

Acknowledgments

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APPENDIX 1

Station Reports

Station reports are presented alphabetically, using a standardized format. Reports should be read in conjunction with the relevant 1:250,000 scale land system maps which show cadastral boundaries, land system boundaries, watering points, major topographic features, traverse routes and recordings, range evaluation (inventory) sites and severely degraded and eroded areas.

Each report presents a summary description of land systems on the station and their areas and pastoral value. Condition statements derived from traverse records are presented for each land system. Statements for component units of each land system are not presented here, but these data are available.

Descriptive statements of the range condition of each land system are made together with management recommendations where necessary.

The table at the end of each station report lists all land systems and their component pasture types present on the station. The areas of each pasture type in good, fair and poor range condition are indicated, as determined from traverse records obtained during the survey.

Suggested stocking rates for modal seasonal conditions are presented with each pasture type for each level of condition (table 29). The total carrying capacity of each pasture type and land system on each station has been estimated in this way. A table for each station shows the recommended sheep unit capacity of the land systems for their present range condition. One sheep unit is defined as a dry ewe or

a wether; for properties running cattle the generally accepted conversion rate of 8 sheep units has been used to convert cattle numbers. The table also indicates the capability sheep unit capacity if the systems were all in good range condition. Recommended and capability sheep capacities for the whole station are obtained by summation and rounded to the nearest 50.

A summary (table 32) of all stations is presented before the individual reports. The table includes a column showing the ratio of recommended sheep unit capacity:capability sheep unit capacity. This figure gives an indication of how far removed the present range condition of each station is from uniformly good condition and is a measure of the degree of degradation that has occurred. A figure of 1.0 indicates that present condition is all good to optimal. The lower the fraction the greater the departure is from ideal condition.

Individual reports presented here are for the following stations:

Boolathana, Booloogooro, Brickhouse, Bullara, Callagiddy, Callytharra Springs, Carbla, Cardabia, Carey Downs, Carrarang, Coburn, Cooralya, Dirk Hartog, Doorawarra, Edaggee, Ella Valla, Exmouth Gulf, Faure, Gilroyd, Gnoraloo, Hamelin, Hill Springs, Lyndon, Manberry, Mardathuna, Marron, Meadow, Meedo, Meeragoolia, Mia Mia, Middalya, Minilya, Mooka, Nanga, Nerren Nerren, Ningaloo, Peron, Pimbee, Quobba, Talisker, Tamala, Towrana, Towera, Wahroonga, Wandagee, Warroora, Williambury, Winderie, Winning, Woodleigh, Wooramel, Yalardy, Yalbalgo and Yaringa.

Table 32. Conditions and carrying capacity summary of stations.

Station	Area km ²	Range condition km ²			Extreme degradation km ²	Total sheep capacity		Ratio recommend: capability cattle (C)	Present stock nos (1982) sheep(S)	Remarks
		Good	Fair	Poor		Recommended	capability			
Boolathana	1455	809	397	206	43	16650	21950	0.76	10000 (S) 110 (C)	Mostly high potential country, condition fair to good except parts Sandal, Delta and Coast l.s. severely degraded, some parts inadequately watered.
Boologooro	741	497	155	89	-	8800	10700	0.82	5600 (S)	Mostly high potential country, condition predominantly good or fair, insufficient or saline stock waters in parts.
Brickhouse	2263	827	720	612	104	24450	37950	0.64	29000 (S) 336 (C)	High pastoral potential, condition variable but extensive parts Delta l.s. severely degraded, some parts inadequately watered.
Bullara	1109	999	84	24	2	17000	18050	0.94	11638 (S) 105 (C)	Soft spinifex and bluebush country largely in good range condition, some parts inadequately watered.
Callagiddy	654	173	324	157	-	6550	10000	0.66	7859 (S)	High pastoral potential country, condition predominantly fair.
Callytharra Springs	673	466	133	74	-	3950	4500	0.88	230 (S) 196 (C)	Mostly sandplain country with some rough hills, very incompletely developed.
Carbla	957	200	453	304	-	8800	17100	0.51	4051 (S)	Mostly high potential limestone country, parts degraded to fair or poor condition, no significant erosion, some extensive parts inadequately watered.

Table 32. Continued

Station	Area km ²	Range condition km ²			Extreme degradation km ²	Total sheep capacity		Ratio recommend: capability cattle (C)	Present stock nos (1982) sheep(S)	Remarks
		Good	Fair	Poor		Recommended capability				
Cardabia	1998	1524	407	67	-	28450	32900	0.86	17349 (S) 321 (C)	Soft spinifex and bluebush country of high pastoral potential generally in good condition. Gearle and Firecracker systems need careful management.
Carey Downs	955	480	285	190	-	4900	6250	0.78	4416 (S)	Sandplain, stony plains and rough hills, condition variable but mostly fair or good, eastern parts not developed.
Carrarang	805	586	86	97	36	8000	97000	0.82	1747 (S)	Sandplain and dunes, range condition good except Coast I.s. highly sensitive and subject to blowouts, poorly developed and inadequately watered.
Coburn	1005	448	345	212	-	5150	7050	0.73	3022 (S)	Mostly sandplain in fair to good condition, inadequately watered.Nanga I.s. too poor to develop for pastoralism.
Cooralya	1619	586	762	271	-	13350	18650	0.72	21000 (S)	Sandplain and alluvial plains moderate to high potential, condition predominantly fair.
Dirk Hartog	616	475	103	20	18	5450	6300	0.87	3150 (S)	Sandy plains and coastal dunes, condition mostly good, Inscription I.s. too poor to develop for pastoralism, massive blowouts occur on sensitive Coast I.s., only partly developed and insufficient waters.
Doorawarra	2193	525	1050	618	-	16900	27350	0.62	11498 (S)	Plains country of moderate to high pastoral value, pastures generally degraded to fair or poor condition.
Edaggee	679	167	311	201	-	6700	10450	0.64	7000 (S)	Alluvial plains with high pastoral value but pastures generally degraded and shrub invaded, inadequately watered.
Ella Valla	761	321	320	120	-	7000	9650	0.73	7084 (S)	Sandy plains and low dunes moderate to high pastoral potential, condition variable but largely fair or good, no significant erosion.
Exmouth Gulf	930	864	66	-	-	8050	8250	0.98	10259 (S)	Sandy plains and rugged limestone ranges, condition good, most of Range I.s. is unsuitable for pastoralism.
Gilroyd	809	353	386	70	-	5600	6700	0.84	3195 (S)	Sandplain and dunes, moderate pastoral value, condition fair or good, additional water points needed.
Gnaraloo	913	625	225	51	12	10350	12550	0.82	4180 (S) 9 (C)	Sandplain and limestone country, moderate to high pastoral potential, condition mostly good, blowouts on Coast I.s., parts inadequately watered.
Hamelin	2028	584	624	820	-	16650	29900	0.56	8136 (S)	Sandy plains and limestone plains, moderate to high pastoral value, pastures generally degraded to fair or poor condition, some extra waters needed.

Table 32. Continued

Station	Area km ²	Range condition km ²			Extreme degradation km ²	Total sheep capacity		Ratio recommend: capability cattle (C)	Present stock nos (1982) sheep(S)	Remarks
		Good	Fair	Poor		Recommended capability				
Hill Springs	1232	682	376	162	12	10600	13900	0.76	10000 (S)	Sandplain, dunes, stony plains of moderate value, range condition fair or good except Gearle l.s. which is seriously degraded, parts of station are not in use.
Lyndon	2482	1116	913	439	14	14950	20700	0.72	15648 (S)	Stony plains, alluvial plains and rough hills, moderate pastoral potential, condition generally good or fair but some severe degradation, some extra waters needed.
Manberry	854	165	450	239	-	5650	8350	0.68	6596 (S) 74 (C)	Sandy plains and dunes, moderate pastoral value, condition mostly fair but variable, some parts little used due to lack of waters.
Mardathuna	2433	1422	670	337	4	18600	23900	0.78	15500 (S) 500 (C)	Sandplain, alluvial plains, stony plains and rough plateaux, overall moderate value, condition mostly good or fair but Gearle l.s. severely degraded.
Marron	805	400	276	129	-	7500	10250	0.73	6250 (S) 38 (C)	Alluvial plains, sandplain and dunes moderate to high pastoral value, condition mostly good or fair but some degradation.
Meadow	832	405	323	104	-	6100	8500	0.72	1945 (S)	Mostly sandplain of moderate pastoral value, condition mostly good or fair, inadequately watered.
Meedo	1465	549	619	297	-	9250	12850	0.72	6928 (S) 10 (C)	Sandplain, dunes and alluvial plains of moderate pastoral value, condition fair to good but Lyons l.s. generally degraded.
Meeragoolia	260	42	111	107	-	2050	3900	0.53	4000 (S)	Alluvial plains of high pastoral value, pastures are shrub-invaded and degraded to fair or poor condition.
Mia Mia	2089	1301	492	287	9	21450	29400	0.73	24474 (S)	Sandplain and alluvial plains, moderate to high pastoral value, sandplain in good condition, elsewhere condition variable, Winning and Spot l.s. degraded.
Middalya	1997	1163	491	322	21	15200	19350	0.79	12300 (S)	Sandplain, alluvial and stony plains, hills, moderate pastoral value, condition mostly good but variable, parts Jimba l.s. severely degraded, some parts little used due to lack of waters.
Minilya	2733	1640	748	307	38	31050	40700	0.76	25000 (S) 1500 (C)	Sandy plains and alluvial plains of moderate and high pastoral value, condition variable, severe degradation on some alluvial systems, north-east parts inadequately watered.
Mooka	809	559	181	69	-	4700	5450	0.86	2418 (S)	Mostly sandy plains and dunes, moderate pastoral value, condition predominantly good or fair, western parts undeveloped.

Table 32. Continued

Station	Area km ²	Range condition km ²			Extreme degradation km ²	Total sheep capacity		Ratio recommend: capability cattle (C)	Present stock nos (1982) sheep(S)	Remarks
		Good	Fair	Poor		Recommended capability				
Nanga	1751	1504	184	63	-	7700	8850	0.87	3000 (S)	Sandplain with very low value heath pastures, better pastures in north, range condition of used areas is fair, Nanga system too poor for pastoralism.
Nerren Nerren	1775	1153	412	210	-	9650	11400	0.85	4682 (S)	Sandplains of very low and moderate pastoral value, condition mostly good, additional waters required, Nanga system too poor for development.
Ningaloo	497	388	91	2	16	5950	6800	0.88	5817 (S)	Sandplain and dunes, generally high pastoral value, condition mostly good, large blowouts on sensitive Coast I.s., station poorly watered.
Peron	1052	421	372	244	15	8350	11650	0.72	7000 (S)	Sandy plains, moderate to high pastoral value, condition varies from good to poor, Taillefer system susceptible to wind erosion, parts inadequately watered.
Pimbee	565	153	279	133	-	3600	4850	0.74	3000 (S)	Sandplain and dunes, moderate pastoral value, condition mostly fair, some local pasture degradation, a few extra waters needed.
Quobba	750	555	172	18	5	9050	10350	0.87	4737 (S)	Sandplain, dunes and limestone plains, high pastoral value, condition mostly good but some local pasture degradation, large blowouts on sensitive Coast I.s., additional waters needed.
Talisker	2873	1479	1148	246	-	20800	24300	0.86	5150 (S)	Sandplain of moderate pastoral value, good or fair condition, much of station undeveloped due to lack of groundwater supplies.
Tamala	1297	1035	149	104	9	11500	13350	0.86	8500 (S) 32 (C)	Sandplain, dunes, limestone plains, pastoral value very low to very high, condition mostly good except large blowouts on sensitive Coast I.s., inadequately watered.
Towera	2061	1089	674	288	10	13950	17550	0.79	3238 (S)	Sandy plains, stony plains and hills, moderate pastoral value, variable condition, some local areas of severe degradation, some extra waters needed.
Towrana	1627	474	791	362	-	10200	13700	0.74	2908 (S)	Mostly sandplain and dunes, moderate pastoral value, condition mostly fair but some pastures degraded to poor.
Wahroonga	830	362	265	203	-	6150	9300	0.66	5804 (S)	Sandplain, dunes and alluvial plains, moderate to high pastoral potential, condition varies good to poor, some pastures are shrub invaded, additional waters needed.
Wandagee	1924	776	630	490	28	16550	24800	0.67	21545 (S) 40 (C)	Alluvial plains and sandplain, moderate to high pastoral potential, condition variable, some extensive areas of severe degradation, parts inadequately watered.

Table 32. Continued

Station	Area km ²	Range condition km ²			Extreme degradation km ²	Total sheep capacity		Ratio recommend: capability cattle (C)	Present stock nos (1982) sheep(S)	Remarks
		Good	Fair	Poor		Recommended capability				
Warroora	1077	812	259	5	1	16350	18500	0.88	10084 (S)	Sandplain, alluvial plains and limestone plains of high pastoral value, range condition good or fair, inadequately watered.
Williambury	2728	1125	1028	551	24	14050	20150	0.70	8000 (S) 120 (C)	Stony plains, alluvial plains, rough hills, overall pastoral value moderate, condition varies good to poor, severe degradation on parts of Jimba l.s.
Winderie	692	152	372	141	27	3900	5800	0.67	6294 (S)	Sandplain, dunes, and alluvial plains of moderate pastoral value, condition mostly fair, severe degradation on parts Bidgemia and Jimba l.s.
Winning	1585	682	337	544	22	13450	22300	0.60	17000 (S) 220 (C)	Sandy plains and alluvial plains, pastoral value moderate to high, condition variable but considerable pasture depletion and parts of Winning l.s. severely degraded.
Woodleigh	2331	1330	790	211	-	17050	19650	0.87	14600 (S) 20 (C)	Sandplain of moderate pastoral value, condition mainly good or fair, some large areas inadequately watered.
Wooramel	1414	508	360	378	168	13000	22550	0.58	4253 (S)	Alluvial plains of high pastoral value, condition varies from good to poor, large parts Delta l.s. severely degraded, additional waters needed.
Yalardy	1012	719	205	88	-	7550	8350	0.90	4000 (S)	Sandplain and dunes, moderate pastoral value, condition mostly good or fair, some large parts inadequately watered.
Yalbalgo	865	242	460	163	-	6300	9050	0.70	5000 (S) 15 (C)	Sandplain and dunes of moderate to high pastoral value, condition mostly fair, some large areas inadequately watered.
Yaringa	1227	440	479	308	-	10000	13550	0.74	4620 (S)	Sandplain and limestone plains of moderate to high pastoral value, condition varies from good to poor, large areas inadequately watered.
TOTALS	71145	36396	22351	11760	638	596200	801350	-	455078(S) 3658 (C) =484342 sheep units	

Boolathana station - Carnarvon Shire

Area 1,455 km²

Location

Boolathana station is located on the Quobba 1:250,000 map sheet. The homestead is about 35 km north by road from Carnarvon and the station has common boundaries with Quobba, Booloogoora, Cooralya, Doorawarra and Brickhouse stations and the Carnarvon townsite. In the west the station has about 23 km of Indian Ocean coastline and in the north-west it abuts onto Lake McLeod.

Description

All of the station is accessible to livestock and more than 90% of the country is of high pastoral value.

The largest and most valuable land systems on the station are Sable (24.1% of the station area), Sandal (17.9%), Delta (16.1%) and Warroora (13.4%). These systems all consist of almost flat saline and non-saline alluvial plains with varying proportions of low

sandy banks and rises. They support extensive low shrublands of saltbush and bluebush and patches of tall acacia shrublands on the sandy rises. The Delta system is marginally lower than the other systems and consists of active floodplains with numerous scalds and scoured areas associated with flooding from the Gascoyne River.

Two sand dune systems, Lyell (4.5%) and Coast (4.3%) occur in the west. These systems and the gently undulating sandy plains of the Brown system (12.3%) support acacia shrublands with useful low shrubs including saltbush. The introduced buffel grass is well established on parts of these systems and on sandy elements of many other systems throughout the station.

All land systems found in the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Boolathana station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Brown - gently undulating sand plains and occasional dunes; tall mixed acacia shrublands, also buffel grass.	12.3
	McLeod - samphire flats and sandy plains with bare marginal mudflats; samphire and saltbush low shrublands.	3.7
	Mallee - undulating sandy plains with limestone at shallow depth; mallee shrublands with soft and hard spinifex.	0.7
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; currant bush and acacia mixed shrublands.	0.5
		17.2
High (5-9 ha/s.u.)	Sable - nearly flat saline alluvial plains, minor sandy banks; saltbush and bluebush shrublands.	24.1
	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; currant bush and acacia mixed shrublands and bluebush.	17.9
	Delta - almost flat, active alluvial floodplains, low shrublands of saltbush and bluebush	16.1
	Warroora - nearly flat, saline alluvial plains, sluggish drainage tracts and prominent drainage foci, minor limestone outcrop plains and sandy banks; low shrublands of saltbush and bluebush.	13.4
	Lyell - linear and reticulate dunes with saline interdunal plains; acacia shrublands and saltbush.	4.5
	Coast - large, long walled parabolic coastal dunes and narrow swales, unstable blowout areas, narrow swales, rocky wave cut platforms and beach; mixed low shrubs, also buffel grass.	4.3
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; currant bush mixed shrublands and acacia shrublands	0.1
		80.4
Very high (> 5 ha/s.u.)	Chargoo - nearly flat, saline alluvial plains with numerous drainage foci and swampy depressions, chenopod shrublands and tussock grasses.	0.2
	Bare surfaces of Lake McLeod	2.2
		100.0

Table 2. Condition statements derived from traverse records (257 recordings on 8 land systems)

Boolathana

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	20	100	—	—	—	30	30	30	10	—	60	30	10
Coast	1	100	—	—	—	—	100	—	—	—	100	—	—
Delta	99	39	26	23	12	8	33	18	14	27	39	19	42
Lyell	14	100	—	—	—	43	50	7	—	—	93	7	—
MacLeod	9	100	—	—	—	89	11	—	—	—	100	—	—
Sable	40	100	—	—	—	20	30	35	15	—	50	35	15
Sandal	31	80	10	10	—	3	32	49	13	3	35	46	19
Warroora	43	100	—	—	—	42	49	9	—	—	91	9	—
Total over all land systems	257	74	11	10	5	21	35	23	10	11	56	23	21

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 22 sites on 8 land systems.

Range condition and recommendations

1. Sable land system (24.1%)

Saltbush (SALT) and Bluebush (BLUE) pastures on this system are mostly in fair to very good condition although some localized areas show shrub depletion to poor condition. There is no erosion on the system and over all range condition is predominantly fair or good.

2. Sandal land system (17.9%)

This system supports valuable Currant Bush Mixed Shrub Pastures (CBMS) and some Bluebush (BLUE) on the duplex soils of the alluvial plains and Acacia Sandplain pastures (ACSA) on the sandy banks. Condition of the Currant Bush Mixed Shrub pastures is about evenly distributed between good, fair and poor with the poorer areas showing loss of desirable shrubs such as currant bush, Gascoyne bluebush and tall saltbush. The Acacia Sandplain pastures are nearly all in fair or good condition. Localized parts of the system show minor and moderate erosion in the form of patchy scalding and surface sheeting.

Taken over all the traverse data indicates that about 20% of this system is in poor range condition, with 45% and 35% being in fair and good range condition respectively. The poorer parts of the system could be readily improved by spelling from grazing over a number of growing seasons.

3. Delta land system (16.1%)

The alluvial flood plains of this system support mixed Saltbush (SALT) and Bluebush (BLUE) pastures. Condition of the pastures varies from very good to very poor. More than 40% of the traverse recordings indicated poor or very poor pasture condition with desirable shrubs such as bladder saltbush and low bluebush severely depleted or absent. On some sites, notably to the north of the homestead, the undesirable needle bush appears to be increasing.

Wind and water erosion is common on the system and has resulted in extensive bare scalded surfaces and areas with hummocking and shallow scouring. About 29 km² (12%) of the system shows extreme pasture degradation with moderate to severe erosion. These areas should not be used for grazing and require special remedial treatments including cultivation works and seeding to facilitate rehabilitation. Cultivation treatments have already been attempted over large areas and have met with mixed success.

4. Warroora land system (13.4%)

This system is nearly all in good range condition with Bluebush (BLUE) and Saltbush (SALT) pastures in good or very good condition and no erosion. Some parts are not fully used due to the distance from water and/or the fairly high levels of salt in some of the stock waters.

5. Brown land system (12.3%)

This system supports Acacia Sandplain pastures with an overstorey of silver bark wattle with other shrubs such as tall saltbush, sand plain poverty bush, and Wilcox bush and various grasses. Pasture condition is mostly fair to very good and there is no erosion. Considerable death of shrubs has occurred in the past on some heavily used areas, but these now support good stands of the introduced buffel grass.

6. Lyell land system (4.5%)

This sand dune system supports Coastal Dune Shrub pastures (CDSH) with low shrubs such as coastal jam and *Calytrix* sp. on the dunes and a wide range of more useful shrubs such as silver saltbush, *Rhagodia* sp.; and other chenopods on the interdunal plains. Pasture condition is good or very good and there is no erosion.

7. The remaining six land systems on the station collectively occupy 9.5% of the station area. Pastures are in good or very good condition and there is no erosion except for one large sand blowout on the Coast system.

8. In general the station is well subdivided into paddocks. Although the station has numerous watering points, some areas in the north, north-east and elsewhere are inadequately watered and some of the supplies are very saline. High salt intake by sheep (resulting from a combination of salty stock waters and saline pastures) means that grazing radii from water are shortened and pasture usage is restricted. As a consequence, many areas of Saltbush and Bluebush pastures have been under used. These areas need to be brought into production with more

and/or better quality water supplies. This would enable the stocking pressure to be reduced on severely degraded parts of the station and facilitate rehabilitation works on those parts (which are almost exclusively confined to the Delta land system- see 3).

9. The recommended sheep unit capacity for present condition is 16,650.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 21,950.

Individual station report

Boolathana station - 145,480 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sable	351	SALT	69	65	24	—	2,343	3,160
		BLUE	62	57	21	—	2,084	2,800
		ACSA	29	14	10	—	369	442
Sandal	261	CBMS	33	43	42	—	1,460	2,360
		ASCA	41	58	5	—	724	867
		BLUE	15	16	8	—	550	780
Delta	235	BLUE	32	22	37	15	1,146	2,120
		SALT	28	20	32	14	1,010	1,800
		ASCA	28	7	—	—	277	292
Warroora	194	BLUE	76	11	—	—	1,658	1,740
		SALT	68	10	—	—	1,485	1,560
		SAMP	29	—	—	—	116	116
Brown	178	ASCA	96	48	16	—	1,164	1,133
		SALT	6	6	6	—	233	360
Lyell	65	CDSH	39	3	—	—	509	525
		SALT	21	2	—	—	445	460
Coast McLeod	62	CDSH	35	8	5	14	515	775
		SAMP	27	—	—	—	108	108
		SALT	11	—	—	—	220	220
Mallee	10	No veg	16	—	—	—	—	—
		HASP	5	1	—	—	28	30
		SOSP	3	1	—	—	58	67
Lyons	8	ACSA	2	2	—	—	29	33
		CBMS	—	2	—	—	25	40
		ACCR	—	—	—	—	—	—
Chargoo	3	No veg	2	—	—	—	—	—
		SALT	1	1	—	—	33	40
		TUGR	1	—	—	—	33	33
Target	2	BLUE	—	—	—	—	—	—
		CBMS	—	1	—	—	13	20
		ACSA	1	—	—	—	8	8
Lake McLeod	32	ACCR	—	—	—	—	—	—
		No veg	32	—	—	—	—	—
Totals	1,455		809	397	206	43	16,643	21,969

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 16,650

Capability 21,950

Declared stock numbers (sheep units or equivalents)

1968-1984 (no data for 1982):

average (mean) 18,693

highest (1974) 23,970

lowest (1980) 9,295

Boologooro station - Carnarvon Shire

Area 741 km²

Location

Boologooro station is located on the Quobba and Kennedy Range 1:250,000 map sheets. The homestead is adjacent to the North-West Coastal Highway about 80 km north of Carnarvon. The station has common boundaries with Minilya, Cooralya and Boolathana stations and with Lake McLeod to the west.

Description

The largest land system on the station is Sandal (48.6% of the station area) which occurs in central and southern parts. It consists of alluvial plains with duplex soils and numerous low sandy rises and banks. It supports mixed shrublands of currant bush, various acacias and some Gascoyne bluebush. Pastoral value is high.

The Warroora system (21.4%) occurs in the west and consists of almost flat saline alluvial plains with low shrublands of saltbush and bluebush and some tall acacia shrublands. Pastoral value is high.

Four other systems of high pastoral value occur on the station. The largest of these is Target (6.6%) which is found in the south of the station and consists of nearly flat plains with sandy banks and small but prominent drainage foci with dense vegetation. The plains support currant bush mixed shrublands and tall acacia shrublands.

The remainder of the station (16.6%) consists of land systems McLeod, Lyons and Yalbalgo which are of moderate grazing value. The McLeod system (7.2%) occurs in the central west and consists of saline plains with low shrublands of samphire and saltbush. The Lyons system occurs in the centre and north-east. It consists of sandy alluvial plains with numerous distinctive claypans surrounded by linear and reticulate dunes. Vegetation is currant bush mixed shrublands on the alluvial plains and tall shrublands of wanyu on the dunes. The Yalbalgo system consists of large linear dunes and sandy swales and vegetation is mainly a tall shrubland of wanyu.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Boologooro station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	McLeod - samphire flats and sandy plains with bare marginal mudflats, samphire and saltbush shrublands.	7.2
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; currant bush mixed shrublands and wanyu shrublands.	5.8
	Yalbalgo - sandplain with linear and reticulate dunes; tall shrublands of wanyu.	3.6
		16.6
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; currant bush, acacia and bluebush mixed shrublands.	48.6
	Warroora - nearly flat, saline alluvial plains, sluggish drainage tracts and prominent drainage foci, minor limestone outcrop plains and sandy banks; low shrublands of saltbush and bluebush.	21.4
	Target - plains with sandy banks, more clayey inter-bank areas and numerous small drainage foci; currant bush mixed shrublands and acacia shrublands.	6.6
	Brown - gently undulating sand plains and occasional dunes; tall mixed Acacia shrublands.	2.5
	Sable - nearly flat saline alluvial plains minor sandy banks; low shrublands of saltbush and bluebush.	2.2
	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes, tall mixed acacia shrublands	2.1
		83.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (109 recordings on 9 land systems)

Boologooro

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	3	100	—	—	—	100	—	—	—	—	100	—	—
Lyons	14	100	—	—	—	7	50	29	14	—	57	29	14
MacLeod	1	—	—	—	100	—	—	—	—	100	—	—	100
Sable	2	100	—	—	—	—	50	—	50	—	50	—	50
Sandal	61	93	5	2	—	10	38	36	16	—	48	36	16
Target	2	100	—	—	—	—	50	50	—	—	50	50	—
Trealia	3	100	—	—	—	67	33	—	—	—	100	—	—
Warroora	20	90	10	—	—	40	40	15	5	0	80	15	5
Yalbalgo	3	100	—	—	—	—	—	67	33	—	—	67	33
Total over all land systems	109	93	5	1	1	18	38	29	14	1	56	29	15

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 4 sites on 2 land systems.

Range condition and recommendations

1. Sandal land system (48.6%)

The Currant Bush Mixed Shrub pastures (CBMS) on the duplex soil plains of the system are mostly in good condition although some 22% of the traverse records indicate shrub losses and poor condition. The Acacia Sandplain (ACSA) pastures of the low sandy rises of the system are in fair to very good condition. Degraded areas would respond well to spelling from grazing over a number of growing seasons.

2. Warroora land system (21.4%)

The Saltbush (SALT) and Bluebush (BLUE) pastures of this system are mostly in good or very good condition and there is very little erosion. The system is under used due to the general lack of good quality stock water supplies.

3. McLeod land system (7.2%)

Because of the highly saline nature of the Samphire (SAMP) and Saltbush (SALT) pastures the system is only of limited use for pastoral purposes. The problem of high levels of salt intake by stock are increased if stock water supplies are also saline. Condition of the pastures is good or very good.

4. Target land system (6.6%)

The system was not intensively sampled but where seen was in fair or good range condition.

5. Lyons land system (5.8%)

The Currant Bush Mixed Shrub (CBMS) pastures on this system are mostly in fair or good condition although some areas show partial degradation to poor condition. Acacia Sandplain (ACSA) pastures dominate the dunes and sandy swales of the system and are good condition.

6. Yalbalgo land system (3.6%)

The system was insufficiently sampled but from knowledge of the Acacia Sandplain pastures of the system as seen elsewhere during the survey, condition is expected to be fair or good. The system is not prone to erosion.

7. The remaining three minor land systems are in fair or good range condition.

8. The station is well subdivided into paddocks but, as is common with stations in the coastal strip north and south of Carnarvon, has some problems of insufficient or poor quality (saline) stock water supplies. High salt intake by stock resulting from a combination of saline pastures and saline waters means that grazing range around waters is often severely restricted. As a result many of the Saltbush and Bluebush pastures on the station are not fully used. The provision of more frequent, better quality stock waters is required so that these valuable pastures may be fully used.

9. The recommended sheep unit capacity for present condition is 8,800.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 10,700.

Individual station report

Boologooro station - 74,117 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	360	CBMS	108	18	36	—	2,610	3,240
		ASCA	92	48	4	—	1,083	1,200
		BLUE	36	6	12	—	870	1,080
Warroora	158	BLUE	46	11	6	—	1,095	1,260
		SALT	44	14	5	—	1,086	1,260
		SAMP	32	—	—	—	128	128
McLeod	54	SAMP	27	—	—	—	108	108
		SALT	11	—	—	—	220	220
		No veg	16	—	—	—	—	—
Target	49	CBMS	2	9	11	—	221	440
		ACSA	7	10	3	—	133	167
		ACCR	3	3	1	—	95	140
Lyons	43	ACSA	16	4	2	—	166	183
		CBMS	4	4	1	—	136	180
		ACCR	—	3	—	—	30	60
Yalbalgo	27	No veg	9	—	—	—	—	—
		ACSA	13	10	4	—	187	255
		ASCA	10	5	1	—	119	133
Brown	18	SALT	1	1	—	—	33	40
		SALT	5	2	1	—	131	160
		BLUE	4	2	1	—	111	140
Sable	17	ACSA	1	1	—	—	15	17
		ACMS	9	4	1	—	226	280
		BLUE	1	—	—	—	20	20
Trealla	15							
Totals	741		497	155	89	—	8,823	10,711

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 8,800

Capability sheep unit capacity 10,700

Declared stock numbers (sheep units or equivalent)

1968-1983 (no data for 1971, 1977, 1982, 1984):

average (mean) 8,642

highest (1972) 13,250

lowest (1983) none

Brickhouse station - Carnarvon Shire

Area 2,263 km²

Location

Brickhouse station is located on the Quobba, Kennedy Range, Shark Bay and Wooramel 1:250,000 map sheet. The homestead is about 19 km east by road from Carnarvon. The station has common boundaries with Boolathana, Doorawarra, Meeragoolia and Callagiddy stations and to the Carnarvon townsite area. Its western side extends to a long coastline north of Shark Bay.

Description

The Gascoyne River runs through the station from east to west and divides it into two sections, about one-third north of the river and two-thirds to the south.

The station consists largely of broad, saline and non-saline active floodplains and stable floodplains of the Gascoyne River delta. All of the station is accessible to livestock and nearly all of it is of high pastoral value.

The most extensive land systems are Sandal (34.9% of the station area), Delta (28.2%) and Sable (26.3%). These three systems all consist of almost flat alluvial plains with varying proportions of low sandy banks and rises. They support low shrublands of saltbush and bluebush over broad plains and patches of tall acacia shrublands on the sandy rises. The Delta system is marginally lower than the other systems

and consists of active flood plains of the Gascoyne River. It is susceptible to degradation and has numerous scalded, hummocked and water scoured areas.

The remaining seven land systems on the station collectively occupy only 10.6% of the total area. Of these the Brown (3%), Littoral (2.5%) and River (2.5%) systems are the most significant.

The Brown system occurs in the west near the coast and consists of undulating sandy plains and occasional large dunes. It supports tall acacia shrublands sometimes with a ground storey of buffel grass.

The Littoral system occurs as a long strip fringing the coastal margin of the station. It consists of low, stabilized sand dunes and narrow sandy plains fronting onto highly saline samphire flats and bare tidal sandflats with mangroves on the outer margins.

The River system occurs as a narrow strip of country on either side of the Gascoyne River. It includes the river channel, banks and narrow levee zones. Vegetation on the levees is a scattered eucalypt and acacia woodland frequently with a ground storey of dense buffel grass. The river channel is lined with large river red gums.

All ten systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are summarised in table 2. These statements were derived from traverse records.

Table 1. Land systems on Brickhouse station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Brown - gently undulating sand plains and occasional dunes; tall acacia shrublands also buffel grass.	3.0
	Littoral - low coastal foredunes, samphire and tidal flats and mangrove fringes.	2.5
		5.5
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; currant bush, acacia and bluebush mixed shrublands.	34.9
	Delta - almost flat, active alluvial flood plains, low shrublands of saltbush and bluebush.	28.2
	Sable - nearly flat, saline alluvial plains, minor sandy banks; low shrublands of saltbush and bluebush.	26.3
	River - narrow active floodplains and levees with major channels; fringing woodlands and tall shrublands with tussock grasses.	2.5
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; currant bush mixed shrublands and acacia shrublands.	1.6
	Ella - short linear dunes and sandy banks with interdunal plains and drainage foci, sand dune gidgee woodlands and mixed shrublands.	0.4

Table 1 Continued...

Pastoral value	Land systems	Area %
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; currant bush mixed shrublands and acacia shrublands.	< 0.1
		94.0
Very high (< 5 ha/s.u.)	Chargoo - nearly flat, saline alluvial plains with numerous drainage foci and swampy depressions, chenopod shrublands and tussock grasses	0.5
		100.0

Table 2. Condition statements derived from traverse records (427 recordings on 8 land systems)

Brickhouse

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	8	100	—	—	—	—	61	39	—	—	62	38	—
Cahill	3	100	—	—	—	33	67	—	—	—	100	—	—
Delta	172	32	26	23	19	2	18	26	26	28	20	21	59
Ella	3	100	—	—	—	—	—	67	33	—	—	67	33
Littoral	14	100	—	—	—	86	7	7	—	—	93	7	—
Lyons	3	100	—	—	—	—	67	33	—	—	67	33	—
Sable	94	97	3	—	—	13	37	33	16	1	50	33	17
Sandal	130	93	5	2	—	2	33	40	24	1	34	41	25
Total over all land systems	427	70	12	10	8	7	28	31	22	12	35	30	35

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 20 sites on 5 land systems.

Range condition and recommendations

1. Sandal land system (34.9%)

This system supports valuable Currant Bush Mixed Shrub pastures (CBMS) and some Bluebush (BLUE) on the duplex soils of the alluvial plains and Acacia Sandplain pastures (ACSA) on the sandy rises. Condition of the Currant Bush Mixed Shrub pastures is mostly fair although there are also considerable areas in good and poor condition. The poorer parts show considerable loss of desirable shrubs such as currant bush, Gascoyne bluebush and tall saltbush. Condition of the Acacia Sandplain pastures varies from poor to good. A few parts of the system show minor erosion, but in general the system is stable.

The traverse data indicates that about 25% of the system is in poor range condition with depleted pastures. Some 41% and 35% are in fair and good range condition respectively. The poorer parts could be readily improved by spelling from grazing over a number of growing seasons.

2. Delta land system (28.2%)

The flood plains of this system support mixed Saltbush (SALT) and Bluebush (BLUE) pastures. Pasture condition is mostly poor or very poor with minor areas in fair or good condition. Very poor

condition is indicated by severe depletion of desirable shrubs such as bladder saltbush, low bluebush and Gascoyne bluebush.

Wind and water erosion is common on the system and has resulted in extensive, bare scalded surfaces and areas with hummocking and water scouring.

About 104 km² (16%) of the system shows extreme pasture degradation with moderate to severe erosion. These areas should not be used for grazing and require special remedial treatments including cultivation works and seeding to facilitate rehabilitation. Less severely degraded areas could be improved by regular spelling from grazing over a number of growing seasons.

The system is subject to regular flooding from the Gascoyne River and is inherently susceptible to water erosion. Where vegetative ground cover is depleted by excessive grazing pressure the susceptibility to water erosion is markedly increased.

The largest single areas of degradation on the Delta system are north of the Gascoyne River in Neenalia, Canterbury and Neemanwarra paddocks. There are also extensive areas of degradation south of the river in parts of East Coburn, Moolooloo, Standard, East Coast and Wanargie paddocks and also in West Coast paddock in the vicinity of Argyle tank.

3. Sable land system (26.3%)

This stable floodplain system is slightly more elevated than the adjacent Delta system and is not subject to regular flooding from the Gascoyne River. It supports Saltbush (SALT) and Bluebush (BLUE) pastures which are mostly in fair or good condition. There is no erosion on the system and over all range condition is predominantly good or fair.

4. Brown land system (3%)

Acacia Sandplain (ACSA) pastures on this system are mostly in good condition with smaller areas in fair condition. There is no erosion.

5. Littoral land system (2.5%)

This system supports Coastal Dune Shrub (CDSH) pastures and highly saline Samphire (SAMP) pastures. Pasture condition is nearly all very good.

6. The remaining five minor systems on the station were not intensively sampled but, where seen, were in fair or good condition. The River system (2.5%), although small, provides useful grazing as it supports dense stands of buffel grass on the banks and narrow levees flanking the Gascoyne River.

7. Although the station is well developed with numerous paddocks and watering points there are still considerable areas that are poorly used because

of their excessive distance (> 4 km) from water. In addition, many of the water supplies are quite saline which further restricts the grazing radius of stock during the hotter months.

Additional supplies and/or better distributed water points by piping from existing supplies are required. This will enable use of areas currently under-used and the reduction of stocking pressure on degraded parts.

8. Some existing water points are the focus points of large, badly degraded areas. The supplies should be closed down and remedial treatments commenced.

9. The recommended sheep unit capacity for present condition is 24,450.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 37,950.

Individual station report

Brickhouse station - 226,328 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	789	CBMS	82	170	103	—	4,409	7,100
		ACSA	123	117	76	—	2,060	2,633
		BLUE	55	38	25	—	1,731	2,360
Delta	638	BLUE	52	57	126	52	2,541	5,740
		SALT	36	56	111	52	2,114	5,100
		ACSA	17	23	56	—	509	800
Sable	595	SALT	145	78	45	—	4,156	5,360
		BLUE	129	69	40	—	3,693	4,760
		ACSA	34	41	14	—	596	742
Brown	69	ACSA	39	23	—	—	469	517
		SALT	4	3	—	—	118	140
Littoral	58	CDSH	18	5	—	—	261	288
		SAMP	10	2	—	—	47	48
		No veg	23	—	—	—	—	—
River	57	ACCR	17	9	3	—	445	580
		TUGR	12	6	2	—	728	1,000
		No veg	8	—	—	—	—	—
Lyons	36	ACSA	4	9	5	—	110	150
		CBMS	—	2	6	—	63	160
		ACCR	—	3	—	—	30	60
Chargoo	12	No veg	7	—	—	—	—	—
		SALT	4	3	—	—	118	140
		TUGR	4	—	—	—	133	133
Ella	8	BLUE	1	—	—	—	20	20
		ACSA	3	3	—	—	44	50
		CBMS	—	2	—	—	25	40
Target	1	ACCR	—	—	—	—	—	—
		CBMS	—	1	—	—	13	20
		ACSA	—	—	—	—	—	—
		ACCR	—	—	—	—	—	—
Totals	2,263		827	720	612	104	24,433	37,941

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 24,450

Capability 37,950

Declared stock numbers (sheep units or equivalents)
1968-1984:

average (mean) 32,283

highest (1968) 42,452

lowest (1980) 12,172

Bullara station - West Pilbara Shire

Area 1,109 km²

Location

Bullara station is located on the Ningaloo and Yanrey 1:250,000 map sheets. The homestead is about 90 km south by road from Exmouth. The station has common boundaries with Giralia, Marrilla, Cardabia, Ningaloo and Exmouth Gulf stations and a short coastline to Exmouth Gulf in the north-east.

Description

The Minilya-Learmonth road runs in a northerly direction through the station dividing it into two sections. The western section consists almost entirely of undulating sandy plains with linear dunes and minor limestone ridges. This is the Cardabia land system (72.4% of the station area) which supports a hummock grassland of soft spinifex and some hard spinifex. Pastoral value is high.

The sandplains of the Cardabia system also extends to the east of the Minilya-Learmonth road, but further east the landscape is one of broad gently sloping outwash plains with duplex soils. This is the Donovan land system (23%) which supports tall shrublands of snakewood with a bluebush understorey or low shrublands of bluebush. Pastoral value is high.

In the far south-east of the station there is a small area of hilly limestone country of the Jubilee system (2.7%) and undulating stony uplands and plains of the Firecracker system (1.3%). The Jubilee system supports a variable shrubland with mixed hard and soft spinifex understorey. The Firecracker system supports a characteristic low shrubland of bluebush with occasional taller snakewood shrubs. Pastoral value is high.

Two other insignificant systems, Range and Learmonth, occur on the station. All systems are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are shown in table 2. These statements were derived from traverse records.

Table 1. Land systems on Bullara station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Range - limestone hills, ridges and plateaux with steep stony footslopes; tall acacia shrublands with hard spinifex.	0.5
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Jubilee - limestone hills and undulating stony plains; acacia shrublands with hard and soft spinifex.	2.7
High (5-9 ha/s.u.)	Cardabia - undulating sandy plains with linear dunes and minor limestone ridges and outcrop plains; low shrublands and hummock grasslands of soft and hard spinifex.	72.4
	Donovan - gently sloping outwash plains and minor stony plains; snakewood shrublands with bluebush, some soft spinifex and buffel grass.	23.0
	Firecracker - undulating limestone uplands and stony plains; low shrublands of bluebush.	1.3
	Learmonth - sandplains, sandy outwash plains and minor limestone outcrop plains, soft spinifex grasslands with sparse shrubs.	< 0.1
		99.5
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (170 recordings on 4 land systems)

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	87	100	—	—	—	74	26	—	—	—	100	—	—
Donovan	80	95	5	—	—	23	41	24	9	3	64	25	11
Jubilee	2	100	—	—	—	100	—	—	—	—	100	—	—
Littoral	1	100	—	—	—	—	100	—	—	—	100	—	—
Total over all land systems	170	98	2	—	—	49	34	12	4	1	83	12	5

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 2 land systems.

Range condition and recommendations

1. Cardabia land system (72.4%)

Pastures on this system are mixed hummock grasslands of Soft Spinifex and Hard Spinifex (SOSP, HASP) with numerous low, almost heath like shrubs, interspersed (depending on fire history) with patches of taller shrubs. Pasture condition is excellent or good and there is no significant erosion.

The system is generally stable under grazing except for occasional localized dune crests which may become unstable due to the effects of fire or excessive grazing pressure. Fire is a natural feature of the environment and regular, controlled burning is an accepted management tool to maintain pastures in a useful condition for grazing. Some sand drift can occur after fire, but the system revegetates rapidly after rain and stabilizes.

2. Donovan land system (23%)

The low alluvial plains of the system support Bluebush (BLUE) pastures with a variable overstorey of snakewood. Slightly more elevated plains with limestone at shallow depth support Acacia Mixed Shrub pastures (ACMS). Pasture condition is largely good or very good although restricted areas show shrub depletion to fair or poor condition. A

few small patches of severe depletion (about 2 km²) occur adjacent to watering points, notably near Minga and Cyclone mills in the east.

Over all, the system is in good range condition as indicated by 64% of the traverse records, with a further 25% and 11% indicating fair and poor range condition respectively. Those restricted parts in bad condition could be readily improved by spelling from grazing over a number of growing seasons. The introduced buffel grass is already very well established on parts of the system and has the ability to spread further.

3. The remaining four land systems (4.6% of the station area) were not intensively sampled. However, where seen they were in good condition.

4. Although the station is reasonably well developed with paddocks and watering points there are still considerable areas that are poorly used because of their excessive distance (> 4) from water. In addition, many of the water supplies are saline which further restricts the grazing radii of stock during the hotter months. Additional watering points, either new or by piping from existing supplies are required to enable better use of areas currently distant from waters.

5. The recommended sheep unit capacity for present condition is 17,000.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 18,050.

Individual station report

Bullara station - 110,917 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Cardabia	803	SOSP	723	—	—	—	12,050	12,050
		HASP	80	—	—	—	400	400
Donovan	255	BLUE	95	28	17	—	2,356	2,800
		ACMS	41	27	7	2	1,134	1,540
Jubilee	30	SOSP	19	19	—	—	475	633
		HASP	15	2	—	—	82	85
		SOSP	10	2	—	—	183	200
		ACCR	1	—	—	—	20	20
Firecracker Range	15	BLUE	9	6	—	—	255	300
		HASP	5	—	—	—	25	25
Learmonth	1	SOSP	1	—	—	—	17	17
		HASP	—	—	—	—	—	—
		ACMS	—	—	—	—	—	—
Totals	1109		999	84	24	2	16,997	18,070

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 17,000

Capability sheep unit capacity 18,050

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1970):

average (mean) 12,908

highest (1974) 16,322

lowest (1968) 10,526

Callagiddy Station - Carnarvon Shire

Area 654 km²

Location

Callagiddy station is located on the Wooramel, Shark Bay and Kennedy Range 1:250,000 map sheets. The homestead is about 52 km south-east by road from Carnarvon some 28 km east of the North-West Coastal Highway. The station has common boundaries with Brickhouse, Meeragoolia, Ella Valla and Edaggee stations.

Description

All of the station is accessible to livestock and all is of high pastoral value.

About 89% of the station consists of broad, almost flat, sandy alluvial plains of the Sandal land system supporting a tall shrubland of various *Acacia*, *Cassia* and *Eremophila* species and currant bush.

In the far west of the station the country becomes more open with a mixture of low shrublands of saltbush and bluebush and tall shrublands of acacias. These communities are on the broad, saline plains of the Sable land system (5.2% of the station area).

The only other significant system on the station is Ella (5.0%) which occurs in the centre-east and consists of linear dunes and sandy inter-dunal plains supporting tall shrublands of wanyu and sand dune gidgee.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are summarized in table 2. These statements were derived from traverse records.

