



Biomass Monitoring Report

Ginninderry Conservation Trust

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1. Executive Summary

The Trust completed spring monitoring across November 2023. This report represents the survey results from spring 2023 as well as previous surveys conducted in November/December 2022 and April 2022. The survey originally had 12 monitoring sites; however, 1 site was removed from the monitoring program in the spring 2022 due to its location on the boundary of the new suburb of Macnamara. The spring 2023 monitoring included 11 sites, each with 3 plots which were surveyed to find the overall biomass of the Conservation Corridor. In spring 2023 the results revealed that 61% of the surveyed plots were within acceptable levels.

2. Introduction

The Ginninderry Conservation Trust (The Trust) has been developed as a strategic initiative of the Ginninderry Joint Venture (the JV). It is designed as a vehicle to manage, enhance and conserve the Ginninderry Conservation Corridor (the Corridor), to deliver *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) commitments and restore the landscape. The landscape management and restoration process will be coordinated by the Trust with support and guidance from experts and partner organisations. As a community-focused organisation, the Trust looks to harness community support for ecosystem management and aims to be known as a contemporary leader in the conservation space.

The purpose of the biomass surveys is to determine the level of fire fuel load within the Conservation Corridor. Under the ACT Government licensing agreement, the Trust is required to conduct bi-annual biomass surveys throughout the Corridor.

