Victorian Duck Season Priority Waterbird Count, 2021

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August 2021

Arthur Rylah Institute for Environmental Research
Client Report

Arthur Rylah Institute for environmental research

VICTORIA State Government | Environment, Land, Water and Planning

Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

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Citation: Menkhorst, P. and Stamation, K. (2021). Victorian Duck Season Priority Waterbird Count, 2021. Client Report for Biodiversity Policy and Regulation Section, Department of Environment, Land, Water and Planning. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

Front cover photo: Great Egret (P. Menkhorst).

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Unpublished Report
Department of Environment, Land, Water and Planning
Heidelberg, Victoria

Acknowledgements

Funding for the preparation of this report was provided by the Regulatory Strategy and Design Branch of the Department of Environment, Land, Water and Planning (DELWP) – we thank Louise Thompson for her support. We also thank the Game Management Authority for its continuing support of the pre-duck season waterbird counts. We particularly thank Carolien Schoenborn (Statewide Wildlife Programs) and Amanda Ashton (Grampians Region) for their efforts to improve coordination and participation in the counts across the DELWP regions.

Special thanks are due to the observers who collected the data that form the basis of this report. They include staff of DELWP, Parks Victoria and the Game Management Authority, and DELWP regional coordinators who carried out the task of organising most of the local surveys. Geoff Brown assisted with data entry.

A draft of this report was improved by comments from Danny Rogers and Tim O'Brien (ARI), Louise Thompson (DELWP Wildlife and Invasive Species Policy) and Simon Toop (Game Management Authority).

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Summary

Context

The Victorian Duck Season Priority Waterbird Count is a state-wide survey of selected waterbird species on priority duck hunting wetlands. It is conducted each year in the lead up to the Victorian duck hunting season. The 2021 duck season was delayed and short: opening day was 26 May rather than the usual mid-March starting date. Consequently, the count took place from 20 April until 3 May. In 2021 we continued the change in emphasis introduced in 2020 – instead of counting eight common non-game species, priority was given to 12 threatened species that are considered susceptible to disturbance during duck hunting.

Aims

The Duck Season Priority Waterbird Count (DSPWC) gathers numerical, locational and breeding data about game ducks and threatened waterbirds to inform management decisions regarding the forthcoming duck hunting season. Specifically, the aims are:

- to identify wetlands that are open to hunting and are holding large numbers of significant, non-game waterbirds (to inform consideration of further regulation of hunting, including closure of individual wetlands to hunting)
- to identify cases of local breeding by waterbirds, particularly colony-breeding species (for consideration of further regulation, including closure to hunting)
- to provide details on the distribution and numbers of game and priority non-game species of waterfowl on wetlands open to hunting.

Implementation

The 2021 DSPWC took place between 20 April and 3 May. Prior to commencement of the survey, a review of its organisation and management was undertaken by staff of the Office of the Conservation Regulator. This resulted in a more streamlined and focussed approach and an increased participation by staff of DELWP, Parks Victoria and the Game Management Authority, and is reflected in the very high proportion of priority wetlands that were assessed (98%).

Key results

In 2021 the total count of ducks belonging to the eight game species was less than one quarter of the long-term average, reflecting the low numbers of ducks present in the state at the time.

For the first time in 35 years, no Freckled Ducks were encountered during the DSPWC.

Based on data collected during the survey and on follow-up visits, one wetland was closed to hunting – Greens Swamp near Glenthompson due to its use as a flocking area by significant numbers of Brolga.

Conclusions and implications

The 2021 Duck Season Priority Waterbird Count achieved greater coverage and efficiencies than has been the case in recent years thanks to improved coordination and awareness resulting from active management by Statewide Wildlife Programs, DELWP.

1 Introduction

Project context

Annual counts of waterbirds in the lead-up to the opening of duck hunting season have been conducted at wetlands across Victoria since 1987. The counts were instigated following a recommendation from a review of the management of duck hunting within the state (Loyn 1989, 1991). Between 1987 and 2014, the purpose of the counts (then referred to as the Summer Waterbird Count) was to count waterbirds at as many wetlands as possible across Victoria, but with an emphasis on game species. This information was used to inform management decisions about further regulation of hunting on specific wetlands during the forthcoming duck hunting season. In 2015, a new approach was introduced that limited survey coverage to wetlands that have been historically important duck hunting sites on public land, or have a history of supporting threatened waterbird species, rather than including any wetland, regardless of hunting status. There has also been an increasing emphasis on broadening the focus of the surveys to include all threatened waterbirds, rather than only threatened duck species. This change reflects a concern that duck hunting could have more nuanced impacts on waterbirds apart from direct mortality (Menkhorst 2019). This changed approach is reflected in the list of target species, as well as the change of name of the count to Duck Season Priority Waterbird Count (DSPWC) and adjusting the layout of the field data sheet.