Table 1. Land systems on Callagiddy station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Brown - gently undulating sand plains and occasional dunes; tall acacia shrublands.	0.7
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils, mixed shrublands of acacia, currant bush and bluebush.	89.1
	Sable - nearly flat saline alluvial plains, minor sandy banks; low shrublands of saltbush and bluebush.	5.2
	Ella - short linear dunes and sandy banks with interdunal plains and drainage foci, sand dune gidgee woodlands and tall shrublands of wanyu.	5.0
		99.3
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (143 recordings on 3 land systems)

Callagiddy

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	2	100	—	—	—	—	—	100	—	—	—	100	—
Sable	11	91	9	—	—	18	46	27	9	—	64	27	9
Sandal	130	99	1	—	—	1	18	53	25	3	18	54	28
Total over all land systems	143	99	1	—	—	2	20	52	23	3	22	52	26

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 10 sites on 3 land systems.

Range condition and recommendations

1. Sandal land system (89.1%)

This system supports valuable Currant Bush Mixed Shrub pastures (CBMS) and some Bluebush pastures (BLUE) and perennial mulla mulla on the duplex soils of the alluvial plains and Acacia Sandplain pastures (ACSA) on the sandy banks.

When in good condition the Currant Bush Mixed Shrub pastures are extremely productive with a wide range of desirable low shrubs such as currant bush, Gascoyne bluebush, Gascoyne mulla mulla, cotton bush and tall saltbush beneath tall shrubs such as curara, snakewood and spreading gidgee. Condition of the Currant Bush Mixed Shrub pastures as seen on survey is mostly fair but a high proportion of the traverse recordings (40%) also showed pasture degradation to poor or very poor condition. In these latter cases, although the pastures are still highly productive in terms of annuals, the desirable perennial shrubs are considerably depleted. Decline in condition is apparent in paddocks to the south of the homestead, past Jimmies bore. Along the south boundary fence with Edagee station there is an obvious loss of tall shrubs, particularly snakewood, because of a past major fire.

In other areas, decline in condition of Currant Bush Mixed Shrub pastures is indicated by marked increases in undesirable shrub species. This is particularly seen in the vicinity of Old Callagiddy where waxy cremophila and straight leafed cassia form dense stands. Other species that tend to increase in the overgrazed situation are needle bush and bardie bush.

Condition of the Acacia Sandplain (ACSA) pastures of the sandy rises and banks of the Sandal system is somewhat better than the Currant Bush Mixed Shrub pastures. Condition is predominantly fair but more than a quarter of the traverse readings indicated good condition.

Range condition for the whole system is fair (54% of traverse records) with 18% in good range condition and the balance (28%) in poor condition. Because it does not slope the system is not prone to erosion but pasture degradation is common. However, as there is usually a reasonable residue of desirable shrubs even on degraded sites, the system has the ability to recover well if it can be spelled from grazing for a number of consecutive growing seasons.

2. Sable land system (5.2%)

Almost two-thirds of this system was assessed as being in good range condition with most of the balance in fair condition. Saltbush (SALT) and Bluebush (BLUE) pastures of the system consist of low shrublands of bladder saltbush and Gascoyne bluebush and are largely in good condition. There is negligible erosion.

3. Ella land system (5.0%)

This small sand dune system was insufficiently sampled but, where seen, was in fair range condition.

4. Parts of the station (notably paddocks to the south of the homestead and in the vicinity of Old Callagiddy) have received heavy use in the past and pastures are degraded. These areas have the potential to improve considerably in condition if they can be judiciously spelled in good seasons. More use could probably be made of the Sable land system in the far west of the station as it is highly productive and mostly in good condition.

5. The recommended sheep unit capacity for present condition is 6,550.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 10,000.

Individual station report

Callagiddy station - 65,380 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	582	CBMS	24	134	104	—	2,805	5,240
		ACSA	61	140	32	—	1,511	1,942
		BLUE	44	29	14	—	1,330	1,740
Sable	34	SALT	12	—	3	—	259	300
		BLUE	12	—	2	—	253	280
		ACSA	2	3	—	—	35	42
Ella	33	ACSA	12	11	—	—	169	192
		CBMS	1	4	2	—	83	140
		ACCR	2	1	—	—	50	60
Brown	5	ACSA	3	1	—	—	31	33
		SALT	—	1	—	—	13	20
Totals	654		173	324	157	—	6,539	9,989

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 6,550

Capability sheep unit capacity 10,000

Declared stock numbers (sheep units or equivalent)

1969-1984 (no data for 1968, 1974):

average (mean) 9,321

highest (1976) 13,114

lowest (1980) 4,394

Callytharra Springs station - Shark Bay and Upper Gascoyne Shire

Area 673 km²

Location

Callytharra Springs station is located on the Wooramel and Glenburgh 1:250,000 map sheets. The homestead is about 110 km south by road from Gascoyne Junction. The station has common boundaries with Carey Downs, Byro, Gilroyd and Towrana stations.

Description

The station comprises mainly dune fields and broad sandy plains in western and central parts and rough hills and plateaux on crystalline rocks in the far east. The dunes and sandy plains are the Yalbalgo and Wooramel land systems (respectively 30.3% and 30.0% of the total station area) and these support tall shrublands of wanyu and other acacias. Pastoral value is moderate. The hills and plateaux are the Thomas (13.3%), Agamemnon (6.8%) and

Pells (4.7%) land systems. These support scattered tall and low shrubs with a ground layer of forbs and annual grasses in season. Pastoral value is generally low.

The channel of the Wooramel River runs through the station from south-east to north-west and is flanked by the Channel (8.1%) land system. This system consists of rough plains, steep slopes (often intensely dissected to exposed hardpan) and river channels and banks. The system supports a very scattered and depauperate shrub cover on the plains and slopes and a fringing woodland of eucalypts along the channels and banks. Pastoral value is moderate.

Three other minor land systems Sandplain (5.9%), Moogooloo (0.6%) and Jimba (0.3%) occur on the station. All systems found on the station are further summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Callytharra Springs station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks, steep footslopes and narrow valleys; tall acacia shrublands.	0.6
	Thomas - low lateritized mesas; hills and stony plains of granite or gneiss, scattered tall shrublands of mulga and other acacias.	13.3
	Agamemnon - rough hills and ridges of granite and gneiss; scattered tall shrublands of mulga and other acacias.	6.8
	Pells - low hills, ridges and mesas of sedimentary rocks; stony slopes and lower plains, scattered tall acacia shrublands.	4.7
		24.8
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu.	30.3
	Wooramel - sandy plains and stony plains often with hardpan at shallow depth; tall shrublands of wanyu and mulga.	30.0
	Channel - major channels with narrow flood plains and dissected marginal slopes and plains; very scattered shrublands and fringing woodlands.	8.1
	Sandplain - nearly flat to gently undulating red sandplains; tall shrublands of wanyu.	5.9
	Jimba - gently sloping alluvial plains with diffuse drainage, minor pebbly plains and low ridges; scattered shrublands	0.3
		74.6
High (5-9 ha/s.u.)	—	—
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (93 recordings on 5 land system)

Callytharra Springs

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Agamemnon	2	100	—	—	—	100	—	—	—	—	100	—	—
Channel	3	100	—	—	—	—	—	100	—	—	—	100	—
Thomas	14	93	7	—	—	43	29	21	7	—	72	21	7
Wooramel	45	96	2	2	—	11	44	16	22	7	55	16	29
Yalbalgo	29	93	7	—	—	14	62	17	7	—	76	17	7
Total over all land systems	93	96	3	1	—	18	46	19	14	3	64	19	17

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 5 sites on 4 land systems.

Range condition and recommendations

1. Yalbalgo land system (30.3%)

This system supports the Acacia Sandplain (ACSA) pasture type which has a typical tall shrub layer of wanyu above very scattered low shrubs and wanderrie grass in season. Pasture condition as seen during the survey, although dry, was mostly good or excellent with only minor areas assessed as fair or poor. There is no erosion.

Because of the relatively sparse occurrence of palatable shrubs and the rather short-lived nature of the wanderrie grasses the system has only limited drought value.

Fire may be a useful management tool on this system, but its use has not been researched. Evidence seen during the survey suggests that the effects of fire are extremely long term. Where the over-storey of tall wanyu shrubs has been killed by fire the low shrub layer and the ground layer is increased in diversity of species and in density. This fire induced sub-climax appears to be considerably more productive for livestock production than the mature wanyu stand.

2. Wooramel land system (30.0%)

The sandy plains of this system frequently have hardpan at < 1 m depth and are interspersed with plains with hardpan at the surface or with a sparse stony surface mantle. The plains support the Acacia Sandplain (ACSA) and Acacia Short Grass Forb (ASGF) pasture types. These pastures have an over-storey of tall shrubs dominated by wanyu, mulga and other acacias with scattered low shrubs, grasses and forbs.

Condition of the pastures varied from very poor to excellent. Some large areas in the west of the station and north of the Wooramel River were severely drought affected with much of the wanyu being dead. Elsewhere there was a good sprinkling of desirable low shrubs such as Wilcox bush, mulga bluebush and flat leaved bluebush beneath the wanyu or mulga.

3. Thomas and Agamemnon land systems (13.3 and 6.8% respectively)

These hilly systems support Stony Short Grass Forb (SSGF) or Acacia Short Grass Forb (ASGF) pastures with sparse palatable shrubs, forbs and annual grasses interspersed with mulga and various *Eremophila* and *Cassia* species. Pasture condition was either good or excellent, but the pastures have only moderate durability in droughts. Short term opportunistic use can be made of the flush of forbs and annual grasses in good seasons.

4. The remaining minor systems were not intensively sampled but, where seen, were mostly in good range condition.

5. The station is very poorly developed in terms of paddocks and artificial watering points and, at the time of survey in 1982, was carrying very few stock due to the effects of previous droughts. Considerable areas of the station cannot be used to any extent because of the lack of stock waters.

6. The recommended sheep unit capacity for present condition and assuming full development is 3,950.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 4,500.

Individual station report

Callytharra Springs station - 67,327 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	204	ACSA	155	35	14	—	1,566	1,700
Wooramel	202	ACSA	65	26	30	—	824	1,008
		ASGF	49	8	24	—	332	405
Thomas	89	SSGF	64	19	6	—	331	356
Channel	55	SSGF	22	22	—	—	161	176
		ACCR	3	3	—	—	90	120
		No veg	5	—	—	—	—	—
Agamemnon	45	SSGF	45	—	—	—	180	180
Sandplain	40	ACSA	20	20	—	—	292	333
Pells	32	ASGF	32	—	—	—	160	160
Moogooloo	4	ASGF	4	—	—	—	20	20
Jimba	2	STCH	2	—	—	—	17	17
		ASGF	—	—	—	—	—	—
		ACSA	—	—	—	—	—	—
Totals	673		466	133	74	—	3,973	4,475

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 3,950

Capability 4,500

Declared stock numbers (sheep units or equivalent)
1968-1983 (no data for 1971, 1984):

average (mean) 4,123

highest (1976) 6,975

lowest (1981) 1,050

Carbla station - Shark Bay Shire

Area 957 km²

Location

Carbla station is located on the Yaringa 1:250,000 map sheet. The homestead is 10 km west of North-West Coastal Highway and is approximately 185 km south by road from Carnarvon. The station has common boundaries with Yaringa, Woodleigh and Hamelin stations and, in the west, has a coastline on Hamelin Pool.

Description

About two-thirds of the station consists of broad limestone plains of the Toolonga land system supporting acacia mixed shrub pastures of moderate pastoral value.

In central, north-eastern and south-eastern parts of the station the limestone plains have been masked by sand to form the Sandplain and Yaringa land systems (collectively 22.3% of the station area). These systems support tall shrublands of wanyu and are of moderate to high pastoral value. The Yaringa system also occurs near the coast where it is associated with isolated low limestone mesas and plateaux and low outwash plains of the Foscal land system (7%).

Four other minor land systems namely Snakewood, Salune, Littoral and Coast occur on the station. The largest and most valuable of these is Snakewood (2.5%) which consists of nearly flat plains with duplex soils and snakewood and saltbush shrublands.

All systems found on the station are summarized in table 1.

Condition statements for land systems and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Carbla station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplain with tall shrublands of wanyu.	12.5
	Salune - saline plains and pans with scattered low dunes; bluebush, samphire and wanyu shrublands.	0.6
	Littoral - low coastal foredunes, samphire and tidal flats and mangroves fringes	0.4
		13.5
High (5-9 ha/s.u.)	Toolonga - limestone plains with mixed acacia tall shrublands.	66.8
	Yaringa - sandy plains with sandy banks, low dunes and limestone outcrop plains; tall shrublands of wanyu.	9.8
	Foscal - gently sloping outwash plains, low limestone mesas, plateaux edges and footslopes; saltbush and bluebush shrublands.	7.0
	Snakewood - nearly flat plains with duplex soils; tall shrublands of snakewood with saltbush understorey.	2.5
	Coquina - low shelly foredunes, shell beaches and supra-tidal flats; scattered tall acacia shrublands on dunes.	0.4
		86.5
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (165 recordings on 5 land systems)

Carbla

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Foscal	19	100	—	—	—	5	42	37	11	5	47	37	16
Sandplain	18	100	—	—	—	—	33	61	6	—	33	61	6
Salune	2	50	50	—	—	—	—	100	—	—	—	100	—
Toolonga	107	98	2	—	—	1	10	45	39	5	11	45	44
Yaringa	19	100	—	—	—	5	53	26	16	—	58	26	16
Total over all land systems	165	98	2	—	—	2	21	44	29	4	23	44	33

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 12 sites on 3 land systems.

Range condition and recommendations

1. Toolonga land system (66.8%)

Within the Acacia Mixed Shrub (ACMS) pasture of this system there has been considerable loss of desirable perennial shrubs. Consequently, although the system is still moderately productive in terms of cotton bush and annual grasses and forbs in season, drought reserves are seriously depleted. Range condition is mostly fair or poor.

Desirable species such as green cassia, currant bush, ragged leaf scaevola and warty leaved eremophila, although very scattered, are still present. The system has the ability to recover well if judicious spelling of paddocks can be incorporated into the management system. Erosion is not a problem on the system.

2. Sandplain land system (12.5%)

Pastures on this land system are in fair or good condition and there is no erosion. The system is not fully used as it is inadequately watered in the far north-east of the station.

3. Yaringa land system (9.8%)

The majority of this system is in good range condition with pastures in good to excellent condition and no erosion. In some restricted areas pastures are degraded to fair or poor condition.

4. Foscal land system (7%)

The Saltbush (SALT) and Bluebush (BLUE) pastures on this system are nearly all in fair or good condition. It is likely that stock are unable to use these pastures fully because of high dietary salt intake from a combination of salty vegetation and salty stock waters.

5. Other minor systems, Snakewood, Salune, Littoral and Coast, are generally in fair or good range condition.

6. The station is inadequately watered. Large areas in many paddocks are considerably in excess of 5 km from permanent water supplies. Pastures in these areas are under used and are in good condition. This is particularly the case in all paddocks down the far eastern side of the station.

Additional water points, either in the form of new sources or by piping from existing supplies, are required to enable better distribution of stock and reduction in grazing pressure on some of the paddocks in central parts of the station.

7. The recommended sheep unit capacity for present condition and assuming the whole station was adequately watered (which is not the case, see 6) is 8800.

8. The capability sheep unit capacity if all country was in good range condition is estimated at 17,100.

Individual station report

Carbla station - 95,733 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Toolonga	639	ACMS	63	259	253	—	5,431	12,780
		ACSA	—	32	—	—	200	267
		ASGF	4	8	20	—	97	160
Sandplain	120	ACSA	40	73	7	—	818	1,000
		ACSA	38	19	18	—	507	625
Yaringa	94	ACMS	16	3	—	—	350	380
		SALT	24	10	3	—	624	740
Foscal	67	BLUE	6	17	—	—	333	460
		ACMS	—	4	3	—	59	140
Snakewood	24	SALT	—	19	—	—	238	380
		ACMS	—	4	—	—	40	80
Salune	5	ACSA	—	1	—	—	6	8
		ACSA	—	2	—	—	13	17
Coquina	8	SAMP	2	—	—	—	8	8
		BLUE	—	1	—	—	13	20
Coquina	8	CDSH	4	—	—	—	50	50
		No veg	4	—	—	—	—	—
Totals	957		201	452	304	—	8,787	17,115

* Area of extreme degradation; severe erosion and/or pasture degradation zero carrying capacity.

Recommended sheep unit capacity 8,800

Capability 17,100

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 9,343

highest (1975) 13,631

lowest (1968) 1,550

Cardabia station - Carnarvon Shire

Area 1,998 km²

Location

Cardabia station is located on the Minilya, Winning Pool, Ningaloo and Yanrey 1:250,000 map sheets. The station homestead is about 245 km north by road from Carnarvon. The main Minilya-Exmouth road passes in a northerly direction through the western half of the station and the nearest town is Exmouth about 150 km to the north. Cardabia has common boundaries with Ningaloo, Bullara, Marilla, Winning, Mia Mia and Warroora stations. In the west, the station has about 37 km of coastline on the Indian Ocean which includes the Mauds landing site and the Coral Bay tourist establishment.

Description

All of the station, with the exception of parts of the Giralia Range in the centre, is readily accessible to livestock. About 45% of the station area is country of high pastoral value and 52.5% is of moderate pastoral value. The remaining 2.5% is of low or very low value.

The western part of the station consists largely of high, undulating sandy plains and longitudinal dunes of the Cardabia land system (27%). The vegetation is a low hummock grassland of mixed soft and hard spinifex with numerous low shrubs rarely exceeding 2 m in height and usually much less. Along the coast a narrow strip of large recent dunes and beach ridges forms the Coast land system (1%).

The Giralia Range (Jubilee land system) runs north-south through the centre of the property. This consists of rough limestone hills and undulating stony plains supporting mostly hard spinifex pastures. Relief above sea level is up to a maximum of 216 m at Remarkable Hill. Low outwash plains of the Donovan land system (17%) flank the western side of the Giralia Range. These plains support productive Gascoyne bluebush pastures.

Gently sloping plains of the Gearle and Yarcowie land systems (20% and 4% respectively) predominate in the east. These systems are based on bentonitic siltstone, shale and radiolarite and support productive pastures of bluebush, saltbush and perennial tussock grasses as well as some soft spinifex and introduced buffel grass. Cardabia Creek, an intermittent stream, drains in a north-south direction through these eastern plains.

In the far east of the station the country consists of raised calcrete plains of the Carleeda land system (7%). This country supports useful soft spinifex pastures with minor inclusions of hard spinifex.

Table 1 summarizes the land systems found on the station.

Condition statements for land systems and for the station as a whole have been prepared from data collected whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Cardabia station

Potential value	Land systems	Area %
Very low (> 30 ha/s.u.)		—
Low (20-30 ha/s.u.)	Wapet - low rises and stony plains and slopes with hard spinifex hummock grasslands.	2.0
Moderate (10-19 ha/s.u.)	Jubilee - limestone hills and undulating stony plains with hard and soft spinifex and scattered shrubs.	18.0
	O'Brien - gently sloping alluvial plains and minor stony plains, mixed acacia shrublands with vegetation often arranged in groves.	0.5
	McLeod - samphire flats and sandy plains with bare marginal mudflats; samphire and saltbush low shrublands.	0.5
		19.0
High (5-9 ha/s.u.)	Cardabia - undulating sandy plains with linear dunes, minor limestone rises; hummock grasslands soft and hard spinifex with scattered shrubs.	27.0
	Gearle - alluvial plains, more sloping marginal plains, gently sloping saline and low rises; mixed shrublands of acacias, bluebush and saltbush.	20.0
	Donovan - gently sloping outwash plains and minor stony plains, tall shrublands of snakewood with bluebush, some soft spinifex and buffel grass.	17.0
	Carleeda - undulating limestone plains, soft spinifex and some hard spinifex with scattered shrubs.	7.0
	Yarcowie - gilgai plains with clay soils; tussock grasslands and sparse shrubs.	4.0
	Firecracker - undulating limestone uplands and plains; low shrublands of Gascoyne bluebush.	3.0

Table 1 continued...

Potential value	Land systems	Area %
	Coast - large, long walled parabolic coastal dunes and narrow swales, minor limestone plains and rocky wave cut platforms; tall acacia shrublands, also soft spinifex and buffel grass	1.0
		79.0
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (278 recordings on 12 land systems)

Cardabia

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	73	99	1	—	—	80	16	4	—	—	96	4	—
Collier	1	100	—	—	—	100	—	—	—	—	100	—	—
Carleeda	4	100	—	—	—	75	25	—	—	—	100	—	—
Coast	7	100	—	—	—	86	14	—	—	—	100	—	—
Donovan	70	100	—	—	—	37	39	24	—	—	76	24	—
Firecracker	7	71	29	—	—	—	57	43	—	—	57	43	—
Gearle	72	79	18	3	—	17	33	39	11	—	49	38	13
Jubilee	19	100	—	—	—	68	16	16	—	—	84	16	—
MacLeod	7	100	—	—	—	57	43	—	—	—	100	—	—
O'Brien	1	100	—	—	—	—	100	—	—	—	100	—	—
Wapet	7	100	—	—	—	57	43	—	—	—	100	—	—
Yarcowie	10	40	40	20	—	10	30	50	—	10	30	50	20
Total over all land systems	278	92	7	1	—	47	29	21	3	—	75	21	4

Range evaluation sites

Detailed descriptions and measurements of land form, vegetation, soils and range condition were made at 16 sites on 7 land systems.

Range condition and recommendations

1. Cardabia land system (27%)

Pastures on this system are mixed Soft Spinifex and Hard Spinifex (SOSP, HASP) with numerous low shrubs. Pasture condition is excellent or good and there is no erosion.

The system is generally stable under grazing except for occasional localized dunes and dune crests which may become unstable due to the effects of fire or excessive grazing pressure. Fire is a natural feature of the environment and regular, controlled burning is a management tool to maintain pastures in an attractive condition for livestock. Some sand drift can occur after fire, but the system revegetates rapidly after rain and stabilizes.

2. Gearle land system (20%)

This system supports valuable Saltbush (SALT) and Bluebush (BLUE) pastures which are mostly in fair or good condition. Some parts show active erosion in the form of shallow gullying, rilling and scalding.

Parts of the system with slopes in excess of about 1% and/or highly saline soils are very susceptible to erosion. Other units of the system such as stony rises

and flat plains with clay soils are relatively stable. Access tracks should avoid sensitive erosion susceptible areas.

Fire should be avoided on this system. Some areas require spelling over a number of consecutive growing seasons in order to encourage shrub recovery.

3. Jubilee land system (18%)

The stony limestone hills and plains of this system support mostly Hard Spinifex (HASP) pastures with minor areas of Soft Spinifex (SOSP). Pasture condition is excellent or good and there is no erosion.

The system is stable under grazing and, due to shallow soils with dense surface mantle of stones, is not susceptible to erosion. Because of its stability, this system is suitable for access tracks which should be confined to it wherever possible. Also, where possible, watering points should be located on this system rather than on adjacent, more sensitive, systems. Burning every four or five years is a desirable management practice.

4. Donovan land system (17%)

This plain system supports Bluebush (BLUE) pastures. Pasture condition is generally good although some localized areas show considerable depletion of bluebush. Buffel grass has colonized strongly and, in some cases, has entirely replaced the bluebush.

The system is generally resistant to erosion because of its heavy soils and lack of slope. Areas that are only in fair condition would benefit from spelling over a growing period. Fire should be avoided.

5. Carleeda land system (7%)

Soft Spinifex (SOSP) pastures on this land system are in good or very good condition. The system is not susceptible to erosion and it is stable under grazing. Regular burning is an acceptable and desirable management practice.

6. Yarcowie land system (4%)

This gilgai plain system supports Tussock Grass (TUGR) pastures and various acacias and some chenopod shrubs. Condition is generally fair to good. Tracks and sheep pads on sloping margins of the system are susceptible to erosion and there are some localized areas of active gullyng.

7. Firecracker land system (3%)

Bluebush pastures on this system (Gascoyne bluebush) are in fair to good condition. There are some isolated areas of minor erosion. Sloping parts of the system without stony surface strewn are highly susceptible to erosion in the form of gullyng and sheeting if the vegetative cover is depleted. Access tracks should avoid these parts. More stony parts are much less susceptible.

Periodic spelling from grazing is required to maintain pasture vigour. Fire should be avoided.

8. Coast land system (1%)

Pastures on this system are in good condition and there is no significant erosion.

Under conditions of very heavy grazing or excessive disturbance parts of this system can commence actively eroding with the formation of large blow-outs and unstable dune crests. Access through dune areas needs to be carefully planned and controlled. Burning is probably an undesirable practice.

9. Wapet, O'Brien and McLeod land systems (collectively 3%)

These minor systems are in fair to good condition.

10. The station is almost fully developed as a sheep station with numerous paddocks and watering points. A few sections, notably in the far north, are not adequately watered.

11. The recommended sheep unit capacity for present condition is 28,450.

12. The capability sheep unit capacity assuming all country was in good range condition is estimated at 32,900.

Individual station report

Cardabia station - 199,876 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Cardabia	546	SOSP	420	17	—	—	7,142	7,283
Gearle	377	HASP	105	4	—	—	538	545
		BLUE	111	86	29	—	3,476	4,520
		SALT	51	45	17	—	1,689	2,260
		TUGR	17	15	6	—	1,174	1,900
Donovan	366	BLUE	135	66	—	—	3,525	4,020
		ACMS	89	21	—	—	1,990	2,200
		SOSP	55	—	—	—	917	917
		HASP	162	26	—	—	897	940
Jubilee	342	SOSP	103	34	—	—	2,000	2,283
		ACCR	9	8	—	—	260	340
		SOSP	86	—	—	—	1,433	1,433
Carleeda	122	HASP	24	—	—	—	120	120
		TUGR	12	—	—	—	400	400
		BLUE	52	40	—	—	1,540	1,840
		TUGR	18	31	12	—	606	1,017
Firecracker	92	BLUE	5	7	3	—	206	300
		HASP	42	—	—	—	210	210
		CDSH	16	—	—	—	200	200
Yarcowie	76	ASGF	2	3	—	—	20	25
		STCH	1	2	—	—	18	25
		ACCR	—	2	—	—	20	40
		SAMP	3	—	—	—	12	12
McLeod	6	No veg	2	—	—	—	—	—
		SALT	1	—	—	—	20	20
		HASP	2	—	—	—	10	10
Giralia	3	SOSP	1	—	—	—	17	17
Totals	1,998		1,524	407	67	—	28,440	32,877

* Area of extreme degradation; severe erosion and/or pasture degradation zero carrying capacity.

Recommended sheep unit capacity 28,450

Capability 32,900

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 22,947

highest (1975) 28,100

lowest (1968) 16,650

Carey Downs station - Upper Gascoyne Shire

Area 955 km²

Location

Carey Downs station is located on the Glenburgh and Wooramel 1:250,000 map sheets. The homestead is about 85 km south by road from Gascoyne Junction. The station has common boundaries with Dairy Creek, Glenburgh, Byro, Callytharra Springs and Towrana stations.

Description

The station comprises sandy plains and dunes in the west, gently sloping stony plains in central parts and rough hills and plateaux on granite and gneiss in the east. Except for a few of the roughest ranges most of the property is accessible to livestock and about two-thirds of the country is of moderate pastoral value. The balance is of low or very low pastoral value.

The largest land system on the station is Agamemnon (28.3%) which consists of granite and gneiss hills and ridges with stony slopes and narrow drainage lines. The system occurs in the east of the station and is associated with other hill systems such as Sandiman (12.3%), Thomas (5.9%), Pells (4.9%) and Phillips (1.9%). All these systems support a scattered mixed shrubland dominated by acacias, eremophilas and cassias with forbs and annual

grasses as a ground cover in season. The shrub cover becomes rather more dense and diverse along the narrow drainage floors and creek-lines. The systems provide very useful feed although carrying capacity is generally low.

The dunes and sandy plains in the west of the station consist of the Yalbalgo (7.9%), Divide (2.3%) and Wooramel (19.0%) land systems. These systems support tall shrublands of wanyu and other acacias with variable low shrubs and grasses. The Divide system frequently has a prominent ground layer of hard and soft spinifex. Pastoral value of these systems is moderate.

The Durlacher system (6.2%) found between the sandy systems to the west and the hill systems to the east consists of gently sloping plains, drainage zones and low stony rises all commonly with a sparse to moderately dense mantle of quartz and other rock fragments. The system supports a variable but usually sparse shrubland with mulga and other *Acacia*, *Eremophila* and *Cassia* species.

An additional six minor land systems are found on the station. All fifteen systems are further summarized in table 1.

Condition statements for each land system and for the station as a whole have been prepared from data collected whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Carey Downs station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks, steep footslopes and narrow valleys; sparse tall shrublands.	0.1
Low (20-30 ha/s.u.)	Agamemnon - rough hills and ridges of granite and gneiss; scattered tall shrublands of mulga and other acacias.	28.3
	Thomas - low lateritized mesas, hills and stony plains of granite or gneiss; scattered tall shrublands of mulga and other acacias.	5.9
	Pells - low hills, ridges and mesas of sedimentary rocks, stony slopes and lower plains; scattered tall acacia shrublands.	4.9
		39.1
Moderate (10-19 ha/s.u.)	Wooramel - sandy and stony plains often with hardpan at shallow depth; tall shrubland of wanyu and mulga.	19.0
	Sandiman - undulating stony uplands with low breakaways and ridges; scattered tall acacia shrublands.	12.3
	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu.	7.9
	Sandplain - nearly flat to gently undulating red sandplains with tall shrublands of wanyu.	6.7
	Durlacher - gently sloping stony plains and low stony rises; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods.	6.2
	Divide - gently undulating sandplains with occasional minor dunes; shrublands and hummock grasslands mostly hard spinifex.	2.3

Table 1 continued...

Pastoral value	Land systems	Area %
	Phillips - undulating stony uplands and low hills of granite and gneiss; scattered tall acacia shrublands.	1.9
	Channel - major channels with narrow floodplains and dissected marginal slopes and plains; very scattered acacia shrublands and fringing woodlands.	1.4
	Yagina - low stony plains, soil covered plains, stony claypans and minor sandy banks and dunes; scattered tall acacia shrublands.	1.2
	Mantle - gently undulating stony plains with sluggish drainage, stony rises and low summits; scattered tall and low shrublands.	1.0
	Jimba - gently sloping alluvial plains with diffuse drainage, minor pebbly plains and low ridges; scattered tall and low shrublands.	0.9
		60.8
High (5-9 ha/s.u.)	—	—
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (140 recordings on 10 land systems)

Carey Downs

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Agamemnon	26	100	—	—	27	54	19	—	—	81	19	—	—
Channel	1	—	100	—	—	—	—	100	—	—	—	100	—
Divide	4	100	—	—	—	75	25	—	—	—	100	—	—
Durlacher	13	84	8	8	—	—	—	38	47	15	—	38	62
Pells	2	50	50	—	—	—	50	—	50	—	50	—	50
Sandiman	24	83	13	4	—	—	13	54	29	4	13	54	33
Sandplain	11	100	—	—	—	9	55	27	9	—	64	27	9
Wooramel	47	89	9	2	—	6	17	36	32	9	23	36	41
Yalbalgo	11	100	—	—	—	—	27	37	27	9	27	37	36
Yagina	1	100	—	—	—	100	—	—	—	—	100	—	—
Total over all land systems	140	91	7	2	—	11	26	33	24	6	37	34	29

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 5 land systems.

Range condition and recommendations

1. Agamemnon land system (28.3%)

This rough low hill system in the east is not heavily used for grazing and is nearly all in good range condition. It supports Stony Short Grass Forb (SSGF) or Acacia Short Grass Forb (ASGF) pastures with some palatable low shrubs and numerous forbs and annual grasses in season. Although it only has limited drought reserves the system can provide useful quantities of feed in some seasons. Additional water supplies would be required to bring it and other hilly systems further east into production.

2. Wooramel land system (19%)

The sandy plains of this system support Acacia Sandplain (ACSA) pastures while the more stony plains or plains with hardpan at shallow depth support the Acacia Short Grass Forb (ASGF) pasture type. These pastures have an overstorey of tall shrubs of either wanyu or mulga with an understorey of scattered low shrubs, grasses and forbs.

The condition of pastures on the system varies considerably from very poor to very good depending on distance from water, intensity of past use and the effects of fire and drought. There is very little erosion, but some extensive parts of the system such as in parts of Cardilya paddock show pasture degradation with the loss of desirable perennial shrubs such as mulga, bluebush, flat leaf bluebush and Wilcox bush. However, the system has the ability to recover well if it can be protected from grazing for a number of consecutive growing seasons.

Some large areas of wanyu shrub, notably in the paddock to the south-east of Four Corner well, have died some considerable time ago probably as the result of fire and have not regenerated to wanyu. However the ground layer of low shrubs such as Wilcox bush, flat leaf bluebush, cotton bush and other desirable shrubs and wanderric grasses has increased considerably.

Fire may be a useful management tool on the acacia sandplain pastures of the sandy parts of this system, but its use has not been researched. The remarkable increase in diversity and density of the ground layer after fire and the very long time span (50 years) for the wanyu to become dominant again has also been seen elsewhere during the survey. The fire induced sub-climax appears to be considerably more productive for livestock production than is the dense mature wanyu situation.

3. Sandiman land system (12.3%)

This stony system as seen in the north-east of the station is mostly in fair range condition but some drainage floors and stony plains are degraded with pastures in poor condition. A few of the less stony drainage floors are eroded with rills and shallow gullies. Elsewhere the system is inherently resistant to erosion because of the surface mantle of rocks and cobbles.

4. Yalbalgo (7.9%) and Sandplain (6.7%) land systems

These sandy systems support Acacia Sandplain (ACSA) pastures with a tall shrub over-storey of wanyu and variable low shrubs and wanderric grasses. Pasture condition is mostly fair or good although some areas on the Yalbalgo system were assessed as being poor.

Because palatable shrubs below the wanyu are sparse and the wanderric grass pastures are fairly short lived the system has only limited reserves for times of drought. However, in good seasons the grasses and wanyu bean crop provide good grazing.

On these systems fire is a possible management tool (as on the Wooramel system) and useful shrubs and grasses can be expected to increase markedly after fire has killed the mature wanyu.

5. Durlacher land system (6.2%)

This stony plain system supports sparse Acacia Short Grass Forb (ASGF) pastures and Stony Chenopod (STCH) pastures. The low shrub layer includes unpalatable *Eremophila* and *Cassia* species with, when in good condition, a scattering of desirable shrubs such as cotton bush, flat leaf bluebush and tall saltbush. In small run-on areas the vegetation can be more dense with a wider range of desirable species.

Many of the desirable shrubs have been lost from the system; about 60% of the traverse records indicated poor or very poor pasture condition with the balance in fair condition. The system requires spelling to enable the desirable shrubs to recover.

6. The remaining nine land systems on the station collectively occupy 19.6% of the station area. They include the rough hill systems Thomas and Pells and the stony plains of the Phillips system. Some parts of these systems have been used for grazing but the bulk of them occur in the far east of the property and have not been developed with waters or fencing. They were not intensively sampled or not sampled at all. Where seen these systems and the other minor systems on the station were nearly all in good range condition.

7. The recommended sheep unit capacity for present condition is 4900. This figure assumes that all pastures are adequately watered which is not the case (see 6).

8. The capability sheep unit capacity if all country was in good range condition is estimated at 6,250.

Individual station report

Carey Downs station - 95,536 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Agamemnon	271	SSGF	198	46	—	—	945	976
		ACCR	27	—	—	—	540	540
Wooramel	181	ACSA	23	39	47	—	623	908
		ASGF	17	26	29	—	244	360
Sandiman	118	STCH	10	42	25	—	377	642
		SSGF	5	22	14	—	121	164
Yalbalgo	76	ACSA	21	28	27	—	458	633
Sandplain	63	ACSA	40	17	6	—	464	525
Durlacher	59	STCH	—	15	14	—	122	242
		ASGF	—	12	12	—	70	120
Thomas	56	ACCR	—	—	6	—	30	120
		SSGF	56	—	—	—	224	224
Pells	47	ASGF	10	27	10	—	165	235
Divide	22	HASP	20	—	—	—	100	100
		ACCR	2	—	—	—	40	40
Phillips	18	SSGF	14	—	—	—	56	56
		STCH	3	—	—	—	25	25
Channel	14	ACCR	1	—	—	—	20	20
		SSGF	—	7	—	—	23	28
Yagina	11	ACCR	—	4	—	—	40	80
		No veg	3	—	—	—	—	—
Mantle	9	ASGF	8	—	—	—	40	40
		ACSA	2	—	—	—	17	17
Jimba	9	ACMS	1	—	—	—	20	20
		STCH	6	—	—	—	50	50
Moogooloo	1	SSGF	3	—	—	—	12	12
		STCH	6	—	—	—	50	50
		ASGF	2	—	—	—	10	10
		ACSA	1	—	—	—	8	8
Totals	955		480	285	190	—	4,899	6,250

* Area of extreme degradation; severe erosion and/or pasture degradation zero grazing capacity.

Recommended sheep unit capacity 4,900

Capability 6,250

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 3,947

highest (1970) 6,033

lowest (1980) 1,500

Carrarang station - Shark Bay Shire

Area 805 km²

Location

Carrarang station is located on the Edel 1:250,000 map sheet. Access to the station is via the road between the Overlander Roadhouse, on North-West Coastal Highway, and Shark Bay and then via Tamala station on the Useless Loop road. The homestead is on the Carrarang Peninsula about 118 km west of the Overlander Roadhouse.

The station has a common boundary with Tamala station in the south. It has a long convoluted coastline with shallow tidal flats to Freycinet Estuary in the east and a coastline with steep cliffs to the Indian Ocean in the west.

Description

The two largest land systems on the station are Edel (61.2%) and Coast (36.1%). The Edel system consists of undulating and, at times, moderately

elevated sandy plains (relative relief up to 70 m) with minor dunes and limestone rises. The Coast system consists of large linear and reticulate coastal dunes, including unstable blow-out areas, with minor limestone rises and steep coastal cliffs. Both systems support similar mixed shrublands and pastoral value is high.

The remaining three systems on the station, Birrida, McLeod and Littoral, collectively occupy only 2.7% of the total station area. They are all highly saline systems with low shrublands of samphire and saltbush and some bare mudflats and tidal flats. Pastoral value is moderate. All systems are summarized in table 1.

Condition statements for land systems and for the whole station (total over all land systems) were prepared from data collected whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Carrarang station

Potential value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Birrida - highly saline and gypsiferous pans and depressions; low shrublands of samphire and saltbush.	2.4
	McLeod - bare mudflats, saline plains and marginal sandy plains; sparse low shrublands of samphire and saltbush in parts.	0.2
	Littoral - low coastal foredunes, samphire flats and tidal flats with mangrove fringes; low and tall shrublands in parts.	0.1
		2.7
High (5-9 ha/s.u.)	Edel - undulating sandy plains, minor saline flats, low dunes and limestone rises, mixed low shrubs; degraded areas with exotic annual pastures.	61.2
	Coast - large long walled parabolic coastal dunes, including unstable blow out areas, narrow swales, minor limestone plains, rocky wave cut platforms and beach; mixed low shrubs, also soft spinifex and buffel grass.	36.1
		97.3
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (192 recordings on 4 land systems)

Carrarang

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Birrida	3	100	—	—	—	67	33	—	—	—	100	—	—
Coast	46	94	2	—	4	81	13	—	2	4	93	—	7
Edel	140	95	4	1	—	34	30	19	11	6	64	19	17
MacLeod	3	100	—	—	—	33	67	—	—	—	100	—	—
Total over all land systems	192	94	4	1	1	45	27	14	8	6	72	14	14

Range evaluation sites

Detailed descriptions and measurements of land form, vegetation, soils and range condition were made at 12 sites on 3 land systems.

Range condition and recommendations

1. Edel land system (61.2%)

Condition of the Coastal Dune Shrub pastures (CDSH), Saltbush pastures (SALT) and Heath (HEAT) on this system is generally good or very good. Some areas around watering points such as at Biddy Giddy outcamp and in Coolboo paddock have been profoundly altered from perennial shrublands to exotic annual grass and herb pastures but appear to be reasonably stable.

Much of the system is not used for grazing because of the lack of stock waters.

2. Coast land system (36.1%)

This system supports similar shrublands to the Edel system and these are nearly all in very good condition. Most of the system is ungrazed because of the lack of stock waters.

About 30 km² of the system consists of very large unstable blowouts and mobile dunes. The largest of these areas commences near Dulverton Bay and

extends north for about 23 km on to Bellefin Prong. The general area has been used for grazing in the past (a number of abandoned watering points are present), but because of its unstable condition, it should not be brought into production again.

Much of the Coast system is extremely sensitive to any form of disturbance and is highly vulnerable to wind erosion. It is doubtful if the system should be used for pastoral purposes and, at the present time, most of it is in fact not being used. Use of the system for almost any purpose will need to be carefully planned.

3. The remaining land systems Birrida, McLeod and Littoral are mostly in good condition but, because of their relatively small areas, are of little significance for grazing.

4. The station is very poorly watered with many areas being in excess of 5km from stock water.

5. Recommended sheep unit capacity for present condition is 8,000. This figure assumes that all pastures are adequately watered which is not the case (see 4).

6. Capability sheep unit capacity if all country was in good range condition is estimated at 9,680.

Individual station report

Carrarang station - 80,515 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Edel	493	CDSH	264	71	84	—	4,143	5,238
		HEAT	30	10	9	—	143	163
		SALT	16	5	4	—	408	500
Coast	291	CDSH	255	—	—	36	3,188	3,638
		SAMP	16	—	—	—	64	64
Birrida	19	SALT	3	—	—	—	60	60
		SAMP	1	—	—	—	4	4
		No veg	—	—	—	—	—	—
McLeod	1	SALT	—	—	—	—	—	—
		SAMP	—	—	—	—	—	—
		No veg	—	—	—	—	—	—
Littoral	1	CDSH	1	—	—	—	13	13
		No veg	—	—	—	—	—	—
		SAMP	—	—	—	—	—	—
Totals	805		586	86	97	36	8,023	9,680

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 8,000

Capability 9,700

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 9,321

highest (1971) 15,834

lowest (1979) 420

Coburn station - Shark Bay Shire

Area 1,005 km²

Location

Coburn station is located on the Yaringa 1:250,000 map sheet. The homestead is 25 km west of North-West Coastal Highway and is about 260 km south by road from Carnarvon. The station has common boundaries with Hamelin, Meadow, Nerren Nerren and Nanga stations and with the Cooloomia Nature Reserve.

Description

More than 85% of the station consists of gently undulating sandplain of the Nerren, Nanga and Sandplain land systems.

The Nerren system occupies about 34.6% of the station area and occurs in the central and southern parts. It supports a tall shrubland dominated by wanyu with a patchy over-storey of various eucalypts. Pastoral value is moderate.

The Sandplain system (15.6%) which occurs in the eastern half of the station is very similar to the Nerren system but lacks the eucalypt over-storey.

The Nanga sandplain system (35.4%) occurs in the far west of the station. It is rather more undulating than the Nerren system and the vegetation is quite different in that it consists of scrubby heath and tree heath with a wide variety of species typical of sandplains south of the survey area. Pastoral value is very low.

Two land systems, Yaringa (8.2%) and Snakewood (5.3%), occur in the north of the station. The Yaringa system consists of sandy plains with tall shrublands of wanyu and minor limestone plains supporting tall shrublands of Hamelin wattle and other acacias. Pastoral value is moderate. The Snakewood system is characterized by snakewood and saltbush shrublands on nearly flat plains with duplex soils. Pastoral value is high.

There are small areas of three other systems on the station, but these are of little significance.

All systems are summarized and their pastoral value shown in table 1.

Condition statements for land systems and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Coburn station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Nanga - undulating sand plain and occasional dunes with tree heath	35.4
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Nerren - nearly flat to gently undulating red sandplains; tall shrublands of wanyu with scattered trees and mallee eucalypts	34.6
	Sandplain - nearly flat to gently undulating red sandplains; tall wanyu shrublands	15.6
	Cooloomia - undulating sandplain and minor limestone outcrop plains; tall and low shrublands with mallee eucalypts; also scrubby heath	0.8
		51.0
High (5-9 ha/s.u.)	Yaringa - sandy plains with sandy banks, low dunes and limestone outcrop plains; tall shrublands of wanyu and other acacias	8.2
	Snakewood - nearly flat plains with duplex soils; tall shrublands of snakewood with understorey of saltbush	5.3
	Toolonga - limestone plains with tall shrublands of Hamelin wattle and other acacias	< 0.1
	Tarcumba - nearly flat plains with gradational soils overlying calcrete; tall shrublands of acacias	< 0.1
		13.6
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (156 recordings on 6 land systems)

Coburn

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Nanga	22	100	—	—	—	91	9	—	—	—	100	—	—
Nerren	69	100	—	—	—	1	12	51	35	1	13	51	36
Sandplain	37	100	—	—	—	—	14	67	19	—	14	67	19
Snakewood	8	100	—	—	—	—	13	49	25	13	13	49	38
Toolonga	1	100	—	—	—	—	—	100	—	—	—	100	—
Yaringa	19	100	—	—	—	—	16	42	42	—	16	42	42
Total over all land systems	156	100	—	—	—	13	12	48	26	1	26	46	28

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 6 sites on 4 land systems.

Range condition and recommendations

1. Nanga land system (35.4%)

Condition of the Heath (HEAT) pastures on this system is good or excellent but they are of little use for pastoral purposes being rated at only 1s.u./30ha. Most of the system is not developed and is not used by the station for grazing.

2. Nerren land system (34.6%)

Most of the Acacia and Eucalyptus Short Grass Forb (AESG) pastures on this system are in fair or poor condition. In parts there has been considerable loss of useful low shrubs and the pastures are now only annual grasses and forbs in season. There is no erosion.

When in good condition a small range of desirable shrubs such as ruby saltbush, cotton bush and flat leaf bluebush occur clumped beneath the eucalypt trees and larger wattles. These species confer limited drought durability to the pastures and management needs to aim at maintaining them in the stand.

3. Sandplain land system (15.6%)

About two-thirds of the Acacia Sandplain (ACSA) pastures on this system are in fair condition with the remainder about evenly distributed between good and poor. The pasture type is very similar to that on the Nerren system with, when in good condition, a small range of desirable low shrubs as well as annuals in season.

4. Yaringa land system (8.2%)

Acacia Sandplain (ACSA) and Acacia Mixed Shrub (ACMS) pastures on the Yaringa land system all show more or less depletion to fair or poor condition. The system has little durability in times of drought.