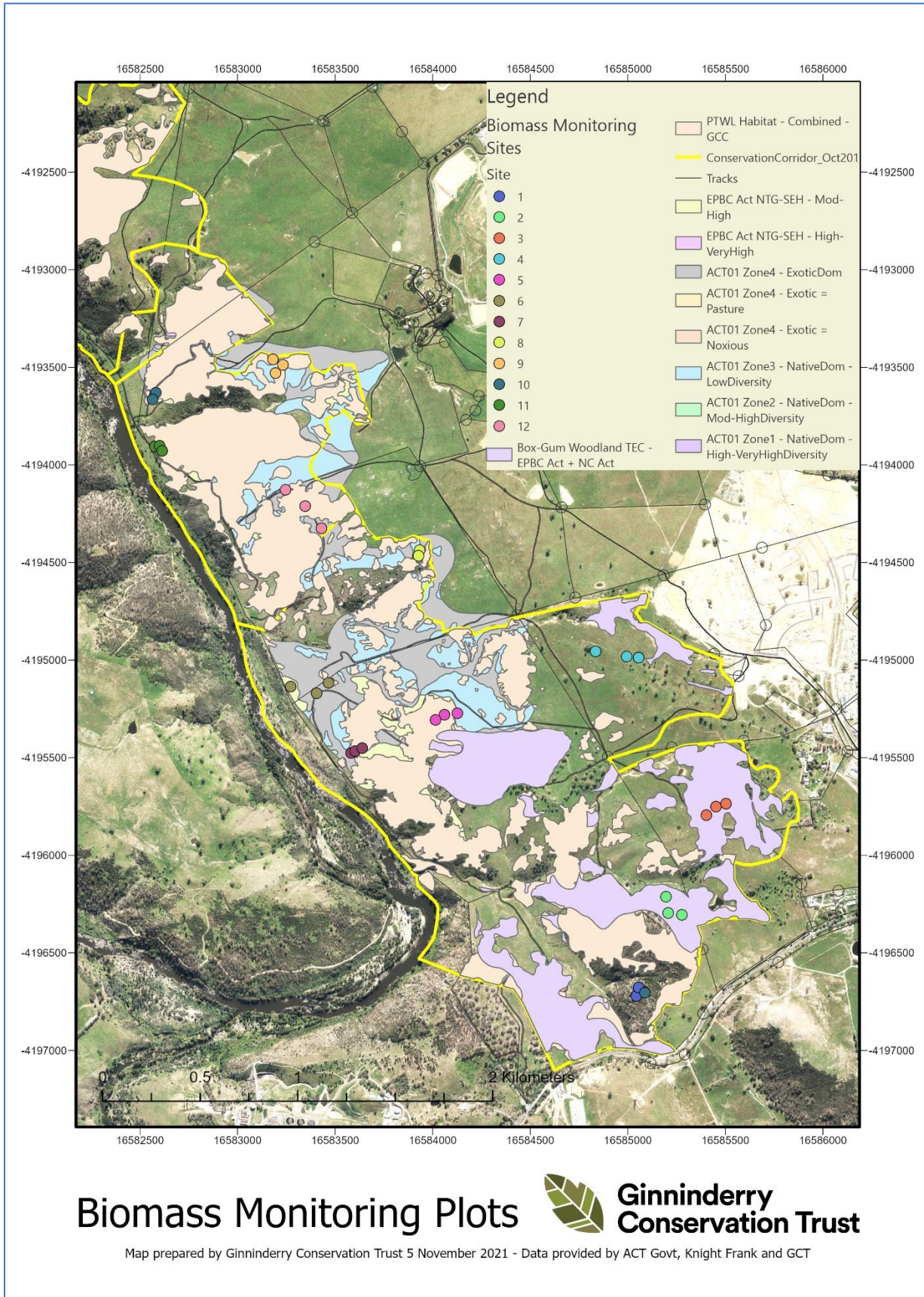
3. Methods

Twelve sites across the Ginninderry Conservation Corridor were originally selected (noting that there are now eleven), each with three survey plots within the area. The monitoring sites identified have been chosen as they represent the different habitat structure and varying disturbance levels from farming practices (Refer Figure 1). Using a 1 m x 1 m square of PVC tubing, random quadrat plots were located.

Ecologists used the Country Fire Authority (CFA) Grassland curing Field Card to determine the following measurements:

- Height
- Curing
- Cover
- Fuel load
- Bare ground
- Leaf Litter

ArcGIS Survey 123 was used to record the top five dominant species, weather, wind levels and GPS locations during the spring monitoring.



Biomass Monitoring Plots

Figure 1 Biomass Monitoring Plots and vegetation type

4. Results (Spring Monitoring- November 2023)

Out of the 33 plots, 61% of the quadrats were classified within the green zone (with acceptable levels of biomass) and 39% were in the red zone (classified with high levels of biomass that require action) (see Appendix 7.3).

The five most dominant species were recorded to help understand the abundance of native species vs exotic species within a wide representation of vegetation types. The most abundant species recorded throughout the Corridor was Squirrel-tail fescue (*Vulpia bromodies*). *Vulpia bromodies* was found in 21 plots and made up a total of 25% of the overall biomass. Kangaroo grass (*Themeda triandra*) was the next most dominant species which was found in 10 plots and made up 12% of the overall biomass. Overall, there were more exotic species compared to native (71% vs 29%)

The following is a list of the 10 most common species found:

1. Squirrel-tail fescue (*Vulpia bromodies*)
2. Kangaroo grass (*Themeda triandra*)
3. Soft brome (*Bromus hordeaceus*)
4. Bearded/ wild oat (*Avena barbata*)
5. African lovegrass (*Eragrostis curvula*)
6. Slender speargrass (*Austrostipa scabra*)
7. St John's Wort (*Hypericum perforatum*)
8. Red-legged grass (*Bothriochloa macra*)
9. Great brome (*Bromus diandrus*)
10. Grey tussock-grass (*Poa sieberiana*)

5. Discussion:

During the spring monitoring 2023, a noticeably low percentage of sites had acceptable levels of biomass in accordance with the issued license (61%). 39% of the sites monitored recorded >70% grass curing with height/cover levels placing them in the high (red) category (See Appendix 7.3). This is expected to be due to several factors. The Trust's primary source of biomass control is cattle, and over the last few months of winter 2023, they were removed from the Conservation Corridor to allow the ground flora to recover before the dry season. Over the months of September and October, unexpected rainfall levels caused an increase in biomass growth followed by high temperatures which resulted in elevated curing percentages. Cattle were moved back into the Corridor late November, which was after the sites were surveyed.

