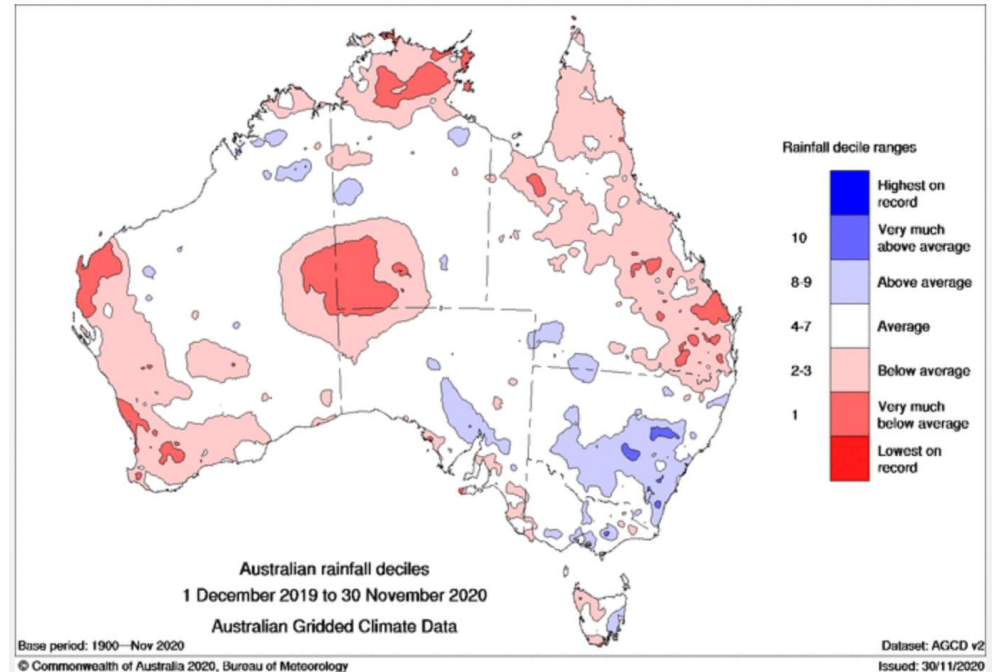
Rainfall through the seasons 2020



- Despite reaching La Nina thresholds in October, widespread above average rainfall has not eventuated to date in 2020.
- Eastern Australian received mostly average to below average rainfall during summer, with parts of coastal Victoria, NSW and Queensland receiving areas of above average falls.
- Most of NSW, Victoria and south-western Queensland and far north-eastern South Australia received above to very much above average rainfall in autumn.
- Most of eastern Australia received average to below average rainfall in winter.
- Most of eastern Australia received average rainfall in spring, however, most of SA received above-average rainfall and south-eastern and costal Queensland received below average rainfall.

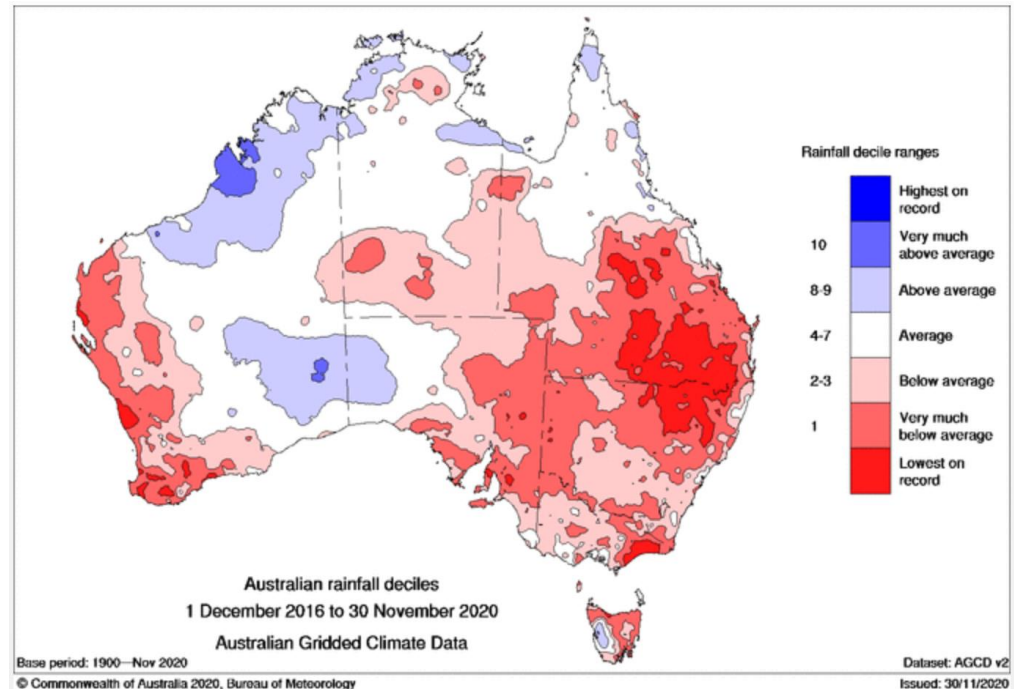
Year-to-date rainfall 2020

- Since December 2019, most of Australia has experienced average to below average rainfall. About half of NSW has experienced above average rainfall.
- This follows, the second driest January - November period on record in 2019 and amongst the three driest for NSW, SA, WA and the NT.
- At December 2020, about 67% of Queensland was in drought or drought affected (Qld DAF 2020).
- About 70% of South Australia is drought affected (SA PIR 2020).
- 10% of NSW is in drought or drought affected (NSW DPI 2020).
- Most of Victoria has received average rainfall in 2020.

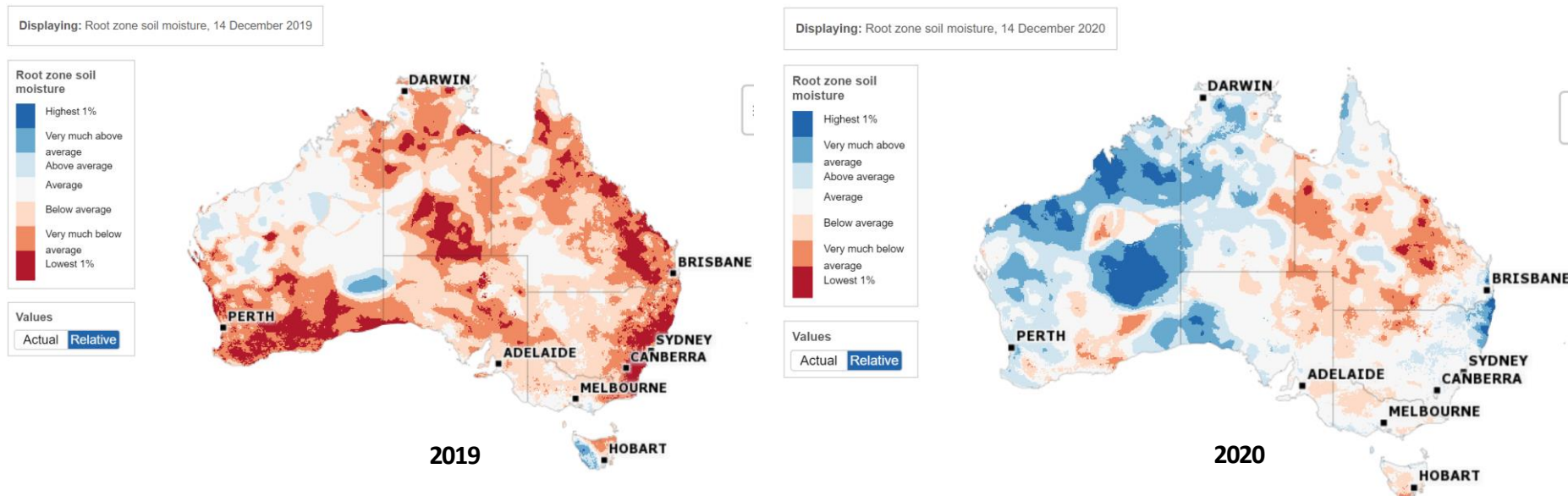


Four-year rainfall

- Rainfall deficiencies have affected much of Australia since early-2017.
- The size of the rainfall deficit accumulated over annual and longer timescales remains very large over much of Australia.
- Despite above average rainfall for much of south-eastern Australia and parts of the inland northwest and Northern Territory during one or more months this year, serious or severe longer-term rainfall deficiencies persist over very large areas.
- Persistent, widespread, above average rainfall is needed to lift areas out of deficiency at annual and longer timescales and provide relief from the impacts of this long period of low rainfall (such as renewing water storages). The impact of the longer dry on water resources is still evident, especially in northern parts of the Murray–Darling Basin where total storages are still low.



Soil moisture – December 2020

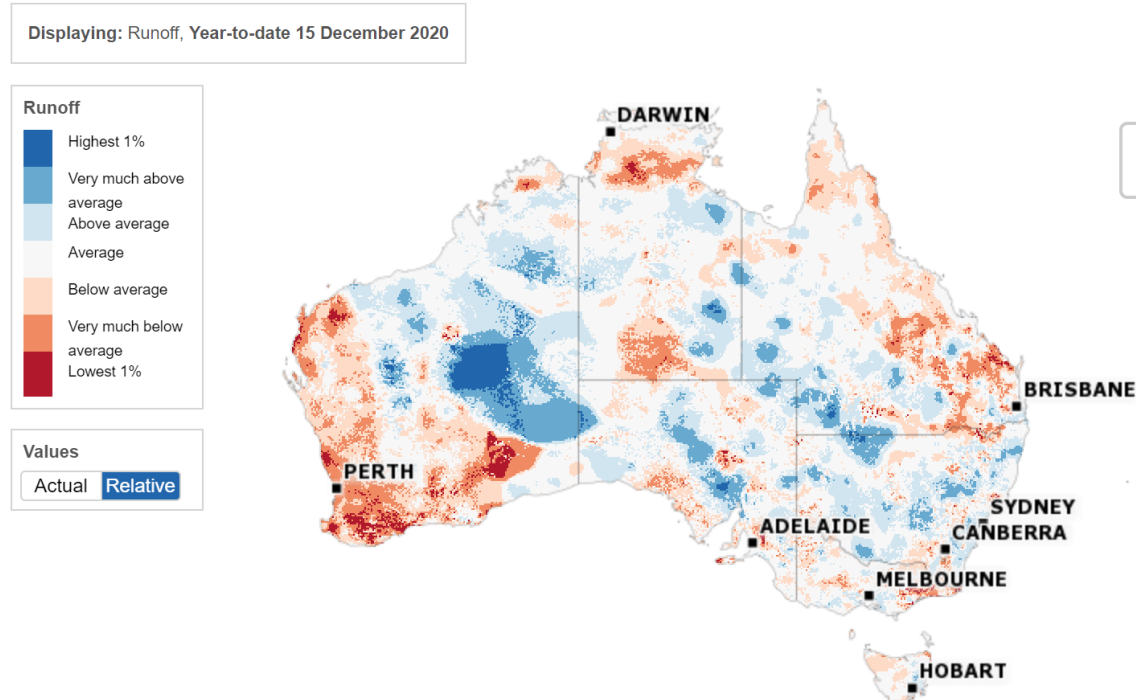


- Root zone (0-100cm) soil moisture at December improved from 2019 to 2020.
- However, at 14 December 2020, approximately half of eastern Australia recorded below average to very much below average root zone soil moisture levels, reflecting low rainfall totals across Australia since autumn and the cumulative affects of four years of dry conditions.

Runoff

Runoff impacts the availability of water in the wetlands and the health of riverine systems. It has a direct influence in the creation and maintenance of waterbird habitat.

