

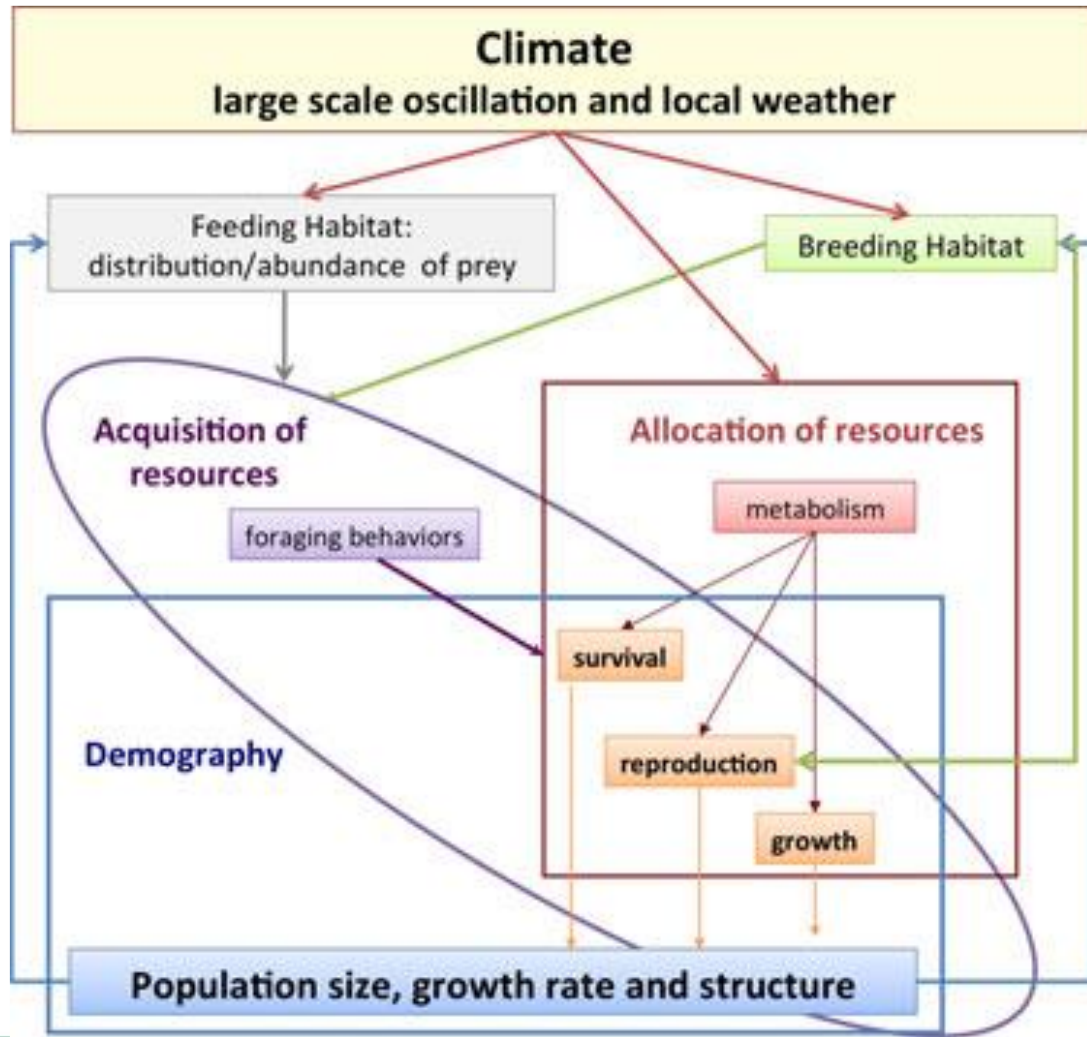
2023 Waterfowl, Environment and Climate Conditions and Forecasts Report

18 December 2023

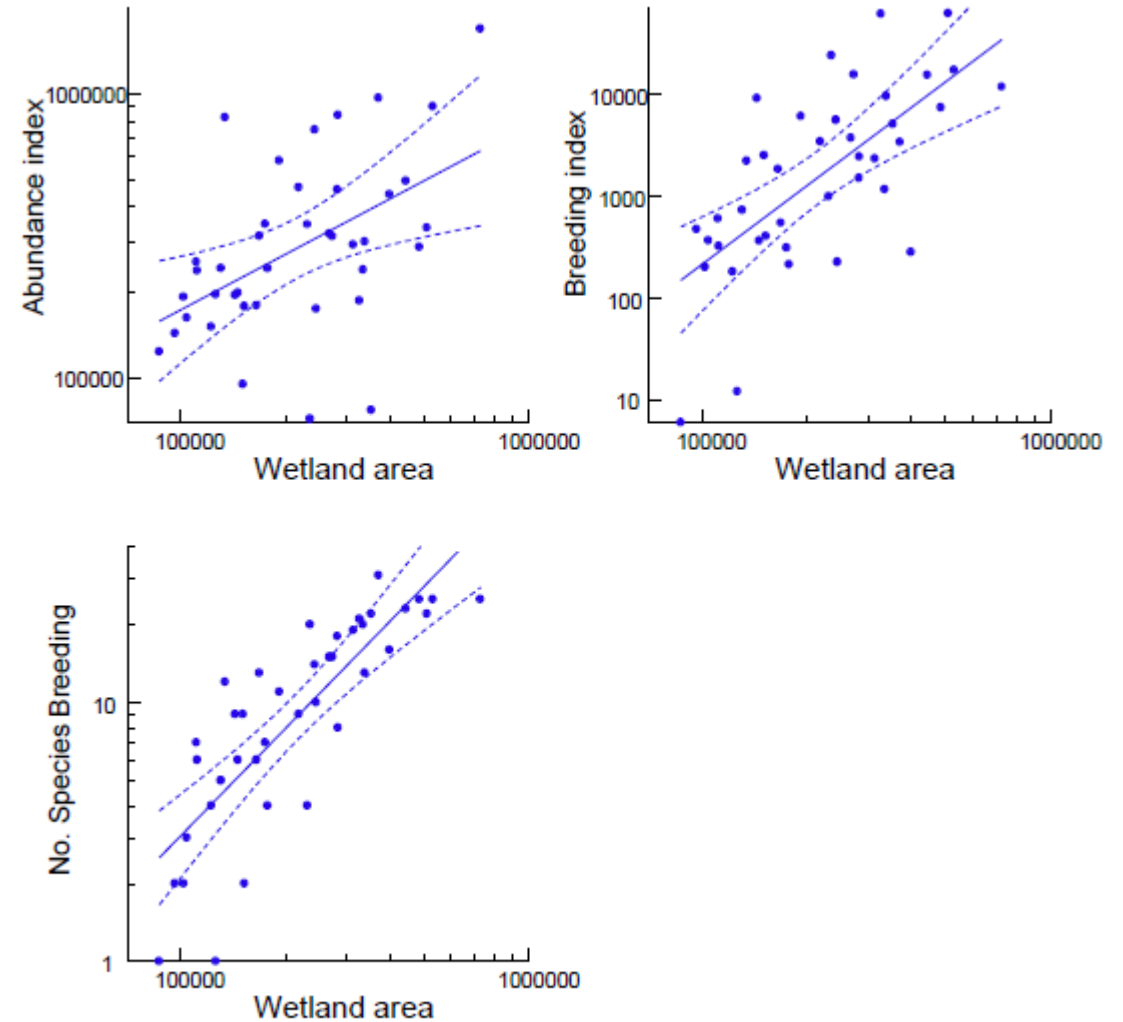
Conditions – review and outlook

- Climate influence on bird abundance & distribution
- Rainfall summary
- Climate drivers
 - El Niño Southern Oscillation - La Niña
 - Indian Ocean Dipole
 - Southern Annular Mode
- Summer rainfall & temperature forecasts
- River Murray inflows, storages and flow to SA
- Lake Eyre Basin

Climatic conditions affecting bird abundance & demographics



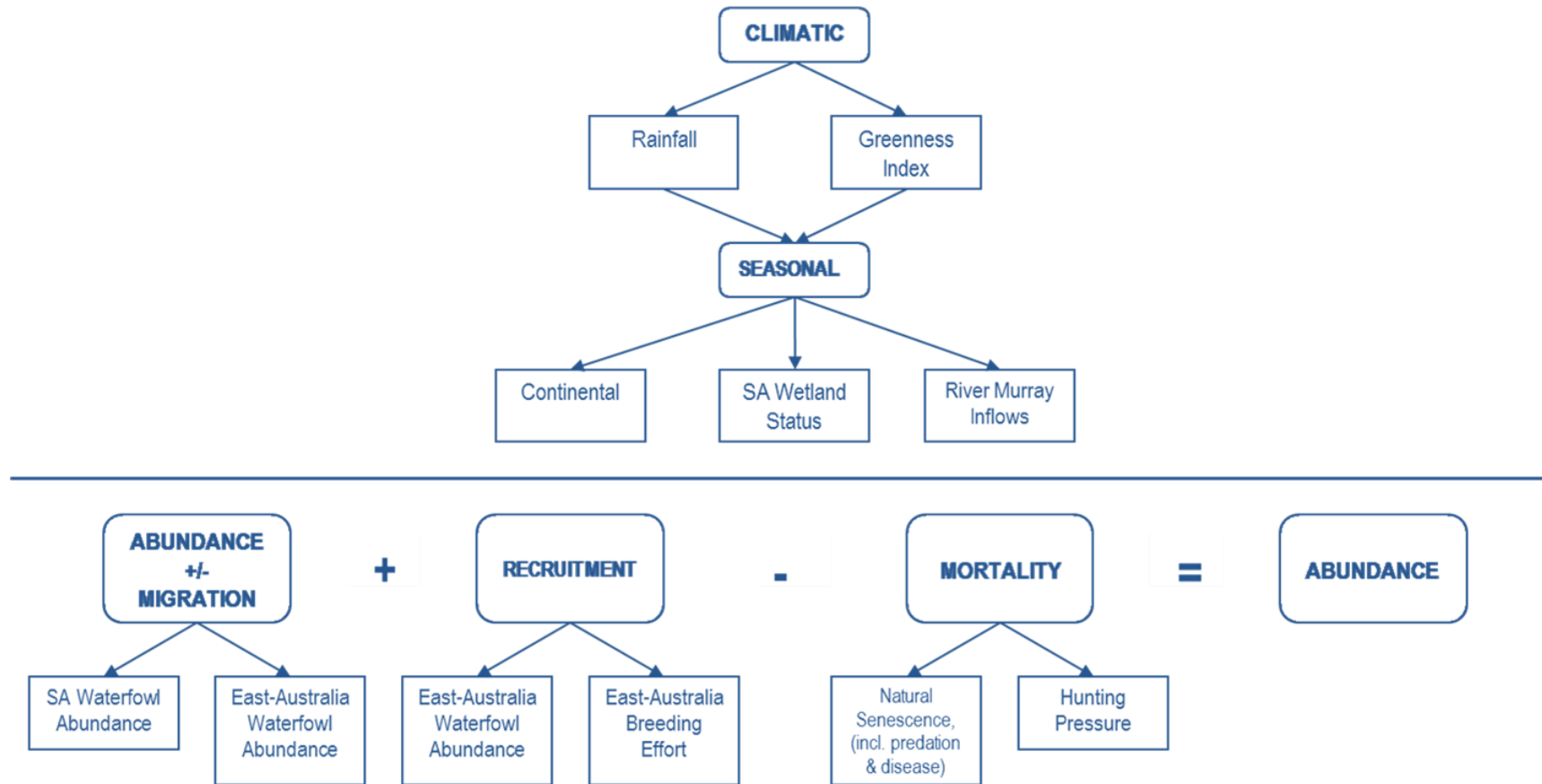
Source: Jenouvrier, S., 2013. Impacts of climate change on avian populations. *Global Change Biology*, 19(7), pp.2036-2057.



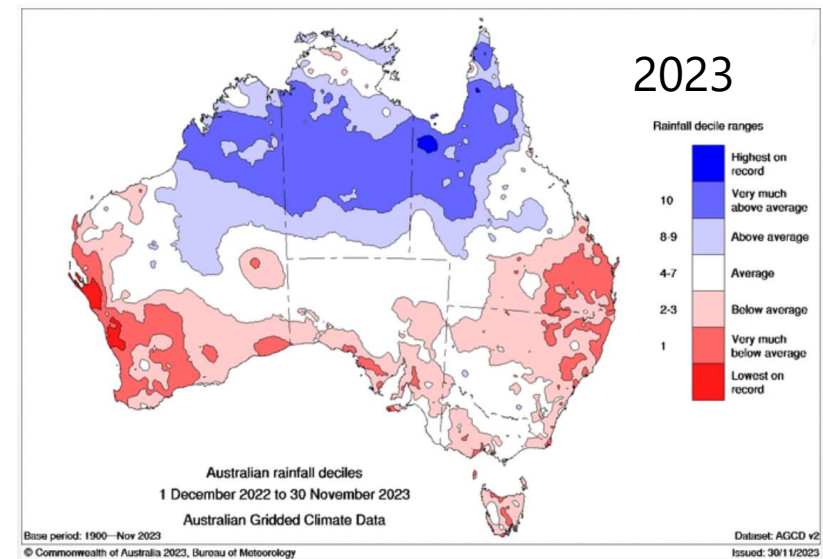
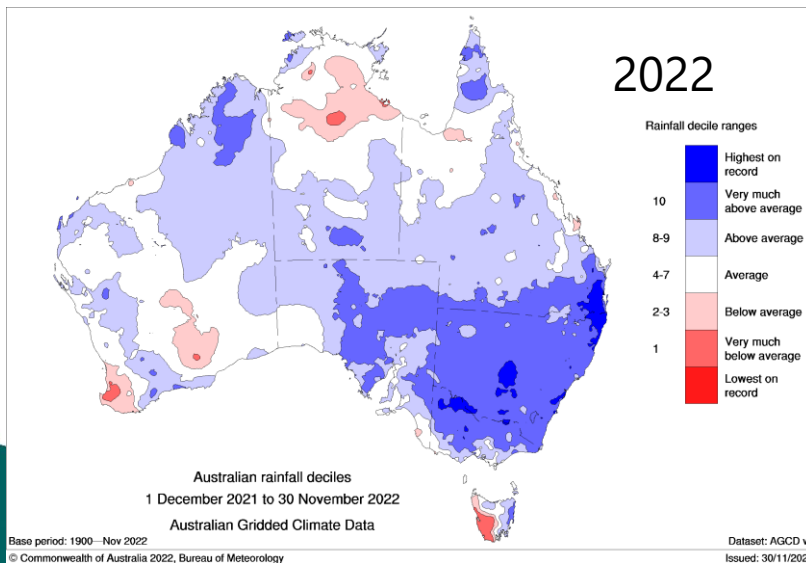
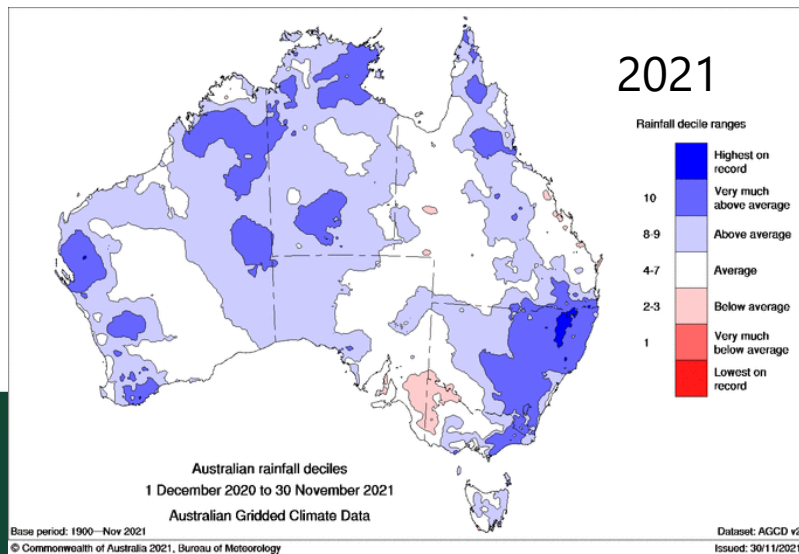
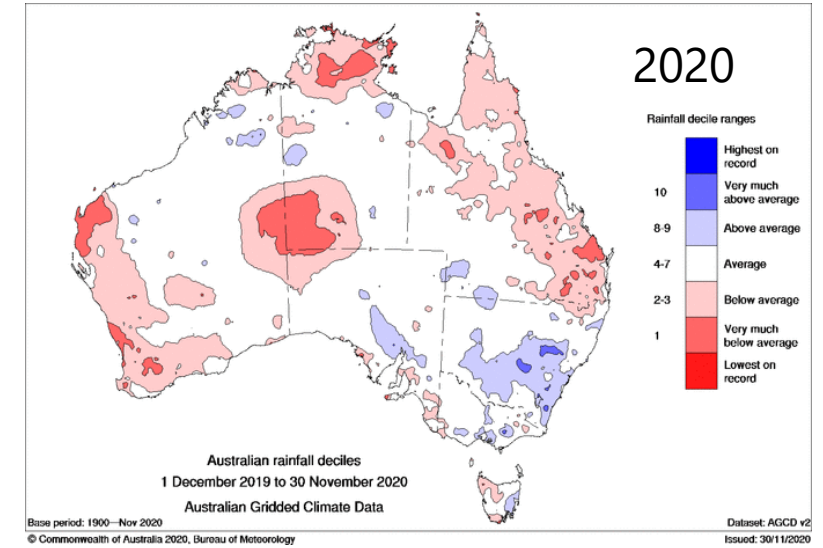
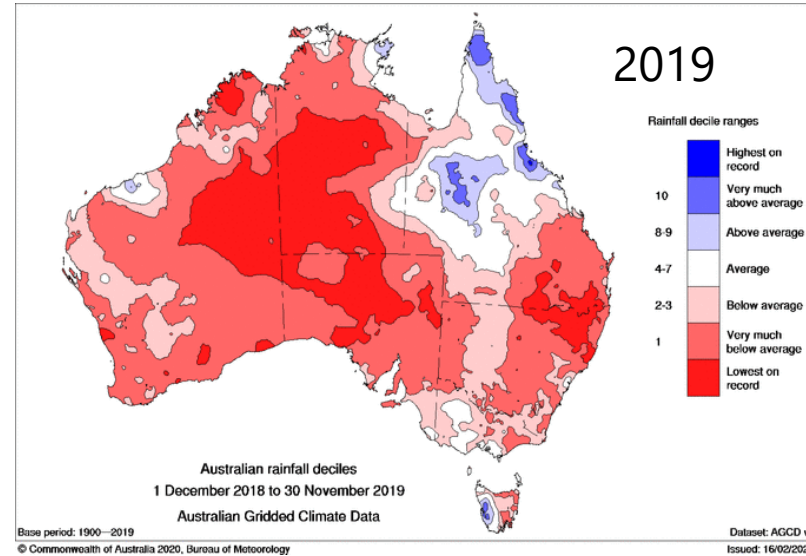
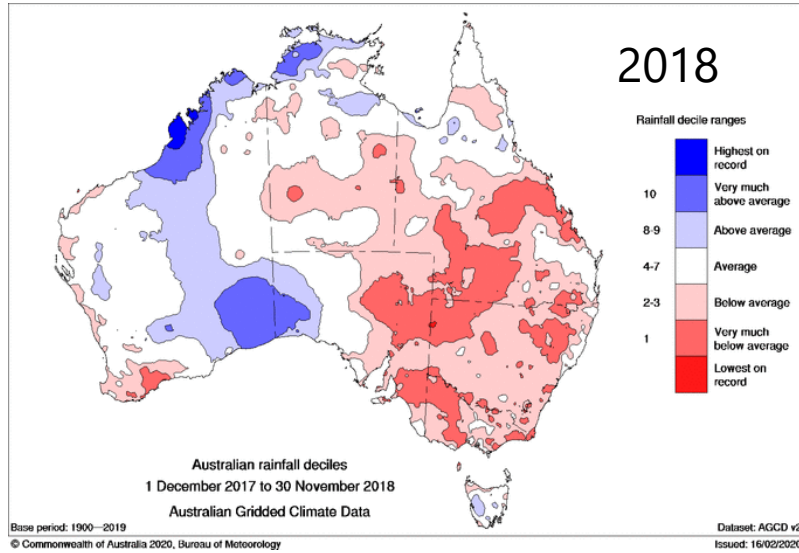
Source: Porter J.L., Kingsford R.T., Francis R., Brandis K, and Ahern, A. (2023) *Eastern Australian Waterbird Aerial Survey - October 2023 Annual Summary Report*

Duck and quail hunting in South Australia

Factors influencing waterfowl species and populations

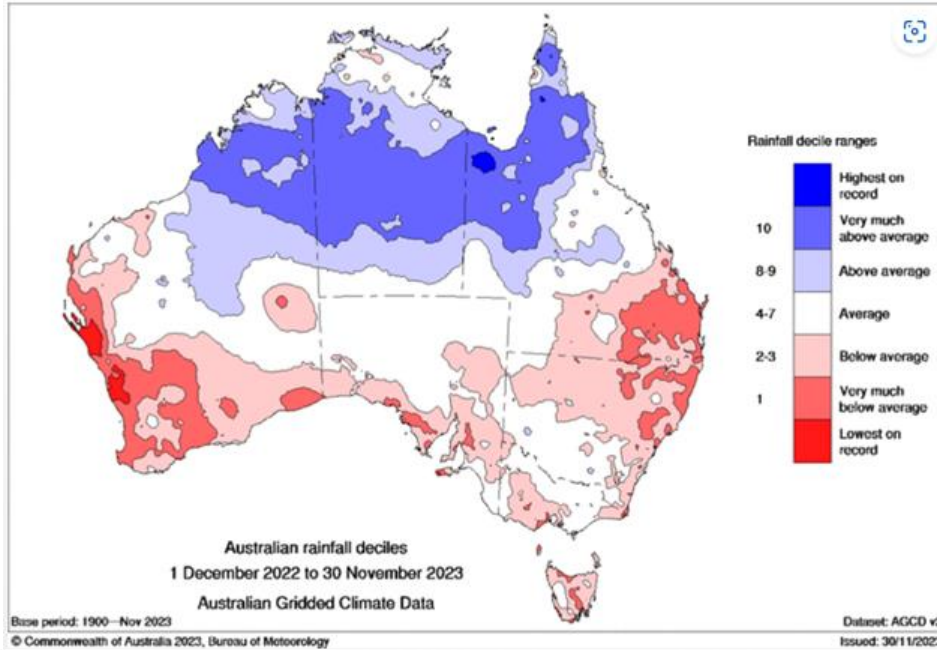


Rainfall 2018 to 2023 (1 Dec - 30 Nov)

