



CASSINIA
ENVIRONMENTAL

Golden Sun Moth Survey 2020

Ninyeunook Road, Ninyeunook



Figure 1: Pink Mulla Mullas *Ptilotus exaltatus*, found during vegetation surveys, 2 December 2020.

Submitted: May 2021

Introduction

Cassinia Environmental manages Conservation Covenants on the 200ha property on Ninyeunook Road, Ninyeunook. The property is home to endangered grassland communities, including a number of rare and threatened species. The property had previously been used primarily as a grazing property for livestock.

This report is submitted as per the requirements of the *Offset Management Plan For The Ninyeunook Grassland, Ninyeunook Road, Ninyeunook* prepared by Biosis for MAB Corporation to satisfy offset requirements under the EPBC Act.

Golden Sun Moth (GSM) surveys were conducted by Hamilton Environmental Services for Cassinia Environmental in 2017 and 2018. Cassinia Environmental conducted GSM surveys in 2019.

This report details the most recent surveys conducted by Cassinia Environmental in 2020, and compares them against the data collected to date, and with the baseline monitoring data on the distribution and abundance of GSM provided by Biosis (2013).

This report should be read in conjunction with the 2020 Annual Report C1626 submitted by Cassinia Environmental to Trust for Nature. The 2020 Annual Report details works completed over the year on management actions including weeds, pest animals and fencing.



Figure 2: Male GSM found on Cassinia property during surveys in 2019.

Background

Site location and description

The property lies within the Gannawarra Shire, approximately 14km South West of Quambatook.