Spring 2023 monitoring has demonstrated a strong presence of exotics, however, there has been an increase in natives compared to spring 2022 monitoring. 20 of the 33 plots from spring 2023 monitoring had an exotic as the most dominant species, which is a decrease compared to spring 2022 which had 23. The top 10 species identified also showed an increase in natives, with 40% being native and 60% being exotic. This is a 20% increase of natives compared to spring 2022.

Many of the exotics species identified are more abundant during November/December, such as Wild Oats (*Avena barbata*) and Kangaroo Grass (*Themeda triandra*), resulting in an increased representation during the monitoring period. The most dominant species recorded was Silver Grass (*Vulpia bromodies*) which can be present at any time of year due to its wide temperature range (10-30°C), providing that there is sufficient soil moisture available. This indicates that factors such as temperature and rainfall were optimal for *Vulpia bromodies* to thrive. Some of the Weeds of National Significance (WONS) identified continue to feature in the top 10 most dominant species, including African Lovegrass (*Eragrostis curvula*) and St John's Wort (*Hypericum perforatum*).

See Appendix 8.5 and 8.6 for previous monitoring.

6. Management Strategies

To combat the high biomass levels the Trust has and will continue to implement the following management strategies:

- Stocking of cattle in the locations with high biomass. The Conservation Corridor is currently grazed by 75 head of cattle from the adjoining Belconnen Farm. Cattle are moved between the four current paddocks based on biomass and weed management requirements, as well as ecological considerations (i.e. native seed set).
- Hand slashing locations with high biomass. Sites in the red zone will be actioned with manual brush cutting to reduce vegetation height and cover.
- Cool burn through traditional methods. This can be undertaken once scheduled in the ACT Bushfire Operations Plan (BOP). Presently the ACT BOP notes the Corridor as a Grazing Management zone. Future cool-burn activities will be pending approval of the Trust's Bushfire Management Plan which is currently under review by ACT Rural Fire Service and ACT Parks and Conservation Service.

This is the fifth biomass monitoring survey that has been conducted by the Trust. Weather conditions have resulted in a high curing percentage in spring 2023 surveys. It should be noted that November/December and April 2022 monitoring were undertaken after 2 years of higher-than-average rainfall. The vegetation within the Corridor was taller and thicker than it has been for several years due to prior drought conditions.

7. Reference list:

Bureau of Meteorology (2022). *Aranda, Australian Capital Territory November 2022 Daily Weather Observations*. Retrieved from