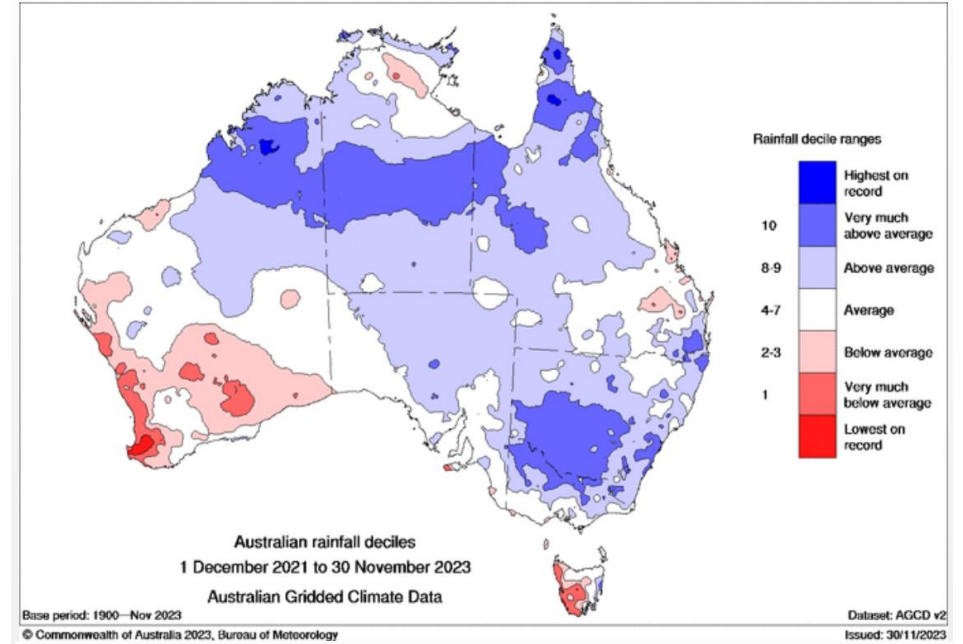


12, 24, 36 and 48 month rainfall deciles

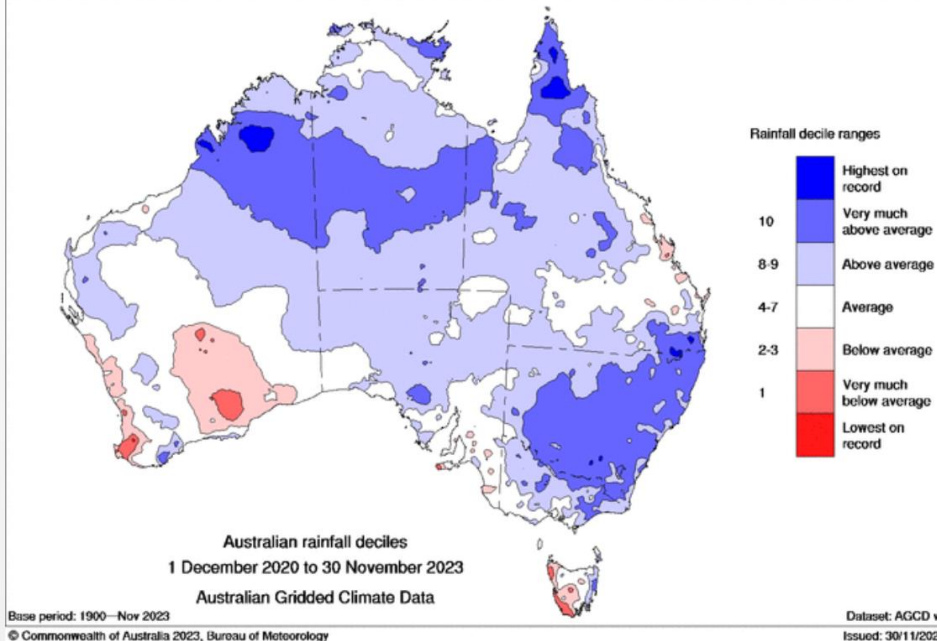
12 month



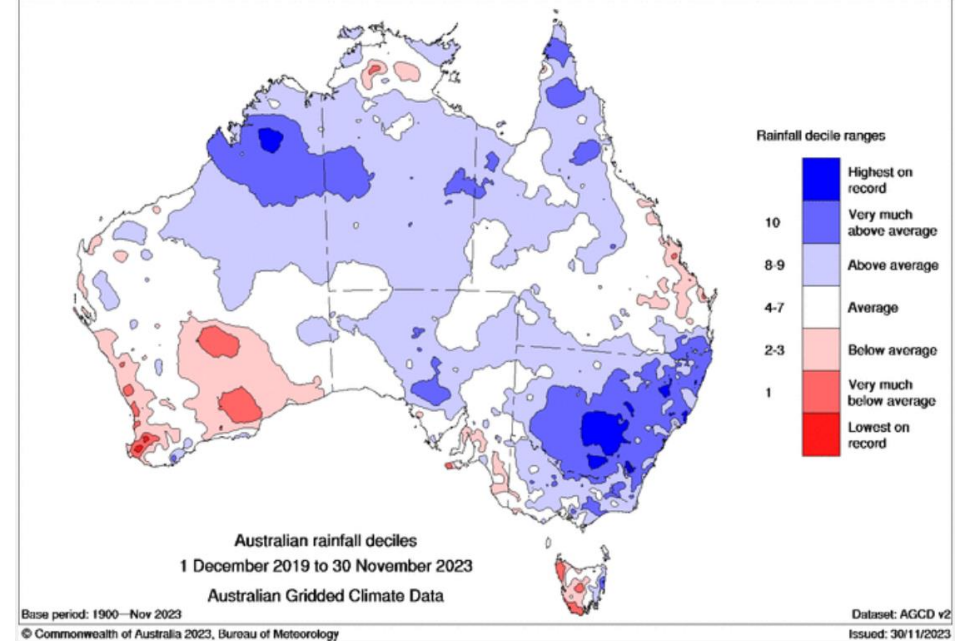
24 month



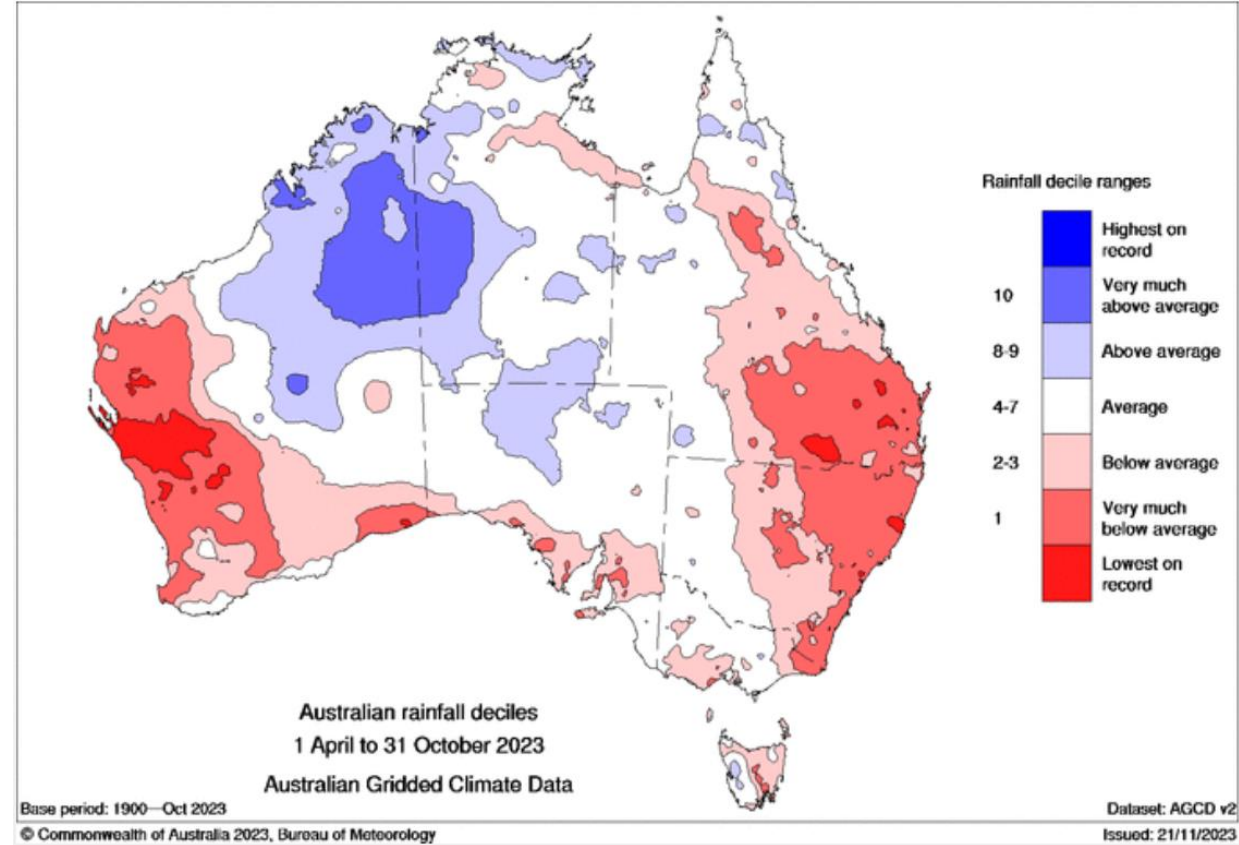
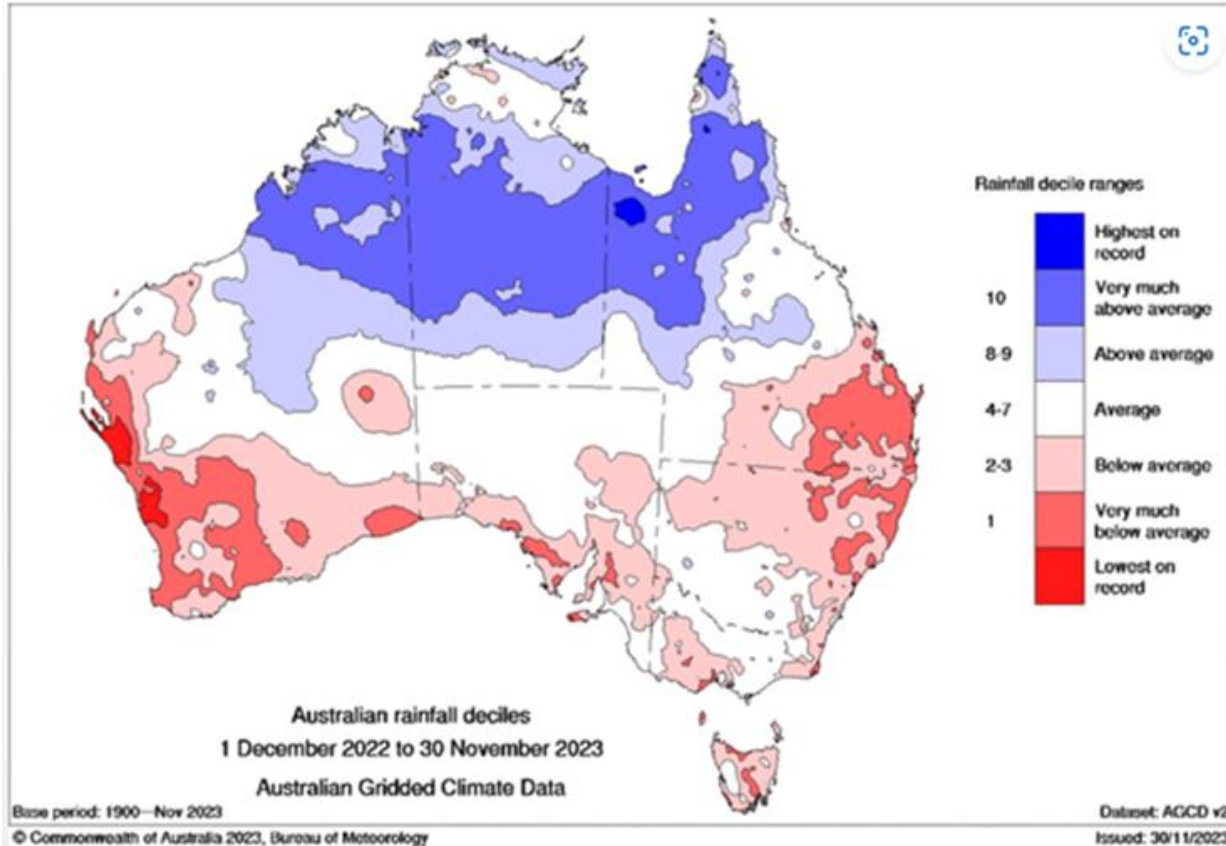
36 month



48 month

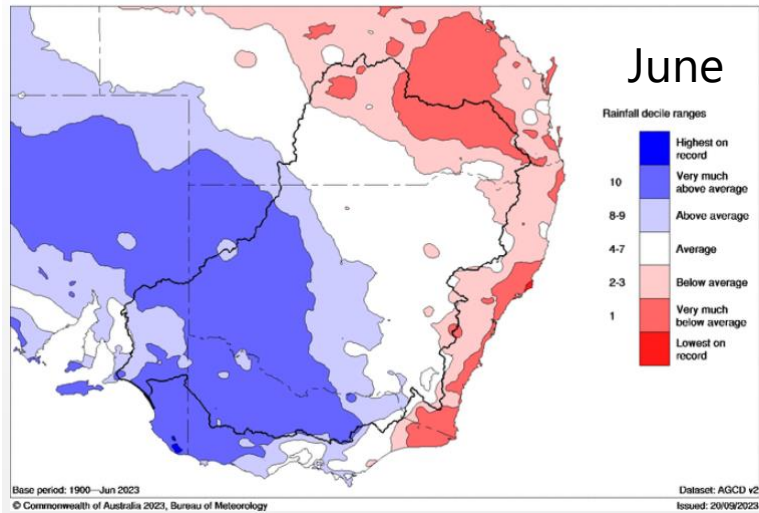


Rainfall deciles: 12 month & cool season

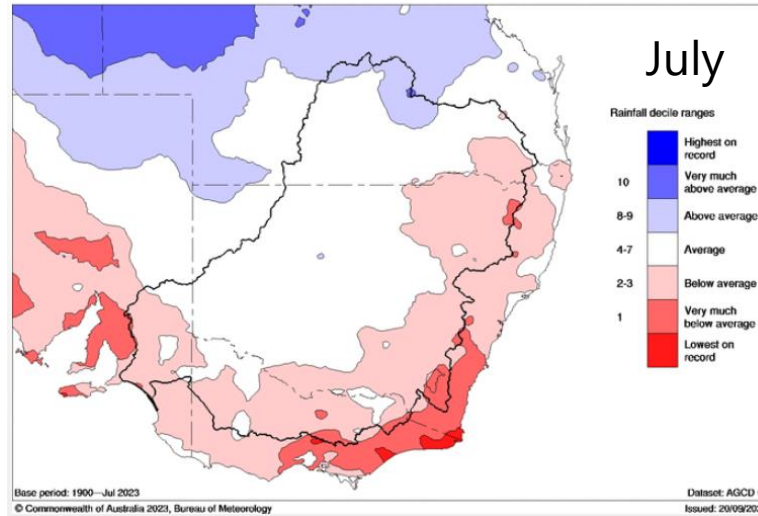


2023 Rainfall in the Murray Darling Basin

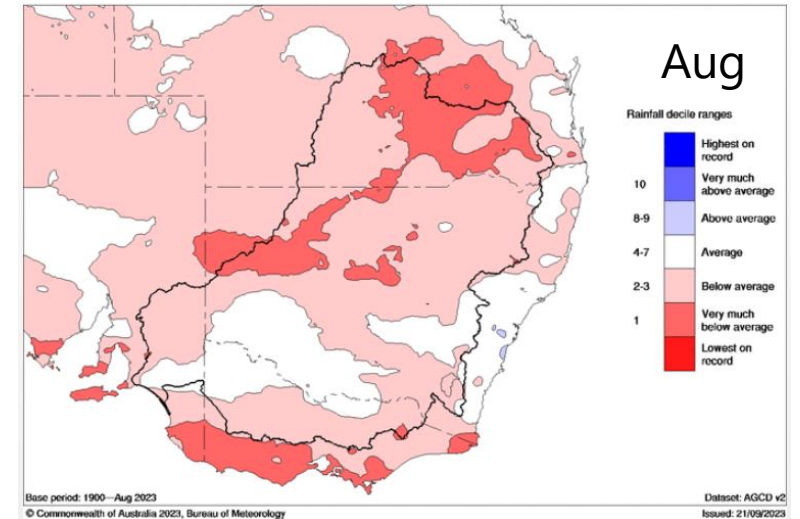
Monthly rainfall deciles for Murray-Darling Basin 01/06/2023 – 30/06/2023



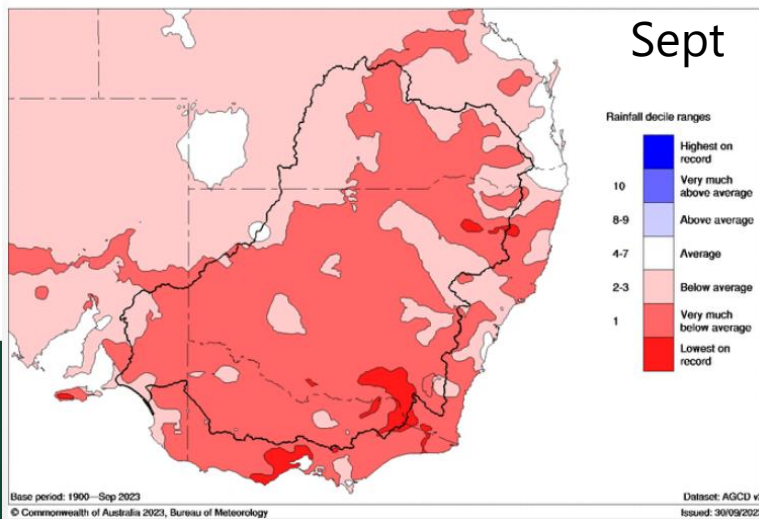
Monthly rainfall deciles for Murray-Darling Basin 01/07/2023 – 31/07/2023



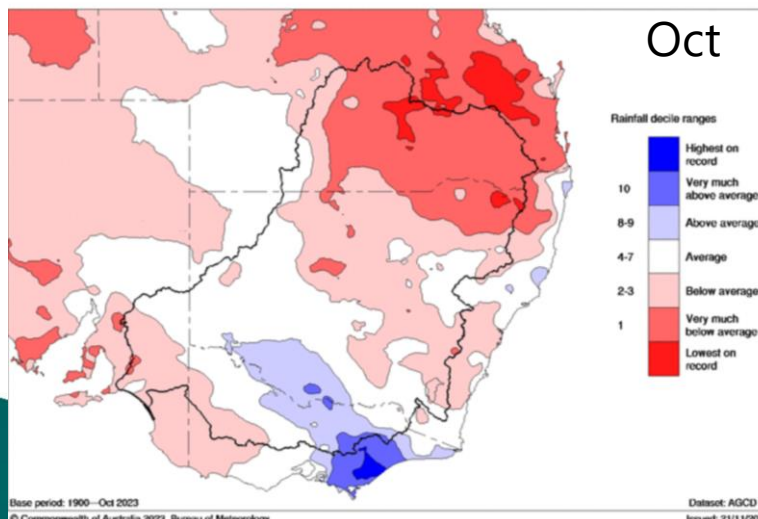
Monthly rainfall deciles for Murray-Darling Basin 01/08/2023 – 31/08/2023



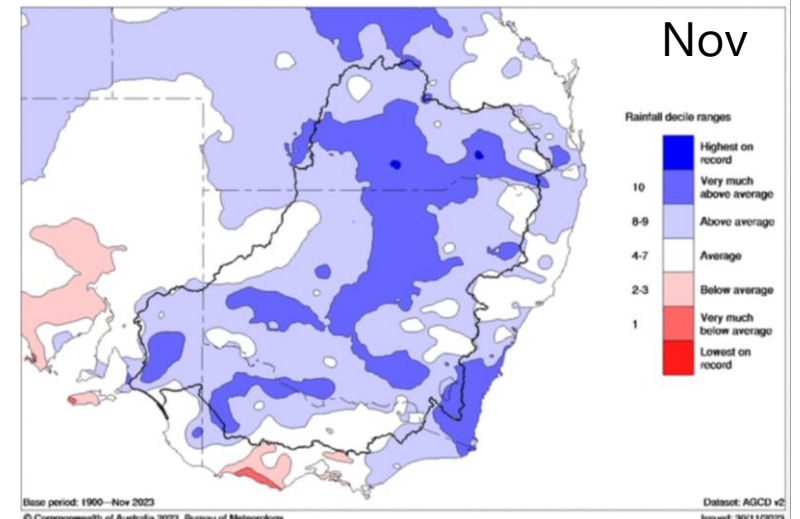
Monthly rainfall deciles for Murray-Darling Basin 01/09/2023 – 30/09/2023

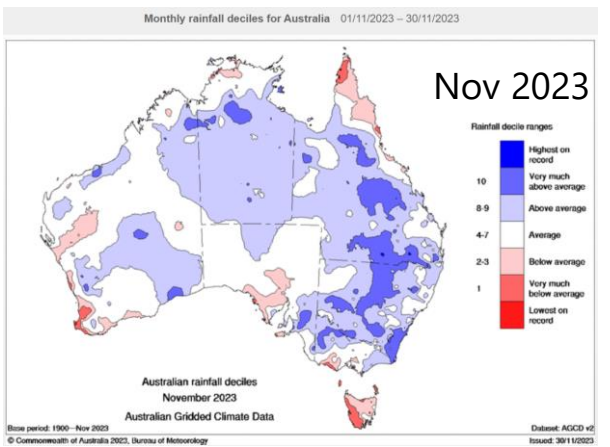
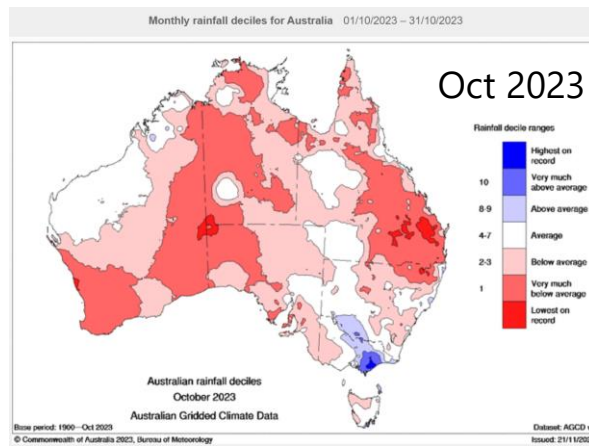
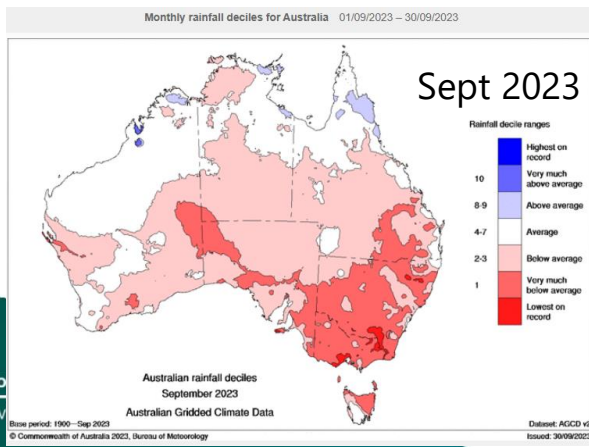
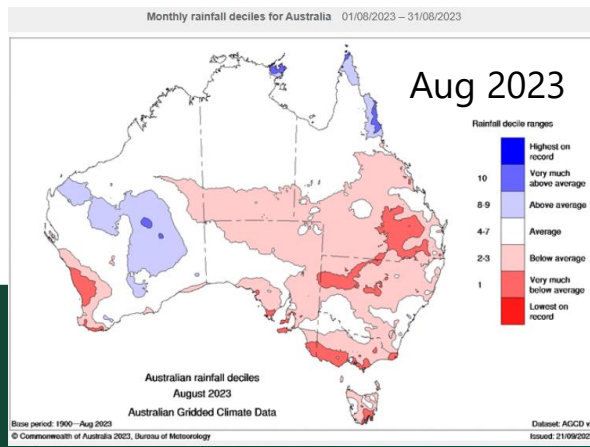
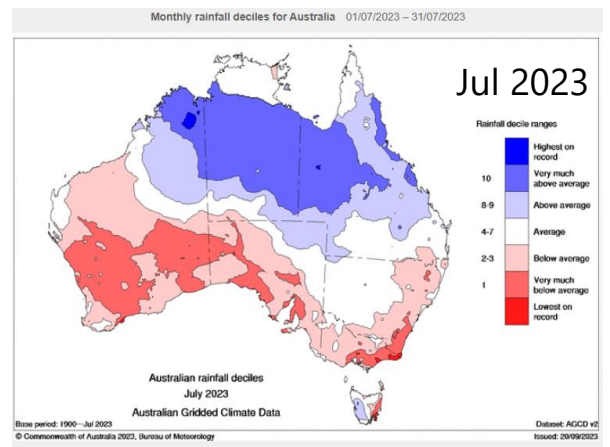
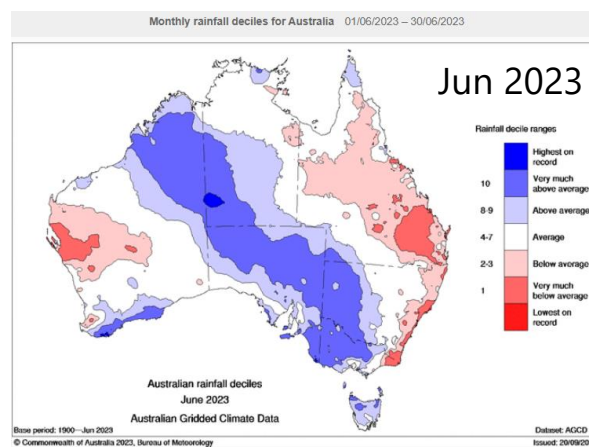
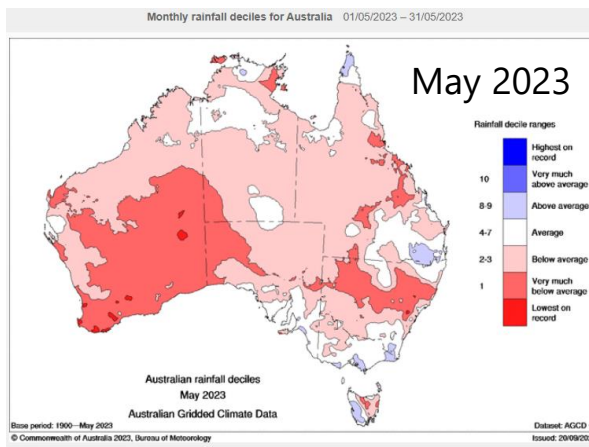
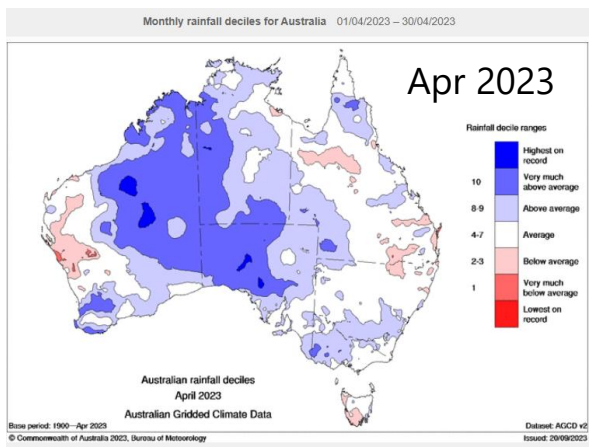
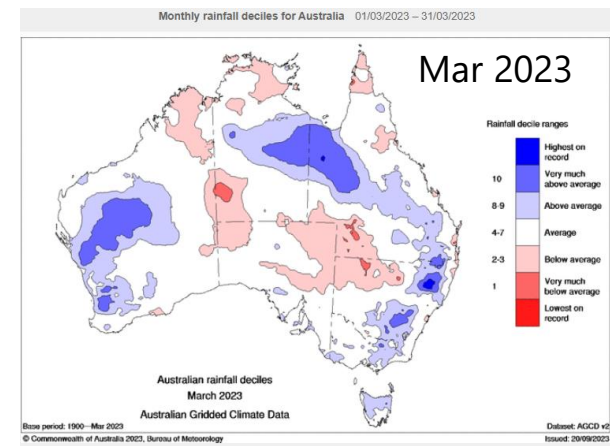
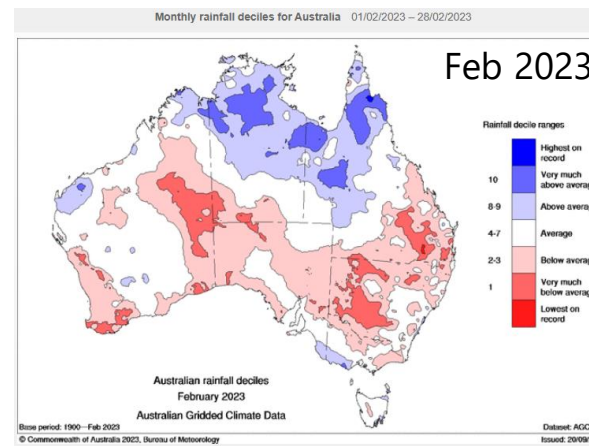
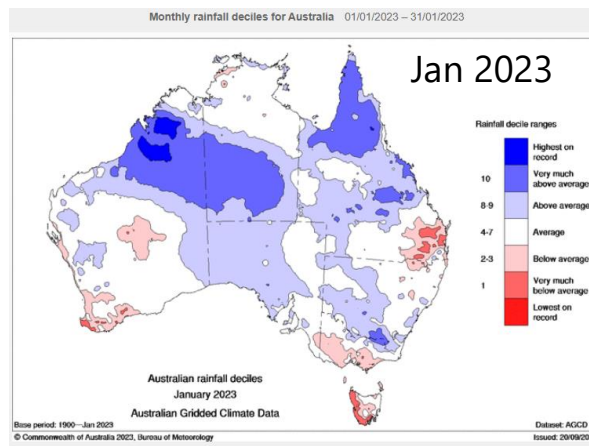
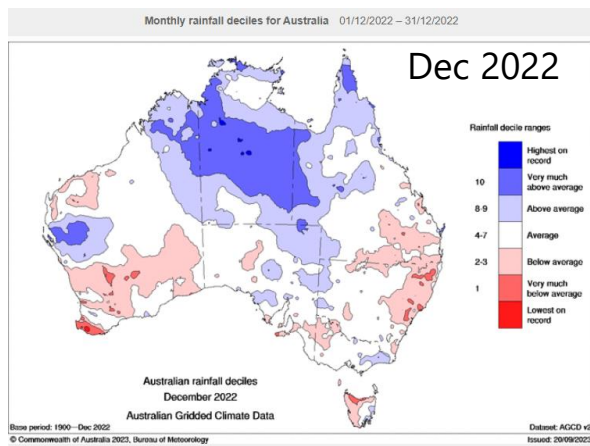


Monthly rainfall deciles for Murray-Darling Basin 01/10/2023 – 31/10/2023

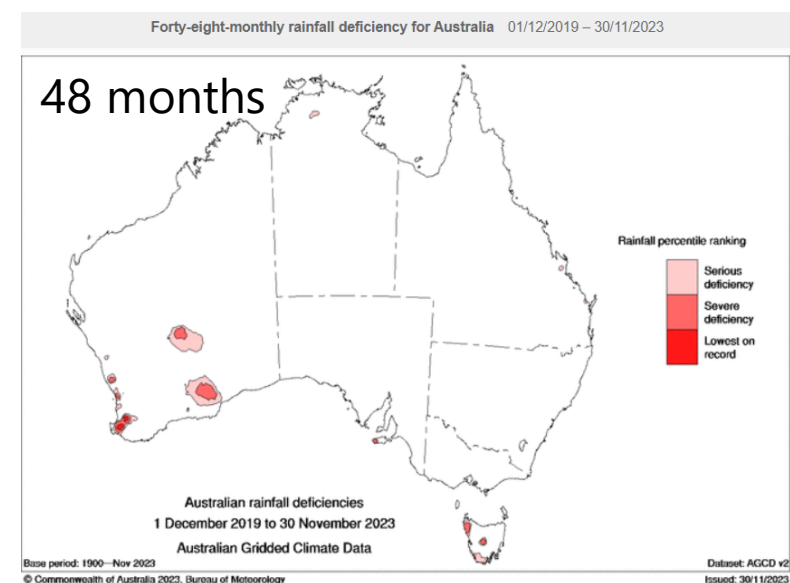
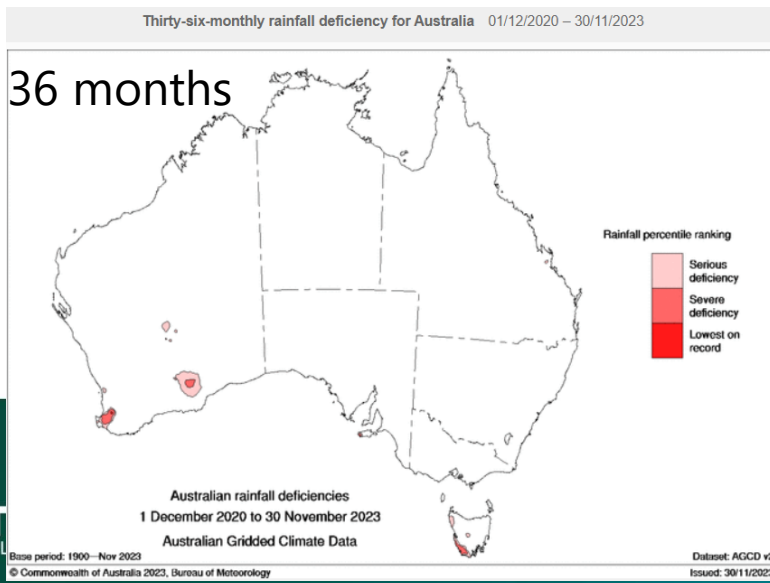
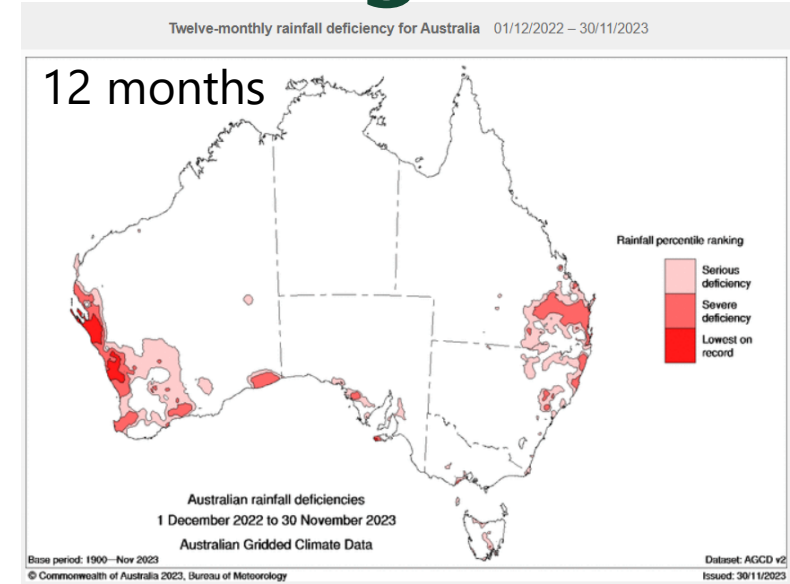
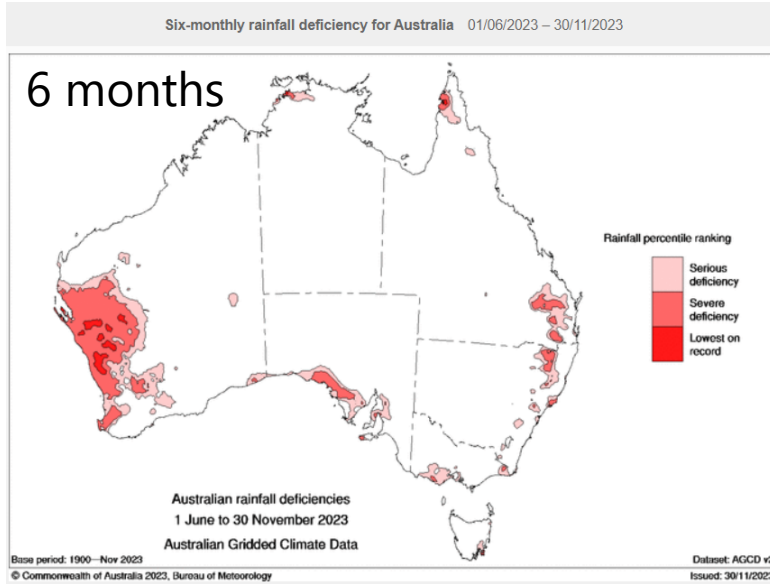