Dates for the counts are set so that enough time is available to recommend further regulation of duck hunting and for management action to be legally enacted prior to opening day. Data collected during the pre-duck season counts have also proven to be valuable for other purposes, including informing the development of management plans for Ramsar sites and other individual wetlands, and monitoring population trends of individual species.

All count data obtained during these surveys are stored in departmental databases held at the Arthur Rylah Institute for Environmental Research (ARI) and are submitted to the Victorian Biodiversity Atlas. The results of these annual counts have been published in various reports (Martindale 1988; Hewish 1988; Peter 1989–1992; Purdey and Loyn 2011, 2013; Purdey and Menkhorst 2014, 2015) or are available as unpublished reports (Price 1993; O'Brien 1994; Pert 1995; Norman 1996–2006; Norman and Purdey 2007; Purdey and Loyn 2008–2010; Menkhorst and Purdey 2016; Menkhorst et al. 2017, 2018, 2019, 2020a) and since 2014 have been made available on the website of the Game Management Authority, Victoria (https://www.gma.vic.gov.au/research/duck-research).

Thus, the objectives of the 2021 DSPWC were to:

1. identify wetlands that are open to hunting and currently support large numbers of significant, non-game waterbirds (to inform consideration of further regulation, including possible closure of individual wetlands to hunting)
2. identify cases of local breeding by waterbirds, particularly colony-breeding species (for consideration of further regulation, including closure to hunting)
3. provide details on the distribution and numbers of game and non-game species of waterfowl on wetlands open to hunting.

2 Methods

Survey methods

Most wetlands were surveyed by staff from either the Department of Environment, Land, Water and Planning (DELWP), Parks Victoria (PV) or the Game Management Authority (GMA), and a small number were independently surveyed (or partially surveyed) voluntarily by interested members of the public. Counts were made of targeted waterbird species (see below) on a wetland (or a defined part of a large wetland), using binoculars or a spotting scope. Observers were asked to record the wetland name, location (using Australian Map Grid reference or nearest town as a guide), date, time, priority species present and number of individuals of each priority species. At each wetland, an estimate of water level was taken (as a percentage of its full supply level) and, if the entire wetland could not be surveyed, an estimate was sought of the proportion of the wetland that was surveyed. Observations of breeding by any waterbird species were also recorded, including numbers of broods or nests (and contents where appropriate). Wetlands that were found to be dry, or almost so, were generally not formally surveyed but were simply noted to be not supporting waterbirds.

Survey organisation

The count was coordinated centrally through Statewide Wildlife Programs (DELWP) in collaboration with the GMA. Five DELWP regional coordinators were assigned the task of arranging the on-ground logistics. Because Port Phillip Region had only one priority wetland (the Western Treatment Plant), no coordinator was required from that region.

Each regional coordinator was responsible for liaising locally with other DELWP, PV and GMA officers in their region, distributing instructions and count forms, and ensuring adequate coverage of regional wetlands without duplication. The coordinators acted as a conduit for problems encountered during surveys and were expected to review completed forms before forwarding them to the Waterbirds and Wetlands Section at the Arthur Rylah Institute (ARI) by a specified date.

Regional coordinators were also required to inform ARI immediately if any of the priority species were detected or significant breeding events (e.g., colony-breeding waterbirds) were found during counts. In cases where a wetland was counted by persons other than government agency staff and significant waterbird values were reported, a government agency staff member was sent to the site to verify the report.

Completed forms, once processed locally, were scanned and emailed to ARI as soon as possible. This allowed preliminary data to be examined for records of rare or threatened non-game species, or any evidence of breeding birds that might require special protection. At ARI, staff checked all data sheets for accuracy and completeness, queried coordinators or individual observers on unusual or deficient records and entered data into a Microsoft Access© database.

Count dates

The period over which the count is conducted has been reduced to 12 days with the end date being as close as possible to opening day of the duck season while also allowing sufficient time for a preliminary review of the data. Where required, this was followed by implementation of the necessary legal mechanisms to allow management actions, as required. This timing helps to minimise error due to waterbird movements between the count and opening day of the hunting season. Even so, the period between the count and opening day, which is necessitated by requirements to implement legal mechanisms under the Victorian *Wildlife Act 1975*, was 22 days in 2021, an ample period for flocks of waterbirds to change location. This time lag remains a shortcoming in the decision-making process as it is currently structured. To minimise the chance of errors due to waterbird movements, wetlands at which significant values (above-threshold numbers of threatened species or breeding activity) were identified during the count were monitored by GMA or DELWP staff prior to management decisions being finalised (i.e., until publication in the *Victorian Government Gazette* of Thursday 6 May 2021) to ensure that the issue still existed at the site. Further targeted monitoring by GMA or DELWP staff took place throughout the duck hunting season to assess the need for further management intervention, such as further closures or re-openings.