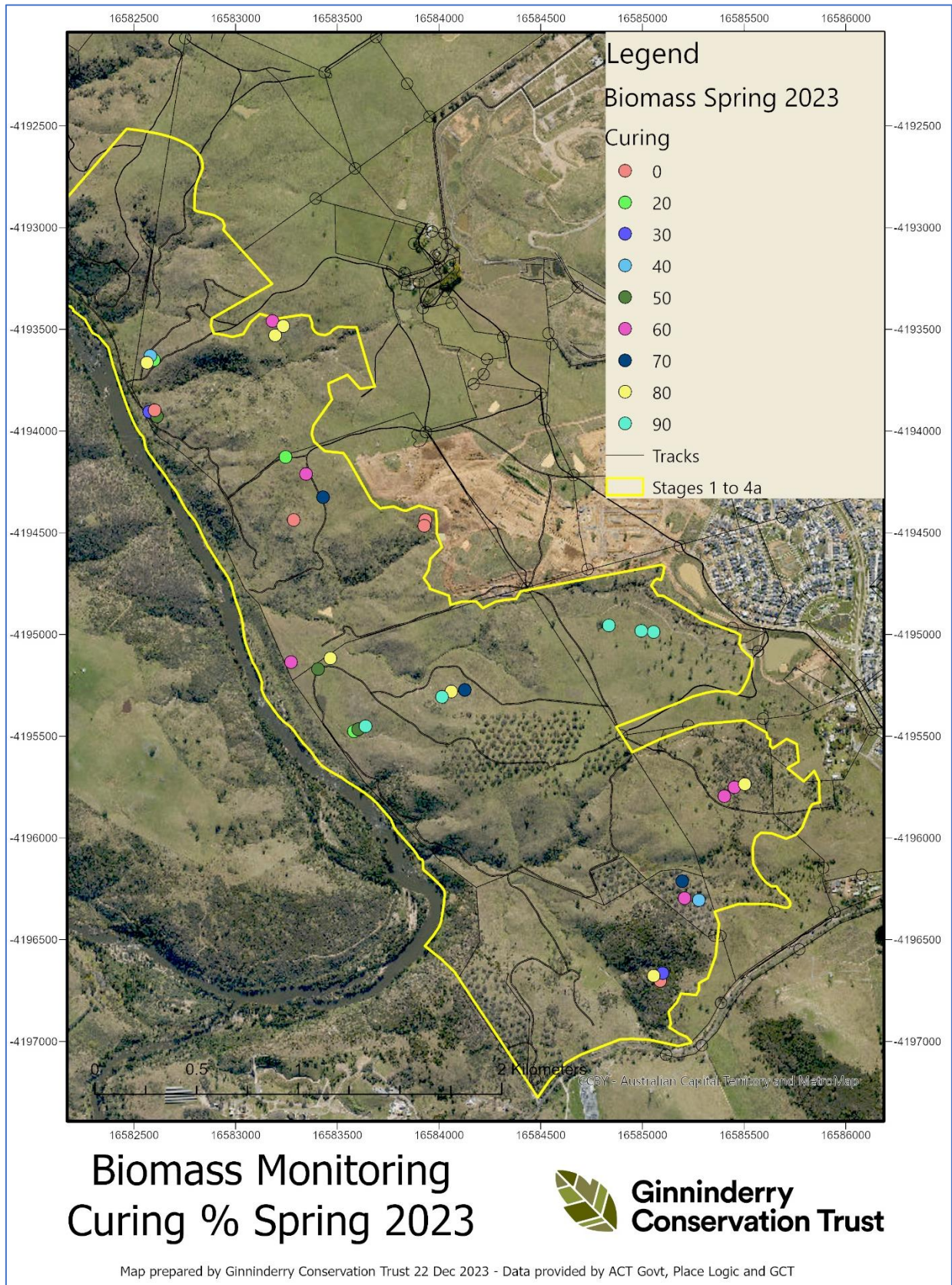
http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_display_type=dailyDataFile&p_nccObsCode=136&p_stn_num=070242&p_c=-987003242&p_startYear=2022

Silver grass (2019), *Agriculture and Food*. Retrieved from

<https://www.agric.wa.gov.au/grains-research-development/silver-grass>

8. Appendix

8.1. Curing percentage across the 33 monitoring plots – Spring (November) 2023.



8.2. Interim Grazing Management Plan:

ATTACHMENT C
INTERIM GRAZING MANAGEMENT PLAN

Grazing issue	POTENTIAL IMPACT	MANAGEMENT CONTROL
Bushfire	Fires spread over the property due to high fuel loads and lack of access.	<ul style="list-style-type: none"> • Grassland fuels maintained in accordance with GFH requirements identified (table below).
Bushfire	Yellow Box Red Gum Woodland significantly impacted by intense or frequent bushfires.	<ul style="list-style-type: none"> • Grass across the property managed in accordance with GFH requirements identified for each area.
Grazing	Livestock damage significant numbers of mature members of Yellow Box Red Gum Woodland community through gnawing, or other physical activity.	<ul style="list-style-type: none"> • Supply nutrient blocks to correct nutrient searching (eg gnawing Yellow Box trees for Iodine). • Construct a physical barrier around effected tree to prevent being continual rubbing or gnawing.
Grazing	Pink Tailed Worm Lizard habitat structure and type destroyed.	<ul style="list-style-type: none"> • Ensure grass height resulting from grazing does not fall below 100mm across 70% of the site or as directed/approved by the custodian.
Grazing	Pink Tailed Worm Lizards emerging from winter torpor killed or injured through trampling by livestock.	<ul style="list-style-type: none"> • Grazing will generally be permitted from 30th May to 15th Sept and 15th Dec to 1st March or as requested or approved by the custodian. • Ensure grass height resulting from grazing does not fall below 100mm across 70% of the site or as directed/approved by the custodian.
Grazing	Ground cover reduced to level that affects soil health and permits soil erosion.	<ul style="list-style-type: none"> • Maintain a minimum of 80% ground cover/ 1500kg per ha of Dry Matter over the entire property unless otherwise specified.
Grazing	Open areas dominated by exotic annual grasses.	<ul style="list-style-type: none"> • Reduce limit of exotic annual grasses by grazing late Autumn to very early Spring as they elongate to milky dough stage.