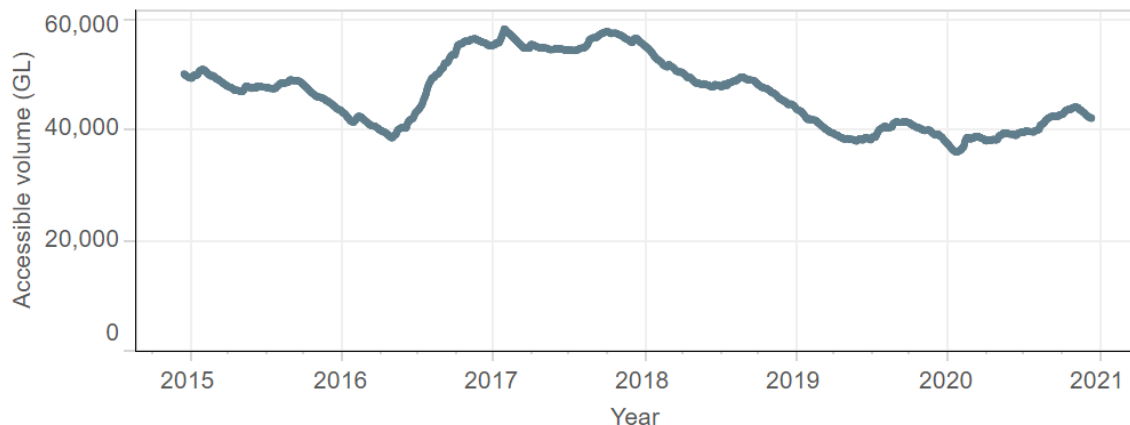
- Year-to-date runoff for eastern Australia has been variable. Large parts of Victoria, eastern Queensland and western Western Australia have recorded below average runoff.
- Western Queensland and most of NSW has recorded above average runoff.
- Eastern South Australia has experienced a mix of above and below average runoff for 2020.



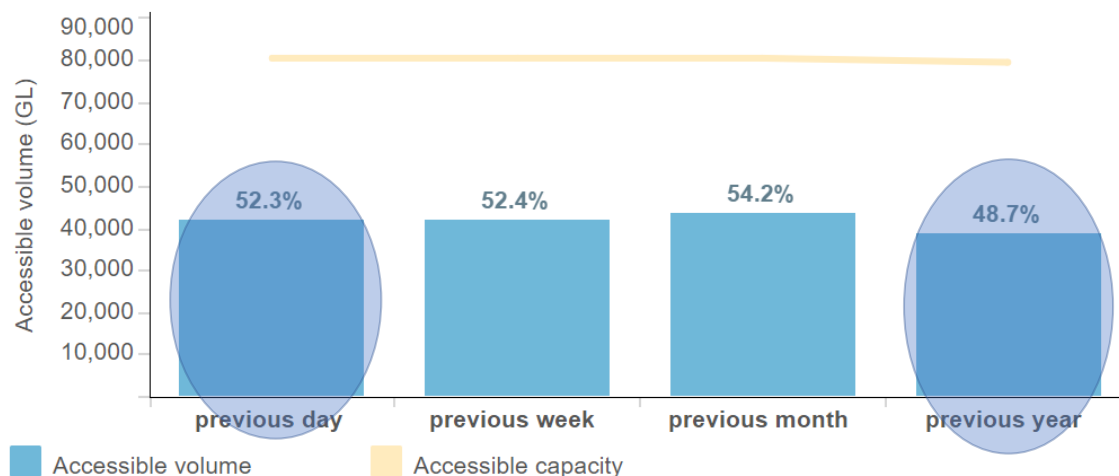
Australian water storage levels

- Water storage levels provide an indicator of the availability of waterbird habitat and waterflows through feeder systems. However, often impoundments and storages can trap water and prevent it from entering creeks, streams and wetlands, thereby reducing available habitat. Therefore, this information must be considered in context, particularly during dry periods.
- In 2020, Australia's water storages increased marginally by 3.6% from the same time last year, from 48.7% to 52.3%.

Accessible volume - Australia

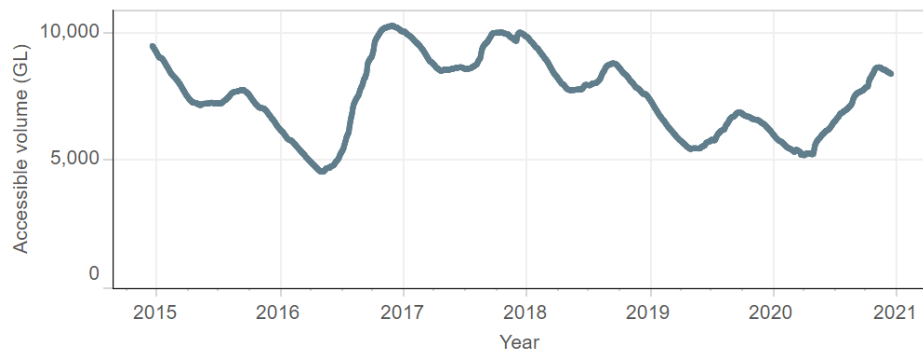


History - Australia



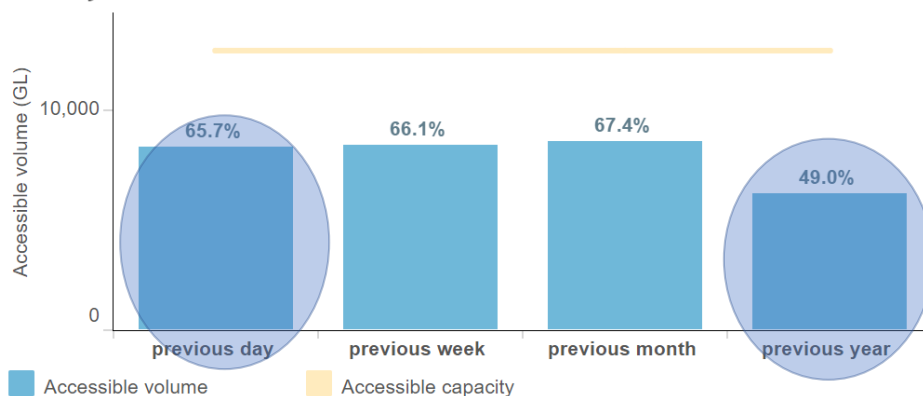
Victorian water storage levels

Accessible volume - Victoria



- The total (Melbourne and Regional) Victorian water storage levels are currently at 65.7% compared to 49.0% last year.
- Storage levels have increased by 16.7% from this time last year.

History - Victoria

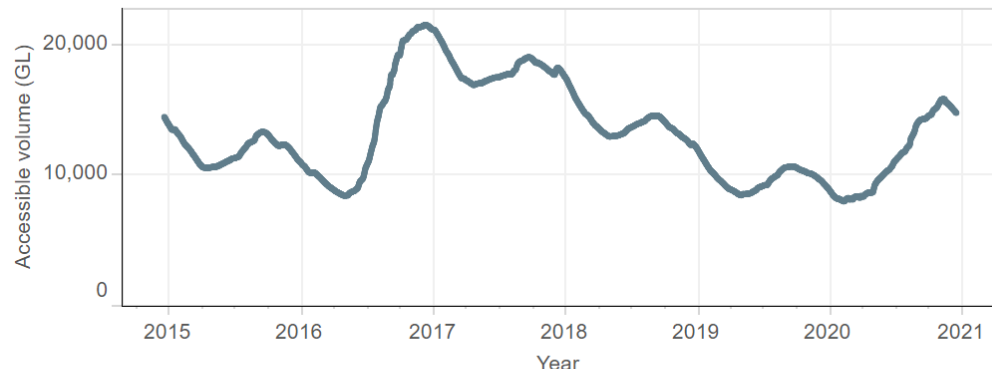


Murray-Darling Basin water storage levels

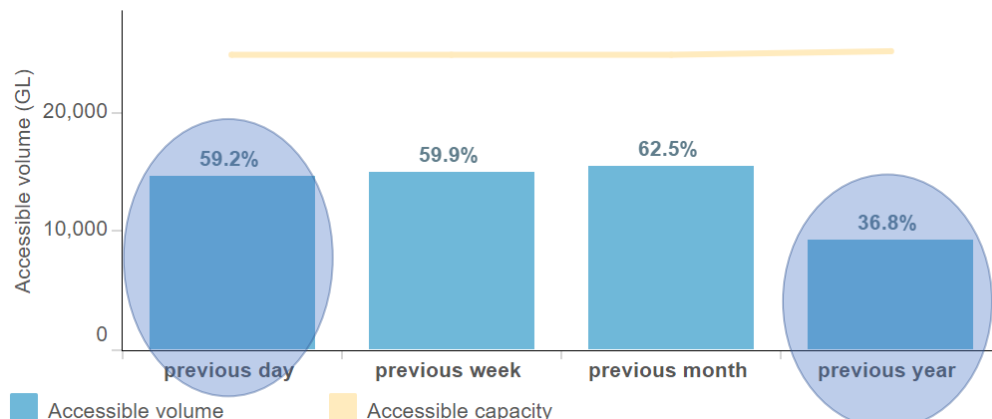
The Murray–Darling Basin is a critical area for waterfowl production and Australia's most developed river basin (240 dams storing 29,893 GL).

- Storage systems in the MDB are at 59.2% of capacity, which is 22.4% higher than at the same time last year (36.8%).
- Storage volumes in the northern MDB have increased to 25% from 6.7% in mid-November last year.
- Storage volumes in the southern MDB are at 66% up from 46.7% in November 2019.

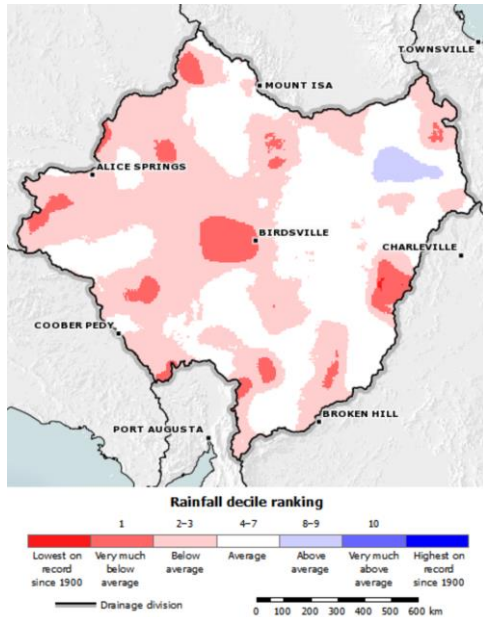
Accessible volume - Murray-Darling Basin



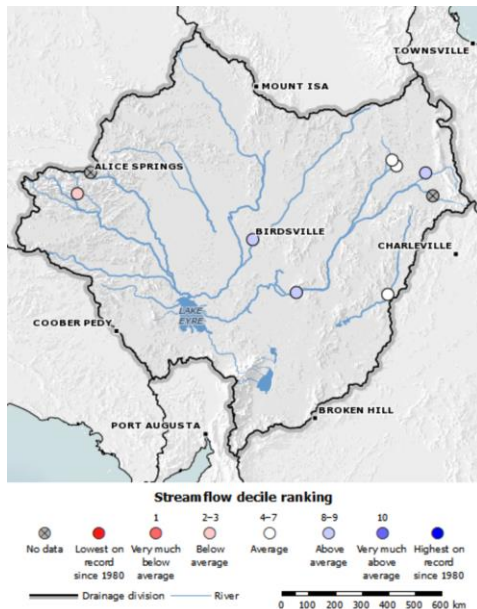
History - Murray-Darling Basin



Eyre Basin



- Rainfall was average across 44 per cent of the Basin and lower than average across 54 per cent of the area in November.
- Total rainfall was 6 mm, 68 per cent lower than the long-term mean of 19 mm for November.
- Lake Eyre is currently dry.