5. Snakewood land system (5.3%)

This valuable system with Saltbush (SALT) pastures is mostly in fair or bad range condition. Pastures are mostly degraded with almost half assessed as being poor or very poor. However, despite its depletion the pastures still have the potential to recover if strategic spelling over a number of growing seasons can be incorporated into the management system.

6. A major problem on the station is that it has an inadequate number of stock watering points. As a result, stock are poorly distributed over the property and grazing pressure has been excessive in some areas. This is reflected in the poor condition of much of the pasture. Attempts in the past to obtain additional supplies have been unsuccessful with drill holes being dry or containing very salty water. Until additional supplies are established it will be impossible to bring all parts of the property into use and to relieve grazing pressure on degraded areas.

7. The recommended sheep unit capacity for present condition and assuming the station was adequately watered (which is not the case, see 6 above) is 5150.

8. The capability sheep unit capacity if all country was in good range condition is estimated at 7,050.

Individual station report

Coburn station - 100,483 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Nanga	356	HEAT	320	—	—	—	1,067	1,067
		HASP	36	—	—	—	180	180
Nerren	348	AEGF	45	178	125	—	1,810	2,486
Sandplain	157	ACSA	22	105	30	—	960	1,308
Yaringa	83	ACSA	14	14	38	—	356	550
		ACMS	—	17	—	—	170	340
Snakewood	53	SALT	6	18	18	—	458	840
		ACMS	—	8	—	—	80	160
		ACSA	—	3	—	—	19	25
Cooloomia	8	AEGF	3	2	1	—	37	43
		ACMS	1	—	—	—	20	20
		HEAT	1	—	—	—	3	3
Toolonga	0.4	ACMS	—	0.4	—	—	4	8
		ACSA	—	—	—	—	—	—
		ASGF	—	—	—	—	—	—
Tarcumba	0.2	ACMS	—	0.2	—	—	2	4
Totals	1,005		448	345	212	—	5,166	7,034

* Area of extreme degradation; severe erosion and/or pasture degradation, zero grazing capacity.

Recommended sheep unit capacity 5,150

Capability sheep unit capacity 7,050

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 7,167

highest (1974) 10,103

lowest (1981) 3,200

Cooralya station - Carnarvon Shire

Area 1,619 km²

Location

Cooralya station is located on the Quobba and Kennedy Range 1:250,000 map sheets. The homestead is 8 km east of the North-West Coastal Highway and about 75 km north-east of Carnarvon by road. The station has common boundaries with Manberry, Hill Springs, Mardathuna, Doorawarra, Boolathana, Booloogooro and Minilya stations.

Description

All of the station is accessible to livestock. About half the country has been classified as being of high pastoral value and the remainder is of moderate value.

The two largest land systems on the station, Yalbalgo and Sandal, collectively occupy about 87% of the station area. The Yalbalgo system occurs in the northern half of the station and also in the east. It consists of sandplain with numerous linear and reticulate dunes and supports a moderately close tall shrubland of wanyu. The Sandal system occupies most of the southern half of the station and consists of alluvial plains with duplex soils and numerous low

sandy rises and banks. Vegetation consists of mixed tall shrublands of various acacias with numerous low shrubs such as currant bush and cassias.

Six other land systems make up the rest of the station (13.4%) and although these systems are all relatively small they are important as they are of high or moderate pastoral value. The largest of these are Lyons (8.8%) and Sable (2.4%).

The Lyons system is found as inclusions in the Yalbalgo system in central and eastern parts of the station. It consists of sandy plains with numerous large, distinctive claypans surrounded by linear and reticulate dunes. The vegetation is a tall mixed shrubland, with wanyu dominating on the sand dunes. The Sable system occurs in the far south-west of the station and consists of almost flat saline alluvial plains with minor areas of sandy banks. Vegetation on the plains is mostly a low shrubland of Gascoyne bluebush and saltbush. The sandy banks support taller acacia shrublands.

All land systems found on the station are further summarized in table 1.

Condition statements for each land system for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Cooralya station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	-	—
Low (20-30 ha/s.u.)	-	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplain with linear and reticulate dunes; tall shrublands of wanyu	49.2
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall mixed shrublands of acacias and currant bush	8.8
		58.0
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall mixed shrublands of acacias and currant bush	37.4
	Sable - nearly flat saline alluvial plains, minor sandy banks; low shrublands of saltbush and bluebush and some tall acacia shrublands	2.4
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall shrublands of acacias and currant bush	0.8
	Ella - short linear dunes and sandy banks with inter-dunal plains and drainage foci, tall acacia shrublands	0.7
	Gearle - gently sloping plains, minor stony rises with more sloping marginal plains, low shrublands of bluebush	0.4
	Mary - gently sloping plains with calcrete at shallow depth; mixed tall shrublands of acacias and cassias	0.3
		42.0
Very high (< 5 ha/s.u.)	-	—
		100.0

Table 2. Condition statements derived from traverse records (218 recordings on 4 land systems)

Cooralya

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Lyons	31	100	—	—	—	23	6	52	19	—	29	52	19
Sandal	115	99	1	—	—	1	17	55	25	2	18	55	27
Target	1	100	—	—	—	—	—	—	100	—	—	—	100
Yalbalgo	71	99	—	1	—	14	39	38	8	1	52	38	10
Total over all land systems	218	99	—	—	—	8	22	50	19	1	31	48	21

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 12 sites on 4 land systems.

Range condition and recommendations

1. Yalbalgo land system (49.2%)

This system supports the Acacia Sandplain (ACSA) pasture type. The pastures consist of scattered low shrubs such as cotton bush, flannel bush and Wilcox bush and wandarrie grass beneath tall shrubs such as wanyu and other acacias. Pasture condition as seen during survey was nearly all fair to very good. There is no erosion and over all range condition was fair or good.

Fire may be a useful management tool on this system, but its use has not been researched. Evidence seen elsewhere during survey suggests that the effects of fire are long term. Wanyu may take decades to regenerate after fire although other acacias in the stand recover much more rapidly. When the overstorey of tall shrubs is killed by fire the low shrub layer and the ground layer often increases markedly both in diversity of species and in density. This fire induced sub-climax appears to be considerably more productive for livestock production than is the climax situation.

2. Sandal land system (37.4%)

This system supports valuable Currant Bush Mixed Shrub pastures (CBMS) on the duplex soils of the alluvial plains and Acacia Sandplain pastures (ACSA) on the sandy banks. Both pasture types are largely in fair condition although some areas are poor and show considerable loss of desirable shrubs such as currant bush and tall saltbush and an increase in undesirables such as needle bush. Areas in poor condition are still highly productive in terms of annual herbage in season, but have limited drought reserves compared to areas in good condition. Strategic spelling over a number of growing seasons will enable the recovery of desirable low shrubs. Techniques to reduce thickets of needle bush on a wide scale have yet to be developed.

Buffel grass has colonized many of the sandy areas of this system and compliments native pastures on these sites. It is continuing to spread and its spread on to duplex soils and more clayey soil sites where it may compete with desirable low shrubs needs to be monitored.

3. Lyons land system (8.8%)

This system also supports Currant Bush Mixed Shrub pastures (CBMS) and Acacia Sandplain pastures (ACSA). Pasture condition is very similar to that of the Sandal system. Condition is predominantly fair although significant areas (about 20% of the traverse recordings) were in poor condition with depleted shrub pastures. These pastures have the potential to recover well if they can be occasionally spelled from grazing.

4. The remaining minor land systems on the station were not intensively sampled but, where seen, were generally in fair condition with no erosion. Their overall condition is expected to be similar to that of the Sandal system.

5. The recommended sheep unit capacity for present condition is 13,350.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 18,650.

Individual station report

Cooralya station - 161,886 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	797	ACSA	414	303	80	—	5,665	6,642
Sandal	606	CBMS	41	156	76	—	3,245	5,460
		ACSA	44	140	58	—	1,474	2,017
		BLUE	14	52	25	—	1,086	1,820
Lyons	143	ACSA	5	52	15	—	427	600
		CBMS	—	23	8	—	338	620
		ACCR	—	11	—	—	110	220
		No veg	29	—	—	—	—	—
Sable	39	SALT	11	4	3	—	289	360
		BLUE	10	4	2	—	263	320
		ACSA	2	2	1	—	33	42
Target	12	CBMS	—	2	3	—	44	100
		ACSA	2	3	—	—	35	42
		ACCR	1	1	—	—	30	40
Ella	11	ACSA	4	4	—	—	58	67
		CBMS	—	2	—	—	25	40
		ACCR	1	—	—	—	20	20
Gearle	6	BLUE	4	—	—	—	80	80
		SALT	2	—	—	—	40	40
		TUGR	—	—	—	—	—	—
Mary	5	ACMS	2	3	—	—	70	100
		BLUE	—	—	—	—	—	—
Totals	1,619		586	762	271	—	13,331	18,630

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 13,350

Capability sheep unit capacity 18,650

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1969):

average (mean) 20,583

highest (1972) 27,700

lowest (1984) 15,655

Dirk Hartog Station - Shark Bay Shire

Area 617 km²

Location

Dirk Hartog station (Dirk Hartog Island) is located on the Edel and Shark Bay 1:250,000 map sheet. The nearest point of the island lies about 35 km in a westerly direction from Denham across Denham Sound. The island is almost 80km long by about 10 km wide and lies at the western side of Shark Bay with its long axis in a south-east to north-west direction.

Description

Five land systems occur on the station, three of which (Coast, Edel and Inscription) collectively make up about 99% of the total station area.

The Coast land system (41.9%) occurs along the entire western side of the island and consists of large long-walled parabolic dunes and narrow swales, unstable blow-out areas and bare mobile dunes, minor limestone hills and rises and steep sea cliffs.

Vegetation is tall open heath or tall shrubland usually dominated by *Acacia ligulata* and with numerous low shrubs. There are some localized areas of spinifex hummock grassland *Triodia plurinervata* notably on the hills near Herald Heights. Pastoral value is high.

The Edel land system (32.5%) occurs in eastern and south-eastern parts of the island and consists of undulating sandy plains with minor low dunes, limestone rises and saline flats. Vegetation is a tall or low open heath or low shrubland and pastoral value is high.

The Inscription land system (24.3%) is found in the north-east and central-east of the island. It consists of gently undulating sandy plains over limestone usually at shallow depth. Vegetation is low heath with a variable admixture of spinifex. Pastoral value is low or very low.

The remaining land systems Birrida (0.7%) and Littoral (0.6%) are of little significance. All systems on the island are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from information recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Dirk Hartog station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	Inscription - gently undulating sandy plains over limestone at variable depth; low heath with some spinifex	24.3
Moderate (10-19 ha/s.u.)	Birrida - highly saline and gypsiferous pans and depressions, low shrublands of samphire and saltbush	0.7
	Littoral - low coastal foredunes, samphire flats and tidal flats; tall and low shrublands in parts	0.6
		1.3
High (5-9 ha/s.u.)	Coast - large, long walled parabolic coastal dunes and narrow swales, unstable blowout areas and mobile dunes, minor limestone hills and rises, steep sea cliffs; tall open heath or tall acacia shrublands	41.9
	Edel - undulating sandy plains with minor low dunes, limestone rises and saline flats, low sea cliffs, tall or low heath	32.5
		74.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (129 recordings on 3 land systems)

Dirk Hartog

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Coast	37	92	5	—	3	59	30	8	—	3	89	8	3
Edel	43	93	5	2	—	9	51	33	5	2	60	33	7
Inscription	49	100	—	—	—	74	14	12	—	—	88	12	—
Total over all land systems	129	95	3	1	1	47	31	18	2	2	79	18	3

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 3 land systems.

Range condition and recommendations

1. Coast land system (41.9%)

This system supports Coastal Dune Shrub pastures (CDSH) which consist of a large number of palatable low shrubs mixed with less palatable types beneath taller shrubs such as *Acacia ligulata* and coastal jam. Desirable shrubs include silver saltbush, cotton bush, green cassia and rhagodias. Pasture condition is mostly good or very good.

About 16 km² of the system consists of unvegetated blowout areas or large mobile sand dunes. These unstable zones are particularly numerous in the south-west of the island where they originate on the coast facing the Indian Ocean and have migrated northwards. One blowout has migrated right across the island and enters the sea on the eastern side of the island at Tetrodon Loop. Also a number of very large mobile dunes occur in the north-west of the station near Mystery bore.

Although the system supports useful pastures it is highly susceptible to wind erosion if the vegetation is removed by fire, overgrazing or other agencies.

Elsewhere in the survey area there is clear cut evidence that some blowouts on the Coast land system have originated near man-made stock watering points. The system should not be further developed for grazing unless extreme care is taken about the siting of watering points, fences and access tracks.

2. Edel land system (32.5%)

This system supports the Coastal Dune Shrub (CDSH) pasture type and the Heath (HEAT) pasture type. Pasture condition is mostly good or fair and there is little erosion. Over all range condition is good or fair except in the vicinity of some mills where the indigenous vegetation is almost completely lost. Such areas have lost their surface sand due to wind erosion and the underlying limestone is exposed. Vegetative cover, in the form of introduced annual species, is present only during periods after rain.

3. Inscription land system (24.3%)

This system supports Heath pastures (HEAT) which are generally of very low grazing value. Many of the low shrub components are unattractive to stock although small annual species provide some useful grazing after rain. Pasture condition is mostly good or very good.

4. Much of the station, particularly in the northern half, is not being used for grazing because of the lack of permanent water supplies.

5. The recommended sheep unit capacity for present condition assuming the station was fully watered (which is not the case, see 4) is estimated at 5,450.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 6,300.

Individual station report

Dirk Hartog station - 61,674 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Coast	258	CDSH	216	19	7	16	2,863	3,225
Edel	200	CDSH	101	56	11.5	1.5	1,709	2,125
		HEAT	12	7	1	—	60	67
		SALT	6	3	1	—	164	200
Inscription	150	HEAT	66	9	—	—	243	250
		HASP	66	9	—	—	360	375
Birrida	4	SAMP	3	—	—	—	12	12
		SALT	1	—	—	—	20	20
Littoral	4	CDSH	2	—	—	—	25	25
		No veg	1	—	—	—	—	—
		SAMP	1	—	—	—	4	4
Totals	616		475	103	20.5	17.5	5,460	6,303

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 5,450

Capability sheep unit capacity 6,300

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 5,956

highest (1969) 12,500

lowest (1981) 2,500

Doorawarra station - Carnarvon Shire

Area 2,193 km²

Location

Doorawarra station is located on the Kennedy Range and Wooramel 1:250,000 map sheets. The homestead is about 78 km east of Carnarvon on the Carnarvon-Gascoyne Junction road. The station has common boundaries with Cooralya, Mardathuna, Mooka, Jimba Jimba, Yalbalgo, Ella Valla, Meeragoolia, Brickhouse and Boolathana stations.

Description

The station largely comprises sandy alluvial plains, sandplains and sand dunes and all of it is accessible to livestock. The Ella land system is the largest and occupies about 32.5% of the total area of the station. The system occurs in the west, south and north-east and consists of short, linear sand dunes and narrow inter-dunal plains. The inter-dunal plains frequently have central run on areas or drainage foci which support somewhat more dense vegetation than the surrounding plains. Vegetation is predominantly wanyu shrubland or sand ridge gidgee woodland and pastoral value is moderate.

The Target land system (25.1%), which occurs over most of the station, has affinities with the Ella system except that it has very low sandy banks rather than

dunes or ridges and has more pronounced drainage foci. Vegetation is a tall shrubland of wanyu on sandy parts and tall mixed shrublands of acacias and currant bush on the more clayey plains and drainage foci. Pastoral value is high.

The Sandal land system (13.6%) occurs in the north and west of the station and consists of alluvial plains with duplex soils and numerous low sandy banks and rises with sandy soils. It supports a mixed tall shrubland of acacias and numerous other shrubs. Pastoral value is high.

Two sand dune systems, Yalbalgo (13.0%) and Lyons (11.7%) make up most of the rest of the station. The Yalbalgo system consists of sandplains with large linear and reticulate dunes with relief up to 25 m. It supports moderately dense tall shrublands of wanyu and pastoral value is moderate. The Lyons system also consists of large dunes, but also has more clayey inter-dunal plains and large, prominent claypans. It supports shrublands of wanyu, other acacias and currant bush. Pastoral value is moderate.

Three other minor land systems (collectively 4.1%) occur on the station but are of little significance.

All systems are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Doorawarra station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes, tall shrublands of wanyu or woodlands of sand dune gidgee	13.0
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall shrublands of acacias and currant bush	11.7
	Channel - major channels with narrow flood plains and dissected marginal slopes, tall acacia shrublands	3.6
		28.3
High (5-9 ha/s.u.)	Ella - short linear dunes and sandy banks with inter-dunal plains and drainage foci; sand dune gidgee woodlands and mixed tall shrublands of acacias	32.5
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall mixed shrublands of acacias	25.1
	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall mixed shrublands and some low shrublands of bluebush	13.5
	River - narrow active flood plains and major channels, fringing woodlands and tall acacia shrublands	0.3
	Mary - gently sloping plains with calcrete at shallow depth, tall shrublands of acacia and cassia	0.2
		71.7
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (311 recordings on 8 land systems)

Doorawarrah

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	88	96	3	1	—	5	20	48	26	1	25	48	27
Lyons	26	92	8	—	—	23	4	46	23	4	27	46	27
Mary	2	100	—	—	—	—	—	100	—	—	—	100	—
River	7	42	—	29	29	—	43	14	14	29	43	—	57
Sandal	49	90	6	4	—	2	39	45	14	—	41	45	14
Target	132	83	15	2	—	2	9	47	39	3	11	47	42
Yalbalgo	7	100	—	—	—	—	14	29	57	—	14	29	57
Total over all land systems	311	88	9	2	1	5	17	45	30	3	22	45	33

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 17 sites on 4 land systems.

Range condition and recommendations

1. Ella land system (32.5%)

About half the traverse records indicate fair range condition for this system with the remainder being about evenly distributed between good and bad condition. Condition of the Acacia Sandplain (ACSA) pastures on the sandy units of the system is nearly all fair or good. However, the Currant Bush Mixed Shrub (CBMS) pastures which occur on the more clayey inter-dunal plains are more or less degraded with considerable loss of desirable low shrubs in some parts. There is very little erosion on the system and it has the ability to recover well if spelled over a number of growing seasons.

2. Target land system (25.1%)

Acacia Sandplain (ACSA) pastures on the sandy banks of the system are mostly in fair condition and there is no erosion on this unit. Currant Bush Mixed Shrub (CBMS) pastures are in fair or poor condition with considerable depletion of desirable shrubs such as tall saltbush, ruby saltbush and green cassia. Minor wind and water erosion in the form of localized surface deflation, thin sheeting and surface scalding is common on the duplex soils associated with this pasture type. The most badly degraded areas require a programme of strategic spelling from grazing over a number of growing seasons to enable recovery of desirable shrubs.

3. Sandal land system (13.6%)

The Acacia Sandplain (ACSA) and Currant Bush Mixed Shrub (CBMS) pastures on this system are largely in fair or good condition with only some minor areas showing vegetation degradation to poor condition. There are a few localized areas of minor wind and water erosion, but generally the system is relatively stable under grazing. A system of occasional spelling of paddocks over a growing season would be beneficial.

4. Yalbalgo land system (13.0%)

The system was inadequately sampled. However, where seen, there was no erosion but the acacia sandplain pastures were depleted. Generally the system is stable under grazing and not highly susceptible to degradation.

5. Lyons land system (11.7%)

Condition of the Acacia Sandplain (ACSA) and Currant Bush Mixed Shrub (CBMS) pastures seen on this system was predominantly fair or good with some localized parts for example in the vicinity of watering points, in poor condition. There is occasional minor wind and water erosion but this is not a significant problem.

6. The remaining land systems Channel (3.6%), River (0.3%) and Mary (0.2%) were not intensively sampled. However, some moderate and severe water erosion in the form of active rills and gullies was seen on slopes marginal to the main river channel of the Gascoyne River. Because of the proximity to water these sites are likely to be overgrazed and the erosion problem may need further attention.

7. The station has been well developed in terms of paddocks and stock water in the past. Many of the more outlying paddocks did not appear to be in use. Stock should be more equitably distributed over the property so that regular spelling can be commenced on more heavily grazed parts of the station.

8. The recommended sheep unit capacity for present condition is 16,900.

9. The capability sheep unit capacity if all country was in good condition is estimated at 27,350.

Individual station report

Doorawarra station - 219,301 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Ella	714	ACSA	175	260	65	—	3,343	4,167
		CBMS	9	63	71	—	1,411	2,860
		ACCR	18	36	17	—	805	1,420
Target	551	CBMS	10	104	134	—	2,338	4,960
		ACSA	35	128	57	—	1,320	1,833
		ACCR	21	42	20	—	940	1,660
Sandal	299	CBMS	32	81	22	—	1,790	2,700
		ACSA	73	31	16	—	866	1,000
		BLUE	11	26	7	—	589	880
Yalbalgo	284	ACSA	20	41	81	—	747	1,183
		HASP	28	57	57	—	473	710
Lyons	255	ACSA	12	82	34	—	749	1,067
		CBMS	—	56	—	—	700	1,120
		ACCR	—	8	12	—	140	400
		No veg	51	—	—	—	—	—
Channel	79	BLUE	2	17	21	—	384	800
		ACCR	4	8	4	—	180	320
		No veg	23	—	—	—	—	—
River	7	ACCR	—	4	—	—	40	80
		TUGR	—	2	—	—	40	100
		No veg	1	—	—	—	—	—
Mary	4	ACMS	—	4	—	—	40	80
Totals	2,193		525	1,050	618	—	16,895	27,340

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 16,900

Capability sheep unit capacity 27,350

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 19,391

highest (1976) 25,272

lowest (1981) 9,050

Edaggee station - Carnarvon Shire

Area 679 km²

Location

Edaggee station is located on the Wooramel 1:250 000 map sheet. The homestead is about 22 km east of the North-West Coastal Highway with the road turn-off about 77 km south of Carnarvon. Edaggee has common boundaries with Brickhouse, Callagiddy, Ella Valla, Marron, Wahroonga and Wooramel stations. In the south-west it has a coastline of about 12 km on Shark Bay.

Description

The station consists of broad, almost flat plains with numerous low sandy rises and minor areas of sandplain and sand dunes. All of the station is accessible to livestock and is classified as being of high pastoral value.

Five land systems occur on the station; the largest of these is the Sandal system which occupies about 75% of the total station area. It consists of low plains with numerous low sandy rises and banks supporting tall acacia shrublands.

The Sable land system (15.6%) occurs in the west of the station. It consists of saline alluvial plains with occasional sandy rises and supports low shrublands of saltbush and bluebush on the plains and tall shrublands of silver bark wattle and other acacias on the sandy rises.

Two other minor systems Ella (9.3%), and Brown (0.6%) occur on the station. All systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Edaggee station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Brown - gently undulating sandplains and occasional dunes; tall acacia shrublands	0.6
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall shrublands of acacias and currant bush, minor low shrublands of bluebush	74.5
	Sable - nearly flat saline alluvial plains, minor sandy banks; low shrublands of saltbush and bluebush, some tall acacia shrublands	15.6
	Ella - short linear dunes and sandy banks with inter-dunal plains and drainage foci, sand dune gidgee woodlands and acacia shrublands	9.3
		99.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (147 recordings on 5 land systems)

Edaggee

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	2	100	—	—	—	—	—	100	—	—	—	100	—
Ella	11	100	—	—	—	—	—	45	55	—	—	45	55
Littoral	4	100	—	—	—	75	25	—	—	—	100	—	—
Sable	27	100	—	—	—	45	33	22	—	—	78	22	—
Sandal	103	99	1	—	—	1	17	47	26	9	18	47	35
Total over all land systems	147	99	1	—	—	11	19	42	22	6	30	41	29

Range evaluation sites

Detailed descriptions of landform, vegetation, soils and range condition were made at 9 sites on 2 land systems.

Range condition and recommendation

1. Sandal land system (74.5%)

This system supports valuable Currant Bush Mixed Shrub pastures (CBMS) and some Bluebush (BLUE) on the duplex soils of the alluvial plains and interbank areas and Acacia Sandplain pastures (ACSA) on the sandy banks. Condition of the Currant Bush Mixed Shrub pastures is predominantly fair or poor although some areas are in good condition. The poorer parts, which are concentrated in paddocks near the homestead, show considerable loss of desirable shrubs such as currant bush and tall saltbush. Undesirable species such as needle bush, bardie bush and waxy leaved eremophila have increased at the expense of the desirables. Condition of the Acacia Sandplain pastures on the sandy rises is rather better being mostly fair or good. There is no erosion on the system.

About 29% of the traverse observations indicated bad range condition with depleted pastures. These areas still produce abundant annual herbage in season, but their reserves of palatable shrubs for dry periods are much reduced. Some 41% and 30% of the observations indicated fair and good range condition respectively.

Degraded parts, where undesirable species have not increased substantially, could be readily improved by spelling from grazing. However, where dense stands of undesirable shrubs have become established, practical methods for their removal are not known.

2. Sable land system (15.6%)

This system supports mixed Bluebush and Saltbush pastures (BLUE, SALT) with smaller areas of Acacia Sandplain pastures (ACSA). Pasture condition is mostly good or very good with a wide range of desirable shrubs such as Gascoyne bluebush, low bluebush, Gascoyne mulla mulla, bladder saltbush and silver saltbush. There is no erosion. The system is not fully used for grazing because many parts are distant from stock water supplies.

3. Ella land system (9.3%)

This sandy system supports Acacia Sandplain pastures (ACSA) with minor areas of Currant Bush Mixed Shrub pastures (CBMS) on the inter-dunal corridors. The system is restricted to the north-east of the station. Only part of the system was sampled but, where seen, the pastures were degraded with loss of desirable shrubs. There is no erosion.

4. Brown land system (0.6%)

Pastures on this minor system are in fair condition and there is no erosion.

5. The station is inadequately watered. More than half the pastures on the station are further than 5 km from permanent stock water. Consequently pastures distant from water are in good condition and are little used while those close to the watering points have been over-used and are now degraded. Additional watering points, possibly by piping from existing artesian supplies, are required to enable better distribution of livestock.

6. The recommended sheep unit capacity for present condition (assuming the station is adequately watered which is not the case, see 5) is 6,700.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 10,450.

Individual station report

Edaggce station - 67,878 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	505	CBMS	34	75	118	—	2,356	4,540
		ACSA	45	121	36	—	1,275	1,683
		BLUE	13	38	25	—	891	1,520
Sable	106	SALT	34	14	—	—	855	960
		BLUE	30	12	—	—	750	840
		ACSA	11	5	—	—	123	133
Ella	64	ACSA	—	34	11	—	257	375
		CBMS	—	2	11	—	94	260
		ACCR	—	6	—	—	60	120
Brown	4	ACSA	—	4	—	—	25	33
		SALT	—	—	—	—	—	—
Totals	679		167	311	201	—	6,686	10,464

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 6,700

Capability sheep unit capacity 10,450

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 9,773

highest (1976) 15,300

lowest (1980) 1,000

Ella Valla station - Carnarvon Shire

Area 7,614 km²

Location

Ella Valla station is located on the Wooramel 1:250 000 map sheet. The homestead is about 68 km east of the North-West Coastal Highway with the road turn-off about 22 km south of Carnarvon. Common boundaries are shared with Meeragoolia, Doorawarra, Yalbalgo, Marron, Edaggee and Callagiddy stations.

Description

The eastern two-thirds of the station consists of short, linear sand dunes and narrow inter-dunal plains of the Ella land system. Relief of the dunes is up to 15 m. The inter-dunal plains frequently have central run-on areas or drainage foci which support more dense vegetation than the surrounding plains.

Vegetation on the sandy units of the system is sand dune gidgee woodland or wanyu shrubland and elsewhere is mixed shrubland. Pastoral value is high.

Most of the remainder of the station consists of alluvial plains with numerous low sandy banks and rises. This is the Sandal land system (28.2%) which supports mixed shrubland, wanyu shrubland and some Gascoyne bluebush. Pastoral value is high.

Only one other land system, Brown (7%) occurs on the station. It is found in the south-west and consists of sandplain with tall shrublands of wanyu and other acacias.

The three systems found on the station are summarized and their pastoral value shown in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Ella Valla station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Ella - short linear dunes and sandy banks with inter-dunal plains and drainage foci, sand dune gidgee woodlands and mixed shrublands Brown - gently undulating sandplains and occasional dunes; tall shrublands of wanyu	64.8 7.0 71.8
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall shrublands of acacias and currant bush, minor low shrublands of bluebush	28.2
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (165 recordings on 3 land systems)

Ella valla

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	2	100	—	—	—	—	50	50	—	—	50	50	—
Ella	95	100	—	—	—	5	41	41	12	1	46	41	13
Sandal	68	100	—	—	—	3	28	46	22	1	31	45	24
Total over all land systems	165	100	—	—	—	4	36	43	16	1	40	43	17

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 11 sites on 2 land systems.

Range condition and recommendations

1. Ella land system (64.8%)

Most of this system is in fair or good range condition. Condition of the Acacia Sandplain (ACSA) pastures on the sandy units of the system is fair to good. The Currant Bush Mixed Shrub (CBMS) pastures of the inter-dunal plains are rather more degraded with almost 50% classified as being in poor condition. There is no erosion on the system and it has the ability to recover well if spelled over growing seasons.

2. Sandal land system (28.2%)

This system is mostly in fair or good range condition although some Currant Bush Mixed Shrub (CBMS) pastures are degraded to poor condition.

This pasture type occurs on the small flat plains with duplex soils which lie between the sandy banks and rises of the system. When in good condition the pasture is very productive with numerous desirable shrubs such as currant bush and tall saltbush. Decline in condition is often indicated by a relative increase in undesirable species such as waxy leaf eremophila and straight leaf cassia.

3. Brown land system (7%)

This minor system was not intensively sampled but, where seen, was in fair or good range condition.

4. The station is generally well watered. Only small areas in the far east and south-west are more than 5 km from a watering point. Stock can be well distributed over the property.

5. The recommended sheep unit capacity for present condition is 7,000.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 9,650.

Individual station report

Ella Valla station - 76,135 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Ella	493	ACSA	176	145	24	—	2,469	2,875
		CBMS	13	40	46	—	1,048	1,980
		ACCR	39	10	—	—	880	980
Sandal	215	CBMS	10	58	29	—	1,106	1,940
		ACSA	43	28	15	—	593	717
		BLUE	13	13	6	—	460	640
Brown	53	ACSA	24	24	—	—	350	400
		SALT	3	2	—	—	85	100
Totals	761		321	320	120	—	6,991	9,632

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 7,000

Capability 9,650

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 10,701

highest (1969) 15,723

lowest (1980) 4,500

Exmouth Gulf station - Exmouth Shire

Area 930 km²

Location

Exmouth Gulf station is located on the Yanrey and Ningaloo 1:250 000 map sheets. The homestead is 5 km east of the Exmouth road and about 53km south by road from Exmouth. The station has common boundaries with Bullara station, Cape Range National Park and in the east with the coastline of Exmouth Gulf.

Description

Only four land systems occur on the station. Nearly 60% of the station comprises rugged limestone hills, ridges and plateaux of the Range land

system (Cape Range). Most of this system is unsuitable for grazing and is not used by the station. Most of the remainder of the station consists of undulating sandy plains of the Cardabia land system and sandplains, minor outwash plains and stony plains of the Learmonth system. Both these systems support hummock grasslands, predominantly of soft spinifex, with a patchy over-storey of tall shrubs. Pastoral value is high.

Small areas of the Littoral system with low coastal dunes with soft spinifex and buffel grass, samphire flats, bare mudflats and mangroves occur along the shoreline to Exmouth Gulf. All systems are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Exmouth Gulf station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Range - limestone hills, ridges and plateaux with steep stony footslopes; tall shrublands with hard spinifex	57.2
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Littoral - low coastal foredunes, samphire and tidal flats and mangrove fringes; hummock grasslands, soft spinifex and buffel grass and scattered shrubs, also low shrublands of samphire	2.7
High (5-9 ha/s.u.)	Cardabia - undulating sandy plains with linear dunes and minor limestone ridges and outcrop plains; low shrublands and hummock grasslands of soft and hard spinifex	26.3
	Learmonth - sandplains, sandy outwash plains and minor limestone outcrop plains; soft spinifex hummock grasslands with scattered shrubs	13.8
		40.1
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (105 recordings on 4 land systems)

Exmouth

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	55	98	2	—	—	71	27	2	—	—	98	2	—
Learmonth	39	97	3	—	—	81	8	8	—	3	89	8	3
Littoral	5	100	—	—	—	40	60	—	—	—	100	—	—
Range	6	100	—	—	—	83	17	—	—	—	100	—	—
Total over all land systems	105	98	2	—	—	74	21	4	—	1	95	4	1

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 5 sites on 3 land systems.

Range condition and recommendations

1. Cardabia land system (26.3%)

Pastures are mostly Soft Spinifex (SOSP), but also with some Hard Spinifex (HASP). Pasture condition is very good or good and there is no erosion.

The system is generally stable under grazing except for occasional localized dunes and dune crests which may become unstable due to the effects of fire or excessive grazing pressure. Fire is a natural feature of the environment and regular, controlled burning is an accepted management tool to maintain pastures in a useful condition for grazing. Some sand drift can occur after fire, but the system revegetates rapidly after rain and stabilizes.

2. Learmonth land system (13.8%)

This system supports Soft Spinifex pastures (SOSP) on the sandy parts with minor areas of Acacia Mixed Shrub pastures (ACMS) on small outwash plains over limestone. Buffel grass is well established on some sandy areas especially in paddocks close to the homestead. Over all, the pastures are in very good or good condition and there is no erosion. An exception is in the eastern half of Wogalti paddock where pastures are depleted to poor or very poor condition and there are small patches of minor wind and water erosion.

3. Littoral land system (2.7%)

This minor system was not sampled intensively. However, where the soft spinifex, buffel grass, samphire and saltbush pastures of the system were seen they were in good or very good condition.

4. The recommended sheep unit capacity for present condition is 8,050.

5. The capability sheep unit capacity if all country was in good range condition is estimated at 8,250.

Individual station report

Exmouth Gulf station - 92,986 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Range	532	HASP	484	48	—	—	2,580	2,660
	245	SOSP	192	4	—	—	3,233	3,267
Learmonth	128	HASP	48	1	—	—	243	245
		SOSP	69	8	—	—	1,217	1,283
		HASP	23	3	—	—	125	130
		ACMS	23	2	—	—	480	500
Littoral	25	SOSP	10	—	—	—	167	167
		SAMP	5	—	—	—	20	20
		No veg	10	—	—	—	—	—
Totals	930		864	66	—	—	8,065	8,272

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 8,050

Capability 8,250

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1974):

average (mean 9,468

highest (1975) 11,503

lowest (1980) 7,498

Faure station - Shark Bay Shire

Area 58 km²

Location

The station consists of Faure Island in Shark Bay at the head of the Hamelin Pool embayment. The island lies about 18 km east of the Peron Peninsula from Monkey Mia.

Description

Three land systems, Sandplain, Birrida and Littoral, occur on the station. The Sandplain system is by far the largest (82.1% of total station area) and consists of undulating red sandplain supporting a moderately close wanyu shrubland about 1.5-2 m high. Under-shrubs are considerably more prolific than is usual for this system and this, coupled with the widespread occurrence of buffel grass means that pastoral value is very high.

The Birrida system (11%) occurs in the north and west as a series of salt pans and depressions with sandy margins. The system supports low shrublands of saltbush and samphire.

The Littoral system occurs as a narrow coastal fringe in the north, north-east and south-west. It consists of low coastal foredunes and samphire and tidal flats with mangrove fringes. The foredunes support a mixed shrubland of stunted wanyu and curara 1-2 m high with numerous under-shrubs and coastal spinifex.

The three land systems on the station are summarized in table 1.

Condition statements for land systems and for the whole station (taken over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Faure station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Birrida - highly saline pans and depressions with sandy margins; low shrublands of samphire and saltbush Littoral - low coastal foredunes, samphire and tidal flats with mangrove fringes, low shrublands of wanyu and curara, also coastal spinifex and samphire	11.2 6.7 17.9
High (5-9 ha/s.u.)	—	—
Very high (< 5 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplain with wanyu shrublands and buffel grass	82.1
		100.0

Table 2. Condition statements derived from traverse records (22 recordings on 2 land systems)

Faure

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Birrida	3	100	—	—	—	33	67	—	—	—	100	—	—
Sandplain	19	79	21	—	—	21	42	21	5	11	63	21	16
Total over all land systems	22	82	18	—	—	23	45	18	5	9	68	18	14

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 3 sites on 2 land systems.

Range condition and recommendations

1. Sandplain land system (82%)

This system usually supports the Acacia Sandplain pasture type (ACSA) but on Faure the pastures are more productive and are closer in composition (in terms of desirable low shrubs) to the Coastal Dune

Shrub pasture type (CDSH). The over-storey consists of somewhat wind pruned wanyu and curara to about 2 m. Useful low shrubs such as silver saltbush, tall saltbush and ruby saltbush are numerous and buffel grass is widely established especially in the paddocks at the southern end of the island.

Over 60% of the traverse recordings indicated good or very good pasture condition with most of the remainder indicating fair condition. In the southern paddocks the pastures have been degraded with considerable loss of desirable low shrubs but buffel grass is now well established.

Near the south-eastern coast there is some minor wind erosion with disturbed sandy surfaces. However, these areas are becoming stabilized by buffel grass. In the south-west there are some old, small coastal blowouts which are now stabilized by buffel grass and coastal spinifex. They are not likely to become a problem except under extreme conditions of overgrazing or drought.

2. Birrida land system (11%)

Saltbush (SALT) and Samphire (SAMP) pastures of this system were all in good or very good condition. The former pastures are very productive

with many desirable shrubs such as bladder saltbush, felty bluebush, cotton bush and rhagodias.

3. Littoral land system (7%)

This system was not traversed. However, it was seen at a number of points and at these was in good condition.

4. The recommended sheep unit capacity for present condition is 1,230.

5. The capability sheep unit capacity if all country was in good range condition is estimated at 1,350.

Individual station report

Faure station - 5,816 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	48	CDSH	24	8	6	—	618	760
		TUGR	10	—	—	—	500	500
Birrida	6	SAMP	3	—	—	—	12	12
		SALT	3	—	—	—	60	60
Littoral	4	CDSH	2	—	—	—	40	40
		No veg	2	—	—	—	—	—
		SAMP	—	—	—	—	—	—
Totals	58		44	8	6	—	1,230	1,372

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 1,250

Capability 1,350

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 1,753

highest (1974) 2,734

lowest (1981) 798

Gilroyd station - Carnarvon & Shark Bay Shires

Area 8,094 km²

Location

Gilroyd station is located in the south-east of the Wooramel 1:250,000 map sheet. The homestead is about 230 km by road south-east from Carnarvon via Pimbee, Wahroonga and Edaggee stations. The station has common boundaries with Towrana, Callytharra Springs, Byro, Yalardy, Woodleigh and Meedo stations.

Description

More than 80% of the station consists of gently undulating red sandplain of moderate pastoral value.

This is the Sandplain land system which supports tall shrublands of wanyu or open woodlands of sand dune gidgee.

The Yalbalgo system (17.2% of the station area) occurs in north-eastern and central eastern parts of the station. It consists of well-defined linear sand dunes with relief up to 20 m and sandy swales and supports virtually the same vegetation as the Sandplain system.

Three other land systems, Wooramel, Target and Channel occur on the station but collectively occupy only about 1.2% of the total station area. A large bare claypan about 500 ha in area (0.6%) occurs in the south on the boundary with Yalardy station.

All land systems on the station are summarized in table 1.

Condition statements for land systems and for the whole station (total overall land systems) are shown in table 2.

Table 1. Land systems on Gilroyd station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplain with tall shrublands of wanyu and woodlands of sand dune gidgee	81.0
	Yalbalgo - sandplain with linear and reticulate dunes; tall shrublands of wanyu and woodlands of sand dune gidgee	17.2
	Wooramel - sandy plains and stony plains with hardpan at shallow depth; tall shrublands of wanyu and mulga	1.0
	Channel - major channels with highly dissected marginal slopes and plains, very scattered low shrublands and fringing woodlands	0.1
		99.3
High (5-9 ha/s.u.)	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall mixed shrublands of acacia, currant bush and others	0.1
Very high (< 5 ha/s.u.)	—	—
	Bare claypan	0.6
		100.0

Table 2. Condition statements derived from traverse records (164 recordings on 3 land systems)

Gilroyd

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Sandplain	114	100	—	—	—	12	34	48	6	—	46	48	6
Target	1	100	—	—	—	—	100	—	—	—	100	—	—
Yalbalgo	49	98	2	—	—	—	31	47	22	—	31	47	22
Total over all land systems	164	99	1	—	—	9	34	46	11	—	42	47	11

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 2 land systems.

Range condition and recommendations

1. Sandplain land system (81%)

This system supports the Acacia Sandplain (ACSA) pasture type. Typically, this pasture has a tree layer of sand dune gidgee or, less frequently, a tall shrub layer of wanyu. The lower layers consist of very scattered low shrubs including a few desirable species such as Wilcox bush and cotton bush. In season there is a prominent ground layer dominated by wanderrie grass or forbs. Pasture condition as seen during survey was mostly fair or good. There is no erosion present and over all range condition is fair or good.

Because of the general lack of palatable shrubs and the rather ephemeral nature of the wanderrie grass pastures the system has limited drought value. Opportunistic use on a flexible basis can be made on the grass pastures in good seasons.

Fire may be a useful management tool on this land system, but its use has not been researched. Evidence seen on this system during survey suggests that the effects of fire are very long term. Where the overstorey of tall wanyu shrubs has been killed by fire the

low shrub layer and the ground layer is remarkably increased both in diversity of species and in density. This fire induced subclimax appears to be considerably more productive for livestock production than is the mature wanyu or sand dune gidgee situation.

2. Yalbalgo land system (17.2%)

This system supports the same Acacia Sandplain (ACSA) pasture as found on the Sandplain system. Pasture condition is mostly fair although it varies from good to poor depending largely on distance from water.

3. The station has been developed relatively recently having been taken up in the mid 1950s. Some of the paddocks are very large, and eleven watering points have been established. However, the station is still not adequately watered with considerable areas in the north-west, south-west, south and south-east being further than 5 km from water. Pastures distant from water are in good or very good condition and are currently under-used. Conversely, over-use has occurred around some existing waters and pasture condition has declined.

4. The recommended sheep unit capacity for present condition is 5,600.

5. The capability sheep unit capacity if all country was in good range condition is estimated at 6,700.

Individual station report

Gilroyd station - 80,937 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	653	ACSA	300	314	39	—	4,619	5,442
Yalbalgo	140	ACSA	43	66	31	—	895	1,167
Wooramel	9	ACSA	3	2	—	—	38	42
		ASGF	2	2	—	—	17	20
Target	1	CBMS	—	1	—	—	13	20
		ACSA	—	—	—	—	—	—
		ACCR	—	—	—	—	—	—
Channel	1	SSGF	—	1	—	—	3	4
		ACCR	—	—	—	—	—	—
large clay pans	5	No veg	5	—	—	—	—	—
Totals	809		353	386	70	—	5,585	6,695

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 5,600

Capability 6,700

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 7,527

highest (1974) 11,000

lowest (1981) 2,850

Gnaraloo station - Carnarvon Shire

Area 913 km²

Location

Gnaraloo station is located on the Minilya 1:250,000 map sheet. The homestead is about 155 km north by road from Carnarvon via Quobba station. Boundaries are shared with Warroora, Minilya and Quobba stations and with Lake McLeod in the east. The western boundary is the coastline of the Indian Ocean.

Description

Nearly two-thirds of the station consists of undulating sandy plains and linear dunes of the Mallee, Cardabia and Coast land systems. Most of the remainder of the station consists of elevated limestone plains or plains with thin sand cover over limestone of the Trealla land system.

The Mallee system (47.5% of the station area) is the largest and occurs throughout the centre of the station. It supports a moderately close tall shrubland or low woodland with numerous *Acacia* species and patchy stands of eucalypts in both mallee and tree form. The ground layer is a mixture of soft and hard spinifex. Pastoral value is moderate or high depending on the proportion of soft and hard spinifex and the time since last burning.

The Cardabia system (11.5%) is very similar in landform to the Mallee system. Near the coast it supports a hummock grassland of hard and soft

spinifex with patchy shrubs. Further inland the shrubs become taller and more numerous and, except for the lack of eucalypts, the vegetation is similar to the Mallee system. Pastoral value is generally moderate.

The Coast system (4.9%) consists of large parabolic coastal dunes and sandy swales with minor limestone plains, low sea cliffs and rocky wave cut platforms. The system supports patchy tall shrublands with coastal jam, curara and silver bark wattle and hummock grasslands of soft and hard spinifex.

The limestone based Trealla land system (29.2%) occurs on the north of the station. It supports a moderately close tall shrubland dominated by silver bark wattle, but with various other *Acacia* species such as wanyu, curara and snakewood. Numerous useful low shrubs occur in the understorey and pastoral value is high.

Two other minor land systems, Warroora (4%) and McLeod (2.9%) occur in the south-east adjacent to Lake McLeod. Although they are small in area these saline plain systems support very useful shrublands of saltbush and bluebush and pastoral value is high.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Gnaraloo station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	McLeod - samphire flats and sandy plains with bare marginal mudflats; low shrublands of samphire and saltbush	2.9
	Mallee - undulating sandy plains with limestone at shallow depth, linear dunes and minor limestone outcrop plains; mallee shrublands with soft and hard spinifex	47.5
		50.4
High (5-9 ha/s.u.)	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes; tall shrublands of various acacias	29.2
	Cardabia - undulating sandy plains with linear dunes, minor limestone rises; hummock grasslands of soft and hard spinifex with scattered shrubs	11.5
	Coast - large, long-walled parabolic coastal dunes and narrow swales, unstable blowout areas, low sea cliffs, rocky wave cut platforms and beach; patchy acacia shrublands and hummock grasslands of soft and hard spinifex	4.9
	Warroora - nearly flat, saline alluvial plains, sluggish drainage tracts and prominent drainage foci, minor limestone outcrop plains and sandy banks; low shrublands of saltbush and bluebush	4.0
		49.6
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (194 recordings on 6 land systems)

Gnaraloo

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	39	81	13	3	3	18	46	31	5	—	64	28	8
Coast	15	60	13	20	7	—	33	60	—	7	33	40	27
MacLeod	10	100	—	—	—	100	—	—	—	—	100	—	—
Mallee	61	85	13	2	—	23	47	23	5	2	70	23	7
Trealla	46	100	—	—	—	30	38	28	4	—	68	28	4
Warroora	23	100	—	—	—	83	17	—	—	—	100	—	—
Total over all land systems	194	88	8	3	1	33	37	25	4	1	70	23	7

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 4 land systems.

