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## ARRANGEMENTS FOR THE 2023 STUBBLE QUAIL SEASON

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### Core message

The Stubble Quail is the most common and widespread quail species in Australia. It is nomadic, capable of long-distance movements and can respond rapidly to changing environmental conditions. The species is highly productive, can breed at an early age and breed multiple times in a year if conditions are favourable. There are approximately 28,000 hunters licensed to hunt Stubble Quail in Victoria and they harvest approximately 150,000 quail each year. The majority of hunting occurs on private land. The wide distribution of quail and the way in which hunting is undertaken provide a number of protections that limit the probability of broad-scale overharvesting.

Eastern Australia has experienced La Niña conditions over the last three years. Above average rainfall, particularly over the last two years, has led to good environmental conditions for Stubble Quail. Preliminary results from a recent population survey has estimated the total abundance of Stubble Quail in Victoria at 7.1 million birds.

In light of the good habitat conditions, the built-in protections from over-harvesting and the estimated population abundance, the Game Management Authority Board considers that based on the best available evidence there are no substantive risks that would warrant variation to the prescribed arrangements.

Due	As soon as possible
Explanation	To allow industry, the hunting community and government agencies to make arrangements.

### Recommendation

That you:

1. Note the contents of this brief and that the Game Management Authority does not consider there is any substantive basis to vary the Stubble Quail season from the prescribed arrangements.

**Recommendation 1**    ☐ Approved    ☐ Not approved    ☐ Noted    ☐ Returned for review

### Minister's Comments

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<b>Signed</b>	<b>Sonya Kilkenny MP</b> Minister for Outdoor Recreation	<b>Date</b>
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**Approved by**

**Date**

06/03/2023

Brian Hine, Chair Game Management Authority 

Endorsed by: Graeme Ford, CEO Game Management Authority 

Prepared by:  Game Management Authority 

<b>From</b>	GAME MANAGEMENT AUTHORITY	<b>Ref</b>
<b>Title</b>	ARRANGEMENTS FOR THE 2023 STUBBLE QUAIL SEASON	<b>File</b>
		<b>Due</b> As soon as possible

## 1. Key Information

### Biology and ecology

The Stubble Quail is the most common quail species in Australia. Its conservation status is listed as 'Least Concern' by the International Union for the Conservation of Nature. Stubble Quail are widespread and found throughout all states and territories of Australia. It is a nomadic species capable of long-distance movements and can respond rapidly to changing environmental conditions. It is a ground dwelling bird that can be found in a diverse range of habitats from very dry parts of Australia to alpine grasslands.

Stubble Quail prefer grassland made up of native or introduced grasses, and crops. It has adapted to agriculture and has likely increased its range following European settlement, despite significant reductions in its original habitat of native grasslands. Stubble Quail feed on seeds, other plant material and insects. Population abundance is strongly influenced by rainfall and the resultant impact on food availability. The species is highly productive and can breed at four months of age, lays average clutches of 7-8 eggs and can breed multiple times in a year if conditions are favourable.

Changes in agricultural practices, such as the increased use of pesticides and herbicides, large monocultures of crops and more intensively grazed pastures, has been found to impact ground-dwelling gamebirds internationally. It is currently unknown whether this has impacted Stubble Quail populations in Australia or whether it has offset any benefits to the species from agriculture.

While research into the ecology and biology of the species is limited, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) undertook research into the species' breeding, movements and diet in the 1970s-80s. Harvests have been monitored in Victoria using various methods since 1996. An ongoing abundance monitoring program commenced in Victoria in 2021 under the government's Sustainable Hunting Action Plan. A wing collection program has also commenced to collect demographic data on the species.

### Hunting

The Stubble Quail is the only native quail species that can be hunted in Victoria. The Wildlife (Game) Regulations 2012 (the Regulations) prescribe the annual arrangements for the Stubble Quail season, such as season dates, bag limits and hunting methods, including the use of gundogs.

Approximately 28,000 people are licensed to hunt Stubble Quail in Victoria. Harvest surveys, however, show the number of hunters who actually hunt each year fluctuates between approximately 3,000 – 7,000. Stubble Quail hunters collectively hunt on average for about 20,000 days per season however, this can be as high as 47,000 days, as was the case in 2011.

Harvest surveys show that approximately 90% of quail hunting occurs on private land, in harvested winter crop stubble paddocks or on improved or mixed pasture or grasslands. There are 16 State Game Reserves available for Stubble Quail hunting on public land. Approximately 70-80% of hunters use a gundog to assist in hunting.

The average seasonal harvest of Stubble Quail is approximately 150,000 birds per year. However, this can fluctuate in response to bird abundance, with harvest levels in the last decade ranging from a low of approximately 16,000 in 2014 to a high of approximately 678,000 in 2011 (this excludes COVID-affected years). The average quail harvested per hunter per hunting day over that period is approximately eight birds.

Wounding levels in Stubble Quail hunting are unknown. Factors to note in assessing potential wounding rates in quail hunting are; the birds are most often found singularly or in pairs and not in larger groups and therefore the incidence of wounding through unintentionally striking non-target birds may mean levels are lower than those experienced in duck hunting where birds often fly in flocks; the cartridges favoured in quail shooting can

contain approximately 550 pellets meaning that a large number of pellets are within the pattern spread of the shot, however there is always some risk that a struck target will not receive an immediately fatal wound. Also, the extensive use of gundogs by hunters may also lower wounding rates as the use of a well-trained dog has been shown to reduce wounding by locating birds and allowing hunters to move within effective shotgunning range and assisting in locating downed birds.