- Streamflows in November were average for 43 per cent of the sites and higher than average for 43 per cent of the sites, predominantly in the east.

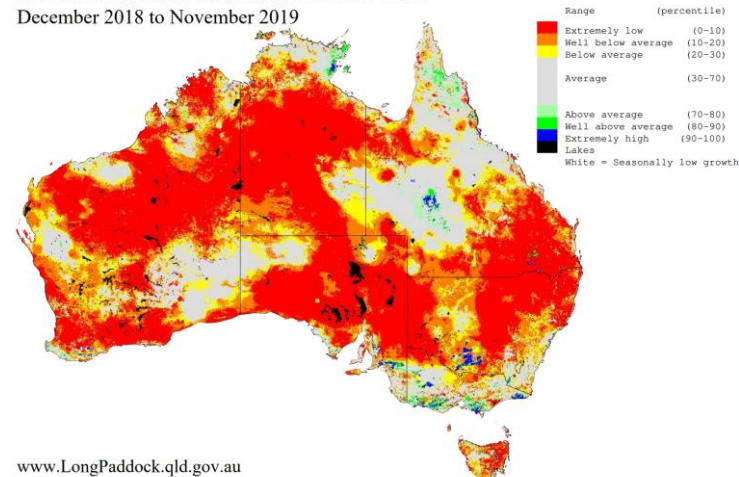
Pasture conditions

Pasture conditions are a coarse indicator of potential feeding habitat for grazing species, such as Wood Duck and Mountain Duck, and nesting habitat for ground-nesting game ducks.

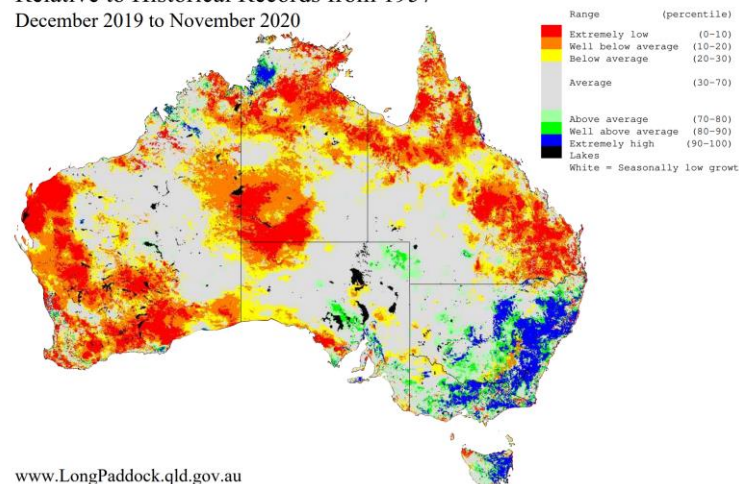
Current conditions

- The last 12 months of pasture growth across NSW, Victoria and South Australia has shown considerable improvement from 2019, with average to extremely high growth.
- However, there has been little overall improvement in Queensland from the previous year, with approximately half the state showing average growth and the other half showing well below average to extremely low growth.

Pasture Growth Percentile
Relative to Historical Records from 1957
December 2018 to November 2019



Pasture Growth Percentile
Relative to Historical Records from 1957
December 2019 to November 2020



Habitat availability



Eastern Australian Waterbird Survey (EAWS)

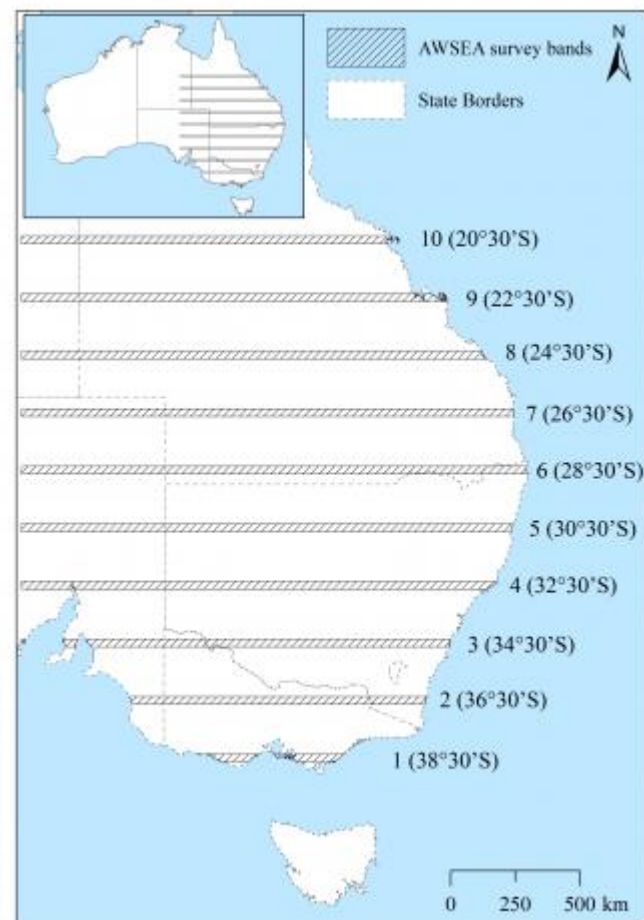
The EAWS monitors changes in the abundance and distribution indices of 50 waterbird species in eastern Australia.

The EAWS was designed by Graeme Caughley and has been conducted annually in October since 1983. Waterbirds are counted from the air across ten aerial survey bands (each 30 km in width), every two degrees of latitude, crossing eastern Australia to monitor all wetlands over 1ha in size.

The EAWS provides:

- an index (not total count) of abundance of waterbirds, including game ducks
- information on the distribution of waterbird and game duck populations along survey bands
- the extent and distribution of habitat along survey bands, and
- limited information on waterbird breeding.

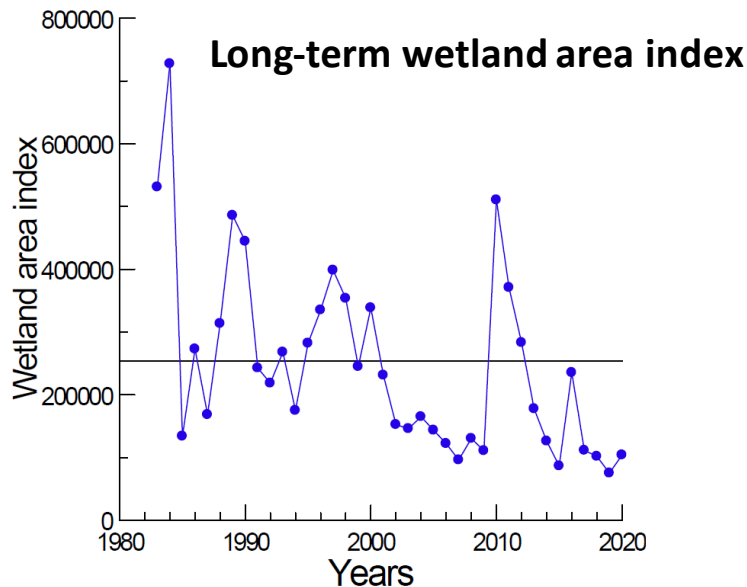
The information is valuable for examining waterbird trends on over one-third of continental Australia and over a long period.



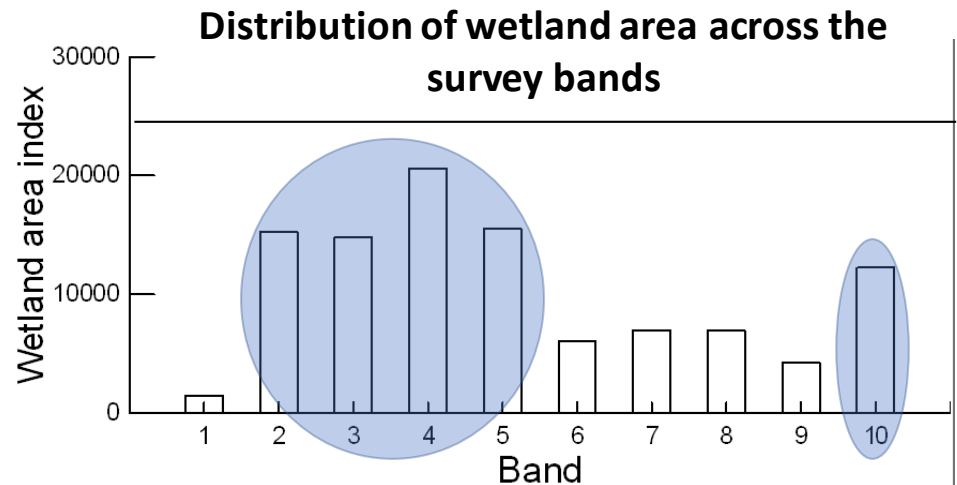
Wetland area index

The wetland area index is a measure of wetland availability across all 10 EAWS transects (bands). This gives an indication of the extent of habitat available for waterbirds.

- The 2020 wetland area index was the 5th lowest recorded since surveys began 38 years ago and reflects the continued dry conditions across eastern Australia over the last 4 years.
- There was a slight increase in the index from last year, but it still sits at 42% of the long-term average. The majority of the available habitat occurs from northern Victoria to northern NSW (bands 2 – 5). Band 10 also recorded greater habitat than the remaining bands.

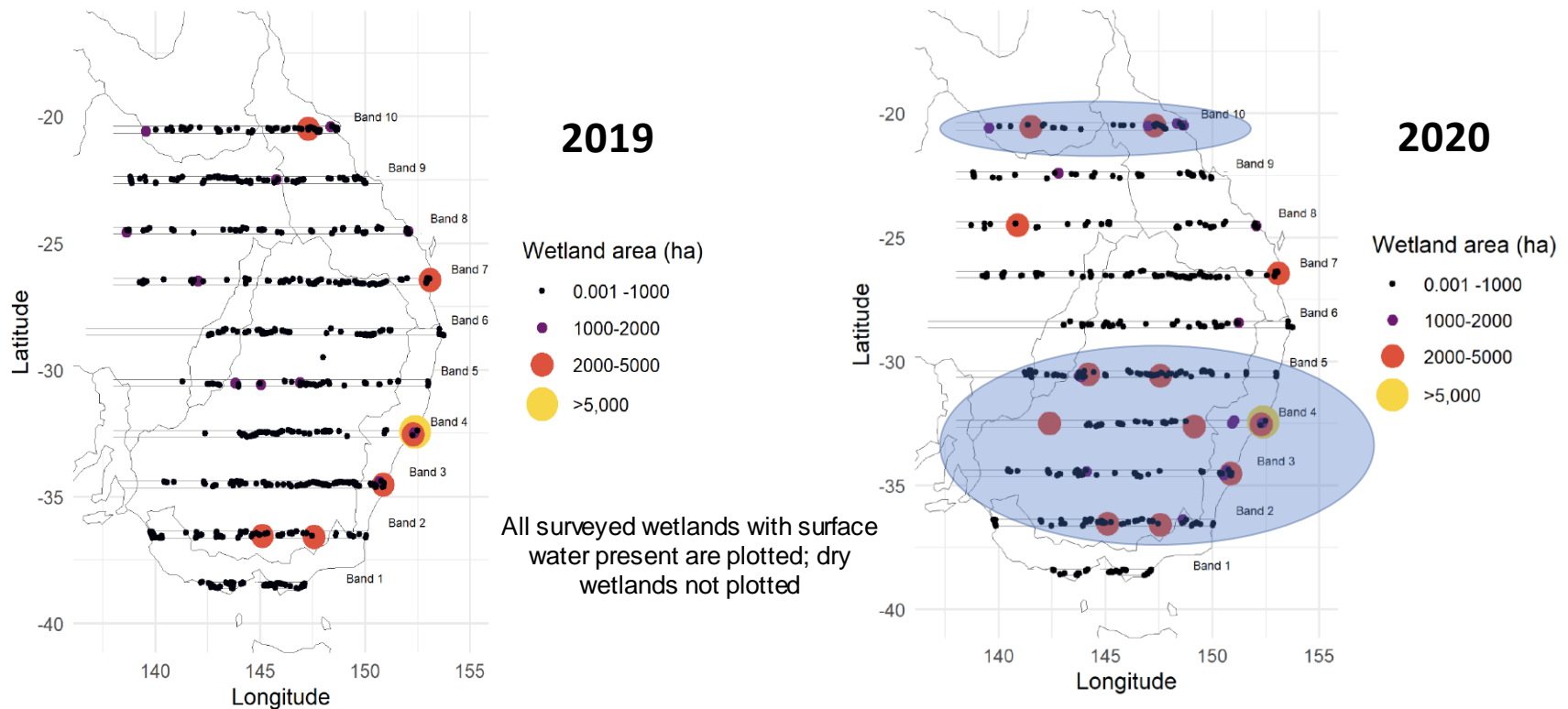


Changes over time in wetland area in the Eastern Australian Waterbird Survey (1983 - 2020); horizontal line shows long-term average.