Range condition and recommendations

1. Mallee land system (47.5%)

The system supports mixed Hard Spinifex and Soft Spinifex pastures (HASP, SOSP) with variable inclusions of useful low shrubs. Pasture condition is mostly good or very good with some areas in fair condition. There is localized minor wind erosion on a few dunes and dune crests, but this is not a serious problem.

The value of the pastures for grazing depends largely on burning history and the length of time elapsed since the last fire. Fire is a natural feature of the environment and occasional controlled burning is an accepted management tool to maintain pastures in a useful condition for grazing. Pasture composition is considerably altered for a few years after burning with rapid growing species such as native poplar and fire bush becoming temporarily dominant. Numerous low shrubs, herbs and grasses, some of which are valuable to stock, are also promoted for a few years following fire.

2. Trealla land system (29.2%)

This system supports valuable Acacia Mixed Shrub pastures (ACMS) with numerous desirable shrubs such as Wilcox bush, warty leaf cremophila, felty bluebush and currant bush. Pasture condition varies from fair to very good. There is no erosion. Considerable parts of the system are further than 5 km from stock water and are not fully used for grazing.

3. Cardabia land system (11.5%)

Pastures on this system are hummock grasslands of Soft Spinifex and Hard Spinifex (SOSP, HASP) with numerous low shrubs. Pasture condition is predominantly good with smaller proportions in very good and fair condition. There are a few areas near the coast showing wind erosion in the form of soil hummocking and stripping to expose the underlying limestone.

The system is generally stable under grazing except for occasional dunes and dune crests which may become unstable due to the effects of fire or excessive

grazing pressure. Periodic controlled burning is desirable to maintain pastures in an attractive condition for stock. Some sand drift can occur after fire but the system revegetates rapidly after rain and stabilizes.

4. Coast land system (4.9%)

This system supports Coastal Dune Shrub pastures (CDSH) and Soft Spinifex pastures (SOSP). Pasture condition is variable but generally somewhat degraded. There has been a marked loss of desirable shrubs and a suggestion of an increase in hard spinifex in some areas especially within a few kilometres of watering points.

The system is highly susceptible to wind erosion once vegetation is depleted and there are patches of severe wind erosion in the form of sand hummocking and stripping to the underlying limestone pavement in Monument paddock. There are active dune blowouts, with a total area of about 12 km², near Monument mill and 17 Mile mill.

The large degraded section of this system in the vicinity of Monument mill should not be used for grazing. About 10 km of fencing would be required to exclude the area from use.

5. Warroora land system (4%)

The Saltbush and Bluebush pastures (SALT, BLUE) on this system are all in very good or good condition and there is no erosion. Much of the system has only recently been brought into full use by the provision of additional watering points.

6. McLeod land system (2.9%)

Samphire and Saltbush pastures (SAMP, SALT) on this system are in very good condition.

7. About 20% of the station, notably in the central east and north-east, cannot be fully used for grazing because of the distance (5km or more) from permanent stock water supplies.

8. The recommended sheep unit capacity for present condition assuming the whole station was fully watered (which is not the case, see 7) is 10,350.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 12,550.

Individual station report

Gnaraloo station - 91,328 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Mallee	434	HASP	182	60	18	—	1,155	1,300
		SOSP	122	40	12	—	2,415	2,900
Trealla	267	ACMS	170	79	5	—	4,221	5,080
		BLUE	11	2	—	—	245	260
Cardabia	105	SOSP	54	24	6	—	1,124	1,400
		HASP	13	6	2	—	90	105
Coast	45	CDSH	6	7	4	6	141	440
		SOSP	5	7	4	6	174	288
Warroora	36	BLUE	16	—	—	—	320	320
		SALT	15	—	—	—	300	300
McLeod	26	SAMP	5	—	—	—	20	20
		SAMP	13	—	—	—	52	52
		SALT	5	—	—	—	100	100
		No veg	8	—	—	—	—	—
Totals	913		625	225	51	12	10,357	12,565

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 10,350

Capability sheep unit capacity 12,550

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 7,110

highest (1969) 9,663

lowest (1981) 4,248

Hamelin station - Shark Bay Shire

Area 2,028 km²

Location

Hamelin station is located on the Yaringa 1:250,000 map sheet. The homestead is about 27 km west of North-West Coastal Highway on the access road from the Highway to Denham. The station has common boundaries with Carbla, Woodleigh, Talisker, Meadow, Coburn and Nanga stations and a coastline to the Hamelin Pool embayment.

Description

Nine land systems occur on the station and all are accessible to livestock. Over 70% of the station is assessed as being of high pastoral value (carrying capacity 5-9 ha/s.u.) with the remainder being of moderate or very low value.

The largest land system on the station is the Snakewood system which occupies about 34% of the total station area. It occurs scattered throughout the station with the largest single expanse in north-central parts. It supports a characteristic tall shrubland dominated by snakewood. Pastoral value is high.

Extensive limestone outcrop plains of the Toolonga system (24.6%) occur in the central west of the station with smaller areas in the north-west close to the coastline. The system supports a moderately close tall shrubland dominated by Hamelin wattle and with numerous other acacias. Pastoral value is high.

The Sandplain land system (16.5%) occurs as large expanses in the far north-east and east of the station and also as numerous smaller patches overlying Toolonga limestone in the centre of the station. It consists of nearly flat or gently undulating red

sandplain and supports a moderately close tall shrubland of wanyu. The Yaringa system (11%) is closely associated with the Sandplain system and consists of small patches of sandplain and limestone plains. It supports tall shrublands of wanyu on the sand and Hamelin wattle, curara and other acacias on the limestone.

The Nanga system (5.9%) is found in the far south-west of the station. It consists of undulating sandplain and occasional dunes supporting tree heaths and other South-West Botanical Province vegetation. Pastoral value is very low.

The Nerren system (5.6%) occurs in the central west and the south-eastern corner of the station. It is very similar in landform to the Sandplain system being nearly flat to gently undulating red sandplain. It mainly supports a moderately close tall shrubland of wanyu with a scattered tree over-storey of various eucalypts. About 25 per cent of the system, in central western parts, consists of flat plains with calcareous soils and tree steepe vegetation of Dongara mallee over hard spinifex. Pastoral value is moderate to low.

Low limestone breakaways and gently sloping outwash plains of the Foscal land system (1.9%) occur in the north-east and north-west. It supports tall shrublands of acacias and low shrublands of saltbush and bluebush. Pastoral value is high.

The remaining two very small systems Coquina and McLeod support halophytic shrublands close to the shore line of Hamelin Pool. They are of little significance for grazing.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Hamelin station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Nanga - undulating sandplains and occasional dunes, tree heath vegetation	5.9
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplain with tall shrublands of wanyu	16.5
	Nerren - nearly flat to gently undulating red sandplain; tall shrublands of wanyu with patchy eucalypt trees and hard spinifex	5.6
	Coquina - low shelly foredunes, shell beaches and supra-tidal flats; scattered tall acacia shrublands on dunes	0.4
	McLeod - samphire flats and sandy plains with bare marginal mudflats; samphire and saltbush low shrublands	0.2
		22.7
High (5-9 ha/s.u.)	Snakewood - nearly flat plains with duplex soils; tall shrublands of snakewood	33.9
	Toolonga - limestone outcrop plains with tall shrublands of Hamelin wattle and other acacias	24.6
	Yaringa - sandy plains with sandy banks, occasional low dunes and limestone outcrop plains, tall shrublands of wanyu	11.0
	Foscal - gently sloping outwash plains, low limestone mesas and plateaux edges and footslopes; low shrublands of saltbush and bluebush	1.9
		71.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (290 recordings on 9 land systems)

Hamelin

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Coquina	7	86	14	—	—	—	71	29	—	—	71	29	—
Foscal	8	100	—	—	—	—	38	50	13	—	38	49	13
MacLeod	1	100	—	—	—	100	—	—	—	—	100	—	—
Nanga	5	100	—	—	—	100	—	—	—	—	100	—	—
Nerren	29	100	—	—	—	17	24	45	14	—	41	45	14
Sandplain	52	100	—	—	—	17	29	23	23	8	46	23	31
Snakewood	49	94	6	—	—	4	18	16	33	6	10	48	42
Toolonga	111	99	1	—	—	1	9	48	36	6	10	48	42
Yaringa	28	100	—	—	—	11	7	53	29	—	18	53	29
Total over all land systems	290	98	2	—	—	9	18	36	28	9	27	37	36

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 17 sites on 4 land systems.

Range condition and recommendations

1. Snakewood land system (33.9% of total station area)

This system supports highly productive saltbush pastures (SALT) beneath an overstorey of snakewood with smaller areas of acacia mixed shrub pastures (ACMS) which also support numerous useful low shrubs when in good condition.

Pasture condition is variable, but substantial areas are seriously degraded with considerable loss of desirable shrubs. Some 62% of the traverse recordings indicated poor or very poor pasture conditions. The degraded pastures are still productive in terms of annual herbs and forbs in season, but their reserves of palatable shrubs for dry periods are well below potential. Degraded areas of the system occur in central northern paddocks such as Five Mile, Milkbrush and Coolglya. The system still has the ability to respond well if fully protected from over grazing; a spelling programme needs to be implemented in one or two of the most degraded paddocks.

Some saltbush pastures on the Snakewood system are in excellent condition, for example those in North and South Hanlins paddocks to the east of North-West Coastal Highway. This area and others in good condition appear to have had little use due to problems associated with a lack of good quality stock water supplies or long distances from supplies.

2. Toolonga land system (24.6%)

The most important pasture type on this system is Acacia Mixed Shrub (ACMS). When in good condition the pastures have numerous desirable low shrubs including ragged leaf scaevola, tall saltbush, tall cassia, warty leaf eremophila and ruby saltbush beneath tall shrubs of Hamelin wattle, silver bark wattle and other acacias.

Pastures are nearly all degraded to some extent with the majority being in fair range condition. Extensive areas show serious depletion of desirable shrubs to poor or very poor condition, but some areas are in good condition. Degraded areas are still productive in that they often support the intermediate value cotton bush and numerous forbs and annual grasses in season. However, their reserves of palatable shrubs for dry seasons are much reduced. Degraded parts have the capacity to recover if spelled for a number of consecutive growing seasons and conservatively stocked at other times.

3. Sandplain land system (16.5%)

Condition of the Acacia Sandplain (ACSA) pastures of this system are variable. About 46% of traverse observations indicated good or very good condition, 22% indicated fair and 32% indicated poor or very poor condition. There is no erosion.

Areas in good or very good condition occur in the far north-east and south-west of the station. They appear to receive little grazing because of the lack of water supplies. There are also some areas of the Snakewood system in good condition in the same general locality. Consideration needs to be given to developing water supplies to these areas so that stock can be more equitably distributed over the station.

4. Yaringa land system (11%)

The system supports Acacia Sandplain pastures (ACSA) on sandplains and Acacia Mixed Shrub pastures (ACMS) on limestone plains. Pastures are predominantly in fair range condition although condition varies from very good to poor. There is no erosion and the system is stable under grazing. No special grazing management, other than occasional spelling to maintain desirable low shrubs in the stand, is required.

5. Nanga land system (5.9%)

The system supports Heath (HEAT) pastures but is little used due to its lack of water and poor potential for grazing. Pastures are in very good condition but it is doubtful if they can be economically developed for grazing.

6. Nerren land system (5.6%)

Pastures on this sandplain system are Acacia and Eucalypt Short Grass Forb (AEGF) which are similar to the Acacia Sandplain (ACSA) types. There are also some Hard Spinifex (HASP) pastures as the ground storey to eucalypt woodland. Pasture condition is mostly fair, good or very good and there is no erosion.

7. Foscal land system (1.9%)

This system supports productive Saltbush and Bluebush (SALT, BLUE) pastures and Acacia Mixed Shrub (ACMS) pastures. Pasture condition is mostly fair or good and there is no erosion. High dietary salt intakes by sheep can occur on this system as a result of a combination of saline feed and brackish stock

water supplies. This will restrict the use that can be made of the pastures. It is important to ensure that stock water supplies are of good quality.

8. The station is well developed in terms of paddocks but parts, as previously mentioned, are inadequately watered. Also, some existing water supplies are rather saline which will restrict the grazing radii of stock watering on them especially if pastures commanded by the particular water are saline.

9. The recommended sheep unit capacity for present condition assuming the station is fully watered (which is not the case, see 8) is 16,650.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 29,900.

Individual station report

Hamelin station - 202,821 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Snakewood	686	SALT	93	61	395	—	5,091	10,980
		ACMS	18	34	51	—	1,019	2,060
		ACSA	27	—	7	—	253	283
Toolonga	500	ACMS	54	275	121	—	4,586	9,000
		ACSA	—	13	12	—	129	208
		ASGF	—	5	20	—	67	125
Sandplain	335	ACSA	154	74	107	—	2,174	2,792
		ACMS	25	95	59	—	1,038	1,492
Yaringa	224	ACMS	15	23	7	—	573	900
		HEAT	108	—	—	—	360	360
Nanga	120	HASP	12	—	—	—	60	60
		AEGF	52	25	36	—	654	807
Nerren	113	SALT	8	10	3	—	304	420
		BLUE	5	6	2	—	188	260
Foscal	38	ACMS	2	2	—	—	60	80
		CDSH	3	1	—	—	45	50
Coquina	8	No veg	4	—	—	—	—	—
		SAMP	2	—	—	—	8	8
McLeod	4	No veg	1	—	—	—	—	—
		SALT	1	—	—	—	20	20
Totals	2,028		584	624	820	—	16,629	29,905

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 16,650

Capability sheep unit capacity 29,900

Declared stock numbers (sheep units or equivalent)

1968-84 (no data for 1973-1974):

average (mean) 12,462

highest (1976) 18,100

lowest (1981) 6,092

Hill Springs station - Carnarvon Shire

Area 1,232 km²

Location

Hill Springs station is located on the Kennedy Range and Winning Pool 1:250,000 map sheets. The homestead is about 90 km north-east of the North-West Coastal Highway via Mardathuna station and about 145 km north-east by road from Carnarvon. The station shares boundaries with Middalya, Mardathuna, Cooralya, Manberry and Wandagee stations.

Description

The largest land system on the station is Yalbalgo which consists of sandplain and linear dunes supporting moderately close tall shrublands of acacias, mainly wanyu, silver bark wattle and spreading gidgee. It occupies most of the southern half of the station and pastoral value is moderate.

The Windalia land system (15% of the total station area) and the O'Brien system (16%) occur in the north of the station. The Windalia system lies above O'Brien and consists of gently sloping stony plains and narrow upper interfluvies on radiolarite. It supports very scattered to moderately close tall shrublands dominated by spreading gidgee. Pastoral value is moderate. The O'Brien system consists of broad alluvial plains and slightly more elevated upper plains and interfluvies. It supports tall shrublands of spreading gidgee and snakewood which

are frequently arranged in a groved pattern with dense vegetation in the groves and much sparser vegetation in the broader intergrove areas. Pastoral value is moderate.

The Mary system (11.9%) occurs in the centre of the station. It consists of gently sloping plains with calcrete at shallow depth and low stony calcrete rises. It supports a tall shrubland of spreading gidgee and silver bark wattle frequently with relatively dense under-shrubs dominated by cassias. Pastoral value is high.

Four other small land systems namely Gearle, Cahill, Lyons and Jimba also occur on the station. The Gearle system (4.9%) consists of very gently sloping alluvial plains supporting low shrublands of bluebush. When in good condition the pastoral value of the system is high. The Cahill system (2.4%) consists of sandy outwash plains and channelled flow zones. It supports tall shrublands with scattered eucalypts. In some parts buffel grass is well established in the ground layer. Pastoral value is high.

The Lyons and Jimba systems (0.2% and < 0.1% respectively) are of negligible significance to the station.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Hill Springs station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes, tall shrublands of wanyu and spreading gidgee	49.5
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often groved	16.0
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of spreading gidgee	15.0
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; currant bush mixed shrublands and tall acacia shrublands	0.2
	Jimba - gently sloping alluvial plains with diffuse drainage, minor pebbly plains and low ridges, scattered tall and low shrublands, acacias and some chenopods	0.1
		80.8
High (5-9 ha/s.u.)	Mary - gently sloping plains with calcrete at shallow depth and low calcrete rises; tall shrublands of acacia and cassia	11.9
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains; low shrublands of saltbush and bluebush	4.9
	Cahill - sandy outwash plains and channelled flow zones; tall acacia shrubland or open woodlands, some buffel grass	2.4
		19.2
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (171 recordings on 6 land systems)

Hill Springs

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cahill	9	100	—	—	—	11	45	33	11	—	56	33	11
Gearle	32	97	—	—	3	—	—	25	44	31	—	25	75
Mary	22	100	—	—	—	5	41	54	—	—	45	55	—
O'Brien	43	95	5	—	—	2	30	40	26	2	33	39	28
Windalia	3	100	—	—	—	—	—	100	—	—	—	100	—
Yalbalgo	62	98	2	—	—	35	26	29	10	—	61	29	10
Total over all land systems	171	98	2	—	1	15	25	35	19	6	39	36	25

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 10 sites on 6 land systems.

Range condition and recommendations

1. Yalbalgo land system (49.5%)

This system supports the Acacia Sandplain pasture type (ACSA) with scattered desirable low shrubs such as Wilcox bush, cotton bush and flannel bush below the tall shrub layer. The ground storey supports wandarric grass and various herbs in season and, in some areas, soft and hard spinifex. Pasture condition as seen during survey was about evenly distributed between fair, good and very good with only minor areas assessed as poor. There was no erosion.

Because of the relatively sparse occurrence of palatable shrubs and the rather short lived nature of the wandarric grasses the system has only limited drought value.

Fire may be a useful management tool on this system, but its use has not been researched. Evidence seen during the survey suggests that the effects of fire are extremely long term. Where the over-storey of tall shrubs has been killed by fire the low shrub layer and the ground layer is increased in diversity of species and in density. This fire induced sub-climax vegetation appears to be considerably more useful for livestock production than the mature shrub stand.

2. O'Brien land system (16%)

Pastures on this system are predominantly Acacia Short Grass Forb (ASGF) with smaller inclusions of Stony Chenopod (STCH) and Acacia Creek-line (ACCR) types. The latter type occurs as dense stands of vegetation in groves and along drainage floors. Pasture condition is mostly fair, although there are substantial parts in poor and good condition. There is no erosion on the system.

The system supports a wide range of desirable low shrubs and grazing management needs to be aimed at ensuring the maintenance of these in the stand. Desirable species include Wilcox bush, flat leaf bluebush, and ruellia on the groved plains and Gascoyne mulla mulla, ruby saltbush and sago bush on more saline parts.

3. Windalia land system (15%)

This system supports the same pastures as the O'Brien system but with rather less of the more productive inclusions of Stony Chenopod (STCH) and Acacia Creek-line types.

The system was inadequately traversed but, because of its distance from water and on the evidence seen at one range evaluation site, is expected to be in good range condition. There is one localized area of about 0.5km² of severe pasture degradation in the vicinity of End tank. This is part of a much larger area of severe degradation occurring on the adjacent Gearle land system.

4. Mary land system (11.9%)

This system supports productive Acacia Mixed Shrub (ACMS) pastures. Pasture condition is about evenly distributed between fair and good. There is no erosion and the system is relatively stable under grazing.

5. Gearle land system (4.9%)

This system supports bluebush (BLUE) pastures which are mostly seriously degraded to poor or very poor condition. The pastures are attractive to livestock, are well-watered and have been over grazed in the past.

About 11 km² of the system is severely degraded with gross loss of desirable shrubs accompanied in some instances by minor to severe water erosion. These degraded areas are centred on Whitby dam, McDonald dam and End tank. Watkins paddock which contains the largest areas of severe degradation should be closed to grazing until pastures recover.

6. Cahill land system (2.4%)

Pasture types on this system are Acacia Sandplain (ACSA) and some buffel grass (Tussock Grass TUGR). Pasture condition is mostly fair or good and there is no erosion.

7. The northern most parts of the station (Windalia land system) are very little used for grazing as they are in excess of 5 km from permanent stock water. Additional water points need to be developed to bring this country into use and to allow destocking of severely degraded sections elsewhere (c.g. Watkins paddock, see 5).

8. The recommended sheep unit capacity for present condition is 10,600.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 13,900.

Individual station report
Hill Springs station - 123,191 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	610	ACSA	335	159	55	—	4,005	4,575
		SOSP	37	18	6	—	791	1,017
O'Brien	198	ASGF	29	42	28	—	355	495
		STCH	8	27	15	—	252	417
		ACCR	41	—	8	—	860	980
Windalia	185	ASGF	118	15	14.5	0.5	676	740
		ACCR	15	4	—	—	340	380
		STCH	14	4	—	—	137	150
Mary	146	ACMS	63	76	—	—	2,020	2,780
		BLUE	3	4	—	—	110	140
Gearle	60	BLUE	—	14	29	11	356	1,080
		TUGR	—	2	4	—	56	300
Cahill	29	ACSA	8	5	2	—	106	125
		TUGR	8	5	1	—	504	700
Lyons	3	ACSA	1	1	—	—	15	17
		CBMS	1	—	—	—	20	20
		ACCR	—	—	—	—	—	—
Jimba	1	STCH	1	—	—	—	8	8
Totals	1,232		682	376	162.5	11.5	10,611	13,924

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 10,600

Capability sheep unit capacity 13,900

Declared stock numbers (sheep units or equivalent)
1971-1984 (no data for 1968-1970):

average (mean) 12,542

highest (1973) 18,000

lowest (1981) 9,000

Lyndon station - Carnarvon Shire

Area 2,482 km²

Location

Lyndon station is located on the Winning Pool and Edmund 1:250,000 map sheets. The homestead is about 148 km east of the Minilya River bridge on the North-West Coastal Highway via Middalya and Williambury stations. Boundaries are shared with Towera, Maroonah, Williambury, Middalya and Mia stations.

Description

Landforms on the station are many and varied with 21 land systems being represented. The two largest systems are Durlacher (21.5% of total station area) and Yinnietharra (16.3%). The Durlacher system which is scattered throughout the station, consists of gently sloping plains and low stony rises with a characteristic mantle of white quartz pebbles and rocks. It supports scattered tall and low shrubs and pastoral value is moderate.

The Yinnietharra system is similar to Durlacher, but is more sandy with gently sloping sandy plains, broad drainage tracts, minor stony plains and low granite hills. It supports tall shrublands usually dominated by mulga and pastoral value is moderate.

In the eastern half of the station there are a number of rugged hilly land systems based on granite, gneiss and schist. These are the Agamemnon and James systems (13.4 and 1.3%) with associated stony

uplands and lower plains of the Phillips system (10.1%). They support sparse tall shrublands of mulga and other acacias and pastoral value is low or moderate.

In the far east rugged mountain ridges of the Augustus system (5.3%) dominate the landscape. The system is based on quartzite, sandstone and dolomite and is too rugged to be of much pastoral use.

In the western half of the station a number of sandy low relief systems occur. These are the sandy plains of the Uaroo system (6.5%), sandplain and dunes of the Giralalia system (5.8%) and sandy alluvial plains and broad drainage zones of the Wash system (8.7%) associated with the Lyndon River. The former two systems support hard and soft spinifex hummock grasses with variable tall shrubs. The Wash system is more productive with tall shrublands of spreading gidgee and other acacias with many useful low shrubs and perennial grasses.

Numerous other small land systems occur on the station. Of these the River system (1.9%) along the Lyndon River, the Gneudna system (1.3%) in the south and south-west and the Winning system (0.9%) in the west of the station are the most valuable for pastoral use.

All land systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Lyndon station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Augustus - rugged mountains, hills and ridges of sedimentary rocks; tall shrublands of mulga and other acacias	5.2
Low (20-30 ha/s.u.)	Agamemnon - rough hills and ridges of granite and gneiss; scattered tall shrublands	13.4
	Collier - low hills of sandstone and quartzite and stony undulating uplands; tall shrublands of mulga	3.1
	James - low granite hills and ridges, undulating stony plains and lower plains; scattered tall acacia shrublands	1.3
	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall acacia shrublands	1.0
	Two Hills - hills and stony footslopes of sedimentary rocks; scattered tall acacia shrublands	0.5
	Glenburgh - rugged granite hills, stony uplands and lower plains; scattered tall acacia shrublands	0.2
		19.5

Table 1 continued...

Pastoral value	Land systems	Area %
Moderate (10-19 ha/s.u.)	Durlacher - gently sloping stony plains, with broad drainage tracts, low stony rises and occasional ridges; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	21.5
	Yinnietharra - gently sloping sandy plains and broad drainage tracts, minor stony plains and low granite hills; tall acacia shrublands	16.3
	Phillips - low undulating stony uplands and low hills of crystalline rocks; scattered tall acacia shrublands	10.1
	Uaroo - nearly flat sandy plains and minor pebbly plains; spinifex hummock grasslands with scattered shrubs	6.5
	Giralia - sandy plains with large linear dunes; spinifex hummock grasslands and scattered shrubs	5.8
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall acacia shrublands	2.1
	Mantle - gently undulating stony plains with sluggish drainage tracts, stony rises and low summits; scattered tall and low shrublands acacias and some chenopods	0.2
	Jimba - gently sloping alluvial plains with diffuse drainage, minor pebbly plains and low ridges; scattered tall and low shrublands acacias and some chenopods	< 0.1
	Divide - gently undulating sandplain with occasional dunes; spinifex hummock grasslands with scattered shrubs	< 0.1
	Duffy - gently undulating sandy and stony plains, minor stony rises and low granite hills; spinifex hummock grasslands and scattered shrubs	< 0.1
		62.5
High (5-9 ha/s.u.)	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; tall acacia shrublands and grassy woodlands	8.7
	River - narrow sandy flood plains and major channels; tall shrublands and grassy woodlands	1.9
	Gneudna - almost flat plains with calcareous soils and parallel bands of siltstone and limestone outcrop; tall acacia shrublands	1.3
	Winning - low rises, extensive lower plains and broad drainage tracts; scattered tall and low shrublands	0.9
		12.8
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (300 recordings on 12 land systems)

Lyndon

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Agamemnon	16	100	—	—	—	13	74	13	—	—	87	13	—
Collier	4	100	—	—	—	—	75	25	—	—	75	25	—
Durlacher	92	90	10	—	—	—	15	52	28	5	15	51	34
Giralia	5	100	—	—	—	60	40	—	—	—	100	—	—
Gneudna	2	100	—	—	—	—	50	50	—	—	50	50	—
James	2	100	—	—	—	—	50	50	—	—	50	50	—
Phillips	35	94	6	—	—	6	17	71	6	—	23	71	6
River	11	100	—	—	—	18	27	46	9	—	46	45	9
Thomas	1	100	—	—	—	—	—	100	—	—	—	100	—
Uaroo	19	100	—	—	—	37	58	5	—	—	95	5	—
Wash	38	78	11	11	—	5	26	46	18	5	32	44	24
Yinnietharra	75	74	23	3	—	1	5	44	39	11	7	44	49
Total over all land systems	300	87	11	2	—	6	22	45	22	5	29	44	27

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 23 sites on 5 land systems.

Range condition and recommendations

1. Durlacher land system (21.5%)

The broad stony plains of this system support Stony Chenopod (STCH) and Acacia Short Grass Forb (ASGF) pastures. When in good condition these pastures have a good range of desirable low shrubs such as tall cassia, warty leaf eremophila and cotton bush on the non saline sites and silver saltbush, tall saltbush, ruby saltbush and sago bush on more saline sites.

The traverse data show that, in general, the pastures are degraded with the bulk being in fair or poor condition. Desirable species are depleted in many areas, but the system has the capacity to recover under strategic spelling. There is some minor water erosion in some parts, but this is not a significant problem.

2. Yinnietharra land system (16.3%)

The system supports Stony Chenopod (STCH) and Acacia Short Grass Forb (ASGF) pastures on the broad plains with denser Acacia Creek-line (ACCR) pastures on drainage floors and flow zones. Desirable shrub species are similar to those listed for the Durlacher system.

Pasture condition is predominantly fair, but substantial parts are degraded to poor or very poor condition. Minor and sometimes moderate water erosion in the form of shallow rilling and guttering is common on broad drainage floors and flow zones.

About 8 km² of the system shows severe degradation with almost complete loss of perennial vegetation and severe soil erosion. These areas are in Beroi paddock near Beroi dam, in North Quaille paddock and in Ram paddock. A rehabilitation programme involving complete protection from grazing with additional fencing to effect this is required and possibly some cultivation and seeding work needs to be commenced.

3. Agamemnon land system (13.4%)

This rough hilly system which supports Stony Short Grass Forb (SSGF) pastures with minor areas of Acacia Creek-line (ACCR) pastures is nearly all in good range condition. Pasture condition is mostly good and there is no erosion.

4. Phillips land system (10.1%)

The stony plains of this system support Stony Short Grass Forb (SSGF) pastures with small inclusions of better quality Stony Chenopod (STCH) pastures and Acacia Creek-line (ACCR) pastures along the water courses. Pasture condition is variable but mostly fair or good with only minor depletion of desirable shrubs. The stony nature of the system means that it is inherently resistant to erosion except for occasional minor rilling along narrow drainage floors.

5. Wash land system (8.7%)

Pastures found on this productive system are Acacia Short Grass Forb (ASGF), Acacia Creek-line (ACCR) and Tussock Grasses (TUGR). When in good condition many desirable shrubs and grasses occur especially where the system is subject to flood out from the Lyndon River. Desirables include tall saltbush, currant bush, ruby saltbush and the tussock grasses silky brown top and ribbon grass.

Pasture condition varies from very good to very poor. Taken over all about 30% of the traverse recordings indicated good or very good condition, about 50% indicated fair condition and 20% indicated poor or very poor condition.

About 6.5 km² of the system in Bumbarry paddock is severely degraded. Duplex soils have lost sandy surface horizons to form numerous scalds between residual sandy surfaces. Water erosion in the form of rills and scour lines is common and perennial vegetation is extremely sparse. In order to encourage recovery the paddock should be spelled for a number of consecutive growing seasons and grazed at conservative rates during other times of the year.

6. Uaroo and Giralia land systems (6.5 & 5.8% respectively)

These sandy systems support a mixture of Hard Spinifex and Soft Spinifex pastures (HASP, SOSP). Pasture condition is nearly all good or very good and there is no erosion. Occasional burning is a management requirement on these systems in order to maintain pastures in a useful condition for stock.

The Giralia system in the south-west of the station is little used. To bring it into production additional boundary fencing and the upgrading of water supplies such as Tarn bore would be required.

7. Condition of pastures on the other five land systems traversed on the station (Collier, Gneudna, James, River and Two Hills) are nearly all in fair to very good condition and there is no erosion. Buffel grass is well established on parts of the River system.

8. Although much of the station is well developed in terms of stock water points there are still some substantial areas that are > 5 km from permanent waters. The largest single area is in the north-west where parts of the Windalia, Billy and Giralia systems are under-used. Also, in southern parts of Beroi and Willaraddie paddocks the Durlacher and Phillips systems are distant from water supplies. Consideration needs to be given to piping water or providing other water supplies to these areas.

9. The recommended sheep unit capacity for present condition is 14,950.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 20,700.

Individual station report

Lyndon station - 248,208 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Durlacher	534	STCH	21	147	99	—	1,240	2,225
		ASGF	15	131	68	—	682	1,070
		ACCR	30	15	8	—	790	1,060
Yinnietharra	405	ASGF	—	82	100	—	523	910
		STCH	4	64	66	8	573	1,183
		ACCR	22	45	14	—	978	1,620
Agamemnon	332	SSGF	254	45	—	—	1,166	1,196
		ACCR	33	—	—	—	660	660
Phillips	250	SSGF	22	164	14	—	663	800
		STCH	—	34	4	—	183	317
		ACCR	6	6	—	—	180	240
Wash	215	ASGF	49	49	31	—	486	645
		ACCR	23	30	6	6	790	1,300
		TUGR	—	11	10	—	178	700
Uaroo	163	HASP	114	—	—	—	570	570
		SOSP	49	—	—	—	817	817
Giralia	144	HASP	86	—	—	—	430	430
		SOSP	58	—	—	—	967	967
Augustus	129	ASGF	123	—	—	—	615	615
		ACCR	6	—	—	—	120	120
Collier	76	ASGF	42	—	—	—	210	210
		SSGF	19	—	—	—	76	76
		STCH	11	4	—	—	112	125
Windalia	52	ASGF	21	21	—	—	175	210
		ACCR	4	1	—	—	90	100
		STCH	3	2	—	—	35	42
River	46	ACCR	10	10	3	—	319	460
		TUGR	7	7	2	—	498	800
		No veg	7	—	—	—	—	—
James	32	SSGF	27	—	—	—	108	108
		STCH	3	2	—	—	35	42
Gneudna	32	BLUE	—	16	—	—	200	320
		STCH	—	16	—	—	80	133
Billy	26	SSGF	16	—	—	—	64	64
		ASGF	5	5	—	—	42	50
Winning	23	BLUE	1	5	10	—	145	320
		SOSP	4	—	—	—	50	50
		STCH	—	1	2	—	12	25
Two Hills	12	SSGF	12	—	—	—	48	48
		SSGF	6	—	—	—	24	24
Glenburgh	6	STCH	1	2	—	—	18	25
		SSGF	1	—	—	—	8	8
Mantle	4	STCH	—	—	—	—	3	3
		ASGF	—	—	—	—	—	—
Jimba	0.4	ACSA	—	—	—	—	—	—
		HASP	0.3	—	—	—	2	2
Divide	0.3	ACCR	—	—	—	—	—	—
		HASP	0.2	—	—	—	1	1
Duffy	0.2	SOSP	—	—	—	—	—	—
		—	—	—	—	—	—	—
Totals	2,482		1,116	913	439	14	14,966	20,691

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 14,950

Capability sheep unit capacity 20,700

Declared stock numbers (sheep units or equivalents)

1969-1984 (no data for 1968):

average (mean) 26,496

highest (1971) 40,949

lowest (1979) 6,772

Manberry station - Carnarvon Shire

Area 854 km²

Location

Manberry station is located on the Winning Pool and Kennedy Range 1:250,000 map sheets. The homestead is about 17 km east of the North-West Coastal Highway and 124 km north of Carnarvon. The station has common boundaries with Wandagee, Hill Springs, Cooralya and Minilya stations.

Description

Six land systems occur on the station and all of these are accessible to stock. The largest system is Yalbalgo (about 70% of the total station area) which is found in northern, western and southern parts. It consists of long linear sand dunes oriented in a north-westerly direction and with up to 15 m relief and sandy inter-dunal corridors. It supports a moderately close tall shrubland dominated by wanyu and spreading gidgee with numerous low shrubs and occasionally hard spinifex in the ground layer. Pastoral value is moderate.

The O'Brien land system (22.9%) is found in the north-west of the station. It consists of nearly flat or gently sloping alluvial plains and slightly more elevated upper plains and interfluves. It supports tall

shrublands of spreading gidgee which is frequently arranged in a groved pattern with dense stands in the groves and sparser stands in the broader intergrove areas. Pastoral value is moderate.

The Mary system (3.8%) is found in the north-east and south-east. It consists of gently sloping sandy plains with calcrete at shallow depth or outcropping at the surface. It supports a tall shrubland of silver barked wattle and other acacias with a low shrub layer usually dominated by cassias. Pastoral value is high.

The Cahill land system (2.6%) consists of sandy outwash plains associated with the Hutton Creek which flows through the centre of the station. The system supports a sparse to moderately close tall shrubland of silver barked wattle and spreading gidgee with occasional coolibah trees. Buffel grass has established in some areas and pastoral value is high.

Two other minor systems, Brown and Sandal, occur on the station (collectively 1.0%) but are of little significance. All the systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Manberry station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu and spreading gidgee	69.7
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluves; tall acacia shrublands often arranged in groves	22.9
	Brown - gently undulating sandplains and occasional longitudinal dunes; tall shrublands of wanyu and silver bark wattle	0.8
		93.4
High (5-9 ha/s.u.)	Mary - gently sloping plains and low rises with calcrete at shallow depth at surface; tall shrublands of acacias and cassias	3.8
	Cahill - sandy outwash plains with channels; tall shrublands of silver bark wattle and other acacias	2.6
	Sandal - alluvial plains with numerous sandy banks and rises, duplex and sand soils; tall acacia shrublands	0.2
		6.6
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (128 recordings on 4 land systems)**Manberry**

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cahill	8	100	—	—	—	—	25	75	—	—	25	75	—
Mary	2	100	—	—	—	—	—	100	—	—	—	100	—
O'Brien	44	100	—	—	—	—	9	48	32	11	9	48	43
Yalbalgo	74	99	1	—	—	5	19	49	26	1	24	49	27
Total over all land systems	128	99	1	—	—	3	16	50	26	5	19	51	30

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 3 land systems.

There is no erosion on the system. The O'Brien land system in Manarrah paddock in the north is in poor condition, but has the ability to recover if it could be spelled for a number of consecutive growing seasons and grazed at very conservative levels during other times of the year.

Range condition and recommendations**1. Yalbalgo land system (69.7%)**

The system supports Acacia Sandplain (ACSA) pastures with scattered desirable low shrubs such as Wilcox bush, cotton bush and flat leaf bluebush below the tall shrub layer. The ground layer supports wandarrie grass and numerous herbs in season and, in some areas, soft and hard spinifex. Pasture condition is predominantly fair. However some considerable areas such as in Meeraji paddock are in poor condition with depletion of desirable low shrubs. Elsewhere in areas which have not been used for some time or which are distant from water, such as South Bore paddock, pasture condition is good or very good. There is no erosion on the system.

Because of the relatively sparse occurrence of palatable shrubs and the apparently short lived nature of wandarrie grasses here, the system only has limited durability in drought times.

Fire may be a useful management tool on this system, but its use has not been researched. Evidence seen elsewhere during the survey suggests that the effects of fire are extremely long term. Where the over-storey of tall shrubs has been killed by fire the low shrub layer and the ground layer is increased in diversity of species and in density. The fire-induced sub-climax vegetation appears to be considerably more useful for livestock production than the mature shrub stand.

2. O'Brien land system (22.9%)

Pastures are predominantly Acacia Short Grass Forb (ASGF) with smaller inclusions of Stony Chenopod (STCH) and Acacia Creek-line (ACCR) types. The latter type occurs as dense stands of vegetation in groves and along drainage floors. Nearly all of these pastures show some degree of loss of desirable shrubs. None of the traverse recordings indicated very good pasture condition and good, fair, poor and very poor condition were indicated by 9%, 48%, 32% and 11% respectively of the recordings.

3. Mary land system (3.8%)

The system was not intensively sampled but, where seen, its pastures were in fair condition and there was no erosion.

4. Cahill land system (2.6%)

This system supports Acacia Sandplain (ACSA) pastures with some areas of Tussock Grass (TUGR) pastures of introduced buffel grass. Pasture condition is fair or good and there is no erosion.

5. The small areas of the Brown and Sandal systems were not sampled, but are likely to be in fair or good condition.

6. Some areas of the station such as parts of Paddy's and South Bore paddocks and all of Colvins paddock are not used because of the lack of water supplies. At the time of survey, Jone's bore in Paddy's paddock and Colvin well in Colvin's paddock were not operational. There is a need to refurbish these water sources or develop alternate sources so that this country which is in good condition can be brought into use. This will enable the grazing pressure on other parts of the station, notably the O'Brien land system, to be reduced.

7. The estimated recommended sheep unit capacity for present condition is 5,650.

8. The estimated capability sheep unit capacity if all country was in good range condition is estimated at 8,350.

Individual station report
Manberry station - 85,408 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	595	ACSA	125	291	179	—	3,576	4,958
O'Brien	196	ASGF	3	43	52	—	288	490
		STCH	—	49	—	—	245	408
		ACCR	14	35	—	—	630	980
Mary	32	ACMS	12	15	3	—	409	600
		BLUE	—	2	—	—	25	40
		TUGR	4	7	3	—	352	700
Cahill	23	ACSA	3	4	2	—	58	75
		ACSA	4	2	—	—	46	50
Brown	7	SALT	—	1	—	—	13	20
		CBMS	—	1	—	—	13	20
Sandal	1	ACSA	—	—	—	—	—	—
		BLUE	—	—	—	—	—	—
Totals	854		165	450	239	—	5,655	8,341

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 5,650

Capability sheep unit capacity 8,350

Declared stock numbers (sheep units or equivalent)

1968-1983 (no data for 1972, 1984):

average (mean) 10,287

highest (1976) 13,550

lowest (1982) 7,211

Mardathuna station - Carnarvon Shire

Area 2,433 km²

Location

Mardathuna station is located on the Kennedy Range 1:250,000 map sheet. The homestead is about 132 km north east by road from Carnarvon via the North-West Coastal Highway and station access road. The station has common boundaries with Cooralya, Hill Springs, Middalya, Williambury, Mooka and Doorwarrah stations and with the Kennedy Range National Park.

Description

Eleven land systems are found on the station and most of these, with the exception of the rugged hill system Moogooloo, are accessible to livestock.

The largest system is Yalbalgo which occupies about 34% of the total station area and is found in south-western and south central parts. The system consists of linear sand dunes, sandy inter-dunal corridors and sandplain. The dunes are generally orientated in a north-west to south-east direction and relief is up to about 12 m. It supports a moderately close tall shrubland dominated by wanyu and spreading gidgee with numerous low shrubs and occasionally spinifex in the ground layer. Pastoral value is moderate.

Plains of the Windalia system (12.4%) occur in the north and east of the station associated with the O'Brien system (8.3%) and low flat-topped hills of the Billy system (5.6%). The Windalia system consists of gently sloping stony plains on radiolarite and narrow stony upper interfluvies with intensely dendritic drainage patterns. It supports very scattered to moderately close tall shrublands dominated by spreading gidgee. Pastoral value is moderate.

The O'Brien system lies below the Windalia system and consists of broad, alluvial plains and slightly more elevated upper plains. It supports tall shrublands of spreading gidgee and snakewood which are frequently arranged in a groved pattern with dense vegetation in the groves and much more sparse vegetation in the broader intergrove areas. Pastoral value is moderate.

The Billy system consists of low plateaux, mesas and buttes of duricrust over radiolarite, with short stony footslopes and narrow drainage floors. It supports very sparse short or tall shrublands of various acacias and pastoral value is low.

The Moogooloo system (11.8%) occurs in the north-east of the station and consists of deeply dissected plateaux, mesas and hills of sedimentary rocks with steep footslopes and narrow valleys. The hills and plateaux crests rise up to 150 m or more above the plains of other systems to the west. A few valleys and footslopes are accessible to cattle but most of the system is too rugged and inaccessible to be of any use for pastoral purposes. The Kennedy system (3.0%) of large linear sand dunes lies on top of the Moogooloo plateaux surface. It supports hummock grasslands of spinifex with numerous shrubs and, because of its isolated position and difficulty of access, is of no pastoral value to the station.

The Cahill land system (9.7%) occurs mainly in the centre of the station as broad sandy outwash plains flanking Watermelon Creek and Irybaroo Creek. It supports moderately close tall shrublands of silver bark wattle and spreading gidgee and numerous low shrubs. Pastoral value is high.

Gently sloping plains and low rises with calcrete at shallow depth or at the surface of the Mary system (8.4%) occur in the south-central part of the station. It supports a moderately close tall shrubland of silver bark wattle and other acacias with a prominent low shrub layer dominated by cassias. Pastoral value is high.

Three other systems namely Lyons (2.6%), Mantle (2.1%) and Gearle (2.1%) are found on the station. Although restricted in area they are of moderate or high pastoral value.

All systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Mardathuna station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks with steep footslopes and narrow valleys; tall shrublands of mulga and other acacias	11.8
Low (20-30 ha/s.u.)	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors, sparse mulga shrublands	5.6
	Kennedy - elevated sandy plains with large linear and reticulate dunes; hummock grasslands of hard spinifex with scattered shrubs	3.0
		8.6

Table 1 continued...

Pastoral value	Land systems	Area %
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu and spreading gidgee	34.0
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of spreading gidgee	12.4
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often arranged in groves	8.3
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall mixed shrublands of acacias and numerous low shrubs	2.6
	Mantle - gently undulating stony plains with sluggish drainage tracts, stony rises and low summits; sparse tall and low shrublands of acacias and some chenopods	2.1
		59.4
High (5-9 ha/s.u.)	Cahill - sandy outwash plains with channels; tall shrublands of silver bark wattle and other acacias	9.7
	Mary - gently sloping plains and low rises with calcrete at shallow depth or at surface; tall shrublands of acacias and cassias	8.4
	Gearle - gently sloping alluvial plains with duplex soils, minor low rises with more sloping marginal plains; low shrublands of bluebush	2.1
		20.2
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (334 recordings on 10 land systems)

Mardathuna

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Billy	7	71	29	—	—	14	—	72	14	—	14	72	14
Cahill	45	85	11	—	4	11	33	42	7	7	45	42	13
Gearle	27	51	26	19	4	—	4	7	48	41	4	7	89
Lyons	15	93	7	—	—	13	27	33	27	—	40	33	27
Moogoolo	1	100	—	—	—	—	—	100	—	—	—	100	—
Mantle	16	100	—	—	—	—	—	31	63	6	—	31	69
Mary	36	100	—	—	—	3	44	42	11	—	47	42	11
O'Brien	46	93	7	—	—	2	33	41	17	7	35	41	24
Windalia	49	88	12	—	—	2	37	43	14	4	39	43	18
Yalbalgo	92	97	2	1	—	34	41	18	5	2	74	18	8
Total over all land systems	334	89	8	2	1	13	32	32	16	7	44	33	23

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 18 sites on 8 land systems.

Range condition and recommendations

1. Yalbalgo land system (34.0%)

The system supports Acacia Sandplain pastures (ACSA) with scattered desirable low shrubs such as Wilcox bush, cotton bush and flat leaf bluebush

below the tall shrub layer. The ground layer supports wanderrie grass and numerous herbs in season and, in some areas, soft and hard spinifex. Pasture condition is mostly good or very good with minor localised areas showing loss of desirable shrubs to fair or poor condition. There is no significant erosion on the system.

Because of the relatively sparse occurrence of palatable shrubs and the rather short lived nature of wanderrie grass the system only has limited durability in times of drought.