Government's Sustainable Hunting Action Plan committed to development of a quail wounding reduction action plan and preparation has commenced in consultation with a stakeholder working group. The Game Management Authority (GMA) provides education material to hunters on how to minimise wounding.

### **Systemic protections from overharvesting**

The majority of hunting occurs on private land. Permission to hunt must be obtained from the landowner/manager before being allowed to hunt with firearms. This prevents large concentrations of hunters in any one area. The number of hunters hunting at any one time and in an area is generally low, and hunters are dispersed in low densities. Stubble Quail are dispersed widely across the landscape in variety of habitats.

This combination of dispersed hunting pressure, low hunter numbers and densities and the lack of bird concentration provides a level of protection from over-harvesting. Stubble Quail are also cryptic (secretive, well-camouflaged and not easy to see) and difficult to locate unless they are flushed while walking or located with the use of a gundog.

In periods of extreme drought, birds may concentrate in areas of remaining suitable cover, experience high levels of mortality and fail to breed. In these circumstances, consideration may be given as to whether the species requires protection from hunting. Current environmental conditions indicate a very low risk of birds not being widely dispersed.

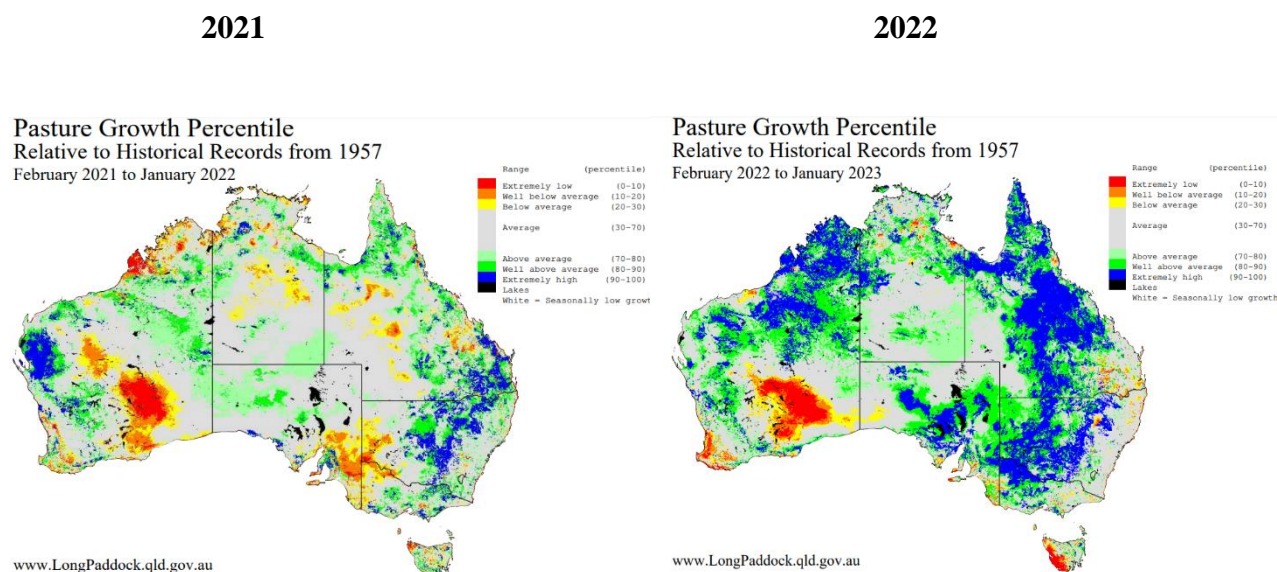
The GMA has recently provided you with a brief on the use of electronic 'quail callers' which are used to attract and concentrate birds for hunting. Research has shown that these devices are highly effective and pose a risk of overharvesting. They are also inconsistent with the concept of 'fair chase' hunting. As recommended in our briefing to you of 27 February 2023, the GMA considers their use in hunting should be suspended until their costs and benefits can be fully explored in the review of the Wildlife (Game) Regulations 2012.

### **Current habitat conditions for Stubble Quail**

Habitat conditions for Stubble Quail are currently very good. The species largely occurs in open grasslands (native and improved) and cropland, and these environments have benefitted from recent high rainfall across eastern Australia. La Niña and other drivers have influenced Australia's climate for the last three years resulting in significant rainfall. Multi-year rainfall deficiencies experienced during the 2017-2019 drought have been almost entirely removed from the eastern states. November 2022 was Australia's, NSW's and South Australia's wettest November on record. It was also Australia's wettest spring since the La Niña of 2010 and the tenth wettest since records began in 1900. Stubble Quail populations are strongly influenced by rainfall. They increase in periods of high rainfall and decline during periods of extended drought.