Monthly rainfall deciles for Murray-Darling Basin 01/11/2023 – 30/11/2023

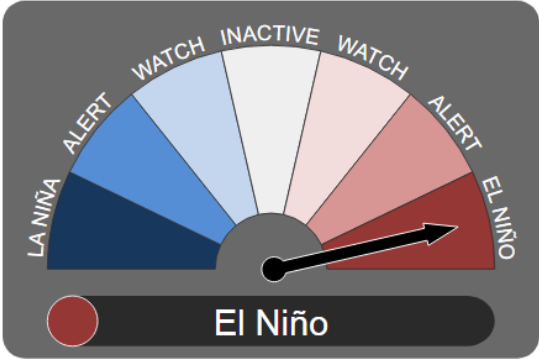




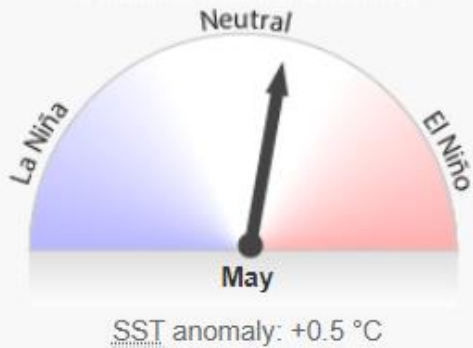
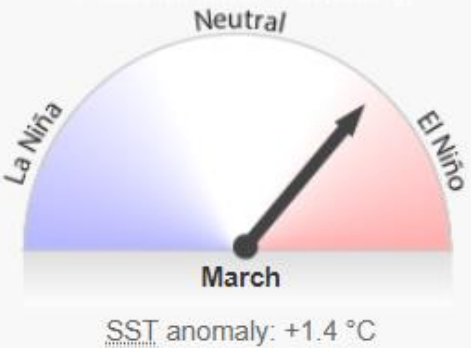
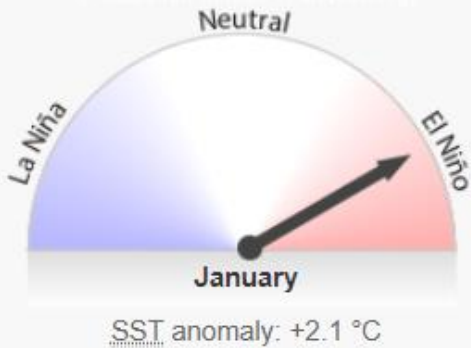
2023 Rainfall deficiencies (drought)



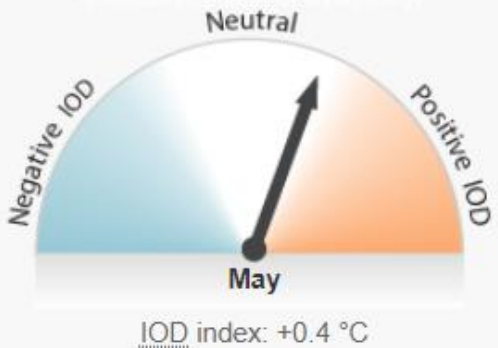
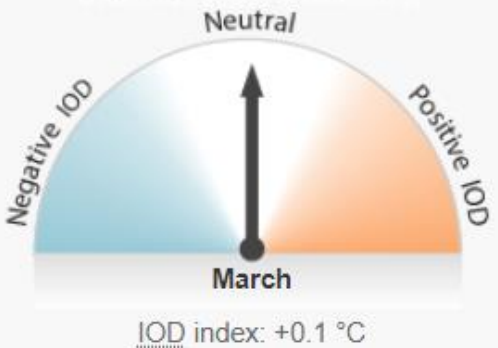
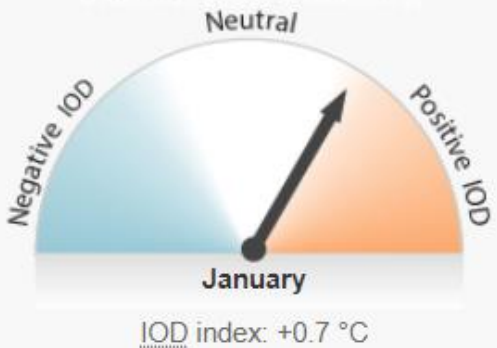
Climate Drivers



Average of international model forecasts for NINO3.4 Issued 12 December 2023



Average of international model forecasts for IOD Issued 12 December 2023



TYPICAL IMPACTS IN A POSITIVE PHASE



Average winter-spring rainfall

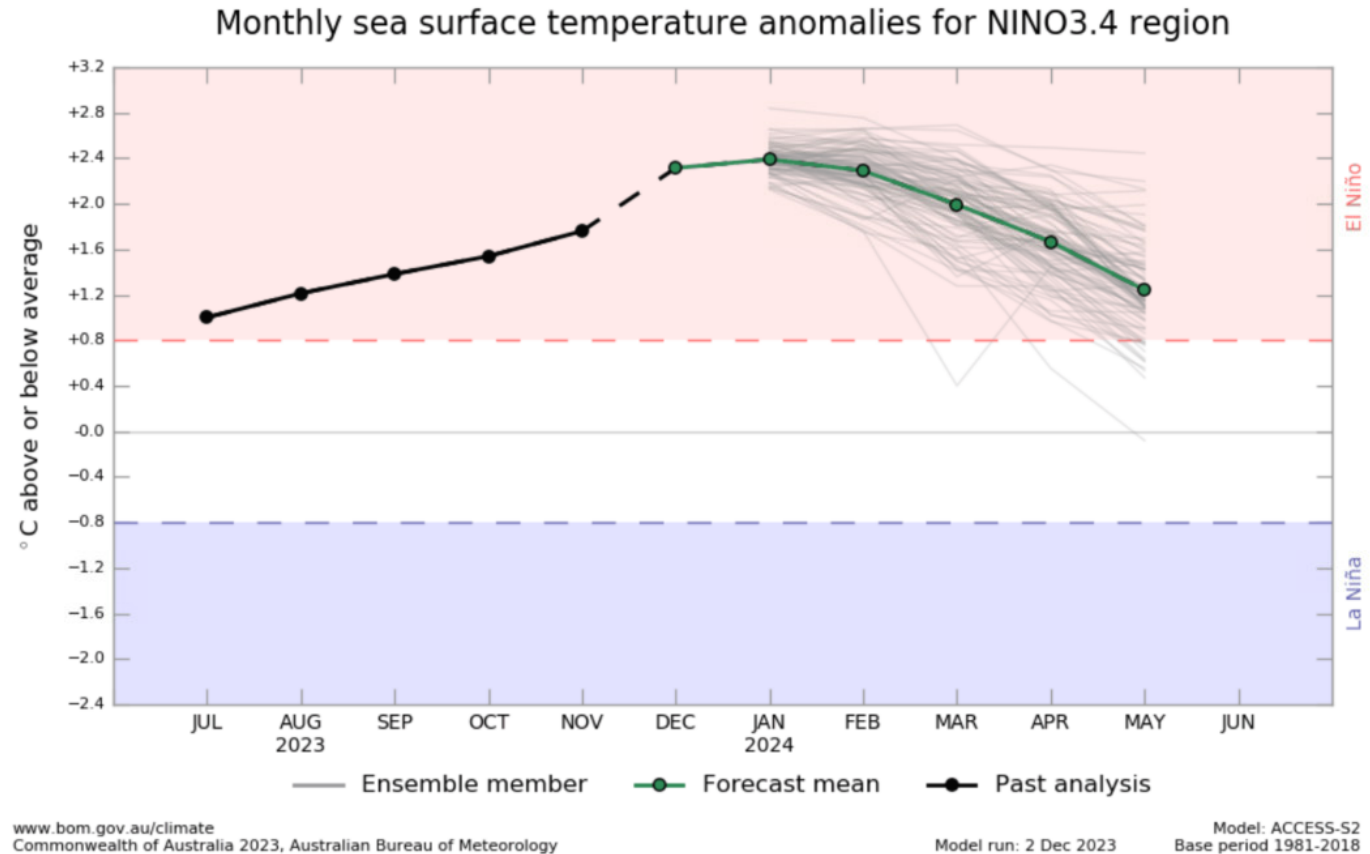
RED = DRIER THAN NORMAL

- LESS RAINFALL OVER CENTRAL AND SOUTHERN AUSTRALIA
- WARMER DAYS IN WEST AND SOUTH
- WARMER NIGHTS IN SOUTHWEST, COOLER IN NORTH
- SHORTER SNOW SEASON, LOWER SNOW DEPTHS
- INCREASED FIRE RISK IN SOUTHEAST

POSITIVE PHASE MORE LIKELY TO COINCIDE WITH EL NIÑO

1982 SOUTHEAST AUSTRALIA HAD ITS **DRIEST** YEAR ON RECORD WHEN A **POSITIVE IOD** COINCIDED WITH **EL NIÑO**

El Niño Southern Oscillation



Indian Ocean Dipole

TYPICAL IMPACTS IN A POSITIVE PHASE

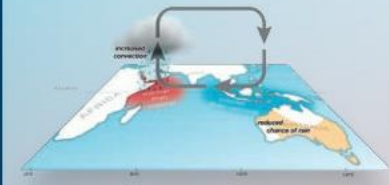


- LESS RAINFALL OVER CENTRAL AND SOUTHERN AUSTRALIA
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- WARMER NIGHTS IN SOUTHWEST, COOLER IN NORTH
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POSITIVE PHASE MORE LIKELY TO COINCIDE WITH EL NIÑO

1982 SOUTHEAST AUSTRALIA HAD ITS

DRIEST YEAR ON RECORD WHEN A **POSITIVE IOD** COINCIDED WITH **EL NIÑO**



INDIAN OCEAN DIPOLE IN AUSTRALIA

WHAT IS IT?

The Indian Ocean Dipole is the difference in ocean temperatures between the west and east tropical Indian Ocean, that can shift moisture towards or away from Australia.

WHEN DO THEY OCCUR?

THE IOD CAN IMPACT FROM **MAY TO DECEMBER** AND LAST FOR

2 TO 7 MONTHS

THE IOD DOESN'T FORM DURING SUMMER DUE TO THE AUSTRALIAN MONSOON

TYPICAL IMPACTS IN A NEGATIVE PHASE

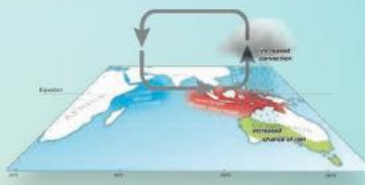


- MORE RAINFALL OVER EASTERN AND SOUTHERN AUSTRALIA
- COOLER DAYS IN SOUTH
- WARMER NIGHTS IN NORTH
- INCREASED CHANCE OF FLOODING
- MORE NORTHWEST CLOUD BANDS

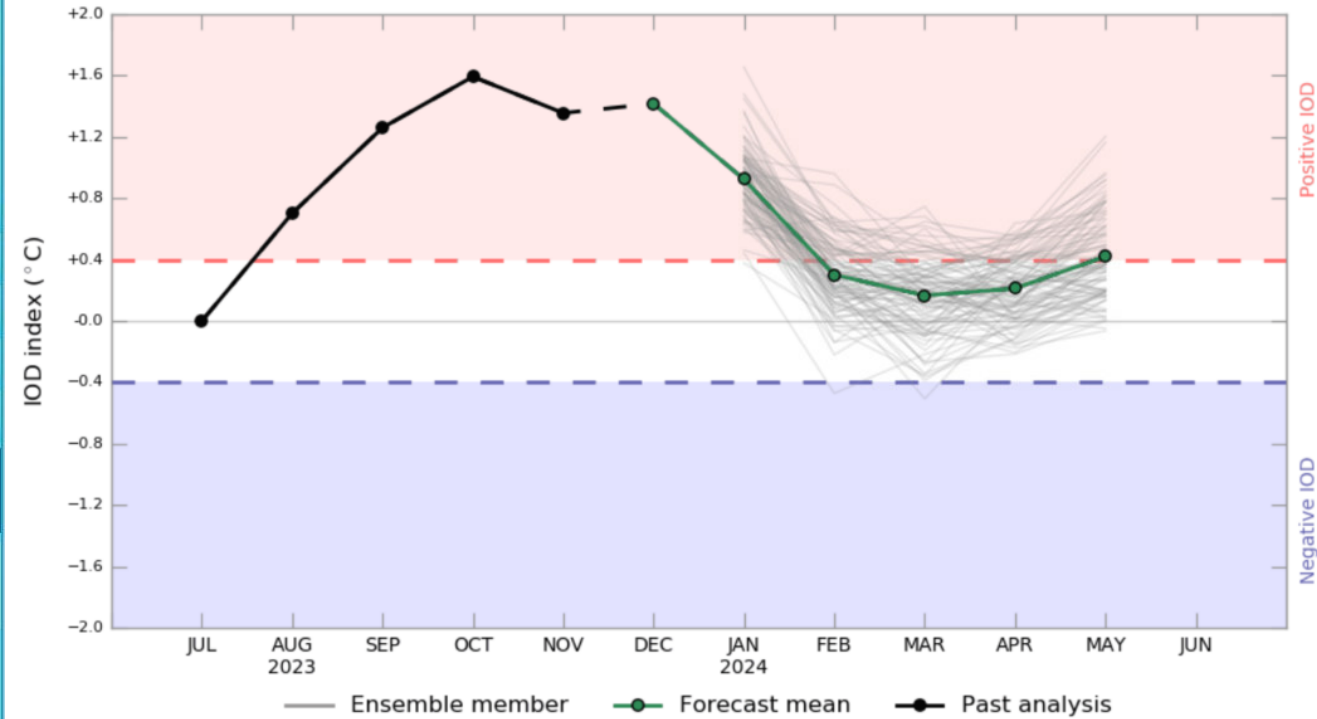
NEGATIVE PHASE MORE LIKELY TO COINCIDE WITH LA NIÑA

1974 AUSTRALIA HAD ITS

WETTEST YEAR ON RECORD WHEN A **NEGATIVE IOD** COINCIDED WITH **LA NIÑA**



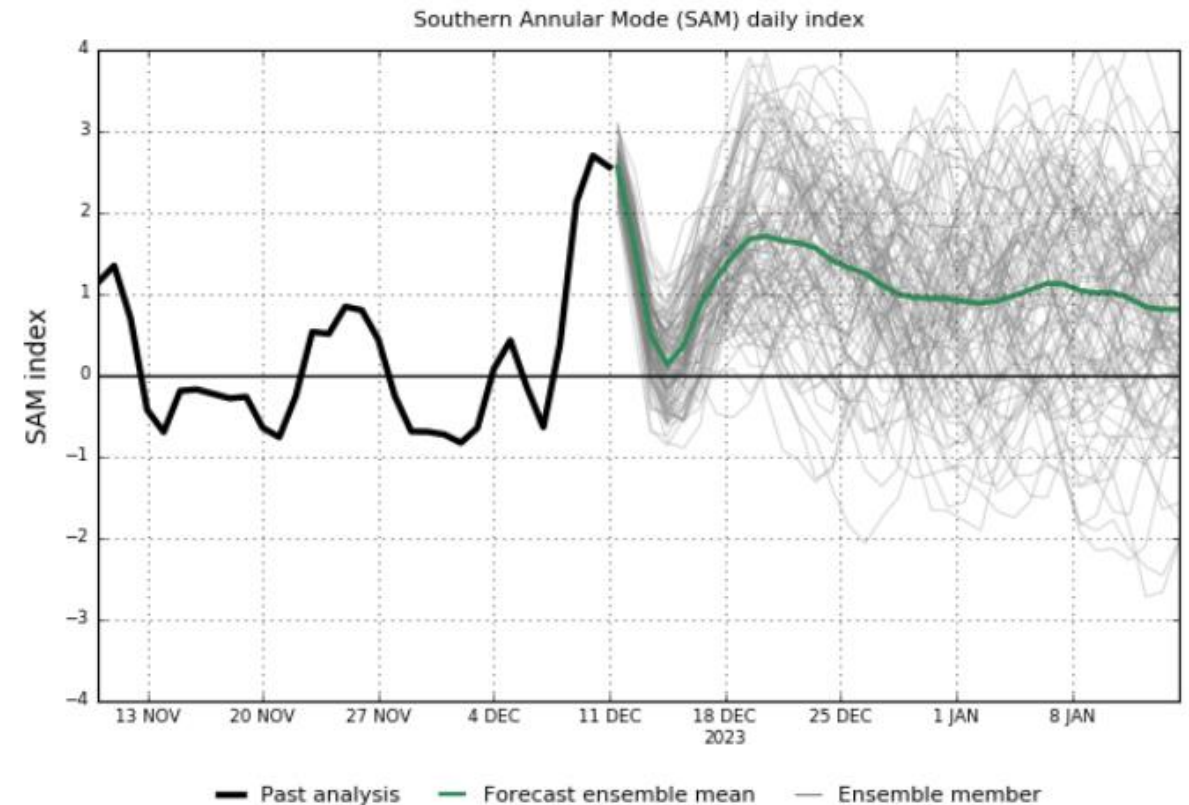
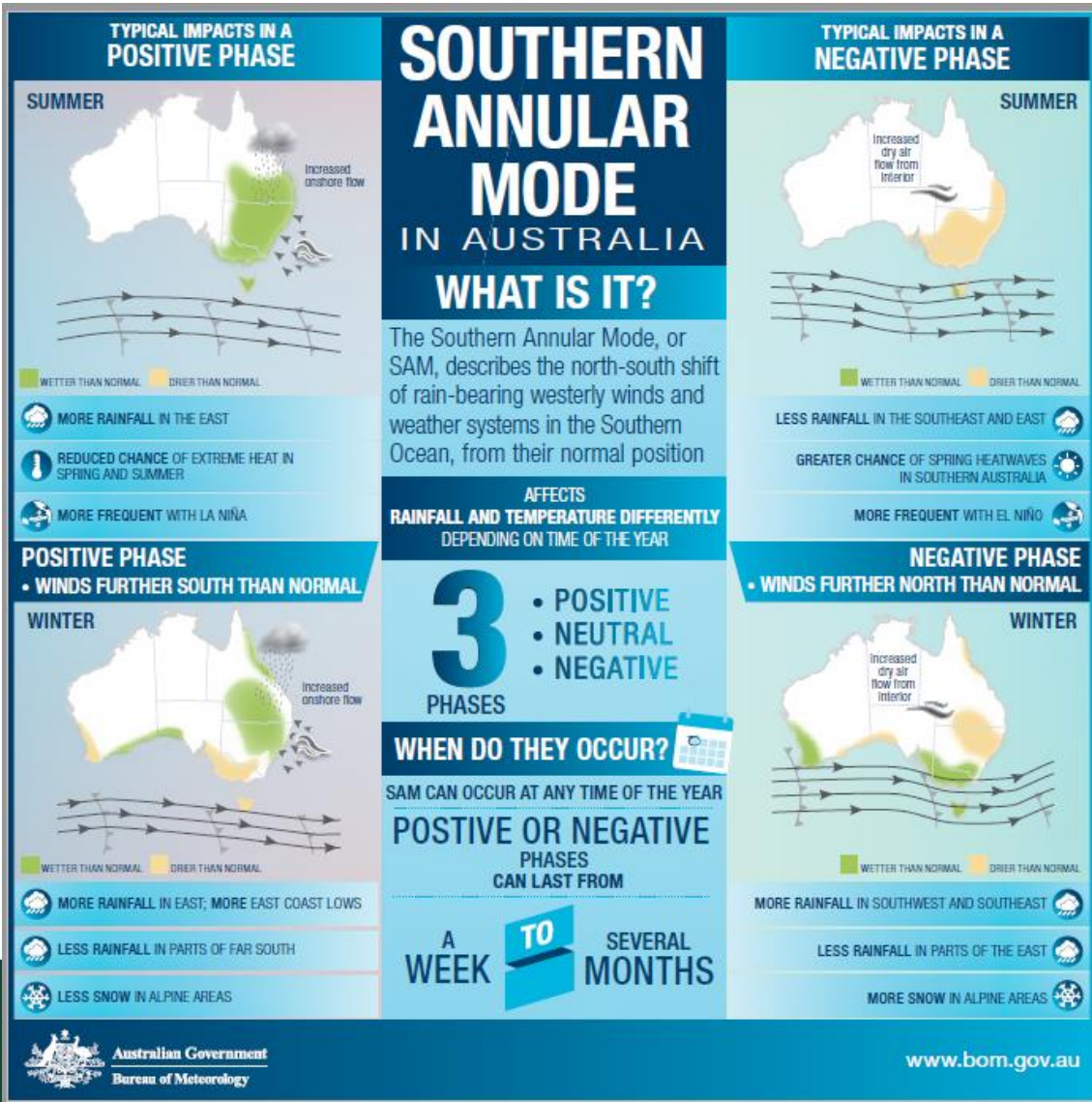
Monthly sea surface temperature anomalies for IOD region



www.bom.gov.au/climate
Commonwealth of Australia 2023, Australian Bureau of Meteorology

Model run: 2 Dec 2023
Model: ACCESS-S2
Base period 1981-2018

Southern Annular Mode

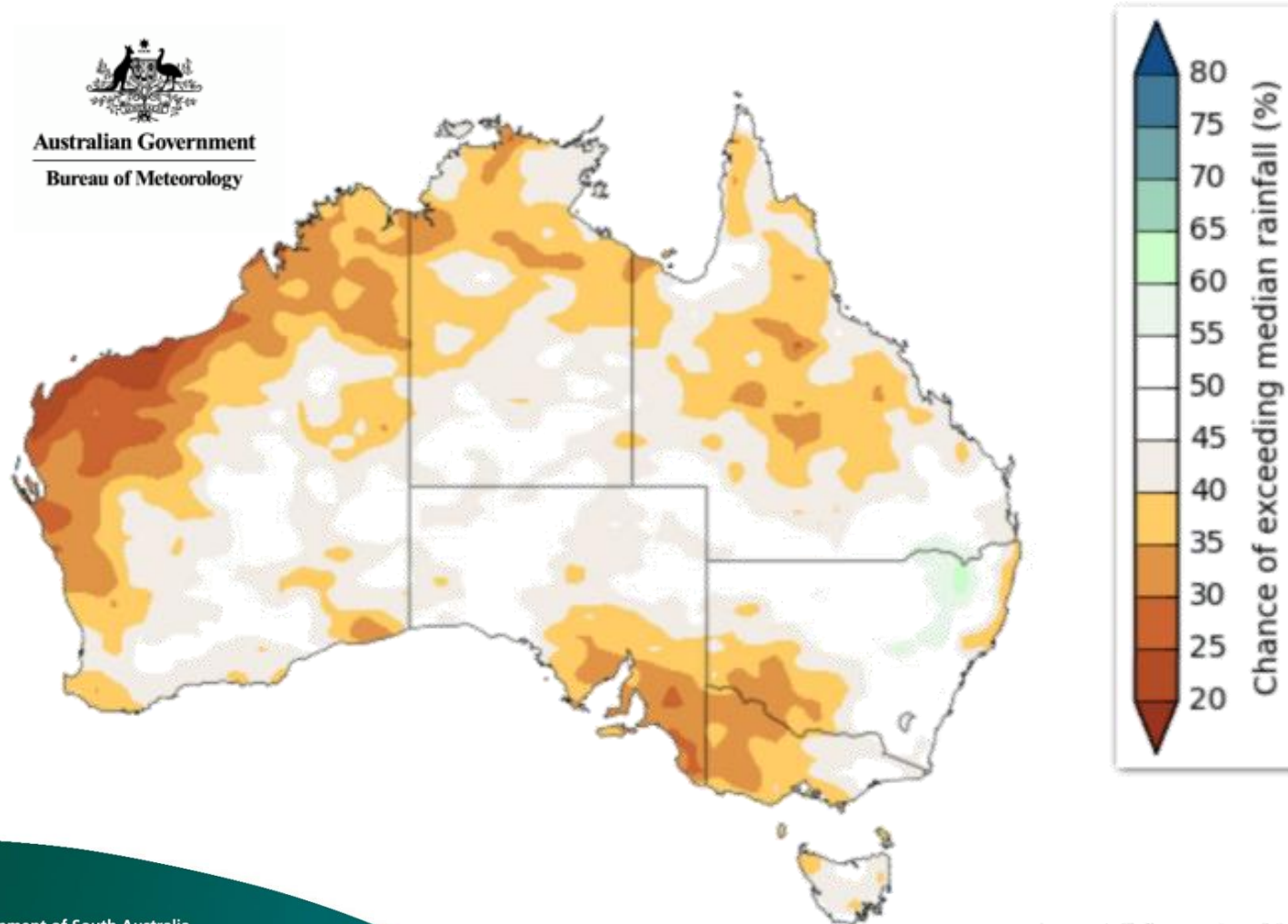


www.bom.gov.au/climate
Commonwealth of Australia 2023, Australian Bureau of Meteorology

