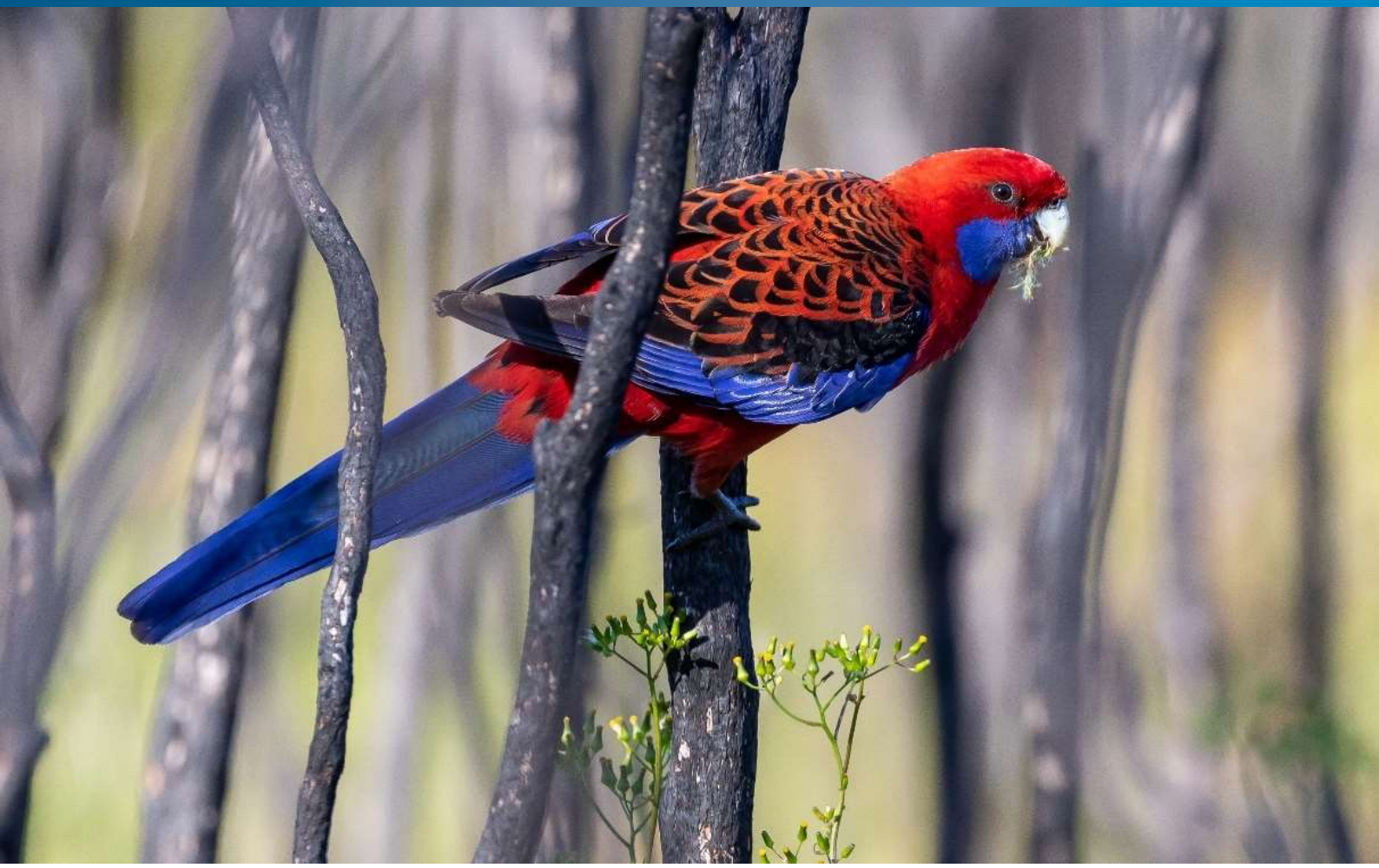


BIRDLIFE SHOALHAVEN

BUSHFIRE RECOVERY PROJECT

FINAL REPORT

June 2023

birdlife
Shoalhaven

"Thanks to a three-year commitment of volunteers in the field, this project has made a meaningful contribution to understanding the impacts of the 2019-20 summer bushfires on birds in the Shoalhaven."

Prof. Martine Maron, President BirdLife Australia

"This project grew out of individuals trying to understand what the fires meant for the future of the birds where they live. It is a perfect example of local citizen science in action. The effort of everyone involved should be acknowledged and applauded by the broader scientific community."

Paul Sullivan, CEO BirdLife Australia

BirdLife Shoalhaven acknowledges the Aboriginal people of the Shoalhaven, their care of country, birds and habitat, and we pay respect to all their Elders past, present and emerging.

Photo front cover - A Crimson Rosella feeding in the slowly recovering understory in a heavily burnt site near Lake Conjola in August 2020 – Geoff Ball

Contents

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

Foreword

The sudden absence of birdsong in those places hit hardest by the fires was noticed by everyone. This was especially the case in the Shoalhaven on the NSW South Coast, where 80% of the land area was impacted by the fires, including 90% of our national parks, state forests and crown land.

The project was initially driven by birdwatchers wanting to get a better understanding of how the fires had impacted bird populations at the places that were important to them. So, as soon as the fires started to be extinguished, they started surveying the birds they found close to where they lived. BirdLife Shoalhaven then started to bring together these surveys and to analyse the data each year, which evolved into this Bushire Recovery Project.

The project was launched by Prof. Martine Maron, President of BirdLife Australia, at an event at Mollymook in March 2020. All three levels of government were represented and the Welcome to Country by a local elder reminded us that the original custodians of the land had been especially affected. The bushfires in the Shoalhaven had been confirmed as extinguished only a few weeks before and nearby Shoalhaven City Council's main fire evacuation centre was still giving much-needed support to the local community. So, there was a real concern that it might be too soon to hold this event. This proved to be misplaced with over 130 attending. Everyone wanted to come together to share experiences, as well as hear about the impacts of the fires on local wildlife. The event revealed to us, that the project was about people, as much as it was about birds.

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

Birds are an ever-present link for us to the healing powers of nature. When they disappear, that link is broken. However, the reverse is true. Seeing birds return across the Shoalhaven increasingly became a subject for conversation for experienced and novice birdwatchers alike. More birds were being seen and talked about by more people. Ironically when so many had been lost.

Through this project, BLS facilitated this conversation, as bushland regenerated and birdsong came back from the ashes.

Rob Dunn, President BirdLife Shoalhaven – June 2023

Summary

Project aims

BirdLife Shoalhaven's (BLS) Bushfire Recovery Project (BRP) focused on the impacts of the 2019-20 bushfires on bird populations in the Shoalhaven Local Government Area on the NSW South Coast, covering the period from the peak period of the fires in January 2020 to December 2022.

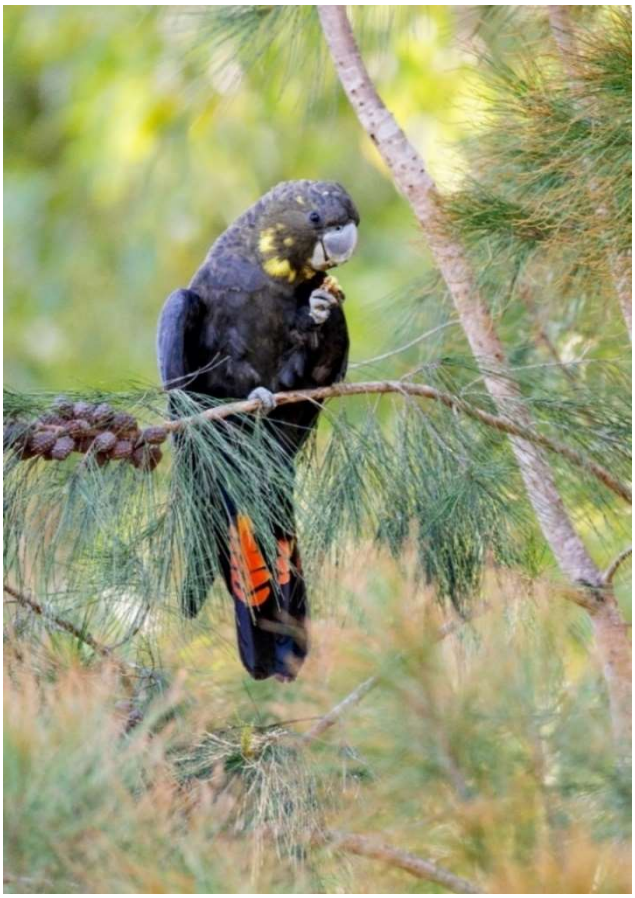
The primary aim of the project was to examine changes in bird species richness and abundance by analysing 744 bird surveys recorded by volunteers in the three-year period at different fire-affected sites. It also looked at the impacts of the bushfires on both individual and groups of species, species considered by the Australian Government as bushfire recovery priorities and in the Shoalhaven's Key Biodiversity Areas (KBA).

Results

The primary findings from the project were that:

- In terms of species richness, more bird species were recorded on average at unburnt survey sites, compared to burnt sites, though there has been a gradual reduction in this difference over the three years. (Refer Section 2, Graphs 2)
- However, in terms of species abundance, while greater numbers of birds were recorded in unburnt survey sites, compared to burnt sites, there was no reduction in this difference over the three years. (Refer Section 3, Graphs 4)

This could suggest that, while more species are moving back into burnt areas from unburnt areas, this is still not occurring in high numbers of birds. This could be explained by habitat in burnt areas not having recovered sufficiently after three years to support the same abundance of birds as in unburnt areas.



Female Glossy-black Cockatoo – Duade Paton

The primary findings from the project were that:

- In burnt and unburnt sites similar numbers of species, excluding waterbirds, were recorded each year with 131 species recorded over the three years. Of these 114 were recorded in burnt sites and 108 in unburnt sites. (Refer Section 4.1.)
- The species recorded included birds most commonly found in the forests of the Shoalhaven, honeyeaters, rainforest and wet sclerophyll specialists, and migratory species. (Refer Section 4.2 & Appendix A)
- Analysis of records of honeyeaters showed that after three years the same number of species were recorded on average in both burnt and unburnt sites. However, after three years the abundance of honeyeaters detected at burnt sites remained lower than that detected at unburnt sites. (Refer Section 4.3. and Graphs 5 & 6)

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

- Of the ten species found in the Shoalhaven on the Australian Government's list of bird species identified for 'Bushfire Recovery Priority':
  - Six were recorded at burnt sites (Refer Section 4.4, Table 10)
  - Three were recorded in the Jerrawangala Key Biodiversity Area (KBA) and five within the combined area of the KBA and the surrounding 5 kms. (Refer Section 5.1, Table 10)
  - Three of these species were recorded in the Ulladulla to Merimbula KBA. (Refer Section 5.2, Table 11)

Social outcomes

While the aims of the project focussed on changes in bird species richness and abundance, it also delivered unexpected social outcomes. (Refer Section 6).

This project was launched by Dr Martine Maron, President of BirdLife Australia, at an event in Mollymook on 8 March 2020. It was one of the first events to bring people together after the fires to share experiences and learn more about the impact of the fires on birds and other fauna and flora.

From this point our project evolved and became multi-faceted, making casual bird observations, completing surveys, preparing reports, helping landowners, supporting arts events, running bird courses, organizing bird walks and giving presentations. Importantly, new connections were made through a long period of a slow recovery.

In many ways, these social outcomes have been just as important as the primary focus of the project.

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 and a number of coastal villages. The population in the Shoalhaven trebles in summer with the impact of tourists drawn to the many beaches on the South Coast.

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. 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, offshore reefs, beaches, dunes, coastal bays, lakes, lagoons, wetlands, extensive eucalypt forests and woodlands, rainforests 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

Sixty-three threatened bird species listed under Commonwealth and NSW legislation have been recorded in the Shoalhaven, representing approx. one in every six bird species recorded in the region. Refer www.birdlifeshoalhaven.org/threatenedspecies.html.

