



BIRDLIFE SHOALHAVEN
BUSHFIRE RESEARCH REPORT
2020 ANNUAL REPORT

May 2021



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Yellow-tufted Honeyeater at a feeding station in Kangaroo Valley in February 2020 – Carla Jackett

Photo front cover – Chris Grounds

BirdLife Shoalhaven acknowledges the Aboriginal people of the Shoalhaven, their care of country, birds and habitat, and pays respects to all Elders.

Foreword

In March last year, I was pleased to be invited by BirdLife Shoalhaven to Mollymook, to speak about the research into the impacts of the fires on fauna and flora across Australia.

Only a few weeks before, the bushfires in the Shoalhaven had been confirmed as extinguished. Nearby, Shoalhaven City Council's main fire evacuation centre was still giving much-needed support to the local community. Initially, there was concern that it might be too soon to hold this event, but this concern proved to be misplaced.

Over 130 attended, including a broad section of the birding community, as well as animal welfare and other conservation groups. It was clear that people wanted to come together to share experiences and offer support to each other, while also hearing about research into the impacts of fires on wildlife, both locally and more widely in Australia.

At this event BirdLife Shoalhaven launched their Bushfire Research Project, though some volunteers had already been completing bird surveys since January. By the end of the year over 400 bird surveys had been completed at over 160 sites. It is a truly impressive community effort. These surveys have now been analysed in this report.

While this project is about birds, it also has a social perspective for both birdwatchers and landowners. Volunteers have completed surveys in areas ravaged by fire close to where they live, which for some has made this project quite personal.

Several of the survey sites are on private properties where Landcare groups are carrying out their own on-ground bushfire recovery projects. This has allowed the volunteers to learn more about Landcare, and landowners to learn more about the birds on their own properties. This is another significant outcome of the project.

With the continuing commitment of volunteers in the field, and the opportunity for universities to add their scientific support, this project will make a meaningful contribution to understanding the impacts of the 2019-20 summer bushfires on birds in the Shoalhaven.

On behalf of BirdLife Australia, I would like to congratulate BirdLife Shoalhaven and its volunteers for this report and everything that they have achieved in such a short period.

Prof. Martine Maron
President, BirdLife Australia
May 2021



Prof. Martine Maron (centre), Fiona Phillips MP, Member for Gilmore, (far right) and attendees at the launch of the project in March 2020 – Dan Crowley

Summary

Project motivation

BirdLife Shoalhaven's (BLS) Bushfire Research Project (BRP) focuses on the impacts of the 2019-20 bushfires on bird populations in the Shoalhaven Local Government Area on the NSW South Coast.

The motivation for the project came from the local birdwatching community's desire to contribute to the post-fire recovery effort, which impacted 80% of the Shoalhaven. Overnight more people were submitting more surveys into BirdLife Australia's (BirdLife) Birddata database than ever before. This increased through the year with the launch of the project in March 2020 and through presentations, social media and articles in the quarterly BLS Magazine.

Project aims

The long-term aim of the project is to examine changes in bird species richness and abundance in the Shoalhaven in the post-fire period.

This first project report analyses the results of surveys recorded by volunteers at sites of different fire severity inside and outside the fire footprint. The report also looks at the impacts of the fires on individual species, species considered by the Australian Government as bushfire recovery priorities, nesting and feeding guilds and Shoalhaven's Key Biodiversity Areas (KBAs).

Overview of the report

The report covers the period from the peak period of the fires in January 2020 to the end of spring in November 2020. The analysis is based on 264 surveys completed at 115 different sites within the fire footprint, using BirdLife's Birddata 20 min. 2 ha. survey technique. The report also draws upon a further 147 surveys at 52 sites outside the fire footprint for comparison purposes.

This is the first report published on the impact of the 2019-20 fires on the birds of the Shoalhaven. Its focus is on all birds, not just those considered by the Australian Government as the most impacted by the fires, which have been the major focus for research and funding to date.

This report outlines our approach, provides an analysis of the survey data collected in the year and prioritises our next steps.

Results

The results of the surveys in the period from January to November after the 2019-20 fires are as follows:

1. Across both burnt and unburnt sites within the fire footprint, average species richness increased between January and November.
2. Across both burnt and unburnt sites within the fire footprint, average species abundance increased between January and November.
3. Average species abundance at lightly burnt sites within the fire footprint increased at a faster rate than at more heavily burnt sites.
4. Average species richness at burnt and unburnt sites within the fire footprint increased, while species richness outside the fire footprint remained relatively constant.
5. Average species abundance at burnt and unburnt sites within the fire footprint increased, while species abundance outside the fire footprint decreased.
6. One hundred and ten species were recorded within the fire footprint, including most common forest birds and rainforest specialists, a number of migratory species and most cuckoos and honeyeaters.
7. Of the ten species found in the Shoalhaven on the Australian Government's list of species identified for 'Bushfire Recovery Priority':
 - six were recorded at high and/or medium fire severity sites

- one was recorded in the Jerrawangala KBA and four within five km. of the KBA boundary
- three of these species were recorded in the Ulladulla to Merimbula KBA

However, any conclusions from the results to date need to be qualified:

- This analysis is based on only one year of post-fire surveys by volunteers with varying field identification skills.
- The majority of survey sites were selected due to their accessibility for volunteers, which means they are not located in the extensive and more remote areas of the Shoalhaven, where catastrophic fires burnt out of control for many weeks.
- There is insufficient data available from the period before the fires for meaningful comparison with pre-fire species richness and abundance.

Clearly, it will take a number of years of consistent data and scientific statistical analysis before firm conclusions can be drawn of the full impact of the fires on bird populations.

Next steps

The first year's results and the on-going commitment of BLS volunteers to complete surveys provide an excellent starting point for university research into the impacts of the 2019-20 fires on birds in the Shoalhaven. This complementary research will add to the motivation of the volunteer team and help deliver the long-term aims of the project.

BLS is keen to explore these opportunities further with BirdLife and universities, as the project moves into its second year.



Red Wattlebird feeding in July 2020 on Xanthorrhoea, flowering profusely after good rainfall – Chris Grounds

Introduction

1. The Shoalhaven

The Shoalhaven on the NSW South Coast falls within the traditional lands of the Jerrinja and Wandawandian people and includes the Dhurga and Dharawal language groups. It borders the Illawarra, Southern Highlands and Eurobodalla regions and is subject to the administration and management of the Shoalhaven City Council and the NSW and Australian Governments.

The population is approx. 100,000, including the major urban centres of Nowra, Ulladulla, Milton and Berry. The population in the Shoalhaven trebles in summer with the impact of tourists drawn to its beaches and coastal villages.

It is a classic assemblage fronting the Tasman Sea with a coastal fringe, developed during Pleistocene and Holocene sea level rise, foothills and hinterland, escarpment and dissected plateau.



Map 1 – Shoalhaven map with key centres

Catchments drain to bays, lakes and lagoons, open or closed, but the Shoalhaven River and its catchment is by far the largest in area, discharge and distance, culminating in especially biodiverse areas at Shoalhaven Heads, including the estuary and Comerong Island.

This combination creates a richly biodiverse collection of varied habitats, embracing ocean, off-shore reef, beach, dunes, coastal bays, lakes, lagoons, wetlands, extensive eucalypt forests and woodlands, rainforest and heaths.

There are extensive areas of NSW national park, nature reserves and state forests, whilst the Booderee National Park on the Bherwerre Peninsula, which is owned by the Wreck Bay Aboriginal Community, is a singularly important environmental area.

2. Bird conservation

The Shoalhaven has 61 threatened bird species listed under Commonwealth and NSW legislation and this represents approximately one in every six bird species recorded in the region – refer [BirdLife Shoalhaven](#).

The Shoalhaven includes several Key Biodiversity Areas (KBA), some of which are exclusive to the Shoalhaven, namely Jervis Bay KBA, Lake Wollumboola KBA and the Jerrawangala KBA. The boundaries of Ulladulla-Merimbula KBA and the Barren Grounds-Booderee KBA cross over the Local Government Area boundary. All KBAs have been listed for globally significant populations of IUCN

red-listed species or a globally significant aggregation of a species during a critical life stage. All KBAs, except for the Jerrawangala KBA, have birds as Trigger species.

The Shoalhaven is also an area of population growth and development pressure, especially along the coastal fringe and in peri-urban areas, with urban expansion of residential and holiday home developments and tourism impacting on adjoining remnant natural areas and bird habitat.

3. The drought, fires, rains

The notorious 2017-2019 drought became the prelude to the catastrophic bushfires of the 2019-2020 summer, which burnt or negatively impacted 80% of the Shoalhaven - [displaydoc.aspx \(nsw.gov.au\)](https://displaydoc.aspx(nsw.gov.au)).

The weather conditions in December 2019 and January 2020 were a recipe for disaster. In these months, Nowra experienced 26 days of temperatures over 30 degrees with 40 to 45 degree experienced on some days. The relentless high-pressure systems of these months produced predominantly northeast-northwest winds with 21 days of winds exceeding 50 kph. A mere 1.2 mm. of rainfall occurred in December.

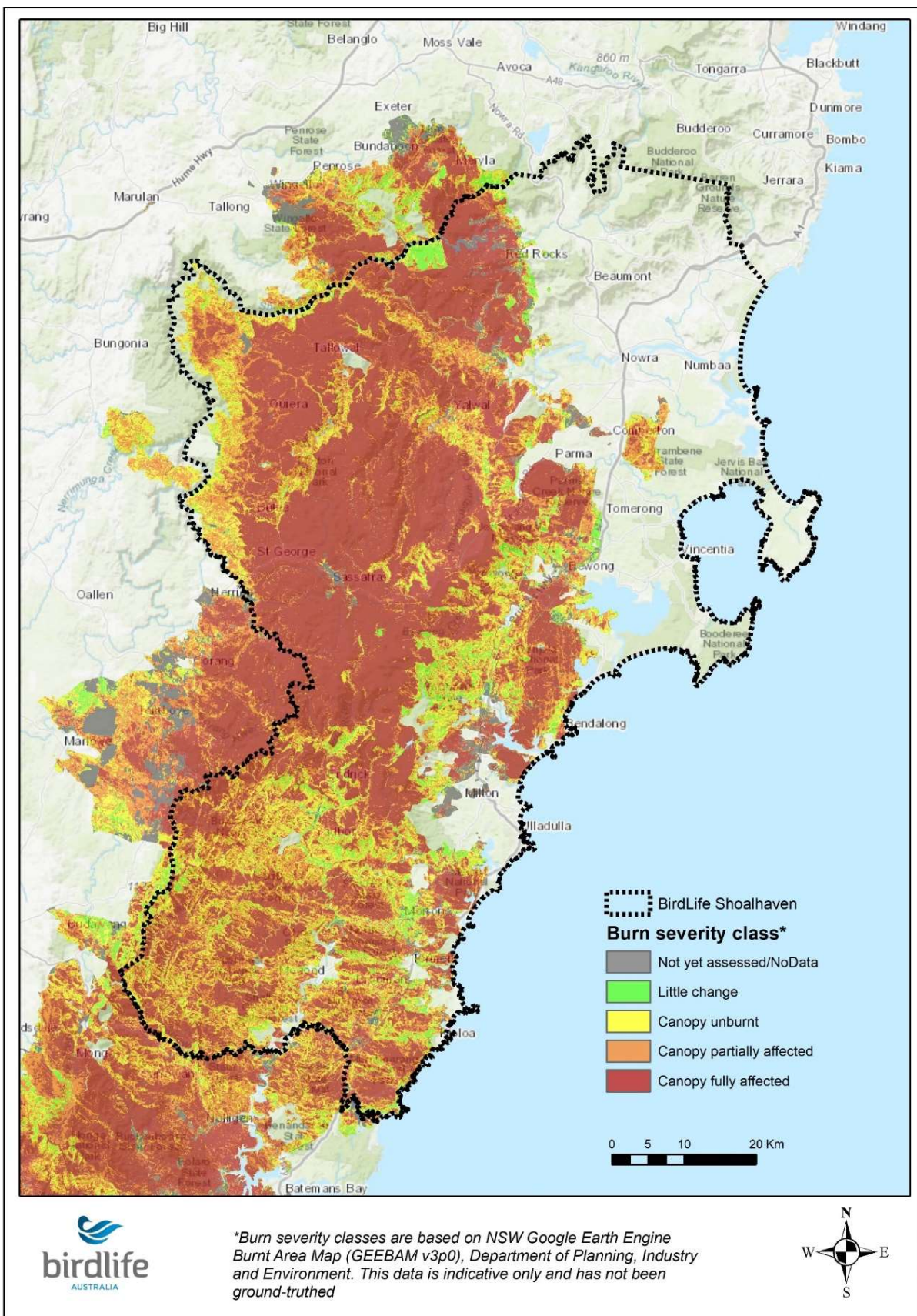
Various areas have been impacted by bushfire over previous decades and, whilst many have been severe, none have involved the extensive coverage of the 2019-20 fires. The notorious 'Currowan Fire' burnt for 74 days, impacting approx. 500,000 ha. and spreading beyond the Shoalhaven to three neighbouring council areas.

The timing of the fires was damaging to the habitat of many bird and other fauna species. Many migratory bird species that normally use the forests and rainforests of the Shoalhaven each summer were also affected. Birds that survived the fire faced starvation if they remained in the burnt habitats.

The bushfires were followed by significant and consistent rains across the Shoalhaven, which have been critical in the initial stages of vegetation and habitat recovery. This included exceptional rain in February 2020 of 473mm in Nowra and an annual total of 1,633 mm., which is 692 mm. above average.