The 2021 Victorian duck hunting season was a shortened one due to low duck numbers and reduced habitat following dry conditions throughout south-eastern Australia. Ongoing restrictions on movement related to management of the Covid-19 pandemic also hampered access to hunting sites. The start of the duck hunting

season was delayed until 26 May and the finishing date was 14 June, a season of only 20 days duration. Thus, the Duck Season Priority Waterbird Count was conducted between 20 April and 3 May.

Wetlands surveyed

The 153 priority wetlands for 2021 are listed in Appendix 1. A list of other wetlands surveyed in 2021 is provided in Appendix 2.

Species counted and analysed

Under the revised priorities for the DSPWC, priority is given to counting the eight game species plus 12 rare or threatened non-game species that were identified as being particularly susceptible to the sorts of disturbance associated with duck hunting (Menkhorst 2019) (Table 1). Other waterbird species are also counted as time permits. This is a significant change from previous Summer Waterbird Counts which targeted the eight games species plus eight non-game species, including some abundant species such as Black Swan and Hoary-headed Grebe.

Table 1. The priority species for the 2021 Duck Season Priority Waterbird Count. * Note that the Australasian Shoveler was a prohibited species during the 2021 duck hunting season.

	English name	Scientific name
Game species		
	Australian Shelduck	*Tadorna tadornoides*
	Australian Wood Duck	*Chenonetta jubata*
	Australasian Shoveler*	*Anas rhynchotis*
	Chestnut Teal	*Anas castanea*
	Grey Teal	*Anas gracilis*
	Hardhead	*Aythya australis*
	Pacific Black Duck	*Anas superciliosa*
	Pink-eared Duck	*Malacorhynchus membrabaceus*
Non-game species		
	Australian Painted-snipe	*Rostratula australis*
	Australasian Bittern	*Botaurus poiciloptilus*
	Blue-billed Duck	*Oxyura australis*
	Brolga	*Grus rubicunda*
	Curlew Sandpiper	*Calidris ferruginea*
	Freckled Duck	*Stictonetta naevosa*
	Great Egret	*Ardea alba*
	Intermediate Egret	*Egretta intermedia*
	Latham's Snipe	*Gallinago hardwickii*
	Little Egret	*Egretta garzetta*
	Magpie Goose	*Anseranas semipalmata*
	Musk Duck	*Biziura lobata*

3 Results

Number of wetlands counted

The 2021 DSPWC contributes to a dataset now spanning the 35 years from 1987. In 2021, counts were made at 84 of the 153 priority wetlands. A further 66 priority wetlands were dry and were not counted (see Appendix 1) giving a total of 150 priority wetlands assessed (98%). Six non-priority wetlands were also surveyed (Appendix 2).

Table 2 provides the annual total count for each of the eight game and eight non-game waterbird species targeted in previous Summer Waterbird Counts, along with the number of wetlands counted. These data show that the number of surveyed wetlands peaked in the 1989–1993 period and declined thereafter but has now stabilised at between 126 and 155 wetlands (apart from 2020 which suffered from the exceptional circumstances associated with the Covid19 pandemic). The numbers of priority wetlands in each DELWP region and the number that were surveyed in 2021 are shown in Table 3.

Game species

In 2021, the total count of ducks belonging to the eight game species was 45,730, 23% of the 34-year mean (Table 2), reflecting the dry conditions, particularly in the west and north-west of the State. Three species made up 86% of the game ducks counted – Chestnut Teal (30.4%), Australian Shelduck (29.4%), and Grey Teal (26.5%) The remaining 14% was comprised of the other five game species (Pacific Black Duck, Australian Wood Duck, Australasian Shoveler, Hardhead and Pink-eared Duck).

Threatened waterbirds considered sensitive to disturbance

Sightings were made of six of the 12 threatened waterbird species (see table 1) targeted for attention during the 2021 DSPWC. Each is briefly considered below.

Blue-billed Duck

The Blue-billed Duck is a non-game species that is of particular concern because it is listed as Vulnerable under the *Flora and Fauna Guarantee Act 1988.* A flock of 150 was counted at Lake Terangpom near Camperdown with smaller numbers at Lake Rosine, Lake Straun, Round Lake (Lake Boga), Buffalo Dam (Lake Buffalo) and Tower Hill State Game Reserve. Surprisingly, no Blue-billed Duck were recorded at Lake Bolac during the 2021 count.

Musk Duck

The Musk Duck is listed as Vulnerable under the *Flora and Fauna Guarantee Act 1988.* It was recorded at 18 wetlands during the 2021 count, with by far the highest count of 600 birds at Lake Fyans and 170 at Lake Bolac.