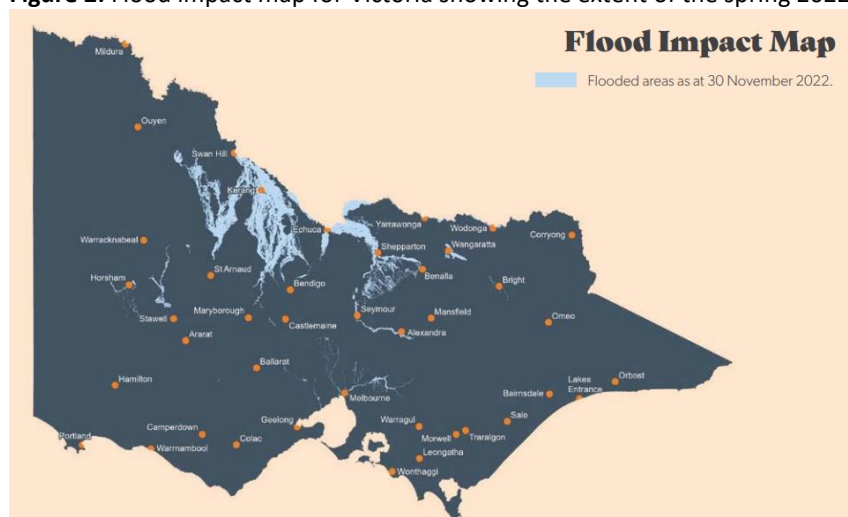
As seen in Figure 1 below, pasture growth (used as an indicator of habitat availability) across almost all of eastern Australia was average to extremely high in 2022 creating excellent habitat for Stubble Quail.

A good winter grain crop season has also likely benefitted Stubble Quail. Despite the flooding events of October and November 2022 in Victoria, the Department of Agriculture, Fisheries and Forestry (Cwth) has forecast the Victorian winter grain crop for 2022-23 to reach a record. Most parts of the Mallee are expected to harvest record crops, while prospects are well above average in large parts of the Wimmera. This will offset crop losses in central and northern border regions of Victoria caused by the flooding and waterlogging during spring. Significant crop damage is likely in regions affected by the record spring rainfall. Once any floodwaters recede, these unharvested crops are likely to provide very good habitat and food sources for Stubble Quail.

**Figure 1: Pasture growth**

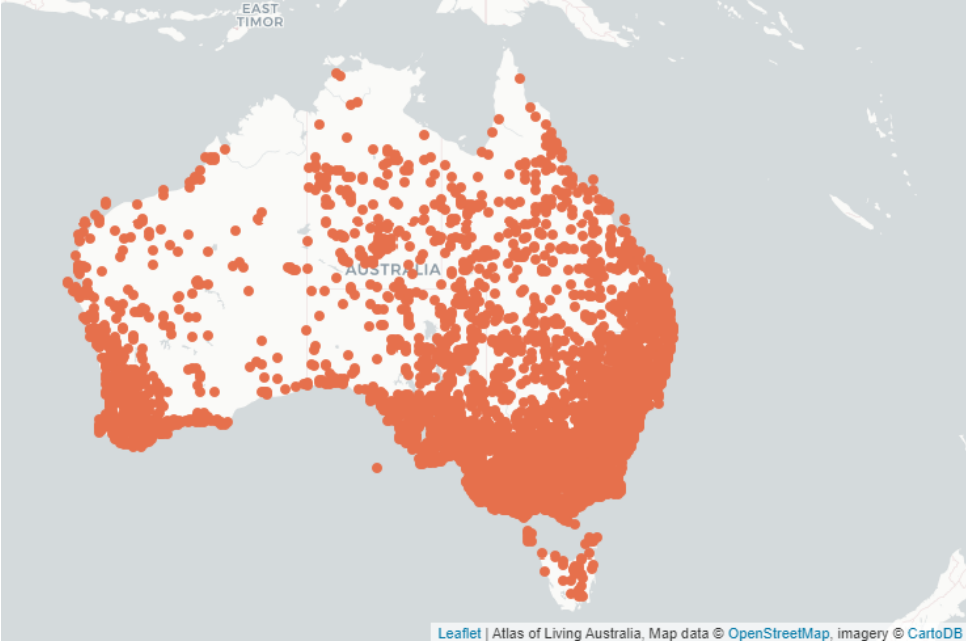
Flooding can have a short-term detrimental effect by destroying nests and eggs and killing chicks that cannot escape floodwaters. It can also have a short-term impact on food availability. However, after flood waters subside, there can be a benefit through a flush of plant growth, providing food and cover. Mature quail can readily find areas of refuge away from floodwaters.

While the floods in Victoria had a significant impact on northern Victorian communities along the Campaspe, Goulburn and Murray Rivers, the extent of land affected (see Figure 2) was not substantive in relation to total quail habitat (see Figure 3). It is not likely the flooding would have had a significant impact on Stubble Quail populations.