Early regrowth at Parma Creek in May 2020 – Yolande Cozijn



Map 2 – Shoalhaven boundary, showing variations in fire severity

Project overview

1. Definitions

Abundance – Abundance is a count of the number of individuals of each species in a survey. The number of surveys is not consistent across the months and fire severity, so the raw data for species abundance is averaged over the number of surveys in each parameter to give a figure that enables comparison. This is referred to as the ‘average species abundance per survey’ through the report.

BRP sites – BRP sites are located within the fire footprint where surveys are completed for analysis and reporting.

Clusters – Clusters are groups of sites based in the same locality to facilitate project co-ordination. Some clusters were chosen to match with separate fire events.

Fire severity class - The fire severity for a site is based on criteria set in BirdLife’s Birdata database:

- Canopy effected - high
- Mid-canopy effected, but canopy not affected – medium
- Shrub level effected only – light

Inside the fire footprint – The fire footprint is defined as the area impacted by the fires, which includes sites with high, medium and light fire severity, and unburnt sites within 10 km. of burnt sites. These sites are all referred to as being within the fire footprint.

Outside the fire footprint - Unburnt sites which are more than 10 km. from the fire footprint are referred to as being outside the fire footprint.

Repeat survey sites – To build consistency in reporting, where resources allow, surveys are repeated at the same site with a target of at least one survey per season.



Photo - Gillian Souter

Richness – Richness is a count of the species recorded in a survey and does not take into account their abundance. The number of surveys is not consistent across the months and fire severity, so the raw data for species richness is averaged over the number of surveys in each parameter to give a figure that enables comparison. This is referred to as the ‘average species richness per survey’ through the report.

Shared sites – Some BRP sites have been set up in Birdata as shared sites to allow more than one volunteer to record surveys at the same site. This is not the case for sites on private land, so that landowners can control access to their properties.

2. Project aims

The project examines changes in bird species richness and abundance in the Shoalhaven in the **post-fire period**.

The project's primary focus is the analysis of species richness and abundance recorded at sites of different fire severity class within the fire footprint, as well as comparison to sites outside the fire footprint.

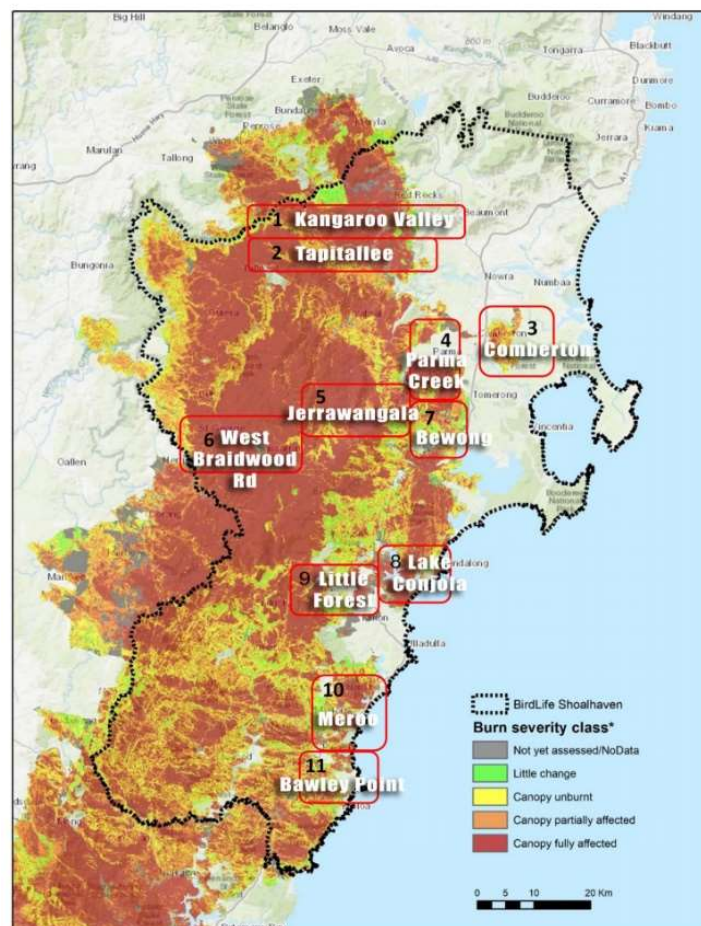
The analysis also looks at the impacts on individual species, species considered by the Australian Government to be most impacted by the fires, nesting and feeding guilds and Shoalhaven's KBAs.

3. Project design

Our project design was based on the opportunity to harness the immediate and ongoing enthusiasm of volunteer birdwatchers.

Survey sites were chosen for safety and proximity to volunteers' homes and grouped into eleven 'clusters' to facilitate project co-ordination. This meant that surveys were completed by volunteers familiar with the wider area and the birds expected to be recorded at each site. The safety of volunteers prevented access to more remote sites, so compromises had to be made in the selection of survey sites.

Certain clusters were chosen to match with separate fire events, like the Comberton cluster where the fires 'jumped' the Princes Highway.



Map 3 – Shoalhaven fire severity map, showing clusters

To build consistency over time, a number of sites were identified as '*BRP sites*' and became '*repeat survey sites*'. This was done in consultation with the principal volunteers in each cluster. BRP sites that were not on private land, were set up in Birddata as '*shared sites*' to facilitate surveys by other volunteers and bird groups, helping ensure the longevity of the project.

Surveys at other sites within clusters were also included in the project analysis and are also referred to as BRP sites. While these sites may not be used for repeat surveys, due to their accessibility, they help provide a broader analysis in this first year.



View south from Coolendel Lookout in the Tapitallee cluster – Kim Touzel

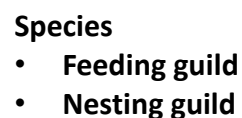
4. Project database

A stand-alone '*BRP Database*' has been developed using the FileMaker Relational Database software. The diagrams below show the BRP Database's home page with its data sources and an example of a BRP site page.

The BRP Database brings together data from various sources for analysis:

- BirdLife's Birddata database - volunteer details, site information, fire assessment information, survey data
- Shoalhaven species list showing feeding and nesting guilds, based on information provided by BirdLife East Gippsland
- Additional site information provided by volunteers, including vegetation, site maps, survey point photographs and fire severity, if not entered into Birddata
- Desk-top analysis to detail site land tenure and cluster

All data in this report is taken from the BRP Database with further analysis in Microsoft Excel.

[illegible]

- Site data**
- Fire severity
 - Vegetation
 - Tenure
 - Cluster



Figure 1 - Overview of BRP database with inputs from Birddata, nesting and feeding guilds, site data and photo survey points

Bushfire Research Project

Survey Site



Griffins Fire Trail

Joy Pegler

survey Point ID 817068

Latitude -34.7308333

Longitude 150.409444

table

return to surveys

Survey date

12/03/2020



picture

Site Data

Burn Severity	High
Vegetation	Dry sclerophyll forest
Cluster	Kangaroo Valley
Land Tenure	Crown Land
Intervention	No
Landcare Project	No

Bushfire Assessment from Birdata

Bushfire Assessment	Yes
Site Burnt	Yes
time Since	2
area burn %	100
distance to unburnt	2
distance to burnt	
ground layer	Affected by fire
lower storey	Affected by fire
mid storey	Affected by fire
canopy	Affected by fire



Figure 2 - example of survey site page in BRP database

5. Survey methodology

All surveys involved searching for birds in a 2 ha. area for 20 mins. based on BirdLife's standard survey method - refer [Survey-Techniques-Guide.pdf \(birdlife.org.au\)](https://www.birdlife.org.au/publications/survey-techniques-guide).

Key details of this method are:

- The shape of the 2 ha. area is 100m x 200m, a circle with a radius of 80 m. or a strip 400 m. long x 50 m. wide are acceptable.
- Only birds heard or seen within the 2 ha. area are recorded, including birds flying over the search area.
- Sites are not chosen to yield the most birds, but rather a similar number of sites chosen at each fire severity.
- As much as possible, mixing habitat types should be avoided.
- The centre point of two survey sides should be more than 400m. distance apart.

All volunteers are experienced birders, defined by their ability to identify all birds by sight and most by call, and are familiar with survey techniques.

Due to a range of issues, such as accessibility, remoteness and safety, it would not have been possible to plan the ideal random selection of survey sites. However, through discussion with volunteers, changes were made with sites selected to get a broad geographical spread of surveys.

An effort was made to maintain a similar number of surveys across each cluster, fire severity and season. A target was set for at least one survey to be completed at each site, in every season and at a similar time of day.



Rock Warblers were recorded at several sites straight after the fires, having survived in rocky escarpments and creeks – Chris Grounds

Results and discussion

1. Sites & surveys

The fire footprint is defined as the area directly impacted by the fires, as well as unburnt sites within 10 km. of burnt sites. Sites more than 10 km. from this area are defined as being outside the fire footprint.

This report analyses the data collected in 264 surveys from 115 sites within the fire footprint, using BirdLife's 2 ha. 20 min. survey method. A further 147 surveys from 52 sites outside the fire footprint have been used for comparison.

Table 1 – number of sites and surveys analysed in the report

	Sites	Surveys
BRP sites and BRP surveys within the fire footprint and grouped within clusters	115	264
Other sites and surveys more than 10 km from clusters and outside the fire footprint	52	147
Total	167	411

All surveys were completed from the height of the peak period of the fires in January 2020 to the end of spring in November 2020. There were no surveys in December 2019 due to fire activity and December 2020 is excluded, given the focus will be on seasons as the project develops.

The survey methodology to complete a similar number of surveys across each cluster, fire severity and season was only possible to a limited degree. This was due to differences in volunteer availability, accessibility of sites and travel time – refer tables 2 and 3 and Appendix 2.

70% of surveys were completed between 7am and 11am in line with the survey methodology.



Survey site in the Comberton cluster straight after the fires, taken in January 2020 – Yolande Cozijn

Table 2 – total BRP sites by cluster and BRP surveys by fire severity and cluster

Cluster	BRP sites	BRP surveys				
		High	Medium	Light	Unburnt	Grand Total
Bawley Point	15	4	7	12	5	28
Bewong	3	1	7			8
Comberton	9	3	6	4	2	15
Jerrawangalla	12	13	10	7		30
Kangaroo Valley	10	2	19		1	22
Lake Conjola	17	25	22	5	7	59
Little Forest	3	3				3
Meroo	9		3	4	3	10
Parma Creek	8	11	9	10		30
Tapitallee	19	10	8		24	42
West Braidwood	10	13	1	1	2	17
Total	115	85	92	43	44	264

Table 3 - total BRP surveys by season and fire severity

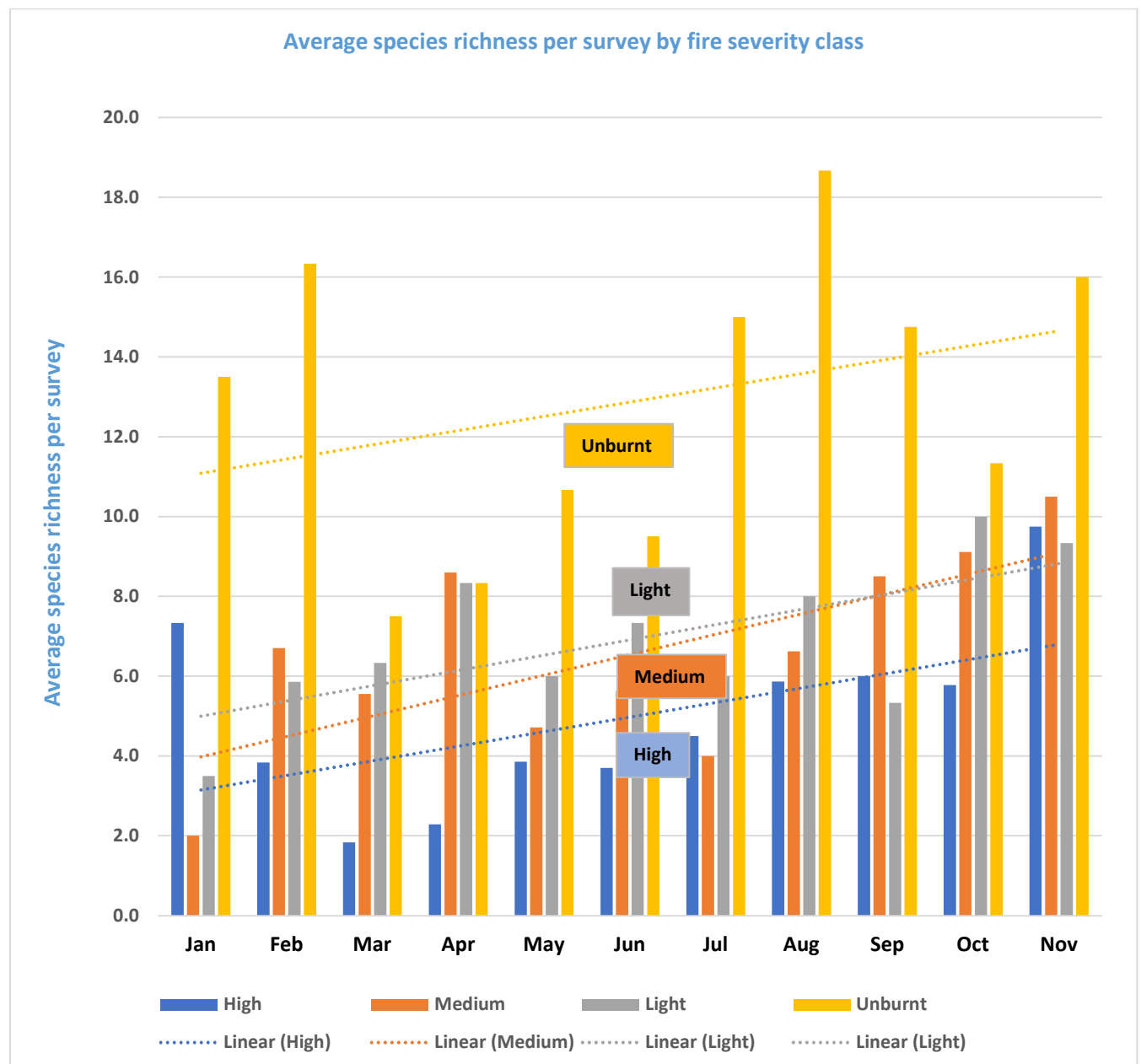
	High	Medium	Light	Unburnt	Total
Summer	9	12	9	8	38
Autumn	27	28	13	12	80
Winter	27	23	7	12	69
Spring	22	29	14	12	77
Total	85	92	43	44	264