8.3. Biomass measurement chart:

Strategic Fire Fighter Advantage Zone										
@ 70% Grass curing										
Height	% of ground cover									
(mm)	10	20	30	40	50	60	70	80	90	100
100	1	2	3	4	5	6	7	8	9	10
200	2	4	6	8	10	12	14	16	18	20
300	3	6	9	12	15	18	21	24	27	30
400	4	8	12	16	20	24	28	32	36	40
500	5	10	15	20	25	30	35	40	45	50
600	6	12	18	24	30	36	42	48	54	60
700	7	14	21	28	35	42	49	56	63	70
800	8	16	24	32	40	48	56	64	72	80
900	9	18	27	36	45	54	63	72	81	90
1000	10	20	30	40	50	60	70	80	90	100
Outer Asset Protection Zone										
@ 70% Grass curing										
Height	% of ground cover									
(mm)	10	20	30	40	50	60	70	80	90	100
100	1	2	3	4	5	6	7	8	9	10
200	2	4	6	8	10	12	14	16	18	20
300	3	6	9	12	15	18	21	24	27	30
400	4	8	12	16	20	24	28	32	36	40
500	5	10	15	20	25	30	35	40	45	50
600	6	12	18	24	30	36	42	48	54	60
700	7	14	21	28	35	42	49	56	63	70
800	8	16	24	32	40	48	56	64	72	80
900	9	18	27	36	45	54	63	72	81	90
1000	10	20	30	40	50	60	70	80	90	100
Inner Asset Protection Zone										
@ 70% Grass curing										
Height	% of ground cover									
(mm)	10	20	30	40	50	60	70	80	90	100
100	1	2	3	4	5	6	7	8	9	10
200	2	4	6	8	10	12	14	16	18	20
300	3	6	9	12	15	18	21	24	27	30
400	4	8	12	16	20	24	28	32	36	40
500	5	10	15	20	25	30	35	40	45	50
600	6	12	18	24	30	36	42	48	54	60
700	7	14	21	28	35	42	49	56	63	70
800	8	16	24	32	40	48	56	64	72	80
900	9	18	27	36	45	54	63	72	81	90
1000	10	20	30	40	50	60	70	80	90	100

8.4. Biomass plots identified in the Red Zone, action required and status check.

Monitoring date	Site Number	Quadrat Number	Vegetation Type	Vegetation Height (cm)	Curing (%)	Cover (%)	Fuel Load	Action Required	Status check	Status Check Date
1/12/2021	4	1	Pasture	150	70	100	7	Monitor curing	100% cover, 150cm, 20% curing. Within acceptable range.	8/02/2022
1/12/2021	4	3	Pasture	140	70	100	7	Monitor curing	100% cover, 112cm, 30% curing. Within acceptable range.	8/02/2022
1/12/2021	7	2	Open grassland	84	90	100	6	Monitor curing	100% cover, 100cm, 30% curing. Within acceptable range.	8/02/2022
1/12/2021	8	2	Open pasture	145	70	100	7	Monitor curing	100% cover, 115cm, 30% curing. Within acceptable range.	8/02/2022
1/12/2021	8	3	Open Pasture	141	80	100	7	Monitor curing	100% cover, 120cm, 30% curing. Within acceptable range.	8/02/2022
1/12/2021	9	2	Open grassland	137	70	100	7	Monitor curing	100% cover, 95cm, 20% curing. Within acceptable range.	8/02/2022
1/12/2021	9	3	Open grassland	164	80	100	7	Monitor curing	80% cover, 100cm, 30% curing. Within acceptable range.	8/02/2022
1/12/2021	10	3	Open pasture	83	70	100	6	Monitor curing	100% cover, 100cm, 40% curing. Within acceptable range.	8/02/2022
21/04/2022	11	1	Native pasture	116	70	100	7	Monitor curing	Checked and within acceptable range.	
14/12/2022	9	2	Open grassland	125	70	95	7	Monitor curing	100% cover, 110cm, 60% curing. Within acceptable range.	02/02/2023
14/12/2022	9	1	Open grassland	100	70	95	7	Monitor curing	100% cover, 110cm, 40% curing. Within acceptable range.	02/02/2023
13/11/2023	2	3	Open grassland	65	70	95	5	Grazing, monitor	50% cover, 36cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	3	2	Native pasture	45	80	100	6.5	Grazing, monitor	75% cover, 65cm, 5% curing. Within acceptable range.	04/01/2024