Distribution of wetland area index in 10 survey bands of the Eastern Australian Waterbird Survey in 2020. Horizontal line shows long-term average.

Wetland distribution



- Despite a wet autumn, most of eastern Australia has experienced average to below average rainfall in 2020. This follows three years of extreme drought.
- The majority of the habitat surveyed occurred in bands 2 to 5. This is reflected in the increased wetland area in the Murray-Darling Basin but was offset by the decrease in the Lake Eyre Basin. Band 10 also recorded a greater amount of habitat compared with remaining bands. 48% of surveyed wetlands (including dry wetlands) held no waterbirds.

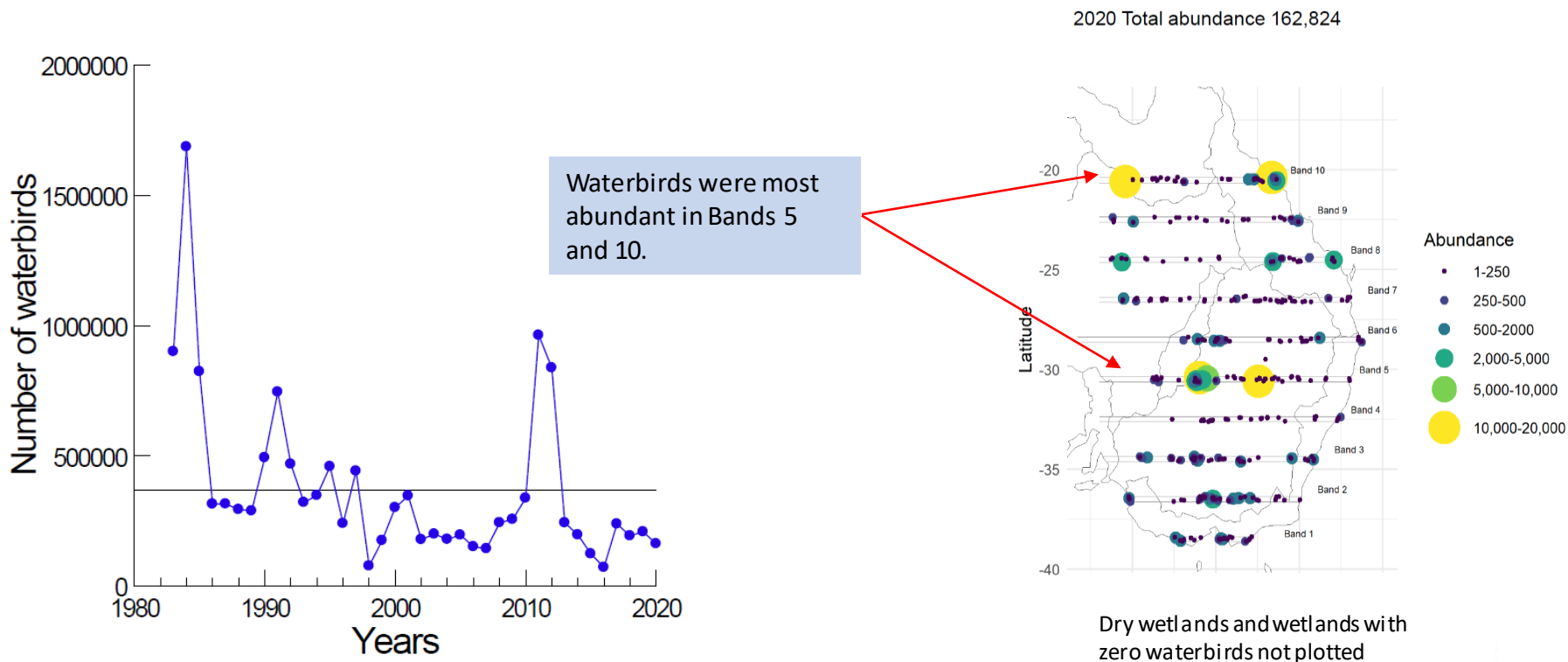


Population indices of abundance,
distribution and breeding

Index of waterbird abundance (all waterbirds)

Up to fifty waterbirds species are surveyed in October each year and includes all Victorian game duck species and non-game species such as swans, Freckled Duck, ibis, coots etc.

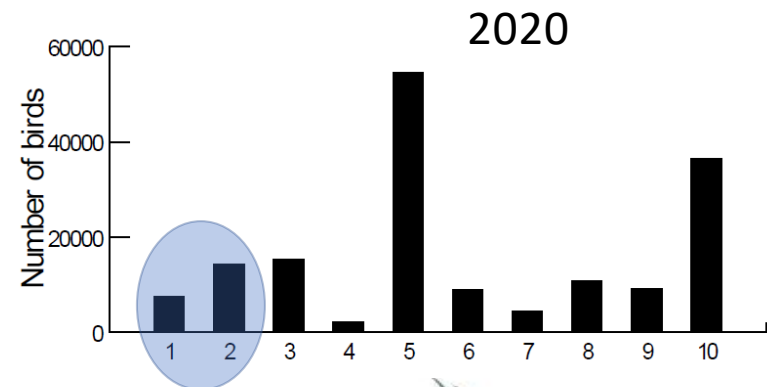
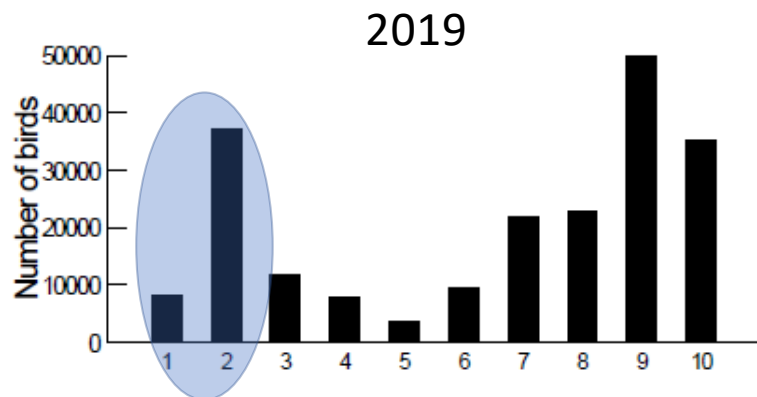
- The total index of waterbird abundance (n=162,824) decreased by 22% from 2019 (208,364). The total waterbird abundance index is the 6th lowest in 38 years.



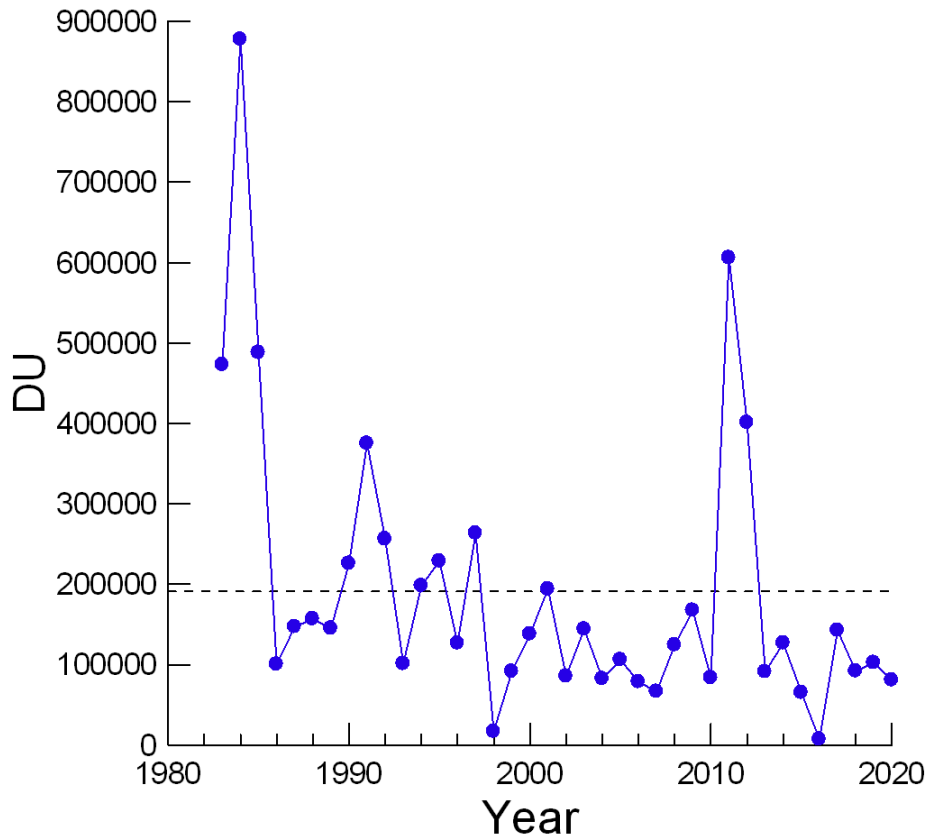
EAWS waterbird abundance index

bands 1 & 2

- Bands 1 and 2 cover parts of Victoria. Band 1 surveys areas of southern coastal Victoria and band 2 surveys northern Victoria.
- Waterbird abundance (all species) in bands 1 and 2 has declined from 2019.
- Note the difference in scales between the graphs.