**Figure 2: Flood impact map for Victoria showing the extent of the spring 2022 northern Victoria flood events**

Source: Victoria State Emergency Service

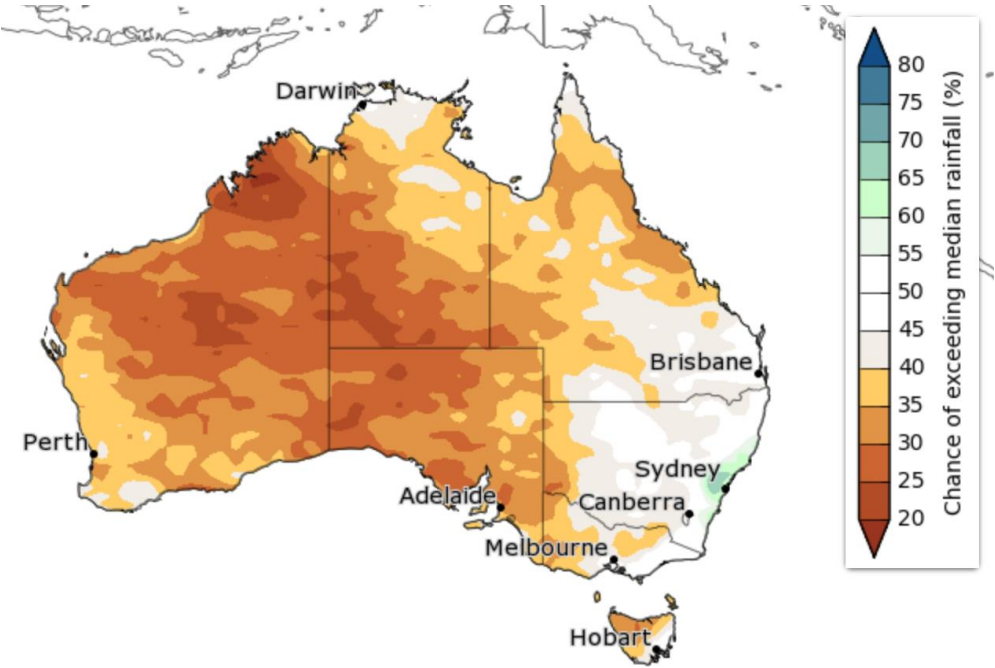
**Figure 3:** Australian distribution of the Stubble Quail



Source: Atlas of Living Australia

The Bureau of Meteorology has reported that La Niña is nearing its end and the El Nino-Southern Oscillation is forecast to be neutral during autumn. It has also predicted that for March-May, below median rainfall is likely for most of Australia away from the south-east coast (see Figure 4). Most of New South Wales, southern Queensland and approximately half of Victoria have an equal chance of exceeding or recording below media rainfall for the outlook period. March-May maximum temperatures are likely to be warmer than the median for most of Australia.

**Figure 4:** Chance of exceeding median rainfall March-May 2023

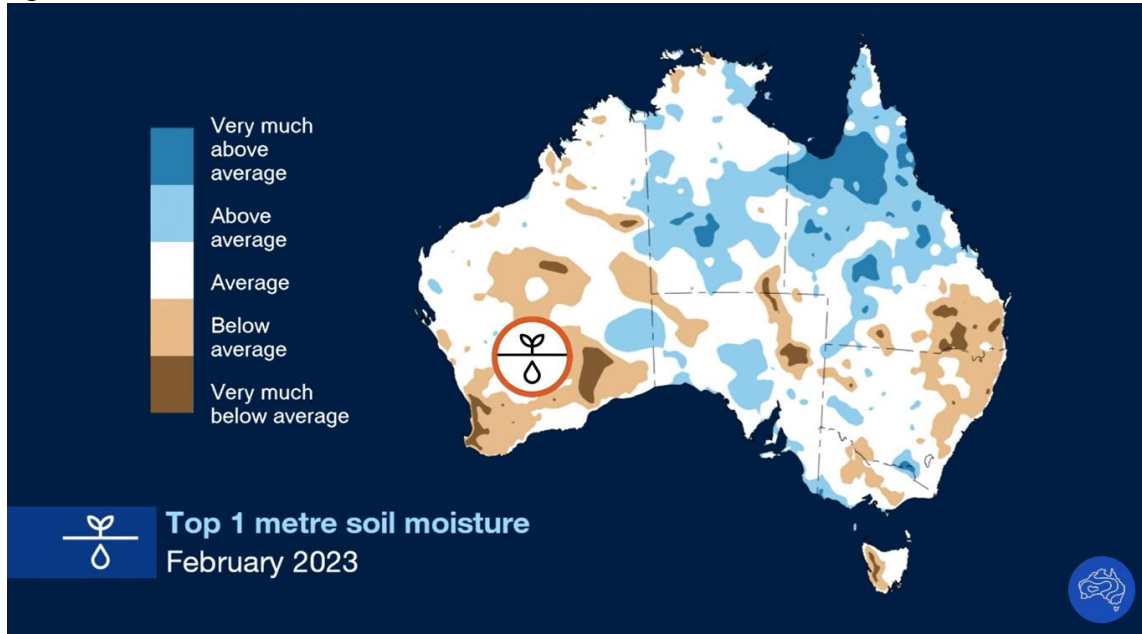


Source: Bureau of Meteorology

Issued: 2 March 2023

Northern parts of eastern Australia currently have average, or above to very much above average, soil moisture (see Figure 5). Following a dry summer across most of Australia, areas of below average soil moisture are present in south-eastern Queensland, eastern New South Wales and central Victoria. This may affect current plant growth, however, the previous wet conditions have created good quail habitat during the spring growing period as described earlier.