Model: ACCESS-S2
Model run: 11 Dec 2023
Base period 1990-2012

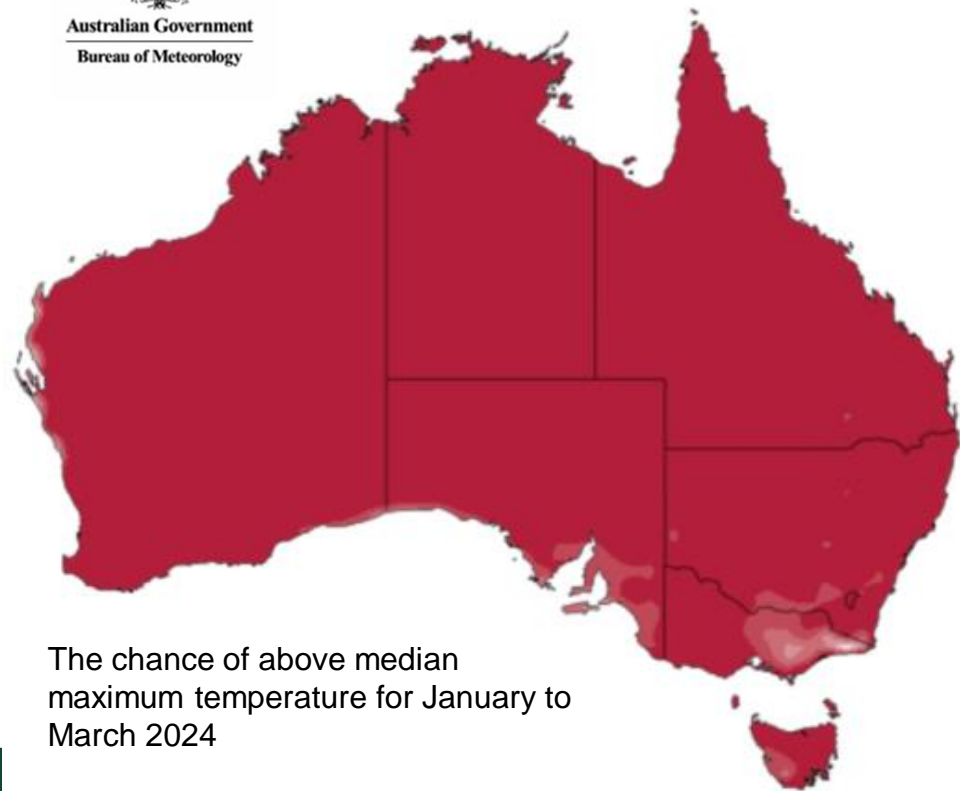
Forecast rainfall

Chance of exceeding median rainfall January to March 2024



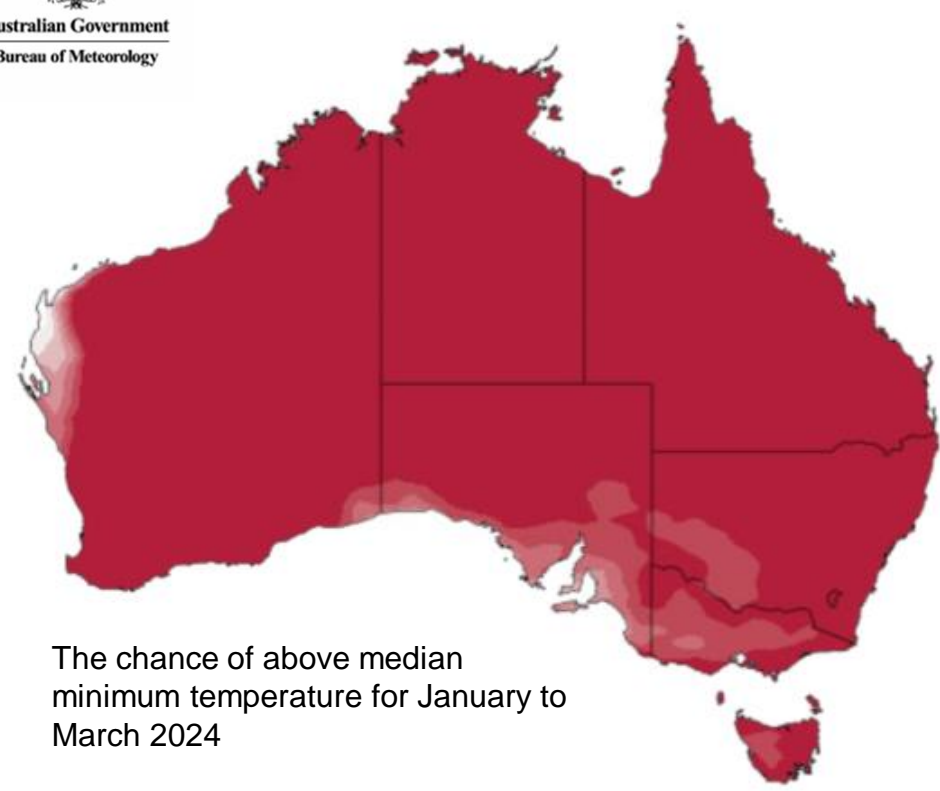
Forecast temperature

Chance of exceeding median maximum and minimum temperatures - January to March 2024



The chance of above median maximum temperature for January to March 2024

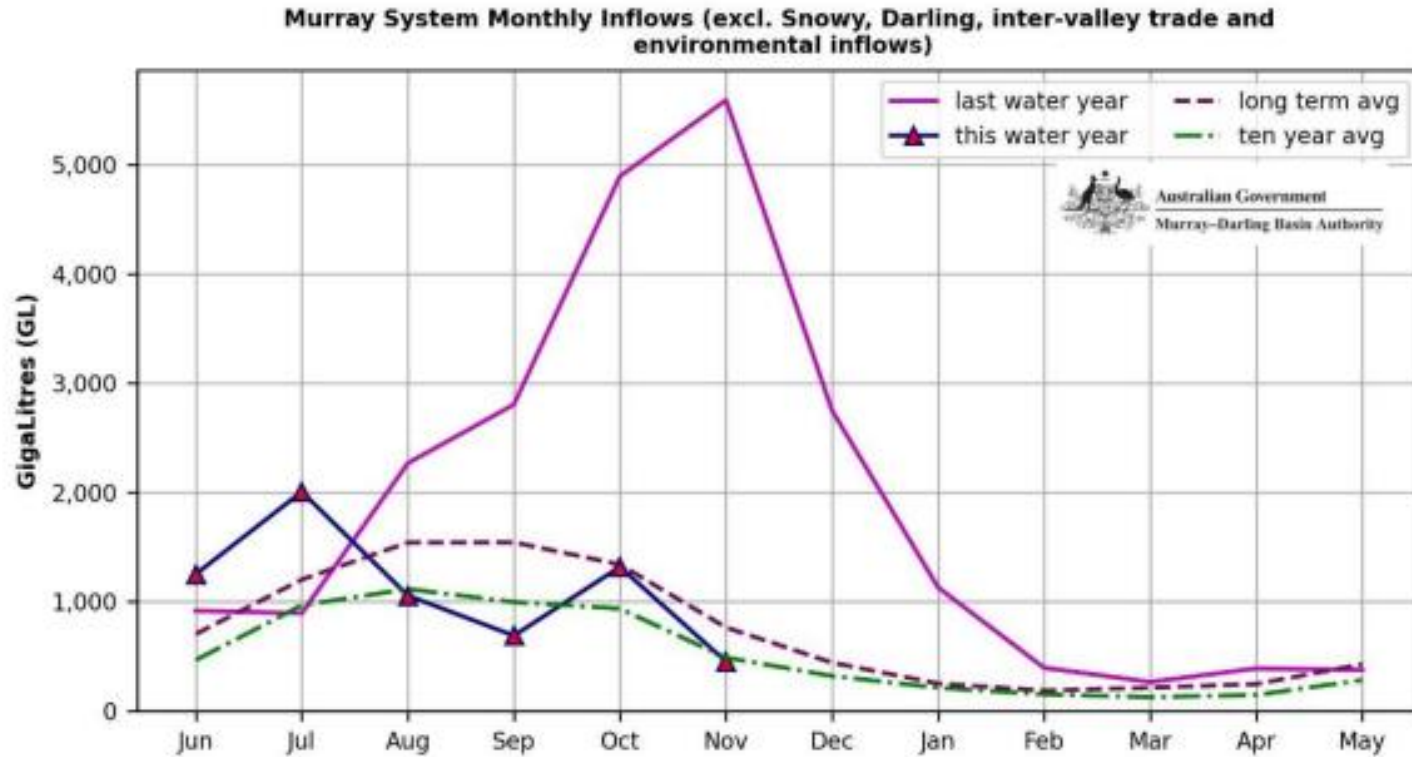
Issued: 7 December 2023



The chance of above median minimum temperature for January to March 2024

Issued: 7 December 2023

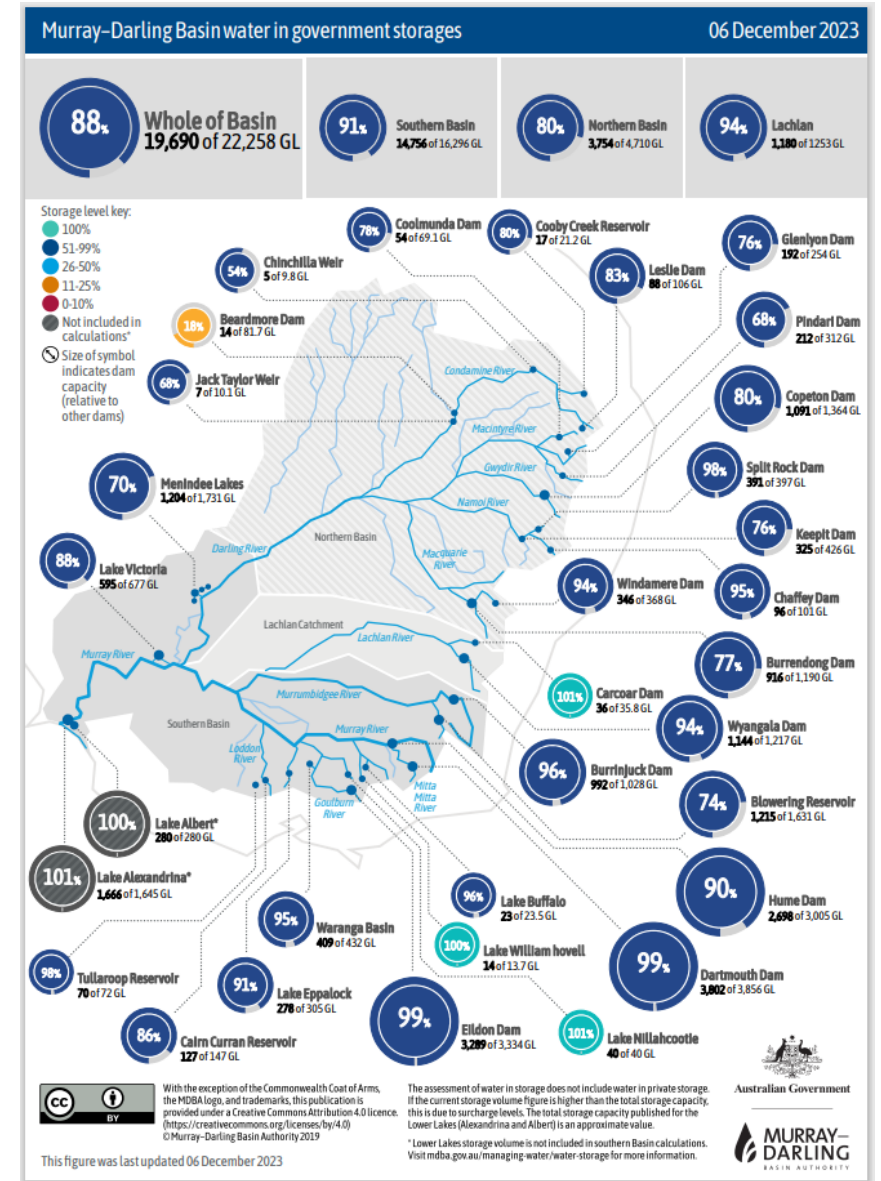
River Murray inflows and storages



[River Murray weekly report 13 December 2023 \(mdba.gov.au\)](https://mdba.gov.au)



Government of South Australia
Department for Environment
and Water



[Murray - Darling Basin Government Storages \(mdba.gov.au\)](https://mdba.gov.au)

River Murray flow to SA

Flow to SA

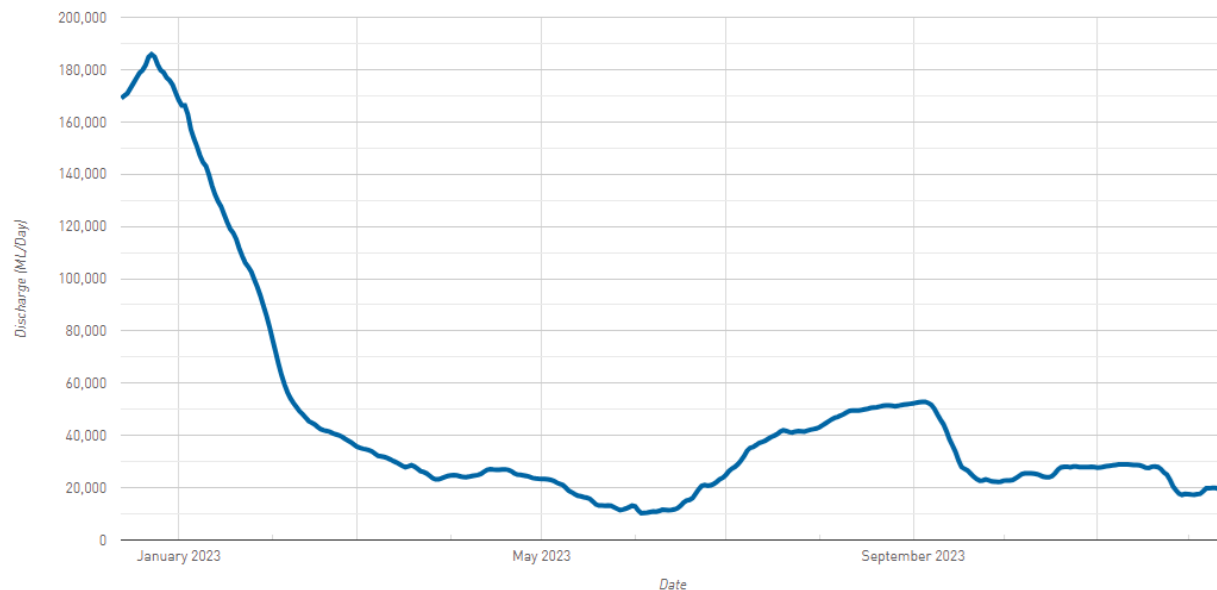


Chart data: 13/12/2022-13/12/2023

2023-24 flow to SA outlook

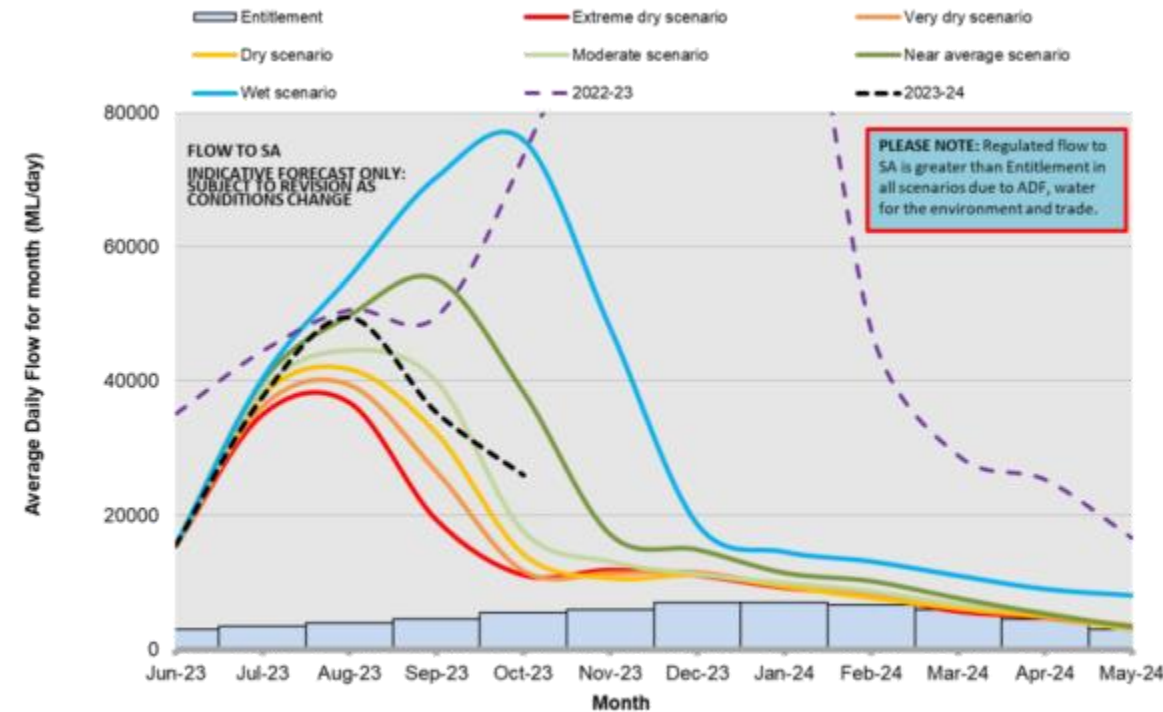
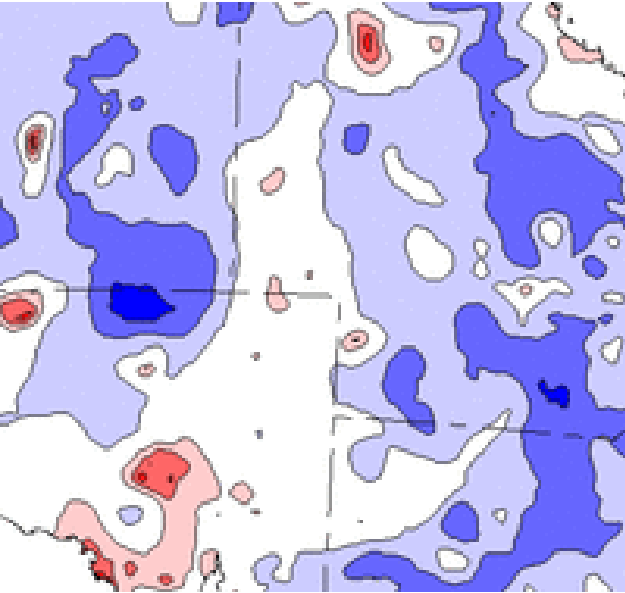


Figure 25: Original flow to South Australia outlook compared with June to October 2023 observed flows.

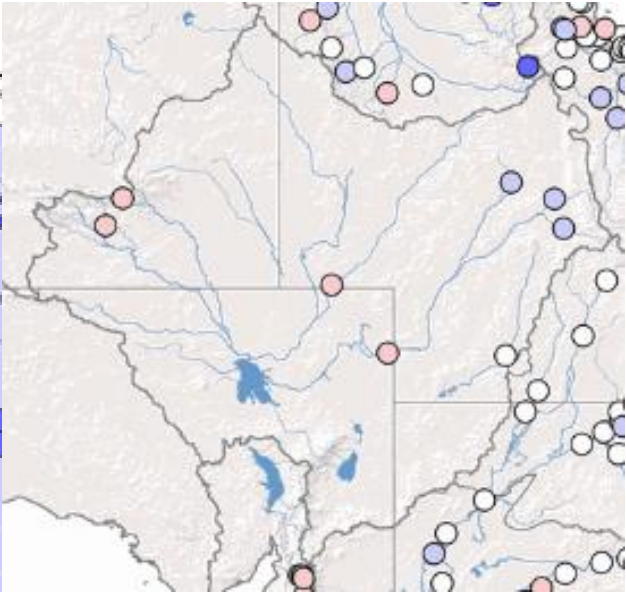
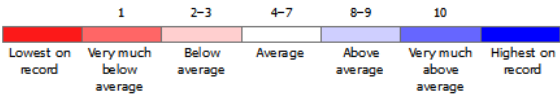
[Flow to South Australia \(Calculated\) | River Murray data \(mdba.gov.au\)](https://www.mdba.gov.au/river-murray/flow-to-south-australia-calculated)

Murray-Darling Basin Authority (2023) River Murray System Annual Operating Outlook 2023-24 Update (End October 2023) – December 2024, MDBA, Canberra

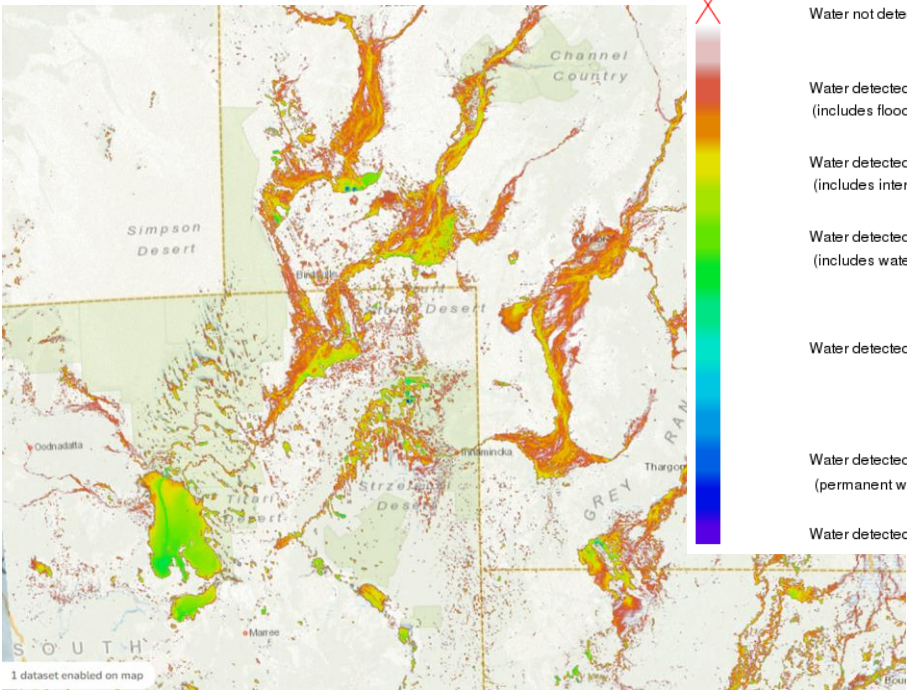
Lake Eyre Basin



Rainfall Decile Ranges November 2023

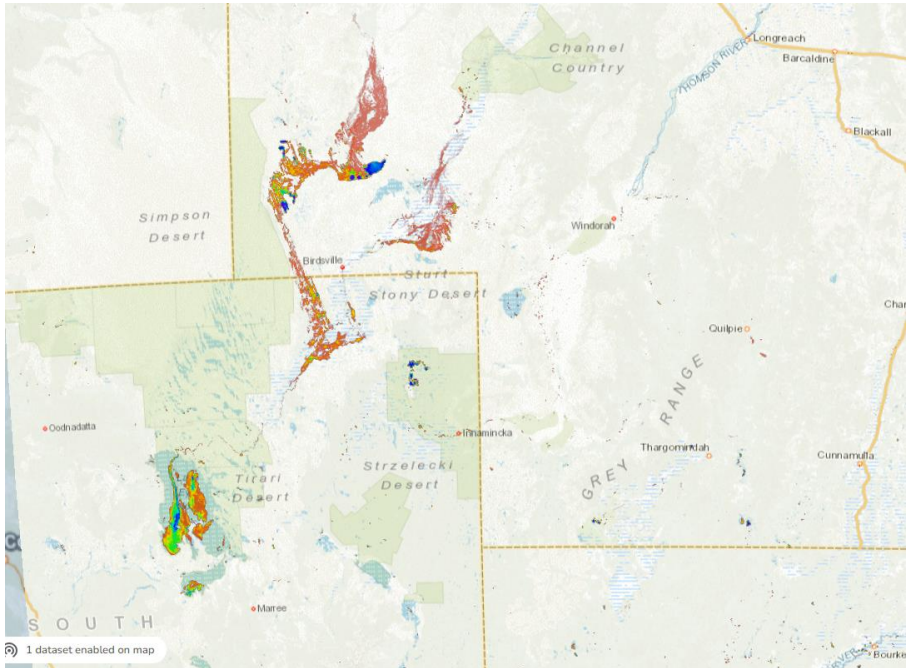


Streamflow decile categories
November 2023



- Water not detected.
- Water detected in 1% of observations (includes flooding and misclassified shadows).
- Water detected in 5% of observations (includes intermittent water bodies).
- Water detected in 20% of observations (includes water bodies that often dry out).
- Water detected in 50% of observations.
- Water detected in 80% of observations (permanent water bodies).
- Water detected always.

2022



2023

April to Oct

Climate – review and outlook summary

Rainfall summary

At the 12-month scale, most of SE Australia experienced between average to very much below average rainfall. Most of the Limestone Coast experienced only average rainfall.

Throughout the cool season, there was a similar trend with between average to very much below average rainfall across most of southern Australia.

Diverse rainfall patterns throughout 2023, with January, April, June and November having average to very much above average rainfall for SA, Vic, NSW (and MDB). The remaining months saw average to below average rainfall. September and October saw very much below average rainfall for SA, Vic, NSW (and MDB).

Functionally no parts of the MDB were subject to drought (rainfall deficiency). In SA, over the last 12 months, some areas of the Yorke and Eyre Peninsulas were subject to severe rainfall deficiency.

Climate drivers

El Niño

Forecasts indicate further warming of the central to eastern Pacific is possible, with SSTs remaining above El Niño thresholds into the early southern hemisphere autumn 2024.

IOD

IOD index values have eased from their highest values in October and are unlikely to re-strengthen. Forecast to return to neutral values from February and likely to have little influence on Australian climate over coming months.

Southern Annular Mode

Currently neutral and forecasted to remain mostly neutral.

Climate – review and outlook summary cont.

Summer rainfall forecast

Low likelihood of exceeding average rainfall over Qld, eastern NSW, Victoria and western WA. Trending mostly low to average over NT. Average to slightly above average in areas of SA.

Summer temperature forecast

Very to extremely high likelihood of exceeding median maximum temperature over most of Australia. Southern SA has a high likelihood of exceeding median maximum temperature.

MDB inflow and storage

Inflows lower than long-term average since late July. November flows were around 453 GL, which is well below the long-term average for November of 764 GL

Whole of basin storage at 88% down from 99% this time last year; southern basin at 91%, northern basin at 80% & Lachlan 94%.

Flow to SA

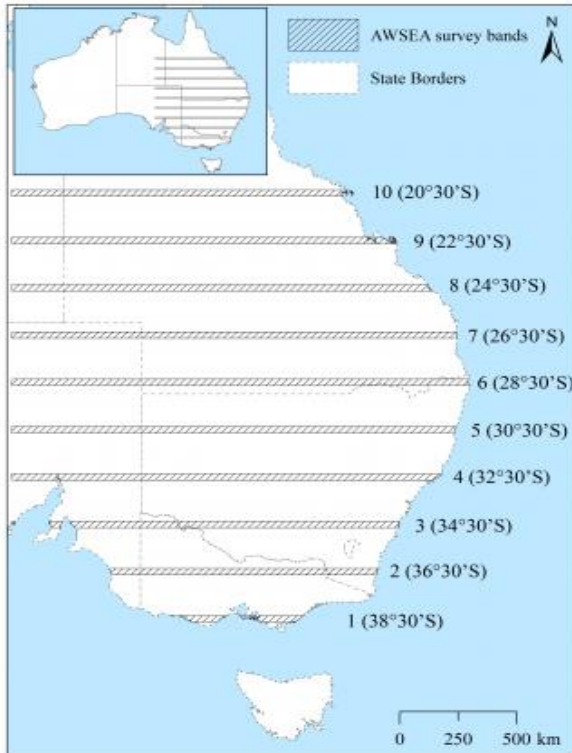
The year started out with extremely high flows from 2022 (around 180 GL/day) but had a sharp decline from mid January and are currently at about 20 GL/day, much lower than 2022.