Brolga

The Brolga is a non-game species that is of particular concern because it is listed as Endangered under the *Flora and Fauna Guarantee Act 1988.* An aggregation of 29 Brolgas was present at Bryans Swamp (near Hamilton) on 29 April 2021 and 8 at Greens Swamp (near Glenthompson). Brolgas were also present in small numbers at Bradys Swamp, Lake Carpolac and Hird Swamp.

Great Egret

The Great Egret is listed as Vulnerable under the *Flora and Fauna Guarantee Act 1988.* It was recorded at 14 wetlands across all regions bar Hume. The largest aggregation (25) was at Lake Connewarre.

Intermediate Egret

The Intermediate Egret is listed as Critically Endangered under the *Flora and Fauna Guarantee Act 1988.* Singles were recorded at three wetlands and a count of three was made at Reedy Swamp (Shepparton). Two wetlands were near Sale where a remarkable breeding event took place earlier in the year at Lake Guyatt (P. Lansley pers comm.), the first recorded breeding event in southern Victoria.

Little Egret

The Little Egret is listed as Endangered under the *Flora and Fauna Guarantee Act 1988.* There were two records during the count, a single bird at Reedy Lake (Geelong) and two birds at Lake Taylor (Grampians Region).

Freckled Duck

The Freckled Duck is a non-game species that is of particular concern because it is listed as Endangered under the *Flora and Fauna Guarantee Act 1988*. Freckled Ducks are at risk of being shot during duck hunting season because they can be difficult to distinguish from Pacific Black Duck and Hardhead when flying. During the 2021 DSPWC, no Freckled Duck were recorded, the first ever zero count (Table 4).

Breeding and moulting

The DSPWC is timed to fall immediately prior to the annual duck hunting season and after the main waterbird breeding period (July–January in Victoria). No colony-breeding events, or incidences of large-scale moulting were reported during the 2021 DSPWC and the late starting date would make this even less likely than normal.

Further regulation of hunting activity

In 2021, information collected during the DSPWC contributed to decisions to further regulate hunting activity, including the complete closure of Greens Swamp near Glenthompson due to the presence of significant numbers of Brolga exhibiting pre-breeding flocking behaviour.

Table 2. Summary of Summer Waterbird Counts and Duck Season Priority Waterbird Counts conducted in Victoria from 1987 to 2021

Year	Count period	Number of wetlands surveyed	Total count of game species	Total count of non-game species
1987	17 – 25 January	332	205,000	177,000
1988	6 – 14 February	472	294,108	185,821
1989	4 – 12 February	626	292,598	170,375
1990	18 – 26 February	668	385,148	225,230
1991	16 – 24 February	786	414,417	264,610
1992	22 February – 1 March	659	408,004	219,411
1993	20 – 28 February	534	218,562	107,650
1994	26 February – 6 March	284	292,899	173,887
1995	25 February – 5 March	367	196,955	141,609
1996	24 February – 3 March	234	200,861	197,916
1997	22 February – 2 March	223	124,914	92,003
1998	21 February – 1 March	309	216,476	152,348
1999	27 February – 7 March	312	206,839	128,969
2000	26 February – 5 March	298	128,021	78,675
2001	24 February – 4 March	336	240,671	102,926
2002	23 February – 3 March	225	231,235	106,191
2003	22 February – 2 March	175	155,623	93,972
2004	21 – 29 February	249	187,139	85,468

Year	Count period	Number of wetlands surveyed	Total count of game species	Total count of non-game species
2005	19–27 February	272	155,069	81,950
2006	25 February – 5 March	268	182,487	85,887
2007	24 February – 4 March	176	91,210	46,770
2008	23 February – 2 March	191	58,628	41,454
2009	21 February – 1 March	161	78,723	38,283
2010	20–28 February	153	77,649	35,485
2011	19 February – 6 March	201	104,903	16,768
2012	11 February – 4 March	136	212,865	81,848
2013	9 February – 2 March	133	185,507	103,467
2014	10–23 February	166	267,055	113,717
2015	16–28 February	126	159,666	74,290
2016	15–26 February	131	92,168	74,452
2017	13–24 February	127	283,430	114,463
2018	12–23 February	144	262,397	130,762
2019	11-22 February	135	225,733	85,889
2020	30 March-12 April & 22-30 April	62	3,250	10,093
2021	19 April – 4 May	84	45,730	20,532
Mean		**278**	**196,741**	**110,291**

Table 3. Coverage of priority wetlands in the 2021 Duck Season Priority Waterbird Count by DELWP region.

Note that the reason for not surveying many of the priority wetlands that were missed is that they were known to be dry. * the delayed starting date in 2021 meant that the Western Treatment Plant was counted outside the count period being counted in February and July as required under the ARI contract with Melbourne Water.