**Figure 5:** Soil moisture



Source: Bureau of Meteorology

### Population monitoring

#### *Estimating the size of Victoria's Stubble Quail population*

Government's Sustainable Hunting Action Plan 2021-2024 includes an ongoing quail abundance survey to monitor population trends. The GMA is responsible for delivering this program and engages independent wildlife consultants to collect the field data and independent expert biometricians to analyse the data and prepare an abundance report.

The inaugural Stubble Quail abundance and distribution survey was completed in January 2022, with over 200 km of transects counted at 54 sites across four different habitat types throughout Victoria. The Arthur Rylah Institute for Environmental Research (ARI) subsequently produced a report, containing a statewide abundance estimate and several recommendations for improvements to future surveys. The report was published in September 2022 and estimated 3.1 million Stubble Quail in Victoria at the time of survey. Researchers stated that this is considered an under-estimate due to a number of recognised inefficiencies associated with the initial survey technique.

Data collection using a revised survey technique and an increased number of sample sites (71) across a greater geographic area was completed in January 2023. Preliminary analysis of the survey (see Attachment 1: Abundance of Stubble Quail (*Coturnix pectoralis*) in Victoria - Preliminary results from the 2023 survey) data shows the revised approach to survey has improved detection and precision and estimates the Victorian Stubble Quail population to be 7.1 million birds. A final report is due by the end of March-early April. There may be some change to final abundance figures, however, the researchers conducting the analysis expect any variation, if it occurred, would be minor.

Based on estimated total abundance of 7.1 million Stubble Quail, a long-term average seasonal harvest of 150,000 birds would constitute 2% of the total estimated Victorian population. A harvest at the highest recorded figure would be below 10% of the estimated population in Victoria and even at this level of harvest is unlikely to be a risk to the sustainability of Stubble Quail.



#### *Using indices of abundance*

The state government has had a long-running harvest monitoring program in place to document trends in harvests over time. Initially (1996 – 2008), mail surveys were used before they were replaced with telephone surveys from 2009. This resulted in improved survey rigor and data accuracy.

A study published recently in a peer-reviewed scientific journal (Moloney et al 2022) analysed 11 years' telephone harvest data, collected between 2009-2019. Harvest data can be used as a proxy or index of game abundance in the absence of direct measurements of the size of the population, such as the above-mentioned abundance survey. The study found that hunting efficiency remained steady, and the annual total harvest changed little over that period after accounting for environmental conditions.

While indices of abundance, like hunter harvest, can provide an index of population size, they are generally based on the risky assumption that the sample represents a constant but unknown proportion of the population. Relative (as opposed to absolute) methods provide no understanding of the actual size of the population but can provide information on trends. Hunter-reported total harvest statistics can be influenced by hunter participation and effort, among other things. Therefore, hunter efficiency (birds harvested per hunting day) is a more appropriate index to consider as a measure of relative abundance. The study referred to above shows a stable trend in total harvest and hunter efficiency over the last decade, factoring in environmental conditions. If this is a true representation of the actual population, these results suggest no decline in the population over the last 11 years. Despite this, the need to rely on indices of abundance is no longer required given the commencement of the abundance survey which uses direct methods of counting quail and is considered a more reliable and superior approach to monitoring Victoria's Stubble Quail population.

#### *Monitoring population demographics*

The GMA commenced an annual voluntary quail wing collection program in 2022. The program investigates the age, sex and moult of harvested Stubble Quail and will complement the existing harvest survey program. 183 samples were collected from birds harvested at various locations across the state. Analysis showed a high percentage of immature birds in the harvested sample (40%) indicating a good breeding season in 2021-22. Environmental conditions have further improved since then and it is likely that 2022-23 would have again been a productive breeding season.

Data collected from these monitoring programs will be used to improve our understanding of Stubble Quail population dynamics to ensure sustainable hunting in the future. GMA's quail monitoring program is the most comprehensive and sophisticated approach in the country.

#### **Recommendation**

In summary, environmental conditions for Stubble Quail are currently good to very good. There is an estimated 7.1 million Stubble Quail in Victoria and indications are that breeding in 2021-22 was good. Conditions for the 2022-23 breeding season were also good. A dry summer and forecast dry autumn outlook are unlikely to impact the species in the short-term following three years of La Niña conditions and a very wet spring in 2022 across eastern Australia.

Based on the best scientific evidence available, the GMA considers that there are no substantive risks that would warrant variation to the prescribed arrangements. The GMA believes this provides a sustainable and responsible set of arrangements for the 2023 quail season.

#### *Social and economic impact*

Given GMA's recommendation is to maintain the current regulated seasonal arrangements, it has no social or economic impact on the government's current policy position on Stubble Quail hunting.

## 2. Context

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### Stubble Quail season

The Wildlife (Game) Regulations 2012 prescribes the arrangements for the Stubble Quail season. The season runs from the first Saturday in April to 30 June, each year. The bag limit is 20 birds per day and gundogs may be used to locate, flush and retrieve Stubble Quail.

Lead shot may still be used for hunting Stubble Quail. The continuation of its use will be considered as part of the review of the sunseting Wildlife (Game) Regulations 2012. Lead shot if ingested can cause harm to wildlife and human health. There are no safe levels of ingestion. Under the right conditions, lead from ammunition can also be mobilised in the environment, including being taken up by plants and invertebrates. The GMA has provided advice to government on the continued use of lead ammunition for game hunting for consideration during the remaking of the Regulations.