13/11/2023	4	1	Open pasture	51	90	90	4.3	Grazing, brush cut, monitor	95% cover, 70cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	4	2	Open pasture	94	90	90	6	Grazing, brush cut, monitor	90% cover, 70cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	4	3	Open pasture	94	90	70	4.9	Grazing, brush cut, monitor	90% cover, 80cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	5	1	Open grassland	72	80	95	5.4	Grazing, monitor	55% cover, 100cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	5	3	Open grassland	62	70	80	4.1	Grazing, monitor	80% cover, 63cm, 10% curing. Within acceptable range.	04/01/2024
13/11/2023	6	3	Open grassland	99	80	95	5.9	Grazing, monitor	95% cover, 79cm, 5% curing. Within acceptable range.	04/01/2024
13/11/2023	7	2	Exotic grassland	94	90	95	7	Grazing, monitor	95% cover, 75cm, 10% curing. Within acceptable range.	04/01/2024
13/11/2023	9	1	Exotic grassland	62	80	100	4.9	Grazing, monitor	80% cover, 90cm, 20% curing. Within acceptable range.	04/01/2024
13/11/2023	9	3	Exotic grassland	74	80	100	5.4	Grazing, monitor	80% cover, 90cm, 20% curing. Within acceptable range.	04/01/2024
13/11/2023	10	3	Exotic grassland	82	80	100	6	Grazing, monitor	95% cover, 75cm, 10% curing. Within acceptable range.	04/01/2024
13/11/2023	12	1	Exotic grassland	85	70	100	6.5	Grazing, monitor	75% cover, 75cm, 5% curing. Within acceptable range.	04/01/2024
*Acceptable										
*Requires action										

8.5. Spring Monitoring- November/ December 2022

Results:

Within the 11 sites that were surveyed a total of 33 quadrats were assessed – three quadrats within each site. Out of these 33 plots, it was found 94% of the quadrats were at <70% curing and in the green zone (with acceptable levels of biomass) and 6% were in the red zone – classified with high biomass.

The five most dominant species in each plot were also recorded. This is to understand the abundance of native species vs exotic species within a wide representation of vegetation types. The most abundant species found throughout the Corridor was Wild Oat grass (*Avena barbata*). This is not unusual for November/December, as Oat grass is widely found throughout the Corridor during this time.

Avena barbata was found in 19 plots and made up 15% of the overall biomass in the quadrats sampled. This was followed by Squirrel-tail Fescue (*Vulpia bromoides*) which was found in 17 plots and made up 10% of the overall biomass. Across the 33 plots, in terms of biomass, there was more exotics than natives (75% vs 25%).

The following is a list of the 10 most common species found.