DELWP region	Number of priority wetlands	Number of priority wetlands surveyed (%)	Number of priority wetlands dry	Number of non-priority wetlands surveyed
Barwon South West	38	33 (87)	6	3
Gippsland	15	13 (87)	0	2
Grampians	35	12 (34)	21	0
Hume	18	7 (39)	9	0
Loddon Mallee	45	13 (29)	30	1
Port Phillip	1	0*	0	0
All	**152**	**78 (51)**	**66 (44)**	**6**

Table 4. Numbers of Freckled Duck recorded during Summer Waterbird Counts and Duck Season Priority Waterbird Counts, 1987–2021

Year	Number of wetlands counted	Number of wetlands with Freckled Duck	Total count of Freckled Duck
1987	445	23	219
1988	484	7	69
1989	642	11	76
1990	665	13	95
1991	786	12	167
1992	664	14	106
1993	504	13	149
1994	343	6	44
1995	367	4	63
1996	234	1	2
1997	223	2	55
1998	309	1	4
1999	298	8	82
2000	328	2	16
2001	336	7	32
2002	225	9	550
2003	175	10	798
2004	249	11	929
2005	272	9	186
2006	268	13	661
2007	176	5	82
2008	191	3	46
2009	161	2	69
2010	153	2	9
2011	201	2	8
2012	136	7	133
2013	133	23	1056
2014	166	18	2803
2015	126	9	258
2016	130	4	174
2017	126	20	447
2018	144	13	1658
2019	135	10	960
2020	62	1	1
2021	84	0	0
Mean	**284**	**8.4**	**343.0**

4 Discussion

The 2021 duck season was delayed and shortened compared to the usual arrangements that have been in place since the late 1980s. Opening day was 26 May rather than the usual mid-March (see https://www.gma.vic.gov.au/hunting/duck/duck-season-considerations/historical-summary-of-seasonal-arrangements). Consequently, DSPWC took place in the last two weeks of April rather than in February. At one closely monitored site in coastal Victoria with guaranteed water (the Western Treatment Plant), duck numbers peak in late summer and are at a minimum in mid-winter (Loyn et al. 2014; Menkhorst et al. 2020b). If this trend applies across Victoria, then we would expect lower counts in April than in February, regardless of seasonal conditions. The total count of game ducks in the 2021 DSPWC was less than one quarter of the long-term mean despite a high proportion of priority wetlands that held water being counted. The degree to which this low count is due to its timing or the continued run of dry years cannot be determined, but both are likely to have contributed, noting that 44% of priority wetlands were dry during the count. Consequently, those waterbirds remaining in Victoria were concentrated on a smaller number of large, more permanent wetlands. This situation risks increasing the proportion of available birds harvested because hunters are concentrated on fewer wetlands.

Limitations and constraints

The limitations and constraints of the DSPWC need to be appreciated when considering the results. While it is the only long-term, land-based survey of the State's waterbirds, with annual counts since 1987, the number of wetlands surveyed has declined from a peak of 786 wetlands in 1991, to 125–145 in recent years. The current level of survey effort renders meaningful statewide, year-by-year comparisons increasingly difficult. Regional organisers are encouraged to focus survey effort on those wetlands that are on public land, are open to hunting and which consistently hold large numbers of game species. This biases the data towards waterbird species that prefer large and more permanent wetlands (such as Hardhead, Blue-billed Duck, Eurasian Coot and Hoary-headed Grebe), and against those species that prefer shallower, ephemeral and more highly vegetated wetlands (such as teal, Pink-eared Duck and bitterns). Furthermore, as survey coverage decreases, the chances of the survey failing to record aggregations of significant species increases, which compromises the value of the counts as a tool for informing the management of duck hunting.

The future

The original SWC was designed to achieve two main objectives (Loyn 1989, 1991):

1. to locate flocks of threatened waterfowl or breeding aggregations of waterbirds that may warrant additional management during the coming duck hunting season
2. to obtain data on numbers of waterbirds in Victoria for long-term monitoring.

Management of game species requires long-term tracking of changes in species abundance across the state and the continent. The inherent variability of the Australian climate has profound effects on the availability of habitat for waterbirds, and breeding opportunities are typically provided by flood events in disparate parts of the continent (e.g., Frith 1982; Kingsford and Norman 2002).