### Role of the Game Management Authority in providing advice on game management

Under section 5(a) of the *Game Management Authority Act 2014* (GMA Act), an objective of the Game Management Authority (GMA) is to 'promote sustainability and responsibility in game hunting in Victoria.'

Under section 6(h), the GMA is to 'monitor, conduct research and analyse the environmental, social and economic impacts of game hunting and game management' and under section 6(i), the GMA may make recommendations to relevant Ministers in relation to:

- (i) game hunting and game management, and
- (iii) open and closed seasons and bag limits.

Section 8A 'Guiding principles' also requires the GMA to have regard to the following relevant principles when exercising its powers or performing its functions:

- (b) the principle of triple bottom-line assessment, which means an assessment of all the economic, social and environmental costs and benefits, taking into account externalities;
- (d) the principle of an evidence-based approach, which means considering the best available information when making decisions.

## 3. Consultation

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Given the short timeframe within which this briefing was requested, it was not possible to consult with community or government agencies on the contents of this brief.

## 4. Attachments

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**Attachment 1** – Abundance of Stubble Quail (*Cortunix pectoralis*) in Victoria: Preliminary results from the 2023 survey



## Abundance of Stubble Quail (*Coturnix pectoralis*) in Victoria

### Preliminary results from the 2023 survey

Dave Ramsey and Michael Scroggie

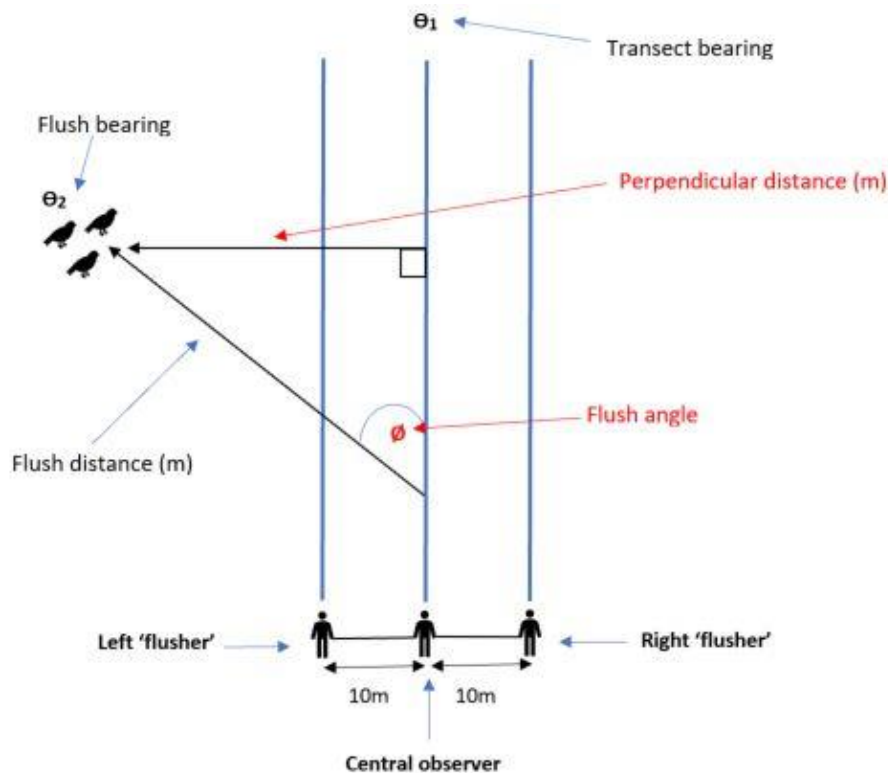
#### Context

Little is known of the population status of Stubble Quail (*Coturnix pectoralis*) in Victoria, other than through harvest statistics collected from hunters each year. To support a transparent assessment of the sustainability of recreational hunting of Stubble Quail, robust and accurate estimates of the statewide abundance are required. Recently, a monitoring program for Stubble Quail in Victoria was developed to obtain estimates of Stubble Quail densities and abundance throughout Victoria over time (Fanson & Ramsey, 2016). Following a pilot survey of this survey design in January 2022, recommendations were made to improve the survey to obtain more robust estimates of Stubble Quail abundance (Scroggie & Ramsey, 2022). These preliminary results report on the results of the 2023 survey, which used the recommended improvements to the survey design.

#### Methods

A stratified random sample of 71 sites were selected across Victoria, with the strata consisting of habitat categories known to be favoured by Stubble Quail (e.g. Dryland Crops, Native Tussock Grasslands and Non-native Pasture). At each site, Stubble quail were sampled using line transect, distance sampling methods within the designated habitat at each site. A total of 4-km of transects were monitored at each site. The line transect method involved a central observer walking along a transect line following a pre-determined compass bearing. In addition to the observer, two 'flushers' were located on the left and right side of the observer, at a distance of 10 m, walking parallel to the transect bearing. Each flusher also dragged a thick nylon rope attached to the central observer. The purpose of the flushers was to ensure that Stubble Quail located on or near the transect line were very likely to be detected and hence, avoid the problem of quail moving in response to the central observer and escaping detection. When quail flushed in response to the observer or flushers, the compass bearing to the initial location of the flushed birds was recorded, along with the distance from the transect bearing (Figure 1). The resulting data were then used to calculate the perpendicular distance of each quail from the transect line.