Controlled burning may be a desirable management practice on this system, but this has not been researched. Evidence seen elsewhere during the survey suggests that the effects of fire are extremely long term. Where the over-storey of tall shrubs has been killed by fire the low shrub layer and the ground layer is increased in both diversity of species and density. The fire-induced sub-climax vegetation appears to be considerably more useful for livestock production than the mature shrub stand.

2. Windalia land system (12.4%)

This system supports Acacia Short Grass Forb pastures (ASGF) with smaller inclusions of Stony Chenopod (STCH) and Acacia Creek-line (ACCR) types. When in good condition there is a wide range of desirable low shrubs below the upper storey of spreading gidgee and other acacias. Desirables include Wilcox bush, flat leaf bluebush, *Phyllanthus* species, corky barked kallstroemia and ruby saltbush.

Pasture condition is mostly good or fair although some restricted areas have lost desirable shrubs and are in poor condition. There is some minor water erosion on some lower plains but generally the system is not susceptible to erosion.

3. Moogooloo land system (11.8%)

Little of this rugged and poorly accessible system was seen on this station. However, most of it is not suitable for grazing and condition of the vegetation is expected to be good.

4. Cahill land system (9.7%)

This system supports the Acacia Sandplain (ACSA) pasture type with some buffel grass and Soft Spinifex (SOSP) pastures in parts. Pasture condition is rather variable but the bulk of traverse recordings indicated fair or good condition. There is one localized area of about 0.5 km² of severe degradation near Donovan dam but, over all, the system is in fair or good range condition and there is no erosion.

5. Mary land system (8.4%)

Pasture type is Acacia Mixed Shrub (ACMS) which includes a good range of desirable low shrubs such as warty leaf cremophila, felty bluebush, ruby saltbush and tall saltbush beneath various cassias and acacias. Pasture condition is mostly fair or good and there is no erosion.

6. O'Brien land system (8.3%)

Pastures on this productive system are predominantly Acacia Short Grass Forb (ASGF) with smaller inclusions of Stony Chenopod (STCH) and Acacia Creek-line (ACCR) types. When in good condition there is a wide range of desirable low shrubs including Wilcox bush, flat leaf bluebush and ruellia on the groved plains and Gascoyne mulla mulla, ruby saltbush and sago bush on the more saline parts. Traverse data indicated that most pastures were in fair or good condition although some areas close to water points such as Mansfield dam are degraded to poor or very poor condition. There is occasional minor water erosion in the form of shallow rills, but generally the system shows no erosion.

7. Mantle land system (2.1%)

The system supports sparse Stony Short Grass Forb (SSGF) and Stony Chenopod pastures (STCH) most of which are degraded to poor condition. Nearly all of the system is located in West Wandinui paddock where it is associated with an area of severely degraded Gearle land system. A programme of spelling over a number of consecutive wet seasons and conservative use at other times of the year is required in the paddock in order to encourage pasture recovery.

8. Gearle land system (2.1%)

This system supports valuable Gascoyne Bluebush (BLUE) pastures which are attractive to stock and appear to have received heavy preferential use. In most cases pastures are now profoundly altered with considerable loss of Gascoyne bluebush and other desirable halophytic shrubs. Some 48% of traverse recordings indicated poor pasture condition and 41% indicated very poor condition. Active wind and water erosion in the form of rills, small gullies and surface hummocking of the duplex soils is common.

About 3 km² near Bottom dam in west Wandinui paddock is severely degraded and needs protection from grazing. A programme of rehabilitation as outlined in 7 is required and additional fencing to subdivide the paddock should be considered.

Although the Gearle system is small it is important to the station as it still supplies good quality annual feed in season. However, the general loss of durable shrubs has greatly reduced its usefulness in drought times. The system has the potential to recover if a system of strategic spelling could be implemented on the paddocks in which the system occurs, namely Soak Creek, North Cahill, South Cahill and West Wandinui. Buffel grass has already colonized in some parts and probably has the capacity to spread further.

9. The remaining land systems, Billy, Kennedy and Lyons, were not intensively sampled but are likely to be in fair or good condition.

10. The recommended sheep unit capacity for present condition is 18,600.

11. The capability sheep unit capacity if all country was in good range condition is estimated at 23,900.

Individual station report

Mardathuna station - 243,368 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	828	ACSA	490	119	53	—	5,039	5,517
		SOSP	123	30	13	—	2,352	2,767
Windalia	301	ASGF	99	101	41	—	934	1,205
		ACCR	24	6	—	—	540	600
		STCH	—	18	12	—	130	250
Moogooloo	288	ASGF	288	—	—	—	1,440	1,440
Cahill	236	ACSA	95	89	27.5	0.5	1,458	1,767
		TUGR	11	10	3	—	762	1,200
Mary	204	ACMS	91	82	21	—	2,771	3,880
		BLUE	5	4	1	—	156	200
O'Brien	203	ASGF	35	45	22	—	380	510
		STCH	17	23	11	—	293	425
		ACCR	25	13	12	—	690	1,000
Billy	136	SSGF	12	59	11	—	267	328
		ASGF	8	39	7	—	188	270
Kennedy	72	HASP	72	—	—	—	360	360
Lyons	63	ACSA	13	8	11	—	202	267
		CBMS	—	4	10	—	113	280
		ACCR	—	5	—	—	50	100
		No veg	12	—	—	—	—	—
Mantle	52	STCH	—	5	29	—	122	283
		SSGF	—	7	11	—	45	72
Gearle	50	BLUE	2	3	37	3	309	900
		TUGR	—	—	5	—	20	250
Totals	2,433		1,422	670	337.5	3.5	18,621	23,871

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 18,600

Capability sheep unit capacity 23,900

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 23,676

highest (1969) 36,250

lowest (1980) 14,500

Marron station - Carnarvon Shire

Area 8,057 km²

Location

Marron station is located on the Wooramel 1:250,000 map sheet. The homestead is about 37 km west of North-West Coastal Highway and is about 115 km by road from Carnarvon. The station has common boundaries with Ella Valla, Yalbalgo, Wahroonga and Edagee stations.

Description

The largest land system on the station is Sandal (44.9% of the station area) which predominates in central and south-western parts. It consists of alluvial plains with duplex soils and numerous low sandy rises and banks. Vegetation is a mixture of tall shrublands of various acacias and low shrublands of bluebush and Gascoyne mulla mulla. Pastoral value is high.

The remainder of the station is made up of the sand dune systems Ella (35.2%) and Yalbalgo (9.9%).

The Ella system occurs in northern and central parts and consists of short linear dunes with relief up to 15 m and narrow interdunal plains with more clayey soil and characteristic drainage foci. The vegetation on the sandy units is sand dune gidgee woodland or wanyu shrubland and elsewhere is mixed shrubland. Pastoral value is moderate.

The Yalbalgo land system occurs in the east of the station. It consists of large linear dunes and sandy swales and lacks the drainage foci unit of the Ella system. Vegetation is mainly a tall shrubland of wanyu with some trees of sand dune gidgee. Pastoral value is moderate.

Table 1 summarizes the land systems found on the station.

Condition statements for land systems and for the whole station (total over all land systems) are shown in table 2. These statements were derived from traverse records.

Table 1. Land systems on Marron station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Ella - short linear dunes and sandy banks with inter-dunal plains and drainage foci, sand dune gidgee woodlands and mixed acacia shrublands Yalbalgo - sandplain with linear and reticulate dunes, tall shrublands of wanyu and sand dune gidgee woodlands	35.2 19.9 55.1
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall mixed shrublands of acacias and numerous low shrubs	44.9
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (159 recordings on 3 land systems)

Marron

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	50	100	—	—	—	12	56	24	8	—	68	24	8
Sandal	91	100	—	—	—	3	22	42	29	4	25	42	33
Yalbalgo	18	100	—	—	—	11	61	28	—	—	72	28	—
Total over all land systems	159	100	—	—	—	7	36	35	19	3	44	35	21

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 12 sites on 3 land systems.

Range condition and recommendations

1. Sandal land system (44.9%)

There is no erosion on this system, but some pastures are degraded. In particular the Currant Bush Mixed Shrublands (CBMS) on the duplex soil plains of the system are nearly all more or less degraded. Although this pasture type is still moderately productive there has been a loss of desirable shrubs and, in some of the south-west and western paddocks, a marked increase in undesirable species such as waxy leafed eremophila and needle bush.

2. Ella land system (35.2%)

Most of this system is in good range condition. The predominant Acacia Sandplain (ACSA) pasture type is mostly in good condition and there is no

erosion. The minor Currant Bush Mixed Shrub (CBMS) pasture type is rather more variable with condition about equally distributed between good, fair and poor.

3. Yalbalgo land system (19.9%)

This system is nearly all in good range condition. Some parts of the system in the far east are probably not fully used because of the considerable distance from water.

4. The station is not particularly well watered with at least a quarter of its country being > 5 km from water. The reduced condition of paddocks in the vicinity of the homestead and to the west suggests that they have carried excessive numbers of stock in the past. Piping of water to new distribution points should be considered as a means of ensuring more equitable use of pastures over the property.

5. The recommended sheep unit capacity for present condition is 7,500.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 10,250.

Individual station report

Marron station - 80,569 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	362	CBMS	26	69	68	—	1,808	3,260
		ACSA	48	59	38	—	921	1,208
		BLUE	27	27	—	—	878	1,080
Ella	283	ACSA	153	45	—	—	1,556	1,650
		CBMS	17	17	23	—	696	1,140
		ACCR	14	14	—	—	420	560
Yalbalgo	160	ACSA	115	45	—	—	1,240	1,333
Totals	805		400	276	129	—	7,519	10,231

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 7,500

Capability sheep unit capacity 10,250

Declared stock numbers (sheep units or equivalent)
1968-1984 (no data for 1974):

average (mean) 10,580

highest (1976) 15,700

lowest (1980) 1,200

Meadow station - Shark Bay Shire

Area 832 km²

Location

Meadow station is located on the Yaringa 1:250,000 map sheet. The homestead is 5 km east of the North-West Coastal Highway and is about 240 km south by road from Carnarvon. The station has common boundaries with Woodleigh, Hamelin, Coburn and Nerren Nerren stations and vacant crown land.

Description

About 75% of the station consists of gently undulating sandplain of the Nerren, Sandplain and Nanga land systems.

The Nerren system (44.4% of the station area) occurs throughout the station except in central parts. It supports a tall shrubland dominated by wanyu with a patchy over-storey of various eucalypts. Pastoral value is moderate.

The Sandplain system (22.5%), which occurs mainly in the north-east and east, is very similar to the Nerren system, but lacks the eucalypt over-storey.

The Nanga sandplain system (7.9%) is found in the south-west of the station. It is more undulating than the Nerren and Sandplain systems with occasional steep dunes and sandy ridges. The vegetation is very different from that found on the other two systems and consists of scrubby heath and tree heath with a wide variety of species typical of sandplains south of the survey area. Pastoral value is very low.

The Tarcumba system (21.9%) occurs in the centre of the station. It consists of nearly flat plains with gradational soils overlying calcrete and supports acacia mixed shrublands. Pastoral value is high.

Three other minor land systems, giving a total of seven systems, occur on the station. All systems are briefly described in table 1.

Condition statements for land systems and for the whole station (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Meadow station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Nanga - undulating sand plain and occasional dunes with tree heath	7.9
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Nerren - nearly flat to gently undulating red sandplain; tall shrublands of wanyu with scattered trees various eucalypts	44.4
	Sandplain - nearly flat to gently undulating red sandplain; tall shrublands of wanyu	22.5
	Yaringa - sandy plains with sandy banks, low dunes and limestone outcrop plains; tall shrublands of wanyu and other acacias	1.9
		68.8
High (5-9 ha/s.u.)	Tarcumba - nearly flat plains with gradational soils overlying calcrete; tall shrublands numerous acacias	21.9
	Snakewood - nearly flat plains with duplex soils; tall shrublands of snakewood with saltbush understorey	1.3
	York - nearly flat low lying alluvial plains with weakly gilgaied clay soils; woodlands of York gum and other eucalypts also tall acacia shrublands	0.1
		23.3
Very high (< 5 ha/s.u.)		
		100.0

Table 2. Condition statements derived from traverse records (168 recordings on 6 land systems)

Meadow

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Nanga	17	100	—	—	—	65	29	6	—	—	94	6	—
Nerren	52	100	—	—	—	6	44	42	8	—	50	42	8
Sandplain	62	100	—	—	—	48	18	26	5	3	66	28	8
Snakewood	4	75	25	—	—	—	—	25	25	50	—	25	75
Tarcumba	29	100	—	—	—	—	7	62	31	—	7	62	31
Yaringa	4	100	—	—	—	—	25	50	25	—	25	50	25
Total over all land systems	168	99	1	—	—	26	25	36	11	2	51	36	13

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 11 sites on 6 land systems.

Range condition and recommendations

1. Nerren land system (44.4%)

This system with Acacia and Eucalyptus Short Grass Forb (AEGF) pastures is nearly all in fair or good range condition. When in good condition a small range of desirable shrubs such as ruby saltbush, cotton bush and flat leaved bluebush occur clumped beneath the eucalypt trees and larger wattles. These species confer limited drought durability to the pastures while numerous annual forbs and grasses provide ephemeral feed in season.

Much of the Nerren land system in the south-east of the station is not used for grazing as there are no permanent stock waters.

2. Sandplain land system (22.5%)

About two-thirds of this system is in good range condition and most of the remainder is in fair condition. Pasture is the Acacia Sandplain (ACSA) type which is very similar to the Acacia and Eucalypt Short Grass Forb (AEGF) pastures of the Nerren land system. The pastures are essentially ephemeral with numerous forbs and annual grasses in season but only small numbers of useful low shrubs for times of drought.

3. Tarcumba land system (21.9%)

This system (with the minor Snakewood system) is the most valuable on the station and has been fully used in the past. More than half of the system is in fair range condition with the remainder being about equally distributed between good and poor condition.

Pastures are productive Acacia Mixed Shrub (ACMS) with an over-storey of numerous wattles such as silver bark wattle, minnirichi, curara and *Acacia galeata* and, when in good condition, a wide range of desirable low shrubs. Desirable species include green cassia, tall saltbush, flat leaved bluebush, woolly bluebush and ruby saltbush. In some parts these species have been depleted but the system has the potential to recover well if spelled from grazing over a number of growing seasons.

4. Nanga land system (7.9%)

This system with its very low grazing value Heath (HEAT) pastures is largely unused due to the lack of stock waters. Range condition is good.

5. Yaringa land system (1.9%)

Condition of the Acacia Sandplain (ACSA) and Acacia Mixed Shrub (ACMS) pastures on this minor system varies from good to poor depending on distance from water.

6. Snakewood land system (1.3%)

Condition of the Saltbush (SALT) pastures beneath the snakewood shrubs on this system vary from good to very poor depending on the level of past use. Because of its small area the system is of little significance on the station.

7. The station is inadequately watered especially in the south but also in other parts. Additional water points are required so that the country can be more fully used and stock better distributed. Dams have been successfully introduced on suitable sites with clay subsoils and may have the potential to bring stock to other areas where underground water supplies are lacking.

8. The recommended sheep unit capacity for present condition and assuming the station was adequately watered (which is not the case, see 7 above) is 6,100.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 8,500.

Individual station report

Meadow station - 83,244 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Nerren	369	AEGF	185	155	29	—	2,299	2,636
Sandplain	187	ACSA	123	49	15	—	1,391	1,558
Tarcumba	182	ACMS	33	100	49	—	1,966	3,640
Nanga	66	HEAT	55	4	—	—	193	197
		HASP	6	1	—	—	33	35
Yaringa	16	ACSA	—	9	4	—	72	133
		ACMS	3	—	—	—	60	60
Snakewood	11	SALT	—	2	7	—	69	180
		ACMS	—	2	—	—	20	40
		ACSA	—	—	—	—	—	—
York	1	SALT	—	1	—	—	13	20
		ACMS	—	—	—	—	—	—
Totals	832		405	323	104	—	6,116	8,499

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 6,100

Capability sheep unit capacity 8,500

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1971):

average (mean) 5,840

highest (1970) 8,976

lowest (1984) 1,022

Meedo station - Carnarvon Shire

Area 1,465 km²

Location

Meedo station is located on the Wooramel 1:250,000 map sheet. The homestead is close to the Wooramel River and is about 39 km east by road from North-West Coastal Highway. Total distance to Carnarvon by road is about 160 km. The station has common boundaries with Wahroonga, Pimbec, Towrana, Gilroyd, Woodleigh, Yaringa and Wooramel stations.

Description

Nearly all of the station consists of red sandy country of the Sandplain, Lyons and Yalbalgo land systems. These systems are all accessible to livestock and are of moderate pastoral value.

The intermittent Wooramel River runs east-west through the centre of the station and is flanked on either side by the Lyons land system. The Lyons system (24.5% of the station area) consists of sandy alluvial plains with numerous distinctive clay pans surrounded by reticulate and linear sand dunes.

Vegetation is mainly rather thin mixed shrublands on the alluvial plains and denser tall wanyu shrublands or sand dune gidgee woodlands on the dunes.

The Sandplain land system (48.7%) is the largest on the station. It occurs in north central parts of the station and also on the south-west and south-east. It consists of gently undulating red sandplain with either wanyu shrublands or sand dune gidgee woodlands.

The Yalbalgo system (24%) occurs in the north-east, north-west and other parts of the station. It consists of well defined linear sand dunes with relief up to 20 m and sandy swales and supports the same vegetation as the Sandplain system.

Four other land systems, Target, Foscil, Yaringa and Delta occur but collectively only occupy 1.4% of the station area and are of little significance. Some very large clay pans (up to 5 km in extent) are found on the station. The larger of these occupy about 1.4% of the total station area. They are unvegetated and are of no use for pastoral purposes. All land systems on the station are summarized in table 1.

Condition statements for land systems and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Meedo station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplain; tall shrub lands of wanyu and woodlands of sand dune gidgee.	48.7
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall shrublands of acacias with numerous low shrubs and woodlands of sand dune gidgee.	24.5
	Yalbalgo - sandplain with linear and reticulate dunes; tall wanyu shrublands and sand dune gidgee woodlands.	24.0
	Yaringa - sandy plains with sandy banks, low dunes and limestone outcrop plains; tall shrublands of wanyu and other acacias.	0.3
		97.5
High (5-9 ha/s.u.)	Target - plains with sandy banks, more clayey inter-bank areas and numerous small drainage foci; tall acacia species mixed shrubland.	0.5
	Foscil - gently sloping outwash plains, low limestone mesas, plateaux edges and footslopes; low shrublands of saltbush and bluebush	0.4
	Delta - almost flat, active alluvial floodplains with low shrublands of saltbush and bluebush.	0.2
		1.1
Very high (< 5 ha/s.u.)		
	Large bare claypans	1.4
		100.0

Table 2. Condition statements derived from traverse records (216 recordings on 5 land systems)

Meedo

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Foscal	1	100	—	—	—	—	—	100	—	—	—	100	—
Lyons	89	68	25	6	1	—	2	34	48	16	2	34	64
Sandplain	85	100	—	—	—	—	40	44	16	—	40	44	16
Yalbalgo	40	100	—	—	—	8	40	39	13	—	47	40	13
Yaringa	1	100	—	—	—	—	—	100	—	—	—	100	—
Total over all land systems	216	88	10	2	—	1	24	40	29	6	25	40	35

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 9 sites on 2 land systems.

Range condition and recommendations

1. Sandplain land system (48.7%)

This system supports the Acacia Sandplain (ACSA) pasture type. This pasture has a typical tall shrub layer of wanyu or a scattered tree layer of sand dune gidgee. The lower layers consist of very scattered low shrubs including a few palatable species and a prominent grass layer dominated by wanderrie grass. Pasture condition as seen during survey was mostly fair or good. There is no erosion present and over all range condition is fair or good.

Because of the general scarcity of palatable shrubs and the rather ephemeral nature of the wanderrie grass pastures the system has limited drought value. Opportunistic use on a flexible basis can be made on the grass pastures in good seasons.

Controlled burning may be a useful management tool on this land system, but its use has not been researched. Evidence seen on this system during survey suggests that the effects of fire are very long term. Where the over-storey of tall wanyu shrubs has been killed by fire the low shrub layer and the ground layer can be remarkably increased both in diversity of species and in density. This fire-induced sub-climax appears to be considerably more productive for livestock production than is the wanyu climax situation.

2. Lyons land system (24.5%)

Current Bush Mixed Shrub (CBMS) pastures on the small interdunal plains of this land system are mostly degraded to poor or very poor condition. The system still produces useful annual feed in good seasons, but its durability in drought times is considerably reduced due to the loss of many desirable perennial shrubs. In some parts there have been marked increases in the undesirable needle bush. The dunes and sandy banks of the system are relatively resistant to erosion but the small interdunal plains with duplex soils are susceptible. More than one-third of the traverse recordings showed minor erosion and 11% indicated moderate erosion.

Management programmes involving regular spelling over growing seasons and conservative stocking at other times of the year are required in order to encourage pasture recovery.

3. Yalbalgo land system (24%)

This system supports the same Acacia Sandplain pasture as described for the Sandplain system. Pasture condition is fair to good and there is no erosion. As for the Sandplain system the wanderrie grass pastures have limited drought value and fire is a potential management tool.

4. The remaining four land systems collectively occupy 1.4% of the station area. They were not intensively sampled but, where seen, were in fair range condition.

5. The station is well developed in terms of paddocks and is adequately watered except in the south-eastern corner. Pastures in this area are in good condition and should be brought into more use so that grazing pressure can be reduced in some other paddocks along the Wooramel River frontage.

6. The recommended sheep unit capacity for present condition is 9,250.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 12,850.

Individual station report

Meedo station - 146,492 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	713	ACSA	285	314	114	—	4,794	5,942
Lyons	360	ACSA	9	106	65	—	998	1,500
		CBMS	—	9	70	—	550	1,580
		ACCR	—	29	—	—	290	580
		No veg	72	—	—	—	—	—
Yalbalgo	352	ACSA	162	144	46	—	2,434	2,933
Target	7	CBMS	—	1	2	—	25	60
		ACSA	1	2	—	—	21	25
		ACCR	—	1	—	—	10	20
		SALT	—	3	—	—	38	60
Foscal	6	BLUE	—	2	—	—	25	40
		ACMS	—	1	—	—	10	20
		ACSA	—	3	—	—	19	25
Yaringa	4	ACMS	—	1	—	—	10	20
		ACSA	—	3	—	—	19	25
Delta	3	BLUE	—	2	—	—	25	40
		SALT	—	1	—	—	13	20
		ACSA	—	—	—	—	—	—
Large clay pans	20	No veg	20	—	—	—	—	—
Totals	1,465		549	619	297	—	9,262	12,865

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 9,250

Capability sheep unit capacity 12,850

Declared stock numbers (sheep units or equivalent)

1968-1974 (no data for 1969):

average (mean) 12,196

highest (1970) 18,661

lowest (1980) 2,684

Meeragoolia station - Carnarvon Shire

Area 260 km²

Location

Meeragoolia station is located on the Kennedy Range and Wooramel 1:250,000 map sheets. The homestead is situated about 68 km due east by road from Carnarvon along the Carnarvon - Gascoyne Junction road and then south by station access road. The station has common boundaries with Brickhouse, Doorawarra, Ella Valla and Callagiddy stations.

Description

Only four land systems occur on the station and three of these, Sandal, Target and Lyons, collectively occupy over 98% of the total station area. All systems are accessible to livestock and pastoral value is high.

The largest system is Sandal (56.6%) which occurs throughout the southern parts of the station. It consists of almost flat or very gently sloping alluvial plains with numerous low sandy banks and rises. Soils are duplex types and sands. Vegetation consists of scattered to moderately close tall shrublands of various acacias and currant bush on the plains and tall shrublands of silver bark wattle and wanyu on the sandy banks.

The Target system occupies about 36% of the station area in the north and as inclusions in the Sandal system. It consists of nearly flat plains with numerous sandy banks, more clayey interbank areas and small but prominent drainage foci with denser vegetation than on the surrounding country. The system supports the same tall acacia shrublands as found on the Sandal system.

The Lyons system (6.1%) occurs along the northern boundary of the station. It consists of sandy plains with numerous large, distinctive claypans surrounded by linear and reticulate sand dunes. Vegetation is the same as found on the other two systems but with a higher proportion of the wanyu and silver bark wattle tall shrubland associated with the large sandy units of the system.

The Ella system (1.6%) occurs in the far south and west of the station. It is similar to the Target system except that it has prominent short linear dunes as well as sandy banks, inter-dunal plains with more clayey soil and drainage foci with rather more dense vegetation. Vegetation structure and composition is the same as the other three systems.

All systems on the station are summarized in table 1.

Condition statements for each land system for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Meeragoolia station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall shrublands of acacias and numerous others	6.1
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sand soils; tall shrublands of acacias with numerous low shrubs	56.6
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall shrublands of acacias with numerous low shrubs	35.7
	Ella - short linear dunes and sandy banks with more clay inter-dunal plains and drainage foci; tall shrublands of acacias and numerous others	1.6
		93.9
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2: Condition statements derived from traverse records (95 recordings on 4 land systems)

Meeragoolia

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	3	100	—	—	—	—	—	67	33	—	—	67	33
Lyons	9	100	—	—	—	11	11	45	22	11	22	45	33
Sandal	46	96	4	—	—	—	20	47	33	—	20	47	33
Target	IR837	89	11	—	—	—	8	30	46	16	8	30	62
Total over all land systems	95	94	6	—	—	1	14	41	37	7	15	41	44

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 5 sites on 3 land systems.

Range condition and recommendation

1. Sandal land system (56.6%)

This system supports valuable Currant Bush Mixed Shrub (CBMS) and some Bluebush (BLUE) pastures on the duplex soils of the alluvial plains and Acacia Sandplain pastures (ACSA) on the sandy banks. Condition of the currant bush and bluebush pastures is mostly poor with considerable loss of desirable shrubs such as currant bush, Gascoyne bluebush and tall saltbush. The desirables have largely been replaced by serious increases or invasions of undesirable shrubs, mainly crinkled and grey cassias and waxy leaf cremophila, which have formed close stands on some of the most productive areas. The Acacia Sandplain pastures are in fair or good condition. There is no erosion on the system but, because of the depleted currant bush pastures, the over all assessment for the system is about one-third in poor range condition, half in fair condition and the balance in good condition.

Areas in poor or fair condition are still highly productive in terms of annual herbage in season, but have limited drought reserves compared to areas in good condition. In order to enable recovery of desirable shrubs one or two of the most degraded paddocks should be spelled over a number of consecutive growing seasons and stocked at very conservative levels during other times of the year.

2. Target land system (35.7%)

This system supports the same pasture types, except for bluebush, as the Sandal system. As is the case with the Sandal system the Currant Bush Mixed

Shrub (CBMS) pastures are considerably depleted to poor or very poor condition. Acacia Sandplain (ACSA) pastures on the sandy units of the system are also depleted, but less so with the bulk being in fair or poor condition. There is some minor water erosion in the form of patchy thin sheeting on some duplex soil sites but this is not a significant problem.

A programme of regular spelling of selected paddocks needs to be developed in order to promote pasture recovery.

3. Lyons land system (6.1%)

Condition of this system is very similar to the others in that pastures are generally degraded with Currant Bush Mixed Shrub (CBMS) pastures more so than the Acacia Sandplain (ACSA) pastures. There is no erosion on the system.

4. Ella land system (1.6%)

This system is of very limited extent on the station and is of little importance. Where seen its pastures were in fair or poor condition.

5. This small station is very well developed in terms of paddocks and water supplies. A system of progressive spelling of the most degraded paddocks could be readily implemented. Invasion by inedible shrubs is a serious problem on parts of the Sandal and Target land systems. Although there is no economically viable means of shrub eradication that can be recommended as yet, undesirable shrub reduction should remain a long-term objective.

6. The recommended sheep unit capacity for present condition is 2,050.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 3,900.

Individual station report

Meeragoolia station - 26,040 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	147	CBMS	—	26	40	—	575	1,320
		ACSA	23	34	2	—	412	492
		BLUE	—	9	13	—	194	440
Target	93	CBMS	—	8	34	—	313	840
		ACSA	6	17	14	—	212	308
		ACCR	7	7	—	—	210	280
Lyons	16	ACSA	3	3	2	—	52	67
		CBMS	—	3	1	—	44	80
		ACCR	—	1	—	—	10	20
Ella	4	No veg	3	—	—	—	—	—
		ACSA	—	2	1	—	17	25
		CBMS	—	1	—	—	13	20
		ACCR	—	—	—	—	—	—
Totals	260		42	111	107	—	2,052	3,892

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 2,050

Capability sheep unit capacity 3,900

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 4,998

highest (1969) 7,031

lowest (1980) 570

Mia Mia station - Carnarvon Shire

Area 2,089 km²

Location

Mia Mia station is located on the Winning Pool 1:250,000 map sheet. The homestead is 10 km east of the North-West Coastal Highway and is about 216 km north by road from Carnarvon. The station has common boundaries with Winning, Lyndon, Middalya, Wandagee, Minilya, Warroora, Cardabia and Marrilla stations.

Description

The North West Coastal Highway passes through the station separating it into a western third and an eastern two-thirds. The Lyndon River runs through the centre and western parts and, in the far west, Cardabia Creek runs north to south through the property.

Landforms on the station are many and varied with 21 land systems being represented. The largest system is Giralia (22.5% of total station area) which is found mostly in eastern and south-eastern parts. The system consists of sandplains with large linear dunes up to 15 m in height and supports spinifex hummock grasslands with numerous shrubs. Pastoral value is high or moderate depending on the relative proportions of soft and hard spinifex.

The Uaroo system (16.3%) occurs in the central west. It consists of broad, almost flat or gently sloping sandy plains with calcrete at shallow depth. Vegetation is a hummock grassland of hard and soft spinifex with numerous shrubs. Pastoral value is moderate.

The Spot system (10.4%) is associated with the Uaroo system and consists of flat to gently sloping plains with numerous sandy banks and more clayey interbank areas and alluvial plains. Soils are sands and duplex types. Vegetation consists of tall shrublands dominated by acacias and cassias and pastoral value is high.

A large area of the Winning land system (9.5%) is found in the centre of the station to the east and north-east from the homestead. The system consists of a few low rises and hills with extensive lower plains and broad drainage tracts. It supports scattered to moderately close tall and low shrublands often dominated by snakewood in the upper-storey. Pastoral value is high.

The productive Gearle land system (7.5%) occurs in the north-west and west of the station. It consists of gently sloping plains with minor low limestone rises and restricted more sloping marginal plains. Vegetation is variable consisting of scattered low shrublands of Gascoyne bluebush or tall acacia shrublands frequently with denser patches arranged in groves or bands on the plains.

The Wandagee land system (7.1%) is found in centre and east of the station and is based on sedimentary rocks of Permian age. It consists of nearly flat stony and clayey plains with broad drainage zones and low, often parallel, rises with rock outcrop. Vegetation varies from a very scattered to moderately close tall shrubland of snakewood, bardie bush and other acacias and numerous low shrubs. Pastoral value is high.

Sandy alluvial plains and broad drainage zones of the Wash land system (5.6%) occur in the centre and far east of the station. It supports tall shrublands of spreading gidgee and other acacias which are often arranged in a groved pattern with dense stands in the groves and sparser stands in the broader intergrove areas. Pastoral value is high.

The hill system Fossil (5.1%) occurs in the far south-east of the station where it represents the Gooch ranges which rise up to about 170 m above the surrounding sandplain country. The system is based on Permian age sedimentary rocks and consists of rounded summits and plateaux remnants with steep rocky, often benched footslopes. The system is poorly accessible to livestock and pastoral value is low.

Other important land systems found on the station are Marloo (5.1%), Donovan (4.3 per cent), River (2.9%) and O'Brien (1.4%). These systems are of high or moderate pastoral value.

The Marloo system is found in the south-west of the station where it forms almost flat alluvial plains with very sluggish through drainage and meandering channels associated with Cardabia Creek. Soils are gilgaied clays and the vegetation is a tussock grassland with occasional shrubs.

The Donovan system in the west and north-west of the station consists of gently sloping outwash plains and minor limestone plains and rises. It supports scattered low shrublands of Gascoyne bluebush and moderately close to close tall shrublands of silver bark wattle and other acacias.

The River system flanks the Lyndon River in parts and consists of narrow active floodplains and major channels. Vegetation is a tall acacia shrubland or open woodland of coolibah, often with a dense lower layer of smaller shrubs or buffel grass.

The O'Brien system is found in the south-east of the station as tributary alluvial plains and slightly more elevated upper plains and interfluvies. It supports scattered tall shrublands of spreading gidgee and snakewood which may be arranged in a groved pattern with dense vegetation in the groves and much sparser vegetation in the broader intergrove areas.

Another nine systems occur on the station but these collectively only occupy 2.2% of the total area. All systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Mia Mia station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	Fossil - rugged hills, ridges and plateaux of sedimentary rocks, steep benched footslopes; scattered tall acacia shrublands	5.1
	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall acacia shrublands	< 0.1
		5.2
Moderate (10-19 ha/s.u.)	Giralia - sandy plains with large linear dunes; spinifex hummock grasslands and scattered shrubs	22.5
	Uaroo - nearly flat sandy plains and minor pebbly plains; spinifex hummock grasslands with scattered shrubs	16.3
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often arranged in groves	1.4
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of spreading gidgee	0.9
	Jubilee - limestone hills and undulating stony plains; tall shrublands with soft and hard spinifex	0.1
	Jimba - gently sloping alluvial plains with diffuse drainage, minor pebbly plains and low ridges; scattered tall and low shrublands	< 0.1
		41.2
High (5-9 ha/s.u.)	Spot - alluvial plains and plains with sandy banks and more clayey interbank areas; tall shrublands of acacias and currant bush, also bluebush and some spinifex grasslands	10.4
	Winning - low rises, extensive lower plains and broad drainage tracts; scattered tall and low shrublands of snakewood and bluebush	9.5
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains; tall and low shrublands of acacias, saltbush and bluebush	7.5
	Wandagee - nearly flat stony and clayey plains with broad drainage zones and outcrop rises of sedimentary rocks; scattered tall acacia shrublands with numerous low shrubs including saltbush	7.1
	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; tall acacia shrublands	5.6
	Marloo - gilgai alluvial plains with clay soils; tussock grasslands	5.1
	Donovan - gently sloping outwash plains and minor stony plains; tall shrublands of snakewood and other acacias, also bluebush and buffel grass	4.3
	River - narrow active flood plains and major channels, tall acacia shrublands or open coolibah woodlands with numerous low shrubs and buffel grass	2.9
	Yalkalya - saline alluvial plains and low calccrete rises; mixed tall and low shrublands of acacias, bluebush and saltbush, some hard spinifex	0.2
	Firecracker - undulating limestone uplands and stony plains, low shrublands of bluebush	0.2
	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes; tall acacia shrublands	0.1
	Sandal - alluvial plains with numerous low sandy banks and rises, duplex and sand soils; tall mixed shrublands with acacias and numerous low shrubs	< 0.1
		53.0
Very high (< 5 ha/s.u.)	Barrabiddy - active flood plains and broad drainage zones with numerous channels; moderately close tall shrublands of acacias, numerous low shrubs and buffel grass	0.6
		100.0

Table 2: Condition statements derived from traverse records (280 recordings on 14 land systems)

Mia Mia

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Barrabiddy	1	—	100	—	—	—	—	—	100	—	—	—	100
Donovan	31	100	—	—	—	23	23	38	16	—	45	39	16
Fossil	3	100	—	—	—	—	100	—	—	—	100	—	—
Gearle	12	67	33	—	—	8	8	51	25	8	17	50	33
Giralia	27	100	—	—	—	89	7	4	—	—	96	4	—
Marloo	11	100	—	—	—	27	27	37	9	—	55	36	9
O'Brien	7	100	—	—	—	—	29	43	14	14	29	42	29
River	15	80	13	7	—	33	20	27	7	13	53	27	20
Spot	49	80	20	—	—	6	22	41	31	—	49	40	31
Trealla	2	100	—	—	—	—	50	50	—	—	50	50	—
Uaroo	38	100	—	—	—	86	11	—	3	—	97	—	3
Wandagee	40	94	3	3	—	18	28	33	18	3	45	35	20
Winning	35	63	31	6	—	—	9	48	17	26	9	48	43
Wash	9	100	—	—	—	—	78	22	—	—	78	22	—
Total over all land systems	280	89	10	1	—	30	21	29	15	5	50	30	20

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 13 sites on 6 land systems.

Range condition and recommendation

1. Giralia and Uaroo land systems (collectively 38.8%)

Both these sandy systems support mixed Hard Spinifex (HASP) and Soft Spinifex (SOSP) pastures which are nearly all in very good or good condition. No erosion was observed on either system.

Old, mature spinifex stands are useless for grazing and management must be aimed at maintaining the pastures in as attractive condition to stock as possible. Spinifex should be burnt on a fairly regular basis about every four or five years. Burnt areas should not be grazed for about 8-10 weeks over the growing season following the fire in order to encourage establishment of durable grasses, shrubs and spinifex seedlings.

The spinifex-based land systems are generally resistant to degradation, although some wind erosion may result if a prolonged dry spell occurs after burning. However, there is rapid re-establishment of vegetation and return to stability after rain.

2. Spot land system (10.4%)

The Currant Bush Mixed Shrub (CBMS) and Bluebush (BLUE) pastures of the alluvial plains and interbank plains of the system are all somewhat degraded to fair or poor condition. Soils are duplex types and minor wind and water erosion is common. Acacia Sandplain (ACSA) and Hard Spinifex (HASP) pastures of the sandy banks of the system are largely in good condition.

3. Winning land system (9.5%)

The broad alluvial plains and drainage tracts of the system support Bluebush (BLUE) pastures characterised by desirable low shrubs such as Gascoyne bluebush, silver saltbush, ruby saltbush and Gascoyne mulla mulla beneath scattered tall

shrubs of snakewood. In some areas there has been considerable loss of desirable shrubs and pastures are degraded to fair, poor or very poor condition. Pasture decline is often accompanied by minor and moderate erosion in the form of rilling, thin sheeting and wind hummocking.

The worst affected area lies just to the east of the homestead in 5 Mile paddock where about 9 km² is severely degraded. A scattering of desirable shrubs remain and thus the area has the potential to recover, but will require full protection from grazing for a number of years to enable new plants to become established. A minimal amount of soil works to trap water and provide a seedbed may hasten the recovery process. A rehabilitation programme needs to be planned and implemented as a matter of some priority. Elsewhere in other paddocks the system is mostly in fair condition and there is no erosion.

4. Gearle land system (7.5%)

The system supports highly productive Bluebush and Saltbush pastures (BLUE, SALT). Desirable low shrubs include bladder saltbush, silver saltbush, ruby saltbush and Gascoyne bluebush. Buffel grass is well established in restricted parts. Pasture condition is predominantly fair although all levels of condition from very good to very poor are present. There is some patchy minor erosion.

The system is one of the most useful and productive on the station. Generally the almost flat parts of the system are stable under grazing but more sloping parts with duplex soils are susceptible to erosion if the vegetation is depleted. Areas in fair or poor condition should be spelled from grazing for a number of consecutive growing seasons and stocked at conservative rates at other times of the year.

5. Wandagee land system (7.1%)

This complex system supports Saltbush (SALT), Stony Chenopod (STCH), Acacia Creek-line (ACCR) and some Hard Spinifex (HASP) pastures. Pasture condition is mostly good or fair with some localized areas degraded to poor condition. There is occasional minor erosion on the softer drainage floors and plains but this is not a significant problem.

6. Wash land system (5.6%)

Condition of the Acacia Short Grass Forb (ASGF) and Acacia Creek-line (ACCR) pastures of the system as seen in Pleiades paddock is mostly good. There is no erosion. Desirable low shrubs beneath the upper layer of spreading gidgee include flat leaf bluebush, Wilcox bush, currant bush and tall cassia. Parts of the system in Pleiades and Jilillia paddocks are not fully used because of the considerable distance from stock water.

7. Marloo land system (5.1%)

This alluvial plains system supports mixed Tussock Grass (TUGR) pastures dominated by Roebourne plains grass but with others such as neverfail grass, silky browntop, barley mitchell grass and weeping mitchell grass. Pasture condition varies from fair to very good. With its clay soils and almost flat topography the system is inherently resistant to erosion. It is regularly flooded by Cardabia Creek and the Lyndon River and provides valuable grazing.

8. Donovan land system (4.3%)

Pastures are Bluebush (BLUE) and Acacia Mixed Shrub (ACMS). Condition is predominantly fair although there are also substantial parts in good or

very good condition with a wide range of desirable low shrubs beneath the taller snakewood or silver bark wattle. Buffel grass has successfully established on the system in Collie paddock and on adjacent more sandy systems such as Giralia in the vicinity of the shearing shed.

9. River land system (2.9%)

Much of the system receives regular flooding from the Lyndon River. It supports Acacia Creek-line (ACCR) pastures and dense buffel grass Tussock Grass (TUGR) pastures. Pasture condition is largely fair to very good although localised areas show loss of desirable shrubs to poor or very poor condition. However, the system generally has good vegetative cover and is stable under grazing.

10. The remaining minor land systems on the station are all in fair or good range condition.

11. The recommended sheep unit capacity for present condition is 21,450.

12. The capability sheep unit capacity if all country was in good range condition is estimated at 29,400.

Individual station report

Mia Mia station - 208,963 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Giralia	470	HASP	271	11	—	—	1,392	1,410
		SOSP	180	8	—	—	3,067	3,133
Uaroo	341	HASP	232	—	7	—	1,178	1,195
		SOSP	99	—	3	—	1,662	1,700
Spot	217	CBMS	20	29	60	—	1,138	2,180
		BLUE	—	30	24	—	525	1,080
		ACSA	30	21	3	—	393	450
Winning	199	BLUE	6	66	58	9	1,308	2,780
		SOSP	15	15	—	—	375	500
		STCH	3	20	7	—	148	250
Gearle	156	BLUE	19	47	28	—	1,143	1,880
		SALT	9	24	14	—	568	940
		TUGR	—	15	—	—	300	750
Wandagee	147	SALT	13	41	20	—	898	1,480
		STCH	4	16	10	—	147	250
		ACCR	13	9	—	—	350	440
Wash	117	HASP	19	—	2	—	100	105
		ASGF	55	15	—	—	325	350
		ACCR	27	8	—	—	603	700
Fossil	107	TUGR	9	3	—	—	510	600
		ASGF	107	—	—	—	535	535
Marloo	106	TUGR	58	38	10	—	1,622	2,208
		BLUE	22	17	11	—	721	1,000
Donovan	91	ACMS	11	14	2	—	373	540
		SOSP	14	—	—	—	233	233
River	61	ACCR	15	9	7	—	425	620
		TUGR	11	6	4	—	686	1,050
		No veg	9	—	—	—	—	—
O'Brien	29	ASGF	4	7	4	—	53	75
		STCH	2	3	2	—	38	58
		ACCR	2	3	2	—	80	140
Windalia	18	ASGF	6	5	3	—	54	70
		STCH	—	2	—	—	10	17
		ACCR	2	—	—	—	40	40
Barrabiddy	13	SALT	—	3	6	—	75	180
		TUGR	2	2	—	—	140	200
Yalkalya	5	BLUE	1	1	—	—	33	40
		SALT	1	1	—	—	33	40
		HASP	1	—	—	—	5	5

Mia Mia station continued

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Firecracker	4	BLUE	2	2	—	—	65	80
Trealla	3	ACMS	2	1	—	—	50	60
		BLUE	—	—	—	—	—	—
Jubilee	3	HASP	2	—	—	—	10	10
		SOSP	1	—	—	—	17	17
		ACCR	—	—	—	—	—	—
Billy	2	SSGF	1	—	—	—	4	4
		ASGF	1	—	—	—	5	5
Sandal	0.4	CBMS	0.4	—	—	—	8	8
Jimba	0.2	STCH	0.2	—	—	—	2	2
Totals	2,089		1,301	492	287	9	21,447	29,410

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 21,450

Capability sheep unit capacity 29,400

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 26,840

highest (1971) 32,910

lowest (1981) 22,036

Middalya station - Carnarvon Shire

Area 1,997 km²

Location

Middalya station is located on the Winning Pool and Kennedy Range 1:250,000 map sheets. The homestead is about 80 km east of the North-West Coastal Highway from the bridge on the Minilya River 216 km north-east of Carnarvon. Middalya has common boundaries with Mia Mia, Lyndon, Williambury, Mardathuna, Hill Springs and Wandagee stations.

Description

The Minilya River runs through the centre of the property from the south-east to the north-west and many different landforms (20 land systems) occur.

In the north of the station the most widespread landforms are sandplains with large linear dunes of the Giralia land system (27.7% of the total station area) and rough hills with steep benched slopes of the Gooch Range (Fossil land system, 7.0%). The Giralia system supports hummock grasslands of soft and hard spinifex with numerous shrubs. Pastoral value is either moderate or high depending on the relative proportions of soft and hard spinifex. The Fossil system supports sparse acacia shrublands and, because of its rugged nature, is of very little use for pastoral purposes.

The second largest land system is Jimba (23.0%) which is scattered throughout central and southern parts of the station. It consists of gently sloping alluvial plains, minor pebbly plains and low ridges derived from Permian age sedimentary rocks and supports variable, very scattered to moderately close tall and low shrublands. The Mantle system (4.1%) is associated with and has affinities with the Jimba system in that it is also derived from Permian sediments. It is a plain system, but is more

undulating and stony than Jimba. It supports very scattered or scattered tall and low shrublands. Pastoral value of both systems is moderate.

The Wash land system (9.0%) occurs in central eastern parts and consists of sandy alluvial plains and broad drainage zones. It supports tall shrublands of spreading gidgee and other acacias with many low shrubs and some perennial grasses. The vegetation is frequently arranged in dense clumps or groves alternating with less dense patches over the plains. Pastoral value is high.

The rugged hill system Moogooloo (7.2%) occurs in the far south-east of the station as part of the Kennedy Range rising about 100 m above the adjacent plains. The system is of very little use for pastoral purposes.

The Windalia land system (4.3%) is restricted to the south-west of the station. It consists of gently sloping stony plains on radiolarite and narrow, stony upper interfluvial with intensely dendritic drainage patterns. It supports very scattered to moderately close tall shrublands dominated by spreading gidgee. Pastoral value is moderate.