Long-term datasets are essential to tease out the relative importance of these climatic influences, compared to immediate human impacts, such as hunting and the provision of environmental water. Such datasets are rare in Australia, and many have been discontinued. In Victoria, only Western Port has been monitored long-term for waterbirds, since 1973 (Loyn et al. 1994; Hansen et al. 2015), and the WTP has been intensively monitored since 2000 (Loyn et al. 2014). On a much broader scale, the Eastern Australian Aerial Waterbird Survey (EAAWS), which began in 1983, has provided annual abundance indices of waterbirds and wetland habitats across a standard series of aerial census lines from Queensland to Victoria and into South Australia (see https://www.ecosystem.unsw.edu.au/content/rivers-and-wetlands/waterbirds/eastern-australian-waterbird-survey). However, the aerial census lines used in the EAAWS are widely spaced (2 degrees of latitude or approximately 168 km in Victoria) and thus many important Victorian wetlands are not covered.

The DSPWC (formerly Summer Waterbird Count) adds a broad perspective to our understanding of waterbird numbers and distribution within Victoria, with data having been collected from a large number of wetlands (126+ annually, and approximately 1,500 altogether) between 1987 and 2021. The data summarised here add to the series that is used to assist decision making about duck hunting and wetland

management in the state, as envisaged by Loyn (1991). Only a sample of the State's wetlands is surveyed each year, and it should be stressed that most of these counts do not provide data on absolute numbers of waterbirds or total species diversity. While the primary aim is to identify wetlands that warrant consideration for further regulation of hunting (objective 1), it also has value as an index of abundance for comparisons between years (objective 2), with appropriate recognition of the data limitations, for example, Murray et al. (2012).

As well as informing the further regulation of hunting, DSPWC data have proved helpful in other waterfowl monitoring programs (e.g. Pacioni et al. 2017, and BirdLife Australia's Australian Waterbird Index project).

The switch from reporting on eight focal non-game species to 12 threatened species considered susceptible to disturbance is a pragmatic decision that reflects our declining capacity to collect meaningful state-wide monitoring data for waterbirds in general. This new approach focuses on the collection of data with immediate application to reducing the impacts of duck hunting on both game species and non-game species, however, the trade-off for this is that the data collected are not as informative when assessing statewide waterbird population trends under objective 2.

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6 Appendices

List of priority wetlands and whether counted or dry

DELWP region	Wetland name	Latitude	Longitude	Counted	Dry at Count
Barwon South West	Brown Swamp	-38.27	144.13	N	Y
Barwon South West	Bryans Swamp	-37.56	142.27	Y	
Barwon South West	Bullrush Swamp	-37.77	142.23	Y	
Barwon South West	Carter Swamp	-38.24	143.30	N	Y
Barwon South West	Cundare Pool	-38.09	143.59	Y	
Barwon South West	Deep Lake (Nerrin Nerrin)	-37.79	143.04	Y	
Barwon South West	Deep Lake (Derrinallum)	-37.93	143.17	Y	
Barwon South West	Eurack Swamp	-38.13	143.70	N	Y
Barwon South West	Hospital Swamp	-38.23	144.41	Y	
Barwon South West	Krause Swamp (e. of Bullrush Swamp)	-37.76	142.25	Y	
Barwon South West	Lake Balkil Narra	-38.125	143.373	Y	
Barwon South West	Lake Bookar	-38.13	143.12	Y	
Barwon South West	Lake Colac	-38.30	143.59	Y	
Barwon South West	Lake Colongulac	-38.17	143.16	Y	
Barwon South West	Lake Connewarre	-38.23	144.45	Y	
Barwon South West	Lake Coradgill	-38.11	143.36	Y	
Barwon South West	Lake Elingamite	-38.35	143.01	Y	
Barwon South West	Lake Gherang	-38.25	144.06	N	Y
Barwon South West	Lake Kariah	-38.17	143.21	Y	
Barwon South West	Lake Linlithgow	-37.75	142.22	Y	
Barwon South West	Lake Martin	-38.07	143.58	Y	
Barwon South West	Lake Modewarre	-38.24	144.11		
Barwon South West	Lake Murdeduke	-38.17	143.89	Y	
Barwon South West	Lake Punpundal	-38.13	143.37	Y	
Barwon South West	Lake Rosine	-38.03	143.57	Y	
Barwon South West	Lake Round	-38.13	143.21	Y	
Barwon South West	Lake Struan	-38.01	143.42	Y	
Barwon South West	Lake Terang Goodwich	-38.12	143.37	Y	
Barwon South West	Lake Terangpom	-38.13	143.32	Y	
Barwon South West	Lake Thurrumbong (Colac)			Y	Y
Barwon South West	Lake Tooilorook (nr Lismore)	-37.98	143.27	Y	
Barwon South West	Lake Weering	-38.08	143.68	Y	
Barwon South West	Lough Calvert	-38.18	143.69	N	Y
Barwon South West	Reedy Lake (Geelong)	-38.21	144.42	Y	