Survey site in the Lake Conjola cluster showing early regrowth – Geoff Ball

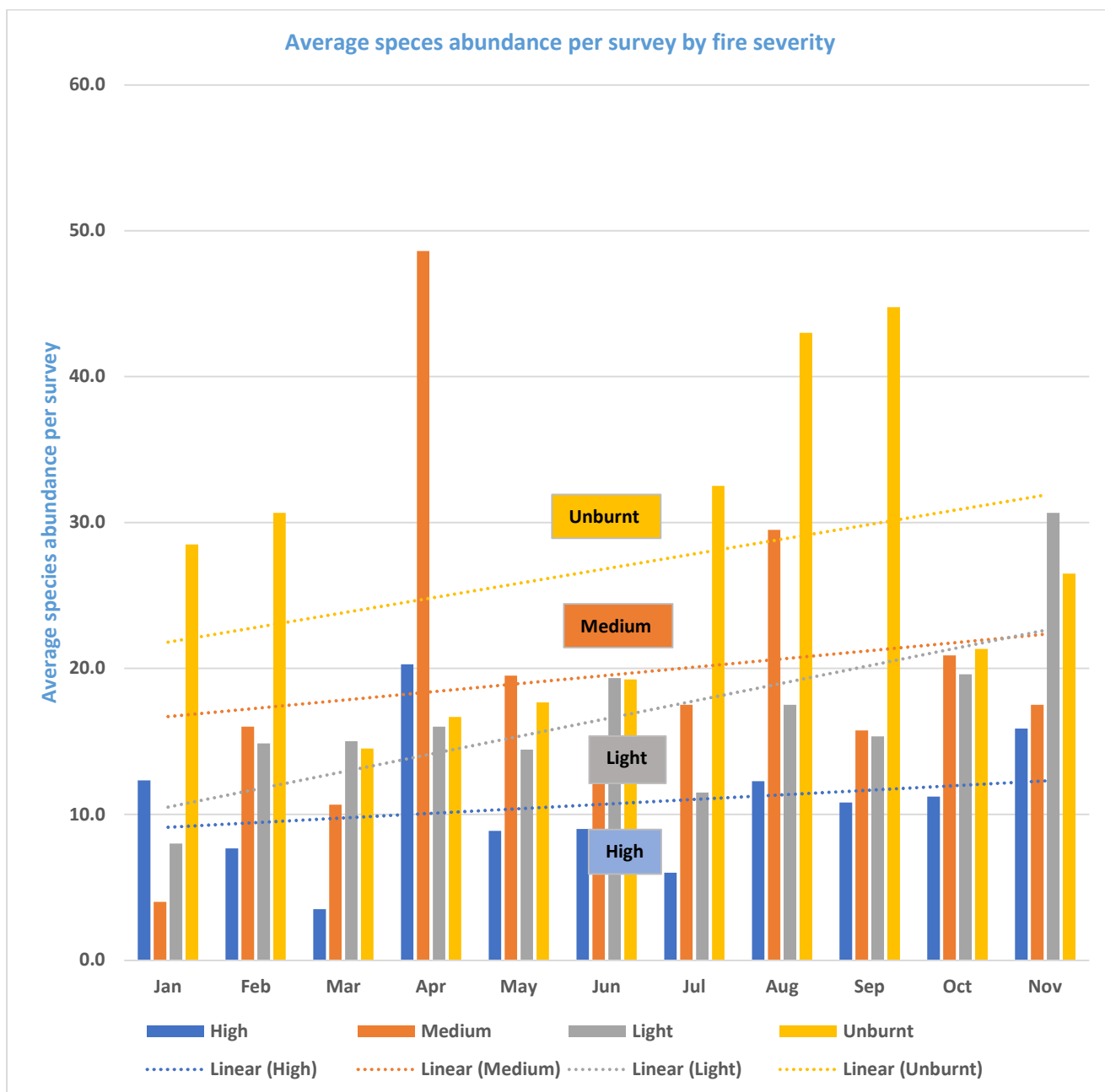
2. Analysis of fire severity class

The results in graphs 1 and 2 show there have been increases over time in terms of both average species richness and abundance within the fire footprint, regardless of the fire severity.



Graph 1 – average species richness per survey at sites within the fire footprint analysed by fire severity with relative trends indicated

The trendlines for average species richness show increases of between approx. 80% and 120% at high, medium and low severity sites, however these differences are not considered significant.



Graph 2 – Average species abundance per survey at sites within the fire footprint analysed by fire severity with relative trends indicated

The trendline for average species abundance shows a faster increase in light fire severity sites when compared to more heavily burnt sites. Abundance peaked in April and August at medium fire severity sites due to the migration of Yellow-faced Honeyeaters and Silveryeyes respectively.

These increases in both richness and abundance across all fire severities are to be expected, given the extensive recovery in vegetation at most sites after consistent rainfall throughout the year.

Much of the ground cover has recovered in light fire severity sites where the mid and upper canopy were not impacted by fire. The re-establishment of the full vegetation structure and proximity to unburnt areas would support the faster increase seen in species abundance at these sites.

The increases in species richness in medium fire severity sites could be explained by the retention of the canopy, which has allowed for higher vegetation recovery. While the recovery varies between sites, generally they show extensive recovery in the understorey with early colonizer plants, and new growth on branches and trunks. This can be expected to support greater foraging for a wider range of species.

Vegetation recovery in high fire severity sites varies significantly. At some sites with sandy low-nutrient soils, exposed to prolonged and extreme fires, there has been minimal regrowth and few birds have been recorded. While at others with higher nutrient soils, there has been extensive epicormic regrowth and a thick density of young acacias, understory and vines. However, despite the level of regrowth in some of these sites, the area of high fire severity covers thousands of hectares and the lack of recruitment after one year of rain remains of concern.

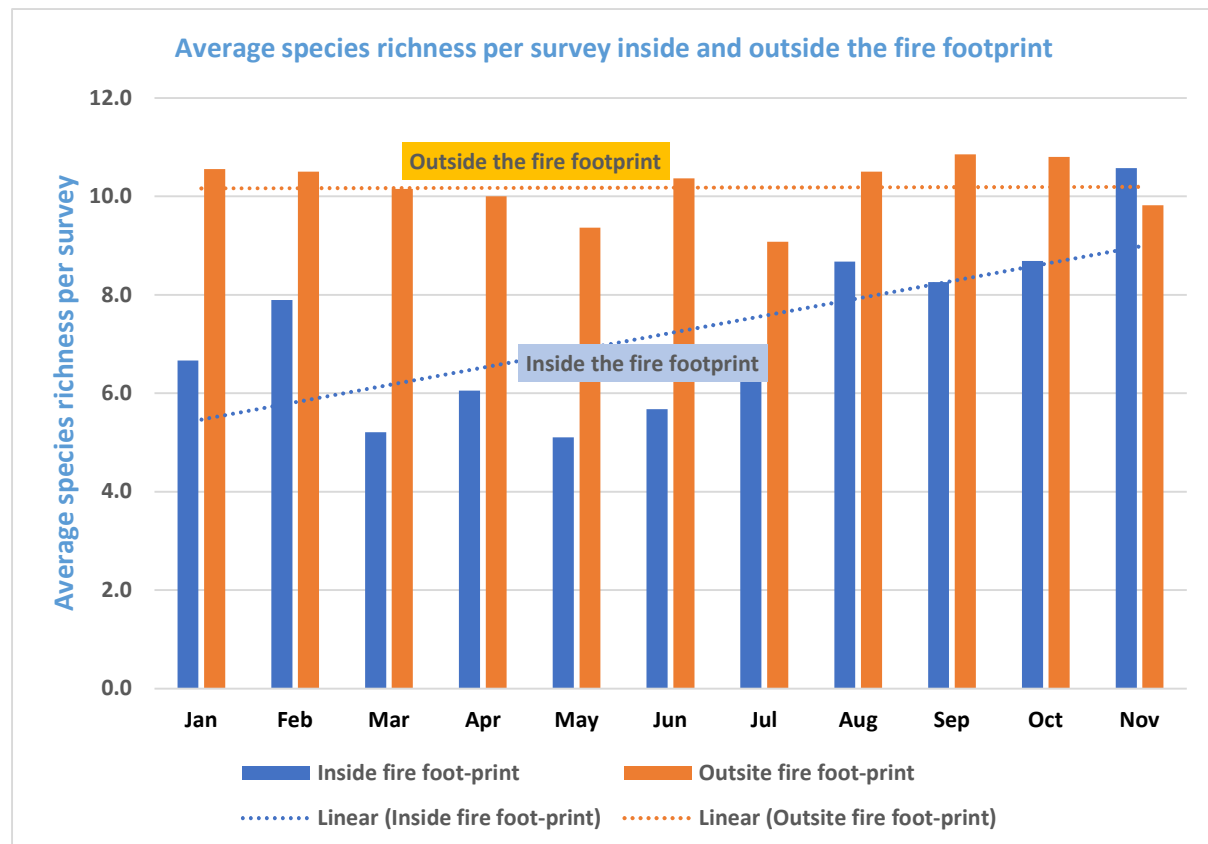


View from Jerrawangala Lookout in February 2020 – Chris Grounds

Regardless of the level of vegetation recovery, the lack of flowering events will have also had negative impacts. Spotted Gums (*Corymbia maculata*), Scribbly Gums (*Eucalyptus sclerophylla*) and Red Bloodwoods (*Corymbia gummifera*) are major elements of Shoalhaven vegetation and were extensively damaged, with only trees outside the fire footprint flowering in the year. Trees that would normally have flowered in late summer, lost most of their buds and potential flowering in sites impacted by canopy burns. Also, in open forest and shrubland, Old Man Banksia (*Banksia serrata*), whose summer flowers are favoured by birds, were damaged. Smaller banksia, such as Heath Banksia (*Banksia ericifolia*) and Hairpin Banksia (*Banksia spinulosa*), which flower soon after the summer and provide sustaining bird winter foraging, especially for honeyeaters, were also badly burnt and any flowering lost. However there have been exceptions with good fire recovery plants, such as *Xanthorrhoea*, and terrestrial orchids, responding to the fire and subsequent rain sequence, with excellent though short-term, positive consequences for bird foraging.

3. Inside and outside the fire footprint

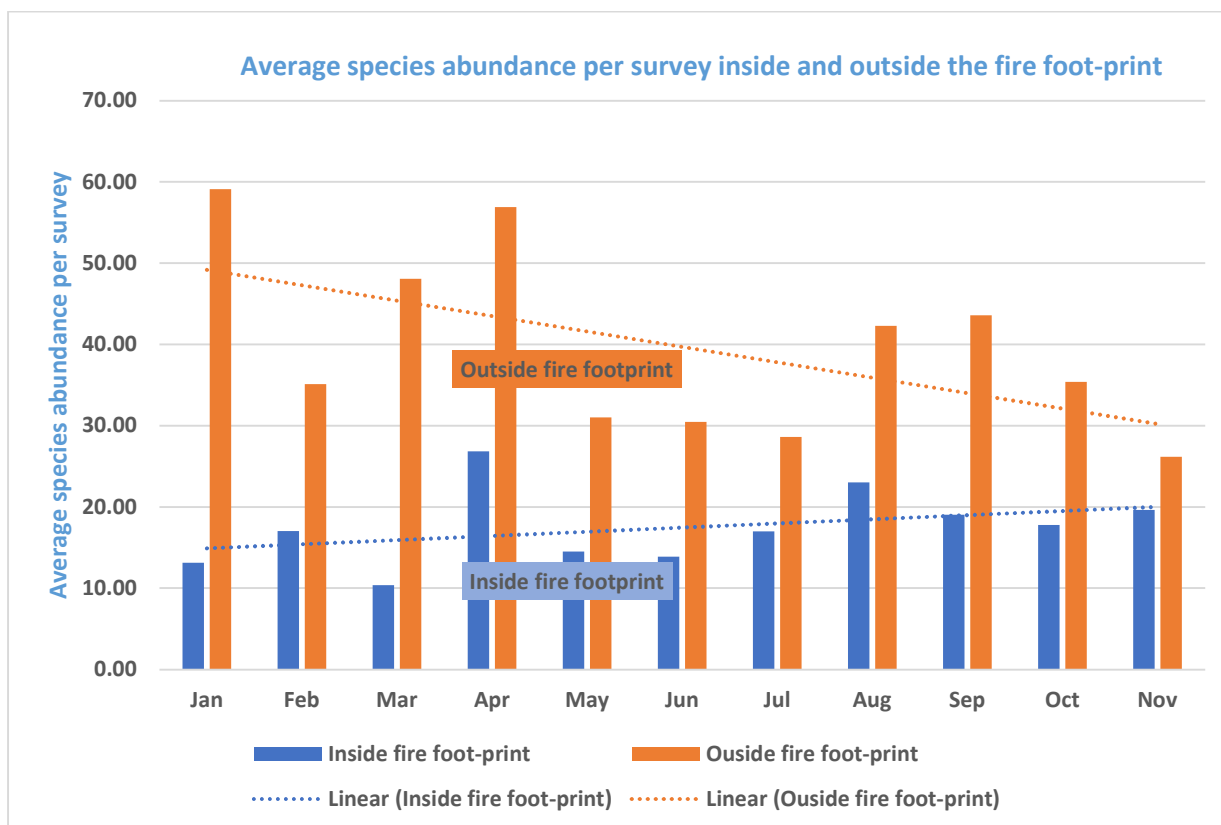
To look at the potential movement of species since the fires, a comparison was made between results from the 264 surveys recorded at the 115 BRP sites inside the fire footprint to the 147 surveys recorded at 52 sites outside the fire footprint. The surveys inside the fire footprint are the combined results of burnt and unburnt sites reported upon in graphs 1 and 2 above.