The Yalbalgo system (3.4%) in the south-west of the station is similar in landform to Giralia in that it consists of sandplain and linear dunes. However, it supports tall acacia shrublands of wanyu and silver bark wattle instead of hummock grasslands of spinifex. Pastoral value is moderate.

Another ten land systems are found on the station but many are restricted in extent. The most important are Target (2.6%), River (1.9%), Lyons (1.5%) and Bidgemia (1.4%) all of which are of high pastoral value.

All systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Middalya station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks with steep footslopes and narrow valleys; tall shrublands of mulga and other acacias	7.2
	Fossil - rugged hills, ridges and plateaux of sedimentary rocks, steep benched footslopes; scattered tall shrublands of mulga and other acacias	7.0
Low (20-30 ha/s.u.)	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall shrublands of mulga and other acacias	0.3
		7.3
Moderate (10-19 ha/s.u.)	Giralia - sandy plains with large linear dunes; spinifex hummock grasslands and scattered shrubs	27.7
	Jimba - gently sloping alluvial plains with diffuse drainage tracts, minor pebbly plains and low ridges; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	23.0
	Uaroo - nearly flat sandy plains and minor pebbly plains; spinifex hummock grasslands and scattered shrubs	4.9

Table 1 continued...

Pastoral value	Land systems	Area %
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of spreading gidgee	4.3
	Mantle - gently undulating stony plains with sluggish drainage tracts, stony rises and low summits; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	4.1
	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu and other acacias	3.4
	Channel - major channels with narrow flood plains and dissected marginal slopes and plains; scattered tall acacia shrublands	0.9
	Divide - gently undulating sandplains with occasional minor dunes; hummock grasslands of spinifex and scattered shrubs	0.2
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often arranged in groves	< 0.1
		68.5
High (5-9 ha/s.u.)	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; tall shrublands of spreading gidgee and other acacias	9.0
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; mixed tall shrublands <i>Acacia</i> species with numerous low shrubs	2.6
	River - narrow active flood plains and major channels; fringing woodlands of river gum and tall acacia shrublands	1.9
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall shrublands of wanyu, also other acacias and numerous low shrubs	1.5
	Bidgemia - tributary alluvial plains with sandy banks and minor dunes; tall shrublands of acacias and some chenopods	1.4
	Spot - alluvial plains and plains with sandy banks and more clayey interbank areas; tall shrublands of acacias and currant bush, also bluebush and some spinifex grasslands	0.6
	Yalkalya - saline alluvial plains and low calcrete rises; tall acacia shrublands and low shrublands of saltbush and bluebush	< 0.1
	Winning - low rises, lower plains and broad drainage tracts; scattered tall and low shrublands of snakewood and bluebush	< 0.1
		17.0
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2: Condition statements derived from traverse records (244 recordings on 13 land systems)

Middalya

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Bidgemia	8	49	38	13	—	—	—	62	38	—	—	62	38
Channel	4	50	50	—	—	—	50	25	25	—	50	25	25
Fossil	3	67	—	—	33	—	67	—	33	—	67	—	33
Giralia	36	97	3	—	—	55	42	3	—	—	97	3	—
Jimba	90	71	26	3	—	1	16	46	29	8	17	45	38
Lyons	1	100	—	—	—	—	100	—	—	—	100	—	—
Mantle	15	87	13	—	—	—	—	66	27	7	—	67	33
River	2	100	—	—	—	50	—	50	—	—	50	50	—
Target	25	72	24	4	—	8	24	44	24	—	28	48	24
Uaroo	23	96	4	—	—	48	48	4	—	—	96	4	—
Windalia	2	50	—	50	—	—	—	—	50	50	—	—	100
Wash	32	78	13	6	3	3	13	31	31	22	16	31	53
Yalbalgo	3	100	—	—	—	—	—	—	33	67	—	—	100
Total over all land systems	244	79	17	3	1	15	23	33	22	7	36	34	30

Range evaluation sites

Detailed descriptions and measurement of landform, vegetation, soils and range condition were made at 17 sites on 7 land systems.

Range condition and recommendations

1. Giralia land system (27.7%)

This sandplain and dune system supports mixed Hard Spinifex (HASP) and Soft Spinifex (SOSP) pastures which are in good or very good condition. There is no erosion. Much of the system in the far north-east and north-west of the station is not used for grazing due to the lack of stock water supplies.

Old, mature spinifex stands are of little use for grazing, but young stands supply useful grazing. Spinifex communities should be burnt on a fairly regular basis about every four or five years. Burnt areas should not be grazed for 8-10 weeks over the growing season following the fire to encourage establishment of durable grasses, shrubs and spinifex seedlings.

Spinifex based land systems are generally resistant to degradation although some minor wind erosion may result if a prolonged dry spell occurs after burning. However, there is a rapid re-establishment of vegetation and return to stability after rain.

2. Jimba land system (23.0%)

The system supports Bluebush (BLUE), Stony Chenopod (STCH), Acacia Short Grass Forb (ASGF) and Acacia Sandplain (ACSA) pastures. Pasture condition varies from good to very poor. Areas distant from stock water such as in the west of Cooraling paddock are in good condition with numerous desirable shrubs such as Gascoyne bluebush, Gascoyne mulla mulla, currant bush and ruby saltbush. Elsewhere pasture condition ranges from fair to very poor. More than 25% of the traverse recordings indicated minor water erosion as isolated rilling and sheeting on lower plains. Other parts of the system such as gently undulating pebbly and stony plains are inherently resistant to erosive forces and are not eroded.

About 14 km² of the system in Aerodrome paddock and in the vicinity of Naniago dam and at Blair camp is severely degraded with severe depletion of desirable low shrubs and bare scalded surfaces. Aerodrome paddock should be closed to grazing until pasture recovery is effected. Some strip cultivation and seeding should be considered as a means of hastening the recovery process.

3. Wash land system (9.0%)

Pastures found on this productive system are the Acacia Short Grass Forb (ASGF) and Acacia Creek-line (ACCR) types. The latter pasture frequently occurs as dense stands in small drainage foci or groves on the broad plains and along watercourses and drainage tracts. When in good condition, numerous desirable low shrubs such as tall saltbush, Wilcox bush, ruby saltbush, flat leaf bluebush and cotton bush are found beneath the taller shrubs.

Most pastures are degraded to fair, poor or very poor condition. An exception to this is in northern parts of Windelbalia paddock where pasture condition is good or very good. Poor sections are in Mundarie ram paddock and between Karilla and Mundarie water points.

A broad drainage plain of about 7 km² in Blair camp paddock is severely degraded. Vegetation is restricted to annuals in season and occasional shrubs of wait-a-while. Severe soil erosion as water scouring, rilling, sheeting and wind piling is widespread. The area should be protected from grazing.

4. Fossil and Moogooloo land systems (collectively 14.2%)

These rugged systems are of negligible use for grazing and were little sampled.

5. Uaroo land system (4.9%)

This sandy plain system which supports Hard Spinifex (HASP) and some Soft Spinifex (SOSP) is all in good range condition.

6. Windalia land system (4.3%)

This system, which is mostly in West Paddy's Tank paddock was not intensively sampled. However, where it was inspected the pastures were in good condition and there was no erosion.

7. Mantle land system (4.1%)

This system supports Stony Chenopod (STCH) and Stony Short Grass Forb (SSGF) pastures. Pastures are degraded, but there is no significant erosion on the system.

8. Yalbalgo land system (3.4%)

This minor system was not intensively sampled, but as seen elsewhere on the survey is expected to be in good or fair condition.

9. Target land system (2.6%)

This system supports Acacia Sandplain (ACSA) pastures on sandy banks and Currant Bush Mixed Shrub (CBMS) and minor chenopod pastures on the small inter-bank plains. The acacia sandplain pastures are in fair or good condition, but the other pastures are more or less depleted to fair or poor condition. Some minor erosion occurs on duplex soils of the inter-bank areas.

10. The remaining ten land systems collectively occupy 6.8% of the station area and are of little over all significance to the station. They were insufficiently sampled but are expected to be in fair condition.

11. The station is not particularly well developed in terms of stock watering points. Some extensive areas of useable country are > 5km from water and have not been developed.

The largest single area as yet undeveloped is part of the Giralia land system to the west of the Gooch Range. There are also large areas of unwatered Giralia system in the far north-west and north-east of the station. Other areas which are in good condition and require additional waters for full use are in the west of Cooraling paddock, the west of West Moogooloo paddock and the north-west of West Paddy's Tank paddock. There is a need to bring these and other areas into production so that the grazing pressure on degraded parts of the station can be reduced.

12. The recommended sheep unit capacity for present condition and assuming full development (which is not the case, see 11) is 15,200.

13. The capability sheep unit capacity if all country was in good range condition is estimated at 19,350.

Individual station report
Middalya station - 199,720 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Giralia	552	SOSP	321	10	—	—	5,433	5,517
		HASP	214	7	—	—	1,093	1,105
Jimba	459	STCH	42	125	117	14	1,365	2,483
		ASGF	28	75	12	—	420	575
		ACSA	15	16	15	—	285	383
Wash	180	ASGF	5	39	64	—	315	540
		ACCR	18	18	11	7	595	1,080
		TUGR	—	5	13	—	135	600
Moogooloo	143	ASGF	143	—	—	—	715	715
Fossil	140	ASGF	140	—	—	—	700	700
Uaroo	99	HASP	66	3	—	—	340	345
		SOSP	29	1	—	—	492	500
Windalia	87	ASGF	33	23	14	—	277	350
		ACCR	7	2	—	—	160	180
		STCH	—	4	4	—	33	67
Mantle	82	STCH	—	29	24	—	225	442
		SSGF	—	19	10	—	83	116
Yalbalgo	68	ACSA	26	19	9	—	371	450
		SOSP	7	5	2	—	166	233
Target	51	CBMS	4	8	11	—	249	460
		ACSA	7	13	—	—	140	167
		ACCR	—	8	—	—	80	160
River	38	ACCR	10	9	—	—	290	380
		TUGR	7	6	—	—	470	650
		No veg	6	—	—	—	—	—
Lyons	30	ACSA	4	7	4	—	93	125
		CBMS	—	2	5	—	56	140
		ACCR	—	2	—	—	20	40
		No veg	6	—	—	—	—	—
Bidgemia	28	ACSA	—	18	—	—	113	150
		CBMS	—	4	3	—	69	140
		SALT	—	2	1	—	31	60
Channel	17	ACCR	7	6	—	—	200	260
		HASP	2	—	—	—	10	10
		No veg	2	—	—	—	—	—
Spot	11	CBMS	1	3	3	—	76	140
		HASP	3	—	—	—	15	15
		ACSA	1	—	—	—	8	8
Billy	7	SSGF	4	—	—	—	16	16
		ASGF	2	1	—	—	13	15
Divide	3	HASP	3	—	—	—	15	15
		ACCR	—	—	—	—	—	—
Yalkalya	1	BLUE	—	1	—	—	13	20
		SALT	—	—	—	—	—	—
		HASP	—	—	—	—	—	—
Winning	0.8	BLUE	—	0.8	—	—	10	16
		SOSP	—	—	—	—	—	—
		STCH	—	—	—	—	—	—
O'Brien	0.6	ASGF	—	0.6	—	—	2	3
		STCH	—	—	—	—	—	—
		ACCR	—	—	—	—	—	—
Totals	1,997		1,163	491	322	21	15,192	19,371

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 15,200

Capability sheep unit capacity 19,350

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 15,773

highest (1970) 22,963

lowest (1978-79) 11,500

Minilya station - Carnarvon Shire

Area 2,733 km²

Location

Minilya station is located on the Minilya, Winning Pool, Quobba and Kennedy Range 1:250,000 map sheets. The homestead is 5 km west of the North-West Coastal Highway near the Minilya River and about 143 km north from Carnarvon. The station has common boundaries with Warroora, Mia Mia, Wandagee, Manberry, Cooralya, and Booloogooro stations and Lake McLeod.

Description

A total of 23 land systems are found on the station. The most important of these are alluvial plain systems associated with the Minilya River and Barrabiddy Creek which run from east to west through the centre of the station and then into Lake McLeod.

Three of the most extensive alluvial plain systems are Sandal (23.4% of total station area), Delta (23 per cent) and Warroora (6.5%). These systems all consist of almost flat saline and non-saline alluvial plains with varying proportions of low sandy banks and rises. They support extensive low shrublands of saltbush and bluebush and patches of tall acacia shrubland on the sandy rises. The Delta system is marginally lower than the other systems and consists of active floodplains with numerous scalds and scoured areas associated with flooding from the Minilya River. Pastoral value of each system is high.

Another alluvial plain system Barrabiddy (3.3%) flanks the Barrabiddy Creek in south-central parts of the station. It consists of active floodplains and broad drainage zones with numerous braided channels. It supports a tall shrubland of various acacias, notably snakewood and bardie bush, with numerous low shrubs and some perennial grasses. When in good condition pastoral value is very high.

The second largest land system is Giralia (23.4%) which predominates in the north-east of the station. The system consists of sandplain and large linear dunes supporting a mixture of hard and soft spinifex hummock grasslands and numerous shrubs. Pastoral

value is moderate or high depending on the relative proportions of soft and hard spinifex. The Giralia system is closely associated with the Uaroo system (2.1%) which consists of almost flat sandy plains with calcrete at shallow depth supporting mostly hard spinifex.

Another sand dune system Yalbalgo (5.0%) occurs in the centre and south of the station. It is very similar in landform to Giralia but supports tall acacia shrublands rather than spinifex hummock grasslands. Pastoral value is moderate.

An important system found in the west of the station is Trealla (8.8%). It consists of elevated limestone plains and low rises and in the north-west forms the Gnargoo Range rising up to 70 m above the surrounding plains. It supports a moderately close tall shrubland of various acacias and pastoral value is high.

The Chargoo system (3.9%) occurs in the north-west of the station as almost flat, saline alluvial plains with numerous drainage foci and swampy depressions. It is regularly flooded by overflow from the Lyndon River and supports low shrublands of various saltbush and bluebush types and patches of tussock grasses. Pastoral value is very high.

In the north of the station the Target system (3.2%) lies between the alluvial plains of the Sandal system and the sand dunes of the Giralia system. Target consists of almost flat plains with numerous low sandy banks, inter-bank areas with more clayey soils and small prominent drainage foci. It supports tall acacia shrublands with numerous under-shrubs and pastoral value is high.

Another 13 land systems occur on the station. Although individually restricted in extent they collectively occupy 9.1% and are nearly all of high pastoral value.

All systems found on the station are summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Minilya station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	Fossil - rugged hills, ridges and plateaux of sedimentary rocks, steep benched footslopes; scattered tall acacia shrublands	< 0.1
Moderate (10-19 ha/s.u.)	Giralia - sandy plains with large linear dunes; spinifex hummock grasslands and numerous shrubs	23.0
	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu and other acacias	5.0
	Brown - gently undulating sandplains and occasional dunes; tall shrublands of Wanyu and silver bark wattle; also buffel grass	2.1

Table 1 continued...

Pastoral value	Land systems	Area %
	Uaroo - nearly flat sandy plains and minor pebbly plains; hummock grasslands of hard and soft spinifex with numerous shrubs	2.1
	McLeod - samphire flats and sandy plains with bare marginal mudflats; low shrublands of samphire and saltbush	2.0
	Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; tall shrublands of wanyu, other acacias and numerous low shrubs	0.2
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often arranged in groves	0.1
		34.5
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy rises and banks, duplex and sandy soils; tall shrublands of acacias, currant bush and some bluebush	23.4
	Delta - almost flat, active alluvial flood plains; low shrublands of saltbush and bluebush	11.7
	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes; moderately close tall shrublands of silver bark wattle, snakewood and other acacias	8.8
	Warroora - nearly flat, saline alluvial plains, sluggish drainage tracts and prominent drainage foci, minor limestone outcrop plains and sandy banks; low shrublands of saltbush and bluebush, some tall acacia shrublands.	6.5
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall shrublands of acacias with numerous low shrubs	3.2
	Spot - alluvial plains and plains with sandy banks and more clayey interbank areas; tall shrublands of acacias, also bluebush and some spinifex grasslands	1.8
	Yalkalya - saline alluvial plains and low calcrete rises; mixed tall and low shrublands of acacias, bluebush and saltbush, some hard spinifex	0.9
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains, tall and low shrublands of acacias, saltbush and bluebush	0.7
	River - narrow, active flood plains and major channels; tall acacia shrublands or open coolibah woodland with numerous low shrubs and buffel grass	0.5
	Donovan - gently sloping outwash plains and minor stony plains; tall shrublands of snakewood and other acacias, also bluebush and buffel grass	0.3
	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; tall acacia shrublands	0.3
	Marloo - gilgai alluvial plains with clay soils; tussock grasslands	0.1
	Cardabia - undulating sandy plains with linear dunes and minor limestone ridges and outcrop plains; low shrublands and hummock grasslands of soft and hard spinifex	0.1
		58.3
Very high (< 5 ha/s.u.)	Chargoo - nearly flat, saline alluvial plains with numerous drainage foci and swampy depressions; low shrublands of saltbush and bluebush, also tussock grasses	3.9
	Barrabiddy - active flood plains and broad drainage zones with numerous channels; tall shrublands of numerous acacias with saltbush and buffel grass	3.3
		7.2
		100.0

Table 2. Condition statements derived from traverse records (393 recordings on 17 land systems)

Minilya

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Barrabiddy	10	60	20	20	—	—	20	30	50	—	20	30	50
Brown	4	100	—	—	—	—	25	25	50	—	25	25	50
Chargoo	22	81	14	5	—	5	41	40	14	—	45	41	14
Delta	116	47	28	16	9	3	28	27	26	16	31	27	42
Gearle	1	100	—	—	—	—	100	—	—	—	100	—	—
Giralia	31	100	—	—	—	84	13	3	—	—	97	3	—
Lyons	5	100	—	—	—	20	20	20	40	—	40	20	40
MacLeod	1	100	—	—	—	—	100	—	—	—	100	—	—
River	2	100	—	—	—	—	100	—	—	—	100	—	—
Sandal	105	85	15	—	—	16	31	44	9	—	47	44	9
Spot	1	100	—	—	—	—	—	100	—	—	—	100	—
Target	21	100	—	—	—	19	48	33	—	—	67	33	—
Trealla	24	92	4	—	4	8	55	29	4	4	63	29	8
Uaroo	10	100	—	—	—	80	20	—	—	—	100	—	—
Wandagee	3	100	—	—	—	100	—	—	—	—	100	—	—
Warroora	27	100	—	—	—	15	70	15	—	—	85	15	—
Yalbalgo	10	100	—	—	—	50	30	20	—	—	80	20	—
Total over all land systems	393	78	14	5	3	19	34	29	13	5	53	29	18

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 26 sites on 7 land systems.

Range condition and recommendations

1. Sandal land system (23.4%)

This productive system supports Currant Bush Mixed Shrub (CBMS) pastures and some Bluebush (BLUE) on the broad plains with duplex soils and Acacia Sandplain (ACSA) pastures on the sandy rises. The currant bush mixed shrub pastures are somewhat degraded with the majority in fair condition and the balance in poor condition. The other pastures are mostly in fair condition although substantial parts are also in good or very good condition. Buffel grass is well established on the more sandy parts of the system especially near the Minilya River and Barrabiddy Creek in such paddocks as Geeberri and Minnaberri.

There is occasional minor erosion on duplex soil sites, but this is not a significant problem and most parts of the system can be grazed on a year long basis. Degraded section will respond well to spelling over a number of consecutive growing seasons and conservative stocking at other times.

2. Giralia land system (23%)

Hard Spinifex (HASP) and Soft Spinifex (SOSP) pastures on this system are nearly all in very good condition. There is no erosion. At the time of survey much of the system was not being used for grazing as a number of stock water points were not in use.

Old, mature spinifex stands are of little use for grazing but young stands provide useful grazing. Spinifex communities should be burnt on a fairly regular basis about every four or five years. In order to encourage establishment of durable grasses, shrubs and spinifex seedlings the burnt areas should not be grazed for 8-10 weeks over the grazing season following the fire.

Spinifex based land systems are generally resistant to degradation although some minor wind erosion may result if a prolonged dry spell occurs after burning. However, there is a rapid re-establishment of vegetation and return to stability after rain.

There is a need to bring the Giralia system in the north-eastern part of the station into production so that grazing pressure on degraded parts of the station can be reduced. The unused north-eastern part of the station also includes some fairly extensive areas of the high pastoral value systems Yalkalya and Spot as well as Giralia.

3. Delta land system

This complex system supports Bluebush (BLUE) and Saltbush (SALT) pastures of various types on the broad flood plains and drainage tracts with minor areas of Acacia Sandplain (ACSA) on sandy rises.

Although parts of the system are still highly productive in terms of perennial shrubs and annuals in season the general condition of the bluebush and saltbush pastures is degraded to fair, poor or very poor condition. The acacia sandplain pastures which often contain dense stands of introduced buffel grass are in good condition.

Minor to severe erosion in the form of surface scalding, wind piling, rilling and scouring is widespread on the flood plain. Over the whole land system 42%, 27% and 31% of the traverse recordings indicated bad, fair and good range condition respectively.

More than 36 km² of the system (11%) is severely degraded with almost complete loss of vegetative cover and severe erosion. These areas are mostly in Shed, Nalyatharra and Booladan paddocks. These paddocks or parts of them should be closed to grazing until recovery is effected. Strip cultivation and seeding with buffel grass and native shrub species should be considered as a means of hastening recovery.

4. Trealla land system (8.8%)

This system supports moderately close Acacia Mixed Shrub (ACMS) pastures with numerous desirable low shrubs such as Wilcox bush, currant bush, ruby saltbush and flat leaf bluebush beneath the taller acacia shrubs. There are also smaller areas of Gascoyne bluebush associated with snakewood.

Condition of the pastures is predominantly good and generally there is no erosion on the system. An exception to this is north and west of Neemarabada bore where there are patches of severe active gully erosion.

Most of the system is stable and can be grazed year long provided stocking rates are conservative. However, a minor unit of the system, namely steeper slopes marginal to extensive more gently sloping plains and supporting Gascoyne bluebush, is more sensitive to degradation and erosion and needs to be carefully monitored.

5. Warroora land system (6.5%)

This saline plain system supports productive Saltbush (SALT) and Bluebush (BLUE) pastures with minor areas of Samphire (SAMP). Pasture condition is nearly all good or very good and there is no erosion. The pastures cannot be fully used by livestock due to high dietary salt intake from the vegetation and poor quality (salty) water supplies or lack of water supplies.

6. Yalbalgo land system (5%)

The Acacia Sandplain (ACSA) pastures of this system are nearly all in good or very good condition and there is no erosion. The system is stable under grazing and provides useful feed in the form of wandarric grasses, forbs and some useful shrubs in season. Wanyu beans (seeds) also provide feed after favourable seasons but, in general, the durability of pastures for drought times is only moderate or low.

7. Chargoo land system (3.9%)

This system supports a complex mosaic of saline and non-saline pastures notably various types of saltbush and bluebush and Tussock Grasses (TUGR). Small depressions and larger drainage foci and swamps support dense stands of vegetation including perennial tussock grasses, low shrubs such as spiny bluebush and swamp bluebush and tall shrubs such as curara and mimosa bush. Slightly more elevated margins and alluvial plains support sparser growth.

Pasture condition is mostly fair or good although restricted areas are degraded to poor condition and have minor wind and water erosion.

8. Barrabiddy land system (3.3%)

This alluvial system is subject to regular flooding as sheet flow and channelled flow from Barrabiddy Creek. It supports a mixture of pastures such as Acacia Creek-line (ACCR), Saltbush (SALT) and Tussock Grasses (TUGR). Pasture condition varies from good to poor, but is predominantly poor. As a result of flooding there is frequent redistribution of soil material over the flood plains and, where vegetation is depleted, accelerated erosion as scouring, rilling, sheeting and hummocking is common. Degraded parts of the system occur in

Barrabiddy paddock and, to a lesser extent, in Minnaberri paddock both of which would benefit from occasional spelling. Buffel grass is well established on sandy parts of the system and its further spread should be encouraged.

9. Target land system (3.2%)

The system supports useful Currant Bush Mixed Shrub (CBMS), Acacia Creek-line (ACCR) and Acacia Sandplain (ACSA) pastures. The current bush mixed shrub pastures are preferentially grazed and are in fair or good condition; the other pastures are in good or very good condition. There is no erosion and over all range condition is mostly good.

10. An additional eight minor land systems were traversed on the station. Some were not sampled in detail but, in general, range condition was fair or good. There were no severe limitations to pastoral use or special management programmes required on these systems.

11. The station is well developed in terms of paddocks. Much of it is well supplied with stock waters (often by long pipelines from reliable good quality supplies near the Minilya River). An exception is the north-eastern part of the station (see 2) which is very poorly watered and mostly not in use. This area needs to be brought into production in order to relieve grazing pressure elsewhere.

Because of the many paddocks a system of strategic pasture spelling and regeneration work could be readily implemented in those paddocks that are in poor range condition. Paddocks requiring priority treatment are Shed, Nalyatharra and Booladan (see 3).

12. The recommended sheep unit capacity for present condition assuming the whole station is adequately watered (which is not the case, see 11) is 31,050.

13. The capability sheep unit capacity if all country was in good range condition is estimated at 40,700.

Individual station report

Minilya station - 273,313 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandal	638	CBMS	—	212	75	—	3,119	5,740
		ACSA	166	77	12	—	1,913	2,125
		BLUE	22	74	—	—	1,365	1,920
Giralia	629	HASP	366	11	—	—	1,867	1,885
		SOSP	244	8	—	—	4,133	4,200
Delta	318	BLUE	19	44	62	18	1,318	2,860
		SALT	17	39	53	18	1,159	2,540
		ACSA	38	10	—	—	379	400
Trealla	241	ACMS	127	75	25	2	3,446	4,580
		BLUE	9	3	—	—	218	240
Warroora	178	BLUE	65	15	—	—	1,488	1,600
		SALT	58	13	—	—	1,323	1,420
		SAMP	27	—	—	—	108	108
Yalbalgo	136	ACSA	109	27	—	—	1,077	1,133
Chargoo	108	SALT	19	30	11	—	824	1,200
		TUGR	17	5	—	—	983	1,067
		BLUE	13	3	—	—	298	320
Barrabiddy	89	SALT	—	24	38	—	538	1,240
		TUGR	27	—	—	—	900	900
Target	86	CBMS	16	23	—	—	608	780
		ACSA	30	4	—	—	275	283
		ACCR	13	—	—	—	260	260
Brown	59	ACSA	13	13	27	—	298	442
		SALT	2	1	3	—	71	120
Uaroo	56	HASP	39	—	—	—	195	195
		SOSP	17	—	—	—	283	283
McLeod	55	SAMP	28	—	—	—	112	112
		SALT	11	—	—	—	220	220
		No veg	16	—	—	—	—	—
Spot	49	CBMS	—	29	—	—	363	580
		HASP	15	—	—	—	75	75
		ACSA	—	5	—	—	31	42
Yalkalya	25	BLUE	11	—	—	—	220	220
		SALT	11	—	—	—	220	220
		HASP	3	—	—	—	15	15
Gearle	20	BLUE	12	—	—	—	240	240
		SALT	6	—	—	—	120	120
		TUGR	2	—	—	—	100	100
River	15	ACCR	8	—	—	—	160	160
		TUGR	5	—	—	—	250	250
		No veg	2	—	—	—	—	—
Donovan	9	BLUE	5	—	—	—	100	100
		ACMS	3	—	—	—	60	60
		SOSP	1	—	—	—	17	17
Wash	7	ASGF	4	—	—	—	20	20
		ACCR	2	—	—	—	40	40
		TUGR	1	—	—	—	33	33
Lyons	6	ACSA	1	1	1	—	19	25
		CBMS	—	2	—	—	25	40
		No veg	1	—	—	—	—	—
Marloo	3	TUGR	3	—	—	—	100	100
O'Brien	3	ASGF	1	—	—	—	5	5
		STCH	1	—	—	—	8	8
		ACCR	1	—	—	—	20	20
Cardabia	2	SOSP	2	—	—	—	33	33
Fossil	1	ASGF	1	—	—	—	5	5
Totals	2733		1640	748	307	38	31,057	40,701

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 31,050

Capability sheep unit capacity 40,700

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1974):

average (mean) 35,836

highest (1977) 48,000

lowest (1980) 25,875

Mooka station - Carnarvon Shire

Area 458 km²

Location

Mooka station is located on the Kennedy Range 1:250,000 map sheet. The homestead is situated 5 km north of the Carnarvon-Gascoyne Junction road and is about 144 km east of Carnarvon. The station has common boundaries with Mardathuna, Doorawarra, Jimba Jimba, and Bidgemia stations and with the Kennedy Range National Park.

Description

Eleven land systems are found on the station. By far the largest is Yalbalgo (60.2% of the total area) which occurs in western central and southern parts of the station. It consists of large linear and reticulate sand dunes up to 12 m high and sandy swales. The system supports tall shrublands of various acacias with occasional patches of eucalypts in both tree and mallee forms. Numerous low shrubs and patchy spinifex make up the understorey. Pastoral value is low or moderate.

The northern part of the station comprises mainly of three land systems namely Billy (13.7%), Windalia (8.3%) and Cahill (10.1%). The Cahill system also

occurs along the eastern boundary of the station at the foot of the Kennedy Ranges. The Billy system consists of low plateaux, mesas and buttes with stony footslopes and narrow drainage floors. It supports sparse tall shrublands of mulga and other acacias and pastoral value is low.

The Windalia system lies below Billy and consists of stony plains and narrow, dissected upper interfluvies on radiolarite. It supports sparse tall shrublands of mulga and other acacias on the plains with more dense and productive tall shrublands along narrow drainage floors and flow lines. Pastoral value is moderate.

The Cahill system consists of sandy outwash plains and sandy channels. It supports moderately close tall shrublands of silver bark wattle, wanyu and other acacias with numerous low shrubs and various grasses. Pastoral value is high.

Seven other minor systems occur on the station.

All systems are briefly described and their pastoral value for good range condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Mooka station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks, steep footslopes and narrow valleys; scattered tall shrublands of mulga and other acacias	3.6
Low (20-30 ha/s.u.)	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall and low shrublands of mulga and other acacias.	13.7
	Kennedy - elevated sandy plains with large linear and reticulate dunes; hummock grasslands of hard spinifex and numerous shrubs	0.4
		14.1
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu and other acacias, occasional eucalypts and some spinifex	60.2
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of mulga and other acacias.	8.3
	Channel - major channels with dissected marginal slopes and narrow flood plains; tall acacia shrublands	2.0
		70.5
High (5-9 ha/s.u.)	Cahill - sandy outwash plains with sandy channels; tall shrublands of silver bark wattle and other acacias	10.1
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall shrublands of acacias	0.9
	Target - plains with sandy banks, more clayey interbank areas and numerous small drainage foci; tall shrublands of acacias with numerous low shrubs	0.5
	Ella - linear dunes and sandy banks, interdunal plains with more clayey soils and drainage foci; tall shrublands of acacias with numerous low shrubs	0.2
	Mary - gently sloping plains with calcrete at shallow depth; tall shrublands of acacias and cassias.	0.1
		11.8
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (131 recordings on 10 land systems).**Mooka**

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Billy	12	100	—	—	—	—	67	33	—	—	67	33	—
Cahill	29	97	3	—	—	17	28	48	7	—	45	48	7
Ella	6	83	17	—	—	—	—	—	100	—	—	—	100
Moogoolo	13	100	—	—	—	8	46	46	—	—	54	46	—
Mary	1	100	—	—	—	100	—	—	—	—	100	—	—
O'Brien	5	100	—	—	—	80	20	—	—	—	100	—	—
River	2	50	50	—	—	—	—	50	50	—	—	50	50
Target	1	100	—	—	—	—	—	100	—	—	—	100	—
Windalia	15	100	—	—	—	13	60	7	20	—	73	7	20
Yalbalgo	47	98	2	—	—	34	40	15	11	—	74	15	11
Total over all land systems	131	97	3	—	—	22	39	26	13	—	61	26	13

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 5 land systems.

Range condition and recommendations**1. Yalbalgo land system (60.2%)**

The dunes and sandy swales of the system support Acacia Sandplain pastures and Hard Spinifex pastures (ACSA, HASP) which are mostly in good or very good condition. Restricted areas close to watering points show depletion of palatable species to fair or poor condition.

The system is stable under grazing and provides useful feed in the form of wanderric grasses and forbs in season and some palatable shrubs. However, many of the shrubs and the hard spinifex are of little use for grazing and the pastures supply only low or moderate reserves for drought periods.

Burning should be used on the spinifex communities as a management tool for keeping the pastures in as attractive condition as possible for livestock. Burning can probably be carried out every five or six years and, in order to encourage the establishment of palatable grasses, herbs and young shrubs, burnt areas should not be grazed for 8-10 weeks over the growing season following the fire.

At least 50% of the system is not grazed as there are no permanent stock waters.

2. Billy land system (13.7%)

The sparse Stony Short Grass Forb and Acacia Short Grass Forb pastures (SSGF, ASGF) of this system are mostly in good condition. Because of its stony nature the system is inherently resistant to erosion.

3. Cahill land system (10.1%)

The Acacia Sandplain pastures (ACSA) of this flood out system support a reasonable range of desirable low shrubs and scattered perennial grasses.

Pasture condition is predominantly fair although substantial numbers of the traverse records (45%) also indicated good or very good condition. Flooding causes re-distribution of sand within the system and surfaces are often uneven and moundy but no accelerated erosion was observed.

4. Windalia land system (8.3%)

The system supports Acacia Short Grass Forb pastures (ASGF) on stony interfluvies and slopes with somewhat denser Acacia Creek-line pastures (ACCR) along narrow creek-lines and in small patches or groves on the stony interfluvies. Most of the pastures are in good condition except for those close to the old Binthalya shearing shed which are in poor condition. There is no erosion.

5. All the remaining systems on the station, with the exception of Ella, are in good range condition. The Ella system is restricted to a small piece of country immediately north of the homestead. Between No. 1 and No. 2 Bores the pastures are degraded to poor condition.

6. The southern and south-eastern parts of the station are reasonably well developed with paddocks and water points. However, all of the western part of the station (Yalbalgo land system, see 1) is undeveloped and not used. The feasibility of development should be considered.

In the north the station has recently acquired additional country from the old Binthalya station lease. A number of old watering points and paddocks in this area could be upgraded and brought into use fairly readily and this should be undertaken.

7. The recommended sheep unit capacity for present condition assuming that the whole station is adequately watered (which is not the case, see 6) is 4,700.

8. The capability sheep unit capacity if all country was in good range condition is estimated at 5,450.

Individual station report

Mooka station - 80,931 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	487	HASP	216	44	32	—	1,307	1,460
		ACSA	144	29	22	—	1,469	1,625
Billy	111	SSGF	45	22	—	—	253	268
		ASGF	29	15	—	—	195	220
Cahill	82	ACSA	33	36	5	—	520	617
		TUGR	4	4	—	—	200	267
Windalia	67	ASGF	48	—	6	—	255	270
		ACCR	—	7	—	—	70	140
		STCH	4	—	2	—	40	50
Moogooloo	29	ASGF	16	13	—	—	123	145
Channel	16	STCH	2	3	2	—	38	58
		ACCR	—	7	—	—	70	140
		No veg	2	—	—	—	—	—
O'Brien	8	ASGF	4	—	—	—	20	20
		STCH	2	—	—	—	17	17
		ACCR	2	—	—	—	40	40
Target	4	CBMS [†]	1	1	—	—	33	40
		ACSA	2	—	—	—	17	17
Kennedy	3	HASP	3	—	—	—	15	15
Ella	1	ACSA	1	—	—	—	8	8
Mary	1	ACMS	1	—	—	—	20	20
Totals	809		559	181	69	—	4,710	5,437

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 4,700

Capability sheep unit capacity 5,450

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 3,258

highest (1980) 4,666

lowest (1969) 545

Nanga station - Shark Bay Shire

Area 1,750 km²

Location

Nanga station is located on the Yaringa and Edel 1:250,000 map sheets. The homestead is situated about 84 km west from North-West Coastal Highway along the access road between the highway and Denham township. The station has common boundaries with Hamelin, Coburn, Tamala and Peron stations and the Cooloomia Nature Reserve. The station also has an extensive shoreline boundary to Hamelin Pool and Freycinet Estuary.

Description

Nearly all of the station consists of gently undulating or hummocky red or yellow sandplains of the Nanga, Sandplain, Nerren and Peron land systems. The Nanga system is by far the largest occupying about 76% of the total station area and occurring throughout southern and central parts. It supports a complex vegetation of tree heath and scrub heath and pastoral value is very low.

The other three sandplain systems Sandplain (14.9%), Nerren (3.5%) and Peron (0.8%) occur in the north of the station. The Sandplain system supports a close tall shrubland of wanyu and other acacias, the

Nerren system supports similar vegetation, but with scattered eucalypts and the Peron system supports mixed low and tall shrubland usually dominated by *Acacia ligulata*. Pastoral value of the Sandplain and Peron systems is high and the Nerren system is of moderate value.

The Birrida system (1.9%) occurs mainly in the north of the station as a series of small inclusions within the Sandplain system. It consists of highly saline and gypsiferous pans and depressions supporting low shrubland of samphire, saltbush and other halopytic plants. Pastoral value is moderate.

The Coquina system (1.3%) occupies the north-eastern edge of the station flanking Hamelin Pool. It consists of low shelly foredunes with scattered tall and low shrubs, occasional samphire flats and shell beaches and supra-tidal flats without vegetation. Pastoral value of the vegetated units of the system is moderate.

Three other minor land systems occur on the station. All systems are briefly described and their pastoral value for good range condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Nanga station

Pastoral value	Land systems	Area %
Very low (> 30ha/s.u.)	Nanga - undulating sandplains and occasional dunes; tree heath and scrub heath	75.7
	Zuytdorp - elevated undulating limestone plains with thin sand cover, sandy coastal slopes and sea cliffs; heath and scrub heath.	1.3
		77.0
Low (20-30ha/s.u.)	—	—
Moderate (10-19ha/s.u.)	Nerren - nearly flat to gently undulating red sandplains; tall wanyu shrublands with scattered trees, mainly eucalypts.	3.5
	Birrida - highly saline and gypsiferous pans and depressions; low shrublands of samphire and saltbush.	1.9
	Coquina - low shelly foredunes, shell beaches and supra-tidal flats; vegetated parts support tall and low shrublands.	1.3
	McLeod - samphire flats and sandy plains with bare marginal mudflats; low shrublands of samphire and saltbush	0.2
		6.9
High (5-9ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplains; tall wanyu shrublands	14.9
	Peron - undulating plains of calcareous sands; tall and low shrublands of <i>Acacia ligulata</i>	0.8
	Edel - undulating sandy plains with minor low dunes, limestone rises and saline flats; mixed shrublands of acacias and saltbush, also heath	0.4
		16.1
Very high (<5 ha/s.u.)	—	—
		100.0

Table 2 Condition statements derived from traverse records (206 recordings on 9 land systems)

Nanga

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Birrida	14	100	—	—	—	36	50	14	—	—	86	14	—
Coquina	4	100	—	—	—	—	50	50	—	—	50	50	—
Edel	4	50	50	—	—	—	—	—	100	—	—	—	100
MacLeod	1	100	—	—	—	100	—	—	—	—	100	—	—
Nanga	100	100	—	—	—	85	13	2	—	—	98	2	—
Nerren	22	100	—	—	—	—	59	41	—	—	59	41	—
Peron	14	93	7	—	—	—	14	58	21	7	14	57	29
Sandplain	38	100	—	—	—	5	32	42	21	—	37	42	21
Zuytdorp	9	100	—	—	—	100	—	—	—	—	100	—	—
Total over all land systems	206	99	1	—	—	50	24	19	7	—	73	19	8

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 14 sites on 7 land systems.

Range condition and recommendations

1. Nanga land system (75.7%)

This extensive system of hummocky sand plain supports Heath pastures (HEAT) in the form of tree heath and scrub heath. Condition of the vegetation is good or very good, but the potential for pastoral use is very low and it is doubtful if the system can be developed economically. Most of the system is not being grazed as there are no stock waters.

2. Sandplain land system (14.9%)

The Acacia Sandplain (ACSA) pastures of the system support scattered desirable low shrubs such as cotton bush, tall saltbush, currant bush and *Chenopodium gaudichaudianum* below the taller wanyu and silver bark wattle. There are also sparse wanderie grasses and forbs in season.

Pasture condition is mostly fair but varies from good to poor depending largely on the distance from water. There is no erosion and the system is stable under grazing.

Controlled burning may be a useful management tool on this system, but its use has not been researched. Evidence seen elsewhere on this system suggests that the effects of fire are very long term. Where the overstorey of tall shrubs has been killed by fire the low shrub layer and the ground layer is increased in diversity of species and in density. This fire-induced sub-climax appears to be more useful for livestock production than is the climax situation of dense tall shrubland of wanyu.

3. Nerren land system (3.5%)

The system supports the Acacia and Eucalyptus Short Grass Forb (AEGF) pasture type which is similar to the Acacia Sandplain pasture of the

Sandplain system. Useful low shrubs are scattered or clumped beneath the larger trees and there are sparse grasses and forbs in season. Pasture condition is good or fair and there is no erosion.

4. Birrida land system (1.9%)

The Samphire (SAMP) and Saltbush (SALT) pastures of the system are mostly in good or very good condition. The samphire pastures are probably too saline to be of much use for sheep.

5. Zuytdorp land system (1.3%)

The small section of this system in the far south-west of the station supports Heath pastures (HEAT) in very good condition. The system is of very low inherent productivity for grazing and is unsuitable for pastoral development.

6. Peron and Edel land systems (0.8% and 0.4% respectively)

These systems occur near the homestead and appear to have received heavy use in the past. Condition of the Acacia Sandplain (ACSA) and Heath (HEAT) pastures is variable but mostly poor with death of many low shrubs. There is some minor wind erosion as hummocking and piling around plants. The small paddock immediately to the north-west of the homestead up to the boundary with Peron station needs to be spelled.

7. The station is very poorly developed in terms of stock waters and paddocks. Development is confined to the north on about one-quarter of the total station area. Because of its inherently very poor pastures it is doubtful if the very large Nanga land system can be developed economically. Basically the system is not suitable for pastoral use.

8. The recommended sheep unit capacity for present condition and assuming the station is fully developed (which is not the case, see 7) is 7,700.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 8,850.

Individual Station Report

Nanga Station - 175,066 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Nanga	1,326	HEAT	1,299	27	—	—	4,398	4,420
Sandplain	261	ACSA	97	110	54	—	2,346	3,263
Nerren	61	AEGF	36	25	—	—	396	436
Birrida	33	SAMP	24	4	—	—	109	112
		SALT	4	1	—	—	93	100
Coquina	23	CDSH	7	6	—	—	130	163
		No veg	10	—	—	—	—	—
Zuytdorp	22	HEAT	22	—	—	—	73	73
Peron	14	ACSA	2	8	1	—	96	138
		HEAT	—	2	—	—	5	7
		HASP	—	1	—	—	3	5
Edel	8	CDSH	—	—	4	—	16	50
		SALT	—	—	3	—	19	60
		HEAT	—	—	1	—	2	3
McLeod	3	SAMP	2	—	—	—	8	8
		No veg	1	—	—	—	—	—
		SALT	—	—	—	—	—	—
Totals	1,751		1,504	184	63	—	7,694	8,838

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 7,700

Capability sheep unit capacity 8,850

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1969, 1979-80):

average (mean) 4,443

highest (1970) 6,370

lowest (1983) 1,920

Nerren Nerren Station - Shark Bay and Northampton Shires

Area 1,775 km²

Location

Nerren Nerren station is located on the Ajana and Yaringa 1:250,000 map sheets. The homestead is on the North-West Coastal Highway about 148 km north of Northampton. The station has common boundaries with Coburn, Meadow, and Murchison House stations, the Cooloomia Nature Reserve and vacant crown land.

Description

Only four land systems occur on the station and three of these are sandplain types.

The Nanga system (38.4% of total station area) occurs in the west and central parts. It consists of gently undulating red to yellow sandplain with confused sand ridges and hummocks up to 6m high. It supports a scrubby heath vegetation and pastoral value is very low.

The Nerren system is found in the south-east and north-east of the station and consists of gently sloping red sandplains. It supports a moderately

close tall shrubland dominated by wanyu with frequent patches of emergent trees of various eucalypts. Pastoral value is moderate.

The Cooloomia system (25.6%) occurs in the central west as a broad strip of country running from north to south for the full length of the station. It consists of undulating red sandplain and minor limestone plains. It supports tall shrublands with patchy eucalypts interspersed with more open areas and scrubby heath. Pastoral value is moderate.

The York system (3.4%) occurs in the centre and east of the station as nearly flat alluvial plains and unchannelled drainage zones sometimes with calcareous gradational or weakly gilgaied clay soils. It supports woodlands dominated by York gum and tall shrublands of curara, wanyu and other acacias. Pastoral value is high.

All land systems on the station are further described and their pastoral value for good range condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Nerren Nerren station

Pastoral value	Land systems	Area %
Very low (> 30ha/s.u.)	Nanga - undulating sand plains with confused sand ridges; scrub heath	38.4
Low (21-30ha/s.u.)	—	—
Moderate (10-20ha/s.u.)	Nerren - nearly flat to gently undulating red sandplains; wanyu shrublands with scattered trees of various eucalypts	32.6
	Cooloomia - undulating sandplains and minor limestone outcrop plains; tall and low shrublands with mallee form eucalypts, also scrubby heath	25.6
		58.2
High (5-9ha/s.u.)	York - nearly flat low lying alluvial plains sometimes with weakly gilgaied clay soils; eucalypt woodlands and tall acacia shrublands	3.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (248 recordings on 5 land systems)

Nerren Nerren

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cooloomia	41	100	—	—	—	7	49	37	5	2	56	37	7
Nanga	84	100	—	—	—	73	21	5	1	—	94	5	1
Nerren	109	100	—	—	—	9	34	30	25	2	43	30	27
Tarcumba	2	100	—	—	—	—	50	50	—	—	50	50	—
York	12	100	—	—	—	—	17	58	25	—	17	58	25
Total over all land systems	248	100	—	—	—	30	32	24	13	1	61	24	15

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 13 sites on 4 land systems.

Range condition and recommendations

1. Nanga land system (38.4%)

The Heath (HEAT) pastures of this system are almost all in very good or good condition and there is no erosion present. Pastures are of very low grazing value and it is unlikely that the system can be developed economically.