Waterfowl Abundance and Distribution, and Habitat Availability

- Eastern Australian Waterbird Survey
- Wetlands and Waterfowl Surveys
- SA Aerial Surveys



Eastern Australian Waterbird Survey (EAWS)



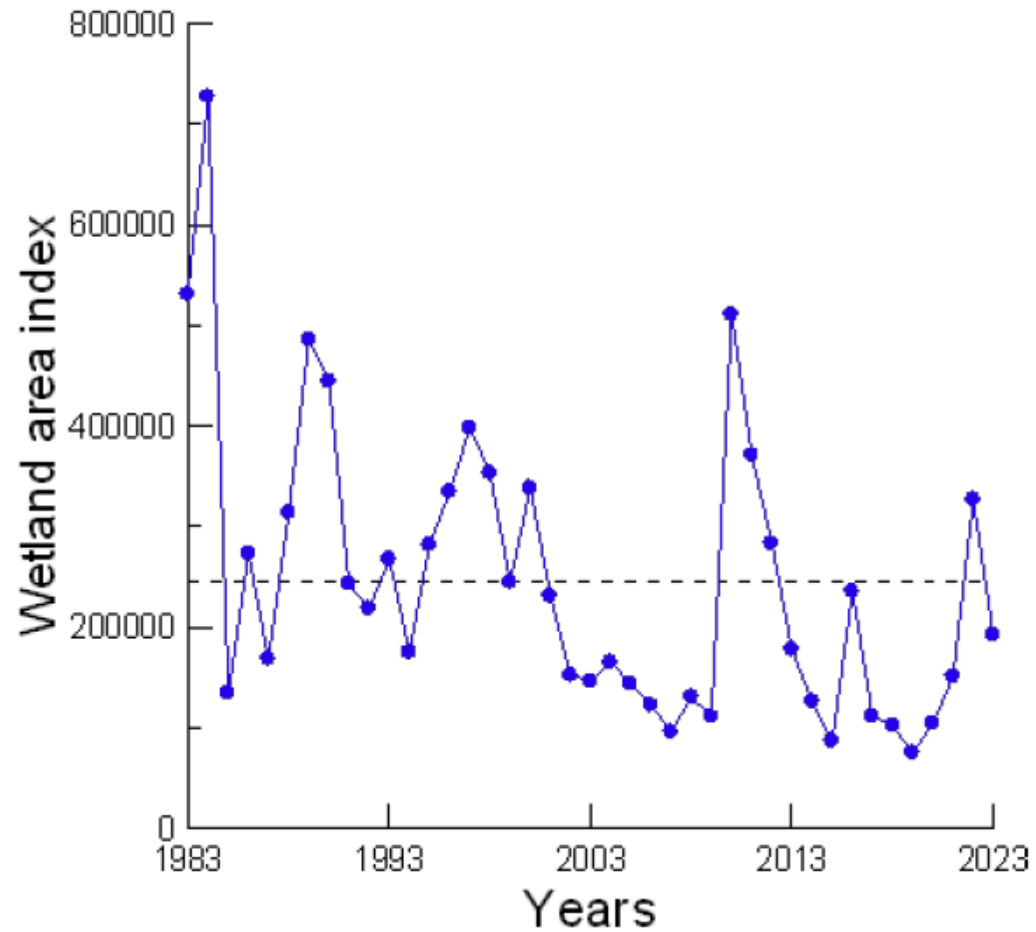
Key to wetlands from W-E, by band

- 10 Lake Moondarra, Cloncurry River, Flinders River, Campaspe R, Burdekin R
- 9 Georgina R, Eyre Ck, Hamilton R, Diamantina R, Lake Galilee, Styx R
- 8 Mumbleberry-Torquinnie Lakes, Eyre Ck, Diamantina R, Thomson R, Barcoo R, various small coastal wetlands
- 7 Goyder Lagoon, Lake Yamma Yamma, Cooper Ck, Bulloo R, Paroo R, Warrego R
- 6 Lake Eyre, Lake Hope, Bulloo R, Paroo R, Warrego R, Balonne R,
- 5 Lake Frome, Paroo O'flow, Darling R, Macquarie Marshes
- 4 Menindee Lakes, Talywalka Lakes, Myall Lakes
- 3 Murray River Lakes, Lowbidgee wetlands
- 2 Coorong, Cooper + Mokoan Lakes, Cooma-Monaro
- 1 Curdies Inlet, Jack Smith Lake



Porter J.L., Kingsford R.T., Francis R., Brandis K, and Ahern, A. (2023) *Eastern Australian Waterbird Aerial Survey – October 2023 Annual Summary Report*

EAWS - Wetland Index & Distribution



2023 Wetland area index – 192,083 ha

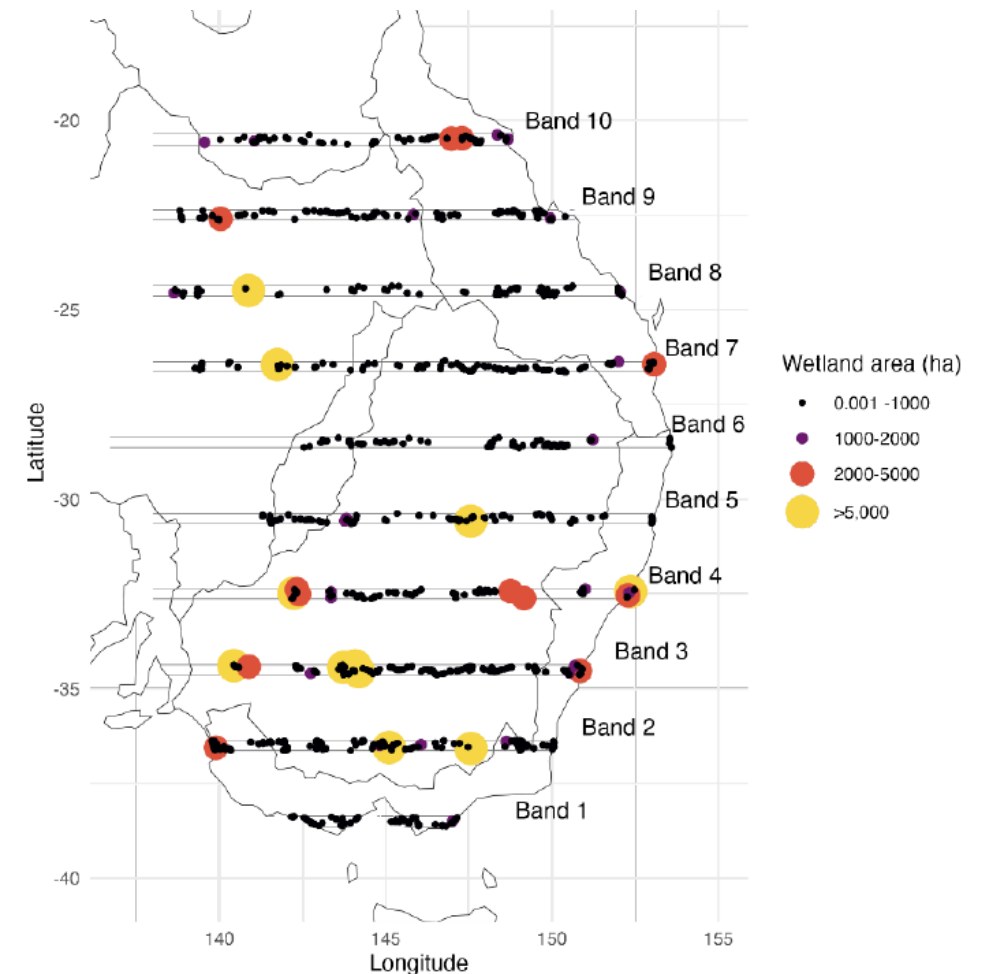


Figure 7. Distribution of wetland area in the 2023 Eastern Australian Waterbird Aerial Survey bands. All surveyed wetlands with surface water present are plotted; dry wetlands are not plotted.

EAWS - Waterbird abundance & distribution

2023 Total abundance index 579,641

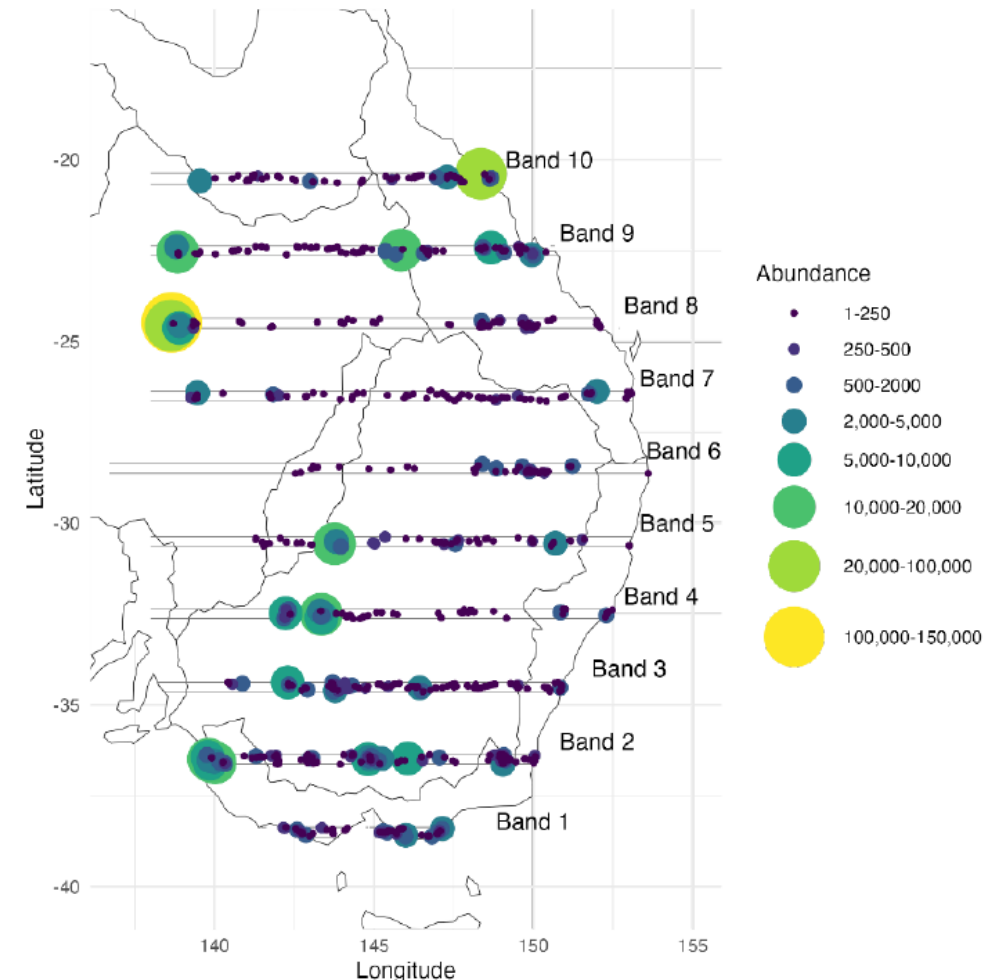
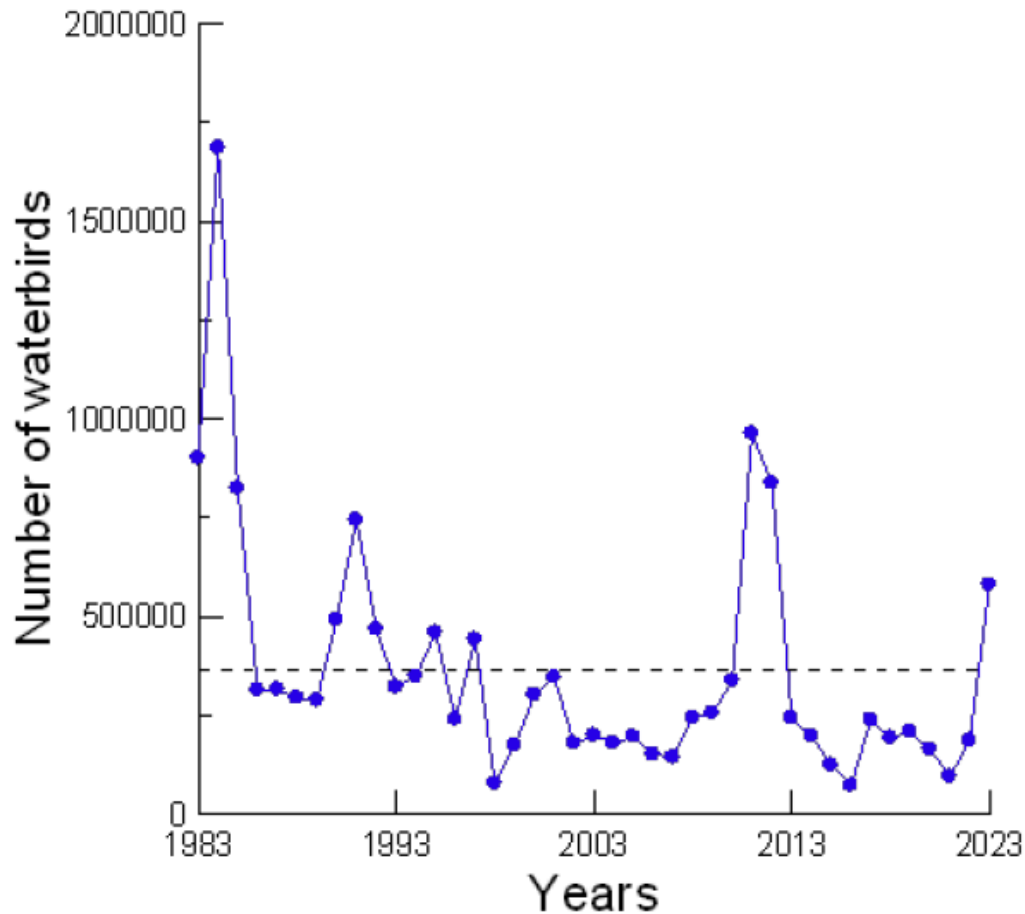
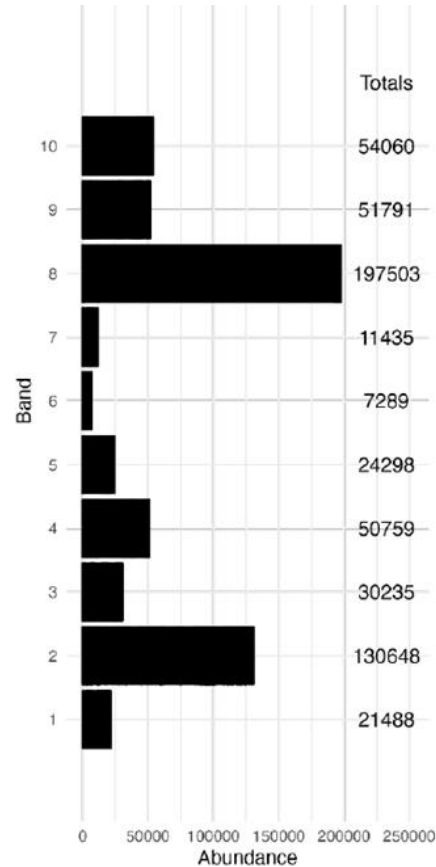
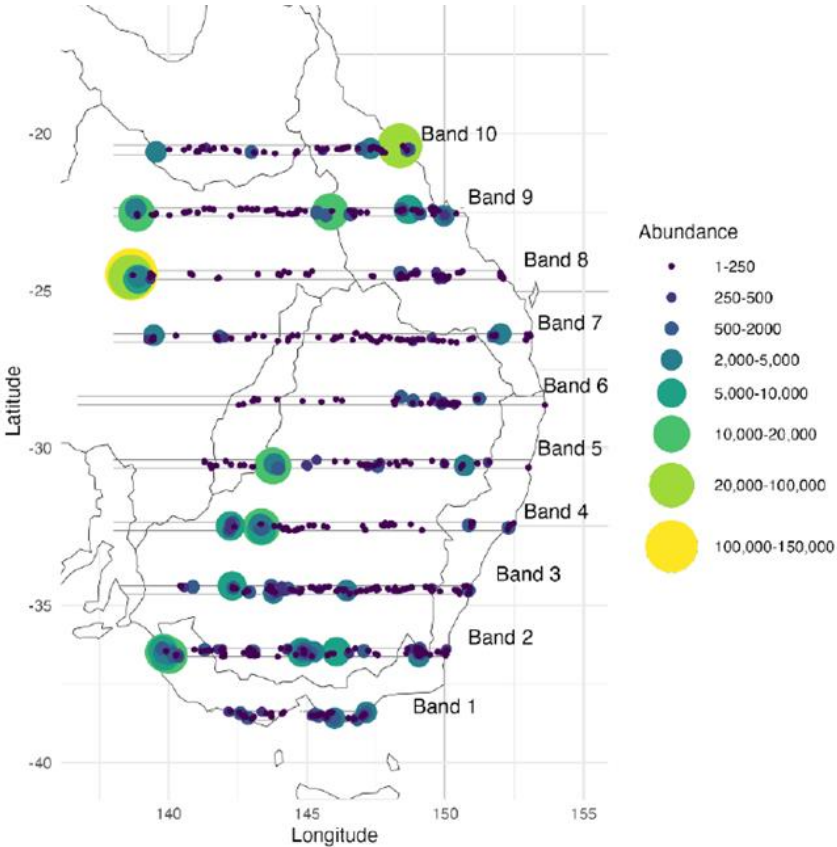


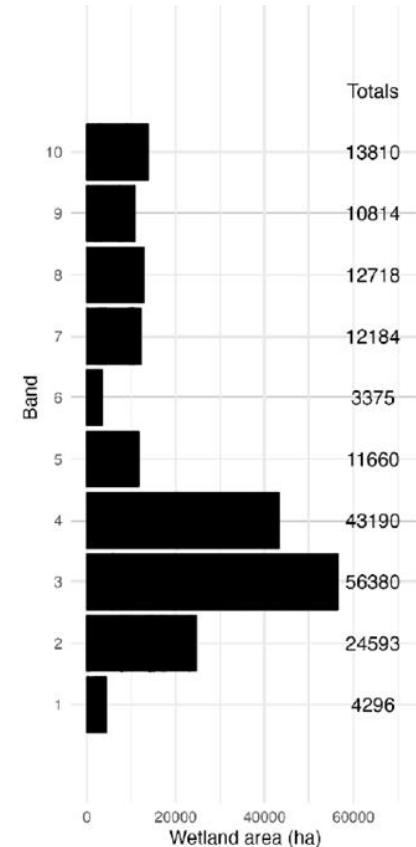
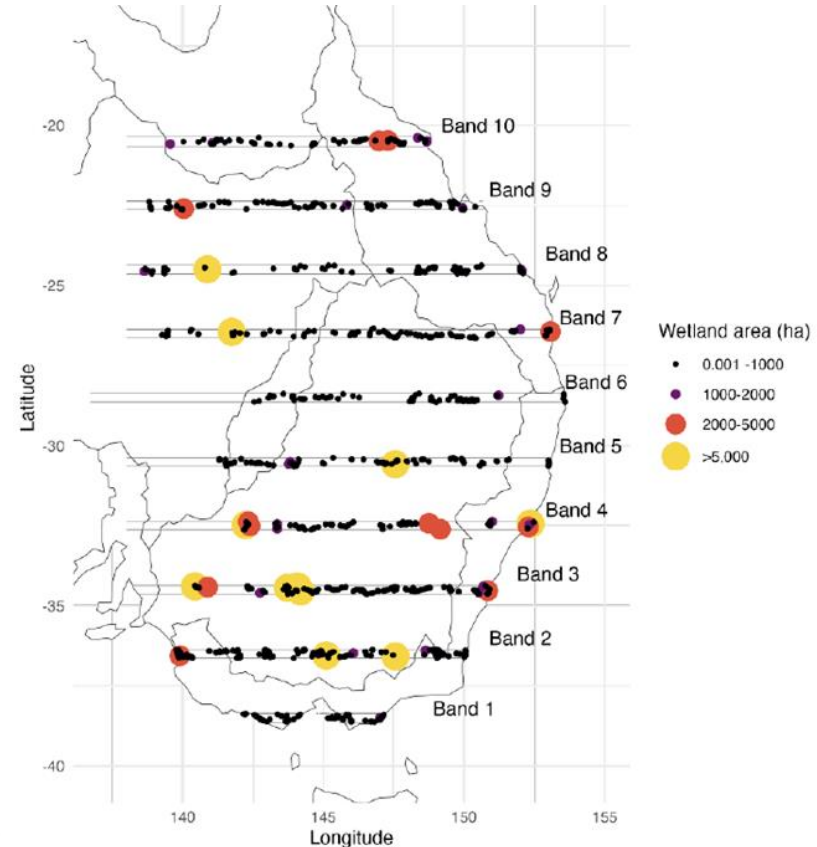
Figure 5. Distribution and abundance of waterbirds in the 2023 Eastern Australian Waterbird Aerial Survey bands. Dry wetlands and those with zero waterbirds not plotted.

EAWS - Waterbird locations

Where the birds are:



Where the habitat is:



EAWS – Waterbird Breeding

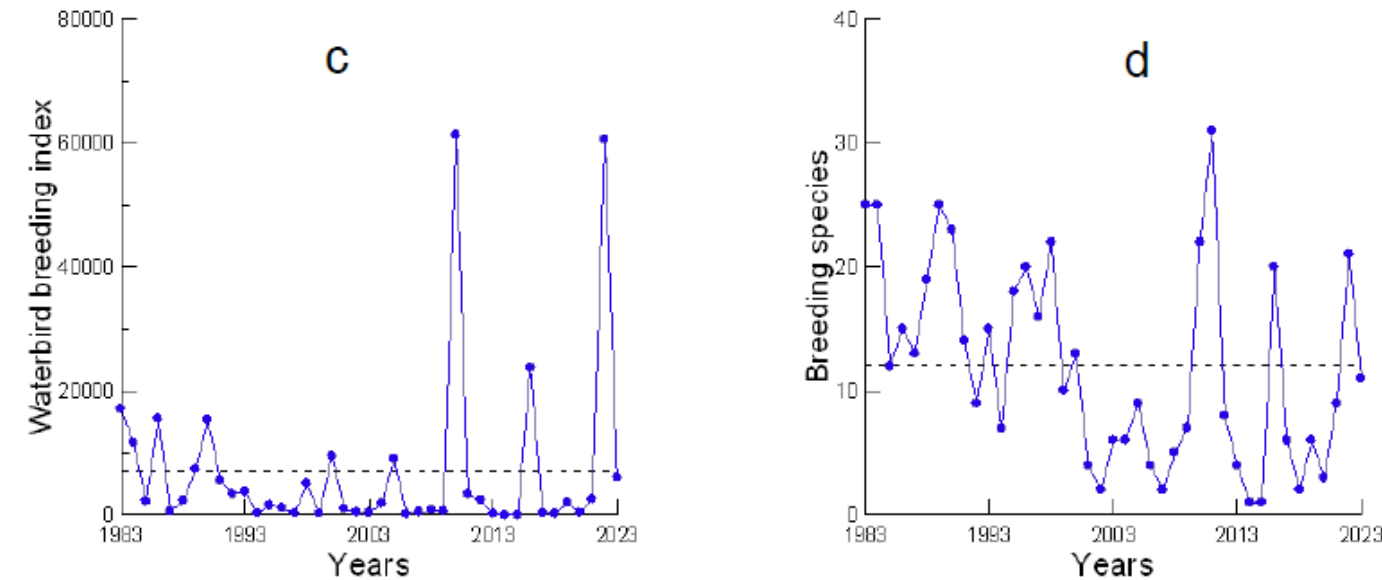


Figure 1. Changes over time in a) total abundance, b) wetland area, c) breeding and d) number of breeding species in the Eastern Australian Waterbird Aerial Survey transects (1983-2023); horizontal lines show long-term averages.

2023 Breeding index – 6,036

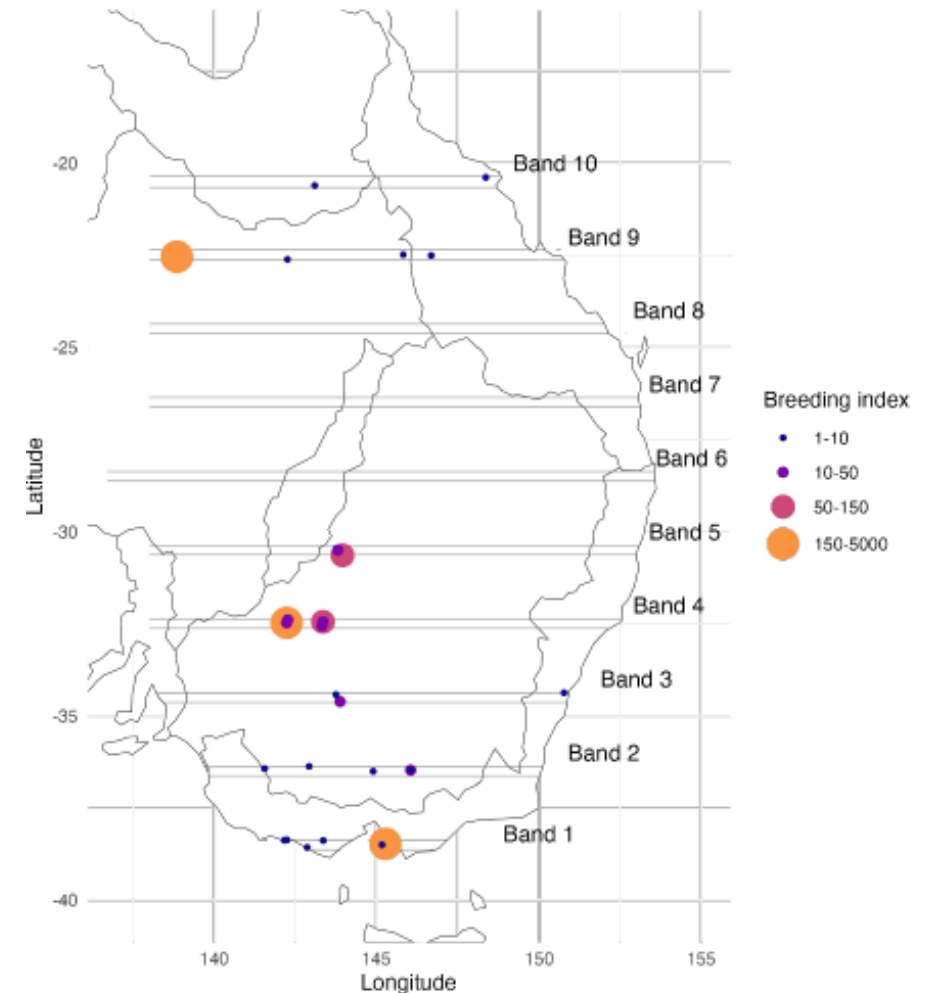


Figure 6. Distribution of waterbird breeding in the 2023 Eastern Australian Waterbird Aerial Survey bands. Only wetlands with breeding recorded are plotted.