Graph 3 – Comparison of the average species richness of the 264 BRP surveys inside the fire footprint to 147 surveys recorded at sites more than 10 km. from the fire footprint and changes through the year.

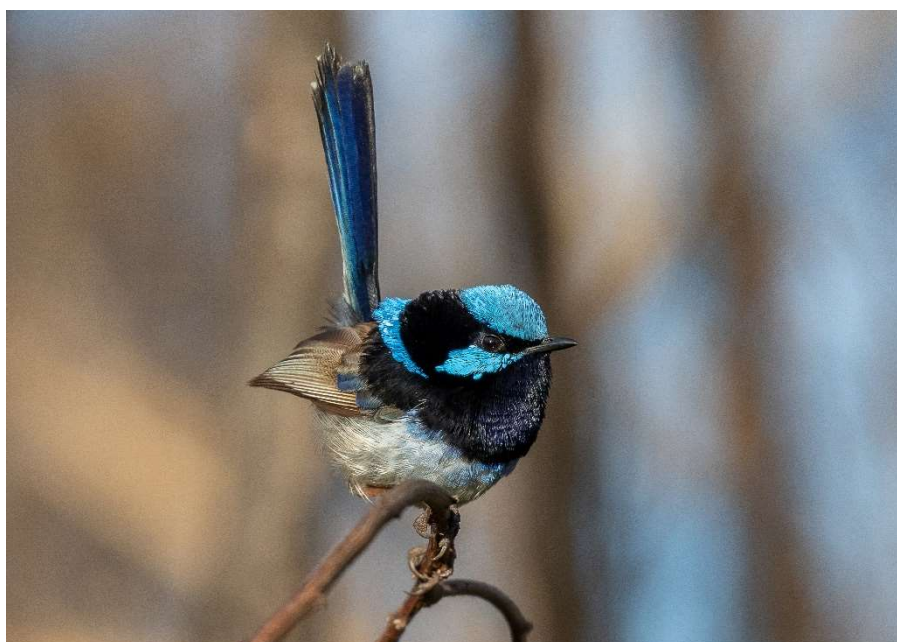
Graph 3 above shows that average species richness at sites outside the fire footprint has remained constant, while at sites inside the fire footprint it has increased through the year. This suggests that there has been recruitment of species from outside the fire footprint over the year. It is likely that the recovery in vegetation structure at some sites provides shelter and an increasing amount and varieties of food to support a greater number of species.

In contrast, graph four below shows a decline in average species abundance outside the fire footprint, while it has increased over the year inside the fire footprint. This could be explained by the high movement of birds escaping the fires at their peak, followed by some movement back through the year. These results have been impacted by records of small flocks, as discussed in section 2 above.



Graph 4 – Comparison of the average species abundance of the 264 BRP surveys inside the fire footprint to 147 surveys recorded at sites more than 10 km. from the fire footprint and changes through the year.

Both analyses indicate possible recruitment back into the fire footprint from outside. However, sites outside the footprint were not specifically selected for this purpose, rather they were drawn from surveys in Birddata, many of which were long-term surveys on people's properties. Further study would be needed for a more meaningful analysis, as well as combining the results with possible recruitment from unburnt areas inside the fire footprint.



Male Superb Fairy-wren seen moving through heavily burnt bushland in the Lake Conjola cluster in a small family group in December 2020– Geoff Ball

4. Species analysis

1. Recorded species

A list of species recorded in surveys was extracted from the BRP Database sorted by family group order, showing their feeding and nesting guilds and whether they are migratory. The average species richness per survey was then calculated for each fire severity – refer Appendix 1.

A total of 110 species was recorded in the 264 BRP surveys during the year.

Some of the results for the average species richness of selected individual or groups are worthy of note. These include records of:

- a number of common forest birds with relatively high results - These include both smaller birds, that can be assumed to have moved shorter distances from adjacent unburnt or light burn areas, like thornbills, pardalotes and grey fantails, and larger birds that could have moved larger distances. Pardalotes might also have survived in tunnels. Refer table 4.
- several rainforest and wet sclerophyll species at burnt sites, though with higher results in unburnt sites - The Superb Lyrebird is discussed in the section 4.2. Refer table 5.
- most species of honeyeater, though with varying results and also between the different fire severity sites - Refer table 6.
- a number of migratory species, including in high and medium fire severity sites - Refer table 7.
- most species of cuckoos, though with low results - Refer table 8.

Table 4 – Average species richness per survey for common forest birds

Common name	Scientific Name	High	Medium	Light	Unburnt	All BRP sites
Eastern Yellow Robin	<i>Eopsaltria australis</i>	20.0%	26.1%	34.9%	45.5%	28.8%
Superb Fairy-wren	<i>Malurus cyaneus</i>	8.2%	13.0%	11.6%	20.5%	12.5%
Grey Fantail	<i>Rhipidura fuliginosa</i>	28.2%	50.0%	41.9%	52.3%	42.0%
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	10.6%	22.8%	20.9%	31.8%	20.1%
Australian Raven	<i>Corvus coronoides</i>	16.5%	16.3%	16.3%	27.3%	18.2%
Pied Currawong	<i>Strepera graculina</i>	12.9%	10.9%	11.6%	29.5%	14.8%
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	12.9%	14.1%	2.3%	31.8%	14.8%
Crimson Rosella	<i>Platycercus elegans</i>	12.9%	19.6%	14.0%	34.1%	18.9%
Brown Thornbill	<i>Acanthiza pusilla</i>	20.0%	29.3%	53.5%	54.5%	34.5%
White-throated Treecreeper	<i>Cormobates leucophaea</i>	30.6%	34.8%	37.2%	18.2%	31.1%
Golden Whistler	<i>Pachycephala pectoralis</i>	12.9%	28.3%	18.6%	52.3%	25.8%
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	18.8%	15.2%	18.6%	36.4%	20.5%
Australian Magpie	<i>Gymnorhina tibicen</i>	3.5%	8.7%	16.3%	38.6%	13.3%

Table 5 – Average species richness per survey for selected rainforest and wet sclerophyll species

Common name	Scientific Name	High	Medium	Light	Unburnt	All BRP sites
Rufous Fantail	<i>Rhipidura rufifrons</i>	1.2%	3.3%	0.0%	22.7%	5.3%
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	11.8%	21.7%	16.3%	59.1%	23.9%
Brown Cuckoo-Dove	<i>Macropygia phasianella</i>	2.4%	1.1%	0.0%	15.9%	3.8%
Wonga Pigeon	<i>Leucosarcia melanoleuca</i>	1.2%	0.0%	0.0%	36.4%	6.4%
White-headed Pigeon	<i>Columba leucomela</i>	0.0%	2.2%	0.0%	4.5%	1.5%
Superb Lyrebird	<i>Menura novaehollandiae</i>	16.5%	16.3%	0.0%	36.4%	17.0%
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	3.5%	4.3%	4.7%	36.4%	9.5%

Table 6 – Average species richness per survey for honeyeaters

Common name	Scientific Name	High	Medium	Light	Unburnt	All BRP sites
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	11.8%	21.7%	16.3%	59.1%	23.9%
Little Wattlebird	<i>Anthochaera chrysoptera</i>	7.1%	5.4%	25.6%	15.9%	11.0%
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	3.5%	4.3%	20.9%	9.1%	7.6%
Noisy Friarbird	<i>Philemon corniculatus</i>	4.7%	16.3%	2.3%	11.4%	9.5%
Red Wattlebird	<i>Anthochaera carunculata</i>	9.4%	14.1%	11.6%	11.4%	11.7%
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	2.4%	5.4%	0.0%	11.4%	4.5%
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	10.6%	22.8%	20.9%	31.8%	20.1%
White-cheeked Honeyeater	<i>Phylidonyris niger</i>	1.2%	3.3%	0.0%	0.0%	1.5%
White-eared Honeyeater	<i>Nesoptilotis leucotis</i>	4.7%	1.1%	2.3%	4.5%	3.0%
White-naped Honeyeater	<i>Melithreptus lunatus</i>	9.4%	4.3%	9.3%	6.8%	7.2%
Yellow-faced Honeyeater	<i>Caligavis chrysops</i>	54.1%	59.8%	62.8%	27.3%	53.0%
Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>	2.4%	0.0%	9.3%	4.5%	3.0%



A Rose Robin a winter migrant to the Shoalhaven was recorded at heavily burnt sites – Charles Dove

Table 7 – Average species richness per survey for migratory species

Common name	Scientific Name	High	Medium	Light	Unburnt	All BRP sites
Rose Robin	<i>Petroica rosea</i>	2.4%	3.3%	0.0%	4.5%	2.7%
Dollarbird	<i>Eurystomus orientalis</i>	0.0%	2.2%	0.0%	4.5%	1.5%
Black-faced Monarch	<i>Monarcha melanopsis</i>	2.4%	2.2%	0.0%	2.3%	1.9%
Leaden Flycatcher	<i>Myiagra rubecula</i>	2.4%	3.3%	0.0%	2.3%	2.3%
Olive-backed Oriole	<i>Oriolus sagittatus</i>	3.5%	10.9%	4.7%	9.1%	7.2%
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	0.0%	3.3%	0.0%	4.5%	1.9%

Table 8 – Average species richness per survey for species of cuckoos

Common name	Scientific Name	High	Medium	Light	Unburnt	All BRP sites
Brush Cuckoo	<i>Cacomantis variolosus</i>	0.0%	0.0%	7.0%	6.8%	2.3%
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	1.2%	0.0%	0.0%	0.0%	0.4%
Eastern Koel	<i>Eudynamis orientalis</i>	0.0%	1.1%	0.0%	4.5%	1.1%
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	8.2%	6.5%	4.7%	9.1%	7.2%
Pallid Cuckoo	<i>Heteroscenes pallidus</i>	0.0%	0.0%	4.7%	0.0%	0.8%
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	1.2%	1.1%	0.0%	15.9%	3.4%

2. Priority species

The Australian Government's list of species for 'Bushfire Recovery Priority' identified 17 bird species – refer to the [Provisional list of animals requiring urgent management intervention Released on 20 March 2020 \(environment.gov.au\)](https://www.environment.gov.au/biodiversity/australia-environmental-protection/bushfire-recovery-priority-species). These included 10 species that are found in the Shoalhaven, of which six were recorded in BRP surveys, namely the Black-faced Monarch, Gang-gang Cockatoo, Glossy Black-Cockatoo, Rockwarbler, Pilotbird and Superb Lyrebird. Of the other four species, there was one recording of the Red-browed Treecreeper, but outside the fire footprint, there are no BRP sites in the distribution areas of the Mainland Ground Parrot and Eastern Bristlebird, and there have been very few sightings of the Regent Honeyeater, which is considered a vagrant to the Shoalhaven. The average species richness per survey for these species is shown below:

Table 9 – Average species richness per survey for Shoalhaven species, identified in the Australia Government's Department of Environment's list of 'Bushfire Recovery Priority' species

Common Name	Scientific Name	High	Medium	Low	Not burnt	All BRP sites
Superb Lyrebird	<i>Menura novaehollandiae</i>	16.5%	16.3%	0.0%	36.4%	17.0%
Rockwarbler	<i>Origma solitaria</i>	5.9%	3.3%	0.0%	0.0%	3.0%
Black-faced Monarch	<i>Monarcha melanopsis</i>	2.4%	2.2%	0.0%	2.3%	1.9%
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	0.0%	3.3%	0.0%	4.5%	1.9%
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	0.0%	1.1%	0.0%	4.5%	1.1%
Pilotbird	<i>Pycnoptilus floccosus</i>	2.4%	0.0%	0.0%	0.0%	0.8%
Red-browed Treecreeper	<i>Climacteris erythrops</i>	0.0%	0.0%	0.0%	0.0%	0.0%
Mainland Ground Parrot	<i>Pezoporus wallicus wallhicks</i>	0.0%	0.0%	0.0%	0.0%	0.0%
Eastern Bristlebird	<i>Dasyornis brachypterus</i>	0.0%	0.0%	0.0%	0.0%	0.0%
Regent Honeyeater	<i>Anthochaera phrygia</i>	0.0%	0.0%	0.0%	0.0%	0.0%

The **Superb Lyrebird** was recorded in 17% of all BRP surveys, 16.5% at high severity sites and 16.3% at medium sites. This suggests that the impacts on lyrebirds was not as great as might have been expected, anecdotally due to its ability to shelter in ground hollows. However, this should be qualified, given most of the BRP sites are closer to the edge of the fire footprint. Surveys across the full extent of its range would need to be carried out to make a truer assessment of its survival rate and threats from predation. Current research by BirdLife & La Trobe University in Gippsland and Eurobodalla is exploring the potential impact of the fires on lyrebirds' future breeding, given the loss of its feeding resources in heavily burnt areas.