2. Nerren land system (32.6%)

Condition of the Acacia Eucalypt Short Grass Forb (AEGF) pastures is variable, but mostly fair or good although some restricted areas close to watering points have lost most desirable low shrubs and are degraded to poor condition.

When unburnt for many years the system supports a moderately dense tall shrubland dominated by wanyu and needle myall with numerous tree eucalypts. When in good condition desirable low shrubs such as cotton bush, tall saltbush and ruby saltbush are found scattered sparsely or clumped beneath the larger trees and tall shrubs. The system also supports sparse wanderrie grasses and forbs in season. It provides useful grazing, but pastures have only limited durability in dry times.

Controlled burning may be a useful management tool on the system but its use has not been researched. The effects of fire appear to be long term. Where the over-storey of tall shrubs has been killed by burning the low shrub layer and the ground layer is increased in diversity of species and in density. The fire-induced sub-climax vegetation appears to be more useful for livestock production than is the climax situation of dense tall shrubs and eucalypt trees.

3. Cooloomia land system (25.6%)

This system supports Acacia Eucalypt Short Grass Forb (AEGF) pastures and some Heath (HEAT) on the undulating sandy plains and useful Acacia Mixed Shrub (ACMS) pastures on restricted limestone plains or plains with thin sand cover over limestone. Pasture condition is predominantly good although some substantial areas are in fair condition. Much of the system, especially in the north-west of the station, is not fully used for grazing because of the lack of stock water supplies.

4. York land system (3.4%)

This system supports Saltbush (SALT) and Acacia Mixed Shrub (ACMS) pastures and is a preferred grazing area. Pastures are still moderately productive, but loss of desirable saltbush has occurred in parts. Some 25%, 58% and 17% of traverse records indicated poor, fair and good pasture condition respectively. The system has the potential to improve in condition if spelled over a number of consecutive growing seasons and conservatively stocked at other times.

5. The eastern half of the station is well developed in terms of paddocks, laneways and water points. The central western part is also developed with a number of large paddocks and water points. Other parts, notably in the far north-west and in the south-west, cannot be used for grazing because of the lack of permanent stock waters. The Cooloomia land system in the north-west of the station in the vicinity of the old Cooloomia homestead is in good condition and the provision of additional watering points to bring this country into production should be considered.

6. The recommended sheep unit capacity for present condition and assuming that the whole station was developed (which is not the case, see 5) is 9,650.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 11,400.

Individual station report

Nerren Nerren station - 177,541 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Nanga	681	HEAT	576	31	6	—	2,010	2,043
		HASP	64	3	1	—	333	340
Nerren	579	AEGF	249	174	156	—	3,369	4,136
Cooloomia	454	AEGF	171	160	32	—	2,238	2,593
		ACMS	38	8	—	—	840	920
		HEAT	45	—	—	—	150	150
York	61	SALT	8	29	12	—	598	980
		ACMS	2	7	3	—	129	240
Totals	1,775		1,153	412	210	—	9,667	11,402

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 9,650

Capability sheep unit capacity 11,400

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 5,374

highest (1972) 8,093

lowest (1984) 3,773

Ningaloo station - Carnarvon and Exmouth Shires

Area 497 km²

Location

Ningaloo station is located on the Ningaloo-Yanrey 1:250,000 map sheet. The homestead is situated about 32 km west of the Carnarvon-Exmouth road by access road which leaves the main road at a point about 95 km south of Exmouth. The station has common boundaries with Bullara and Cardabia stations and to Location 97 in the north. In the west it has a long coastline to the Indian Ocean.

Description

Five land systems occur on the station. The largest of these is Cardabia which occupies about 80% of the total station area. It consists of gently to strongly undulating sandy plains with linear dunes and occasional limestone rises and minor limestone plains. Vegetation is a hummock grassland of soft and hard spinifex with numerous patchy low shrubs including *Banksia ashbyi*. Buffel grass has colonized considerable areas and forms dense stands in some parts. Pastoral value is high where the vegetation is dominated by soft spinifex and buffel grass.

The Coast system (11.4%) extends as a narrow strip along the western edge of the station flanking the Indian Ocean. It consists of large, long walled

parabolic dunes and narrow swales, unstable blow-out areas and coastal fore-dunes and beaches. It supports moderately dense shrublands with coastal jam, minga bush, numerous low shrubs and grasses including introduced buffel grass. Pastoral value is high.

The Learmonth system (6.8%) occurs in the north-west as a strip between the Coast system to the west and the low limestone hills of the Range system to the east. It consists of sandy outwash plains with some stony limestone plains. Vegetation is a patchy shrubland of *Acacia ligulata*, *A. bivenosa* and numerous other shrubs, hard and soft spinifex and some buffel grass. Pastoral value is generally high.

The Range system (4.3%) of rough limestone ranges runs north to south as a narrow strip of country through the north-west of the station. Relief is generally 60-100 m but occasionally up to 150 m. Vegetation is very sparse shrubs and hard spinifex and there is much bare rock. Pastoral value is very low.

A small area of the McLeod land system (0.5%) occurs just north-west of the homestead. It consists of saline clay flats and marginal sandy plains. Vegetation is samphire, some saltbush, salt water couch and soft spinifex. Pastoral value is moderate.

All systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Ningaloo Station.

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Range - rough limestone ridges and hills with steep stony footslopes; scattered shrubs and hard spinifex	4.3
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	McLeod - saline clay flats with narrow marginal sandy plains; low shrublands of samphire and saltbush, also salt water couch	0.5
High (5-9 ha/s.u.)	Cardabia - gently to strongly undulating sandy plains with linear dunes and minor limestone rises and outcrop plains; hummock grasslands of soft and hard spinifex with numerous shrubs, also buffel grass	76.9
	Coast - large, long walled parabolic dunes and narrow swales, unstable blow out areas, coastal fore dunes and beach; shrublands with coastal jam, numerous low shrubs and grasses including buffel grass	11.5
	Learmonth - sandy outwash plains and limestone outcrop plains; shrublands of acacias and numerous other shrubs with hard spinifex, and some buffel grass	6.8
		95.2
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (83 recordings on 5 land systems)

Ningaloo

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	51	100	—	—	—	47	31	22	—	—	78	22	—
Coast	2	100	—	—	—	50	50	—	—	—	100	—	—
Learmonth	23	100	—	—	—	9	60	22	9	—	69	22	9
MacLeod	6	100	—	—	—	17	83	—	—	—	100	—	—
Range	1	100	—	—	—	—	—	100	—	—	—	100	—
Total over all land systems	83	100	—	—	—	34	44	20	2	—	78	20	2

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 5 sites on 3 land systems.

Range condition and recommendations

1. Cardabia land system (76.9%)

Pastures are Soft Spinifex and Hard Spinifex (SOSP, HASP) with some significant areas of introduced buffel grass. Pasture condition is predominantly good or very good and there is no erosion. Pasture condition in some heavily used paddocks near the homestead is reduced somewhat to fair condition this being indicated by an apparent increase in the proportion of hard spinifex to soft spinifex in the stand and an increase in the undesirable shrub coastal daisy bush.

Old, mature stands of spinifex are of little use for grazing and fairly regular controlled burning is required in order to maintain the pastures in an attractive condition for stock. To encourage establishment of grasses, shrubs and spinifex seedlings burnt areas should not be grazed for about 8-10 weeks over the growing season following the fire.

Much of the Cardabia system in the south is little grazed or not grazed as there are no permanent stock water supplies. Pastures are soft spinifex and buffel grass in very good condition. New attempts to provide good quality stock water points are required in order to bring the area into production.

2. Coast land system (11.5%)

The system is inherently highly susceptible to wind erosion if the vegetation is depleted or lost as a result of any disturbance. About 16 km² of the system (28%) consists of beach blowouts and large mobile dunes devoid of vegetation. Elsewhere, the system supports Coastal Dune Shrub pastures (CDSH) which contain palatable low shrubs such as *Rhagodia* species and ragged leaf scaevola below taller shrubs such as coastal jam and minga. Grasses include buffel grass, *Paspalidium tabulatum* and beach spinifex.

Because of its fragility, the system (despite carrying some useful pastures) is not suitable for pastoral use. It is currently used and great care needs to be taken with control of stock numbers and the positioning of access tracks and water points. To be able to exercise proper stock management the system should be fenced off from adjacent systems. This applies for the northern half of the station.

Fire should be avoided on the system.

3. Learmonth land system (6.8%)

Hard Spinifex and Soft Spinifex pastures of the system also contain some buffel grass and some useful low shrubs. Pasture condition is nearly all good with restricted areas in fair condition. There is no erosion.

4. Condition of the two minor systems Range (4.3%) and McLeod (0.5%) is generally good.

5. The station is not adequately watered as about 50% of its pastures are 5 km or more from stock waters. Much pasture is under-used. Additional waters are required especially in the south (see 1) and also in the north-east of the station.

6. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case, see 5) is 5,950.

7. The capability sheep unit capacity if all country was in good range condition and was fully watered is estimated at 6,800.

Individual station report

Ningaloo station - 49,731 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Cardabia	382	SOSP	239	67	—	—	4,542	5,100
		HASP	59	17	—	—	352	380
Coast	57	CDSH	41	—	—	16	513	713
Learmonth	34	SOSP	13	5	2	—	266	333
		HASP	5	2	—	—	32	35
Range	22	ACMS	7	—	—	—	140	140
		HASP	22	—	—	—	110	110
McLeod	2	SAMP	1	—	—	—	4	4
		SALT	—	—	—	—	—	—
		No veg	1	—	—	—	—	—
Totals	497		388	91	2	16	5,959	6,815

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 5,950

Capability sheep unit capacity 6,800

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 6,013

highest (1970-1972) 7,000

lowest (1979) 4,670

Peron station - Shark Bay Shire

Area 1,052 km²

Location

Peron station is located on the Shark Bay and Edel 1:250,000 map sheets. It occupies nearly all of the Peron Peninsular which protrudes into Shark Bay. In the south the station has a short boundary across the Taillefer Isthmus with Nanga station. The homestead is situated about 10 km north of the Denham township.

Description

About three-quarters of the station consists of gently undulating red sandplain and low sandhills of the Sandplain and Peron land systems. The Sandplain system (47.7% of total station area) extends from the north-east down to the central eastern part of the station. It supports a moderately close or close tall shrubland dominated by wanyu. The Peron system (27.7%) occurs in the north-west. It supports close shrublands and patchy thickets usually less than 2 m high and dominated by *Acacia ligulata* and *Lamarchea hakeifolia*. Pastoral value of both systems is high.

The Taillefer system (17.8%) is the third largest on the station and is found in the south. It consists of undulating sandplain with calcareous soils with some limestone ridges and outerop and coastal dunes. It supports hummock grasslands of spinifex *Triodia plurinervata* with numerous low shrubs especially *Acacia ligulata*. Pastoral value is moderate.

The only other system of importance is the Birrida system (5.4%) which occurs as low lying salt pans and depressions (up to 7 km in extent, but usually much less) amongst the sandplains of the Peron and Sandplain systems. Soils are highly saline and gypsiferous and vegetation is a low shrubland of samphire and saltbush. Pastoral value is moderate.

An additional four minor land systems occur on the station. All systems are briefly described and their pastoral value for good range condition status indicated in table 1.

Condition statement for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Peron station

Pastoral value	Land systems	Area %
Very low (>30 ha/s.u.)	—	—
Low (21-30 ha/s.u.)	—	—
Moderate (10-20 ha/s.u.)	Taillefer - undulating sandy plains over limestone, minor limestone ridges and coastal dunes; hummock grasslands of <i>Triodia plurinervata</i> and patchy shrubs	17.8
	Birrida - highly saline and gypsiferous pans and depressions; low shrublands of samphire and saltbush	5.4
	Coquina - low shelly foredunes, shell beaches and supra-tidal flats; vegetated parts support tall and low shrublands	0.3
	Littoral - low coastal foredunes, samphire flats and tidal flats with mangrove fringes; tall and low shrublands in parts	0.2
	McLeod - samphire flats and sandy plains with bare marginal mudflats, low shrublands of samphire and saltbush in parts.	0.2
		23.9
High (5-9 ha/s.u.)	Sandplain - gently undulating red sandplains and sand ridges; tall shrublands of wanyu	47.7
	Peron - undulating sandplains often with calcareous soils, minor coastal dunes; low shrublands and thickets of acacia and <i>Lamarchea hakeifolia</i>	27.7
	Edel - undulating sandy plains with minor low dunes, limestone rises and saline flats, low shrublands of acacia, saltbush, also some heath	0.7
		76.1
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (176 recordings on 7 land systems)

Peron

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Birrida	11	100	—	—	—	36	64	—	—	—	100	—	—
Edel	4	75	25	—	—	—	—	75	25	—	—	75	25
Littoral	1	100	—	—	—	—	—	100	—	—	—	100	—
MacLeod	5	100	—	—	—	40	60	—	—	—	100	—	—
Peron	59	100	—	—	—	5	49	31	12	3	54	31	15
Sandplain	61	100	—	—	—	18	15	39	25	3	33	39	28
Taillefer	35	68	23	6	3	—	17	43	29	11	17	43	40
Total over all land systems	176	93	5	1	1	11	31	34	19	5	43	34	23

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 16 sites on 4 land systems.

Range condition and recommendations

1. Sandplain land system (47.7%)

The Acacia Sandplain pastures (ACSA) of the system support scattered desirable low shrubs such as cotton bush, ruby saltbush, currant bush, *Rhagodia* species and *Chenopodium gaudichaudianum* below the taller wanyu and silver bark wattle. There are also numerous annual grasses and forbs in season. In terms of useful low shrubs the pasture is considerably more productive than the same type found further inland and has been assessed as having a higher potential carrying capacity.

Pasture condition varies considerably with 28% of traverse recordings indicating poor or very poor condition, 39% indicating fair condition and 33% indicating good or very good condition. There is no erosion on the system. Areas of pasture degradation are nearly always confined to within a few kilometres of major watering points or to small paddocks close to shearing facilities.

2. Peron land system (27.7%)

This system also supports the Acacia Sandplain pasture type although the taller shrub species differ somewhat from those found on the Sandplain system. Close to the west coast the shrubs become shorter and more stunted as a result of the wind effect and the pasture type becomes Heath (HEAT).

Pasture condition is mostly good or fair although some restricted areas around watering points are degraded to poor condition. There is no erosion on the system.

3. Taillefer land system (17.8%)

This system supports Hard Spinifex (HASP) pastures with minor areas of Coastal Dune Shrub (CDSH) and Saltbush (SALT) pastures. When in good condition the hard spinifex pastures have a good number of desirable small shrubs and herbaceous species such as cotton bush, ragged leaf scaevola, ruby saltbush, *Rhagodia latifolia* and others between the spinifex.

Pastures on the system are mostly more or less degraded to fair, poor or very poor condition. About 15 km² of the system in the south of the station near the new shearing shed is severely degraded with depleted pastures and serious wind erosion. The area has been burnt and subjected to excessive grazing pressure. In these circumstances the system is highly susceptible to wind erosion. The area should be spelled from grazing for at least one full year by which time reasonable recovery could be expected. Buffel grass is becoming established in some areas and has potential as a stabilising coloniser. Its spread should be encouraged.

Strategic burning may be a useful method of maintaining desirable palatable shrubs, herbs and grasses in the system but it must be accompanied by spelling until six or eight weeks after commencement of the growing season and conservative stocking for the remainder of the year. When in good condition the recommended stocking rate on a year long basis is about 1 sheep unit/11 ha. This represents about 1,700 total sheep units for the whole system.

4. Birrida land system (5.4%)

The Samphire (SAMP) and Saltbush pastures of this system are all in good or very good condition, and there is no erosion.

5. The minor systems Edel, Littoral and McLeod were not intensively sampled but, where seen, were mostly in good or fair condition.

6. Central part of the station are reasonably well developed with water points and paddocks but some extensive areas in the north, far south and east cannot be fully used for grazing because of the lack of permanent water supplies. The provision of water supplies to these areas needs to be considered.

7. The recommended sheep unit capacity for present condition and assuming that the station is fully developed (which is not the case, see 6) is 8,350.

8. The capability sheep unit capacity if all country was in good range condition is estimated at 11,650.

Individual station report

Peron station - 105,200 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	502	ACSA	166	196	140	—	4,268	6,275
Peron	291	ACSA	126	72	35	—	2,315	2,913
	—	HEAT	24	14	6	—	127	147
	—	HASP	8	4	2	—	100	117
Taillefer	187	HASP	32	66	55	15	900	1,400
	—	CDSH	—	5	5	—	56	125
	—	SALT	—	9	—	—	113	180
Birrida	57	SAMP	48	—	—	—	192	192
	—	SALT	9	—	—	—	180	180
Edel	7	CDSH	—	3	—	—	25	50
	—	SALT	—	2	—	—	25	40
	—	HEAT	—	1	—	—	3	3
Coquina	3	CDSH	2	—	—	—	25	25
	—	No veg	1	—	—	—	—	—
Littoral	3	CDSH	1	—	—	—	13	13
	—	No veg	1	—	—	—	—	—
	—	SAMP	1	—	—	—	4	4
McLeod	2	SAMP	1	—	—	—	4	4
	—	No veg	1	—	—	—	—	—
	—	SALT	—	—	—	—	—	—
Totals	1,052		421	372	244	15	8,350	11,668

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 8,350

Capability sheep unit capacity 11,650

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1972):

average (mean) 11,525

highest (1975) 20,000

lowest (1981) 5,045

Pimbee station - Carnarvon Shire

Area 565 km²

Location

Pimbee station is located on the Wooramel 1:250,000 map sheet. Access to the station is through Gascoyne Junction to the north-east or via Wahroonga and Edaggee stations to the North-West Coastal Highway in the west. The station has common boundaries with Yalbalgo, Winderie, Towrana, Meedo and Wahroonga stations.

Description

Nearly 90% of the station consists of sand dunes and sandy swales of the Yalbalgo land system. The system supports a woodland of sand dune gidgee or, less frequently, a tall shrubland of wanyu with a ground layer of wanderrie grasses. Pastoral value is moderate.

Gently undulating sandplain of the Sandplain system occupies about 7.5% of the station area and occurs in the south. Vegetation is similar to the Yalbalgo system.

The Target land system (3.4%) occurs in the south-east of the station. It consists of plains with low sandy banks, more clayey inter-bank areas and small but prominent drainage foci with denser vegetation than that surrounding. It supports tall shrublands with wanyu, other acacias and currant bush. Pastoral value is high.

A minor but very distinctive land system occurs in the east of the station. This is the Yagina system (1.3%) which consists of stony plains and low stony rises with stony claypans and minor sandy banks. Vegetation is a sparse shrubland of mulga, with other *Acacia*, *Cassia* and *Eremophila* species.

All land systems on the station are summarized in table 1. Condition statements for land systems and for the whole station (total over all land systems) are shown in table 2.

Table 1. Land systems on Pimbee station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplain with linear and reticulate dunes; tall shrublands of wanyu and woodlands of sand dune gidgee	87.0
	Sandplain - nearly flat to gently undulating red sandplain with wanyu shrublands and sand dune gidgee woodlands.	7.5
	Yagina - low stony plains, soil covered plains, stony claypans and minor sandy banks and dunes, sparse tall shrublands of mulga and wanyu	1.3
	Yaringa - sandy plains and limestone outcrop plains with occasional low dunes, tall acacia shrublands	0.4
		96.2
High (5-9 ha/s.u.)	Target - plains with sandy banks, more clayey inter-bank areas and numerous small drainage foci; mixed shrublands and acacia shrublands	3.4
Very high (< 5 ha/s.u.)	—	—
	Bare claypans	0.4
		100.0

Table 2. Condition statements derived from traverse records (72 recordings on 3 land systems)

Pimbee

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Sandplain	4	100	—	—	—	—	—	25	50	25	—	25	75
Yalbalgo	65	100	—	—	—	—	25	50	22	3	25	50	25
Yagina	3	100	—	—	—	—	—	33	67	—	—	33	67
Total over all land systems	72	100	—	—	—	—	22	49	25	4	22	49	29

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 5 sites on 2 land systems.

Range condition and recommendations

1. Yalbalgo land system (87%)

This system supports the Acacia Sandplain (ACSA) pasture type which has an upper layer of trees characterized by sand dune gidgee or, less frequently, a tall shrub layer of wanyu. The lower layers consist of very scattered low shrubs including a few palatable species and a prominent grass layer dominated by wanderrie grasses. About half of the pastures as seen on survey were in fair condition with the remainder being evenly distributed between good and poor. Poor condition was indicated by an almost complete lack of desirable low shrubs such as Wilcox bush, flat leaf bluebush and corky bark kallstroemia.

Because of the general sparsity of palatable shrubs, even when in good condition, and the rather short-lived nature of wanderrie grasses, the system has limited drought value. Opportunistic use can be made of the grass pastures in good seasons, but management needs to be flexible in times of drought.

Fire may be a useful management tool on this land system, but its use has not been researched.

2. Sandplain land system (7.5%)

The Acacia Sandplain pastures on this system were in very poor to fair condition. However, the system was not adequately sampled and the few recordings made were close to a watering point. More distant from water and in line with the system as seen in other parts of the survey area, over all condition is likely to be fair to good. As with the Yalbalgo system

the wanderrie grass pastures have limited drought value and fire is a potential management tool. Evidence seen on this system during survey suggests that the effects of fire are very long term. Where the over-storey of trees and tall shrubs has been killed by fire the low shrub layer and the ground layer is remarkably increased both in diversity of species and in density. This fire induced sub-climax appears to be considerably more useful for livestock production than is the mature sand dune gidgee or wanyu situation.

3. Target land system (3.4%)

This minor system was not sampled. However, its condition was expected to be similar to that seen on the system elsewhere in the survey area. Currant Bush Mixed Shrub pastures (CBMS) of the narrow plains between the sandy banks of the system are likely to show some degradation with loss of desirable shrubs. The other pastures of the system are expected to be in fair to good condition.

4. Yagina land system (1.3%)

Condition of the Acacia Short Grass Forb (ASGF) pastures on this stony rather unproductive system was fair to poor. The system produces useful forbs and annual grasses in season, but desirable low shrubs are very sparse and consequently the system has little drought durability.

5. The station is well watered except in northern parts of the north paddocks where some considerable areas are > 5 km from water and are probably under-used.

6. The recommended sheep unit capacity for present condition is 3,600.

7. The capability sheep unit capacity if all country was in good range condition is estimated at 4,850.

Individual station report

Pimbec station - 56,509 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	490	ACSA	123	245	122	—	3,044	4,083
Sandplain	43	ACSA	22	16	5	—	303	358
Target	20	CBMS	1	4	4	—	95	180
		ACSA	3	4	1	—	54	67
		ACCR	1	2	—	—	40	60
Yagina	8	ASGF	1	3	1	—	18	25
		ACSA	—	2	—	—	13	17
		ACMS	—	1	—	—	10	20
Yaringa	2	ACSA	—	2	—	—	13	17
		ACMS	—	—	—	—	—	—
large clay pans	2	No veg	2	—	—	—	—	—
Totals	565		153	279	133	—	3,590	4,827

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 3,600

Capability sheep unit capacity 4,850

Declared stock numbers (sheep units or equivalent)
1968-1984 (no data for 1970):

average (mean) 5,951

highest (1975) 8,400

lowest (1980) 1,200

Quobba station - Carnarvon Shire

Area 750 km²

Location

Quobba station is located on the Quobba and Minilya 1:250,000 map sheets. The homestead is situated close to the coast about 82 km north by road from Carnarvon. The station has common boundaries with Boolathana and Gnarlloo stations and fronts onto Lake McLeod in the east and the coastline of the Indian Ocean in the west.

Description

Nearly two-thirds of the station consists of undulating sandy plains, linear dunes and minor limestone ridges of the Cardabia land system. This system occurs as a continuous belt of country running down the centre of the property from north to south. It supports patchy shrublands usually under 2 m high with soft and hard spinifex understorey. Pastoral value is high.

The Warroora system (12.7% of total station area) occurs along the eastern edge of the station associated with the McLeod system (5.6%). It consists of almost flat or gently sloping saline alluvial plains, sluggish drainage tracts, limestone outcrop plains and minor sandy banks. The saline plains support low shrublands of saltbush and bluebush and the more sandy areas scattered tall acacia shrublands. Pastoral value is high. The McLeod system consists of saline

flats and sandy plains with bare marginal mudflats. The vegetated areas support low shrublands of samphire and saltbush. Taken over all, pastoral value is moderate.

The Coast land system (9.4%) occurs as a narrow strip along the western edge of the station. It consists of large, long-walled parabolic coastal dunes and narrow swales, unstable blow-out areas, minor limestone plains, rocky wave-cut platforms and sea cliffs. The system supports various low shrub communities which are sparse and wind pruned close to the coast and somewhat taller and more diverse on the more inland dunes. Pastoral value is high.

Two other sandy systems, Mallee (4.5%) and Brown (1.2%) are found on the station. The Mallee system is in the north-east and consists of undulating sandy plains with limestone at shallow depth and linear dunes similar to those of the Cardabia system. It supports a tall shrubland of acacias and mallee form eucalypts. The Brown system (which is in the south) consists of gently undulating sandy plains with moderately close tall shrublands of silver bark wattle and other acacias and numerous low shrubs. Pastoral value of both systems is moderate.

One other minor land system, Trealla, occurs on the station but is of little significance. All systems are summarized and their pastoral value for good range condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Quobba station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	McLeod - samphire flats and sandy plains with bare marginal mudflats; low shrublands of samphire and saltbush	5.6
	Mallee - undulating sandy plains with limestone at shallow depth, linear dunes and minor limestone outcrop plains; tall shrublands, acacias and mallee eucalypts, with spinifex	4.5
	Brown - gently undulating sandplains and occasional dunes; tall acacia shrublands	1.2
		11.3
High (5-9 ha/s.u.)	Cardabia - undulating sandy plains with linear dunes and minor limestone ridges and outcrop plains, low acacia shrublands with soft and hard spinifex	65.7
	Warroora - nearly flat, saline alluvial plains, sluggish drainage tracts and prominent drainage foci, limestone outcrop plains and sandy banks; low shrublands of bluebush and saltbush	12.7
	Coast - large, long-walled parabolic coastal dunes and narrow swales, unstable blow-out areas, minor limestone plains, rocky wave cut platforms and sea cliffs; low mixed shrublands and some spinifex	9.4
	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes; tall acacia shrublands	0.2
		88.0
Very high (< 5 ha/s.u.)	—	—
	Bare surfaces of Lake McLeod	0.7
		100.0

Table 2. Condition statements derived from traverse records (217 recordings on 6 land systems)

Quobba

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Brown	18	100	—	—	—	17	44	39	—	—	61	39	—
Cardabia	103	100	—	—	—	17	57	26	—	—	74	26	—
Coast	26	73	11	8	8	—	46	39	15	—	46	39	15
MacLeod	31	100	—	—	—	97	3	—	—	—	100	—	—
Mallee	4	100	—	—	—	—	25	50	25	—	25	50	25
Warroora	35	100	—	—	—	83	14	3	—	—	97	3	—
Total over all land systems	217	97	1	1	1	36	40	22	2	—	76	22	2

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 14 sites on 6 land systems.

Range condition and recommendations**1. Cardabia land system (65.7%)**

This system supports Soft Spinifex and Hard Spinifex (SOSP, HASP) pastures with an admixture of numerous low shrubs, some of which are useful types such as ruby saltbush, cotton bush and *Rhagodia* species. Pasture condition is predominantly good with the balance being in very good or fair condition. There is generally no erosion on the system although areas such as dune crests which may occasionally be bared by fire or excessive use near watering points are susceptible to wind erosion. However, the system revegetates rapidly after rain and stabilizes.

Old mature stands of spinifex are unattractive to livestock and fire is likely to be a useful management tool on this system although its use has not been researched in this environment. Periodic, controlled burning removes old spinifex tussocks and stimulates the growth of shrubs, herbs and grasses some of which are desirable palatable types. Burning on a rotational system would decrease the risk of wild fires over large areas. Burnt areas should not be stocked for about eight weeks over the growing season following the fire in order that seedlings of desirable plants can become established.

2. Warroora land system (12.7%)

The Bluebush and Saltbush (BLUE, SALT) pastures on this productive system are nearly all in very good condition and there is no erosion. Much of the system in the north-east is little used by livestock because of the excessive distance from stock water. Consideration needs to be given to supplying waters to bring this area into production. Ideally, water supplies need to be of low salinity as the dietary salt intake of sheep on bluebush and saltbush pastures is already high and excessive salt intake resulting from a combination of salty feed and salty water will severely reduce animal productivity and restrict grazing radii.

3. Coast land system (9.4%)

Traverse observations indicate that about half of the Coastal Dune Shrub (CDSH) pastures of the system are in good condition. Some considerable parts show minor pasture degradation to fair condition and restricted areas, mostly in the vicinity of water points, are degraded further to poor condition.

Some isolated parts of the system show moderate and severe wind erosion with deflation of the sandy surface to expose the underlying limestone pavement. About 5 km² of the system is severely degraded and consists of unvegetated sand blowouts and mobile dunes commencing at the coast and extending northwards. These areas are adjacent to 9 Mile well and 17 Mile well.

The Coast land system is inherently susceptible to wind erosion once the vegetative cover is depleted or removed by any agency such as fire, roadbuilding or overstocking. Its use for any purpose needs to be carefully planned and managed to minimize the risk of erosion. Burning should be avoided and ideally the system needs to be separately fenced so that complete control of intensity of grazing and season of use is possible.

4. McLeod land system (5.6%)

The Samphire (SAMP) and Saltbush (SALT) pastures on this system are in very good condition and there is no erosion. The pastures are highly saline and this, coupled with long distances from water or brackish water supplies, means that they are in general, only lightly used.

5. Mallee land system (4.5%)

This system was not intensively sampled but the pastures, where seen, were mostly in fair condition. As with the Cardabia system fire is a potential management tool.

6. Brown land system (1.2%)

This system supports Acacia Sandplain pastures (ACSA) and some saltbush (SALT) pastures. Condition varies from fair to very good, but is predominantly good. There is no erosion.

When in good condition numerous desirable low shrubs such as silver saltbush, cottonbush, ruby saltbush and *Rhagodia preissii* occur beneath taller acacias. Management should aim at maintaining these desirables in the stand.

7. The southern half of the station is well developed with paddocks and water supplies but elsewhere the station is not well watered. Considerable areas in the centre and north-east are > 5 km from stock water supplies. Consideration needs to be given to supplying water to bring these areas into use.

8. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case see 2, 7) is 9,050.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 10,350.

Individual station report

Quobba station - 74,973 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Cardabia	492	SOSP	292	102	—	—	5,717	6,567
		HASP	73	25	—	—	448	490
Warroora	96	BLUE	43	—	—	—	860	860
		SALT	39	—	—	—	780	780
		SAMP	14	—	—	—	56	56
Coast	70	CDSH	30	25	10	5	594	875
McLeod	42	SAMP	21	—	—	—	84	84
		SALT	8	—	—	—	160	160
		No veg	13	—	—	—	—	—
Mallee	34	HASP	5	10	5	—	71	100
		SOSP	4	7	3	—	137	233
Brown	9	ACSA	5	3	—	—	60	67
		SALT	1	—	—	—	20	20
Trealla	2	ACMS	2	—	—	—	40	40
		BLUE	—	—	—	—	—	—
Lake McLeod	5	No veg	5	—	—	—	—	—
Totals	750		555	172	18	5	9,027	10,332

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 9,050

Capability sheep unit capacity 10,350

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1970):

average (mean) 6,610

highest (1971) 8,270

lowest (1982) 4,737

Talisker station - Shark Bay Shire

Area 2,873 km²

Location

Talisker station is located on the Yaringa 1:250,000 map sheet. The homestead is about 90 km east by road from the North-West Coastal Highway through Woodleigh station. The station has common boundaries with Yalardy, Muggon, Meadow, Hamelin and Woodleigh stations and, in the south, to vacant crown land.

Description

About 95% of the station consists of almost flat to gently undulating red sandplain of the Sandplain land system. This system supports a moderately close tall shrubland dominated by wanyu but also with numerous other tall and low shrubs. Pastoral value is moderate.

Four other systems Nerren (2.7%), Snakewood (1.3%), Yalbalgo (0.5%) and Garry (0.3%) occur on the station.

The Nerren system is found in the centre of the station close to the homestead and in the far south-west. It consists of red sandplain very similar to the Sandplain system except that the vegetation includes prominent patches of eucalypt trees emergent from the tall shrubland of wanyu. Pastoral value is moderate.

The Snakewood system occurs only in the south-west of the station. It consists of nearly flat plains with duplex soils and supports tall shrublands of snakewood with a saltbush understorey. Pastoral value is high.

The Yalbalgo system, which consists of longitudinal sand dunes and sandy inter-dunal plains, occurs in the north-east of the station. It supports the same vegetation as the Sandplain system, that is a moderately close tall shrubland of wanyu and other acacias. Pastoral value is moderate.

In the centre of the station and in the north-east there are a number of small patches of the Garry land system. It consists of gently sloping stony plains, minor alluvial plains and drainage floors and low limestone rises. It supports scattered tall shrublands of mulga and other acacias with low shrubs of *Eremophila* and *Cassia* species and some low shrublands of sago bush. Pastoral value is moderate.

All the systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Talisker station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplains; moderately close to close tall shrublands of wanyu	95.2
	Nerren - nearly flat to gently undulating red sandplains; moderately close tall shrublands of wanyu with patches of emergent eucalypt trees.	2.7
	Snakewood - nearly flat plains with duplex soils; tall shrublands of snakewood with saltbush understorey	1.3
	Yalbalgo - sandplains with linear and reticular dunes; moderately close tall shrublands of wanyu	0.5
	Garry - gently sloping stony plains, minor alluvial plains and drainage floors and low limestone rises; scattered tall shrublands of mulga and other acacias also low shrublands of sago bush	0.3
		100.0
High (5-9 ha/s.u.)	—	—
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (185 recordings on 3 land systems)

Talisker

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Garry	2	100	—	—	—	—	—	100	—	—	—	100	—
Nerren	7	100	—	—	—	—	43	57	—	—	43	57	—
Sandplain	176	100	—	—	—	24	27	39	9	1	51	40	9
Total over all land systems	185	100	—	—	—	23	27	41	8	1	49	42	9

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 7 sites on 3 land systems.

Range condition and recommendations

1. Sandplain land system (95.2%)

The Acacia Sandplain (ACSA) pastures on this system are mostly in fair, good or very good condition. Good condition is indicated by scattered desirable shrubs such as warty leaf cremophila, Wilcox bush, cotton bush, tall saltbush, *Chenopodium gaudichaudianum* and sparse wanderrie grasses beneath the taller wanyu shrubs. Some restricted areas in existing paddocks show loss of desirable shrubs and are degraded to poor condition but elsewhere within paddocks the pasture condition is fair or good.

Desirable shrubs are only sparsely scattered even when the pastures are in good condition. For this reason, and also because of the relatively short-lived nature of wanderrie grasses, the pastures have only limited value in times of drought.

Fire may be a useful management tool on this land system, but its use has not been researched. Evidence seen elsewhere on this system suggests that the effects of fire are very long term. Where the overstorey of wanyu is killed by fire the low shrub layer and ground layer is considerably increased in diversity of species and in density. This fire-induced sub-climax vegetation appears to be considerably more productive for livestock production than are stands of mature wanyu.

At least 80% of this system is unused for grazing or is little used being >5 km from permanent stock water supplies. In the south and south-west the system is entirely unwatered being 30-60 km from the nearest supply.

2. Nerren land system (2.7%)

This system supports Acacia and Eucalypt Short Grass Forb (AEGF) pastures which are very similar to the Acacia Sandplain pastures of the Sandplain system. Condition of the pastures on the system near the homestead is all fair or good. The section of the system in the far south-west of the station was not inspected but, because it is unused for grazing, is expected to be in very good condition.

3. Snakewood land system (1.3%)

This small system in the far south-west was not inspected. The area is not grazed and Saltbush (SALT) pastures are expected to be in very good condition.

4. Yalbalgo and Garry land systems (0.5, 0.3% respectively)

The Yalbalgo system was not inspected, but is likely to be in good condition. The Garry system supports Acacia Short Grass Forb (ASGF) pastures on stony plains and Bluebush (BLUE) pastures on small alluvial plains. The Acacia Short Grass Forb pastures are in fair condition but the small inclusions of Bluebush pastures have been preferentially over-grazed and are in poor condition. Desirable low shrubs such as sago bush, silver saltbush and low bluebush are still present but at numbers well below potential. The pastures have the ability to recover if they can be spelled over a number of growing seasons and stocked conservatively at other times.

5. The southern and south-western parts of the station are undeveloped with no permanent stock water supplies or fences. Less than 20% of the pastures on the station are within 5 km of permanent water supplies.

6. The recommended sheep unit capacity for present condition and assuming that the station is fully developed (which is not the case see 1, 5) is 20,800.

7. The area commanded by the eight watering points in use at the time of survey can safely carry about 4,000 sheep units.

8. The capability sheep unit capacity if all country was in good range condition is estimated at 24,300.

Individual station report

Talisker station - 287,284 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	2735	ACSA	1,395	1,094	246	—	19,447	22,792
Nerren	78	AEGF	34	44	—	—	487	557
Snakewood	37	SALT	30	—	—	—	600	600
		ACMS	6	—	—	—	120	120
		ACSA	1	—	—	—	8	8
Yalbalgo	13	ACSA	13	—	—	—	108	108
Garry	10	ASGF	—	8	—	—	27	40
		BLUE	—	2	—	—	25	40
Totals	2,873		1,479	1,148	246	—	20,822	24,265

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 20,800

Capability sheep unit capacity 24,300

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 7,224

highest (1977) 12,677

lowest (1984) 4,413

Tamala station - Shark Bay Shire

Area 1,298 km²

Location

Tamala station is located on the Edel, Yaringa and Ajana 1:250,000 map sheets. The homestead is about 90 km west of the North-West Coastal Highway via the access road to Denham and Useless Loop. The station has common boundaries with Carrarang, Nanga and Murchison House stations and to the Cooloomia Nature Reserve. In the north the station has a boundary to the convoluted shoreline of Freycinet Estuary and in the west ends at the spectacular Zuytdorp cliffs overlooking the Indian Ocean.

Description

The largest land system on the station is Nanga (33.2%) which consists of undulating sandplains and occasional confused dunes. It occurs in the north-east and south-east of the station. It supports tree heath and scrub heath vegetation and pastoral value is very low. The south-eastern section is undeveloped and is not used for grazing.

The Zuytdorp system (22.3%) is restricted to the southern half of the station. It consists of elevated, undulating limestone plains with thin sand cover, sandy coastal slopes and sea cliffs up to 100 m above sea level. It supports scrub heath vegetation with some low halophytic components on the coastal slopes and cliffs. Pastoral value is very low. Nearly all of the system is undeveloped and is not used for grazing.

The Coast system (17.8%) is found in the north-west directly above the Zuytdorp cliffs. It consists of large, long-walled parabolic coastal dunes and narrow swales with minor limestone plains. There are a number of unstable blowout areas and unvegetated

mobile dunes. The system supports moderately close or close shrublands usually < 2 m high and often with useful halophytic low shrubs amongst the more heath like types. Pastoral value is high.

The Tamala land system (10.5%) is an important system found in the centre of the station and near the homestead. It consists of undulating sandy plains and plains with thin sand cover over limestone and prominent limestone rises. It supports moderately close tall shrublands of various acacias and extensive areas of annual grasslands and herb-fields which have replaced much of the original perennial vegetation. Much of the new vegetation is made up of introduced annual species of grasses, forbs and medics. Its pastoral value, as an annual pasture at a site of high expectancy for winter rainfall, is very high.

The Edel system (8.6%) in the north of the station is similar to Coast but with less relief. It consists of undulating sandy plains with minor low dunes, limestone rises and saline flats. It supports moderately close low shrublands with many useful shrub species and annual grasses and forbs. Pastoral value is high.

The Cullawarra system (6.6%) in the centre of the station consists of rough, undulating limestone plains and low hills and steep sea cliffs. It supports low shrublands of saltbush with patches of tall shrublands frequently with many exotic annual species in the ground layer. Pastoral value is very high.

One other minor land system (Birrida 1.0%), occurs on the station. It consists of saline flats and pans with low shrublands of saltbush and samphire.

All systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Tamala station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Nanga - undulating sandplains and occasional dunes; tree heath and scrub heath	33.2
	Zuytdorp - elevated, undulating limestone plains with thin sand cover, sandy coastal slopes and sea cliffs; heath and scrub heath	22.3
		55.5
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Birrida - highly saline and gypsiferous pans and depressions; low shrublands of samphire and saltbush	1.0
High (5-9 ha/s.u.)	Coast - large, long-walled parabolic coastal dunes and narrow swales, minor limestone plains, unstable blowout areas and mobile dunes; close low shrublands of acacias, saltbush, some scrub heath	17.8
	Edel - undulating sandy plains with minor low dunes, limestone rises and saline flats; low shrublands of acacias, saltbush, also some heath	8.6
		26.4
	Tamala - undulating sandy plains and plains with thin sand cover over limestone, minor limestone ridges; annual grasslands and herb-fields and tall acacia shrublands	10.5
Very high (< 5 ha/s.u.)	Cullawarra - undulating limestone plains and low hills, steep sea cliffs, low shrublands of saltbush, patches tall acacia shrublands and annual herb-fields	6.6
		17.1
		100.0

Table 2. Condition statements derived from traverse records (238 recordings on 7 land systems)**Tamala**

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Birrida	6	83	17	—	—	17	32	17	17	17	50	17	33
Coast	61	79	8	3	10	25	32	23	7	13	57	23	20
Cullawarra	9	100	—	—	—	11	45	11	11	22	56	11	33
Edel	44	96	2	—	2	34	39	20	7	—	73	20	7
Nanga	31	100	—	—	—	45	52	3	—	—	97	3	—
Tamala	60	77	13	10	—	—	13	30	27	30	13	30	57
Zuytdorp	27	100	—	—	—	81	4	15	—	—	85	15	—
Total over all land systems	238	88	6	3	3	29	28	20	11	12	57	20	23

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 21 sites on 6 land systems.

Range condition and recommendations**1. Nanga land system (33.2%)**

Heath (HEAT) pastures on this system are in good or very good condition. However, potential for pastoral use is very low and it is doubtful if the system can be economically developed. Most of the system is not used for grazing.

2. Zuytdorp land system (22.3%)

The Heath pastures on this system are predominantly in very good condition. Sandy coastal slopes and the tops of coastal cliffs carry a few useful halophytic shrubs, but most of the heath vegetation is of little use for grazing. Over all pastoral value is very low and the system does not warrant development for pastoral use. It is currently unused.

3. Coast land system (17.8%)

Condition of the Coastal Dune Shrub (CDSH) pastures of this system are extremely variable. Large areas are in good or very good condition but some considerable parts are degraded to fair, poor or very poor condition.

At least 9 km² of the system consists of wind eroded blowout areas with large unvegetated, mobile sand dunes. The largest single area of blowout and dunes is in West Beethan paddock and Whale paddock between Beethan outcamp and Whale well. The deflated areas of the blowouts where the sand has been removed to expose the undersurface of limestone rubble need to be fully protected from grazing. This will enable primary colonization to commence. Additional fencing will be required to enable the areas to be excluded from grazing.

Much of the system is poorly watered being at least 5 km or more from permanent stock water supplies. Consequently, much pasture is under used or not used at all.

The system can provide good quality grazing, but it is inherently sensitive to wind erosion if the vegetative cover becomes depleted. It is essential that control of intensity of use and season of use by livestock is done and this automatically requires adequate paddocking and sufficient, well distributed watering points.

4. Tamala land system (10.5%)

The system supports Exotic Annual (EXAN) pastures and Acacia Mixed Shrub (ACMS) pastures. The introduced annual species consist of wild oats, barley grass, lupins, wild turnip, medics and others and have almost completely replaced the original shrub vegetation. It appears that the original vegetation was partly cleared from some areas many years ago. Additional pressures on the vegetation from rabbits, goats and fires have also contributed to shrub loss. The annuals are productive under a regular pattern of winter rainfall and bind the soil surface. However, if over-grazed there is a high susceptibility to wind erosion and/or invasion by undesirable shrubs such as tomato bush.

The acacia mixed shrub pastures which occur elsewhere on the system vary in condition from good to very poor but are predominantly poor to very poor with depletion of desirable low shrubs. There is no erosion.

5. Edel land system (8.6%)

The system supports productive Coastal Dune Shrub (CDSH) pastures and minor areas of Saltbush (SALT) pastures. The coastal dune shrub pastures are almost all in good or very good condition with only very localized areas close to a few water points showing loss of desirable shrubs. The saltbush pastures are in fair to good condition.

Some of the system is little used because it is well in excess of 5 km from permanent stock water. For example, Talga paddock in the north-west of the station is not watered. Pasture condition is very good and the area needs to be brought into production so that stock can be more equitably spread over the station.

6. Cullawarra land system (6.6%)

The system supports Saltbush and Exotic Annual pastures. Condition of the saltbush pastures varies from very poor to very good depending largely on the distance from stock water. In some places the native shrub pastures have been more or less replaced by introduced annual pastures which supply good quality feed in season.

About half the system is little grazed as it is 5 km or more from permanent stock water.

7. The station is not adequately watered in that sizeable areas of the productive Edel and Cullawarra land systems (see 5 and 6) are well over 5 km from permanent supplies. Pastures in these areas are in good condition and consideration should be given to providing water supplies.

8. Over 50% of the station (the Nanga and Zuytdorp systems) is of very low pastoral value and is currently little used or unused because of the lack of water supplies and, in all probability, cannot be economically developed. The systems are unsuitable for pastoral purposes.

9. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case see 7, 8) is 11,500.

10. The watered area of the station is capable of safely carrying about 7,500 sheep units.

11. The capability sheep unit capacity if all country was in good range condition and was fully watered is estimated at 13,350.