EAWS – Game Duck

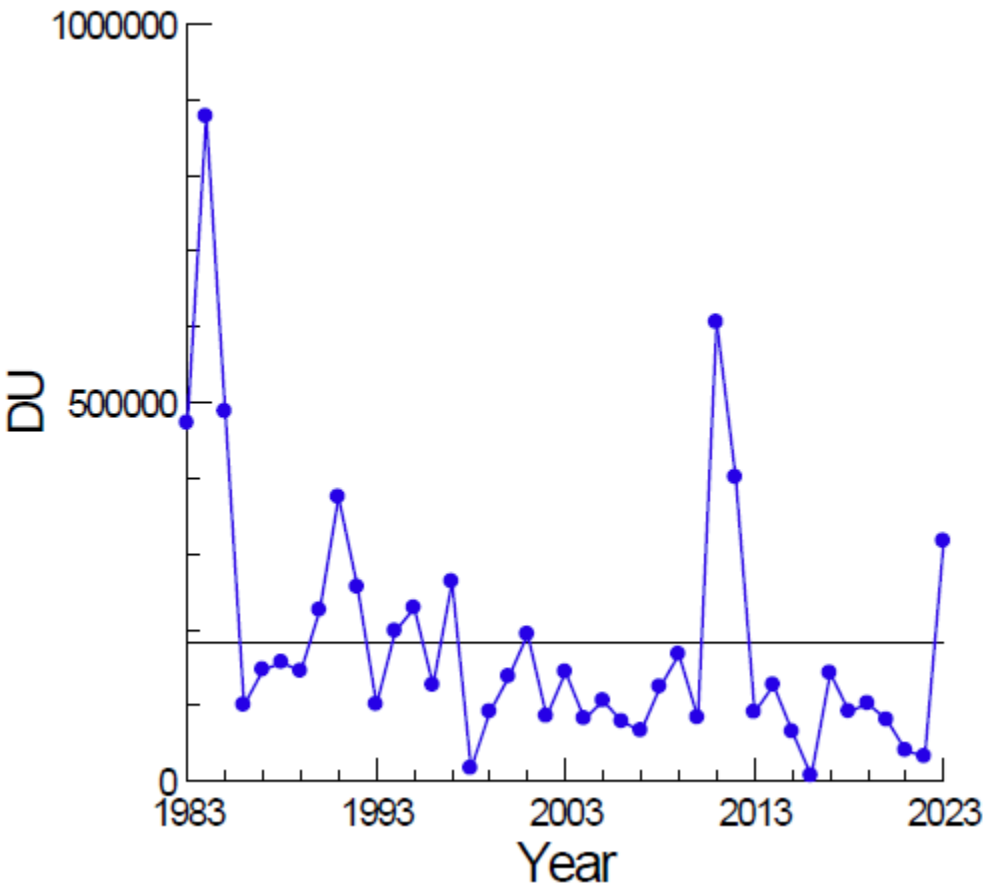
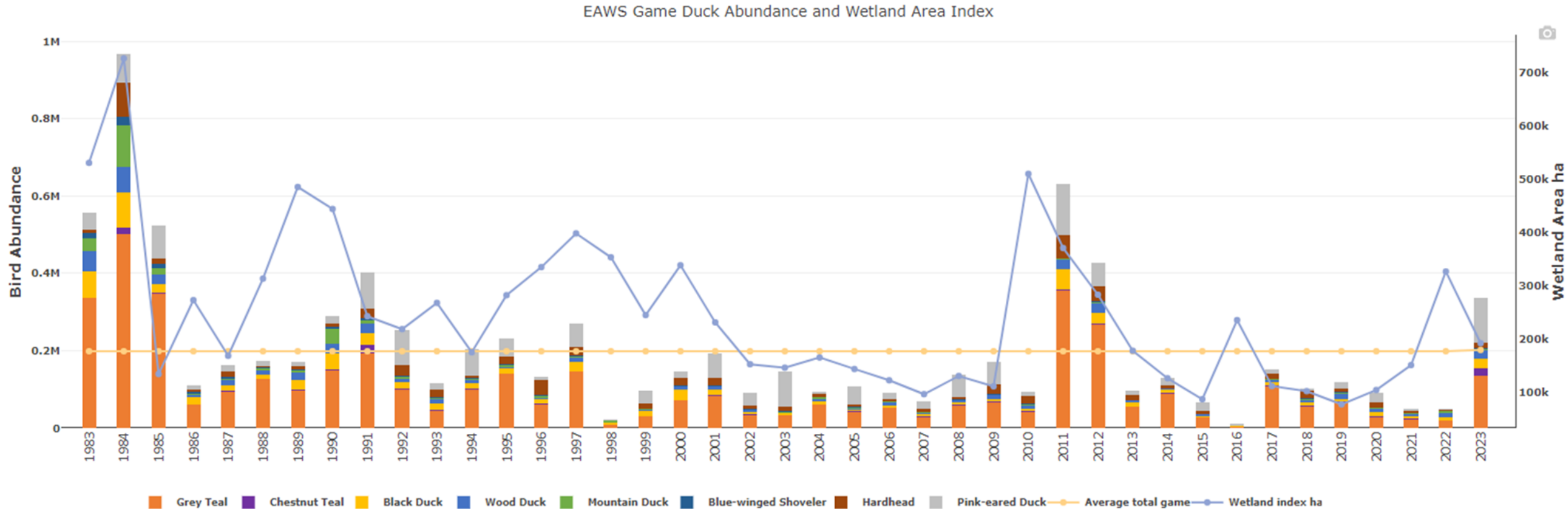


Table 3. Trends in abundances of game species from the Eastern Australian Waterbird Aerial Survey (1983-2023).

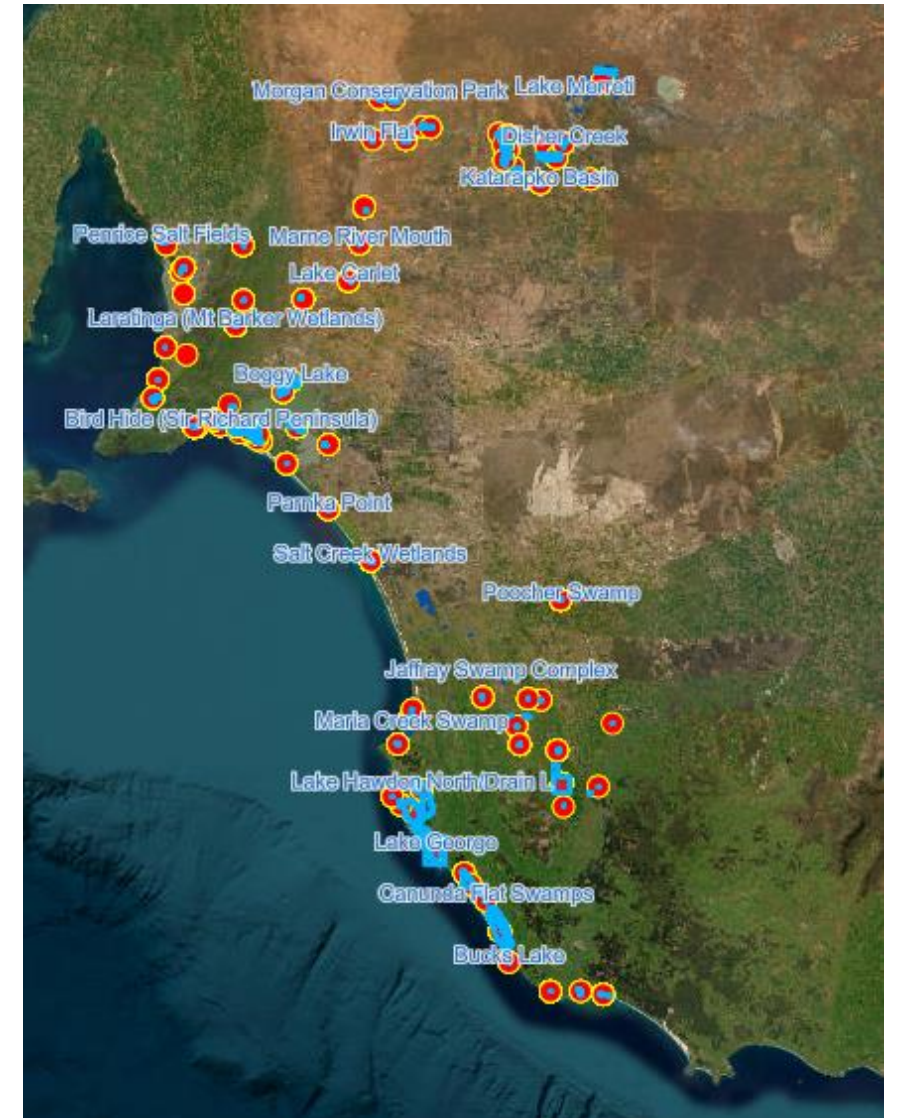
Species	Trend	Regression all years	Trend	Regression 1983-84 omitted
Pacific black duck	decline	$r^2=0.32$, $p<0.001$	decline	$r^2=0.21$, $p=0.004$
Australasian shoveler	decline	$r^2=0.45$, $p<0.001$	decline	$r^2=0.38$, $p<0.001$
Chestnut teal	no trend	$r^2=0.02$, $p=0.337$	no trend	$r^2=0.01$, $p=0.628$
Grey teal	decline	$r^2=0.27$, $p=0.001$	decline	$r^2=0.18$, $p=0.008$
Hardhead	no trend	$r^2=0.06$, $p=0.140$	no trend	$r^2=0.03$, $p=0.321$
Mountain duck	decline	$r^2=0.34$, $p<0.001$	decline	$r^2=0.26$, $p=0.001$
Pink-eared duck	no trend	$r^2=0.07$, $p=0.092$	no trend	$r^2=0.08$, $p=0.092$
Australian Wood duck	decline	$r^2=0.13$, $p=0.019$	no trend	$r^2=0.04$, $p=0.235$

EAWS game duck species composition



SA Wetland and Waterfowl Surveys

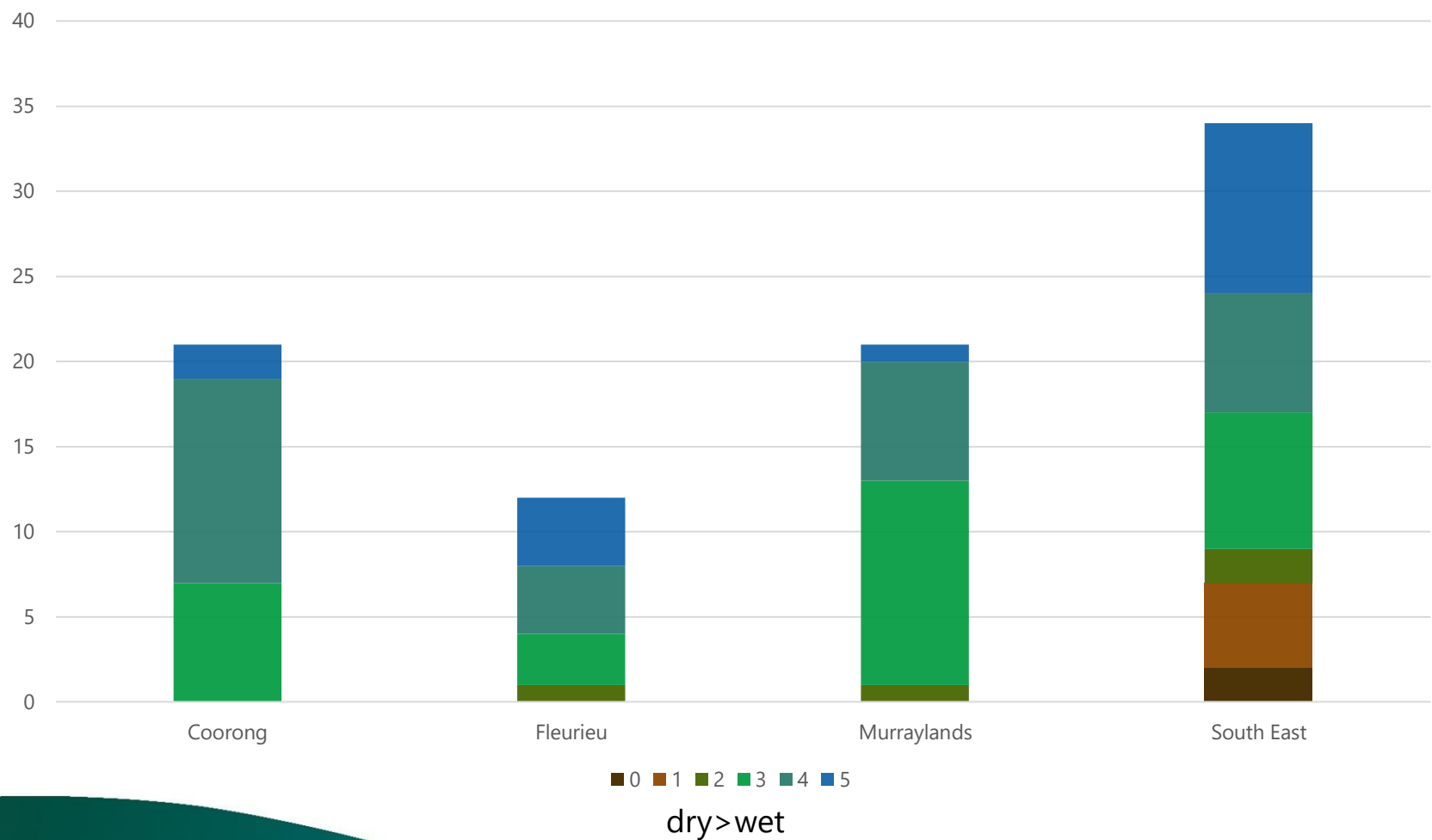
- Annual DEW volunteer-based survey (since 2003)
 - Thanks to all volunteers and DEW who assisted with the 2023 surveys
- Provides snapshot of suite of wetlands
- Indication of trends - not intended as absolute measure
- 90 wetlands surveyed in 2023 (total approx. 100 in register)
 - Numbers much higher than last year
 - 122 surveys conducted
 - 171.5 hours of survey effort by 81 individuals
 - 79,951 ha surveyed



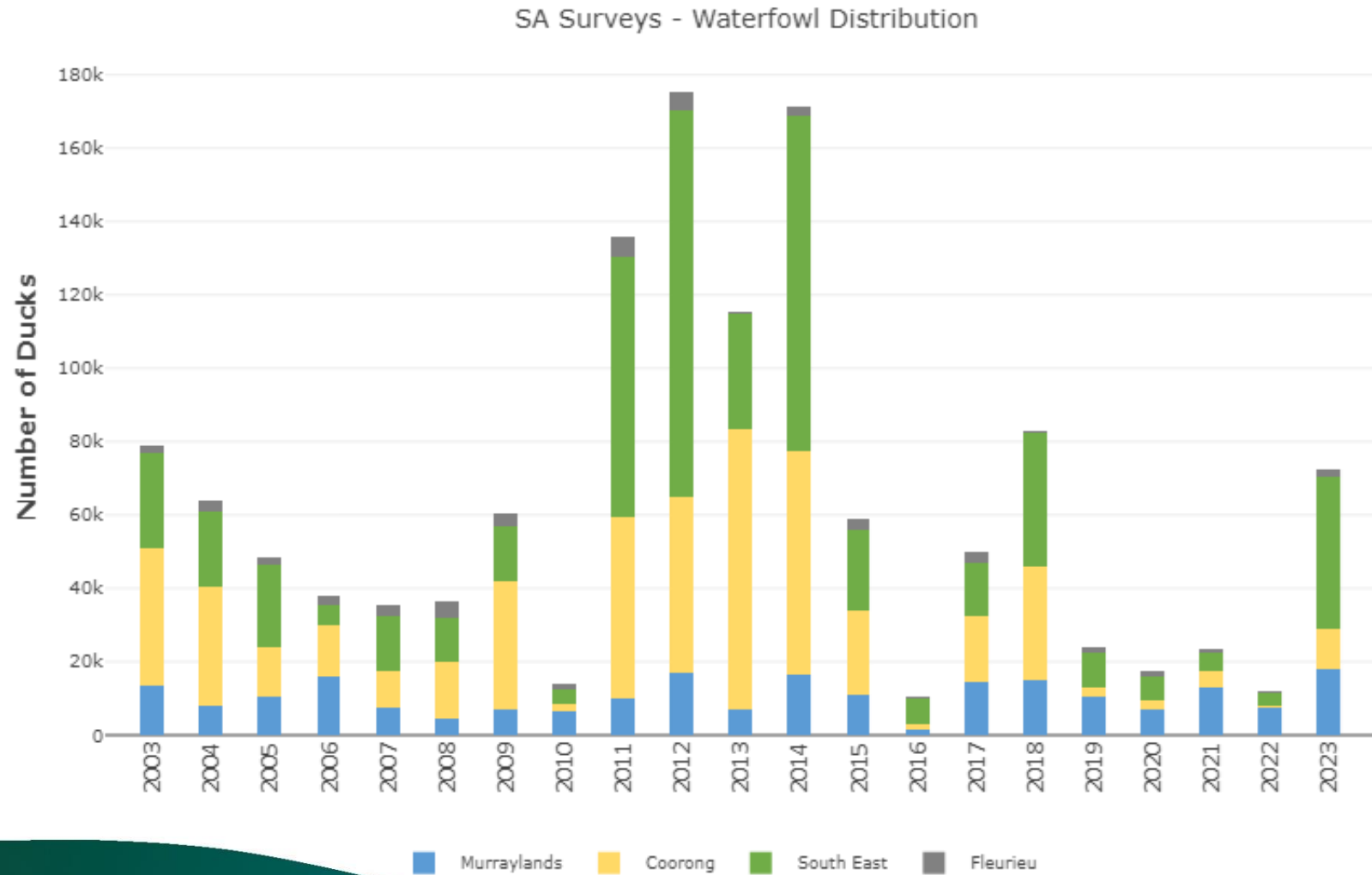
SA Wetland and Waterfowl Surveys – effort summary

	Murraylands		Fleurieu		Coorong		South East		Total	
Year	No. of Wetlands Surveyed	Wetland Area Surveyed (ha)	No. of Wetlands Surveyed	Wetland Area Surveyed (ha)	No. of Wetlands Surveyed	Wetland Area Surveyed (ha)	No. of Wetlands Surveyed	Wetland Area Surveyed (ha)	No. of Wetlands Surveyed	Wetland Area Surveyed (ha)
2003	23	1450	15	518	22	3392	28	7175	88	12535
2004	21	1594	15	488	25	3020	25	4251	86	9353
2005	22	1639	15	507	25	2205	24	3783	86	8134
2006	24	1650	15	512	28	3560	24	3283	91	9005
2007	25	2890	12	502	28	3365	26	3105	91	9862
2008	26	2790	14	562	27	3100	28	2618	95	9070
2009	24	2750	12	564	27	3210	28	2710	91	9234
2010	25	3570	14	466	22	3405	26	2196	87	9637
2011	19	2970	16	1695	17	4147	25	3128	77	11940
2012	20	3070	16	1695	18	4247	25	3128	79	12140
2013	13	2670	5	16	12	2725	19	6406	49	11817
2014	24	4785	12	307	19	5680	22	7223	77	17995
2015	23	3744	13	3990	20	3009	23	2298	79	13040
2016	22	6701	16	1798	17	3883	30	5492	85	17874
2017	17	3504	14	1102	13	2438	17	3852	61	10896
2018	21	2406	15	316	20	2902	25	8812	81	14436
2019	16	2247	14	232	10	307	22	1886	62	4672
2020	24	3329	16	277	21	4235	29	15714	90	23555
2021	25	17517	16	1212	20	6496	34	9347	95	34574
2022	20	16260	13	307	13	4149	29	13082	75	33801
2023	23	17777	12	757	21	12754	34	48661	90	79951
Average	22	5015	14	849	20	3916	26	7531	82	17311

2023 SA Surveys – Wetland Capacity

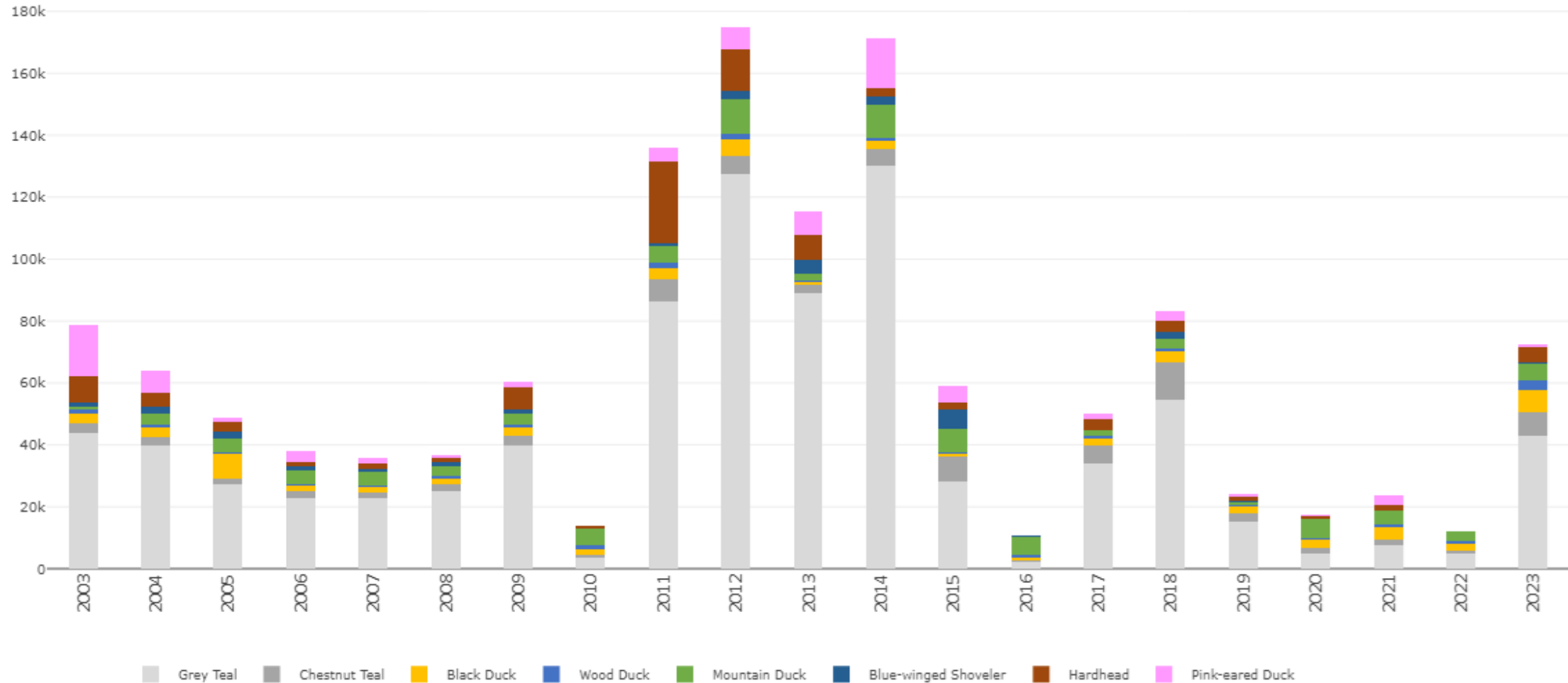


SA Surveys – Waterfowl Distribution



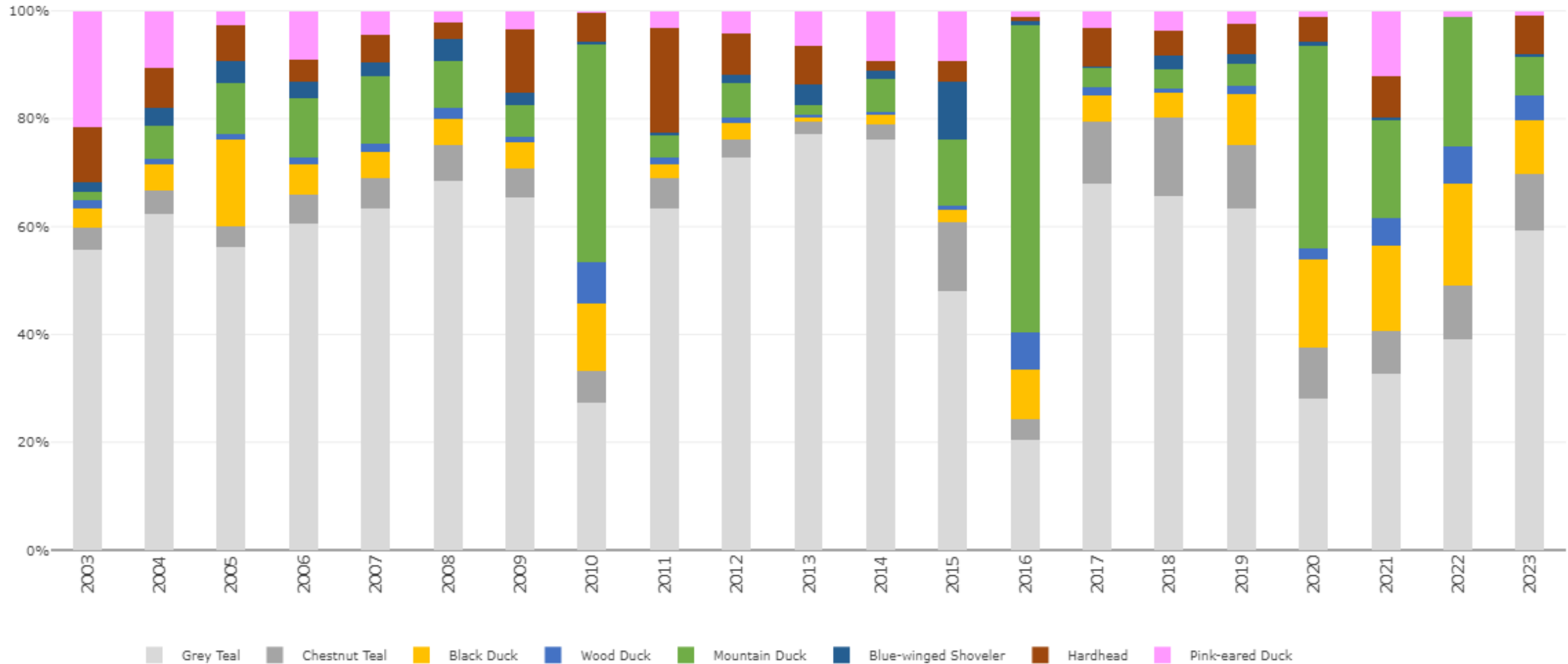
SA Surveys – Waterfowl Composition

SA Surveys - Waterfowl Composition



SA Surveys – Waterfowl Species Proportions

SA Surveys - Waterfowl Species Proportions



Game duck abundance

Year	Grey Teal	Chestnut Teal	Black Duck	Wood Duck	Mountain Duck	Blue-winged Shoveller	Hard Head	Pink-eared Duck	Totals
2003	43,948	3,177	2,801	1,389	1,102	1,428	8,126	16,946	78,917
2004	39,789	2,746	3,038	801	3,869	2,118	4,673	6,762	63,796
2005	27,339	1,848	7,824	522	4,583	1,956	3,190	1,292	48,554
2006	22,881	2,078	2,096	441	4,216	1,178	1,520	3,396	37,806
2007	22,594	2,055	1,709	501	4,537	908	1,792	1,589	35,685
2008	25,031	2,398	1,724	819	3,129	1,518	1,093	794	36,506
2009	39,626	3,232	2,955	724	3,539	1,364	7,084	2,088	60,612
2010	3,801	826	1,733	1,051	5,609	86	760	33	13,899
2011	86,256	7,341	3,689	1,661	5,482	715	26,342	4,358	135,844
2012	127,695	5,734	5,311	1,686	11,422	2,331	13,434	7,472	175,085
2013	89,105	2,658	689	627	2,052	4,419	8,435	7,353	115,337
2014	130,353	5,084	2,982	613	10,730	2,634	2,967	15,915	171,277
2015	28,392	7,630	1,243	464	7,251	6,374	2,277	5,487	59,117
2016	2,200	401	997	724	6,112	87	83	107	10,709
2017	34,009	5,776	2,324	841	1,692	171	3,636	1,535	49,983
2018	54,665	11,946	3,839	672	3,082	2,076	3,809	3,028	83,114
2019	15,151	2,818	2,283	395	955	438	1,341	572	23,954
2020	4,845	1,656	2,797	375	6,478	134	809	178	17,272
2021	7,715	1,900	3,748	1,172	4,331	73	1,815	2,873	23,627
2022	4,703	1,193	2,268	841	2,876	7	21	119	12,028
2023	42,873	7,562	7,196	3,415	5,229	302	5,122	696	72,395
Average	40,618	3,812	3,012	940	4,680	1,444	4,682	3,933	63,120