Superb lyrebirds have been recorded at several sites during the year – Brian O'Leary

There were two recordings of the **Pilotbird** in surveys where lyrebirds were also recorded.

The **Rockwarbler** has been recorded in 5.9% and 3.3% of surveys in high and medium severity sites respectively. The preferred habitat of the Rockwarbler is along rocky creek-lines and below escarpments, which are a key feature of the Shoalhaven landscape, and would have allowed individuals to escape the full impact of the fires.



Gang-gang Cockatoo – Duade Paton

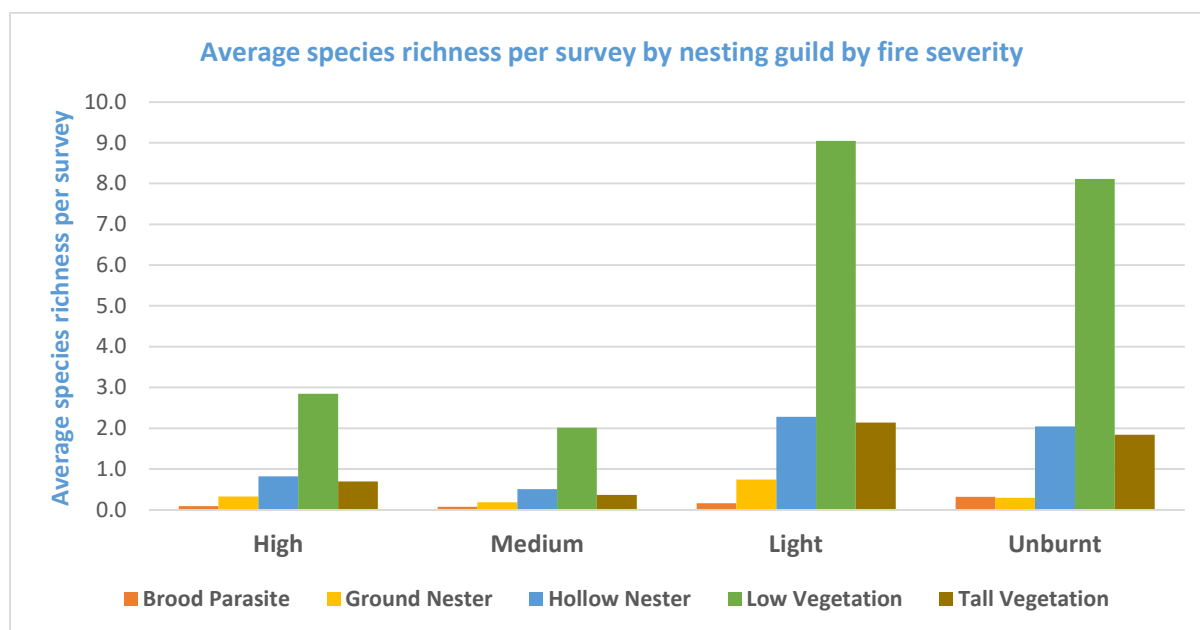
The migratory **Black-faced Monarch** and **Gang-gang Cockatoo** were recorded both in the BRP surveys and outside the fire footprint. One of the sightings of the monarch was in January 2020 at the height of the fires with the others in spring. A group of 16 cockatoos was recorded in June 2020.

The impact of the Shoalhaven fires on the **Glossy Black-Cockatoo** has been significant. This species feeds exclusively on *Allocasuarina* sp.. With the majority of their range impacted by high severity fires, large numbers are now concentrated in unburnt habitat along the coast. There have been several incidental sightings of large flocks of 20-40, when normally they would only form small family groups. Their reliance on a specialist diet, large hollows for nesting and a period of three months from hatching a single egg until the independence of fledglings, raises concerns about their longer-term survival in the Shoalhaven.

BirdLife Australia is currently conducting a research project on the impact of the fires on the **Mainland Ground Parrot** in the Gippsland and Shoalhaven. In the Shoalhaven there are two main distribution areas of the Mainland Ground Parrot, one in Jervis Bay, which was not impacted by the 2019-20 fires, and the other in the Morton National Park, which was not surveyed due to its remoteness. BirdLife intends to carry out fieldwork of the Mainland Ground Parrot in the Shoalhaven in 2021. BirdLife's research also includes the Eastern Bristlebird, though its distribution area in the Shoalhaven was not impacted by the fires.

3. Nesting guilds

The results in graph 6 below show the average species richness per survey of selected nesting guilds, being nesters in low vegetation, tall vegetation and hollows, at ground level and brood parasites, recorded in each fire severity inside the fire footprint. This is based on the nesting guilds for each species shown in appendix 1. The species in other nesting guilds were small in number and so are not shown in the results.



Graph 6 – – Average species richness per survey for nesting guilds in different fire severity sites within the fire footprint

There was no nesting activity recorded in the period and, while no conclusions can be drawn from this result, it could be assumed that any breeding was disrupted within the fire footprint, especially for summer breeders.

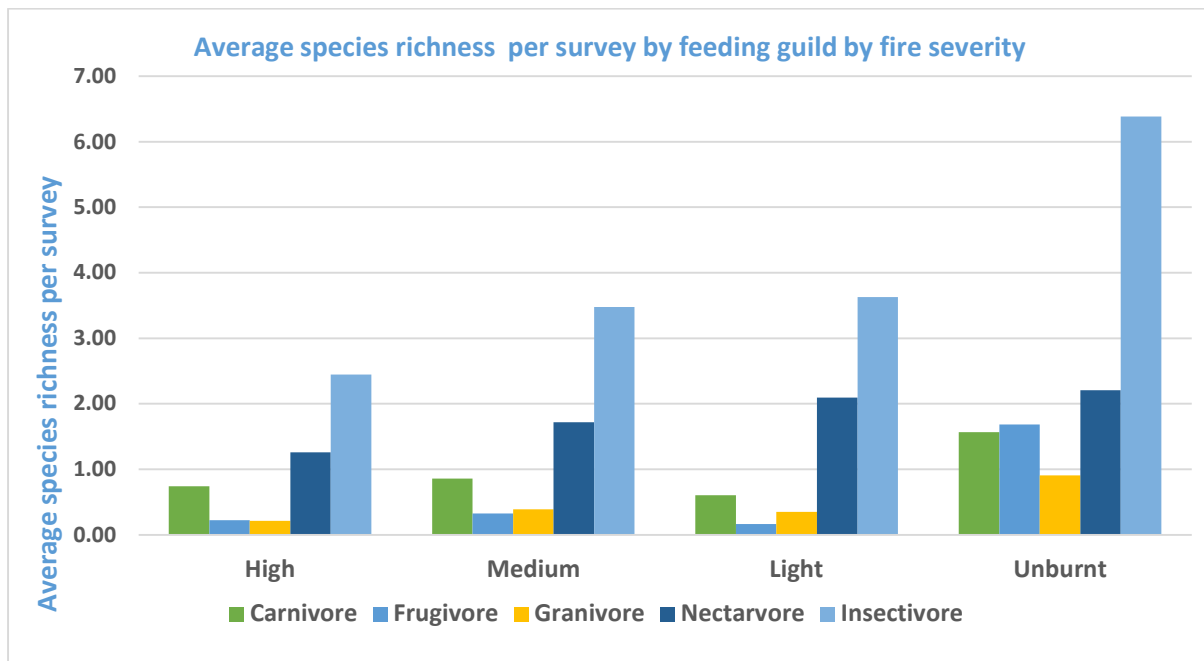
The results show the same consistent pattern in the average richness for each fire severity class, regardless of the species nesting guilds.

Future changes in the average richness and comparisons between guilds, as the canopy, mid-canopy and understorey recovers, could be examined in future research, as well as impacts on hollow nesters, given the major loss of mature trees from the fires.

4. Feeding guilds

The results below in graph 5 below show the average species richness per survey for selected feeding guilds, being carnivores, frugivore, granivores, insectivores and nectivores, recorded in each fire severity inside the fire footprint. This is based on the feeding guilds for each species shown in appendix one. The species in other feeding guilds were small in number and so are not shown in the results.

These results do not account for species which are adaptable in feeding, e.g. nectivores which can also feed on insects.



Graph 5 – Average species richness per survey for feeding guilds in different fire severity sites within the fire footprint

The results show a similar pattern in the average richness for each fire severity class, regardless of the species feeding guilds.

Future changes in the average richness and comparisons between guilds, as the habitat recovers, could be examined in future research.

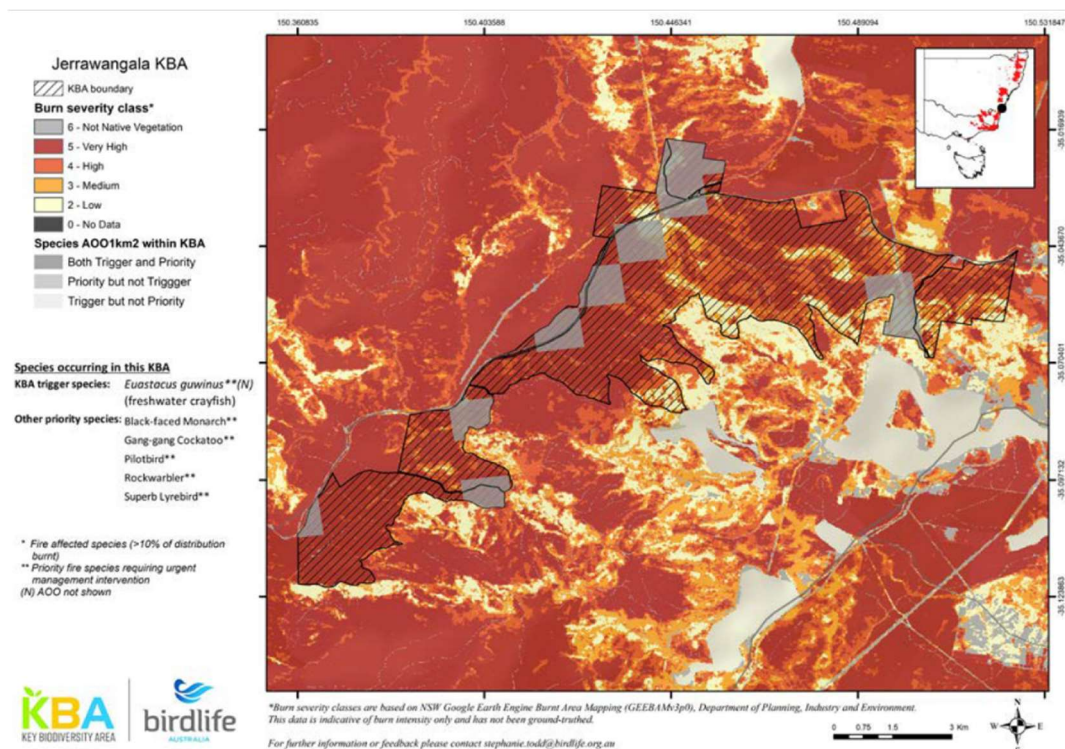


A Crimson Rosella feeding in the slowly recovering understory in a heavily burnt site in the Lake Conjola cluster in August – Geoff Ball

Key Biodiversity Areas

Of the over 300 KBAs identified in Australia, five are wholly or partly in the Shoalhaven. Three of these, the Lake Wollumboola, Jervis Bay & Barren Grounds-Budderoo KBAs were not impacted by the 2019-2020 fires and so are not part of this project. The other two, the Jerrawangala and Ulladulla to Merimbula KBAs are discussed below.

1. Jerrawangala KBA



Map 4 – Jerrawangala KBA boundary and fire severity class

The Jerrawangala KBA is defined as the area of the Jerrawangala National Park, which is considered to be the full extent of the distribution range of *Euastacus guwinus*, the crayfish Trigger species. The KBA is only 4,024 ha. in size, but mapping shows that 99% of this area was impacted by fire, while 84% was mapped as a high burn severity. The KBA lies on a sandstone plateau, ending at steep escarpments to the north and south. Although the plateau was heavily impacted by fire, the fire pattern in the adjacent areas of escarpment, creek-lines and valleys was much more variable.

While the KBA is not triggered by birds, BirdLife identified this KBA as significant for five of the species identified on the Australian Government's priority list, namely the Gang-gang Cockatoo, Pilotbird, Superb Lyrebird, Black-faced Monarch and Rock Warbler.

Within the KBA, only the Gang-gang Cockatoo was recorded in one of seven surveys. However, when analysing the full 40 surveys recorded both within and 5 kms outside the KBA, all of the priority species were recorded, with the exception of the Pilotbird – refer table 10.

This difference is relevant when assessing the ability of priority bird species to move back into a KBA area as the habitat recovers. This is especially important where adjacent areas were not as severely impacted by fire and contain a bird's preferred habitat, like the Superb Lyrebird and Rock Warbler, as is the case with the Jerrawangala KBA.

Table 10 – Average species richness per survey of BirdLife's priority species in the Jerrawangala KBA only and the same area extended by 5kms.