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 areas of Ulladulla-Merimbula KBA and the Barren Grounds-Budderoo 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 adjoining remnant natural areas and bird habitat.

3. The drought, fires, rains

The prolonged drought from 2017 to 2019 drought became the prelude to the catastrophic bushfires of the 2019-2020 summer, which burnt or negatively impacted 80% of the Shoalhaven land area.

The weather conditions in December 2019 and January 2020 were a recipe for disaster. During these months, Nowra experienced 26 days of temperatures over 30 degrees with 40 to 45 degrees 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 bushfires over previous decades and, whilst many have been severe, none have involved the extensive coverage of the 2019-20 fires. The Currowan mega-fire burnt for 74 days, impacting approx. 320,000 ha. and spreading beyond the Shoalhaven to three neighboring local government areas.

The timing of the fires was damaging to the habitat of many birds 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 burnt habitats.

The bushfires were immediately followed by exceptional rain with some areas receiving 40% of their annual rainfall in February 2020. Above-average rainfall has continued over the three years since the bushfires.

Early regrowth at Parma Creek in May 2020 – Yolande Cozijn

4. Post-fire habitat recovery

This increase in post-fire rainfall has resulted in extensive regrowth of bird habitat across much of the Shoalhaven. However, this varies considerably in the under-storey, mid-storey and/or canopy, its density and in different plant species.

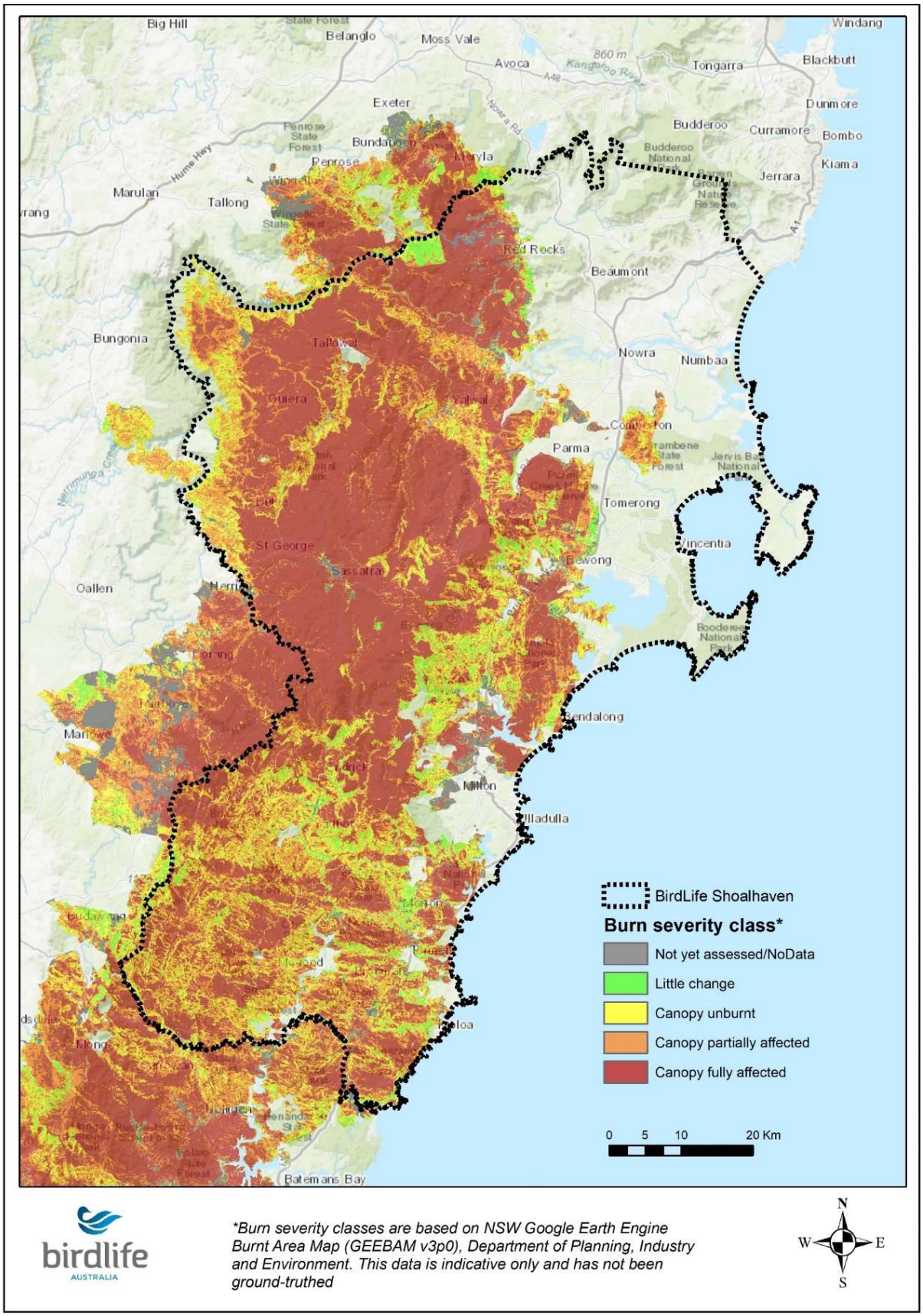
In some areas, even where there were high-severity fires, there has been incredibly dense understory regrowth, made up of early colonizing species, such as Kangaroo Apple and Black Wattle. The impenetrable nature of this regrowth means it is still unlikely to be supporting the recovery of all ground-dwelling or mid-storey species two years after the fires. To highlight this issue, property owners at one of our survey sites lost 1,000 trees in the fires, which they had planted over five years. In post-fire Landcare projects, they have re-planted most of these, but only after removing hundreds of new wattles which had come up after the fires.

In contrast, where there were the most extreme and catastrophic fire events, causing the loss of all habitats, seed stocks and soil after post-fire rain events, there is still minimal vegetation and regrowth.

Understorey regrowth near Berrara in February 2022 – Rob Dunn

Across the thousands of hectares of burnt landscapes in national parks and forests, regrowth continues to follow its natural course. It remains unclear how long it will take for the pre-fire diversity and densities of plant species to re-establish through natural processes. Until this occurs, the variation in habitat recovery across the Shoalhaven is likely to advantage some bird species, while disadvantaging others, for some time to come.

Minimal regrowth two years after the Currowan mega-fires – Rob Dunn



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 areas affected by the fires where bird surveys are completed for analysis and reporting.

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

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

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

Richness – Richness is a count of the number of species recorded in a survey and does not take into account their abundance. The number of surveys was 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.

2. Project aims

The project focused on the impacts of the 2019-20 bushfires on bird populations in the Shoalhaven Local Government Area on the NSW South Coast.

The project's primary aim was to examine changes in average bird species richness and abundance from the peak period of the bushfires in January 2020 to December 2022. There were insufficient bird surveys completed in the years before the fires for a meaningful comparison between average species richness and abundance before and after the fires.

The project also looked at the impacts of the bushfires on both individual and groups of species, species considered by the Australian Government as bushfire recovery priorities and in the Shoalhaven's KBAs.

The recovery in habitat after the fires varied markedly. After three years some high-fire severity sites with fertile soils had dense understorey regrowth. Conversely, large areas exposed to catastrophic fires and with less fertile soils showed minimal regrowth. To analyse the impact on average species richness and abundance of this variation in regrowth is beyond the scope of this project.

There have been no further bushfires in the Shoalhaven since the summer of 2019-20, so the project has not needed to consider the impact of secondary bushfires.

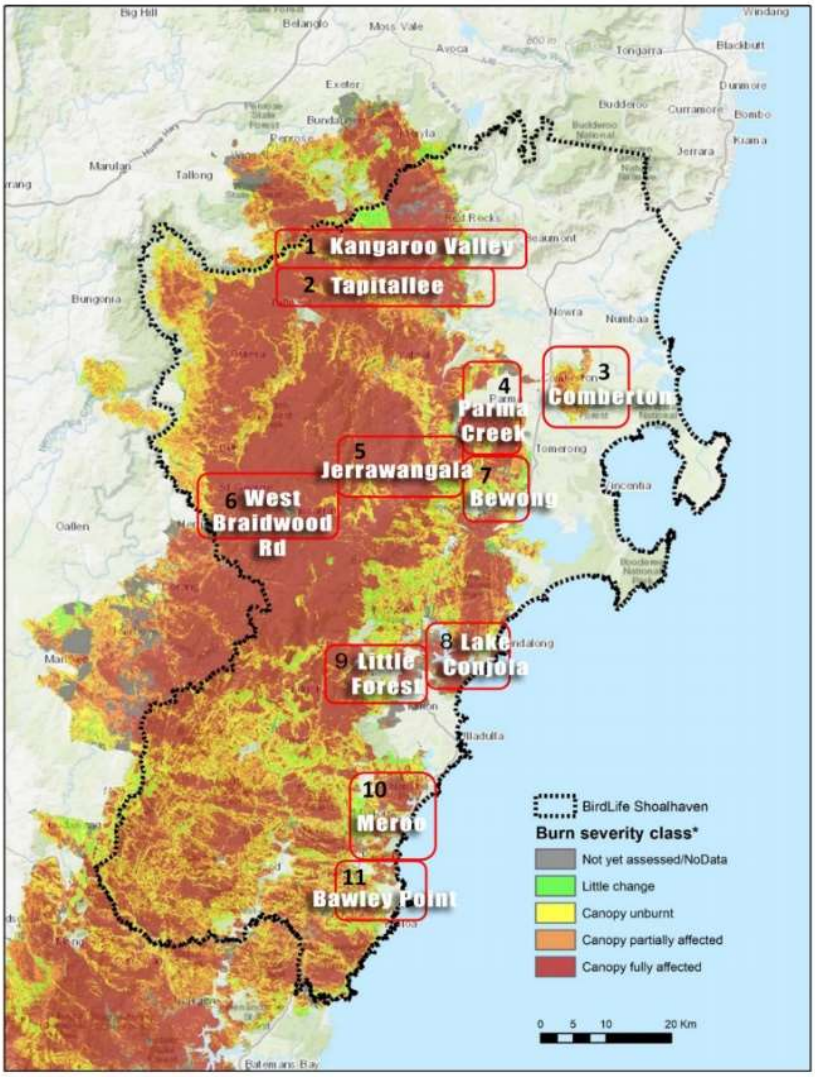
The project only covered the three years after the fires. It will take many years of consistent data and scientific statistical analysis before firm conclusions can be drawn about the full impact of the fires on bird populations.

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 coordination. This meant that surveys were completed by volunteers familiar with both 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, several sites were identified as 'repeat survey sites' in consultation with the principal volunteers in each cluster. Some sites, that were not on private land, were set up in Birdata as 'shared sites' to facilitate surveys by other volunteers and bird groups, helping to 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.