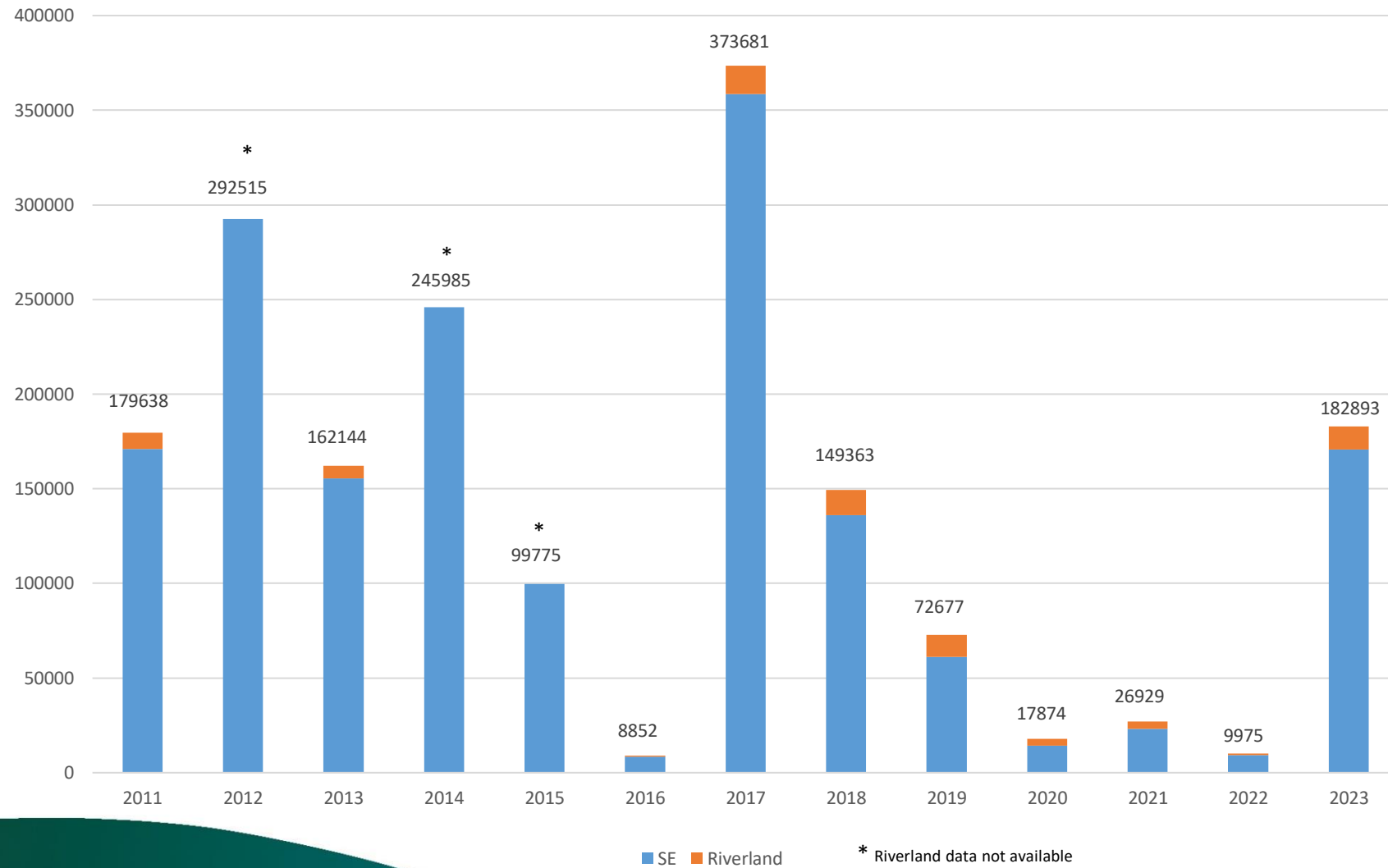
Species proportions

Year	Grey Teal	Chestnut Teal	Black Duck	Wood Duck	Mountain Duck	Blue-winged Shoveller	Hard Head	Pink-eared Duck
2003	55.7	4	3.5	1.8	1.4	1.8	10.3	21.5
2004	62.4	4.3	4.8	1.3	6.1	3.3	7.3	10.6
2005	56.3	3.8	16.1	1.1	9.4	4	6.6	2.7
2006	60.5	5.5	5.5	1.2	11.2	3.1	4	9
2007	63.3	5.8	4.8	1.4	12.7	2.5	5	4.5
2008	68.6	6.6	4.7	2.2	8.6	4.2	3	2.2
2009	65.4	5.3	4.9	1.2	5.8	2.3	11.7	3.4
2010	27.3	5.9	12.5	7.6	40.4	0.6	5.5	0.2
2011	63.5	5.4	2.7	1.2	4	0.5	19.4	3.2
2012	72.9	3.3	3	1	6.5	1.3	7.7	4.3
2013	77.3	2.3	0.6	0.5	1.8	3.8	7.3	6.4
2014	76.1	3	1.7	0.4	6.3	1.5	1.7	9.3
2015	48	12.9	2.1	0.8	12.3	10.8	3.9	9.3
2016	20.5	3.7	9.3	6.8	57.1	0.8	0.8	1
2017	68	11.6	4.6	1.7	3.4	0.3	7.3	3.1
2018	65.8	14.4	4.6	0.8	3.7	2.5	4.6	3.6
2019	63.3	11.8	9.5	1.6	4	1.8	5.6	2.4
2020	28.1	9.6	16.2	2.2	37.5	0.8	4.7	1
2021	32.7	8	15.9	5	18.3	0.3	7.7	12.2
2022	39.1	9.9	18.9	7	23.9	0.1	0.2	1
2023	59.2	10.4	9.9	4.7	7.2	0.4	7.1	1
Average	55.9	7	7.4	2.5	13.4	2.2	6.3	5.3

2023 abundances relative to long-term averages

		Grey Teal	Chestnut Teal	Black Duck	Wood Duck	Mountain Duck	Blue-winged Shoveller	Hard Head	Pink-eared Duck	Totals
SA W&W Surveys	2023	42,873	7,562	7,196	3,415	5,229	302	5,122	696	72,395
	dataset average (2003-2023)	40,618	3,812	3,012	940	4,680	1,444	4,682	3,933	63,120
	2023 as % of dataset average	106	198	239	363	112	21	109	18	115
EAWS	2023	134,420	20,357	23,574	22,988	2,868	2,523	13,769	116,582	337,081
	dataset average (1983-2023)	106,983	1,729	17,224	12,933	7,396	2,090	15,948	37,565	201,871
	2023 as % of dataset average	126	1,177	137	178	39	121	86	310	167

SA Aerial Surveys



Waterfowl and habitat summary

South Australia

Wetland habitat in 90 SA wetlands

Around 92% of wetlands were partially-full to full. Coorong, Fleurieu and Murraylands sites mostly full. SE sites variable from full to empty.

Abundance of ducks

Just above the long-term average since 2003 c. 115%.

Abundance relative to long-term average: Murraylands 176%, Fleurieu 77%, South East 159% and Coorong 42%.

Species dominance

Resident:nomadic species approximately 1:2, compared to average approximately 1:4

Eastern Continental Scale

Wetland area index

Wetland area decreased considerably from the previous flood year, to below the long-term average.

Total waterbird abundance

Increased from 2022 and well above the long-term average: the 7th highest in 41 years.

Breeding index & # species breeding

Total Breeding index (nests + broods) was 6,036 which has decreased order of magnitude from 2022 – 5 species comprised 97% of the total breeding recorded with the vast majority being Little Black Cormorants.

Game duck species

5 of 8 species (PBD, AS, GT, MD, AWD*) show continued long-term decline in abundance

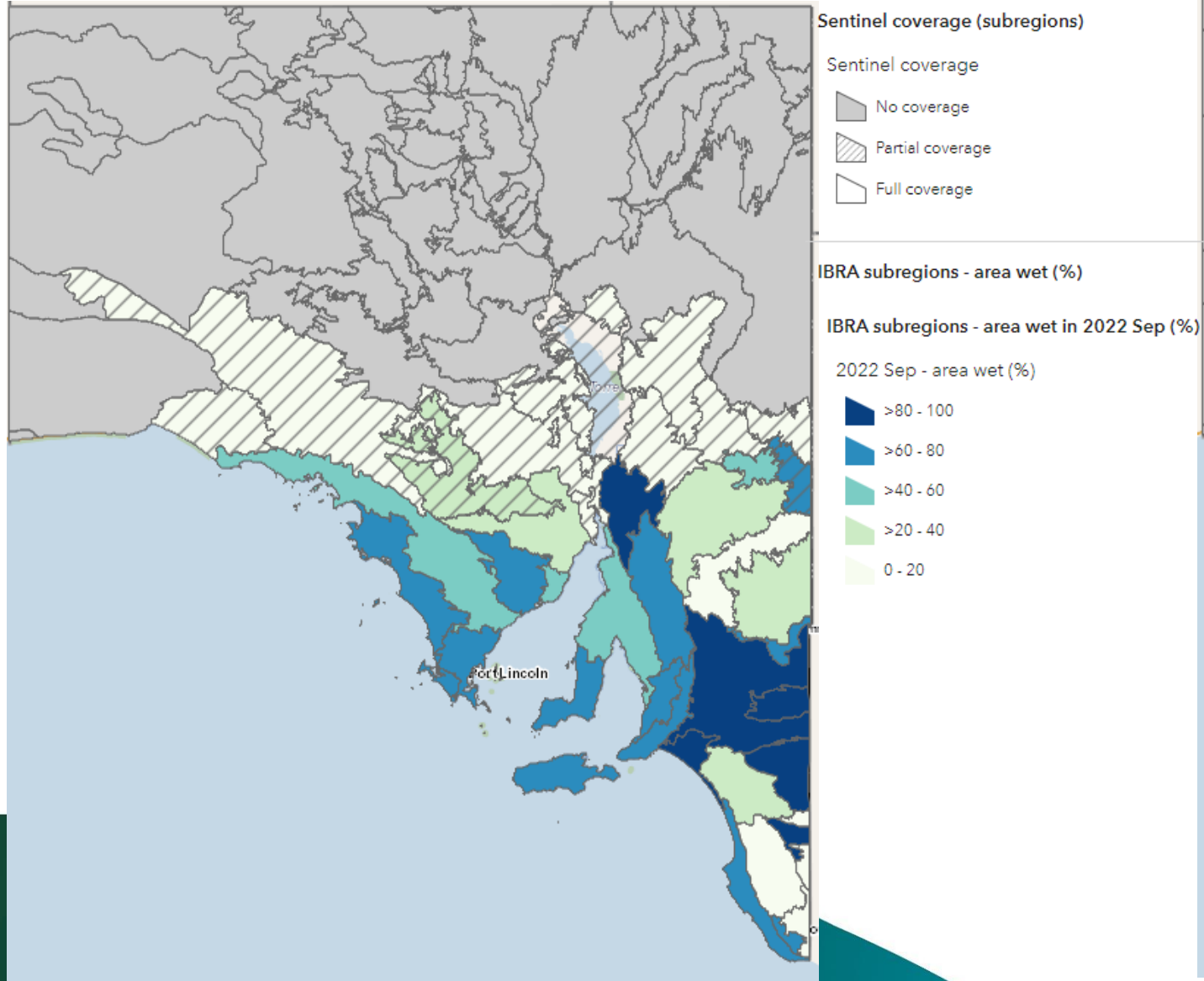
Landscape Condition

- Remotely sensed wetland extent
- Plant Growth Index
- Soil Moisture
- Pasture Biomass

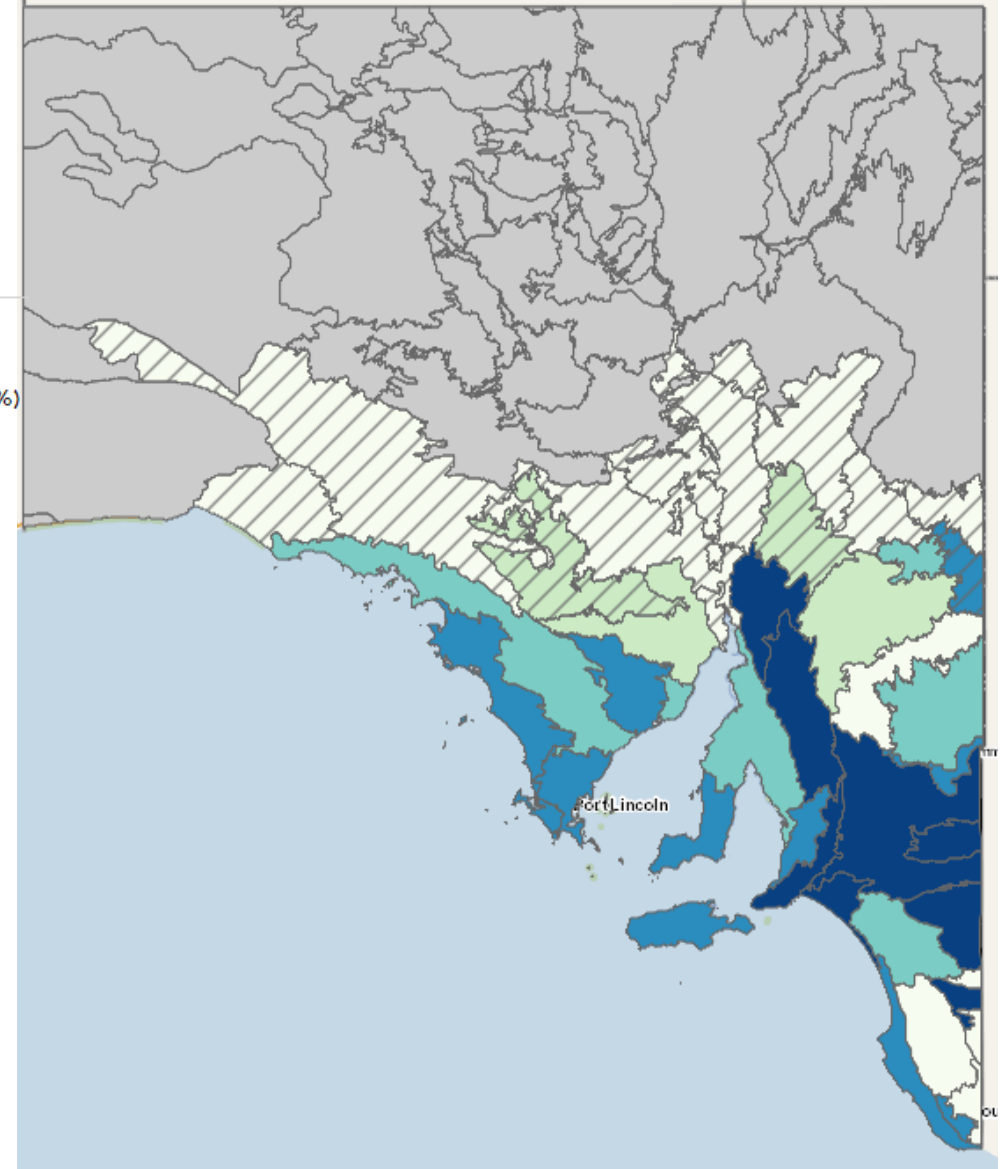


Remotely sensed wetland extent

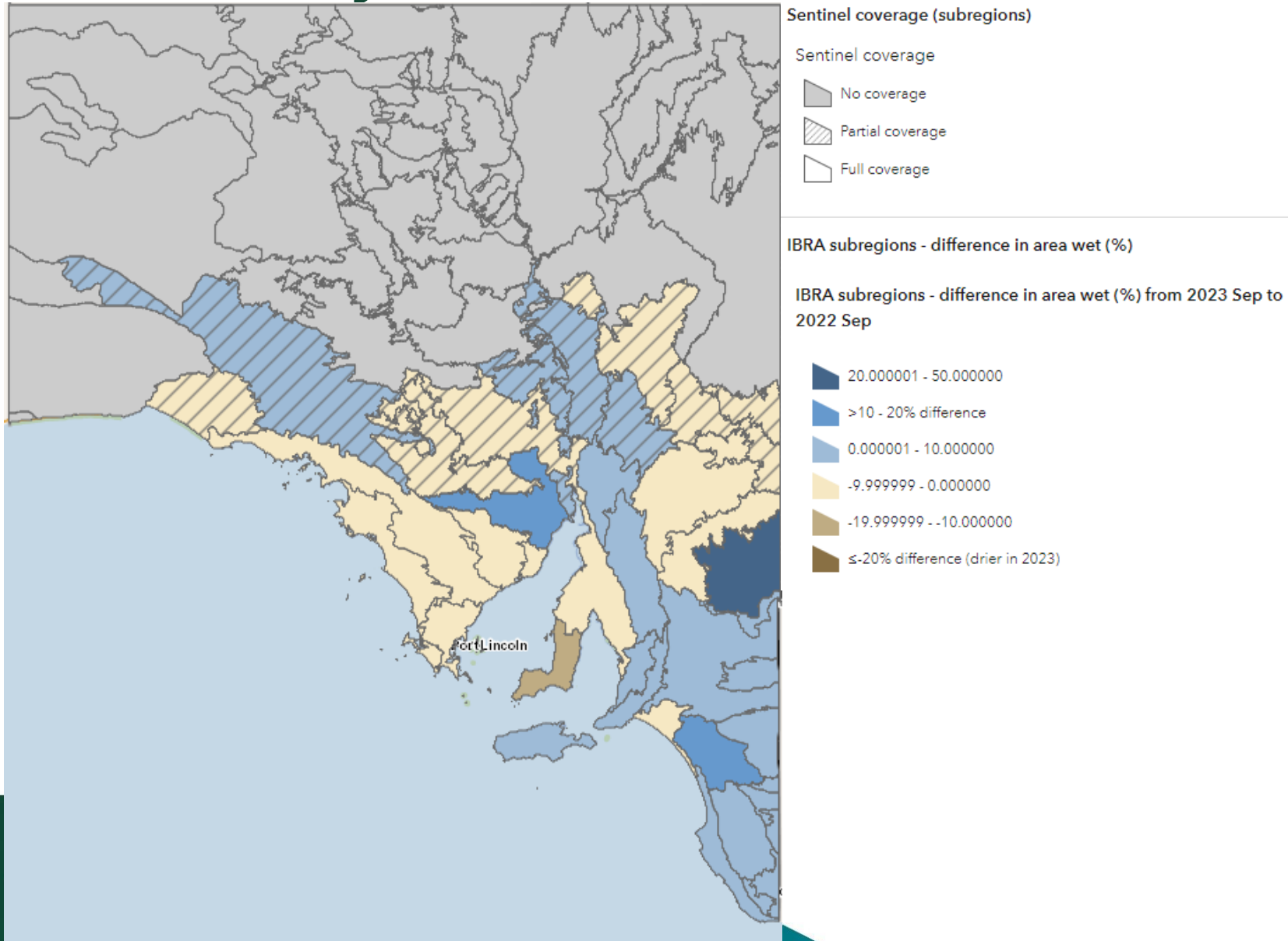
September 2022



September 2023

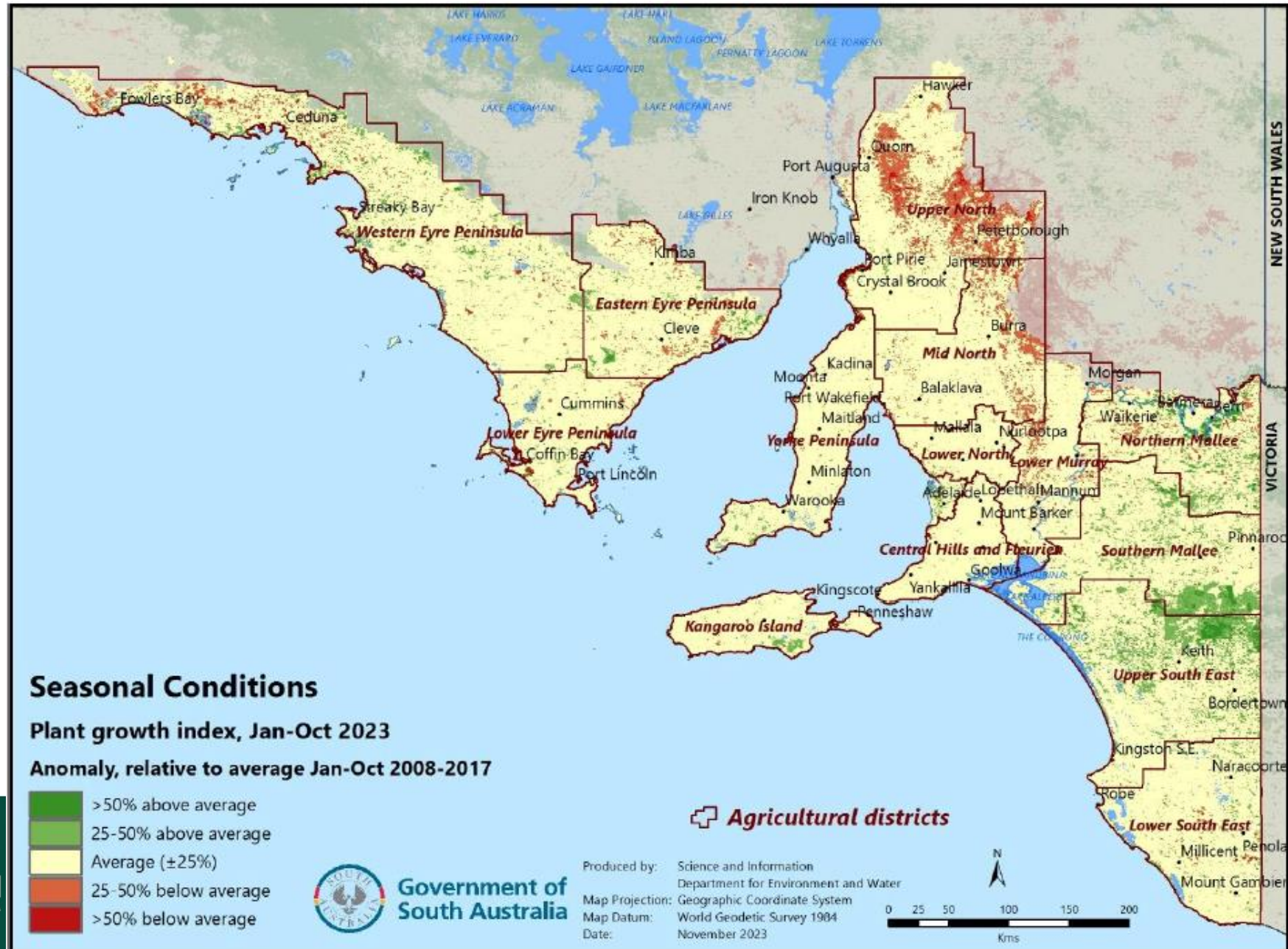


Remotely sensed wetland extent

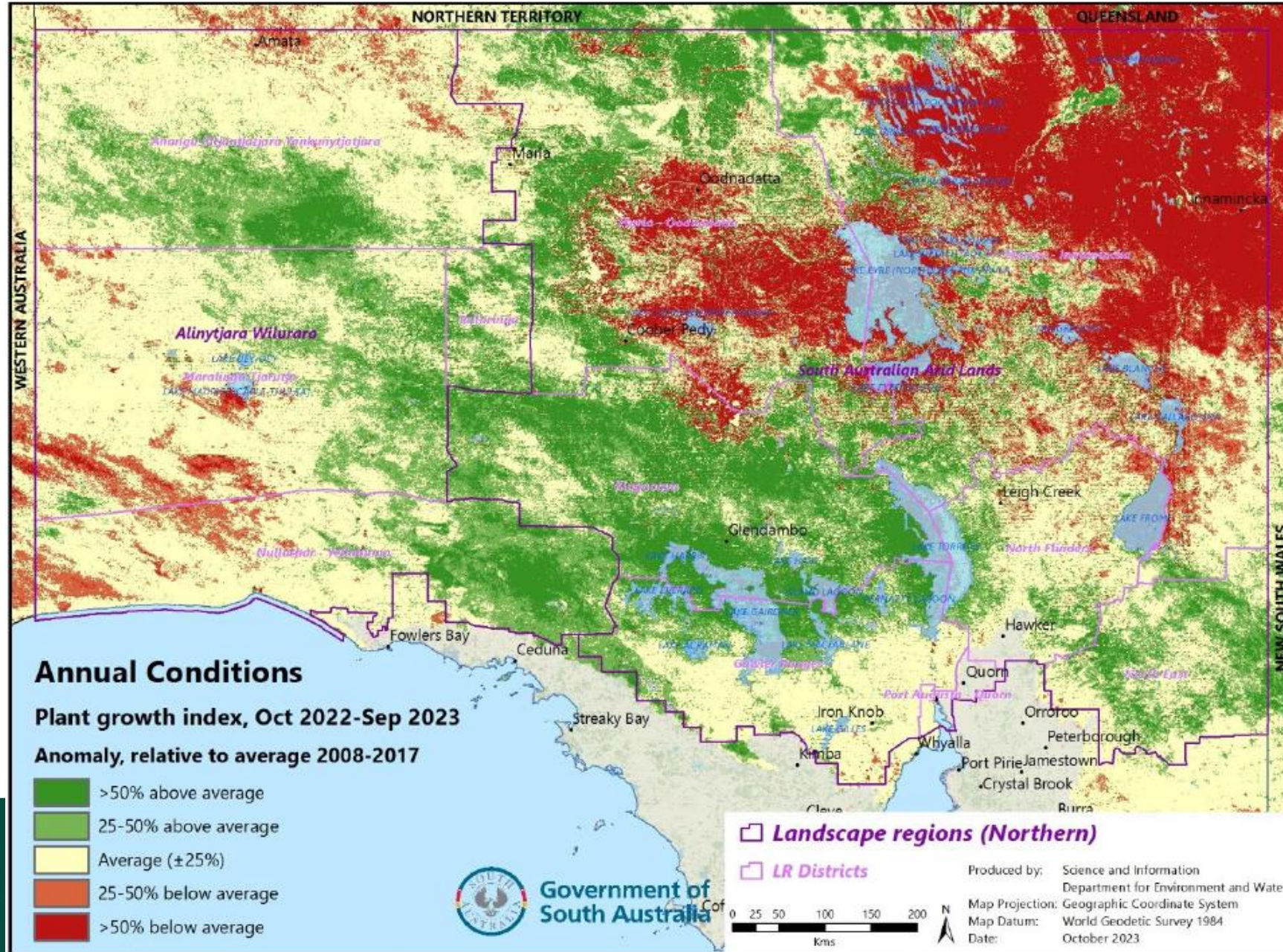


**Difference in extent between
September 2023 and
September 2022**

Plant Growth Index – anomaly to average



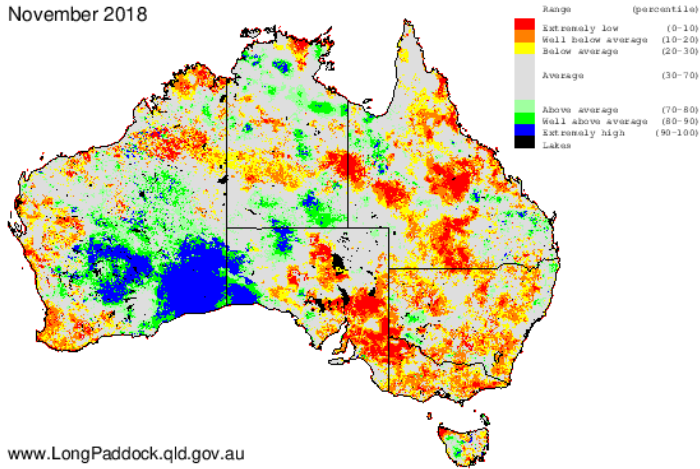
Plant Growth Index – anomaly to average



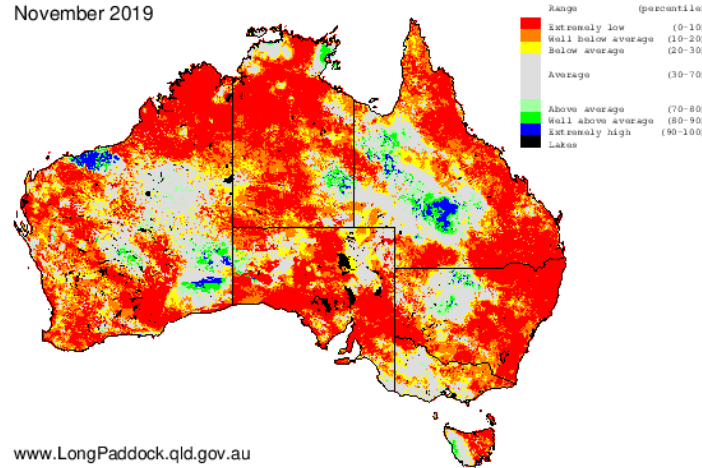
Available Soil Water (0-100cm)

(Relative to historical records from 1957)

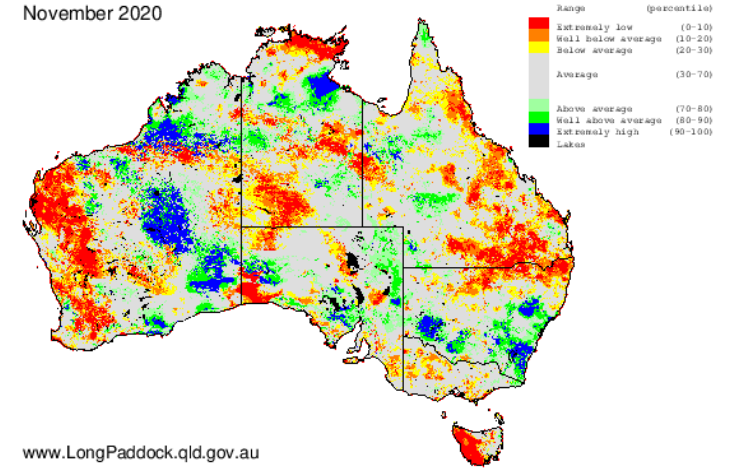
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2018



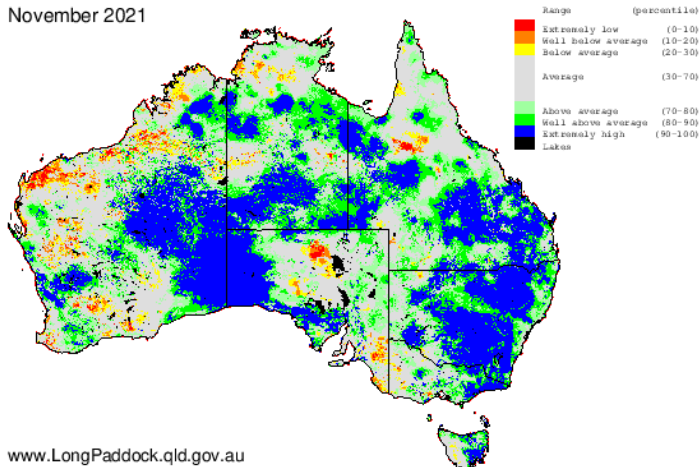
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2019