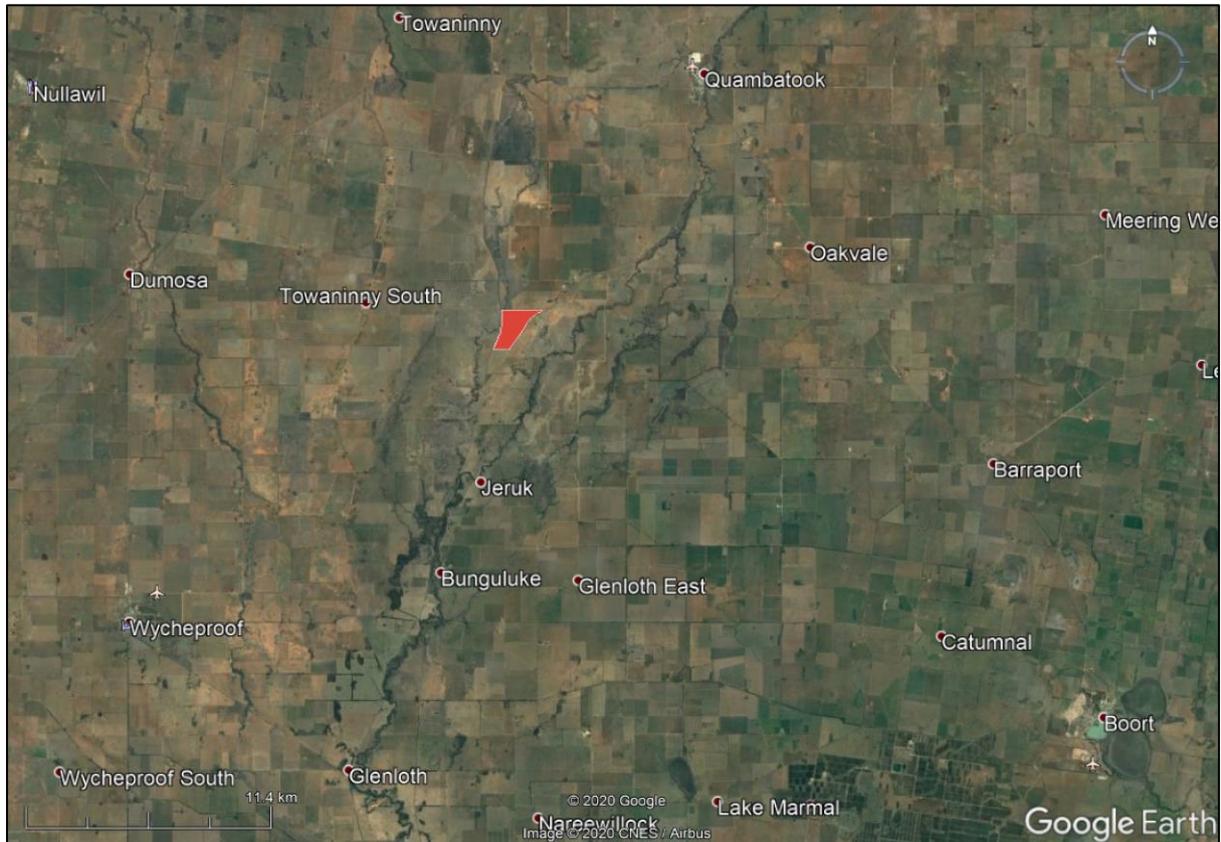


Figure 3: Map showing location of Ninyeunook property, marked in red, in the landscape.

The property is mostly flat, open grasslands with a small section of remnant woodland. Prior to European settlement, the Ecological Vegetation Classes of the property were likely a mixture of *Plains Savannah* along the eastern edge, *Lignum Swampy Woodland* in the north-western corner, and largely *Chenopod Grassland*. The area of open grassland, favourable to GSM habitat, has been grazed by stock over a long period but never improved, cultivated or fertilised to any level of significant impact.

Methods

The Golden Sun Moth (GSM) survey method outlined in the Offset Management Plan was used. In this method, 23 parallel transects, 50m apart, are walked or driven by a pair of observers (Figure 3). The same transects were used in the 2019 survey. In 2020, all transects were walked. This grassland does not have a large population of GSM and the parallel transect method allows us to thoroughly monitor the site. As the observers move, they record the number of flying adult male moths seen 10m either side of the transect, taking care not to record the same moth twice. Ideally, surveys are conducted over four suitable days during the flight season. The male GSM flying period lasts approximately four to five days, and they are most likely to be active on warm, still days (>20°C at 1000 hours), during the hottest part of the day (between 1000 and 1400 hours), at least two or more days after rain.



Figure 3: The location of the Golden Sun Moth survey transects conducted on the Ninyeunook property shown as green lines. The blue drop pins indicate the location and ID number of each photopoint and vegetation monitoring quadrat site.

This survey continues the recommended surveying of GSM every two years. No GSM were sighted in the 2018 survey, therefore extra surveys were conducted by Cassinia in 2019 to confirm continued presence of GSM at the site.

In 2020, surveys were conducted on 25 November, 2 December, and 7 December. These dates are later in the season due to the slow onset of summer temperatures and more rainfall events. A fourth

Golden Sun Moth Survey 2020 - Ninyeunook

survey was not undertaken as it became evident the season was not favourable to GSM conditions, and almost no moths were being observed.

There are 15 permanent monitoring points marked with steel posts scattered throughout the site. These monitoring points determine the location of each vegetation and biomass survey (Figure 3).

The “Golf Ball Method” is used to determine the biomass of a 1m² quadrat. Quadrats were positioned with the steel post in the south west corner of each quadrat. To determine biomass, 18 golf balls were dropped from approximately 1.3m into the 1m² quadrat and the number of visible golf balls was counted. This allows an estimation of biomass.

The quadrat was also used to determine vegetation cover, inter-tussock spaces, average height of vegetation, cover of native vegetation, and cover of exotic vegetation. A brief list of native species identified at each quadrat was also recorded. Images were taken of the quadrats *in situ*. At each monitoring point an image is recorded to the north, east, south and west providing annual monitoring records.

See Results, Appendix A, and Appendix B below.