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

4. Project database

A stand-alone 'BRP Database' was 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 brought together data from various sources for analysis:

- BirdLife's Birdata database - volunteer details, site information, fire assessment information, survey data
- Shoalhaven species list and family groups, 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 Birdata
- Desk-top analysis to detail site land tenure and cluster

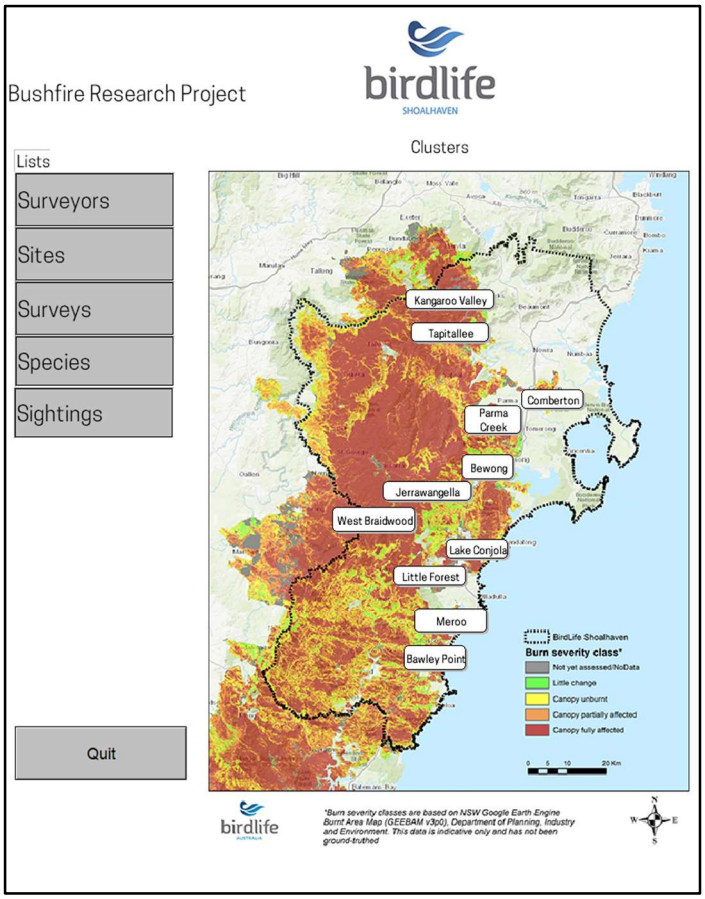
These data were then exported into Excel to calculate average species richness and abundance and detection rates.

The survey design made robust statistical analysis of these data difficult. However, the presentation of results in the report, project an authentic representation of the differences in average species richness and abundance at burnt and unburnt sites, as experienced by all surveyors over the three years.

As an example of the method of analysis used in the report:

- Average species richness in high fire severity sites for a given month is calculated by:
  The total of the species' count in all surveys in each month at high fire severity sites
  Divided by
  The number of surveys at high fire severity sites in each month
  The result for each month was then graphed with a logarithmic trendline added.
  The same logic was used for the calculation for average species abundance, but based on the total number of birds recorded, regardless of the species.
- The calculation of richness and abundance for all burnt sites was based on surveys at all high, medium and light fire severity sites.
- Detection rates relate to the records of a given species, as a percentage of the number of surveys in burnt or unburnt sites.

Species
- **Family**
- **Feeding guild**
- **Nesting guild**



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

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

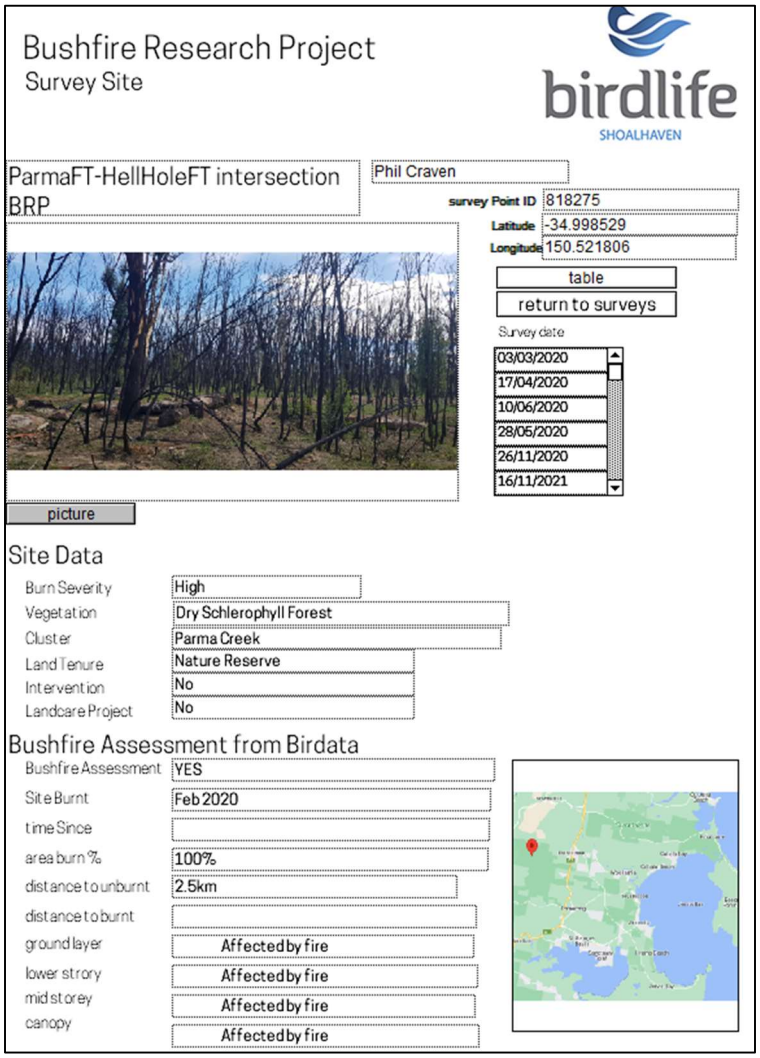


Figure 2 - Example of survey site page in BRP database

5. Survey methodology

All surveys involved searching for birds in a 2 ha. area for 20 mins. based on BirdLife Australia's standard survey method. Refer to Figure 3.

Key details of this method are:

- The shape of the 2 ha. area is 100 m x 200 m, 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 in one survey should be avoided.
- The centre point of two survey sites should be more than 400m. distance apart.

All surveys were completed by experienced birdwatchers, who can identify all birds by sight and most by call and are familiar with bird survey techniques.

Due to a range of issues, such as accessibility, remoteness, and safety, it was not possible to select a random selection of survey sites across all fire-effected area. This meant the extensive and remote areas of the Currowan mega-fire were under-represented. However, through discussion with volunteers, changes were made with sites selected to get a broad geographical spread of surveys.

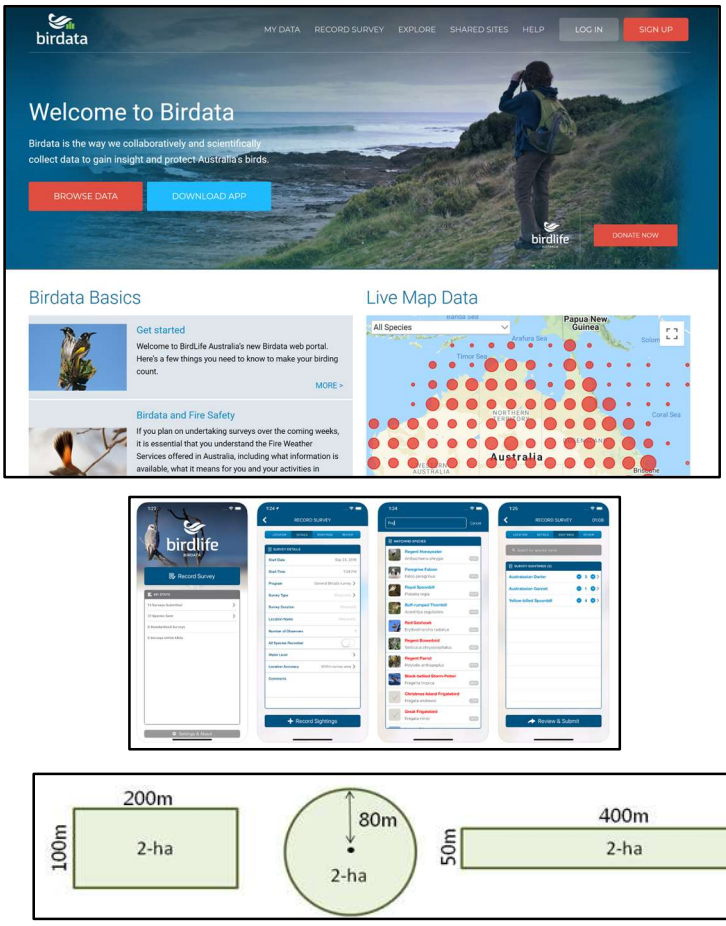


Figure 3 – BirdLife Australia's Birdata portal, App and examples of measurements of 2ha sites

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

1. Sites & surveys

This report analyses the data collected over three years from 744 bird surveys, using BirdLife's 2 ha. 20 min. survey method. All surveys were completed from the height of the peak period of the fires in January 2020 to December 2022.

The number of surveys reduced over the three years with a loss in motivation of some volunteers and the impact of Covid, although as the project was within one LGA, travel restrictions were not a major issue. Refer Table 1. However, there was an increasingly greater focus on the same sites by a smaller core volunteer team, leading to improved consistency in data.

Table 1 – Annual number of surveys

	Surveys
2020	345
2021	245
2022	154
Total	**744**

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.

Table 2 – Total bird surveys by fire severity and cluster

	High	Medium	Light	Total burnt	Unburnt	Grand Total
Bawley Point	11	18	36	**65**	69	**134**
Bewong	2	19		**21**	8	**29**
Comberton	3	17	12	**32**	7	**39**
Jerrawangala	41	23	16	**80**	1	**81**
Kangaroo Valley	24		2	**26**	51	**77**
Lake Conjola	42	46	9	**97**	20	**117**
Little Forest	8			**8**		**8**
Meroo		12	12	**24**	13	**37**
Parma Creek	21	20	25	**66**	1	**67**
Tapitallee	14	34		**48**	59	**107**
West Braidwood	35	2	1	**38**	10	**48**
Grand Total	**201**	**191**	**113**	**505**	**239**	**744**

Table 3 - *Total bird surveys by season and fire severity*

	High	Medium	Light	Total burnt	Unburnt	Total
2020	**112**	**86**	**45**	**243**	**102**	**345**
Summer	15	20	10	**45**	16	61
Autumn	36	24	13	**73**	22	95
Winter	33	18	8	**59**	24	83
Spring	28	24	14	**66**	40	106
2021	**55**	**74**	**45**	**174**	**71**	**245**
Summer	19	22	16	**57**	18	75
Autumn	10	25	9	**44**	18	62
Winter	11	14	13	**38**	10	48
Spring	15	13	7	**35**	25	60
2022	**34**	**31**	**23**	**88**	**66**	**154**
Summer	11	3	4	**18**	23	41
Autumn	7	9	6	**22**	13	35
Winter	12	9	6	**27**	15	42
Spring	4	10	7	**21**	15	36
Grand Total	**201**	**191**	**113**	**505**	**239**	**744**