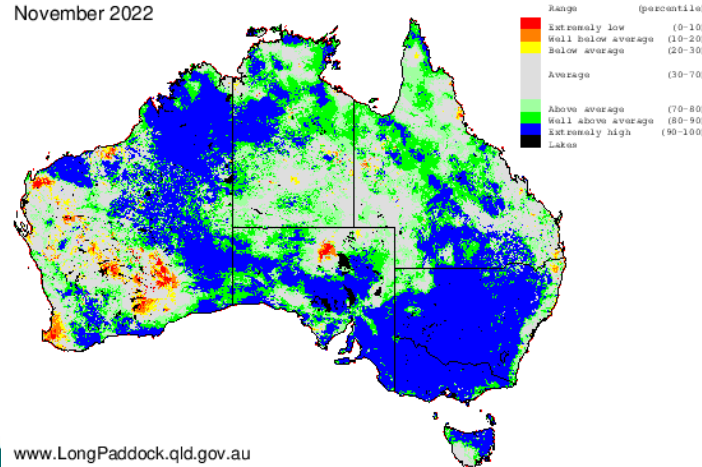
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2020



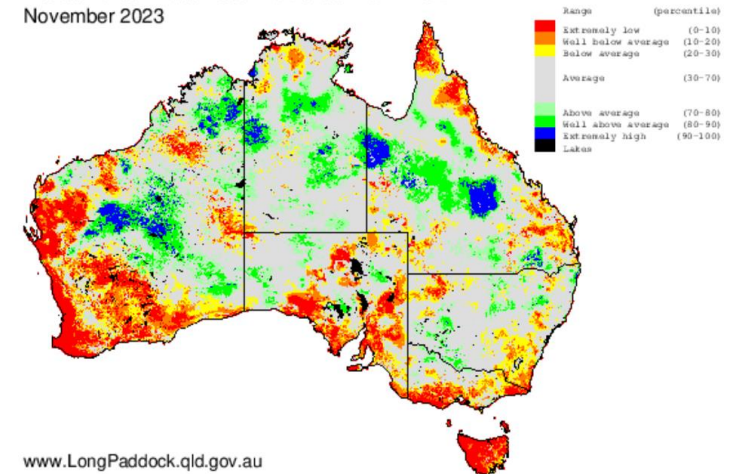
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2021



Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2022



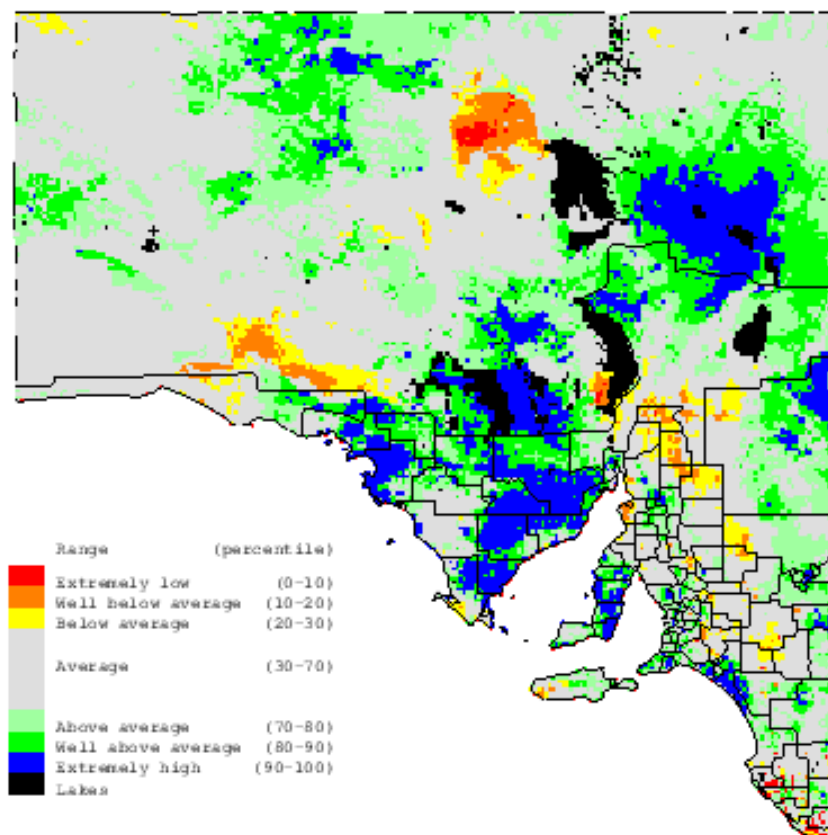
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
November 2023



Available Soil Water (0-100cm)

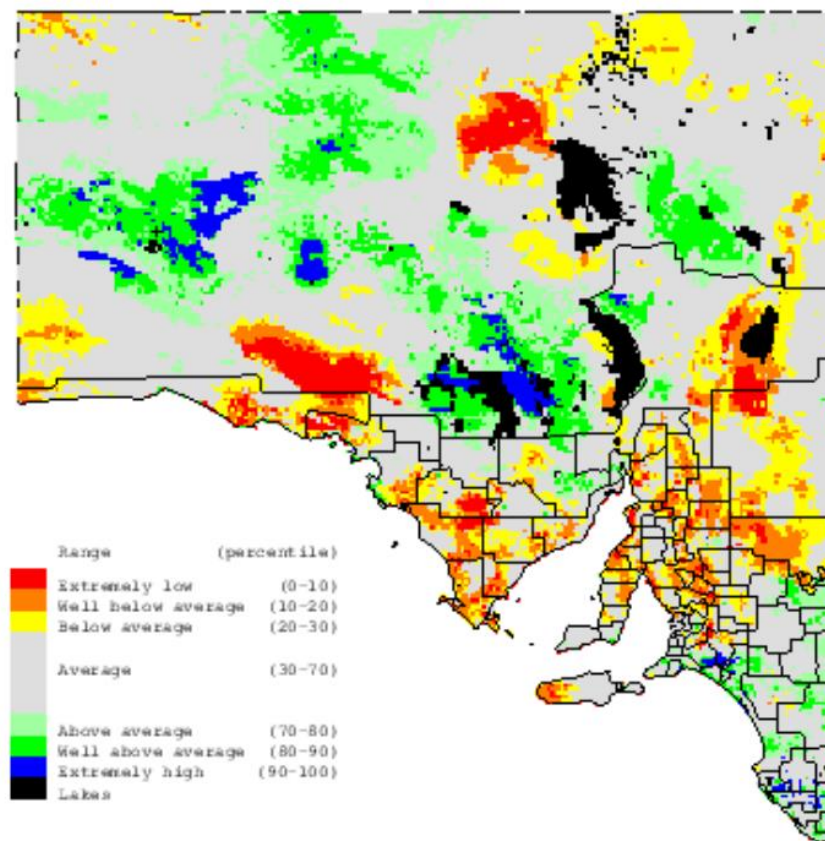
(Relative to historical records from 1957)

Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
December 2021 to November 2022



www.LongPaddock.qld.gov.au

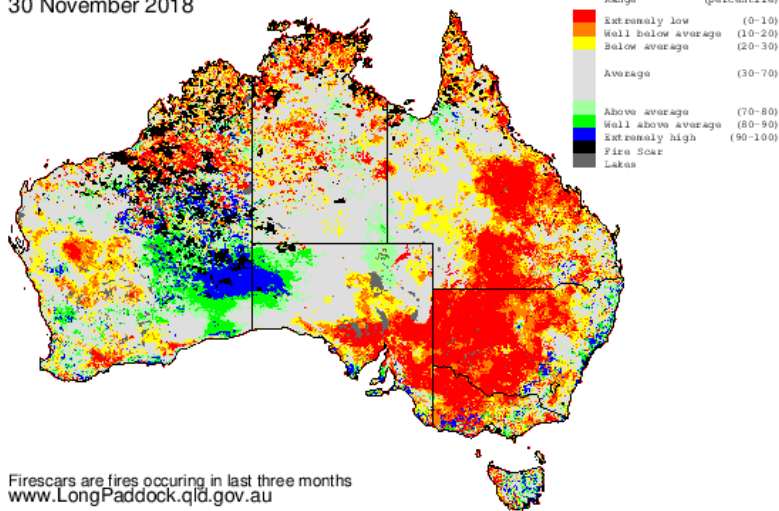
Available Soil Water (0-100 cm)
Relative to Historical Records from 1957
December 2022 to November 2023



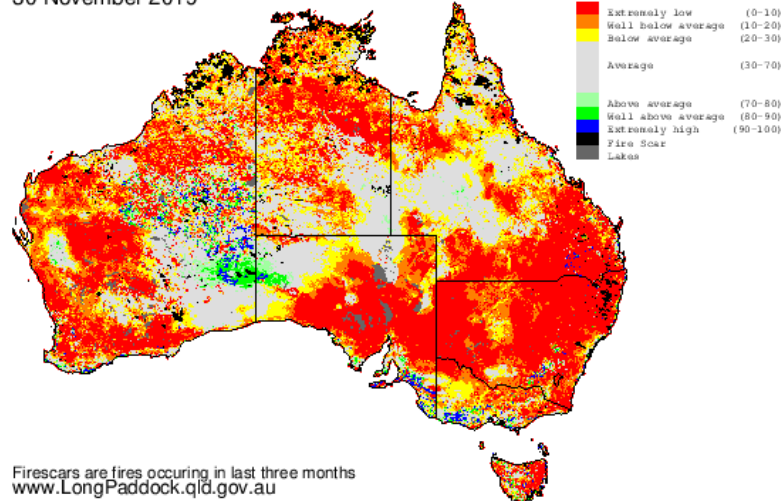
www.LongPaddock.qld.gov.au

Pasture Biomass

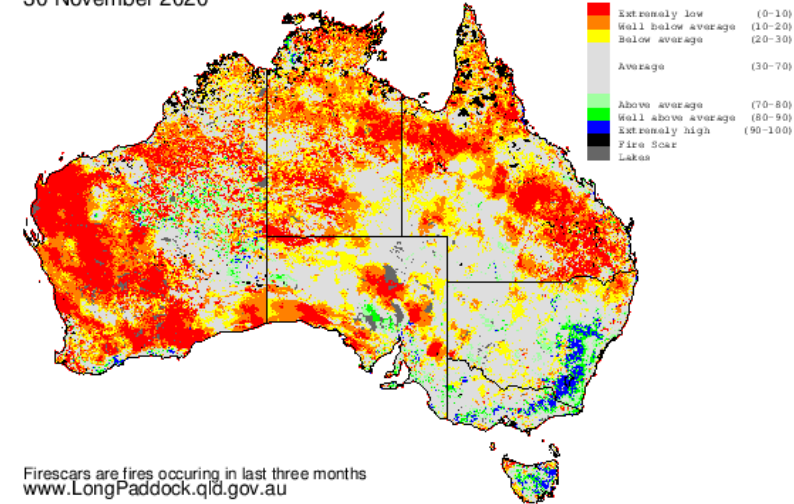
TSDM Percentile
Relative to Historical Records from 1957
30 November 2018



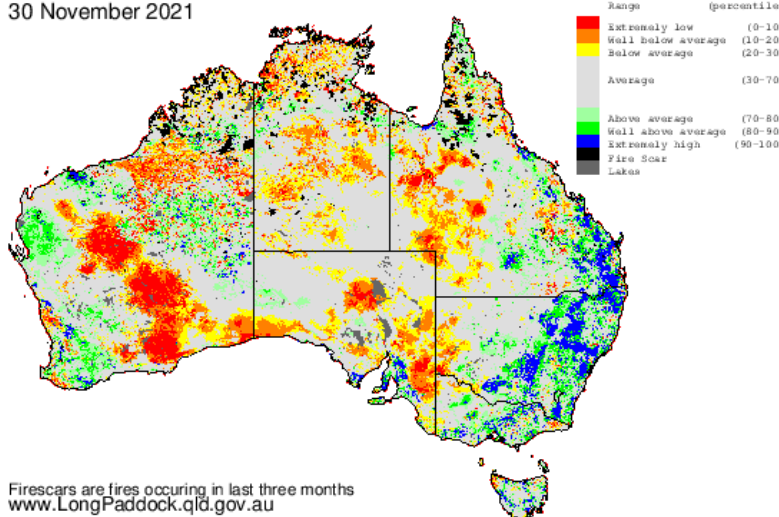
TSDM Percentile
Relative to Historical Records from 1957
30 November 2019



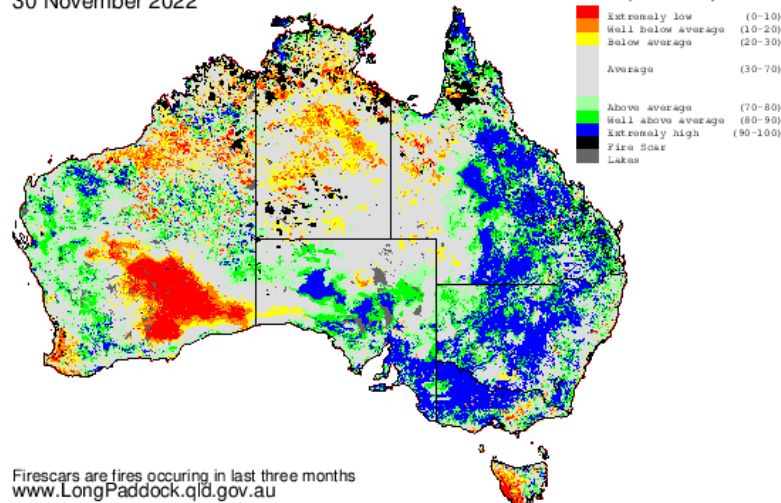
TSDM Percentile
Relative to Historical Records from 1957
30 November 2020



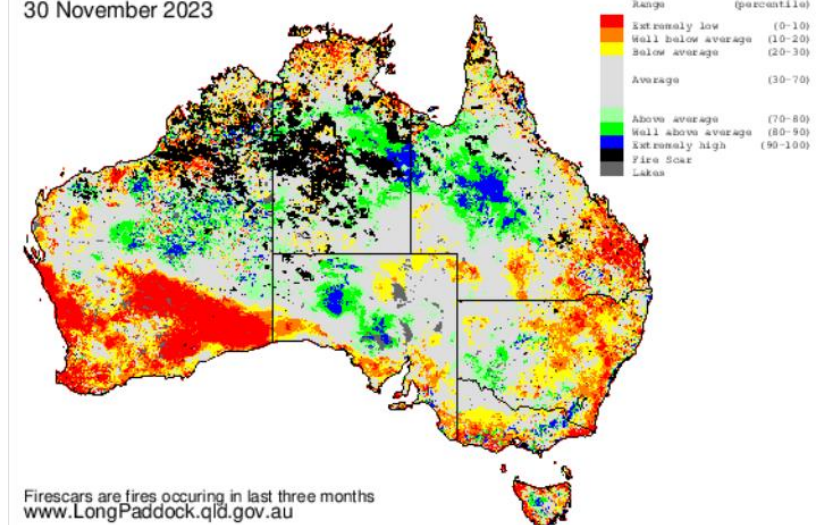
TSDM Percentile
Relative to Historical Records from 1957
30 November 2021



TSDM Percentile
Relative to Historical Records from 1957
30 November 2022



TSDM Percentile
Relative to Historical Records from 1957
30 November 2023

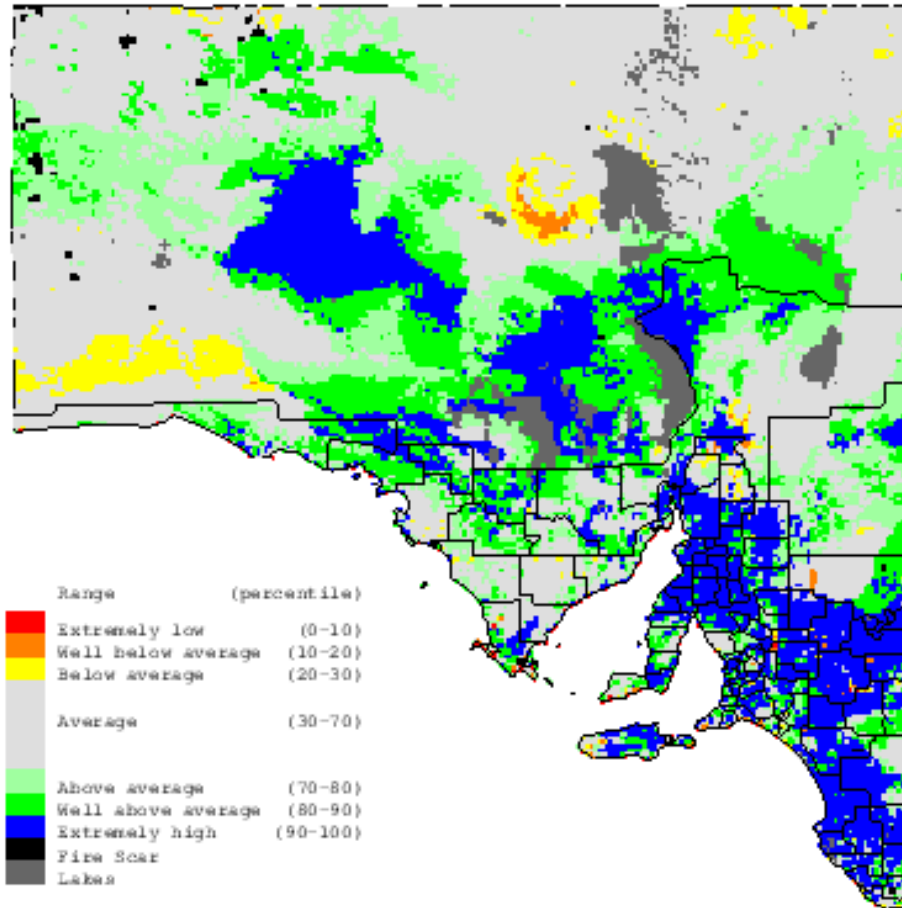


Pasture Biomass

TSDM Percentile

Relative to Historical Records from 1957

30 November 2022

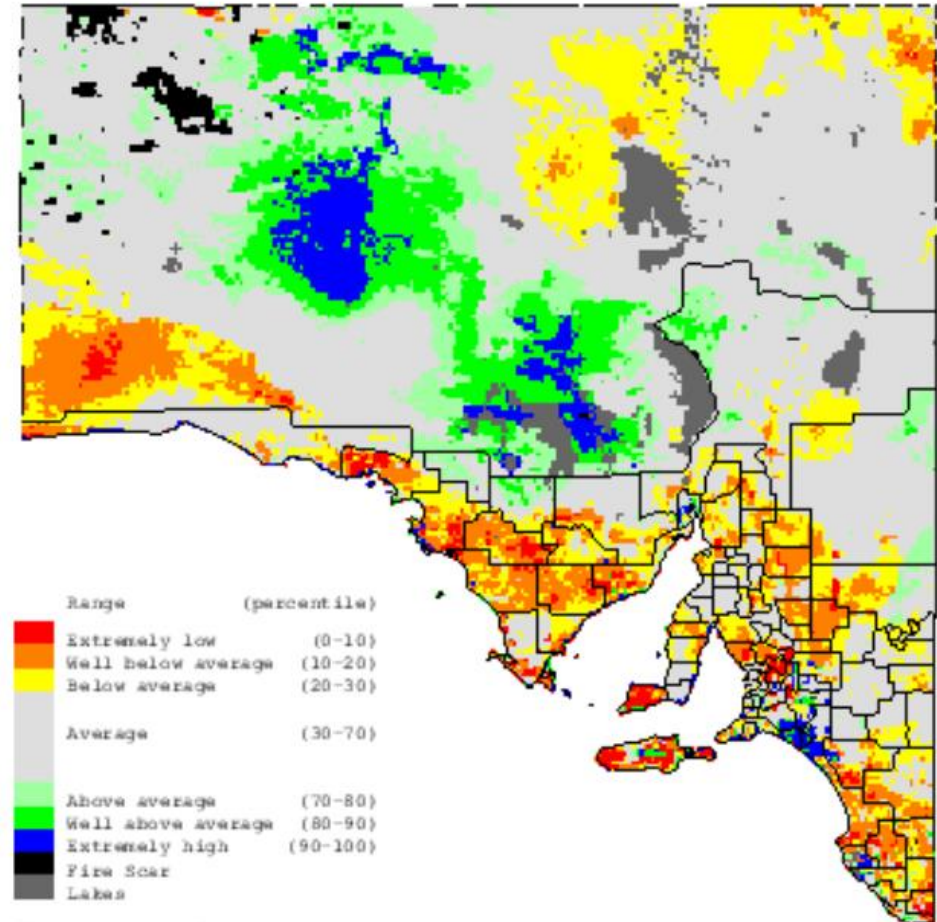


Firescars are fires occurring in last three months
www.LongPaddock.qld.gov.au

TSDM Percentile

Relative to Historical Records from 1957

30 November 2023



Firescars are fires occurring in last three months
www.LongPaddock.qld.gov.au

Landscape Condition summary

Wetland Extent

For wetlands in the 'Agricultural Zone', around 24% 'wet' in September 2023. Compared with 27% in September 2022 and 25% in September 2021.

Plant Growth Index relative to average

Cumulative mean plant growth for the agricultural zone was average, with patches of below average in Upper North. Arid zone highly variable, with the northeast of the state being mostly below average, west had mostly average and the central north had above and below average.

Available Soil Water

Soil moisture across most of MDB and SA mostly average to well below average.

Pasture Biomass

The majority of pasture biomass (as Total Standing Biomass (TSDM)) across MDB and SA is below average to average with some patches above and well above average in the MDB area. The pasture biomass around the Coorong is high and extremely high.

2024 open season considerations

- 2023 open season review
- Open season summary
- Guidance matrix



2023 open season review

- 'Restricted 2' duck season
 - 14 week season 18 March – 25 June 2023
 - Bag limit – 8 birds per hunter per day
 - Excluded: Australasian (Blue-winged) Shoveler and Pink-eared Duck
 - Bool Lagoon Game Reserve closed
 - 1337 permits issued
- Restricted quail open season
 - 13 week season 29 April – 30 July 2023
 - Bag limit – 25 stubble quail per hunter per day
 - Open season applies to all of state
 - 239 permits issued

Duck & Quail Seasons at a glance

Season	Duck Open Season				Quail Open Season	
	Season Status	Bag limit	Season duration		Bag limit	Season duration
2023	2023 Season open R2	8^	18/03/23 – 25/06/23		25	29/04/22 – 31/07/21
2022	2022 Season open R2	8	19/03/22 – 26/06/22		20	30/04/22 – 31/07/22
2021	2021 Season open R3	4****	20/03/21 – 27/06/21		no open season declared	
2020	2020 Season open R3	4***	28/03/20 – 31/05/20		no open season declared	
2019	2019 Season open R2	8	16/03/19 – 30/06/19		15	16/02/19 – 31/08/19
2018	2018 Season open R1	12	17/02/18 – 24/06/18		20	17/02/18 – 26/08/18
2017	2017 Season open R1	10	18/02/17 – 25/06/17		25	18/02/17 – 13/08/17
2016	2016 Season open R3	5	19/03/16 – 26/06/16		20	13/02/16 – 31/07/16
2015	2015 Season open R1	10	14/02/15 – 28/06/15		25	04/04/15 – 30/08/15
2014	2014 Season open R1	10	15/02/14 – 29/06/14		20	15/02/14 – 27/07/14
2013	2013 Season open FULL	12	16/02/13 – 30/06/13		25	16/02/13 – 28/07/13
2012	2012 Season open FULL	12	18/02/12 – 24/06/12		25	03/03/12 – 29/07/12
2011	2011 Season open FULL	12**	19/02/11 – 26/06/11		20	02/04/11 – 31/07/11
2010	2010 Season open R3	6	27/03/10 – 27/06/10		15	03/04/10 – 25/07/10
2009	2009 Season open R3	4	28/03/09 – 31/05/09		15	28/03/09 – 31/05/09
2008	2008 Season closed	no open season declared			15	05/04/08 – 27/07/08
2007	2007 Season closed	no open season declared			10	07/04/07 – 29/07/07
2006	2006 Season open FULL	12*	18/02/06 – 25/06/06		25	18/02/06 – 30/07/06

'**' = Unlimited WD, '***' = Max 6 PBD, '****' = Max 1 MD & max 1 PED, '*****' = no HH, PED, ^ = no PED. Note that BWS have not been in the bag for any year listed on this page

Guidance Matrix – Season setting

SA waterfowl abundance (ground counts)	SA wetland status (% wetlands in the range 2-5)	SA River Murray inflows (6 GL/day = entitlement flow)	Total waterfowl abundance (EAAWS)	Number of all Waterbird species breeding (EAWS)	Breeding index all species (EAWS)	Season Status
>80,000	>80% wetlands	Entitlement flow - average local breeding	>300,000	>12	>2,500	Full
60-80,000	70-80% wetlands	Below entitlement - most managed wetlands watered	240-300,000	10-12	1,876 – 2,500	Restricted level 1
40-60,000	50-70% wetlands	Below entitlement - some managed wetlands watered	180-240,000	8-9	1,251 – 1,875	Restricted level 2
20-40,000	40-50% wetlands	Below entitlement - limited watering of icon sites	150-180,000	5-7	625 – 1,250	Restricted level 3
<20,000	<40% wetlands	Below entitlement flow - main channel flow only	<150,000	<5	<625	No Season

Duck & Quail Seasons guidance matrix parameters and season status 2016-2023

	SA waterfowl abundance Ground(SA Aerial)	SA wetland status (% wetlands in the range 2-5)	SA River Murray inflows (6 GL/day = entitlement flow)	Total waterfowl abundance (EAWS)	Number of all Waterbird species breeding (EAWS)	Breeding index all species (EAWS)	Season Status
2023	72,395 (182,893)	92%	Above Entitlement Flow - average local breeding	337,081	11	6,036	
2022	12,028 (9,975)	85%	Above Entitlement Flow - average local breeding	48,748	21	60,580	2023 Season Open R2
2021	23,627 (26,929)	79%	Above Entitlement Flow - average local breeding	49,704	9	2,494	2022 Season Open R2
2020	17,272 (17,874)	78%	Above Entitlement Flow - average local breeding	91,230	3	364	2021 Season Open R3
2019	23,954 (72,677)	86%	Below entitlement - most managed wetlands watered	118,761	6	1,987	2020 Season Open R3
2018	83,114 (149,363)	89%	Above Entitlement Flow - average local breeding	101,185	2	<625	2019 Season Open R2
2017	49,983 (373,681)	93%	Above Entitlement Flow - average local breeding	150,642	6*	315	2018 Season Open R1
2016	10,709 (8,852)	93%	Above Entitlement flow - average local breeding	9,406	~21*	~25,000*	2017 Season Open R1

Duck & Quail Seasons guidance matrix parameters and season status 2005-2015

	SA waterfowl abundance Ground(SA Aerial)	SA wetland status (% wetlands in the range 2-5)	SA River Murray inflows (6 GL/day = entitlement flow)	Total waterfowl abundance (EAWS)	Number of all Waterbird species breeding (EAWS)	Breeding index all species (EAWS)	Season Status
2015	59,117	56%	Entitlement flow - average local breeding	66,266	0	0	2016 Season Open R3
2014	171,277	66%	Entitlement flow - average local breeding	128,671	1	12	2015 Season open R1
2013	115,337 (162,144)	97%	Entitlement flow - average local breeding	96,850	4	212	2014 Season open R1
2012	175,085	84%	Entitlement flow - average local breeding	428,179	9	2,402	2013 Season open FULL
2011	135,844 (179,638)	97%	Entitlement flow - all managed wetlands watered	630,470	23	3,373	2012 Season open FULL
2010	13,899	92%	Entitlement flow - all managed wetlands watered	93,300	22	61,243	2011 Season open FULL
2009	60,612	88%	Below entitlement - most managed wetlands watered	172,253	7	599	2010 Season open R3
2008	36,506	68%	Below entitlement flow - limited watering of icon sites	136,657	5	725	2009 Season open R3
2007	35,685	40%	Below entitlement flow - main channel flow only	68,549	2	469	2008 Season closed
2006	37,806	32%	Below entitlement - some managed wetlands watered	89,920	4	180	2007 Season closed
2005	48,554	76%	Below entitlement - some managed wetlands watered	108,128	9	9,030	2006 Season open FULL

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