Distance sampling methods (Buckland et al., 1993) were applied to the distance/detection data to correct the transect counts for observer error (i.e., birds present on the transect that were not detected by the observers). The corrected counts were then used to estimate Stubble quail densities on the transect and in each habitat type. The densities of Stubble Quail within each habitat type were then extrapolated to estimate densities and abundances across the state, using relationships between Stubble Quail counts and environmental variables (e.g. land-use classes, vegetation greenness) by analysing the distance-sampling data within a density surface model (Scroggie & Ramsey, 2022).

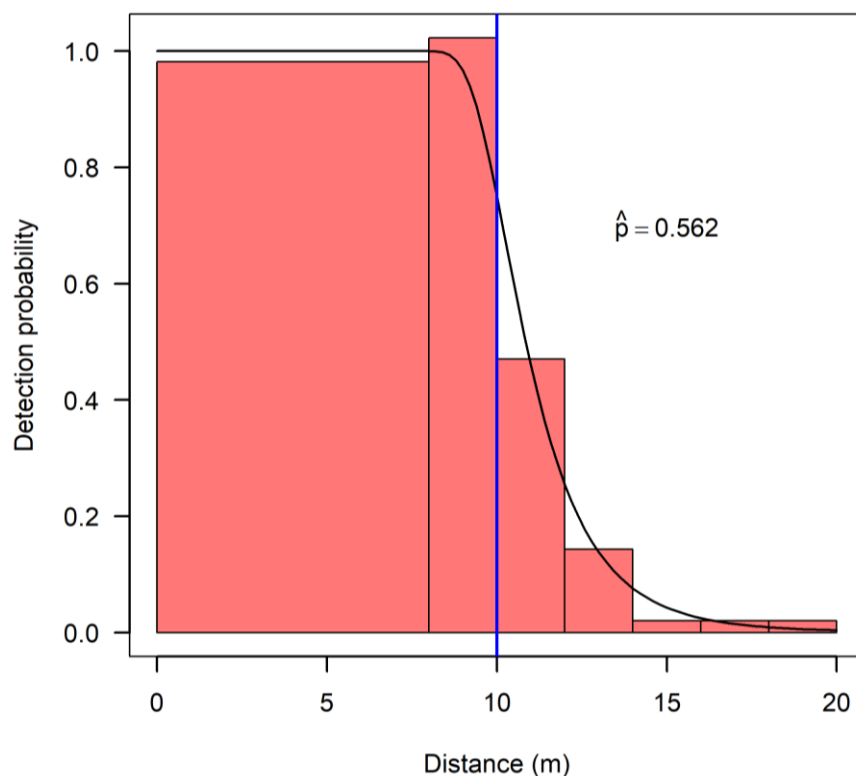


**Figure 1.** Line transect field data recording. The observer walks along a transect travelling in direction  $\theta_1$  (transect bearing). When quail flush in response to the observer, both the flush distance (m) and the flush bearing  $\theta_2$  to the initial location of the flush are recorded along with the number of birds. The resulting flush angle ( $\phi$ ) is later used to calculate the perpendicular distance from the transect line.

## Results

A total of 443 Stubble quail were detected across the 71 sites. The modifications to the line transect distance sampling methods where two flushers walked the transect in addition to the observer, was very successful at reducing the effect of movement of quail in response to the central observer. The distribution of detection distances indicated that quail were almost certainly detected out to distance of 10 m from the transect line, with detection rates dropping to near zero at a distance of 20 m from the transect line (Figure 2). The probability of detection for quail out to a distance of 20m was 0.56 and hence, the effective detection distance was 11m. This was a large improvement from the previous survey which had a probability of detection of 0.23 and an effective detection distance of 4.3m (Scroggie & Ramsey, 2022).