Results

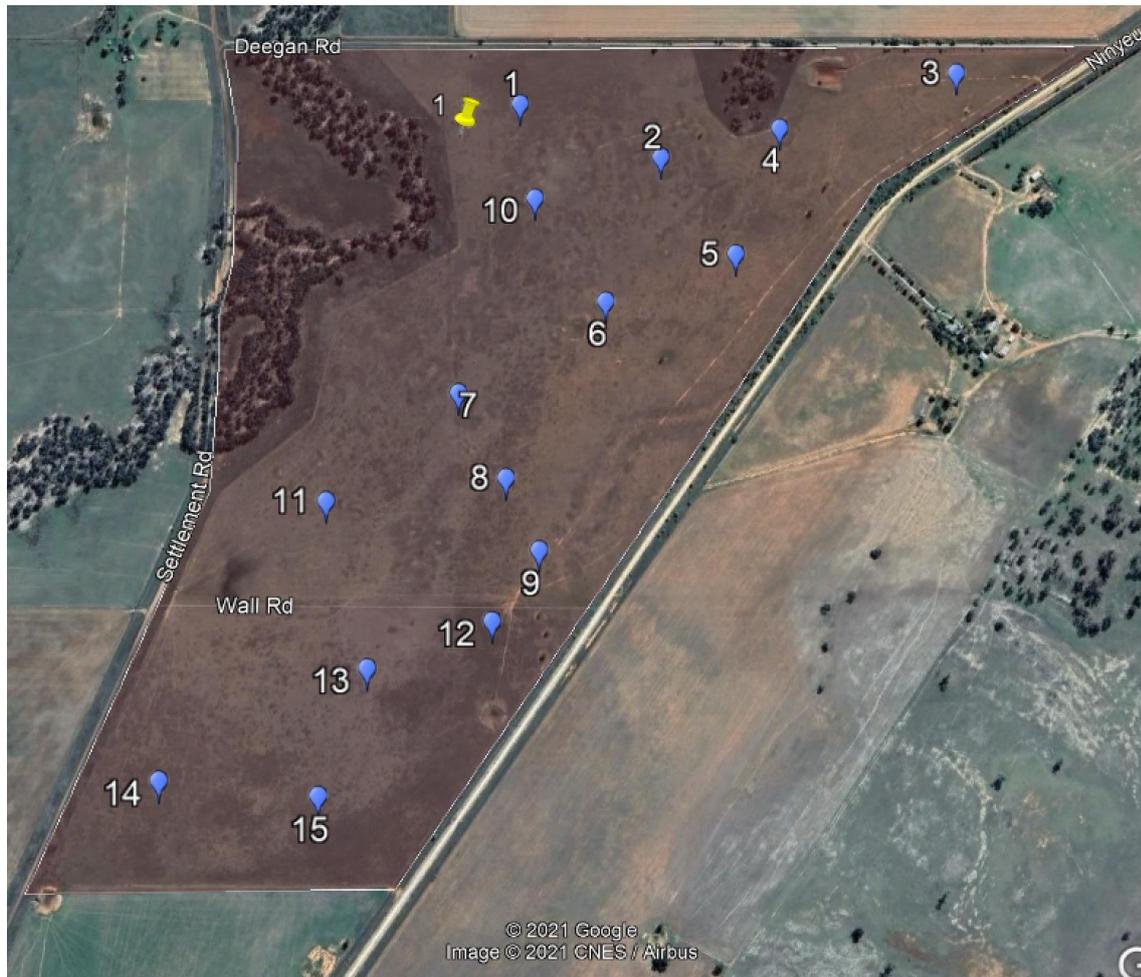


Figure 4: Map of GSM observation in 2020. Location of GSM observed flying shown with yellow marker. The blue drop pins indicate the location and ID number of each photopoint and vegetation monitoring quadrat site.

One male Golden Sun Moth was observed flying during the 2020 survey, on the 2nd December 2020 (Figure 4).

Detailed vegetation data was collected in the fifteen quadrats located at each of the permanent monitoring points (Appendix A).

The mean total vegetation cover across the 15 quadrats was 57%, with 79% indigenous species cover and 21% invasive species cover. The vegetation cover was higher than that noted in 2019 which could reflect higher rainfall experienced over Spring 2020. No change was made to the grazing regime.

Of the 15 quadrats, 10 had a high golf ball score (15-18) indicating low biomass, or a grassland with open structure. A further 4 quadrats had a moderate golf ball score (10-14), and 1 quadrat had a score of 9.5 indicating higher biomass. The average golf ball score across the quadrats was 15.8. These results indicate that even with a wetter and cooler Spring, the current grazing practise to manage biomass is appropriate (See Appendix A and B).

Discussion

There has been significant variation of observed GSM over the four years of surveys (Table 2). The greatest number of moths observed in any given year of the surveys was 2017, with a total of 53 male GSM observed flying over two days. In 2018 no moths were seen despite regular visits to the site and extensive surveys. In 2019, after several informal visits to the area to assess moth activity, 12 male GSM were observed flying over one day of GSM surveys. In 2020, another year with almost no observations has been experienced.

Table 2: Male Golden Sun Moth observations over the last four years.