1. Bearded/ wild oat (*Avena barbata*)
2. Squirrel-tail fescue (*Vulpia bromoides*)
3. Kangaroo grass (*Themeda triandra*)
4. St John's Wort (*Hypericum perforatum*)
5. Clover (*Trifolium subterraneum*)
6. Speargrass (*Austrostipa scabra*)
7. Annual Rye grass (*Lolium rigidum*)
8. African lovegrass (*Eragrostis curvula*)
9. Soft brome (*Bromus hordeaceus*)
10. Yorkshire fog (*Holcus lanatus*)

Discussion:

During the spring monitoring 2022, 94% of sites had acceptable levels of biomass in accordance with the issued licence with 6% of sites recording high levels. Biomass is measured by comparing the grass height, ground cover and grass curing status. 6% of the sites monitored recorded >70% grass curing with height/cover levels placing them in the high (red) category.

Spring 2022 monitoring has demonstrated a strong presence of exotics with 23 out of 33 plots having an exotic as the most dominant species in the quadrat. Out of the top 10 species identified, 80% were exotic which is a 10% increase in the number of exotics identified during spring 2021. Interestingly the top 3 most abundant are the same as the results from spring 2021.

Many of the exotics species identified are more abundant during November/December, such as Wild Oats (*Avena barbata*) resulting in an increased representation during the monitoring period. The Conservation Corridor has continued to experience higher than average rainfall. Aranda recorded

115.4 mm of rain for November, which is above average for this time (BOM, 2022). Some of the weeds of national significance (WONS) identified continue to feature in the top 10 most dominant species, including African love grass (*Eragrostis curvula*) and St John's Wort (*Hypericum perforatum*).

8.6. Autumn Monitoring- April 2022

Results:

Within the 12 sites that were surveyed a total of 36 quadrats were assessed – three quadrats within each site. Out of these 36 plots, it was found 97% of the quadrats were at <70% curing and in the green zone (with acceptable levels of biomass) and 3% were in the red zone – classified with high biomass.

The five most dominant species in each plot were also recorded. This is to understand the abundance of native species vs exotic species within a wide representation of vegetation types. The most abundant species found throughout the Corridor was Red-legged grass (*Bothriochloa macra*). This is not unusual for April, as Red-legged grass is widely found throughout the Corridor during this time. *Bothriochloa macra* was found in 22 plots and made up 33% of the overall mass in the quadrats sampled. This was followed by Kangaroo grass (*Themeda triandra*) which was found in 7 plots and made up 18% of the overall biomass. Across the 36 plots, in terms of biomass, there was more natives than exotics (69% vs 31%).

The following is a list of the 10 most common species found:

1. Red-legged grass (*Bothriochloa macra*)
2. Kangaroo grass (*Themeda triandra*)
3. African lovegrass (*Eragrostis curvula*)
4. Weeping grass (*Microlaena stipodes*)
5. River tussock grass (*Poa labillardierei*)
6. Bearded/ wild oat (*Avena barbata*)
7. Paspalum (*Paspalum dilatatum*)
8. St John's Wort (*Hypericum perforatum*)
9. Windmill grass (*Chloris truncate*)
10. Yorkshire fog (*Holcus lanatus*)

Discussion:

During the Autumn monitoring 2022, 97% of sites had acceptable levels of biomass in accordance with the issued licence with 3% of sites recording high levels. Biomass is measured by comparing the grass height, ground cover and grass curing status. 3% of the sites monitored recorded >70% grass curing with height/cover levels placing them in the high (red) category.

Autumn 2022 monitoring has demonstrated a strong presence of natives with 27 out of 36 plots having a native as the most dominant species in the quadrat. Out of the top 10 species identified, 50% were native which is the same result from monitoring conducted in autumn 2021.

Many of the native species identified are more abundant during April, such as Red-legged grass (*Bothriochloa macra*), resulting in an increased representation during the monitoring compared to

December 2021. The Conservation Corridor has continued to experience higher than average rainfall. April was wetter than average across the ACT, with sites recording around double their average April total rainfall. Canberra Airport recorded 81.4 mm for the month, its wettest April since 2015 (BOM, 2022). Some of the noxious exotics identified continue to feature in the top 10 most dominant species, including African love grass (*Eragrostis curvula*) and St John's Wort (*Hypericum perforatum*).