DELWP region	Wetland name	Latitude	Longitude	Counted	Dry at Count
Barwon South West	Tower Hill	-38.32	142.36	Y	
Region totals				**29**	**6**
Gippsland	Blond Bay SGR	-38.01	147.52	Y	
Gippsland	Clydebank Morass	-38.04	147.22	Y	
Gippsland	Dowds Morass SGR	-38.14	147.23	Y	
Gippsland	Freshwater Swamp SGR	-38.56	146.96	N	
Gippsland	Heart Morass	-38.12	147.20	Y	
Gippsland	Hollands Landing (Lagoon)	-38.06	147.45	Y	
Gippsland	Jack Smith SGR	-38.50	147.00	Y	
Gippsland	Lake Coleman	-38.16	147.33	Y	
Gippsland	Lake Corringle	-37.78	148.49	N	
Gippsland	Lake Curlip	-37.75	148.57	Y	
Gippsland	Lake Kakydra	-38.07	147.20	Y	
Gippsland	Lake Wat Wat	-37.76	148.52	Y	
Gippsland	Macleods Morass	-37.84	147.63	Y	
Gippsland	Morleys Swamp	-38.09	147.44	Y	
Gippsland	Victoria Lagoon	-38.04	147.45	Y	
Region totals				**13**	**0**
Grampians	Black Swamp (Balmoral)	-37.22	141.83	N	Y
Grampians	Booroopki Swamp	-36.73	141.22	N	Y
Grampians	Bradys Swamp	-37.59	142.45	Y	
Grampians	Connan Swamp	-36.69	141.79	N	
Grampians	Dock Lake	-36.77	142.30	N	Y
Grampians	Greens Swamp Wildlife Reserve	-37.00	141.78	Y	
Grampians	Holdsworth Swamp	-37.70	143.01	Y	
Grampians	Jacka Lake	-36.80	141.81	N	Y
Grampians	Lake Albacutya	-35.75	141.97	N	Y
Grampians	Lake Batyo Catyo	-36.52	142.94	N	Y
Grampians	Lake Bolac	-37.72	142.88	Y	
Grampians	Lake Buninjon	-37.48	142.78	Y	
Grampians	Lake Burrumbeet	-37.50	143.64	Y	
Grampians	Lake Carpolac	-36.85	141.32	Y	
Grampians	Lake Clarke	-36.87	141.86	N	
Grampians	Lake Fyans	-37.14	142.63	Y	
Grampians	Lake Goldsmith	-37.54	143.36	N	Y
Grampians	Lake Hancock	-36.54	142.93	N	Y
Grampians	Lake Hindmarsh	-36.04	141.91	N	Y
Grampians	Lake Karnac	-36.83	141.51	N	Y

DELWP region	Wetland name	Latitude	Longitude	Counted	Dry at Count
Grampians	Lake Kennedy	-37.77	142.18	N	Y
Grampians	Lake Koynock	-36.82	141.51	N	Y
Grampians	Lake Lonsdale	-37.03	142.63	Y	
Grampians	Lake Muirhead	-37.49	142.61	N	
Grampians	Lake Natimuk	-36.70	141.94	N	Y
Grampians	Lake Oundell	-37.75	143.02	N	Y
Grampians	Lake Turangmoroke	-37.73	142.89	N	
Grampians	Lake Wongan	-37.61	143.15	Y	
Grampians	McGlashins Swamp	-37.09	141.76	N	Y
Grampians	Merin Merin Swamp	-37.23	143.80	N	Y
Grampians	Pine Lake	-36.79	142.35	N	Y
Grampians	Shooters Swamp	-37.50	142.77	Y	
Grampians	Taylors Swamp (nr Lake Wongan)			Y	
Grampians	Toolondo Reservoir	-37.02	141.95	Y	
Grampians	Walkers Swamp	-37.57	142.48	Y	
Grampians	Wally Allans Swamp	-36.77	141.48	N	Y
Grampians	Waurn Swamp	-36.70	141.21	N	Y
Grampians	Winter Lake	-36.88	141.27	N	Y
Grampians	Yarrackigarra Swamp	-36.72	141.24	N	Y
Region totals				**14**	**21**
Hume	Big Reedy Lagoon	-35.98	145.92	N	Y
Hume	Black Swamp (Black Dog Creek)	-36.16	146.32	N	
Hume	Black Swamp (Nine Mile Creek)	-36.14	145.45	Y	Y
Hume	Buffalo Dam	-36.71	146.66	Y	
Hume	Doctors Swamp	-36.62	145.18		
Hume	Dowdle Swamp	-36.10	146.03	N	Y
Hume	Jubilee Swamp	-36.57	145.76		
Hume	Lake Moodemere	-36.05	146.39	Y	
Hume	Lake Nagambie	-36.78	145.14	Y	
Hume	Lehmann Swamp	-36.56	145.61	N	Y
Hume	Loch Garry	-36.23	145.31	N	Y
Hume	McBurney Swamp	-36.58	145.56	N	Y
Hume	Moodie Swamp	-36.23	145.79		
Hume	Morphett Swamp	-36.54	145.78	N	Y
Hume	Reedy Lake (Nagambie)	-36.72	145.10	N	
Hume	Reedy Swamp (Shepparton)	-36.34	145.36	Y	
Hume	Rowan Swamp	-36.29	145.98	N	Y