Common name	Scientific name	Jerrawangala KBA only	Jerrawangala KBA + five kms
Average species richness per survey			
Superb Lyrebird	<i>Menura novaehollandiae</i>	0.0%	22.5% (9 of 40 surveys)
Rockwarbler	<i>Origma solitaria</i>	0.0%	7.5% (3 of 40 surveys)
Black-faced Monarch	<i>Monarcha melanopsis</i>	0.0%	7.5% (3 of 40 surveys)
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	14.3% (1 of 7 surveys)	2.5% (1 of 40 surveys)
Pilotbird	<i>Pycnoptilus floccosus</i>	0.0%	0.0%



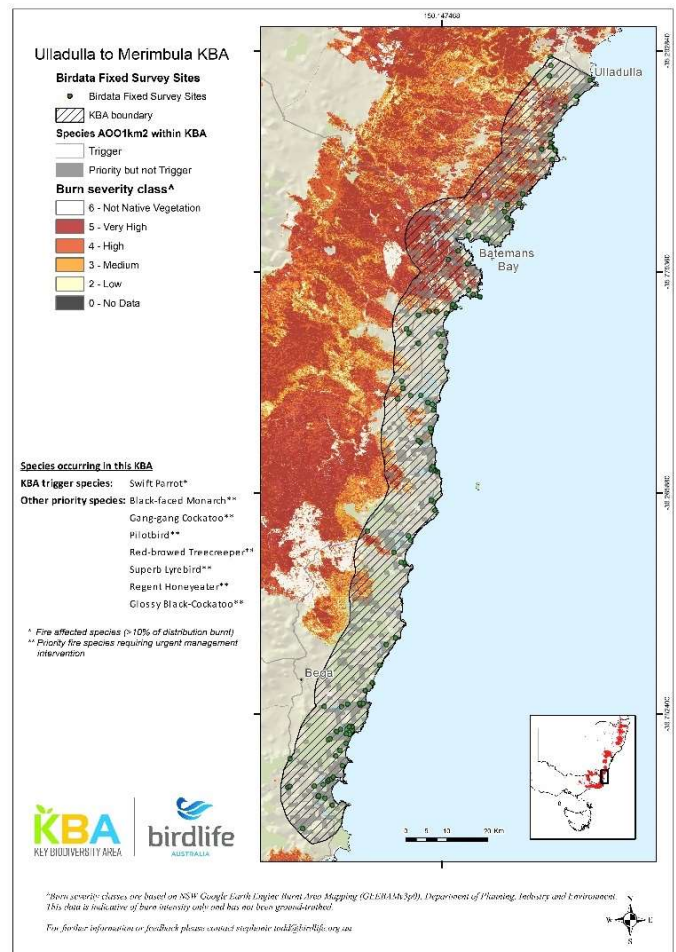
A creek in the Jerrawangala KBA in April 2020 after good rainfall – Rob Dunn

2. Ulladulla to Merimbula KBA

The Ulladulla to Merimbula KBA covers 217,000ha of which 35% was affected by fire. While only the northern section of the KBA is within the Shoalhaven, the following results are based on the 160 surveys in Birddata for the entire KBA, as shown in map 5. These surveys recorded 136 species.

The Trigger species for the KBA is the Swift Parrot. BirdLife has identified the KBA as habitat for seven other bird species of concern on the Australian Government's priority list, namely for the Black-faced Monarch, Gang-gang Cockatoo, Glossy Black-Cockatoo, Red-browed Treecreeper, Pilotbird, Regent Honeyeater and Superb Lyrebird.

There have been no sightings of the Swift Parrot in the year and, of the other priority species, only the Superb Lyrebird, Gang-gang Cockatoo and Glossy Black-Cockatoo were recorded – refer table 11.



Map 5 – Ulladulla to Merimbula KBA boundary and fire severity class

Table 11 – Average species richness per survey for BirdLife's priority species in the Ulladulla to Merimbula KBA

Common Name	Scientific Name	Ulladulla to Merimbula KBA	
		Average species richness per survey	Number of surveys recorded out of 160
Superb Lyrebird	<i>Menura novaehollandiae</i>	4.4%	7
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	1.9%	3
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	1.3%	2

Next steps

The 2020 volunteer in-kind contribution to the project is conservatively estimated to be \$50,000, taking into account bird survey time, including travel to survey sites, project development and co-ordination, event management, social media, presentations, magazine articles and photography.

Looking forward, our priority is to maintain this same level of support to ensure the project's sustainability into the long term. This will be challenging, given that most of the volunteers are also committed to doing surveys in the Lake Wollumboola and Jervis Bay KBAs, NSW NPWS South Coast Shorebird Recovery program and BirdLife's Shorebird 2020 program.

Notwithstanding this key point, there are areas for improvements in the project design and data, while opportunities also exist for new research, subject to the input of additional resources and expertise.



Improvements in project design and data

New Filemaker license – A Filemaker multi-user license upgrade is required to improve the functionality and accessibility of the BRP Database. BLS has funds available to contribute to this expenditure. An operational manual for the BRP Database would then be developed by the volunteer team.

Standardise site information –The potential for inconsistency in site information exists with multiple volunteers. A review of the BRP Database and collection of photo points and maps for all sites is needed to minimise any inconsistency across the project. It is envisaged that this can be carried out by the volunteer team.

Re-evaluate project methodology – This is a critical step, as it is likely to impact priorities for volunteers and possible changes to the number of surveys and sites. This level of expertise is not currently obtainable from the volunteer team due to the availability of local researchers.

Science-based presentation – This report has not been presented in a scientific format with detailed statistical analysis, discussion and research paper references due to the availability of local researchers in the volunteer team. The project would benefit from a more scientific -based presentation of the 2020 and future results, possibly through collaboration with universities.

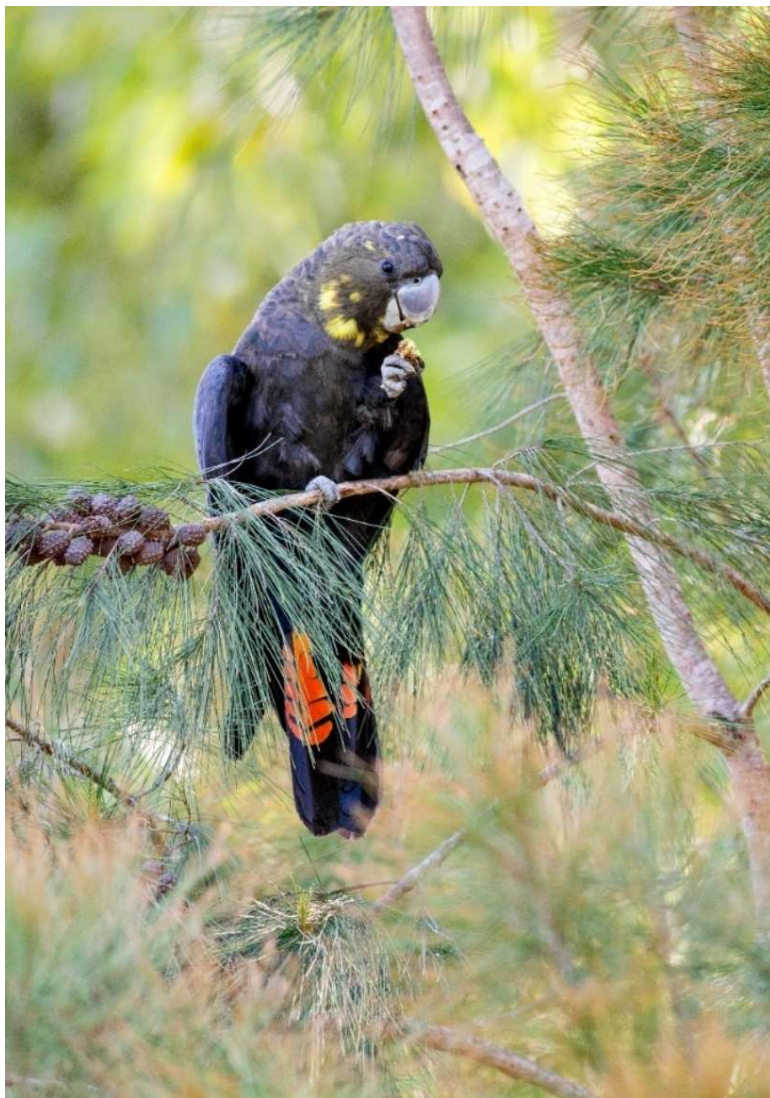
GIS Spatial Analysis – Birddata's spatial analysis capability is very limited, especially for the scope of the project and possible future fire events. Spatial mapping for vegetation, the 2019-2020 fire map, rainfall, future fires, existing sites, etc. would greatly assist project analysis and planning. Scoping the project's requirements with a GIS spatial analyst would be the first step.

Opportunities for new research

Vegetation - Vegetation has not been recorded for BRP sites due to the focus of volunteers on bird surveys. This will require ground-truthing and analysis of available feeding and nesting resources. The preferred approach needs to be determined, which would require additional resources.

Habitat recovery - The level of habitat recovery has varied widely, regardless of the fire severity and vegetation type. This information is required to understand its impacts on species richness and abundance in different feeding and nesting guilds. The best approach needs to be developed and habitat recovery at BRP sites ground-truthed.

Proximity to unburnt sites - The proximity of survey sites to unburnt areas has not been analysed in detail to assess its impacts on birds and to what extent low severity or unburnt sites act as refuges from adjacent high and medium severity areas. Access to spatial analysis would facilitate this analysis.



Female Glossy-black Cockatoo – Duade Paton

Comparison of sites inside and outside the fire footprint – The potential movement of birds into the fire footprint from outside could be another focus for research. A reassessment of the selection of sites outside the fire footprint is required, which to date has not been a primary focus.

Pre & post fire comparison - Comparing species richness and abundance before and after the fires is difficult, given the lack of surveys in Birddata prior to 2020 and the different survey methods applied. However, other bird databases and records maintained by local ecologists could fill this short-coming and is worthy of investigation. Determining the best approach would be the first step, though it is unlikely that this could be completed by the existing volunteer team.

Surveys in more remote areas – Given the need to restrict surveys to sites more accessible to volunteers, analysis of the impacts of the fires in more remote areas, much of which was impacted by catastrophic fires over a prolonged period, has not been completed. This would require development of an appropriate survey methodology with a committed additional project team.

Opportunity for expansion

Partnership with Shoalhaven Landcare - In June 2020 BLS formed a partnership with SLA to complete bird surveys on private land where post-bushfire Landcare projects are being undertaken. These projects are funded by the Great Eastern Ranges Initiative, through their agreement with WWF, South East Local Land Services and WIRES, and include fire impact assessments, weeding, replanting and feral species control on 20 properties. Due to volunteer capacity, BLS only had the resources to complete surveys on three of these properties in 2020. The opportunity to monitor the impact of post-fire interventions on bird species across these properties would make a significant addition to the project outcomes, though how realistic this is for the existing project team is currently being assessed. This focus aligns with BirdLife's existing 'Birds on Farms' program.

Summary

The first-year results provide an excellent starting point for new complementary research projects by universities. In this way, the under-pinning project can remain sustainable with the existing volunteer team, while at the same time new research into the impacts of the 2019-20 fires on birds in the Shoalhaven can be undertaken.

This is likely to add to the motivation of the volunteer team and open up research opportunities for supervised university students at all levels and other researchers, subject to their own funding and resources.

BLS is keen to explore these opportunities further with BirdLife, university academics and other researchers, as this project moves into its second year.



View across remote area of Morton National Park in November 2020, showing the differing fire intensities – Rob Dunn

Appendices

1. Birds recorded

The table below shows the average richness per survey for each species recorded in the 264 BRP surveys. E.g. the Eastern Yellow Robin was recorded in 20% of the 85 high severity BRP sites and in 28.8% of the total 264 BRP surveys.

Family	Common name	Scientific Name	Feeding	Nesting	Migration	Average species richness per survey				
						High	Medium	Light	Unburnt	Total BRP surveys
Australian Robins	Eastern Yellow Robin	<i>Eopsaltria australis</i>	Insectivore	Low Vegetation		20.0%	26.1%	34.9%	45.5%	28.8%
	Red-capped Robin	<i>Petroica goodenovii</i>	Insectivore	Low Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
	Rose Robin	<i>Petroica rosea</i>	Insectivore	Low Vegetation	Partial Summer	2.4%	3.3%	0.0%	4.5%	2.7%
Bowerbirds and Catbirds	Green Catbird	<i>Ailuroedus crassirostris</i>	Frugivore	Hollow Nester		0.0%	0.0%	0.0%	4.5%	0.8%
	Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	Frugivore	Low Vegetation		3.5%	4.3%	4.7%	36.4%	9.5%
Bulbuls	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	Insectivore	Low Vegetation		0.0%	0.0%	0.0%	6.8%	1.1%
Cockatoos and Corellas	Galah	<i>Eolophus roseicapilla</i>	Granivore	Hollow Nester		1.2%	2.2%	2.3%	0.0%	1.5%
	Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Granivore	Hollow Nester		0.0%	3.3%	0.0%	4.5%	1.9%
	Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Granivore	Hollow Nester		0.0%	1.1%	0.0%	4.5%	1.1%
	Little Corella	<i>Cacatua sanguinea</i>	Granivore	Hollow Nester		1.2%	0.0%	2.3%	2.3%	1.1%
	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	Granivore	Hollow Nester		1.2%	0.0%	2.3%	15.9%	3.4%
	Yellow-tailed Black-Cockatoo	<i>Zanda funereus</i>	Granivore	Hollow Nester		2.4%	3.3%	4.7%	13.6%	4.9%
Cormorants and Shags	Great Cormorant	<i>Phalacrocorax carbo</i>	Water	Tall Vegetation		1.2%	1.1%	0.0%	0.0%	0.8%
Crows and Ravens	Australian Raven	<i>Corvus coronoides</i>	Carnivore	Tall Vegetation		16.5%	16.3%	16.3%	27.3%	18.2%
Cuckoos	Brush Cuckoo	<i>Cacomantis variolosus</i>	Insectivore	Brood Parasite	Summer	0.0%	0.0%	7.0%	6.8%	2.3%
	Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	Carnivore	NA	Vagrant	1.2%	0.0%	0.0%	0.0%	0.4%
	Eastern Koel	<i>Eudynamys orientalis</i>	Insectivore	NA	Vagrant	0.0%	1.1%	0.0%	4.5%	1.1%
	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	Insectivore	Brood Parasite	Partial Summer	8.2%	6.5%	4.7%	9.1%	7.2%