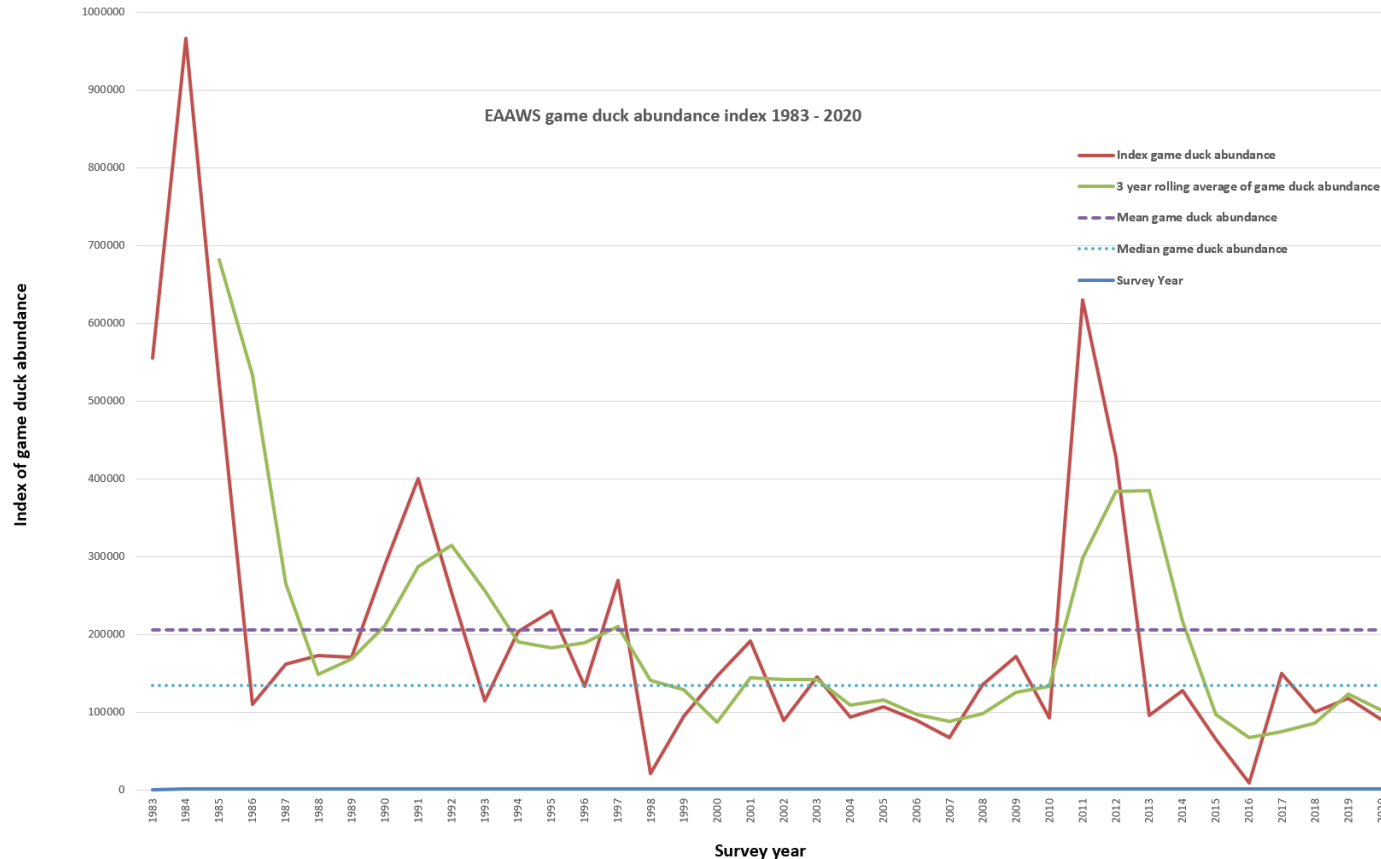
EAWS game duck abundance index



This index provides information on game ducks only.

- The game duck abundance index decreased by 23% from last year.
- The 2020 game duck abundance index was the 7th lowest recorded in 38 years of survey and is 44% of the long-term average.
- The decrease in the index was despite an increase in available habitat. Generally habitat availability and game duck abundance has a positive relationship, so when habitat increases, so does duck abundance. This has not happened in 2020.

Game duck abundance index cont..

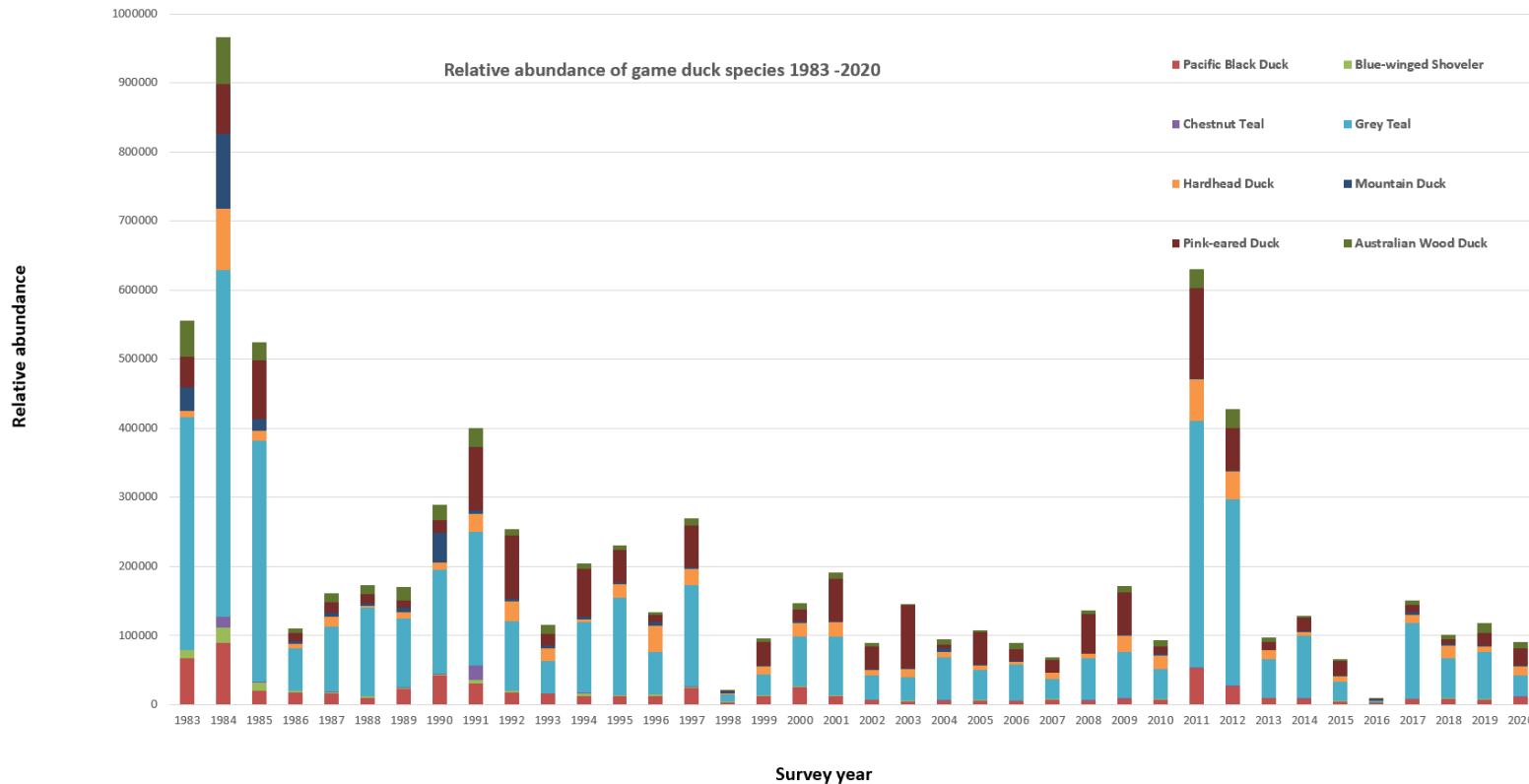


When considering management implications, the abundance index must be considered in context with:

- distribution of birds
- habitat availability and distribution
- climatic forecasts
- concentrations of birds

- This graph includes abundance index data (red line) and the rolling (or moving) average (green line). A rolling average is a technique used to get an overall trend in a data set. In this case, the rolling average is calculated for three-year subsets.
- The long-term average (mean) and median abundance levels are also included. The median is the mid-value and is more statistically suitable than the average when outliers are present.

Relative abundance of game duck species 1983-2020 (EAWS)

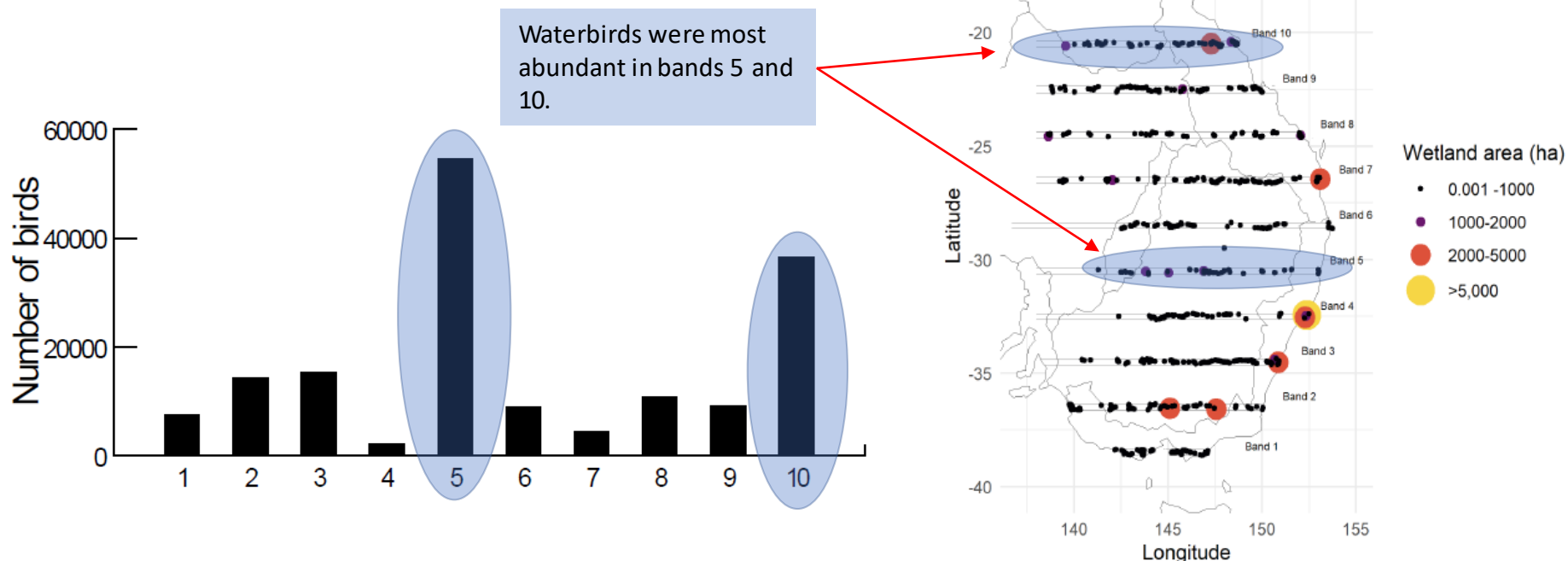


The percentage of game ducks detected in 2020 EAWS were:

Black Duck 12% (6%), Grey Teal 33% (57%), Wood Duck 10% (13%), Pink-eared Duck 27% (15%), Hardhead 14% (7%) and Blue-winged Shoveler 0.3% (1%). Figures in parentheses are from 2019.