Date of transects	2013	2017	2018	2019	2020
	Baseline Data: Biosis		17 Oct; 18 Oct	12 Nov; 4 Dec	19 Nov
Number of transects		43	84	23	69
Total number of GSM observed	12	53	0	12	1

As there is still much to learn about GSM, it is unclear why more moths were observed in 2017 than any year since. Perhaps it was a good year with exceptional GSM activity, or perhaps the timing of the surveys was particularly accurate that year. It could be due to seasonal variation and mistimed surveys. It has been anecdotally noted amongst ecologists that 2020 was a difficult year for GSM observations due to the La Nina weather pattern. Ongoing consistency of survey method to minimise variation and earlier, frequent observation of the site around the male GSM flight season should help to answer some of these questions as the surveys are repeated every year. A strong GSM monitoring program will offer data invaluable to the knowledge and conservation of these species.

It is the recommendation of this report that a further survey over four weeks is conducted in 2021 to assess the population distribution of male GSM, beginning early Spring once the moths are observed flying, depending on the season and the flight of moths on properties in the area.

Appendix A: Quadrat Vegetation Data

Date	Quadrat Number	Total Vegetation Cover (%)	Inter-tussock spaces (%)	Average Height of Vegetation (cm)	Cover of Native Vegetation (%)	Cover of Exotic Vegetation	Biomass Score (Golf Ball Method) TOTAL NO. OF BALLS = 18			Golf Ball Score	NATIVE Species Identified
							No. Balls > 90% visible	No. Balls < 33% visible	No. Balls remaining		
2/12/2020	1	50	50	30-100cm	95	5	16	0	2	17	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida
2/12/2020	2	50	50	15-30cm	95	5	18	0	0	18	Rytidosperma sp., Austrostipa sp., Enteropogon, Rhodanthe.
2/12/2020	3	60	40	30-100cm	100	0	18	0	0	18	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida
2/12/2020	4	70	30	30-100cm	90	10	12	3	3	13.5	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida, Maireana.
2/12/2020	5	50	50	30-100cm	95	5	16	0	2	17	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida, Rhodanthe, Vittadinia.
2/12/2020	6	60	40	30-100cm	10	90	6	1	11	11.5	Rytidosperma sp., Enteropogon.
2/12/2020	7	80	20	30-100cm	10	90	6	5	7	9.5	Rytidosperma sp., Enteropogon, Sida, Juncus
2/12/2020	8	30	70	30-100cm	95	5	18	0	0	18	Austrostipa sp., Enteropogon, Sida, Maireana, Vittadinia, Enchylaena.
2/12/2020	9	50	50	30-100cm	100	0	18	0	0	18	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida, Atriplex, Ptilotus exaltatus, Vittadinia, Maireana.
2/12/2020	10	70	30	30-100cm	95	5	17	1	0	17	Rytidosperma sp., Austrostipa sp., Enteropogon, Sida, Maireana.
2/12/2020	11	60	40	30-100cm	95	5	17	0	1	17.5	Rytidosperma sp., Austrostipa sp., Enteropogon, Enchylaena, Maireana spp., Germander, Asperula, Chrysocephalum/Calocephalus?
2/12/2020	12	50	50	30-100cm	95	5	11	1	6	14	Austrostipa sp., Enteropogon, Aristida, Enchylaena, Maireana spp., Germander, Vittadinia, Sida.
2/12/2020	13	45	55	30-100cm	90	10	9	2	7	12.5	Rytidosperma sp., Austrostipa sp., Enteropogon, Enchylaena, Maireana spp., Vittadinia, Sida, Chrysocephalum/Calocephalus?
2/12/2020	14	70	30	30-100cm	90	10	17	0	1	17.5	Rytidosperma sp., Austrostipa sp., Enteropogon, Maireana spp., Germander, Atriplex, Convolvulus, Vittadinia, Sida.
2/12/2020	15	60	40	30-100cm	30	70	18	0	0	18	Rytidosperma sp., Austrostipa sp., Panicum sp., Atriplex, Calocephalus, Enchylaena, Sida, Juncus.