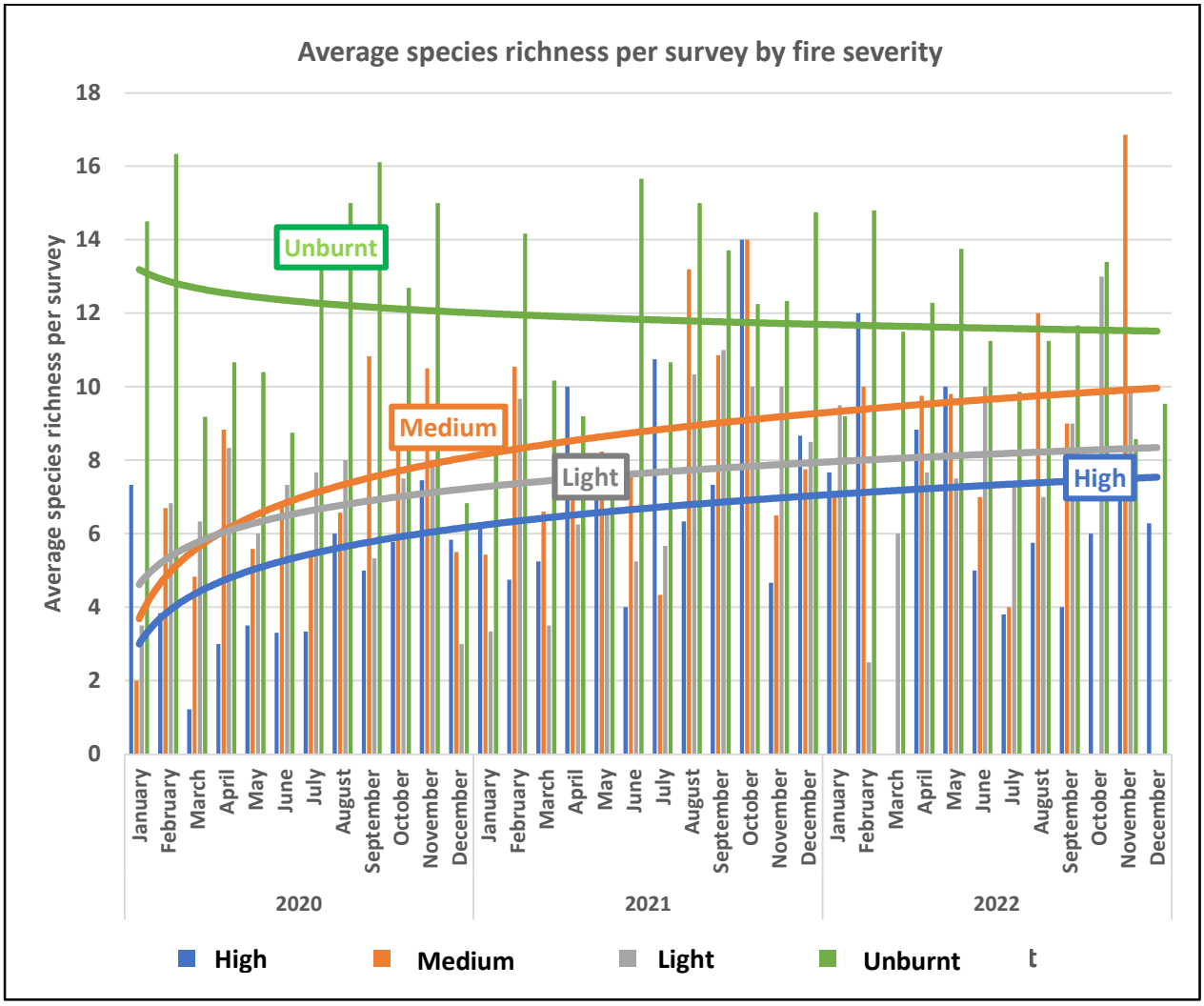
Approx. 75% of surveys were completed between 7am and 11am in line with the survey methodology.

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

2. Species richness

Graph 1 shows there were increases over time in terms of average species richness per survey at sites within the project's clusters, regardless of their fire severity.

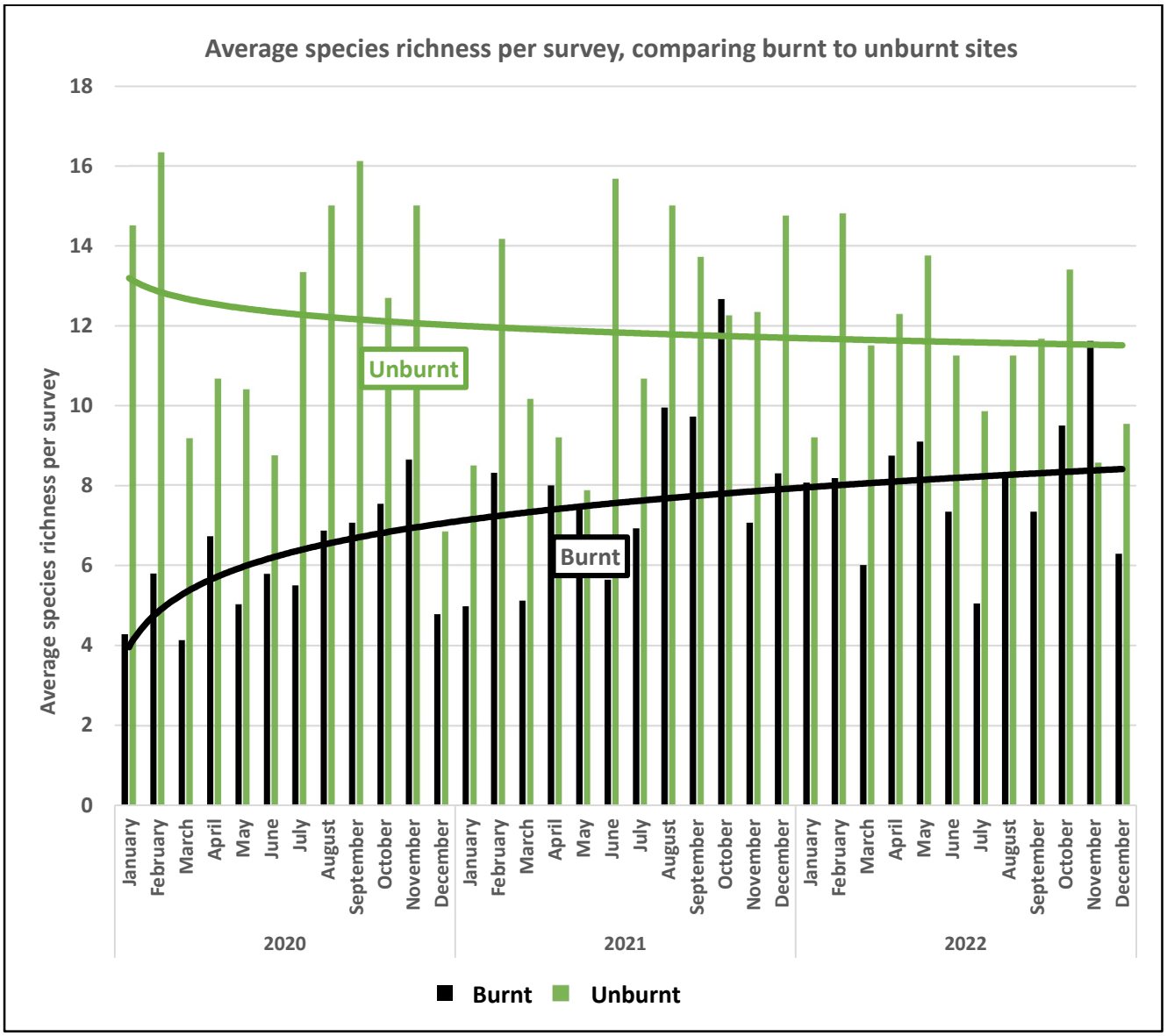
While it would be expected that average species richness at sites of light fire severity would be higher than at medium fire severity sites, the results did not show this, which could be the impact of marked variations in habitat recovery.



Graph 1 – Average species richness per survey by fire severity with logarithmic trendlines indicated

The general improvement in average species richness per survey over the three years can be more easily seen in Graph 2, which compares burnt sites, regardless of the fire severity, to unburnt sites. This shows that the gap in average species richness per survey between burnt and unburnt sites has reduced gradually over the three years. This suggests some movement of species from unburnt sites back into burnt sites as the habitat recovers.

However, given the lack of historic survey data in the cluster areas, it is not possible to assess how long it could take for species richness to return to pre-fire levels, even ignoring any future fire or other environmental impacts.

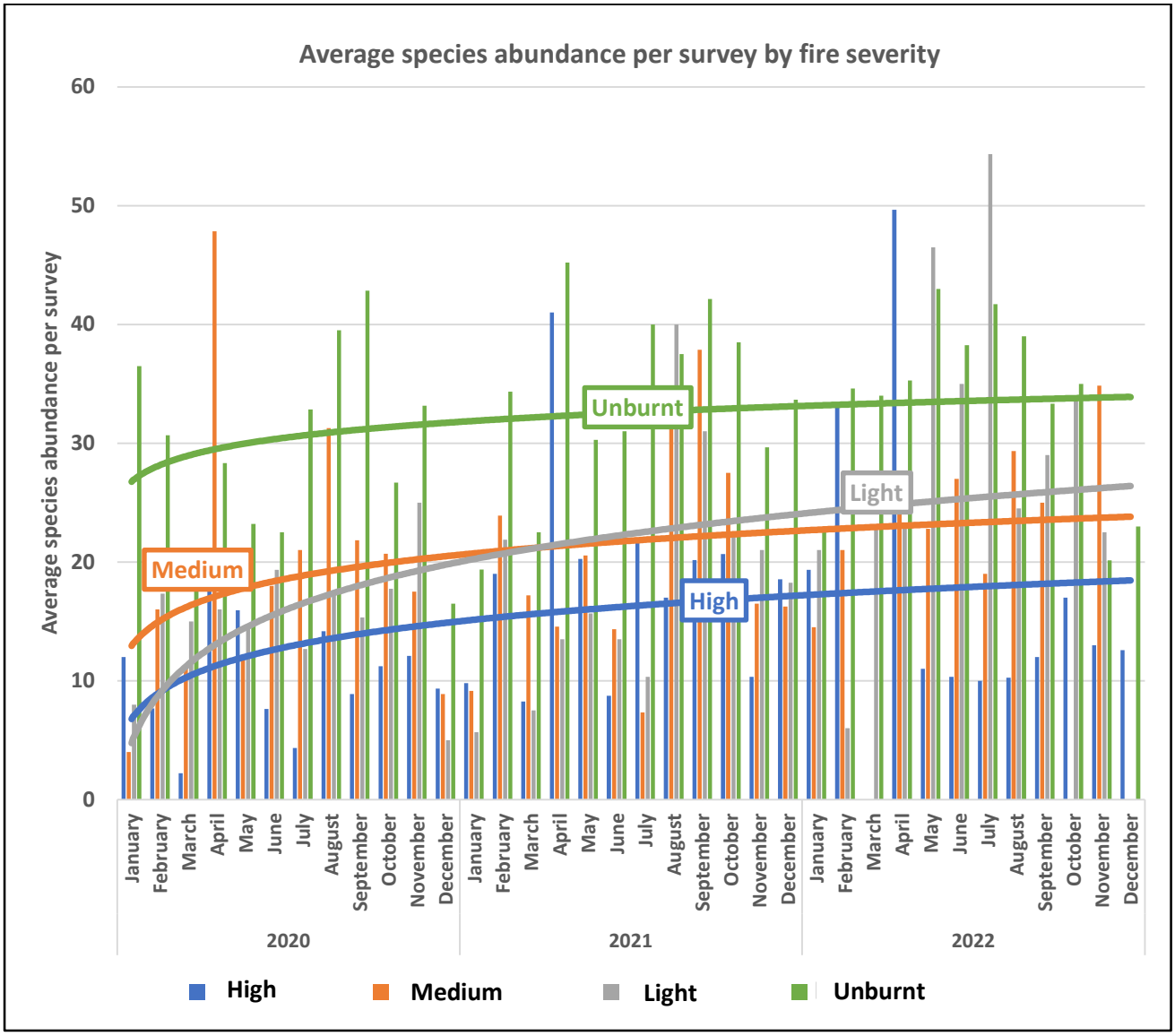


Graph 2 – Average species richness per survey, comparing burnt (an average of high, medium and light severity) to unburnt sites, with logarithmic trendlines indicated

The survey design makes robust statistical analysis of these data difficult, however, the combined observations in Graphs 1 and 2, project an authentic representation of the differences in average species richness, as experienced by all surveyors over the three years.