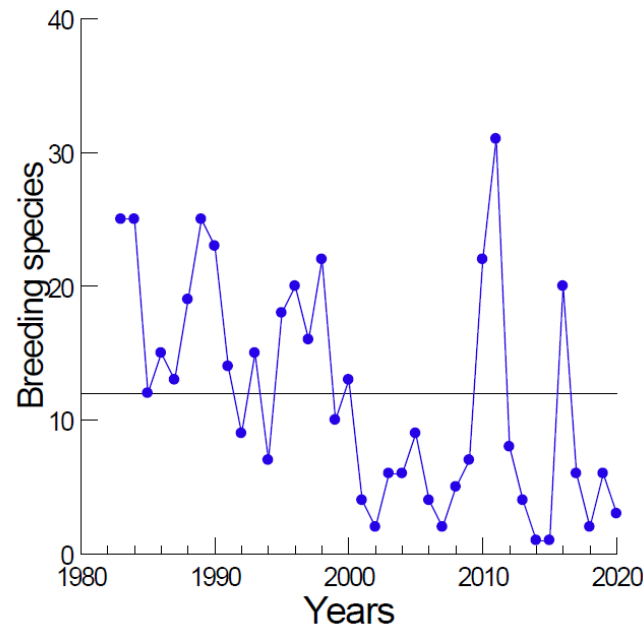
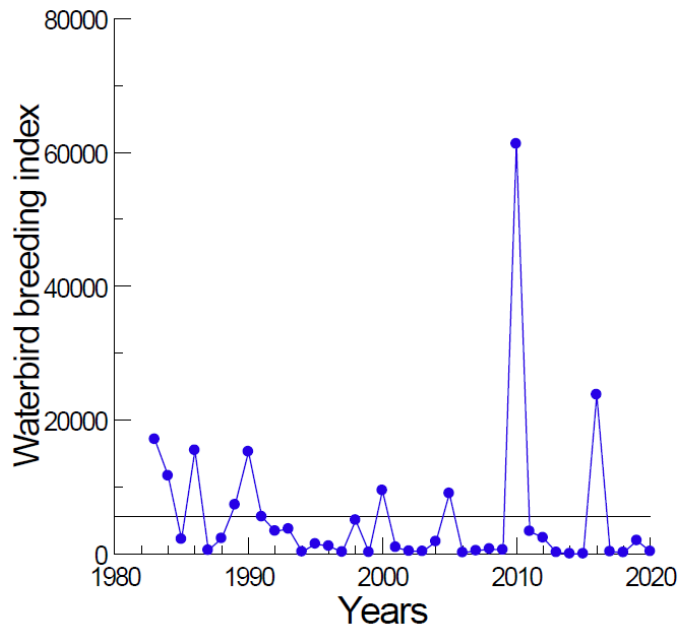


EAWS waterbird distribution



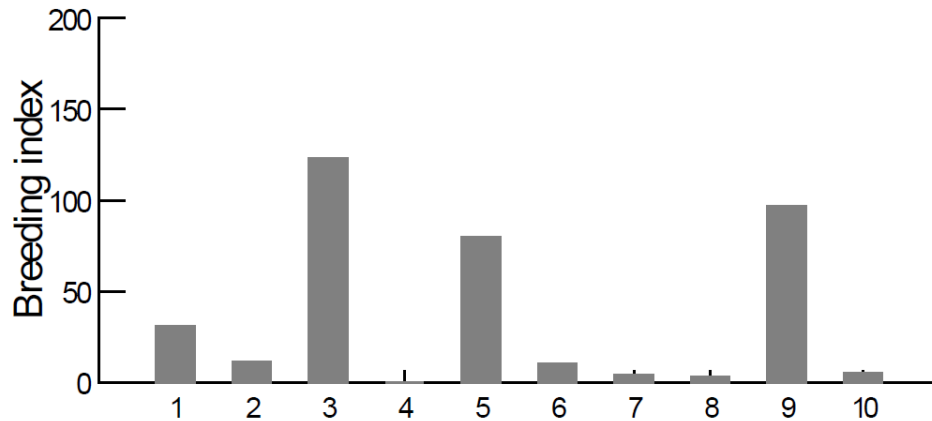
- Surveyed waterbirds were most abundant in bands 5 and 10. Data shows that bands 5 and 10 also held the most game ducks.
- The majority of the habitat occurred in bands 2 - 5 and band 10.
- Waterbirds were more widely dispersed than last year and less concentrated, reflecting an increase in habitat availability in the Murray-Darling Basin.
- Five wetlands supported more than 5,000 waterbirds representing 35% of the total abundance. Two of these occurred in the Murray-Darling Basin.

Waterbird breeding (all species combined)



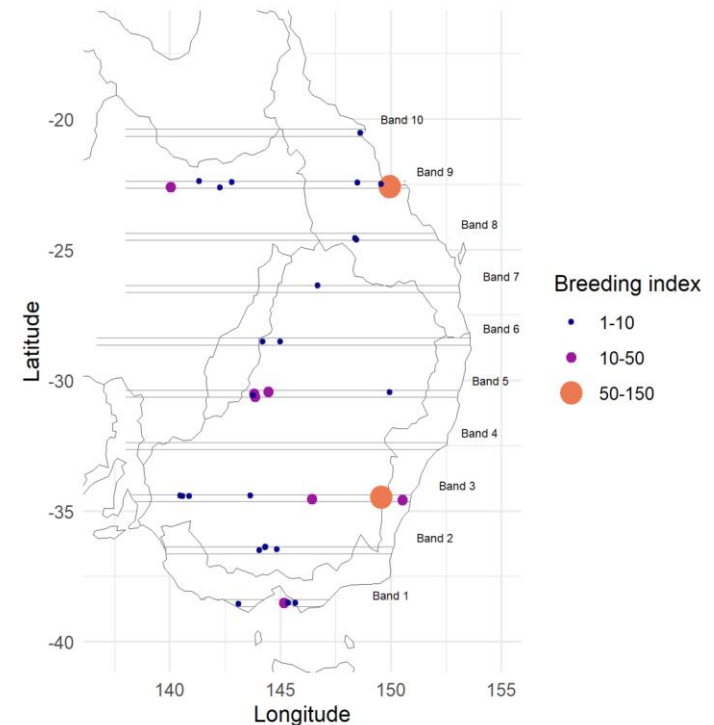
- The EAWS breeding index (all species combined) decreased from the previous year and remains well below the long-term average.
- EAWS breeding species richness (i.e. the number of different species observed breeding) also declined from last year and is well below the long-term average. Only three species were recorded breeding and Black Swans comprised 81% of all records.
- With the exception of 2016, breeding has been suppressed since the major wet period in 2010-12.

Waterbird breeding (all species combined)



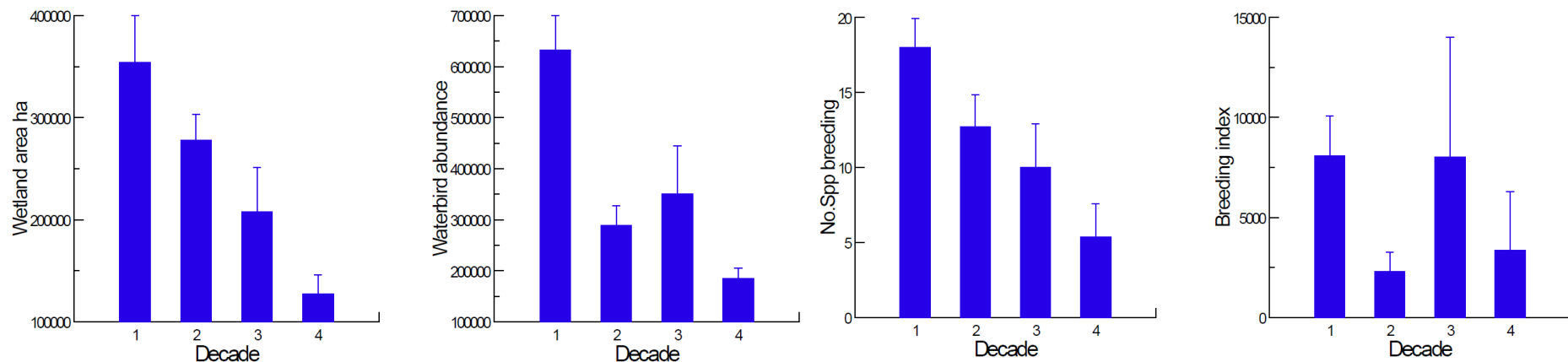
- Most of the breeding occurred in bands 3, 5 and 9.
- Only three species were recorded breeding and the majority of records were of Black Swans.
- Due to COVID-19 restrictions, no bag surveys were conducted during the 2020 duck season and productivity arising from birds produced in 2019 could be assessed.

2020 Breeding index 364



Only wetlands with breeding recorded are plotted.

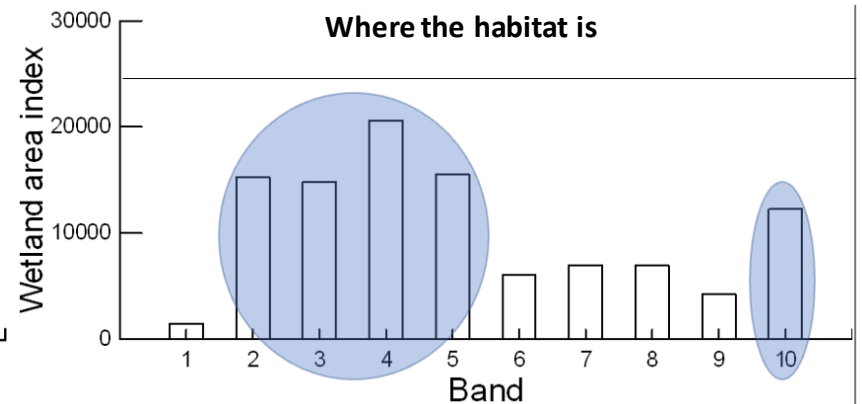
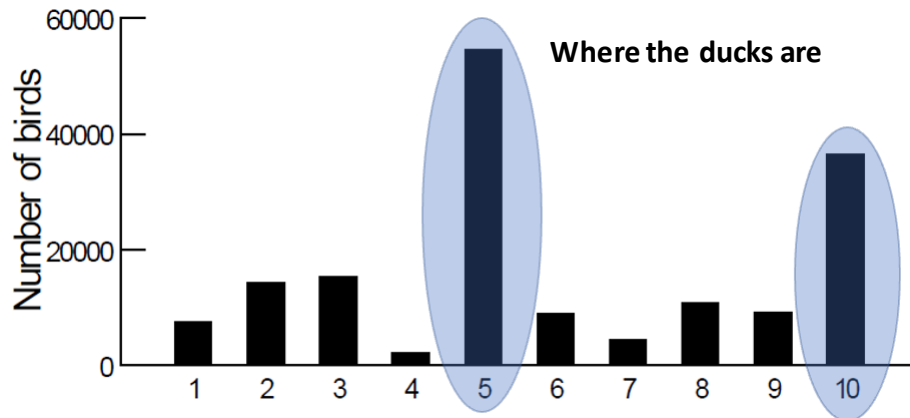
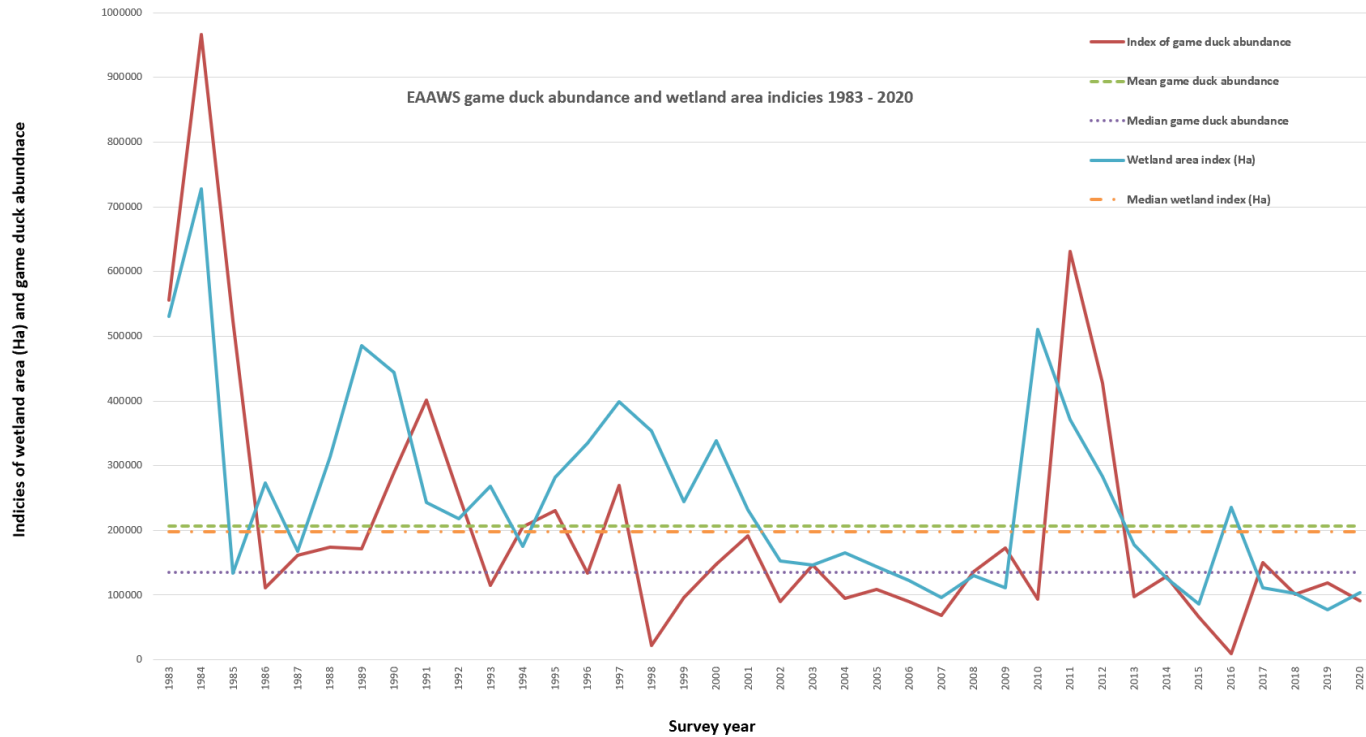
EAWS indices over time



Decadal changes in indices for total abundance, wetland area, number of breeding species and breeding in the EAWS 1983 - 2020

- For eastern Australia, overall waterbird abundance, breeding index and breeding species are positively related to habitat availability (wetland area index).
- All major EAWS indices for waterbirds (total abundance, breeding index, number of species breeding and wetland area index) continue to show significant declines over time.
- Long-term trends are more informative for predicting population status than year-to-year fluctuations.