Appendix B: Vegetation monitoring images

Quadrat 1

Location: 143.425780423 -35.9476071876

Biomass density: Golfball score of 17

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 2

Location: 143.426012015 -35.9489470767

Biomass density: Golfball score of 18

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 3

Location: 143.435520027 -35.9471550677

Biomass density: Golfball score of 18

Coverage of native species: 100%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 4

Location: 143.431190271 -35.9482130315

Biomass density: Golfball score of 13.5

Coverage of native species: 90%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 5

Location: 143.423683103 -35.9510405828

Biomass density: Golfball score of 17

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 6

Location: 143.43008453 -35.9508162411

Biomass density: Golfball score of 11.5

Coverage of native species: 10%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 7

Location: 143.423478669 -35.9536866658

Biomass density: Golfball score of 9.5

Coverage of native species: 10%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 8

Location: 143.42552905 -35.9568313044

Biomass density: Golfball score of 18

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 9

Location: 143.425486218 -35.9567799233

Biomass density: Golfball score of 18

Coverage of native species: 100%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 10

Location: 143.425474735 -35.9497373226

Biomass density: Golfball score of 17

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 11

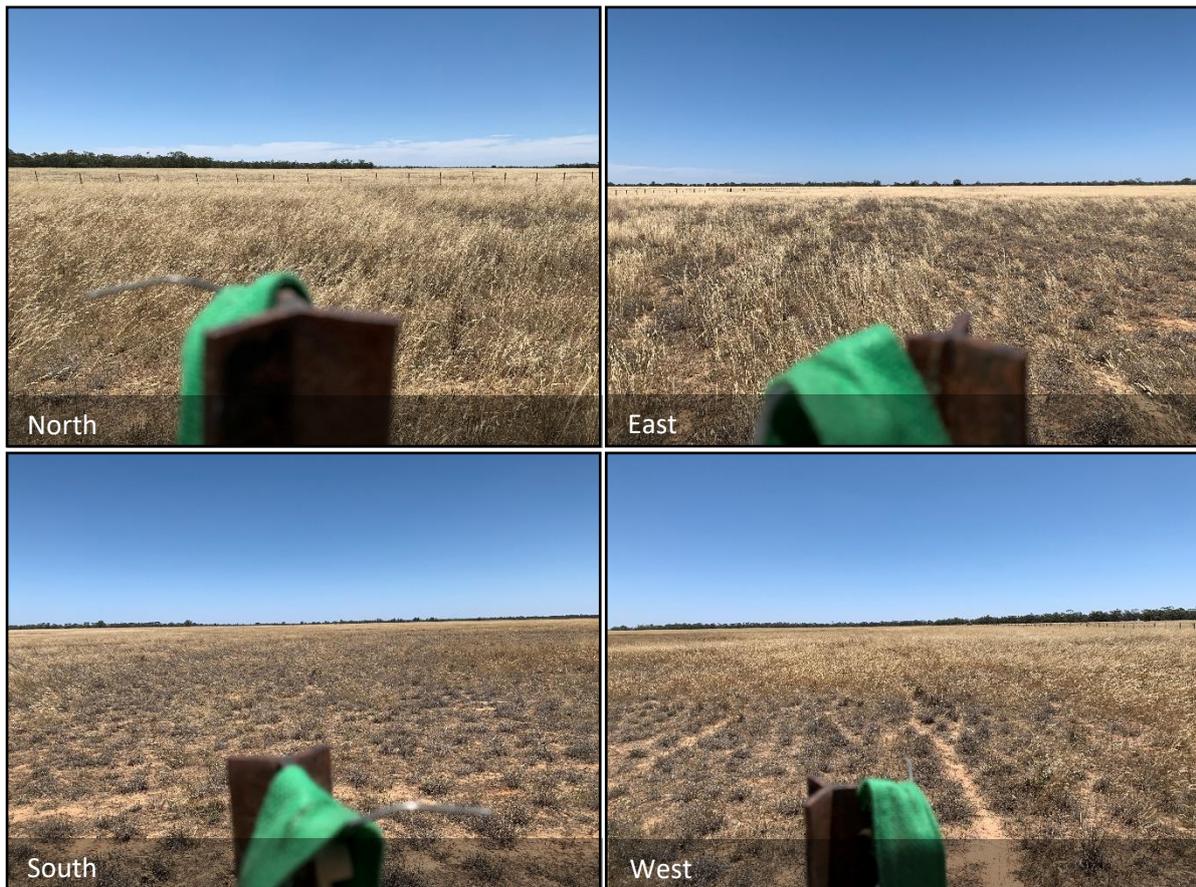
Location: 143.420160944 -35.9573963285

Biomass density: Golfball score of 17.5

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 12

Location: 143.424812984 -35.9583721497

Biomass density: Golfball score of 14

Coverage of native species: 95%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 13

Location: 143.424812984 -35.9583721497

Biomass density: Golfball score of 12.5

Coverage of native species: 90%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 14

Location: 143.416529987 -35.9610948013

Biomass density: Golfball score of 17.5

Coverage of native species: 90%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.