3. Species abundance

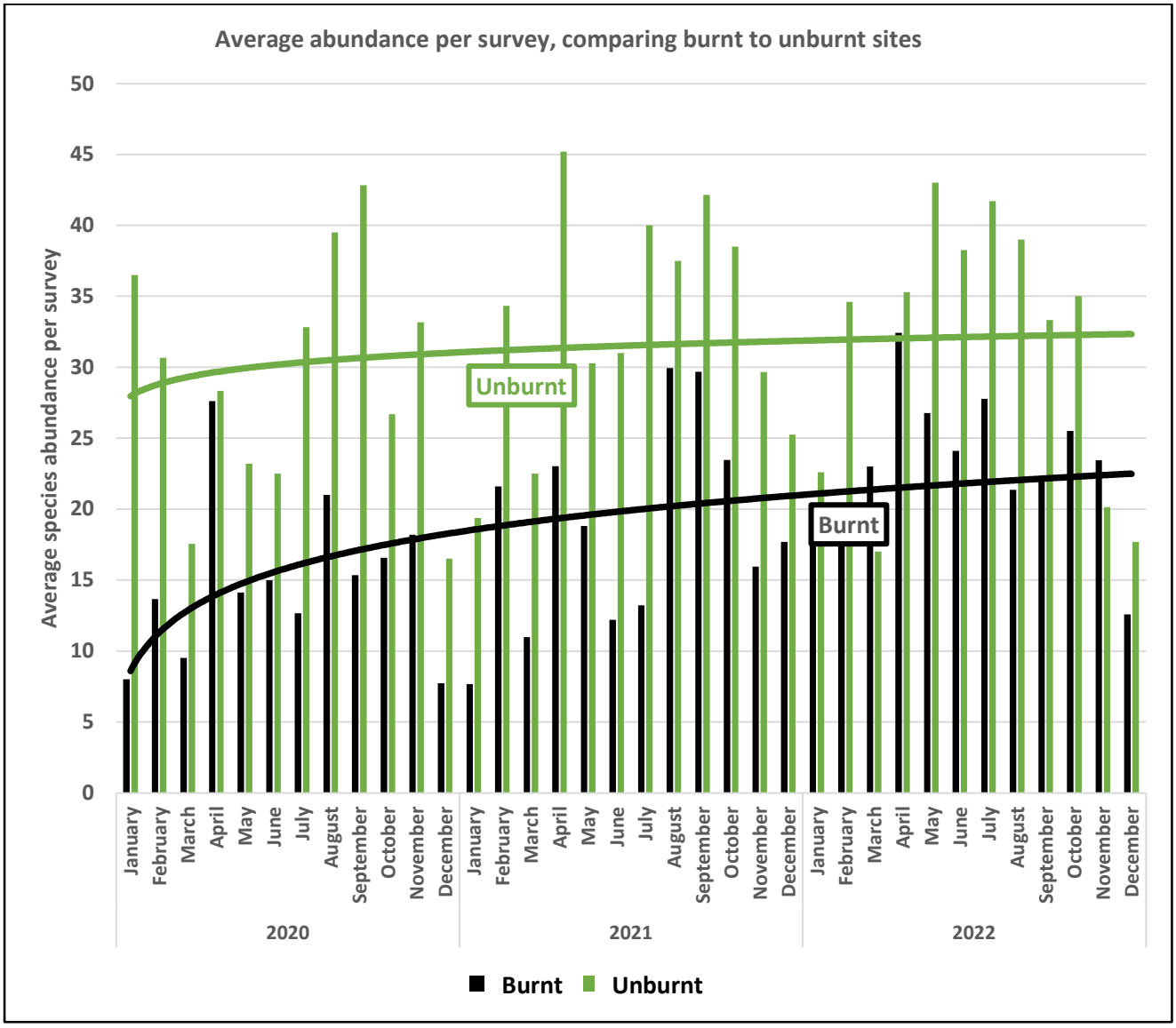
Graph 3 shows there was little increase over time in terms of average species abundance at sites within the project's clusters, regardless of their fire severity.



Graph 3 – Average species abundance per survey by fire severity with logarithmic trendlines indicated

The lack of improvement in average species abundance over the three years can be more easily seen in Graph 4, which compares burnt sites, regardless of the fire severity, to unburnt sites. This shows that the gap in average species abundance between burnt and unburnt sites has not been reduced to any degree.

This contrasts with the gradual improvement in average species richness as shown in Section 2. This suggests that, while there was some movement of species from unburnt sites back into burnt sites as the habitat recovered, the habitat may not have been able to support the same abundance of birds that were utilising unburnt habitats.



Graph 4 – Average species abundance per survey, comparing burnt (an average of high, medium and light severity) to unburnt sites, with logarithmic trendlines indicated

The survey design makes robust statistical analysis of these data difficult, however, the combined observations in Graphs 3 and 4, project an authentic representation of the differences in average species abundance, as experienced by all surveyors over the three years.

4. Species analysis

1. Recorded species

A list of species, excluding waterbirds, recorded in surveys is shown in the appendix. The species list was extracted from the BRP Database, sorted by family group, and the average detection rate per survey for each species was calculated at burnt and unburnt sites in each of the three years.

Table 4 shows that a similar number of species were seen each year in burnt and unburnt sites despite the declining number of surveys each year, which supports the improvement in average species richness over the three years.

Table 4 – The number of species recorded in burnt and unburnt sites each year and over the combined three years

Year		Species recorded	Total bird surveys
2020	**Burnt**	92	243
2020	**Unburnt**	93	102
2021	**Burnt**	93	174
2021	**Unburnt**	87	71
2022	**Burnt**	74	88
2022	**Unburnt**	87	66
Overall	**Burnt**	114	505
Overall	**Unburnt**	108	239
Overall	**Burnt and unburnt**	131	744

2. Species analysis

Some general observations can be made on the detection rates for certain groups of species:

- Several birds most commonly found in the forests of the region showed relatively high detection rates in both burnt and unburnt sites each year. These included both smaller birds, that can be assumed to have moved shorter distances from adjacent unburnt areas, like thornbills, pardalotes and grey fantails, and larger birds that could have moved larger distances. Refer Table 5.
- Most species of honeyeater were recorded in burnt and unburnt sites at similar detection rates. This could be due to their normal dispersal over distance in large numbers. Refer Table 6.
- Several rainforest and wet sclerophyll species were recorded at burnt sites, though with higher detection rates in unburnt sites. Refer Table 7.
- Several migratory species were recorded in burnt and unburnt sites at similar detection rates. Refer Table 8.

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

Table 5 – Average number of surveys common forest birds were detected in burnt and unburnt sites by year

Common Name	Scientific Name	2020	2021	2022	2020	2021	2022
		Burnt	Burnt	Burnt	Unburnt	Unburnt	Unburnt
Eastern Yellow Robin	*Eopsaltria australis*	26%	22%	23%	40%	35%	27%
Superb Fairy-wren	*Malurus cyaneus*	10%	15%	30%	21%	27%	29%
Grey Fantail	*Rhipidura fuliginosa*	38%	45%	42%	57%	48%	39%
Eastern Spinebill	*Acanthorhynchus tenuirostris*	19%	38%	44%	28%	25%	38%
Australian Raven	*Corvus coronoides*	17%	15%	16%	25%	27%	18%
Pied Currawong	*Strepera graculina*	13%	15%	25%	23%	21%	26%
Laughing Kookaburra	*Dacelo novaeguineae*	11%	18%	17%	26%	28%	27%
Crimson Rosella	*Platycercus elegans*	14%	18%	18%	40%	18%	29%
Brown Thornbill	*Acanthiza pusilla*	34%	31%	50%	52%	41%	53%
White-throated Treecreeper	*Cormobates leucophaea*	34%	36%	23%	28%	25%	27%
Golden Whistler	*Pachycephala pectoralis*	19%	19%	31%	50%	38%	27%
Grey Shrike-thrush	*Colluricincla harmonica*	18%	30%	31%	35%	18%	14%
Australian Magpie	*Gymnorhina tibicen*	11%	15%	11%	41%	31%	15%
Average for selected species		20%	25%	28%	36%	29%	28%

Table 6 - Average number of surveys honeyeaters were detected in burnt and unburnt sites by year

Common Name	Scientific Name	2020	2021	2022	2020	2021	2022
		Burnt	Burnt	Burnt	Unburnt	Unburnt	Unburnt
Lewin's Honeyeater	*Meliphaga lewinii*	16%	24%	23%	56%	44%	24%
Little Wattlebird	*Anthochaera chrysoptera*	12%	9%	16%	16%	27%	21%
New Holland Honeyeater	*Phylidonyris novaehollandiae*	9%	8%	11%	12%	8%	11%
Noisy Friarbird	*Philemon corniculatus*	7%	7%	9%	9%	7%	14%
Red Wattlebird	*Anthochaera carunculata*	12%	16%	13%	10%	23%	15%
Scarlet Honeyeater	*Myzomela sanguinolenta*	3%	1%	1%	7%	4%	8%
Eastern Spinebill	*Acanthorhynchus tenuirostris*	19%	38%	44%	28%	25%	38%
White-cheeked Honeyeater	*Phylidonyris niger*	1%	3%	1%		3%	3%
White-eared Honeyeater	*Nesoptilotis leucotis*	3%	2%	5%	2%		2%
White-naped Honeyeater	*Melithreptus lunatus*	7%	7%	5%	5%	3%	2%
Yellow-faced Honeyeater	*Caligavis chrysops*	59%	61%	66%	29%	42%	44%
Yellow-tufted Honeyeater	*Lichenostomus melanops*	4%	4%	3%	3%		3%
Average for selected species		13%	15%	17%	15%	15%	15%

Table 7 – Average number of surveys rainforest and wet sclerophyll species were detected in burnt and unburnt sites by year

Common Name	Scientific Name	2020	2021	2022	2020	2021	2022
		Burnt	Burnt	Burnt	Unburnt	Unburnt	Unburnt
Rufous Fantail	*Rhipidura rufifrons*	1%	1%	4%	12%	10%	5%
Lewin's Honeyeater	*Meliphaga lewinii*	16%	24%	23%	56%	44%	24%
Brown Cuckoo-Dove	*Macropygia phasianella*	1%		1%	13%	6%	5%
Wonga Pigeon	*Leucosarcia melanoleuca*	0%	3%	2%	21%	11%	5%
White-headed Pigeon	*Columba leucomela*	1%			5%	1%	3%
Sacred Kingfisher	*Todiramphus sanctus*	3%	2%	5%		4%	3%
Superb Lyrebird	*Menura novaehollandiae*	9%	17%	14%	28%	15%	15%
Satin Bowerbird	*Ptilonorhynchus violaceus*	4%	12%	5%	31%	31%	27%
Average for selected species		4%	7%	7%	21%	15%	11%

Lewin's Honeyeater was recorded relatively regularly in burnt sites – Charles Dove

Table 8 – Average number of surveys migratory species were detected in burnt and unburnt sites by year

Common Name	Scientific Name	2020	2021	2022	2020	2021	2022
		Burnt	Burnt	Burnt	Unburnt	Unburnt	Unburnt
Rose Robin	*Petroica rosea*	2%	2%	2%	15%	1%	3%
Dollarbird	*Eurystomus orientalis*	1%		4%	4%		2%
Black-faced Monarch	*Monarcha melanopsis*	1%	4%	1%	8%	10%	9%
Leaden Flycatcher	*Myiagra rubecula*	2%	3%	1%	2%	1%	2%
Olive-backed Oriole	*Oriolus sagittatus*	6%	5%	8%	6%	8%	3%
Gang-gang Cockatoo	*Callocephalon fimbriatum*	1%	1%	3%	3%	8%	2%
Average for selected species		2%	2%	3%	6%	5%	3%