DELWP region	Wetland name	Latitude	Longitude	Counted	Dry at Count
Hume	Tungamah Swamp	-36.15	145.92	N	Y
Region totals				**6**	**9**
Loddon Mallee	Browns Lake	-36.46	143.03	N	Y
Loddon Mallee	First Marsh	-35.64	143.74	N	Y
Loddon Mallee	Gaynors Swamp	-36.52	144.83	N	Y
Loddon Mallee	Green Lake (north of Lake Cooper)	-36.44	144.84	Y	
Loddon Mallee	Heywoods Lake	-34.79	143.21	N	Y
Loddon Mallee	Hird Swamp	-35.86	144.09	Y	
Loddon Mallee	Horseshoe Bend Billabong	-34.14	142.06	Y	
Loddon Mallee	Johnson's Swamp	-35.82	144.07	N	Y
Loddon Mallee	Lake Bael Bael	-35.69	143.74	N	Y
Loddon Mallee	Lake Boort	-36.13	143.74	N	Y
Loddon Mallee	Lake Buloke	-36.27	142.96	N	Y
Loddon Mallee	Lake Carpul	-34.73	142.89	N	Y
Loddon Mallee	Lake Cooper	-36.50	144.81	N	Y
Loddon Mallee	Lake Coorong (Hopeton)	-35.73	142.40	N	
Loddon Mallee	Lake Cullen	-35.64	143.77	Y	
Loddon Mallee	Lake Elizabeth	-35.70	143.82	Y	
Loddon Mallee	Lake Gil Gil	-36.33	143.04	N	Y
Loddon Mallee	Lake Grassy	-36.46	143.06	N	Y
Loddon Mallee	Lake Leaghur	-35.98	143.80	N	Y
Loddon Mallee	Lake Meran	-35.88	143.81	Y	
Loddon Mallee	Lake Murphy	-35.81	143.87	N	Y
Loddon Mallee	Lake Nurrumbeet	-36.47	143.06	N	Y
Loddon Mallee	Lake Powell	-34.70	142.88	N	Y
Loddon Mallee	Lake Tutchewop	-35.51	143.75	N	Y
Loddon Mallee	Lake Wandella	-35.74	143.88	N	Y
Loddon Mallee	Lake Yando	-36.04	143.78	Y	
Loddon Mallee	Little Lake Buloke	-36.32	142.95	Y	
Loddon Mallee	Little Lake Meran	-35.85	143.82	N	Y
Loddon Mallee	Mansfield Swamp	-36.44	144.88	N	Y
Loddon Mallee	McDonalds Swamp	-35.70	144.07	N	Y
Loddon Mallee	Meridian Basin	-34.26	141.98	N	Y
Loddon Mallee	Racecourse Lake	-35.61	143.79	Y	
Loddon Mallee	Richardsons Lagoon	-36.03	144.57	Y	
Loddon Mallee	Round Lake 1 (west of Lake Boga)	-35.47	143.61	Y	
Loddon Mallee	Round Lake 2 (n. of Lake Meran)	-35.85	143.80	N	Y

DELWP region	Wetland name	Latitude	Longitude	Counted	Dry at Count
Loddon Mallee	Second Marsh	-35.62	143.74	N	Y
Loddon Mallee	Third Marsh	-35.60	143.73	N	Y
Loddon Mallee	Tobacco Lake	-35.86	143.80	N	Y
Loddon Mallee	Vinifera Billabong	-35.20	143.40	N	Y
Loddon Mallee	Wallenjoe Swamp	-36.48	144.88	N	Y
Loddon Mallee	Woolshed Swamp	-36.17	143.72	N	Y
Loddon Mallee	Wooroonook Lake (Church)	-36.27	143.21	N	Y
Loddon Mallee	Wooroonook Lake (Main)	-36.27	143.20	Y	
Region totals				**12**	**30**
Port Phillip	Western Treatment Plant	-37.99	144.60	N	

Appendix 2: Other wetlands surveyed

DELWP Region	Wetland Name
Barwon South West	Krause Swamp
Barwon South West	Lake Thurumbong
Barwon South West	Round Lake 3 (Camperdown)
Gippsland	Newmerella Sewage Farm
Gippsland	Webb's paddock, Tabbara
Loddon Mallee	The Fresh Lake, Corop