Game duck abundance, distribution and habitat - summary



Climate predictions – future conditions



BOM Australian Government Bureau of Meteorology

Climate and Water Outlook for summer 2019–20,...

Watch later Share 1/88

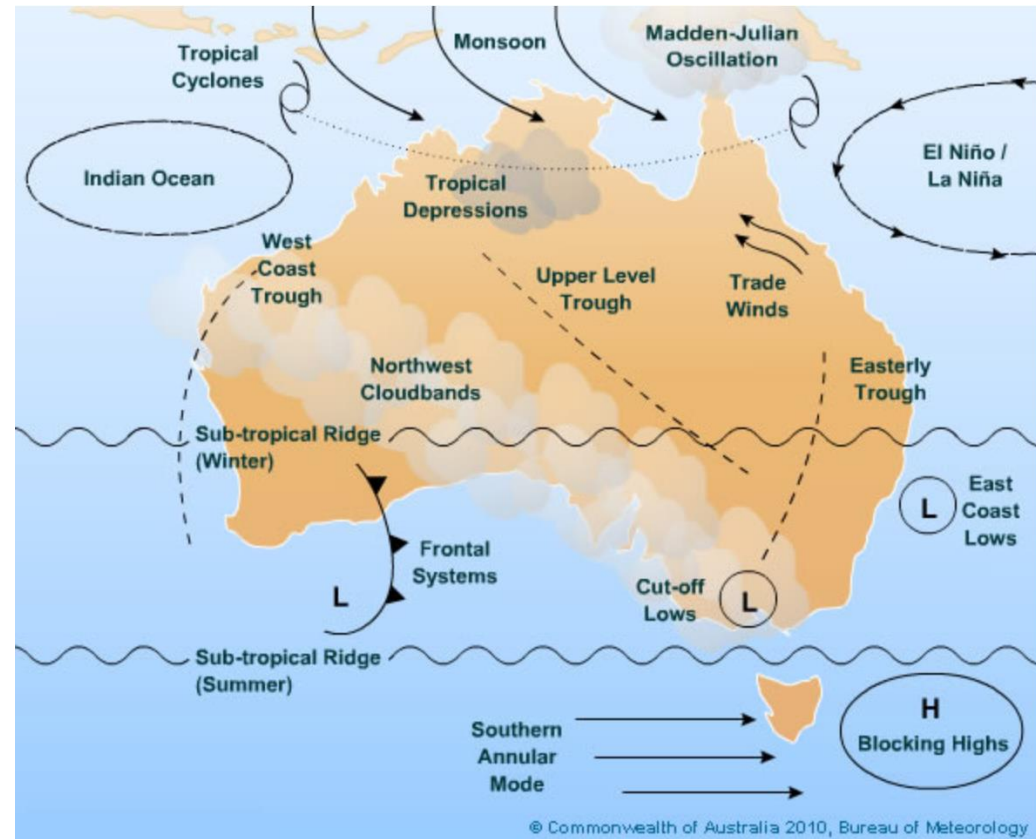
December 2019 – February 2020

Climate and Water Outlook

Icons: River, Water drop, Rain cloud, Crescent moon, Seedling, Lightning bolt, Flame, Thermometer, Globe

Current climate drivers

- Australia's climate can vary greatly from one year to the next.
- A number of drivers can influence the Australian climate. Influences will have varying levels of impact in different regions at different times of year.
- Current influences on Australia's climate include:
 - La Niña
 - The Southern Annular Mode (SAM)
 - The Madden–Julian Oscillation (MJO)
- All of these influences typically result in above average rainfall for northern, eastern or central parts of the country.

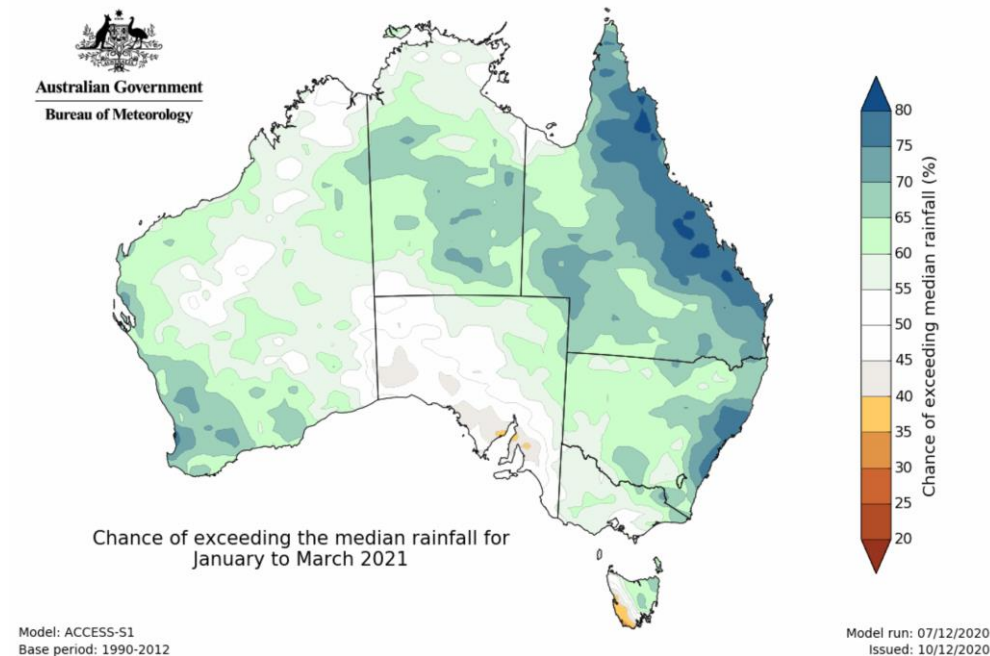


January – March predicted rainfall

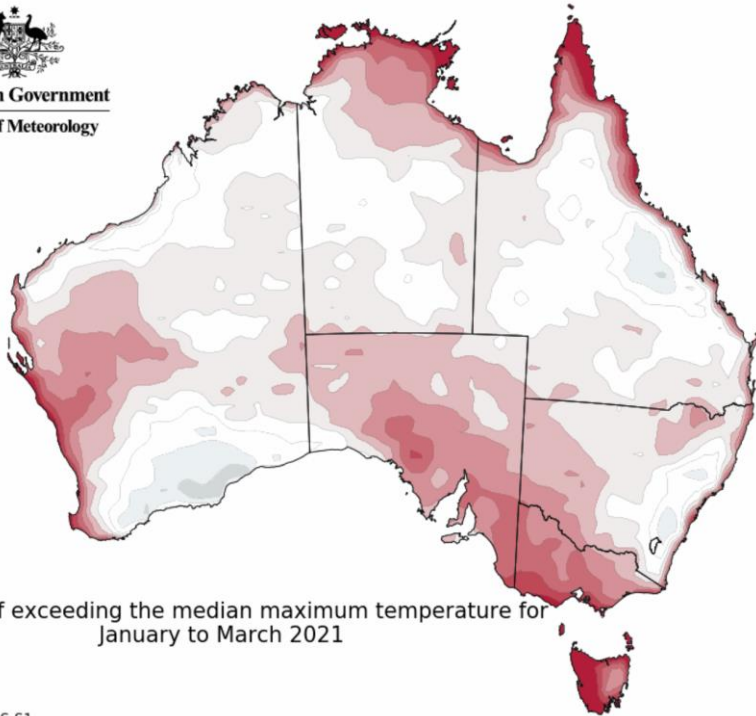
January – March rainfall prediction can be used to indicate the potential impact on habitat for the forthcoming season.

- January to March is likely to be wetter than average for much of Queensland, the NT interior, southwestern WA and eastern parts of NSW, Victoria and Tasmania (greater than 65% chance).
- For southwestern Tasmania, drier than average conditions are more likely.
- While the outlooks indicate wetter than average conditions, southern parts of Australia are entering into their drier season, so rainfall is not likely to be sufficient to relieve long-term rainfall deficits.

Source: www.bom.gov.au

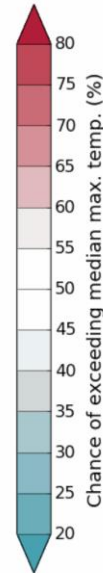


January – March 2021 temperature prediction



Chance of exceeding the median maximum temperature for
January to March 2021

Model: ACCESS-S1
Base period: 1990-2012



Model run: 07/12/2020
Issued: 10/12/2020

- Maximum temperatures over January to March are likely to be higher than the long-term mean for Tasmania, SA, Victoria, western WA and along most of the northern and eastern coastlines (greater than 65% chance).
- Below average maximum temperatures are more likely over a small part of southern WA (greater than 60% chance).
- This will result in greater rates of evaporation and the drying of shallow, ephemeral wetlands.

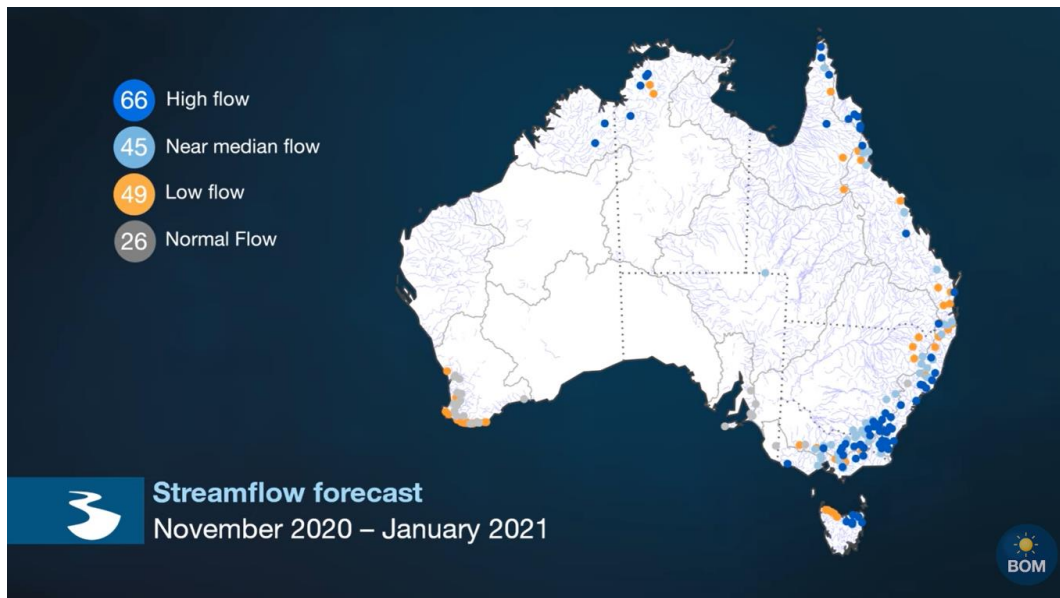
Source: www.bom.gov.au

Streamflow predictions

Streamflow has a direct influence on waterbird habitat extent and population abundance. Rivers and creeks provide feeding, resting and breeding habitat and provide inputs into wetlands where they have not been diverted.