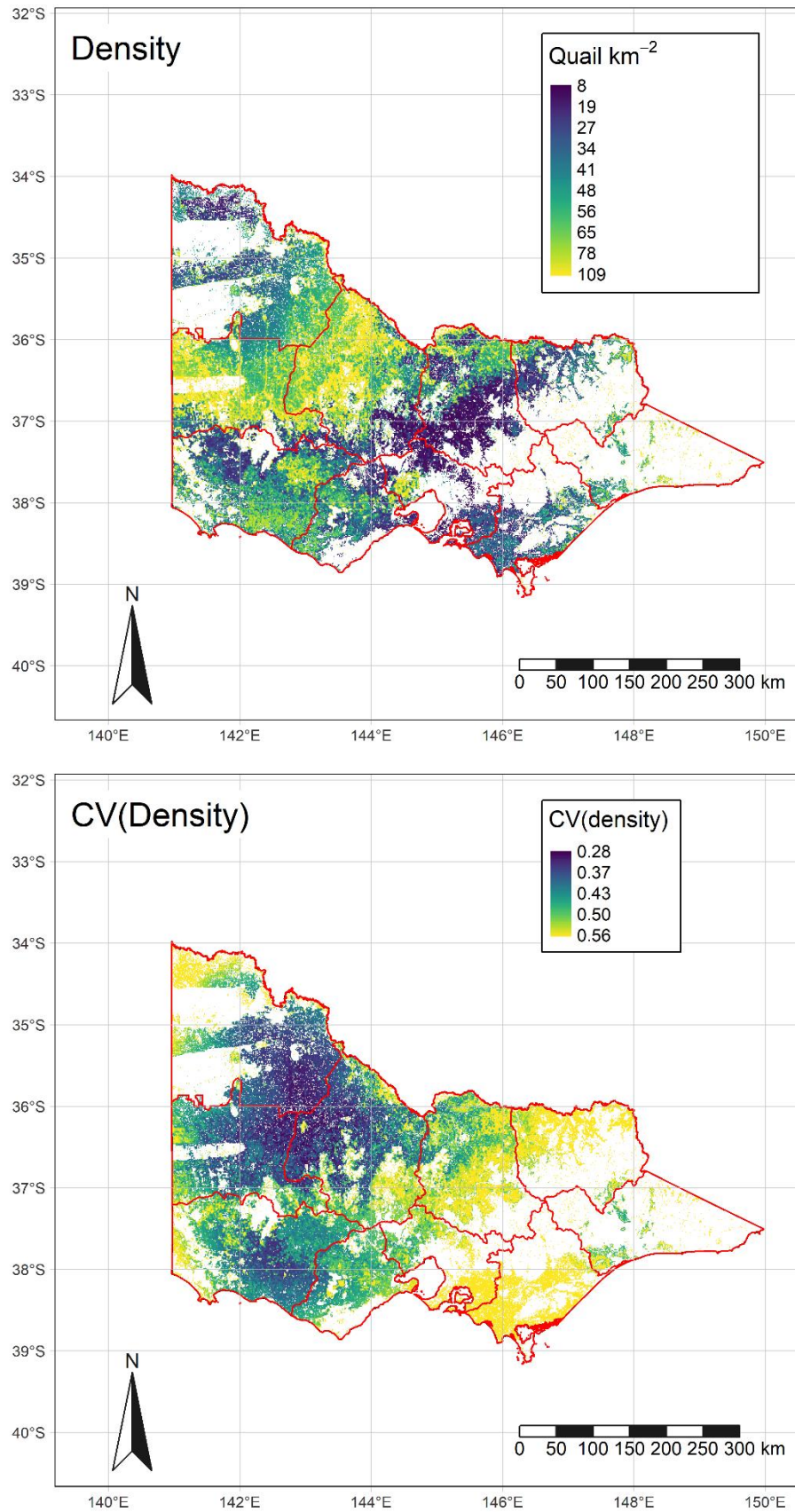
Predictions of stubble quail density and abundance derived from the density surface model indicated that quail preferred sites with a mix of dryland cropping and grassland/pasture habitat. In highly preferred areas of Victoria, densities of Stubble Quail were predicted to be approximately 100 birds/km<sup>2</sup> (Figure 3). The total abundance of stubble quail across suitable habitat in Victoria (i.e., dryland cropping, native and non-native pasture) was estimated to be 7.1M birds (Table 1). Highest abundances occurred in the North Central, Wimmera and Glenelg Hopkins catchment management authorities (CMA) regions of Victoria (Table 1; Figure 3).



**Figure 2.** Histogram of binned distance data, with the fitted hazard-rate function overlay. The distance data were truncated at 20 m to remove the influence of a very small number of detections beyond this distance. Blue line indicates the distance of each ‘flusher’ from the central observer on the transect line.  $p$  – the probability of detecting a quail that is within 20m of the transect line.

**Table 1.** Abundance estimates (N) for Stubble Quail in each region and total abundance in Victoria. CV – coefficient of variation; LCL – lower 95% confidence interval; UCL – upper 95% confidence interval. Estimates are rounded to the nearest 100.

Region (CMA)	N	CV	LCL	UCL
Corangamite	379,100	0.32	206,200	697,000
East Gippsland	298,900	0.55	108,700	822,100
Glenelg/Hopkins	986,900	0.24	620,700	1,569,200
Goulburn/Broken	551,700	0.36	277,900	1,095,500
Mallee	927,300	0.25	571,400	1,505,000
North Central	1,751,400	0.23	1,115,900	2,748,900
North East	336,500	0.52	128,900	878,400
Port Philip and Westernport	183,200	0.41	84,700	396,400
West Gippsland	257,900	0.63	83,300	798,700
Wimmera	1,448,600	0.23	931,300	2,253,200
<b>Total</b>	<b>7,121,500</b>	<b>0.15</b>	<b>5,348,600</b>	<b>9,482,200</b>



**Figure 3.** Density of stubble quail (*Coturnix pectoralis*) in suitable habitat (e.g. dryland cropping, native and non-native pasture) in Victoria. Top graph – density estimate; bottom graph – coefficient of variation in density.

## References

- Buckland, S. T., Anderson, D. R., Burnham, K. P., & Laake, J. (1993). *Distance sampling: estimating abundance of biological populations*. Chapman & Hall.
- Fanson, B., & Ramsey, D. S. L. (2016). *A monitoring program for Stubble Quail (Coturnix pectoralis) in Victoria*.
- Scroggie, M. P., & Ramsey, D. S. L. (2022). *Abundance estimates for Stubble Quail in Victoria*. Arthur Rylah Institute for Environmental Research Technical Report Series No. 342.