Family	Common name	Scientific Name	Feeding	Nesting	Migration	Average species richness per survey				
						High	Medium	Light	Unburnt	Total BRP surveys
	Pallid Cuckoo	<i>Heteroscenes pallidus</i>	Insectivore	Brood Parasite	Summer	0.0%	0.0%	4.7%	0.0%	0.8%
	Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	Insectivore	Brood Parasite	Partial Summer	1.2%	1.1%	0.0%	15.9%	3.4%
Cuckoo-shrikes and Trillers	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	Insectivore	Tall Vegetation	Partial Summer	4.7%	6.5%	4.7%	6.8%	5.7%
	Cicadabird	<i>Edolisoma tenuirostris</i>	Insectivore	Tall Vegetation	Summer	0.0%	1.1%	0.0%	2.3%	0.8%
Dollarbird	Dollarbird	<i>Eurystomus orientalis</i>	Insectivore Aerial	Hollow Nester	Summer	0.0%	2.2%	0.0%	4.5%	1.5%
Ducks, Geese and Swans	Australian Wood Duck	<i>Chenonetta jubata</i>	Water	Hollow Nester		4.7%	1.1%	0.0%	4.5%	2.7%
	Pacific Black Duck	<i>Anas superciliosa</i>	Water	Hollow Nester		0.0%	2.2%	0.0%	2.3%	1.1%
Eagles, Kites and Goshawks	Brown Goshawk	<i>Accipiter fasciatus</i>	Carnivore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
	Grey Goshawk	<i>Accipiter novaehollandiae</i>	Carnivore	Tall Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
	Square-tailed Kite	<i>Lophoictinia isura</i>	Carnivore	Tall Vegetation	Summer	0.0%	2.2%	0.0%	0.0%	0.8%
	Swamp Harrier	<i>Circus approximans</i>	Carnivore	Ground Nester		0.0%	1.1%	0.0%	0.0%	0.4%
	Wedge-tailed Eagle	<i>Aquila audax</i>	Carnivore	Tall Vegetation		2.4%	1.1%	0.0%	2.3%	1.5%
	Whistling Kite	<i>Haliastur sphenurus</i>	Carnivore	Tall Vegetation		0.0%	1.1%	2.3%	0.0%	0.8%
	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Carnivore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
Fairy-wrens, Emu-wrens and Grasswrens	Southern Emu-wren	<i>Stipiturus malachurus</i>	Insectivore	Low Vegetation		0.0%	0.0%	2.3%	0.0%	0.4%
	Superb Fairy-wren	<i>Malurus cyaneus</i>	Insectivore	Low Vegetation		8.2%	13.0%	11.6%	20.5%	12.5%
	Variegated Fairy-wren	<i>Malurus lamberti</i>	Insectivore	Low Vegetation		2.4%	2.2%	4.7%	11.4%	4.2%
Fantails	Grey Fantail	<i>Rhipidura fuliginosa</i>	Insectivore	Low Vegetation		28.2%	50.0%	41.9%	52.3%	42.0%
	Rufous Fantail	<i>Rhipidura rufifrons</i>	Insectivore	Low Vegetation	Summer	1.2%	3.3%	0.0%	22.7%	5.3%
	Willie Wagtail	<i>Rhipidura leucophrys</i>	Insectivore	Low Vegetation		3.5%	2.2%	2.3%	2.3%	2.7%
Flowerpeckers	Mistletoebird	<i>Dicaeum hirundinaceum</i>	Frugivore	Tall Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
Frogmouths	Tawny Frogmouth	<i>Podargus strigoides</i>	Carnivore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
Gulls, Terns and Noddies	Common Tern	<i>Sterna hirundo</i>	Water	NA	Summer	0.0%	1.1%	0.0%	0.0%	0.4%

Family	Common name	Scientific Name	Feeding	Nesting	Migration	Average species richness per survey				
						High	Medium	Light	Unburnt	Total BRP surveys
Hawk-Owls	Powerful Owl	<i>Ninox strenua</i>	Carnivore	Hollow Nester		0.0%	0.0%	0.0%	2.3%	0.4%
Herons, Egrets and Bitterns	White-necked Heron	<i>Ardea pacifica</i>	Water	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
Honeyeaters and Chats	Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>	Nectarvore	Tall Vegetation		1.2%	0.0%	0.0%	2.3%	0.8%
	Crescent Honeyeater	<i>Phylidonyris pyrrhopterus</i>	Nectarvore	Low Vegetation		1.2%	1.1%	0.0%	0.0%	0.8%
	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	Nectarvore	Low Vegetation		10.6%	22.8%	20.9%	31.8%	20.1%
	Lewin's Honeyeater	<i>Meliphaga lewinii</i>	Nectarvore	Low Vegetation		11.8%	21.7%	16.3%	59.1%	23.9%
	Little Wattlebird	<i>Anthochaera chrysoptera</i>	Nectarvore	Low Vegetation		7.1%	5.4%	25.6%	15.9%	11.0%
	New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	Nectarvore	Low Vegetation		3.5%	4.3%	20.9%	9.1%	7.6%
	Noisy Friarbird	<i>Philemon corniculatus</i>	Nectarvore	Tall Vegetation	Partial Summer	4.7%	16.3%	2.3%	11.4%	9.5%
	Noisy Miner	<i>Manorina melanocephala</i>	Nectarvore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
	Red Wattlebird	<i>Anthochaera carunculata</i>	Nectarvore	Tall Vegetation		9.4%	14.1%	11.6%	11.4%	11.7%
	Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	Nectarvore	Low Vegetation	Partial Summer	2.4%	5.4%	0.0%	11.4%	4.5%
	White-cheeked Honeyeater	<i>Phylidonyris niger</i>	Nectarvore	Low Vegetation		1.2%	3.3%	0.0%	0.0%	1.5%
	White-eared Honeyeater	<i>Nesoptilotis leucotis</i>	Nectarvore	Low Vegetation		4.7%	1.1%	2.3%	4.5%	3.0%
	White-naped Honeyeater	<i>Melithreptus lunatus</i>	Nectarvore	Tall Vegetation		9.4%	4.3%	9.3%	6.8%	7.2%
	Yellow-faced Honeyeater	<i>Caligavis chrysops</i>	Nectarvore	Low Vegetation	Partial Summer	54.1%	59.8%	62.8%	27.3%	53.0%
	Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>	Nectarvore	Low Vegetation		2.4%	0.0%	9.3%	4.5%	3.0%
Ibis and Spoonbills	Australian White Ibis	<i>Threskiornis moluccus</i>	Water	Tall Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
Kingfishers	Laughing Kookaburra	<i>Dacelo novaeguineae</i>	Carnivore	Hollow Nester		12.9%	14.1%	2.3%	31.8%	14.8%
	Sacred Kingfisher	<i>Todiramphus sanctus</i>	Carnivore	Hollow Nester	Partial Summer	2.4%	3.3%	2.3%	0.0%	2.3%
Lyrebirds	Superb Lyrebird	<i>Menura novaehollandiae</i>	Insectivore	Low Vegetation		16.5%	16.3%	0.0%	36.4%	17.0%
Monarch and Flycatchers	Black-faced Monarch	<i>Monarcha melanopsis</i>	Insectivore	Low Vegetation	Summer	2.4%	2.2%	0.0%	2.3%	1.9%
	Leaden Flycatcher	<i>Myiagra rubecula</i>	Insectivore	Low Vegetation	Summer	2.4%	3.3%	0.0%	2.3%	2.3%
	Magpie-lark	<i>Grallina cyanoleuca</i>	Insectivore	Tall Vegetation		0.0%	2.2%	0.0%	2.3%	1.1%
	Satin Flycatcher	<i>Myiagra cyanoleuca</i>	Insectivore	Low Vegetation	Summer	0.0%	1.1%	0.0%	0.0%	0.4%

Family	Common name	Scientific Name	Feeding	Nesting	Migration	Average species richness per survey				
						High	Medium	Light	Unburnt	Total BRP surveys
Orioles and Figbirds	Olive-backed Oriole	<i>Oriolus sagittatus</i>	Frugivore	Low Vegetation	Summer	3.5%	10.9%	4.7%	9.1%	7.2%
Pardalotes	Spotted Pardalote	<i>Pardalotus punctatus</i>	Insectivore	Ground Nester		32.9%	32.6%	39.5%	27.3%	33.0%
	Striated Pardalote	<i>Pardalotus striatus</i>	Insectivore	Hollow Nester		5.9%	2.2%	7.0%	4.5%	4.5%
Parrots, Lorikeets and Rosellas	Australian King-Parrot	<i>Alisterus scapularis</i>	Frugivore	Hollow Nester		4.7%	5.4%	2.3%	25.0%	8.0%
	Crimson Rosella	<i>Platycercus elegans</i>	Granivore	Hollow Nester		12.9%	19.6%	14.0%	34.1%	18.9%
	Musk Lorikeet	<i>Glossopsitta concinna</i>	Nectarvore	Hollow Nester		0.0%	0.0%	2.3%	0.0%	0.4%
	Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	Nectarvore	Hollow Nester		2.4%	10.9%	25.6%	25.0%	12.9%
Pigeons and Doves	Brown Cuckoo-Dove	<i>Macropygia phasianella</i>	Frugivore	NA		2.4%	1.1%	0.0%	15.9%	3.8%
	Common Bronzewing	<i>Phaps chalcoptera</i>	Granivore	Tall Vegetation		1.2%	3.3%	0.0%	0.0%	1.5%
	Spotted Dove	<i>Streptopelia chinensis</i>	Granivore	Tall Vegetation		1.2%	0.0%	0.0%	0.0%	0.4%
	White-headed Pigeon	<i>Columba leucomela</i>	Frugivore	NA		0.0%	2.2%	0.0%	4.5%	1.5%
	Wonga Pigeon	<i>Leucosarcia melanoleuca</i>	Frugivore	Tall Vegetation		1.2%	0.0%	0.0%	36.4%	6.4%
Pipits and Wagtails	Australasian Pipit	<i>Anthus novaeseelandiae</i>	Insectivore	Ground Nester		0.0%	1.1%	0.0%	0.0%	0.4%
	Masked Lapwing	<i>Vanellus miles</i>	Water	Ground Nester		0.0%	0.0%	0.0%	2.3%	0.4%
Shrike-tits	Crested Shrike-tit	<i>Falcunculus frontatus</i>	Insectivore	Low Vegetation		0.0%	0.0%	2.3%	0.0%	0.4%
Sittellas	Varied Sittella	<i>Daphoenositta chrysoptera</i>	Insectivore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
Starlings	Common Myna	<i>Acridotheres tristis</i>	Insectivore	Hollow Nester		0.0%	0.0%	0.0%	2.3%	0.4%
Swallows and Martins	Tree Martin	<i>Petrochelidon nigricans</i>	Insectivore Aerial	Hollow Nester	Summer	0.0%	0.0%	4.7%	4.5%	1.5%
	Welcome Swallow	<i>Hirundo neoxena</i>	Insectivore Aerial	Colonial		5.9%	3.3%	9.3%	0.0%	4.5%
Thornbills and Gerygones	Brown Gerygone	<i>Gerygone mouki</i>	Insectivore	Low Vegetation		1.2%	9.8%	7.0%	43.2%	12.1%
	Brown Thornbill	<i>Acanthiza pusilla</i>	Insectivore	Low Vegetation		20.0%	29.3%	53.5%	54.5%	34.5%
	Pilotbird	<i>Pycnoptilus floccosus</i>	Insectivore	Low Vegetation		2.4%	0.0%	0.0%	0.0%	0.8%
	Rockwarbler	<i>Origma solitaria</i>	Insectivore	Rock Nester		5.9%	3.3%	0.0%	0.0%	3.0%