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

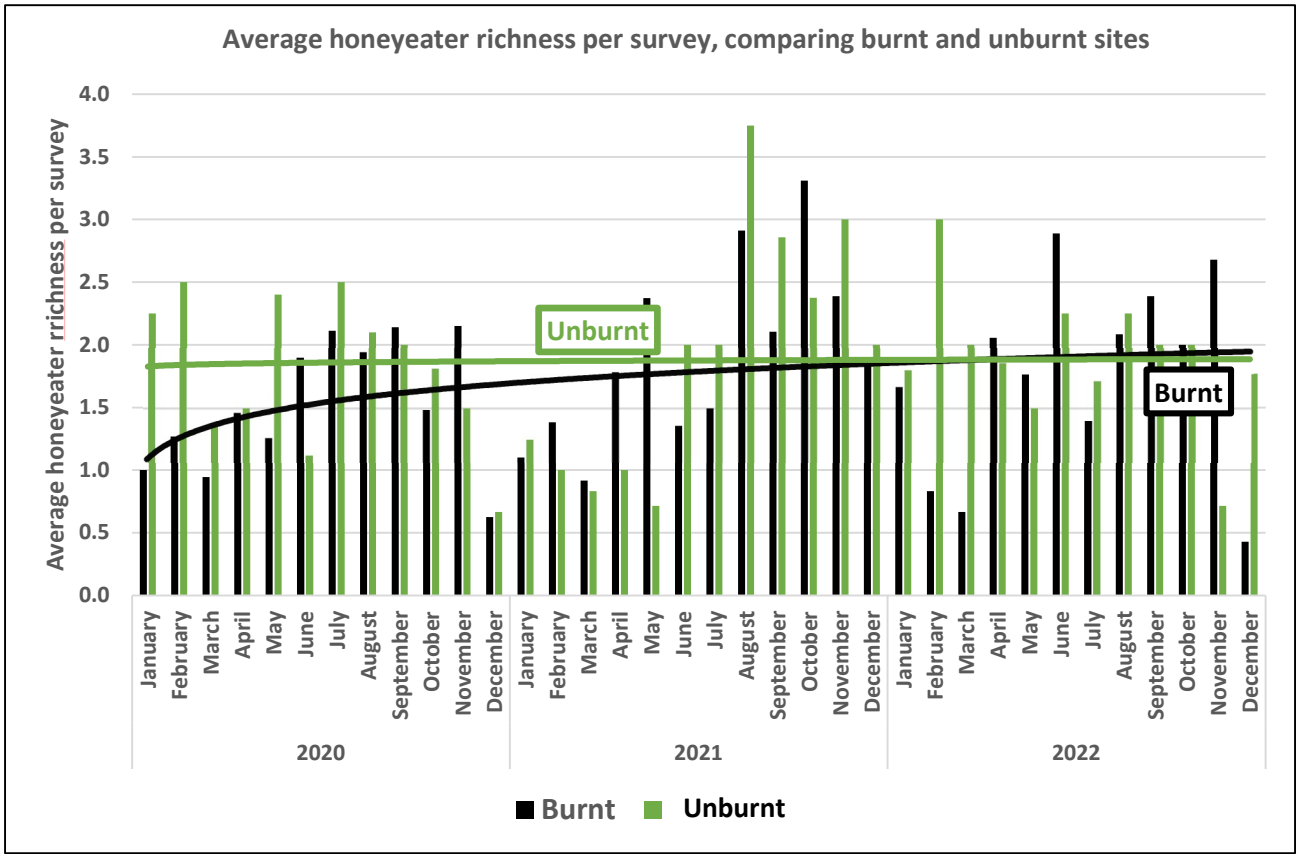
However, to draw any firm conclusions on the recovery of individual species or groups of species is extremely difficult, given the marked variations in habitat recovery.

Some high-fire severity sites with fertile soils have a dense understorey regrowth. This is impenetrable in some locations and could impede movement and foraging by some species. In contrast, large areas exposed to catastrophic fires and with less fertile soils showed minimal regrowth after three years. These variations could advantage some species and disadvantage others, as the pre-fire diversity and relative density of habitat slowly return. Each species' life history will ultimately determine its recovery in this changing landscape.

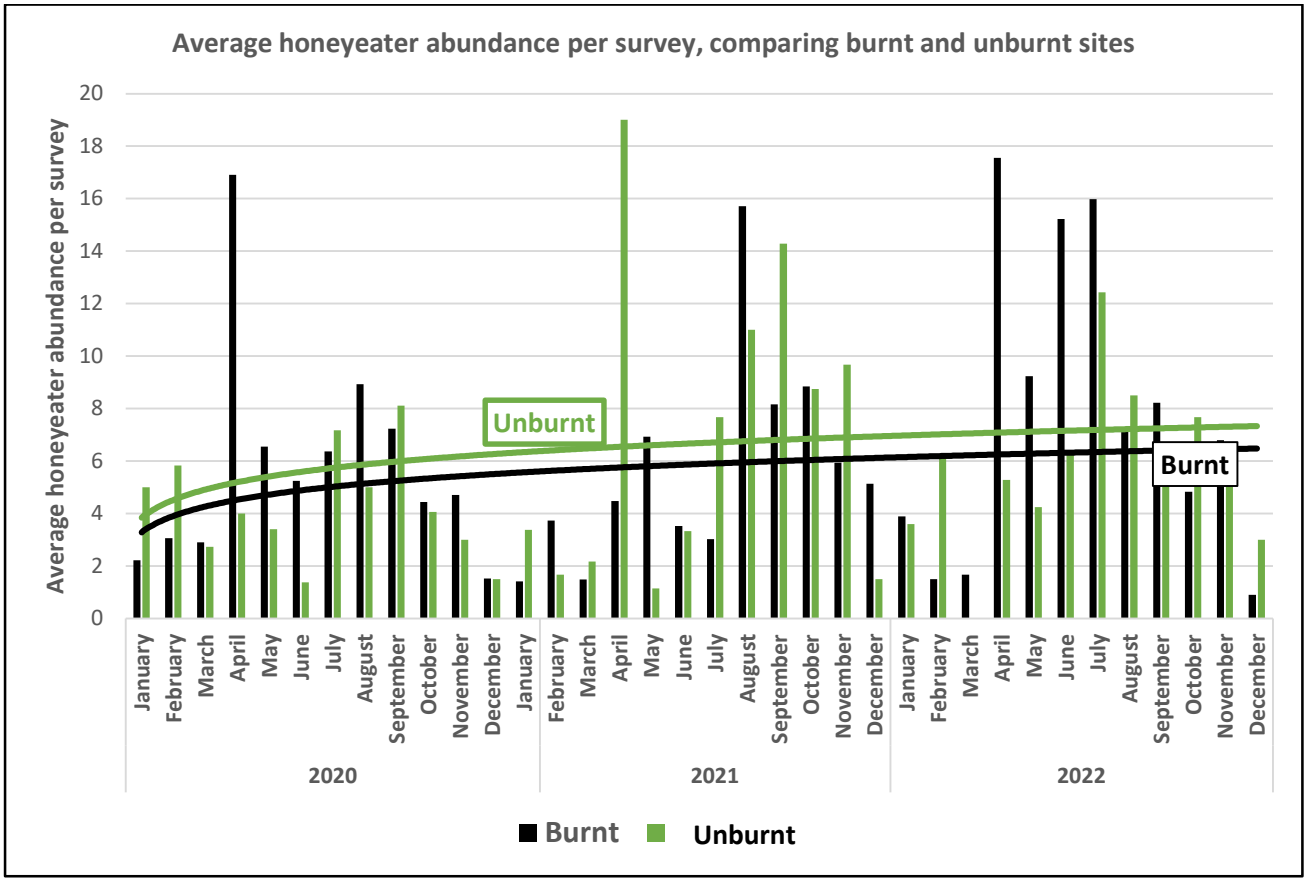
Based on this assumption, it would seem logical that generalists have recovered more quickly than specialist species. Given the limited scope of the project, this was only tested by an analysis of honeyeater species richness and abundance.

Graph 5 shows that after three years there was no difference in average honeyeater richness between burnt and unburnt sites. This is a marked contrast with Graph 2 for all species and suggests the honeyeaters as generalists, feeding on insects and nectar, dispersed more widely compared to other species.

However, this was not the case in terms of honeyeater abundance, as shown in Graph 6, which shows there is still a difference between burnt and unburnt sites, in line with Graph 4 for all species. This reinforces the key finding in this report that, while species are slowly returned to burnt areas, this has not happened in large numbers, even in the case of highly mobile and feeding generalists, like honeyeaters.



Graph 5 – Average honeyeater richness per survey, comparing burnt and unburnt sites, with logarithmic trendlines indicated



Graph 6 – Average honeyeater abundance per survey, comparing burnt and unburnt sites, with logarithmic trendlines indicated

3. Priority species

The Australian Government's list of species for 'Bushfire Recovery Priority' identified 17 bird species. Refer to Provisional list of animals requiring urgent management intervention Released on 20 March 2020 (environment.gov.au). These included 10 species that are found in the Shoalhaven, six of these were recorded in BRP surveys, namely the Black-faced Monarch, Gang-gang Cockatoo, Glossy Black-Cockatoo, Rockwarbler, Pilotbird and Superb Lyrebird. The average number of surveys these species were detected in is shown below in Table 9.

Table 9 – Average number of surveys species, which were identified in the Australia Government's Department of Environment's list of 'Bushfire Recovery Priority' species, were detected

		2020	2021	2022	2020	2021	2022
		Burnt	**Burnt**	**Burnt**	**Unburnt**	**Unburnt**	**Unburnt**
Black-faced Monarch	*Monarcha melanopsis*	1.65%	2.9%	1.1%	7.8%	9.9%	9.09%
Gang-gang Cockatoo	*Callocephalon fimbriatum*	1.23%	0.8%	3.4%	2.9%	8.5%	1.52%
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	0.41%	0.4%		2.9%	1.4%	3.03%
Pilotbird	*Pycnoptilus floccosus*	0.82%	1.2%	3.4%			
Rockwarbler	*Origma solitaria*	3.70%	2.5%	4.5%			3.03%
Superb Lyrebird	*Menura novaehollandiae*	11.11%	13.6%	14.8%	28.4%	15.5%	15.15%

The **Superb Lyrebird** was recorded each year, including burnt sites. This suggests that the impact of the fires on lyrebirds was not as great as might have been expected, anecdotally due to its ability to

shelter in ground hollows. 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. Research by BirdLife Australia & La Trobe University in Gippsland and Eurobodalla is exploring the potential impact of the fires on lyrebirds' future breeding, given the reduction in its feeding resources in heavily burnt areas.

The **Rockwarbler** was also recorded in burnt sites each year. 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.

The migratory **Black-faced Monarch** and **Gang-gang Cockatoo** were recorded at both burnt and unburnt sites. One of the sightings of the monarch was in January 2020 at the height of the fires and a flock of 16 was recorded in June 2020.

The bushfires had a major impact on the **Glossy Black-Cockatoo**. With most of their range impacted by severe fires, flocks of 20-40 were recorded in unburnt habitat along the coast in 2020, 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.

The **Pilotbird** was also recorded each year.

Of the other four species found in the Shoalhaven:

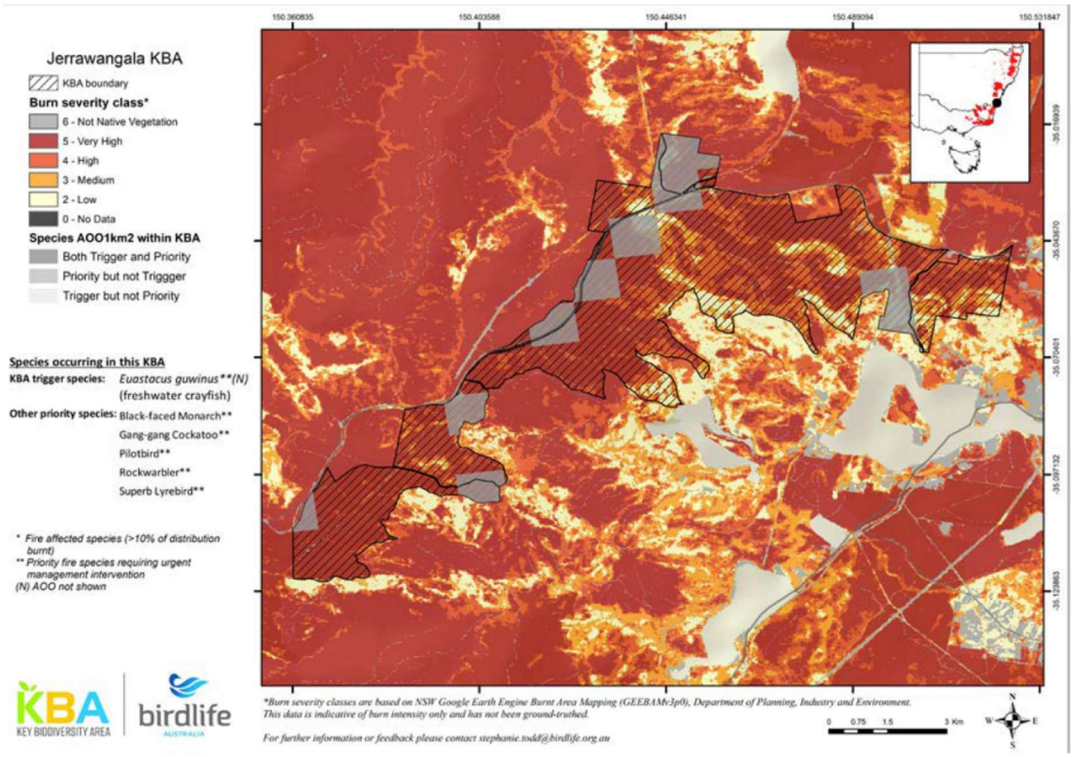
- Only part of the **Mainland Ground Parrot**'s range was burnt, and this was too remote for any surveys to be completed.
- The **Eastern Bristlebird**'s distribution was not impacted by the fires.
- The **Regent Honeyeater** and **Red-browed Treecreeper** are rarely seen and are considered vagrants to the Shoalhaven.