Current prediction

- For summer (December – February), near median or high stream flows are expected at most locations. Near median or high stream flows together with predicted high summer rainfall increases the risk of flooding across areas of eastern Australia which can provide waterbird habitat of varying duration depending on the extent of flooding and follow-up rains.



Victorian harvest estimates 2020



2020 harvest estimates

Harvest statistics can provide information on the health and dynamics of game duck populations, including distribution, abundance and productivity.

- Due to continued dry conditions and low game duck abundance, the 2020 duck season was modified. The season length was 38 days, starting on 2 May and concluding on 8 June, and the daily bag limit was three birds. Blue-winged Shoveler could not be hunted.
- COVID-19 restrictions meant hunting could only occur on your own property at the start of the season. Restrictions were eased that meant hunters could hunt on private property and public land from Wednesday 13 May. Hunters could not camp over night and hunting parties were restricted to no more than 10 people. These restrictions remained in place until the end of the season on 8 June.
- These restrictions and the reduced season significantly impacted on participation levels and the resultant size of the total seasonal harvest.
- There was a maximum of 23,378 Game Licence holders endorsed to hunt duck in 2020. It was estimated that 32%, or 7,481, actually hunted, each taking an average seasonal harvest of 8.1 birds.
- The average number of duck hunting days per active duck hunter was estimated to be 3.9.



2020 harvest estimates cont...

- The total estimated seasonal harvest in 2020 was 60,400, the lowest recorded harvest since the telephone surveys were introduced in 2009 and less than one-sixth of the average annual duck harvests revealed by previous surveys (373,000).
- The total estimated number of duck hunting days was 29,500 (95% CI = 22,900–38,100) and was the lowest recorded, less than one-third of the average annual duck hunting days in previous surveys (95,000).
- The two most commonly harvested species were Pacific Black Duck (comprised 46% of the total harvest) and Australian Wood Duck (30% of the total harvest). The remaining ducks harvested were Grey Teal (10%), Chestnut Teal (7%), Mountain Duck (6%) and Pink-eared Duck (<1%). There were no reports of Hardhead being harvested. The hunting of Blue-winged Shoveler was prohibited for the 2020 season.
- The total harvest was estimated to be greatest in the West Gippsland CMA, followed by the North Central CMA and the Goulburn Broken CMA. The top five towns for the total reported number of ducks harvested were (in descending order) Sale, Warrnambool, Nagambie, Bendigo and Boort.

Long-term harvest estimates

Estimates	2009 ¹	2010 ²	2011	2012	2013	2014	2015 ³	2016 ⁴	2017 ⁵	2018 ⁶	2019 ⁷	2020 ⁸	Aver 2009 -2020
Licensed hunters	18,348	21,861	23,716	24,533	24,036	26,261	25,837	25,681	26,324	25,799	24,925	23,378	24,225
Total # hunter days	76,659	85,801	103,450	109,718	91,748	118,800	91,264	100,749	96,508	91,570	81,023	29,501	89,680
Total harvest	222,302	270,574	600,739	508,256	422,294	449,032	286,729	271,576	438,353	396,965	238,666	60,403	347,160
Average # days hunted in the season	4.0	4.0	4.5	4.6	3.7	4.6	3.6	3.9	3.8	3.6	3.3	1.26	3.74
Seasonal harvest per licence holder	11.1	12.5	26.0	21.2	17.2	17.3	11.4	10.5	17.4	15.7	9.62	2.58	14.39
Opening weekend bag per hunter	4.5	4.2	9.2	5.3	9.5	5.7	5.8	5.1	7.1	6.3	4.4	N/A	5.6*
Average # ducks per day hunted	2.7	3.1	5.7	4.6	4.6	3.7	3.1	2.6	4.5	6.4	2.9	2.05	3.84

*Doesn't include 2020

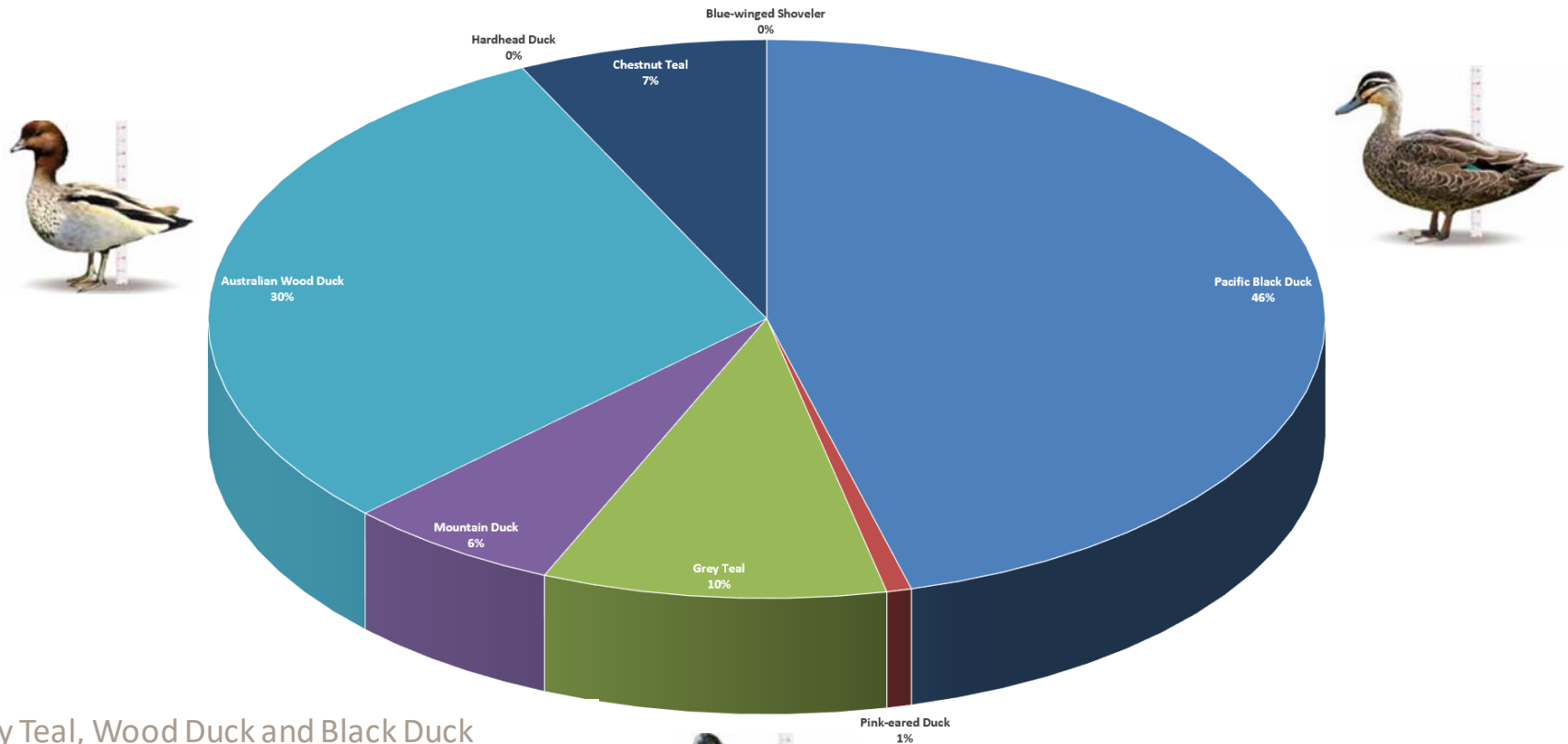
Harvest estimates are at 95% confidence intervals

Modified season arrangements

1. Two (2) birds per day with an additional three (3) Wood Duck. No Blue-winged Shoveler, Pink-eared Duck or Hardhead duck (49 day season)
2. Five (5) birds per day with an additional three (3) Wood Duck. No more than 1 Blue-winged Shoveler (72 day season)
3. Ten (10) birds per day which included a maximum of two Blue-winged Shoveler on opening day. Five (5) birds per day which includes a maximum of one Blue-winged Shoveler for remainder of season (80 day season)
4. Eight (8) birds on opening day. Four (4) birds per day for remainder of the season. No Blue-winged Shoveler hunted in 2016 (87 day season)
5. Ten (10) birds per day. No Blue-winged Shoveler hunted in 2017 (87 day season)
6. Ten (10) birds per day. No Blue-winged Shoveler hunted in 2018 (87 day season)
7. Four (4) birds per day on opening weekend. Five (5) birds per day for the remainder of the season. No Blue-winged Shoveler hunted in 2019 (65 day season)
8. Three (3) birds per day. No Blue-winged Shoveler hunted in 2020 (38 day season). COVID-19 restrictions applied to travel, gathering size, no overnight camping

Estimates of harvest per game duck species

Percentage (rounded) of harvest per duck species for 2020



Grey Teal, Wood Duck and Black Duck consistently make up the majority of the harvest each year. The size of the Grey Teal harvest was significantly lower than normal in 2020 and accords with the significant reduction in Grey Teal abundance detected during the EAWS. Black Duck harvest was higher than normal.

Summary



Summary

- Eastern Australia experienced extreme drought conditions between 2017 – 2019. This had a significant negative impact on the health of wetlands and waterways and consequently, waterbird populations, including game ducks.
- Most of Australia has received average to below average rainfall in 2020 and there has been some partial recovery of the prolonged rainfall deficiencies.
- Despite reaching La Nina thresholds and isolated high rainfall events in some locations, widespread above average rainfall has failed to eventuate in eastern Australia in 2020. Soil moisture levels are reducing with the dry winter, spring and early summer.
- As a result, waterbird habitat has only increased marginally in 2020. The EAWS wetland area index has increased from the lowest recorded in 38 years last year to the 5th lowest recorded and is at 42% of the long-term average.
- Habitat is greatest in EAWS bands 2 – 5 (northern Victoria to northern NSW) and band 10 (north Queensland). 48% of wetlands surveyed (including dry wetlands) held no waterbirds.



Summary

- Low densities of waterbirds are dispersed throughout eastern Australia, with the largest concentrations in band 5 (northern NSW) and band 10 (north Queensland). This applies to game ducks also.
- In response to the continued poor conditions for waterbirds, the EAWS game duck index of abundance remains low at 44% of the long-term average. This is the 7th lowest recorded in 38 years and declined by 23% from the previous year.
- Excluding 2016, there has been very little large-scale waterbird breeding since 2013 and the existing populations constitute core breeding stock.
- Hunting activity and game duck harvests were significantly reduced in 2020 due to COVID-19 restrictions on travel, a prohibition on overnight camping and limit on the size of group gatherings, in addition to a short (5 ½ week) season with reduced (3 bird) bag limit.
- Waterbird abundance, breeding index, breeding species richness and habitat availability are showing continuing long-term declines. Five of the eight game duck species are showing long-term declines.
- La Nina thresholds have been reached and the seasonal climate outlook is for a wetter than average January – March period for 2021. A positive summer Southern Annular Mode and the Madden-Julian Oscillation are predicted to contribute to above average rainfall across eastern Australia. However, persistent, widespread, above average rainfall is needed to lift areas out of deficiency at annual and longer timescales and provide relief from the impacts of the long period of low rainfall.

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