Family	Common name	Scientific Name	Feeding	Nesting	Migration	Average species richness per survey				
						High	Medium	Light	Unburnt	Total BRP surveys
	Striated Thornbill	<i>Acanthiza lineata</i>	Insectivore	Low Vegetation		5.9%	14.1%	18.6%	15.9%	12.5%
	White-browed Scrubwren	<i>Sericornis frontalis</i>	Insectivore	Low Vegetation		5.9%	12.0%	7.0%	40.9%	14.0%
	Yellow Thornbill	<i>Acanthiza nana</i>	Insectivore	Low Vegetation		1.2%	2.2%	2.3%	9.1%	3.0%
	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	Insectivore	Low Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
	Yellow-throated Scrubwren	<i>Sericornis citreogularis</i>	Insectivore	Low Vegetation		0.0%	0.0%	0.0%	4.5%	0.8%
Thrushes	Bassian Thrush	<i>Zoothera lunulata</i>	Insectivore	Low Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
	Common Blackbird	<i>Turdus merula</i>	Insectivore	Low Vegetation		0.0%	0.0%	0.0%	2.3%	0.4%
Treecreepers	Brown Treecreeper	<i>Climacteris picumnus</i>	Insectivore	Hollow Nester		0.0%	1.1%	0.0%	0.0%	0.4%
	White-throated Treecreeper	<i>Cormobates leucophaea</i>	Insectivore	Hollow Nester		30.6%	34.8%	37.2%	18.2%	31.1%
True Babblers	Silvereye	<i>Zosterops lateralis</i>	Frugivore	Low Vegetation		7.1%	8.7%	4.7%	34.1%	11.7%
Weaver Finches	Beautiful Firetail	<i>Stagonopleura bella</i>	Granivore	Low Vegetation		0.0%	0.0%	2.3%	0.0%	0.4%
	Red-browed Finch	<i>Neochmia temporalis</i>	Granivore	Low Vegetation		0.0%	5.4%	7.0%	15.9%	5.7%
Whipbirds and Wedgebills	Eastern Whipbird	<i>Psophodes olivaceus</i>	Insectivore	Low Vegetation		2.4%	9.8%	7.0%	52.3%	14.0%
Whistlers, Shrike-thrushes and allies	Golden Whistler	<i>Pachycephala pectoralis</i>	Insectivore	Low Vegetation		12.9%	28.3%	18.6%	52.3%	25.8%
	Grey Shrike-thrush	<i>Colluricincla harmonica</i>	Carnivore	Low Vegetation		18.8%	15.2%	18.6%	36.4%	20.5%
	Rufous Whistler	<i>Pachycephala rufiventris</i>	Insectivore	Low Vegetation	Summer	7.1%	8.7%	9.3%	4.5%	7.6%
Woodswallows, Currawongs, Butcherbirds and Magpie	Australian Magpie	<i>Gymnorhina tibicen</i>	Insectivore	Tall Vegetation		3.5%	8.7%	16.3%	38.6%	13.3%
	Dusky Woodswallow	<i>Artamus cyanopterus</i>	Insectivore Aerial	Tall Vegetation	Partial Summer	0.0%	0.0%	4.7%	0.0%	0.8%
	Grey Butcherbird	<i>Cracticus torquatus</i>	Carnivore	Low Vegetation		7.1%	14.1%	7.0%	25.0%	12.5%
	Grey Currawong	<i>Strepera versicolor</i>	Carnivore	Tall Vegetation		0.0%	1.1%	0.0%	0.0%	0.4%
	Pied Currawong	<i>Strepera graculina</i>	Carnivore	Tall Vegetation		12.9%	10.9%	11.6%	29.5%	14.8%

2. List of survey sites

Cluster	Survey point name	Lat	Long	Severity	Surveys	Land Tenure	Shared
Bawley Point	Durras Lake	-35.639	150.301	Light	1	National Park	
	Home			High	3	Private Land	
	BRPB2 - KBA-Ulladulla-20min2ha-Beach Cottage	-35.505	150.387	Light	8	Crown Land	Shared
	KBA-Ulladulla-20min2ha-Beach Cottage	-35.505	150.387	Light	1	Crown Land	
	KBA-Ulladulla-500mRadius-62 - BRP			Medium	1	Private Land	Private
	Morton	-35.443	150.343	Unburnt	1	National Park	
	Mount Agony Road	-35.629	150.312	Medium	1	Crown Land	
	BRPB1 - Nuggan Headland	-35.495	150.388	Medium	2	National Park	Shared
	BRPB4 - Old Hume Highway	-35.504	150.309	High	1	State Forest	Shared
	Pretty Beach campground	-35.567	150.366	Light	2	National Park	
	Racecourse beach Bawley Point travk	-35.531	150.395	Unburnt	2	National Park	
	Tallawalla way 2 – BRP			Medium	1	Private Land	Private
	Tallawalla Way 3 - BRP			Medium	2	Private Land	Private
	Willinga Headland	-35.502	150.391	Unburnt	1	National Park	
	BRPB3 - Willinga Road			Unburnt	1	Private Land	Shared
	BRPB3 - Corramy	-35.102	150.497	High	1	Regional Park	Shared
	BRPB2 - Corramy Park	-35.095	150.547	Medium	2	Regional Park	Shared
	BRPB1 - Suffolk Road BRRP			Medium	5	Private Land	Shared
Comberton	BRPC2 - BRP Numboidard fire trail	-34.948	150.609	Medium	1	State Forest	Shared
	BRPC6 - Charcoal Road, Comberton Grange	-34.957	150.642	Medium	2	State Forest	Shared
	BRPC5 - Currumbene State Forest	-34.958	150.641	Medium	1	State Forest	Shared
	BRPC7 - Manuka Road	-34.955	150.642	Light	1	State Forest	Shared
	BRPC1 - Numboid Road, Comberton Grange	-34.947	150.608	Medium	2	State Forest	Shared
	Seasongood Road			Unburnt	2	Private Land	
	BRPC4 - Vineyard Road, Comberton Grange	-34.949	150.627	Light	3	State Forest	Shared
	BRPC3 - Worrigee Nature Reserve	-34.946	150.612	High	2	Nature Reserve	Shared
	BRPC3 - Worrigee Nature Reserve	-34.946	150.612	High	1	Nature Reserve	Shared
Jerrawangalla	12 Mile	-35.108	150.347	Light	1	Crown Land	
	Andean Rd	-35.1	150.41	Light	1	State Forest	
	BRPJ2 - Blackwood Bench - BRP	-35.034	150.423	High	3	State Forest	Shared
	BRPJ3 - Boolijong Headwaters	-35.046	150.427	High	3	State Forest	Shared
	BRPJ8 - Braidwood Rd Twelve Mile – BRP	-35.107	150.346	Light	3	Crown Land	Shared
	BRPJ4 - Butterbush trail - BRP	-35.053	150.467	High	1	National Park	Shared
	BRPJ5 - Cabbage Tree Creeks - BRP	-35.074	150.417	High	3	State Forest	Shared
	BRPJ6 - Cassia Rd Gully - BRP	-35.078	150.406	High	3	State Forest	Shared
	Dean's Gap Road	-35.032	150.447	Light	1	State Forest	
	BRPJ1 - Deans Rd BRP	-35.032	150.446	Light	1	State Forest	Shared
	BRPJ7 - Jerrawangala BRRP	-35.103	150.408	Medium	9	National Park	Shared
	Tianjara cliffs	-35.108	150.333	Medium	1	Crown Land	
Kangaroo Valley	Banksia Park BRP			Medium	7	Private Land	
	Camberwarra lookout	-34.8	150.578	Unburnt	1	Public land	
	Glangarry Campus			Medium	1	Private Land	
	Griffins Fire Trail	-34.731	150.409	High	1	Crown Land	

Cluster	Survey point name	Lat	Long	Severity	Surveys	Land Tenure	Shared
	Jack's Corner Road	-34.731	150.41	Medium	1		
	Kangaroo Valley, Glengarry School	-34.725	150.443	Medium	1		
	Kangaroo Valley, Glenmurray Road Site			Medium	3		
	Rain Forest Track (1)	-34.697	150.611	Medium	3		
	Tallowa Dam road, Moollattoo	-34.777	150.354	High	1	Crown Land	
	Upper Kangaroo Valley Forest	-34.723	150.584	Medium	3		
Lake Conjola	Bendalong Mountain Road			High	4	Private Land	
	Clyde Ridge Road	-35.401	150.318	Medium	1	Crown Land	
	Conjola National Park	-35.168	150.446	High	1	National Park	
	Cunjarong Point			Unburnt	1	Private Land	
	Manyana Ozy site			Unburnt	1	Private Land	
	Maple Street Bush Track	-35.248	150.53	High	11	Crown Land	
	Maple Street Corner	-35.252	150.529	Medium	11	Crown Land	
	Narrawalle Creek Rd, Conjola	-35.279	150.464	Unburnt	5	Crown Land	
	Narrawallee Creek Road	-35.279	150.464	High	2	Crown Land	
	Nerindillah Lagoon Path	-35.231	150.53	Light	5	National Park	
	Nerringillah Rd	-35.222	150.472	Medium	4	State Forest	
	Nerringillah Rd	-35.222	150.471	Medium	3	state Forest	
	Nerringillah rd	-35.222	150.472	High	2	State Forest	
	Stewart Yatte Yattah			High	2	Private Land	
	Stewart Yatte Yattah			Medium	2	Private Land	
	Walter Hood Beach	-35.222	150.536	High	3	Public Land	
	Woodstock Road	-35.376	150.384	Medium	1	Crown Land	
Little Forest	BRPL2 - Little Forest	-35.283	150.337	High	1	Crown Land	Shared
	BRPL1 - Pointer Gap BRRP	-35.264	150.355	High	1	Crown Land	Shared
	BRPL3 - Porters creek dam	-35.263	150.335	High	1	Crown Land	Shared
Meroo	BRPM3 - Lake Tabourie	-35.444	150.407	Light	1	Nature Reserve	Shared
	BRPM4 - Lemon Tree Creek Road	-35.45	150.376	Medium	1	Crown Land	Shared
	BRPM1 - Meroo National Park	-35.4	150.427	Light	1	National Park	Shared
	BRPM5 - Meroo NP, Termeil Lake Track	-35.469	150.372	Medium	1	National Park	Shared
	BRPM6 - Monkey Mountain Road	-35.453	150.329	Medium	1	Crown Land	Shared
	Multon rainforest walk	-35.312	150.435	Unburnt	1	Public Land	
	Narrawalle Reserve	-35.313	150.47	Unburnt	1	Crown Land	
	Ulladulla			Unburnt	1	Private Land	
	BRPM5 - Woodburn SF	-35.416	150.418	Light	2	State Forest	Shared
Parma Creek	BRPP2 - East-West Link Trail (western)	-35.005	150.529	High	3	Nature Reserve	Shared
	BRPP8 - Flat Rock - BRP	-35.038	150.494	Light	3	Nature Reserve	Shared
	BRPP7 - HellHoleFT BRP	-35.021	150.495	Light	4	Nature Reserve	Shared
	BRPP6 – Parma Ck N R BRRP	-35.045	150.51	Light	3	Nature Reserve	Shared
	BRPP1 - ParmaCreek-ParmaFT intersection BRP	-34.994	150.532	High	4	Nature Reserve	Shared
	BRPP4 - ParmaFT-HellHoleFT intersection BRP	-34.999	150.522	High	4	Nature Reserve	Shared
	BRPP5 - Turpentine blue metal dump – BRP	-35.048	150.522	Medium	3	Nature Reserve	Shared
	BRPP3 – Yerringong BRRP	-34.942	150.522	Medium	6	Nature Reserve	Shared

Cluster	Survey point name	Lat	Long	Severity	Surveys	Land Tenure	Shared
Tapitallee	Emery's Rd Private property	-34.828	150.5	Unburnt	4	Private Land	
	BRPT1 – Abernathy's Rd	-34.813	150.455	Medium	2	Crown Land	Shared
	ACH Survey Site I	-34.8	150.472	Medium	1	Private Land	
	ACW Survey Site II	-34.8	150.475	Medium	1		
	Bangalee Reserve	-34.856	150.524	Unburnt	2	Public Land	
	BRPT4 - Bangalee Reserve	-34.851	150.528	Unburnt	1	Crown Land	
	BRPT5 - Bangalee Reserve forest walk PO survey	-34.851	150.531	Unburnt	2	Crown Land	
	BRPT6 - Bangalee Reserve rainforest	-34.853	150.535	Unburnt	2	Crown Land	
	Bengalee Landcare site Restricted Access	-34.83	150.505	Unburnt	4	Private Land	
	Bengalee Landcare Site Restricted Access	-34.83	150.504	Unburnt	4	Private Land	
	Bengslee Landcare sites	-34.83	150.503	Unburnt	3	Private Land	Private
	BLA Shoalhaven - Bangalee Reserve	-34.855	150.528	Unburnt	2	Private Land	
	BRPT2 - Coolendel Lookout	-34.836	150.437	High	5	National Park	Shared
	Creek Budgong	-34.812	150.467	Medium	1	Private Land	
	Dam Illaroo Firetrail	-34.831	150.44	Medium	1	National Park	
	Emery's Plateau Survey Site 2. Within 15 acre Regeneration Area	-34.807	150.491	Medium	1		
	Emery's Plateau survey Site I	-34.807	150.487	Medium	1		
	Fire gully Budgong	-34.839	150.474	High	1		
	BRPT3 - Grady's Hill	-34.849	150.395	High	4	State Forest	
West Braidwood	BRPW4 - Bainbrig Creek 1 - BRP	-35.084	150.147	High	3	National Park	Shared
	BRPW2 - Bainbrig Creek 2 - Wave Cave - BRP	-35.088	150.169	High	1	National Park	Shared
	BRPW1 - Boolijah Creek - BRP	-35.115	150.302	High	2	National Park	Shared
	BRPW6- Endrick River	-35.089	150.12	Light	1	National Park	
	BRPW5 - Bulee Gap - BRP	-35.089	150.139	High	3	National Park	Shared
	BRPW6 - Endrick River at Nerriga Rd – BRP	-35.09	150.121	Unburnt	2	National Park	Shared
	Greta Road - BRP	-35.075	150.231	High	1	National Park	
	Rolfes Gap - BRP	-35.072	150.125	Medium	1	Crown Land	
	Tolwong Road 1 - BRP	-35.043	150.139	High	1	Crown Land	
	BRPW3 - Waterhole near Touga Rd	-35.079	150.153	High	2	National Park	Shared
	Total of 115 BRP sites		Total BRP surveys		264		



Looking across to Grady's Hill, one of the most remote survey sites in the Tapitallee cluster— Rob Dunn

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Disclaimer: Every effort has been taken to ensure that the information presented in the report is accurate. BirdLife Shoalhaven does not accept any responsibility for any errors and inaccuracies.

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For more information on the project and how to get involved go to www.birdlifeshoalhaven.org/fires.html.