Quadrat 15

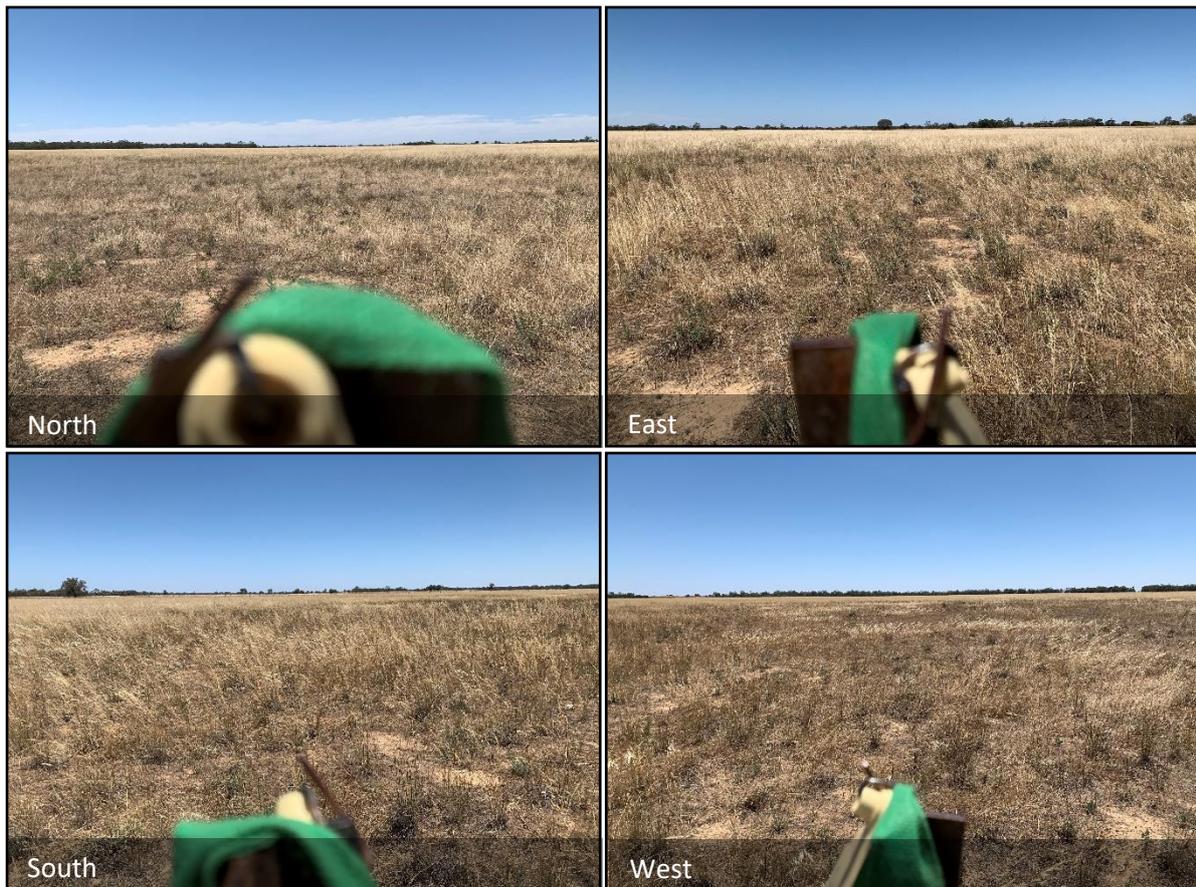
Location: 143.420354901 -35.9614642337

Biomass density: Golfball score of 18

Coverage of native species: 30%



Photo of quadrat *in situ* showing golfball test for biomass density



Photopoint photos showing location from north, east, south and west.