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

5. Key Biodiversity Areas

The International Union for the Conservation of Nature (IUCN) is the world's largest environmental network with 1,300 Member organisations and is the global authority on the status of the natural world and the measures needed to safeguard it. It is this organisation that set the criteria for the identification of Key Biodiversity Areas that contribute significantly to the global persistence of biodiversity. BirdLife Australia applied the IUCN criteria to assess sites across Australia. Just over 300 met the criteria and four of these are in the Shoalhaven. The Jervis Bay KBA and Lake Wollumboola KBA were not impacted by the fires. The Jerrawangala KBA and Ulladulla to Merimbula KBA 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 covers 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 were 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 boundary of the KBA, as defined in BirdLife Australia's Birdata portal, two Gang-gang Cockatoo, one Superb Lyrebird and one Black-faced Monarch were recorded in 15 surveys. However, when analysing the 103 surveys within the combined area of the KBA, plus the surrounding 5kms, all five priority species were recorded. Refer to Table 10 and Figures 4 & 5.

This is explained by the topography surrounding the KBA, which comprises of sharp escarpments

with wet gullies, creeks, and rainforests below with extensive regrowth since the fires. This is the ideal habitat for each of the priority species, compared to the plateau within the KBA with a much drier forest. Refer to Table 10.

These surrounding areas are important sanctuaries for these priority bird species to use while the KBA habitat recovers.

Gang-gang Cockatoo – Duade Paton

Table 10 – Number of surveys BirdLife's priority species detected in the Jerrawangala KBA only and the same area plus a buffer of 5kms.

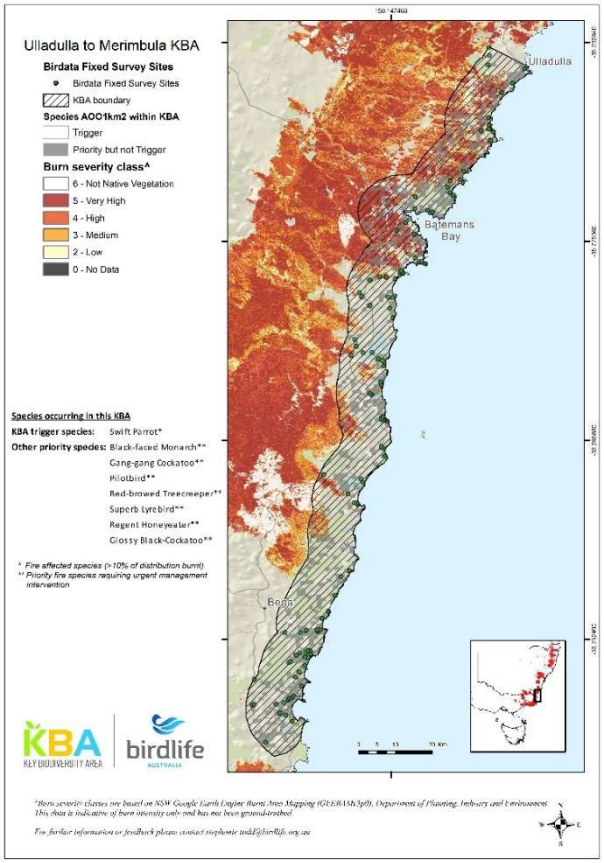
Common name	Scientific name	Jerrawangala KBA only	Jerrawangala KBA plus 5kms
Black-faced Monarch	*Monarcha melanopsis*	7% (1 of 15 surveys)	9% (8 of 103 surveys)
Gang-gang Cockatoo	*Callocephalon fimbriatum*	13% (2 of 15 surveys)	2% (2 of 103 surveys)
Pilotbird	*Pycnoptilus floccosus*	0.0%	8% (8 of 103 surveys)
Rockwarbler	*Origma solitaria*	0.0%	11% (11 of 103 surveys)
Superb Lyrebird	*Menura novaehollandiae*	7% (1 of 15 surveys)	28% (29 of 103 surveys)

2. Ulladulla to Merimbula KBA

The Ulladulla to Merimbula KBA covers 217,000ha of which 35% was affected by fire. While only the northern part of the KBA is within the Shoalhaven, the following results are based on the 450 surveys in Birdata for the entire KBA, as shown in Map 5. These surveys recorded 168 species.

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

There were no sightings of the Swift Parrot in the three years, while of the other seven priority species, only the Black-faced Monarch, Gang-gang Cockatoo, Glossy Black-Cockatoo and Superb Lyrebird were recorded – Refer Table 11.



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

Table 11 – Average number of surveys BirdLife's priority species were detected in the Ulladulla to Merimbula KBA

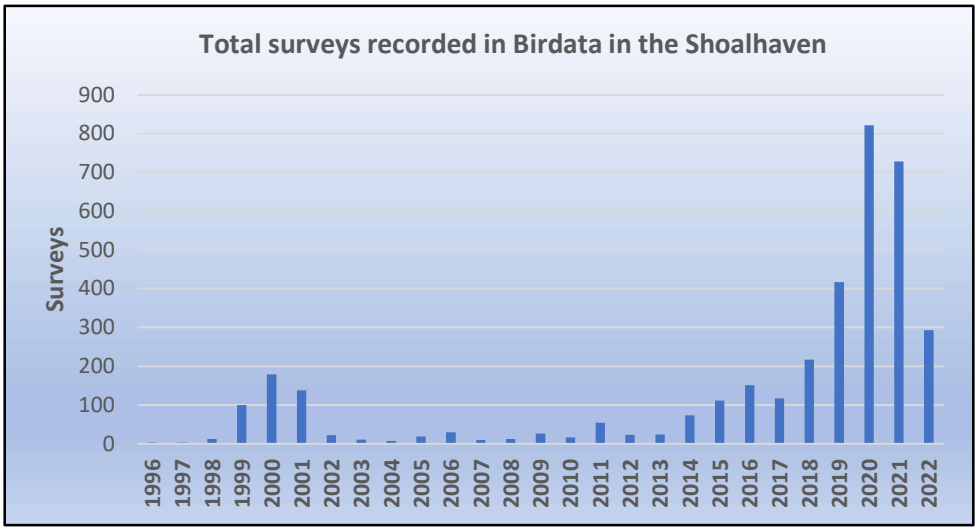
Common Name	Scientific Name	
Black-faced Monarch	*Monarcha melanopsis*	5.0% (23 of 450 surveys
Gang-gang Cockatoo	*Callocephalon fimbriatum*	1.9% (9 of 450 surveys)
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	1.3% (6 of 450 surveys)
Superb Lyrebird	*Menura novaehollandiae*	4.6% (23 of 450 surveys

6. Social outcomes

While the project focused on the impact of the fires on birds, the social outcomes should not be ignored.

The project was not initiated by BirdLife Shoalhaven, but rather evolved as birdwatchers went out to places near where they lived to carry out bird surveys after the fires. This was a spontaneous response by individuals wanting to contribute to the bushfire recovery process.

This was seen in the marked increase in the number of surveys submitted to Birdata from the beginning of 2020 and into 2021 – Refer Graph 7. (It is interesting to note that the high surveys in 2000 was the time of the last fires in the Shoalhaven.) At this point, BLS realised that they had an important role to play to analyse these surveys and add value to this sudden uptake in effort by its members.



Graph 7 - Total 20min 2ha surveys recorded in Birdata in the Shoalhaven

This project was launched by Dr Martine Maron, President of BirdLife Australia, at an event in Mollymook on 8 March 2020. It was one of the first events to bring people together after the fires to share experiences and learn more about the impact of the fires on birds and other fauna and flora. All three levels of government were represented and the Welcome to Country by a local elder reminded us that the original custodians of the land had been especially affected. The bushfires in the Shoalhaven had been confirmed as extinguished only a few weeks before and nearby Shoalhaven City Council's main fire evacuation centre was still giving much-needed support to the local community. So, there was a real concern that it might be too soon to hold this event. This proved to be misplaced with over 130 attending. Everyone wanted to come together to share experiences, as well as hear about the impacts of the fires on local wildlife.

The BLS Summer Magazine was distributed in February 2020 and included observations of the fire's impacts on birds. It was arguably the first publication to have done this. Throughout the three years, the BLS Magazine played a key role in communications about the project. It provided regular updates, interviews with landowners and analysis of changes at specific sites by surveyors.

Later in 2020, our project was expanded through a partnership with Shoalhaven Landcare. New survey sites were set up on private properties where Landcare on-ground projects had been devastated by the fire. On some properties, homes, sheds, businesses, and fencing had also been lost. This initiative allowed landowners to learn more about the birds on their own properties through our Bird for Beginners talks and bird walks. It also allowed birdwatchers to learn more about Landcare and several helped at post-fire recovery planting and weeding days.

BLS and Shoalhaven Landcare members at a planting day at one of the survey sites

In January 2021 on the first anniversary of the end of the Currowan mega-fire, BLS was involved in the New Leaves New Lives art exhibition in Ulladulla, which looked at loss and recovery in the natural world. An underlying theme was the power of immersion in nature to help people heal from the trauma of the fires. Lifeline South Coast was the main event sponsor. BLS contributed a display of members' bird photographs and gave talks on the early findings of the project. The photographs were later displayed in the Eurobodalla Botanic Gardens and Jervis Bay Maritime Museum.

This project has evolved over three years and became multi-faceted; sharing bird observations, completing surveys, preparing reports and articles, helping landowners, supporting arts events, running bird courses, organising bird walks, and giving presentations to community groups. Importantly, new connections have been made through a prolong period of loss and slow recovery.

Fundamentally the project has been just as much about the people involved and their experiences shared, than the changes in birds that have been recorded.

Appendix – Species list

The table below shows the average number of surveys each species, excluding waterbirds, was detected each year at burnt and unburnt sites. Blank cells means the species was not recorded. 0% is the result of rounding, but means the species was still recorded.

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
Australian Robins	Eastern Yellow Robin	*Eopsaltria australis*	26%	22%	23%	40%	35%	27%
	Flame Robin	*Petroica phoenicea*		0%				
	Jacky Winter	*Microeca fascinans*				4%		2%
	Red-capped Robin	*Petroica goodenovii*	0%					
	Rose Robin	*Petroica rosea*	2%	2%	2%	15%	1%	3%
	Scarlet Robin	*Petroica multicolor*		1%	1%			
Bowerbirds and Catbirds	Green Catbird	*Ailuroedus crassirostris*				3%	7%	3%
	Satin Bowerbird	*Ptilonorhynchus violaceus*	4%	12%	5%	31%	31%	27%
Bulbuls	Red-whiskered Bulbul	*Pycnonotus jocosus*				3%		2%
Button-quail	Painted Button-quail	*Turnix varius*		2%			1%	
Chough and Apostlebird	White-winged Chough	*Corcorax melanorhamphos*			2%			
Cockatoos and Corellas	Galah	*Eolophus roseicapilla*	3%	1%	2%	7%	11%	11%
	Gang-gang Cockatoo	*Callocephalon fimbriatum*	1%	1%	3%	3%	8%	2%
	Glossy Black-Cockatoo	*Calyptorhynchus lathami*	0%	0%		3%	1%	3%
	Little Corella	*Cacatua sanguinea*	1%	1%		3%	4%	8%
	Sulphur-crested Cockatoo	*Cacatua galerita*	0%	1%	1%	8%	13%	14%
	Yellow-tailed Black-Cockatoo	*Zanda funereus*	3%	7%	4%	12%	7%	11%
Crows and Ravens	Australian Raven	*Corvus coronoides*	17%	15%	16%	25%	27%	18%
Cuckoos	Brush Cuckoo	*Cacomantis variolosus*	2%	0%		6%	4%	3%
	Channel-billed Cuckoo	*Scythrops novaehollandiae*	0%		4%	1%	1%	
	Eastern Koel	*Eudynamys orientalis*	0%			3%	4%	3%
	Fan-tailed Cuckoo	*Cacomantis flabelliformis*	6%	6%	7%	11%	4%	6%
	Pallid Cuckoo	*Heteroscenes pallidus*	1%			1%	1%	

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
	Shining Bronze-Cuckoo	*Chalcites lucidus*	1%	1%	2%	16%	1%	3%
Cuckoo-shrikes and Trillers	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	6%	6%	10%	7%	11%	17%
	Cicadabird	*Edolisoma tenuirostris*	1%	1%		1%		2%
	White-winged Triller	*Lalage tricolor*				1%		
Dollarbird	Dollarbird	*Eurystomus orientalis*	1%		4%	4%		2%
Eagles, Kites and Goshawks	Brown Goshawk	*Accipiter fasciatus*	0%	2%			1%	
	Collared Sparrowhawk	*Accipiter cirrocephalus*		1%		1%		
	Grey Goshawk	*Accipiter novaehollandiae*	0%	2%		1%	4%	
	Square-tailed Kite	*Lophoictinia isura*	1%					
	Swamp Harrier	*Circus approximans*	0%	0%			1%	2%
	Wedge-tailed Eagle	*Aquila audax*	1%		1%	1%		
	Whistling Kite	*Haliastur sphenurus*	1%					2%
	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	1%	1%	1%	3%	3%	3%
Fairy-wrens, Emu-wrens and Grasswrens	Southern Emu-wren	*Stipiturus malachurus*	1%				3%	
	Superb Fairy-wren	*Malurus cyaneus*	10%	15%	30%	21%	27%	29%
	Variegated Fairy-wren	*Malurus lamberti*	3%	4%	5%	5%	1%	3%
Falcons	Australian Hobby	*Falco longipennis*		1%				
	Nankeen Kestrel	*Falco cenchroides*		0%			1%	
Fantails	Grey Fantail	*Rhipidura fuliginosa*	38%	45%	42%	57%	48%	39%
	Rufous Fantail	*Rhipidura rufifrons*	1%	1%	4%	12%	10%	5%
	Willie Wagtail	*Rhipidura leucophrys*	3%	2%	1%	7%	6%	5%
Flowerpeckers	Mistletoebird	*Dicaeum hirundinaceum*			1%	1%	1%	
Frogmouths	Tawny Frogmouth	*Podargus strigoides*	0%					
Hawk-Owls	Powerful Owl	*Ninox strenua*				1%		
	Southern Boobook	*Ninox boobook*		0%				2%
Honeyeaters and Chats	Brown-headed Honeyeater	*Melithreptus brevirostris*	0%	2%		2%	1%	
	Crescent Honeyeater	*Phylidonyris pyrrhopterus*	1%	2%				

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
	Eastern Spinebill	*Acanthorhynchus tenuirostris*	19%	38%	44%	28%	25%	38%
	Lewin's Honeyeater	*Meliphaga lewinii*	16%	24%	23%	56%	44%	24%
	Little Wattlebird	*Anthochaera chrysoptera*	12%	9%	16%	16%	27%	21%
	New Holland Honeyeater	*Phylidonyris novaehollandiae*	9%	8%	11%	12%	8%	11%
	Noisy Friarbird	*Philemon corniculatus*	7%	7%	9%	9%	7%	14%
	Noisy Miner	*Manorina melanocephala*				1%	1%	
	Red Wattlebird	*Anthochaera carunculata*	12%	16%	13%	10%	23%	15%
	Scarlet Honeyeater	*Myzomela sanguinolenta*	3%	1%	1%	7%	4%	8%
	White-cheeked Honeyeater	*Phylidonyris niger*	1%	3%	1%		3%	3%
	White-eared Honeyeater	*Nesoptilotis leucotis*	3%	2%	5%	2%		2%
	White-naped Honeyeater	*Melithreptus lunatus*	7%	7%	5%	5%	3%	2%
	Yellow-faced Honeyeater	*Caligavis chrysops*	59%	61%	66%	29%	42%	44%
	Yellow-tufted Honeyeater	*Lichenostomus melanops*	4%	4%	3%	3%		3%
Kingfishers	Azure Kingfisher	*Ceyx azureus*				1%		
	Laughing Kookaburra	*Dacelo novaeguineae*	11%	18%	17%	26%	28%	27%
	Sacred Kingfisher	*Todiramphus sanctus*	3%	2%	5%		4%	3%
Lyrebirds	Superb Lyrebird	*Menura novaehollandiae*	9%	17%	14%	28%	15%	15%
Monarch and Flycatchers	Black-faced Monarch	*Monarcha melanopsis*	1%	4%	1%	8%	10%	9%
	Leaden Flycatcher	*Myiagra rubecula*	2%	3%	1%	2%	1%	2%
	Magpie-lark	*Grallina cyanoleuca*	1%		1%	3%	4%	3%
	Satin Flycatcher	*Myiagra cyanoleuca*	0%					
Orioles and Figbirds	Olive-backed Oriole	*Oriolus sagittatus*	6%	5%	8%	6%	8%	3%
Pardalotes	Spotted Pardalote	*Pardalotus punctatus*	35%	49%	32%	19%	30%	24%
	Striated Pardalote	*Pardalotus striatus*	5%	18%	8%	2%	8%	2%
Parrots, Lorikeets and Rosellas	Australian King-Parrot	*Alisterus scapularis*	5%	11%	11%	14%	8%	11%
	Crimson Rosella	*Platycercus elegans*	14%	18%	18%	40%	18%	29%
	Eastern Rosella	*Platycercus eximius*		2%	1%		1%	2%

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
	Little Lorikeet	*Glossopsitta pusilla*		0%				
	Musk Lorikeet	*Glossopsitta concinna*	1%	0%	2%			
	Rainbow Lorikeet	*Trichoglossus moluccanus*	14%	15%	30%	27%	31%	36%
	Turquoise Parrot	*Neophema pulchella*		1%				
Pheasants and Quail	Brown Quail	*Synoicus ypsilophora*		1%				
Pigeons and Doves	Bar-shouldered Dove	*Geopelia humeralis*				1%	3%	3%
	Brown Cuckoo-Dove	*Macropygia phasianella*	1%		1%	13%	6%	5%
	Common Bronzewing	*Phaps chalcoptera*	2%	4%	1%		8%	8%
	Crested Pigeon	*Ocyphaps lophotes*				1%	1%	5%
	Spotted Dove	*Streptopelia chinensis*	0%	0%		3%		
	Topknot Pigeon	*Lopholaimus antarcticus*		0%		2%	4%	
	White-headed Pigeon	*Columba leucomela*	1%			5%	1%	3%
	Wonga Pigeon	*Leucosarcia melanoleuca*	0%	3%	2%	21%	11%	5%
Pipits and Wagtails	Australasian Pipit	*Anthus novaeseelandiae*	0%					
Plovers, Dotterel and Lapwings	Masked Lapwing	*Vanellus miles*			1%	4%	1%	9%
Reed-Warblers	Australian Reed-Warbler	*Acrocephalus australis*				2%	3%	2%
Shrike-tits	Crested Shrike-tit	*Falcunculus frontatus*	1%				1%	2%
Sittellas	Varied Sittella	*Daphoenositta chrysoptera*		1%	3%	1%		2%
Starlings	Common Myna	*Acridotheres tristis*				1%		
	Common Starling	*Sturnus vulgaris*				1%		
Swallows and Martins	Fairy Martin	*Petrochelidon ariel*					1%	
	Tree Martin	*Petrochelidon nigricans*	2%	1%		2%		
	Welcome Swallow	*Hirundo neoxena*	6%	4%	3%	6%	13%	15%
Swifts and Swiftlets	Fork-tailed Swift	*Apus pacificus*		1%				
	White-throated Needletail	*Hirundapus caudacutus*		1%				2%
Thornbills and Gerygones	Brown Gerygone	*Gerygone mouki*	4%	4%	6%	45%	18%	15%
	Brown Thornbill	*Acanthiza pusilla*	34%	31%	50%	52%	41%	53%

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
	Buff-rumped Thornbill	*Acanthiza reguloides*		1%	1%			
	Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*		1%				
	Pilotbird	*Pycnoptilus floccosus*	1%	2%	3%			
	Rockwarbler	*Origma solitaria*	3%	3%	4%			3%
	Striated Thornbill	*Acanthiza lineata*	12%	16%	17%	8%	10%	8%
	Weebill	*Smicrornis brevirostris*					1%	
	White-browed Scrubwren	*Sericornis frontalis*	8%	11%	25%	34%	23%	12%
	Yellow Thornbill	*Acanthiza nana*	2%	2%	5%	4%	4%	9%
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*				1%		2%
	Yellow-throated Scrubwren	*Sericornis citreogularis*		1%		9%	10%	2%
Thrushes	Bassian Thrush	*Zoothera lunulata*		0%		1%	1%	6%
	Common Blackbird	*Turdus merula*				3%		
Treecreepers	Brown Treecreeper	*Climacteris picumnus*	0%					
	White-throated Treecreeper	*Cormobates leucophaea*	34%	36%	23%	28%	25%	27%
True Babblers	Silvereye	*Zosterops lateralis*	6%	7%	14%	24%	17%	12%
Weaver Finches	Beautiful Firetail	*Stagonopleura bella*	1%					
	Red-browed Finch	*Neochmia temporalis*	5%	13%	13%	9%	13%	15%
Whipbirds and Wedgebills	Eastern Whipbird	*Psophodes olivaceus*	6%	25%	19%	51%	34%	29%
Whistlers, Shrike-thrushes and allies	Golden Whistler	*Pachycephala pectoralis*	19%	19%	31%	50%	38%	27%
	Grey Shrike-thrush	*Colluricincla harmonica*	18%	30%	31%	35%	18%	14%
	Rufous Whistler	*Pachycephala rufiventris*	8%	11%	11%	8%	6%	12%
Woodswallows, Currawongs, Butcherbirds and Magpie	Australian Magpie	*Gymnorhina tibicen*	11%	15%	11%	41%	31%	15%
	Dusky Woodswallow	*Artamus cyanopterus*	1%	2%		3%		2%
	Grey Butcherbird	*Cracticus torquatus*	9%	14%	7%	25%	14%	12%

Common Family	Common Name	Scientific Name	2020 Burnt	2021 Burnt	2022 Burnt	2020 Unburnt	2021 Unburnt	2022 Unburnt
	Grey Currawong	*Strepera versicolor*	1%	1%	1%			
	Pied Currawong	*Strepera graculina*	13%	15%	25%	23%	21%	26%
	White-breasted Woodswallow	*Artamus leucorynchus*						2%

Varied Sitella, a NSW threatened species, recorded in burnt sites in both years – Charles Dove

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For more information on the project go to www.birdlifeshoalhaven.org/fires.html.