Individual station report

Tamala station - 129,766 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Nanga	431	HEAT	376	12	—	—	1,283	1,293
		HASP	42	1	—	—	213	215
Zuytdorp	289	HEAT	246	43	—	—	928	963
Coast	231	CDSH	131	53	37	9	2,165	2,875
		EXAN	1	—	—	—	45	45
Tamala	136	EXAN	68	—	—	—	3,091	3,091
		ACMS	11	15	35	—	589	1,220
		SAMP	—	5	2	—	21	28
Edel	111	CDSH	83	7	4	—	1,104	1,175
		HEAT	10	1	—	—	36	44
		SALT	3	2	1	—	91	120
Cullawarra	86	SALT	38	7	22	—	985	1,340
		EXAN	19	—	—	—	864	864
Birrida	13	SAMP	6	2	3	—	37	44
		SALT	1	1	—	—	33	40
Totals	1,297		1,035	149	104	9	11,485	13,357

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 11,500

Capability sheep unit capacity 13,350

Declared stock numbers (sheep units or equivalent)

1969-1984 (no data for 1968, 1970-71):

average (mean) 11,831

highest (1974) 19,000

lowest (1984) 5,031

Towera station - West Pilbara Shire

Area 2,061 km²

Location

Towera station is located on the Winning Pool and Edmund 1:250,000 map sheets. The homestead is about 40 km south of the North-West Coastal Highway from the turn-off at Barradale Roadhouse. The station shares boundaries with Uaroo, Maroonah, Lyndon, Winning and Nyang stations.

Description

Eighteen different land systems occur on the station. Most of these are sandy or stony plain systems although a number of low granitic hill systems occur in the east of the station. The channel of the Yannarie River runs through the property in a south-east to north-west direction and the Lyndon River passes through the south-west corner.

The largest land system is Durlacher (28% of total station area) which is common in the eastern half of the station. It consists of almost flat or gently undulating stony plains and interfluvies usually with a mantle of white quartz pebbles and rock fragments. There are also almost flat drainage floors and a few low stony ridges. The system supports scattered tall shrublands of mulga, snakewood and other acacias with various low shrubs including useful chenopod types. Pastoral value is moderate.

In the western half of the station a number of sandplain systems predominate. These are Uaroo (21.1%), Duffy (17.4%) and Giralia (5.1%).

The Uaroo system consists of nearly flat sand plains and minor pebbly plains often with calcrete at shallow depth. It supports hummock grasslands of hard and soft spinifex with numerous patchy shrubs. The Duffy system consists of gently undulating sandy plains, minor stony plains and rises and low granitic hills. It supports hummock grasslands of spinifex and scattered tall shrublands. The Giralia system consists of sandplains with large linear dunes. It

supports hummock grasslands of hard and soft spinifex with numerous shrubs. Pastoral value of the three systems is generally moderate, but declines as the proportion of hard spinifex increases.

The Yinnietharra system (7.9%) in the east consists of gently sloping sandy plains and broad drainage tracts receiving sheet and channelled flow, minor stony plains and low granitic hills. Vegetation is very scattered to moderately close tall shrublands of mulga and spreading gidgee. Pastoral value is moderate.

In the south-west of the station, an important system, Wash, is associated with flood out from the Lyndon River which at this point has no well defined channel. The system consists of sandy alluvial plains and broad drainage zones receiving concentrated sheet flow. The sandy plains support tall shrublands of spreading gidgee and numerous other acacias frequently arranged in patches of groves. Drainage tracts and floodplains support low woodlands of coolibah or tall shrublands with many low shrubs and scattered perennial grasses in the understorey. Pastoral value is high.

The Channel system (2.9%) occurs as a narrow strip flanking the Yannarie River in the centre and north-west of the station. It consists of the river channel, banks, narrow flood plains and steeper marginal slopes to the adjoining systems. Vegetation consists of fringing woodlands of coolibah and river gum along the channels and banks and sparse tall acacia shrublands on the marginal slopes. Pastoral value is moderate.

Eleven additional land systems (totalling 10.2%) occur on the station. Of these James (2.3%), Agamemnon (0.6%), Capricorn (0.3%), Billy (0.2%), Prairie (0.1%) and Augustus (0.1%) are hill systems of low pastoral value.

All systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Towera station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Augustus - rugged mountains, hills and ridges of sedimentary rocks; tall shrublands of mulga and other acacias	0.1
Low (20-30 ha/s.u.)	James - low granite hills and ridges, undulating stony plains and lower plains; scattered tall acacia shrublands	2.3
	Agamemnon - rough hills and ridges of granite and gneiss; scattered tall acacia shrublands	0.6
	Capricorn - rugged sandstone hills, ridges, stony footslopes and stony interfluvies; scattered tall acacia shrublands, some spinifex	0.3
	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall acacia shrublands	0.2
		3.4

Table 1 continued...

Pastoral value	Land systems	Area %
Moderate (10-19 ha/s.u.)	Durlacher - gently sloping stony plains and drainage floors, minor stony ridges; scattered tall and low shrublands	28.0
	Uaroo - nearly flat sandy plains and minor pebbly plains with calcrete at shallow depth; hummock grasslands of hard and soft spinifex with numerous shrubs	21.1
	Duffy - gently undulating sandy and stony plains and drainage tracts, minor stony rises and low granitic hills; hummock grasslands of hard and soft spinifex, also tall shrublands	17.4
	Yinnietharra - gently sloping sandy plains and broad drainage tracts, minor stony plains and low granite hills; scattered tall shrublands of mulga and other acacias	7.9
	Giralia - sandy plains with large linear dunes; hummock grasslands of hard and soft spinifex with numerous shrubs	5.1
	Channel - major river channels, banks, narrow flood plains and dissected marginal slopes; fringing woodlands and scattered tall shrublands	2.9
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; tall shrublands of spreading gidgee and other acacias sometimes groved	2.8
	Collier - low hills of sandstone and quartzite and stony undulating uplands; tall shrublands of mulga and other acacias	1.8
	Phillips - undulating stony uplands and low hills of crystalline rocks; scattered tall shrublands of mulga and other acacias	0.3
	Prairie - granite hills and undulating stony plains; scattered tall shrublands of mulga and other acacias	0.1
		87.4
High (5-9 ha/s.u.)	Wash - sandy alluvial plains and broad drainage tracts receiving concentrated sheet flow; tall, moderately close shrublands of spreading gidgee and other Acacia species sometimes groved, also scattered low woodland of coolibah and acacias with numerous other shrubs and perennial grasses	7.4
	River - Narrow active floodplains, channels and banks; fringing woodlands of river gum, coolibah and acacias	0.9
	Winning - low plains and broad drainage tracts, scattered tall shrublands of snakewood	0.8
		9.1
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (314 recordings on 14 land systems)

Towera

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Agamemnon	4	100	—	—	—	—	—	100	—	—	—	100	—
Billy	1	100	—	—	—	—	100	—	—	—	100	—	—
Channel	5	100	—	—	—	20	40	40	—	—	60	40	—
Collier	5	100	—	—	—	20	60	20	—	—	80	20	—
Duffy	86	86	12	2	—	13	31	30	16	10	43	30	27
Durlacher	85	94	4	2	—	7	19	50	22	2	26	49	25
Glenburgh	1	100	—	—	—	—	100	—	—	—	100	—	—
James	3	100	—	—	—	34	33	33	—	—	67	33	—
Phillips	2	100	—	—	—	—	—	100	—	—	—	100	—
River	2	100	—	—	—	—	100	—	—	—	100	—	—
Uaroo	45	100	—	—	—	44	47	9	—	—	91	9	—
Windalia	19	95	5	—	—	11	47	26	16	—	58	26	26
Wash	22	100	—	—	—	—	18	68	14	—	18	68	14
Yinnietharra	34	100	—	—	—	18	44	26	9	3	62	26	12
Total over all land systems	314	95	4	1	—	15	32	36	13	4	48	35	17

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 19 sites on 9 land systems.

Range condition and recommendations

1. Durlacher land system (28%)

The broad stony plains and upper parts of the system support Acacia Short Grass Forb (ASGF) pastures whereas the drainage tracts and lower plains support more productive Stony Chenopod (STCH) pastures. Pasture condition is predominantly fair, however, all levels of condition from very good to very poor were encountered. About one-quarter of the traverse records indicated pasture degradation to poor or very poor condition. There is occasional erosion as water stripping and rilling on drainage tracts, but the major parts of the system are inherently resistant to erosive processes due to their stony mantle.

Degraded condition on the acacia short grass forb pastures is indicated by the general loss of desirable low shrubs such as ruby saltbush, cotton bush, flat leaf bluebush and green cassia from below the mulga. On drainage tracts which may be weakly gilgaied the pastures become the stony chenopod type usually beneath snakewood. Desirable low shrubs include sago bush, ruby saltbush, currant bush, tall saltbush and *Cassia hamersleyensis*. Patchy stands of never fail grass and Roebourne plains grass occur in the stony gilgaies.

Degraded parts of the system have the potential to recover well if they are spelled for a number of consecutive growing seasons and stocked conservatively at other times.

2. Uaroo land system (21.1%)

Hard Spinifex (HASP) and Soft Spinifex (SOSP) pastures on this system are all in good or very good condition and there is no erosion.

Old mature stands of spinifex are of little use for grazing and fire is a recommended management tool to maintain the pastures in attractive condition for livestock. Periodic controlled burning removes old spinifex tussocks and stimulates the growth of shrubs, herbs and grasses some of which are desirable palatable types. Burning on a rotational system decreases the risk of wild fires over large areas. Burnt areas should not be stocked for about eight weeks over the growing season following the fire in order that seedlings of desirable plants can become established.

3. Duffy land system (17.4%)

This system supports Hard Spinifex and Soft Spinifex pastures on sandy and stony plains and Acacia Short Grass Forb on drainage tracts and some stony plains.

Condition of the spinifex pastures is mostly good or very good although localized areas are somewhat degraded to fair or poor condition. The Acacia Short Grass Forb pastures are in much poorer condition. Condition is mostly fair, but substantial areas are in poor or very poor condition with loss of desirable shrubs such as cotton bush, tall saltbush and currant bush.

About 10 km² of the system is severely degraded with much depleted pastures and some erosion. These areas are in the south-east of Woolkarra paddock and south-west of Chearie paddock near Chearie mill and in Three Mile paddock. Woolkarra and Three Mile paddocks would benefit from spelling over a number of seasons to encourage pasture recovery.

4. Yinnietharra land system (7.9%)

Acacia Short Grass Forb and Stony Chenopod pastures are generally in fair, good or very good condition. There is no erosion and over all range condition is predominantly good.

5. Wash land system (7.4%)

Productive Acacia Creek-line (ACCR), Tussock Grass (TUGR) and Acacia Short Grass Forb (ASGF) pastures on this system are largely in fair condition with much lesser areas in good and poor condition. There is no erosion.

6. Giralia land system (5.1%)

This system was not traversed but, as it is a spinifex based system, pasture condition is likely to be good and there would be no erosion.

Periodic burning (as for the Uaroo system, see 2) is a recommended management procedure.

7. Channel land system (2.9%)

This system and the similar River system (0.9%) were not intensively sampled but, where seen, were in good or fair range condition. Buffel grass is well established along the banks and narrow flood out zones associated with the system.

8. Windalia land system (2.8%)

The Acacia Short Grass Forb, Acacia Creek-line and Stony Chenopod pastures of the system are mostly in fair, good or very good condition.

9. The many other small land systems on the station were not intensively sampled but, where seen, were in fair or good range condition without any erosion problems.

10. Although a number of mills were not in use at the time of survey the station is reasonably well developed with waters and paddocks. However a number of additional watering points, either by upgrading existing supplies or providing new supplies, are required in order to make full use of available pastures. For example considerable areas in North Pindarra paddock and the north of Pongo paddock are > 5 km from permanent stock water supplies.

11. The recommended sheep unit capacity for present condition assuming that the station is fully watered is 13,950.

12. The capability sheep unit capacity if all country was in good range condition is estimated at 17,550.

Individual station report

Towera station - 206,114 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Durlacher	577	STCH	46	162	81	—	1,463	2,408
		ASGF	42	132	57	—	793	1,155
		ACCR	29	28	—	—	860	1,140
Uaroo	436	HASP	278	27	—	—	1,480	1,525
		SOSP	119	12	—	—	2,083	2,183
Duffy	358	HASP	82	56	41	—	699	895
		ASGF	—	47	50	10	282	535
		SOSP	40	19	13	—	877	1,200
Yinnietharra	163	ASGF	43	21	9	—	308	365
		STCH	34	16	7	—	387	475
		ACCR	33	—	—	—	660	660
Wash	152	ASGF	16	62	13	—	319	455
		ACCR	8	31	7	—	505	920
		TUGR	3	10	2	—	275	500
Giralia	106	HASP	61	3	—	—	315	320
		SOSP	40	2	—	—	683	700
Channel	59	HASP	45	2	—	—	232	235
		ACCR	5	1	—	—	110	120
		No veg	6	—	—	—	—	—
Windalia	57	ASGF	26	14	6	—	192	230
		ACCR	5	1	—	—	110	120
		STCH	—	3	2	—	22	42
James	47	SSGF	27	13	—	—	151	160
		STCH	5	2	—	—	52	58
Collier	38	ASGF	17	4	—	—	98	105
		SSGF	8	2	—	—	39	40
		STCH	6	1	—	—	55	58
River	18	ACCR	9	—	—	—	180	180
		TUGR	6	—	—	—	300	300
		No veg	3	—	—	—	—	—
Winning	17	BLUE	10	2	—	—	225	240
		SOSP	3	—	—	—	50	50
		STCH	2	—	—	—	17	17
Agamemnon	12	SSGF	11	—	—	—	44	44
		ACCR	—	1	—	—	10	20
Phillips	6	SSGF	5	—	—	—	20	20
		STCH	1	—	—	—	8	8
		ACCR	—	—	—	—	—	—
Capricorn	6	HASP	4	—	—	—	20	20
		SSGF	2	—	—	—	8	8
		ACCR	—	—	—	—	—	—
Billy	5	SSGF	3	—	—	—	12	12
		ASGF	2	—	—	—	10	10
Prairie	2	ASGF	2	—	—	—	10	10
		SSGF	—	—	—	—	—	—
Augustus	2	ACCR	—	—	—	—	—	—
		ASGF	2	—	—	—	10	10
		ACCR	—	—	—	—	—	—
Totals	2,061		1,089	674	288	10	13,974	17,553

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 13,950

Capability sheep unit capacity 17,550

Declared stock numbers (sheep units or equivalent)

1974-1984 (no data for 1968-73):

average (mean) 8,786

highest (1976) 22,656

lowest (1980) 570

Towrana station - Upper Gascoyne Shire

Area 1,627 km²

Location

Towrana station is located wholly on the Wooramel 1:250,000 map sheet. The homestead is about 50 km due south by road from Gascoyne Junction. The station has common boundaries with Winderie, Dairy Creek, Carey Downs, Callytharra Springs, Gilroyd, Meedo and Pimbee stations.

Description

Nearly 60% of the station consists of sandplains with many linear and reticulate dunes up to about 12 m in height. This is the Yalbalgo land system which supports a moderately close or close tall shrubland dominated by wanyu or a woodland of sand dune gidgee. Pastoral value is moderate.

The second largest system on the station is Sandplain (17.8%) which is found mainly in the central west and south of the station. It consists of almost flat or gently undulating red sandplain and supports a close tall shrubland of wanyu with some minor areas of sand dune gidgee woodland. Pastoral value is moderate.

The Yagina land system (6.1%) occurs as isolated patches in north central and north-western parts of the station. It consists of stony plains and stony claypans with small areas of soil covered plains and sandy banks and dunes. It supports scattered tall shrublands of mulga and other acacias and pastoral value is moderate.

The Wooramel system (5.7%) in the east consists of sandy plains and stony plains often with hardpan at shallow depth. It supports tall shrublands of wanyu on the sandy sections and sparse tall shrublands of mulga and other acacias on the more stony plains. Pastoral value is moderate.

The Target system (5.7%) occurs in the south-west of the station. It consists of plains with sandy banks, more clayey inter-bank areas and numerous small drainage foci. It supports tall shrublands of wanyu, silver bark wattle, curara and prickly acacia with numerous low shrubs. The vegetation in the drainage foci is much denser than on the surrounding plains. Pastoral value is high.

The channel of the Wooramel River passes through the southern part of the station and is flanked by the Channel land system (3.6%). The system includes the river channel and banks and adjacent dissected marginal slopes and low breakaways with hardpan exposure. The channels and banks support narrow fringing woodland communities and the dissected slopes support very scattered tall acacia shrublands. Overall pastoral value is low.

A minor system, Sandiman (1.7%) occurs in the north-east of the station. It consists of undulating stony uplands with low breakaways and ridges. It supports scattered tall shrublands of mulga and other acacias with *Cassia* and *Eremophila* species in the low shrub layer. Pastoral value is moderate.

All the land systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Towrana station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	Channel - major channels and banks with dissected marginal slopes and plains with low breakaways; very scattered tall shrublands	3.6
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with large linear and reticulate dunes; close tall shrublands of wanyu or woodlands of sand dune gidgee.	59.4
	Sandplain - nearly flat to gently undulating red sandplains; close tall shrublands of wanyu	17.8
	Yagina - low stony plains, soil covered plains, stony claypans and minor sandy banks and dunes; scattered tall shrublands of mulga, wanyu and other acacias	6.1
	Wooramel - sandy plains and stony plains with hardpan at shallow depth; scattered tall shrublands of wanyu and mulga	5.7
	Sandiman - undulating stony uplands with low breakaways and ridges; scattered tall shrublands of mulga and other acacias	1.7
		90.7
High (5-9 ha/s.u.)	Target - plains with sandy banks, more clayey inter-bank areas and numerous small drainage foci; scattered to moderately close tall shrublands of wanyu, silver bark wattle and other acacias	5.7
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (234 recordings on 7 land systems)**Towrana**

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Channel	2	50	—	50	—	—	—	—	100	—	—	—	100
Sandiman	7	100	—	—	—	—	—	86	14	—	—	86	14
Sandplain	26	100	—	—	—	—	46	54	—	—	46	54	—
Target	28	100	—	—	—	7	36	50	7	—	43	50	7
Wooramel	32	97	3	—	—	3	16	43	38	—	19	43	38
Yalbalgo	123	99	1	—	—	—	25	45	29	1	25	45	30
Yagina	16	100	—	—	—	—	19	62	13	6	19	62	19
Total over all land systems	234	99	1	—	—	1	26	48	24	1	27	49	24

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 15 sites on 6 land systems.

Range condition and recommendations**1. Yalbalgo land system (59.4%)**

Condition of the Acacia Sandplain (ACSA) pastures of this system is predominantly fair although substantial parts are also in good and poor condition. There is no erosion on the system.

Good condition is indicated by a sparse scattering of useful low shrubs such as tall saltbush, Wilcox bush, flat leaf bluebush and corky bark kallstroemia below the taller wanyu shrubs. In paddocks close to the homestead the pastures show varying degrees of loss of desirable shrubs to fair or poor condition. Wanderric grasses provide valuable feed in season as do wanyu beans in good seasons. Even when in good condition the pastures have only limited value in times of drought.

2. Sandplain land system (17.8%)

The system supports the same Acacia Sandplain pasture type as the Yalbalgo system. Pasture condition is about evenly distributed between fair and good and there is no erosion. Fire may be a useful management tool on this system, but its use has not been researched. Evidence seen elsewhere on this system suggests that the effects of fire are very long term. Where the over-storey of wanyu is killed by fire the low shrub layer and ground layer is considerably increased in diversity of species and in density. The fire induced sub-climax vegetation appears to be more productive for livestock production than old stands of mature wanyu.

3. Yagina land system (6.1%)

The system supports Acacia Short Grass Forb (ASGF) pastures on the stony plains and Acacia Sandplain on the sandy units. Pasture condition is mostly fair but varies from poor to good. There is no erosion.

4. Wooramel land system (5.7%)

Condition of the Acacia Sandplain and Acacia Short Grass Forb pastures on the system is mostly fair or poor. Durable low shrubs have been

moderately depleted in most areas where the system was assessed. The system should be occasionally spelled from grazing over a growing season to enable the recovery of desirable shrubs.

5. Target land system (5.7%)

The system supports Acacia Sandplain pastures on the sandy banks and Currant Bush Mixed Shrub (CBMS) pastures on the more clayey inter-bank areas. The acacia sandplain pastures are in fair or good condition. Condition of the Currant Bush Mixed Shrub pastures is predominantly fair, but varies from good to poor.

6. Channel land system (3.6%)

The system was insufficiently sampled to be able to make any definite statements about condition.

7. Sandiman land system (1.7%)

Stony Chenopod (STCH) and Stony Short Grass Forb (SSGF) pastures are in fair condition and there is no erosion on the system.

8. Central, northern and eastern parts of the station are well developed in terms of paddocks and watering points. In the south and west the station is only partly developed and some areas are inadequately watered. At the time of survey these latter areas were being run by the adjoining stations Gilroyd and Pimbee by arrangement with the lessee of Towrana.

9. The recommended sheep unit capacity for present condition and assuming that the station is fully developed is 10,200.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 13,700.

Individual station report

Towrana station - 162,735 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	966	ACSA	241	435	290	—	5,887	8,050
Sandplain	290	ACSA	133	157	—	—	2,090	2,417
Yagina	99	ASGF	14	41	14	—	242	345
		ACSA	5	15	—	—	135	167
		ACMS	2	8	—	—	120	200
		ACSA	10	23	23	—	319	467
Wooramei	93	ASGF	5	13	19	—	116	185
Target	93	CBMS	12	18	12	—	540	840
		ACSA	19	18	—	—	271	308
		ACCR	—	14	—	—	140	280
Channel	58	SSGF	25	24	—	—	180	196
		ACCR	2	1	—	—	50	60
		No Veg	6	—	—	—	—	—
Sandiman	28	STCH	—	15	3	—	85	150
		SSGF	—	9	1	—	32	40
Totals	1,627		474	791	362		10,207	13,705

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 10,200

Capability sheep unit capacity 13,700

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1972):

average (mean) 8,198

highest (1970) 14,991

lowest (1980) none

Wahroonga station - Carnarvon Shire

Area 831 km²

Location

Wahroonga station is located on the Wooramel 1:250,000 map sheet. The homestead is about 120 km south-east from Carnarvon via the North-West Coastal Highway and station access road. The station has common boundaries with Marron, Yalbalgo, Pimbee, Mcedo, Wooramel and Edaggee stations.

Description

Only four land systems namely Yalbalgo, Sandal, Ella and Lyons occur on the station and two of these (Yalbalgo and Sandal) collectively occupy about 96% of the total station area.

The Yalbalgo system occupies the whole of the eastern half of the station. It consists of linear sand dunes with up to 15 m relief above sandy swales and supports a moderately close tall shrubland of wanyu or woodland or sand dune gidgee. Pastoral value is moderate.

The Sandal system is found in the west and consists of nearly flat alluvial plains with numerous low sandy banks and rises. The plains support tall shrublands of various acacias and numerous low shrubs and the sandy banks support tall shrublands of wanyu or silver bark wattle. Pastoral value is high.

The minor systems Ella and Lyons occur in central parts of the station. All systems are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Wahroonga station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (21-30 ha/s.u.)	—	—
Moderate (10-20 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes and sandy swales; tall shrublands of wanyu or woodlands of sand dune gidgee	57.0
High (5-9 ha/s.u.)	Sandal - alluvial plains with numerous low sandy banks and rises, duplex and sand soils; mixed tall shrublands of various acacias and numerous low shrubs	38.7
	Ella - short linear dunes and sandy banks, inter-dunal plains with more clayey soils and drainage foci; tall shrublands of wanyu and other acacias	3.5
	Lyons - sandy alluvial plains with numerous large claypans and reticulate and linear dunes; tall shrublands of wanyu and other acacias	0.8
		43.0
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2 Condition statements derived from traverse records (157 recordings on 3 land systems)

Wahroonga

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	1	100	—	—	—	—	100	—	—	—	100	—	—
Sandal	73	100	—	—	—	—	8	39	37	16	8	38	54
Yalbalgo	83	100	—	—	—	17	52	29	2	—	69	29	2
Total over all land systems	157	100	—	—	—	9	32	33	18	8	41	33	26

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at ten sites on two land systems.

Range condition and recommendations

1. Yalbalgo land system (57%)

The Acacia Sandplain (ACSA) pastures of the system are mostly in good or very good condition with only minor parts reduced to fair condition. There is no erosion.

When in good condition the pasture supports very scattered desirable low shrubs such as Wilcox bush, corky bark kallstroemia, warty leaf cremophila and cotton bush and wanderrie grasses beneath the taller wanyu shrubs. Because of the general scarcity of palatable shrubs and the rather short lived nature of wanderrie grasses the pastures have limited durability in times of drought. However, they provide good feed in reasonable seasons and should be used on a flexible basis. In general more use could be made of these pastures.

Controlled burning may be a useful management tool on these pastures but its use has not been researched.

2. Sandal land system (38.7%)

The system supports Currant Bush Mixed Shrub (CBMS) pastures on the interbanks and plains with duplex soils and Acacia Sandplain pastures on the sandy banks and rises.

The Currant Bush Mixed Shrub pastures are considerably degraded with marked loss of desirable low shrubs and, in many cases, marked increases in

undesirable types such as needle bush, waxy leaf poverty bush and bardie bush. There is no erosion. The pasture is still quite productive in terms of annuals and some useful perennial shrubs, but it is producing at well below potential and its usefulness for drought times is considerably reduced. As on the same system in other parts of the survey area the invasion by undesirable shrubs is a matter of concern. Practical methods of reducing undesirable species and replacing with better species are not known. The Acacia Sandplain pastures of the system are not as badly degraded as the Currant Bush Mixed Shrub pastures being predominantly in fair condition.

3. Ella (3.5%) and Lyons (0.8%) land systems

These small systems were not intensely sampled. They both support Currant Bush Mixed Shrub and Acacia Sandplain pastures as for the Sandal system. The former pastures are likely to be degraded to poor condition and the latter are most likely in fair condition.

4. The station is well developed in terms of paddocks, but is inadequately watered. About half the pastures on the station are > 5 km from permanent stock water supplies. The provision of additional water supplies needs to be considered so that stock can be more equitably distributed and grazing pressure reduced on parts of the Sandal land system.

5. The recommended sheep unit capacity for present condition is 6,150.

6. The capability sheep unit capacity if all country was in good range condition is estimated at 9,300.

Individual station report

Wahroonga station - 83,074 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	474	ACSA	327	138	9	—	3,624	3,950
		CBMS	—	32	113	—	1,106	2,900
		ACSA	21	69	38	—	758	1,067
Sandal	321	BLUE	—	11	37	—	369	960
		ACSA	9	9	2	—	139	167
		CBMS	1	2	3	—	64	120
Ella	29	ACCR	2	1	—	—	50	60
		ACSA	1	2	—	—	21	25
		CBMS	—	1	1	—	19	40
Lyons	6	ACCR	—	—	—	—	—	—
		ACSA	—	—	—	—	—	—
		No veg	1	—	—	—	—	—
Totals	830		362	265	203	—	6,150	9,289

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 6,150

Capability sheep unit capacity 9,300

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 7,639

highest (1969) 10,987

lowest (1980) 2,637

Wandagee station - Carnarvon Shire

Area 1,924 km²

Location

Wandagee station is located on the Winning Pool and Kennedy Range 1:250,000 map sheets. The homestead is close to the Minilya River, 60 km east of the Minilya bridge which is about 135 km north of Carnarvon on the North-West Coastal Highway. The station has common boundaries with Minilya, Mia Mia, Middalya, Hill Springs and Manberry stations.

Description

The Minilya River passes from east to west through the centre of the station. Barrabiddy Creek, a large tributary of the Minilya River, passes through the southern part.

Eighteen land systems occur on the station and ten of these (about 44% of the total station area) are of high pastoral value. One system, Barrabiddy (7.2%), is of very high pastoral value when in good range condition.

The largest system on the station is Jimba (26.3%). It occurs in the eastern half and consists of gently sloping alluvial plains with diffuse drainage zones, minor pebbly plains and low ridges. It supports tall and low shrublands with snakewood and other acacias and numerous low shrubs including various bluebush types and cassias.

The Giralia system (13%) is the second largest. It occurs mostly in the north-west and north-east and is little grazed. It supports spinifex hummock grasslands on sandplain with large linear dunes.

A number of important alluvial plain systems associated with the Minilya River and Barrabiddy Creek occur in the centre and south of the station. These include Target (9.5%), Barrabiddy (7.2%), Sandal (6.7%) and River (2.3%). All these systems support scattered to moderately close tall shrublands dominated by acacias such as snakewood, curara, silver bark wattle and wanyu, with numerous low shrubs.

Spot (5.8%) is a productive system lying to the north of the Minilya River between the low plains of the Jimba and Target systems and the spinifex sandplain of the Giralia system. It consists of alluvial plains with numerous low sandy banks and rises supporting tall acacia shrublands and some spinifex.

The Wandagee system (5.4%) in the centre of the station, is a distinctive nearly flat stony and clayey plain system based on sedimentary rocks of Permian age. It supports scattered tall shrublands of acacias with variable low shrubs including useful bluebush and saltbush.

In the south-west the predominant systems are O'Brien (4.5%) and Mary (4.3%). O'Brien consists of tributary alluvial plains and slightly more elevated upper plains and interfluvies. It supports tall shrublands dominated by spreading gidgee and the vegetation is frequently arranged in dense groves interspersed with less dense inter-grove areas across the plains. The Mary system consists of gently sloping plains with calcrete at the surface or at shallow depth. It supports scattered to moderately close tall shrublands with silver bark wattle and spreading gidgee and a prominent and characteristic low shrub layer of cassias.

Saline plains and low calcrete rises of the Yalkalya (5.1%) occur in the far north. The system supports scattered tall and low shrublands with snakewood, bluebush and saltbush.

Seven other small systems occur on the station. All systems are further summarized and their pastoral value for good range condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Wandagee station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (21-30 ha/s.u.)	Fossil - rugged hills and ridges of sedimentary rocks; sparse tall acacia shrublands	0.3
Moderate (10-20 ha/s.u.)	Jimba - gently sloping alluvial plains with diffuse drainage zones, minor pebbly plains and low ridges; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	26.3
	Giralia - sandy plains with large linear dunes; hummock grasslands of hard and soft spinifex with numerous shrubs	13.0
	O'Brien - tributary alluvial plains and slightly more elevated upper plains and interfluvies; tall acacia shrublands often with vegetation banded in groves	4.5
	Yalbalgo - sandplains with linear and reticulate dunes and sandy swales; tall shrublands of wanyu	3.5
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; very scattered tall shrublands of spreading gidgee	1.3
	Uaroo - nearly flat sandy plains and minor pebbly plains; hummock grasslands of hard spinifex with numerous shrubs	0.3
		48.9

Table 1 continued...

Pastoral value	Land systems	Area %
High (5-9 ha/s.u.)	Target - plains with sandy banks and more clayey inter-bank areas with numerous small drainage foci; scattered tall acacia shrublands with numerous low shrubs	9.5
	Sandal - alluvial plains with numerous low sandy banks and rises, duplex and sand soils; mixed tall shrublands various acacias and numerous low shrubs	6.7
	Spot - alluvial plains and plains with reticulate sandy banks and more clayey inter-bank areas; mixed tall shrublands of snakewood and other acacias some hard spinifex	5.8
	Wandagee - nearly flat stony plains and clayey plains with broad drainage zones and outcrop rises on sedimentary rocks; scattered tall shrublands of snakewood and other acacias with bluebush and saltbush	5.4
	Yalkalya - saline alluvial plains and low calcrete rises, scattered tall and low shrublands with snakewood, bluebush and saltbush	5.1
	Mary - gently sloping plains with calcrete at surface or at shallow depth, minor calcrete rises; tall shrublands of spreading gidgee and silver bark wattle with numerous cassias low shrubs	4.3
	Channel - major channels with narrow floodplains and dissected marginal slopes; fringing woodlands along channels, scattered shrublands of snakewood and bluebush	2.9
	River - narrow, active floodplains and major channels, fringing woodlands and tall acacia shrublands	2.3
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains; scattered tall acacia shrublands and low shrublands of bluebush	0.9
	Winning - low rises, extensive lower plains and broad drainage tracts; scattered tall shrublands of snakewood with bluebush and saltbush	0.7
		43.6
Very high (< 5 ha/s.u.)	Barrabiddy - active flood plains and broad drainage zones with numerous channels; tall shrublands of snakewood and other acacias with bluebush and saltbush	7.2
		100.0

Table 2 Condition statements derived from traverse records (300 recordings on 16 land systems)

Wandagee

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Barrabiddy	39	43	36	13	8	3	5	33	36	23	8	33	59
Channel	6	50	33	17	—	17	—	66	17	—	17	50	33
Fossil	1	100	—	—	—	—	—	100	—	—	—	100	—
Gearle	10	90	—	10	—	20	20	30	30	—	40	20	40
Giralia	5	100	—	—	—	20	80	—	—	—	100	—	—
Jimba	83	68	24	7	1	—	12	37	35	16	12	37	51
Mary	13	100	—	—	—	8	38	54	—	—	46	54	—
O'Brien	10	100	—	—	—	—	30	40	30	—	30	40	30
River	6	67	33	—	—	17	33	33	17	—	50	33	17
Sandal	8	100	—	—	—	—	87	13	—	—	87	13	—
Spot	12	100	—	—	—	8	51	33	8	—	59	33	8
Target	38	97	3	—	—	13	24	47	16	—	37	47	16
Wandagee	49	69	31	—	—	—	—	18	41	41	—	18	82
Windalia	5	80	20	—	—	—	—	60	40	—	—	60	40
Yalbalgo	3	100	—	—	—	—	100	—	—	—	100	—	—
Yalkalya	12	50	25	8	17	17	41	17	8	17	58	17	25
Total over all land systems	300	74	19	5	2	5	19	34	27	15	24	33	43

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 28 sites on 11 land systems.

Range condition and recommendations

1. Jimba land system (26.3%)

The system supports Acacia Short Grass Forb (ASGF) and Stony Chenopod (STCH) pastures. In general both types have lost desirable shrub species and are degraded to fair, poor or very poor condition. Minor and moderate erosion in the form of rilling, hummocking and thin sheeting is common on drainage plains and other parts not protected by a stony surface mantle. Some 50% of traverse records indicated poor range condition. In particular parts of Nalbia paddock are severely degraded. The paddock requires spelling over a number of consecutive growing seasons and conservative stocking at other times. Regeneration treatments involving soil cultivation and seeding should be considered.

2. Giralia land system (13%)

Hard Spinifex (HASP) and Soft Spinifex (SOSP) pastures are in good condition. Much of the system in the north of the station is not grazed because of the lack of stock waters. The provision of additional water supplies needs to be considered to enable use of this system and other systems in the north.

3. Target land system (9.5%)

The system supports productive Currant Bush Mixed Shrub (CBMS) pastures on inter-bank alluvial plain parts and less productive Acacia Sandplain (ACSA) pastures on sandy banks and rises. The former pastures are moderately degraded to fair range condition and the latter pastures are mostly in fair or good condition. There is no significant erosion.

4. Barrabiddy land system (7.2%)

This floodplain system supports Saltbush (SALT) and Tussock Grass (TUGR) pastures beneath snakewood and bardie bush and numerous other tall and low shrubs. Although the system is still moderately productive the pastures are often seriously degraded with extensive areas in very poor condition. Erosion in the form of rilling, guttering, sheeting and hummocking is common.

About 24 km² (18%) of the system is severely degraded with gross loss of desirable shrubs and active erosion. The worst affected areas are in parts of Mokine, Mungadan, Nalbia and Koolkilya paddocks and in the small paddocks near the shearing shed. A long term regeneration programme, involving complete destocking and soil cultivation and seeding where applicable, needs to be commenced in one or other of these paddocks and progressively carried through to the other paddocks.

5. Sandal land system (6.7%)

This system was not intensively sampled but where seen the Acacia Sandplain pastures were in good condition. Currant Bush Mixed Shrub pastures are likely to be somewhat degraded.

6. Spot land system (5.8%)

The most important pasture on the system is the Currant Bush Mixed Shrub type which is somewhat degraded to fair condition. It is likely that parts more distant from water are in better condition. There is no erosion on the system.

7. Wandagee land system (5.4%)

Saltbush and Stony Chenopod pastures are nearly all degraded to poor or very poor condition with large areas supporting only a very scattered cover of low shrubs. There is little erosion on the system, but productivity and drought durability are well below potential and over all range condition is poor.

The pastures have the potential to recover, but will require protection from use for a number of years and conservative grazing at other times. Strip cultivation and seeding works in the past have promoted the establishment of desirable saltbush shrubs but unless grazing pressure is carefully controlled the beneficial results of such treatments can be quickly nullified.

Most of the system falls within Mungadan, Nalbia and Koolkilya paddocks all of which have been previously mentioned (see 4) as requiring regeneration. One or other of these paddocks should be closed to grazing for a number of years and remedial works commenced. Such a programme should then be progressively extended to the other paddocks in the future.

8. Yalkalya land system (5.1%)

The system supports a mixture of Saltbush and Bluebush pastures and also some Hard Spinifex. Pasture condition varies from good to very poor largely depending on distance from water. Some parts of the system probably receive very little use because of the excessive distance from permanent water. Pastures near Quailing dam are over used and show minor to severe water erosion.

9. Condition of the remaining land systems on the station are summarized in table 2. Generally there is little erosion although parts of the Gearle system are inherently susceptible. Pasture condition is variable ranging from good to poor.

10. In some outlying parts, for example North Coolanberry and South Coolanberry paddocks in the north-west, the station is inadequately watered. Watered areas in central paddocks have carried excessive stock numbers in the past and as a consequence many pastures are significantly degraded. Additional water points are required so that a spelling programme can be commenced on degraded saltbush and bluebush pastures. Because of the general absence of good ground water these additional points may need to be provided by pipeline from existing supplies or as new dams.

11. The recommended sheep unit capacity for present condition and assuming the station is fully watered is 16,500.

12. The capability sheep unit capacity if all country was in good range condition is estimated at 24,800.

Individual station report

Wandagee station - 192,376 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Jimba	507	STCH	43	112	175	—	1,502	2,750
		ASGF	—	60	67	—	368	635
		ACSA	—	50	—	—	313	417
Giralia	250	HASP	150	—	—	—	750	750
		SOSP	100	—	—	—	1,667	1,667
Target	184	CBMS	12	52	19	—	1,009	1,660
		ACSA	39	31	4	—	535	617
		ACCR	—	27	—	—	270	540
Barrabiddy	139	SALT	—	38	35	24	694	1,940
		TUGR	8	8	26	—	504	1,400
Sandal	128	CBMS	50	8	—	—	1,100	1,160
		ACSA	44	7	—	—	410	425
		BLUE	17	2	—	—	365	380
Spot	112	CBMS	—	54	13	—	756	1,340
		HASP	34	—	—	—	170	170
		ACSA	11	—	—	—	92	92
Wandagee	104	SALT	—	9	39	4	357	1,040
		STCH	—	4	17	—	77	175
		ACCR	—	16	—	—	160	320
		HASP	15	—	—	—	75	75
		SALT	23	6	16	—	635	900
Yalkalya	99	BLUE	22	6	16	—	615	880
		HASP	8	2	—	—	47	50
O'Brien	87	ASGF	13	18	13	—	158	220
		STCH	7	8	7	—	122	183
		ACCR	7	8	6	—	250	420
Mary	83	ACMS	36	43	—	—	1,150	1,580
		BLUE	2	2	—	—	65	80
Yalbalgo	66	ACSA	33	—	—	—	275	275
		HASP	33	—	—	—	165	165
Channel	56	BLUE	5	14	9	—	331	560
		ACCR	3	9	5	—	175	340
		No veg	11	—	—	—	—	—
River	45	ACCR	11	8	4	—	320	460
		TUGR	8	5	3	—	512	800
		No veg	6	—	—	—	—	—
Windalia	25	ASGF	—	12	8	—	60	100
		ACCR	—	2	1	—	25	60
		STCH	—	1	1	—	8	17
Gearle	16	BLUE	4	2	4	—	130	200
		SALT	2	1	2	—	65	100
		TUGR	—	1	—	—	20	50
Winning	12	BLUE	4	4	—	—	130	160
		SOSP	2	—	—	—	33	33
		STCH	2	—	—	—	17	17
Uaroo	6	HASP	4	—	—	—	20	20
		SOSP	2	—	—	—	33	33
Fossil	5	ASGF	5	—	—	—	25	25
Totals	1,924		776	630	490	28	16,560	24,781

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 16,550

Capability sheep unit capacity 24,800

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 20,408

highest (1976) 27,465

lowest (1979) 14,430

Warroora station - Carnarvon Shire

Area 1,077 km²

Location

Warroora station is located on the Minilya and Winning Pool 1:250,000 map sheets. The homestead is about 163 km north from Carnarvon via the North-West Coastal Highway and the Minilya-Exmouth road. The station has common boundaries with Cardabia, Mia Mia and Minilya stations and a coastline along the Indian Ocean in the west.

Description

Ten land systems occur on the station. All are accessible to livestock and most are of high pastoral value.

The largest system is Cardabia (30.5% of the total station area) which occurs as a large single area in the west and north-west. It consists of undulating sandy plains with linear dunes and minor limestone ridges and supports hummock grasslands of soft and hard spinifex with numerous shrubs. Near the homestead the spinifex has been replaced by introduced buffel grass.

The Coast land system (2.4%) occurs as a narrow strip along the coastline to the immediate west of the Cardabia system. It is comprised of large, long walled parabolic coastal dunes and narrow swales with beaches and minor areas of limestone exposure. It supports a wide range of tall and low shrubs with some soft spinifex and buffel grass.

Gently sloping outwash plains and more elevated stony limestone plains of the Donovan system (28.7%) occur as a strip running the full length of the eastern side of the station. The outwash plains support low shrublands of Gascoyne bluebush with scattered tall shrubs of snakewood. Slightly more elevated plains support moderately close tall shrublands dominated by silver bark wattle with numerous low shrubs.

The Warroora system (13.5%) occurs in the centre of the station and consists of nearly flat, saline alluvial plains with sluggish drainage tracts and prominent drainage foci and minor sandy banks. It supports low shrublands of samphire, bluebush and saltbush on the plains and tall shrublands mainly of silver bark wattle on the sandy banks.

Elevated limestone plains of the Trealla land system (13.1%) occur in the south-west of the station and also as smaller outliers in the Warroora system in central parts. The system supports moderately close to close tall shrublands dominated by silver bark wattle, curara and snakewood with numerous useful low shrubs.

The Chargoo system (5.9%) is a productive system found in the south central part of the station immediately at the head of Lake McLeod. It consists of nearly flat, highly saline alluvial plains with numerous large drainage foci and swampy depressions supporting low shrublands of various saltbush types, frankenia and samphire.

The Jubilee (3.4%) and Firecracker (2.3%) systems occur in the north-east of the station as low hills and elevated limestone uplands. The Jubilee system supports hummock grasslands of hard and soft spinifex with scattered shrubs and the Firecracker system supports low shrublands of Gascoyne bluebush with very scattered tall shrubs, mainly snakewood.

Two other very small systems Marloo and Gearle occur on the station but are of little significance. All systems are further summarized and their pastoral value for good condition status indicated in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Warroora station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Jubilee - limestone hills and undulating stony plains, hummock grasslands of hard and soft spinifex with numerous shrubs	3.4
High (5-9 ha/s.u.)	Cardabia - undulating sandy plains with linear dunes, minor limestone ridges and outcrop plains, hummock grasslands of soft and hard spinifex with numerous shrubs	30.5
	Donovan - gently sloping outwash plains and minor limestone plains; low shrublands of Gascoyne bluebush and snakewood, also moderately close tall shrublands of silver bark wattle and other acacias	28.7
	Warroora - nearly flat saline alluvial plains, sluggish drainage tracts and prominent drainage foci, minor limestone outcrop plains and sandy banks; low shrublands of samphire, Gascoyne bluebush and saltbush, also tall shrublands of silver bark wattle	13.5
	Trealla - elevated limestone plains and plains with thin sand cover, minor steeper marginal slopes; moderately close tall shrublands of silver bark wattle and snakewood, also some low shrublands of Gascoyne bluebush	13.1
	Chargoo - nearly flat, saline alluvial plains with numerous large drainage foci and swampy depressions; low shrublands of saltbush, frankenia and samphire	5.9

Table 1 continued...

Pastoral value	Land systems	Area %
	Coast - large parabolic coastal dunes and narrow swales, unstable blow-out areas, minor limestone plains and beaches; low shrublands of acacias and numerous other shrubs, some soft spinifex	2.4
	Firecracker - undulating limestone uplands and plains; low shrublands of Gascoyne bluebush with scattered snakewood	2.3
	Marloo - gilgai alluvial plains with clay soils; tussock grasslands of Roebourne plains grass and other perennial grasses	0.1
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains; scattered tall shrublands with snakewood and wait-a-while with saltbush and bluebush	0.1
		96.6
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (132 recordings on 6 land systems)

Warroora

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Cardabia	57	100	—	—	—	70	23	7	—	—	93	7	—
Chargoo	18	94	6	—	—	6	39	44	11	—	44	45	11
Coast	2	100	—	—	—	100	—	—	—	—	100	—	—
Donovan	18	100	—	—	—	33	45	22	—	—	78	22	—
Trealla	7	100	—	—	—	14	43	43	—	—	57	43	—
Warroora	30	100	—	—	—	23	60	17	—	—	83	17	—
Total over all land systems	132	99	1	—	—	43	37	18	2	—	80	18	2

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 13 sites on 5 land systems.

Range condition and recommendations**1. Cardabia land system (30.5%)**

Soft Spinifex (SOSP) and Hard Spinifex (HASP) pastures are in good or very good condition and there is no erosion. Near the homestead and elsewhere introduced buffel grass has replaced the spinifex.

The system is generally stable under grazing except for occasional localized dunes and dune crests which may become unstable due to the effects of fire or excessive grazing pressure. Fire is a natural feature of the environment and regular, controlled burning is a management tool to maintain pastures in an attractive condition for livestock. Some sand drift can occur after fire, but the system revegetates rapidly after rain and stabilizes.

2. Donovan land system (28.7%)

The system supports productive Bluebush (BLUE) and Acacia Mixed Shrub (ACMS) pastures. Pasture condition is predominantly good or very good and there is no erosion.

Much of this system in the north-east and east of the station is little grazed as it is well in excess of 5 km from stock water supplies. The pastures are durable and productive and additional waters are

required to bring the system into full use. The use of dams needs to be considered as underground supplies are known to be difficult to obtain.

3. Warroora land system (13.5%)

Pastures are Saltbush (SALT) and Bluebush with some areas of Samphire (SAMP). Pasture condition is predominantly good but ranges from fair to very good. A wide range of desirable low shrubs such as Gascoyne bluebush, low bluebush, sage, bladder saltbush and silver saltbush are present. These provide nutritious and durable feed, but have a high salt content. Salt intake by sheep grazing these pastures may be excessive especially if water supplies are also salty as is frequently the case. High salt intake restricts the grazing radii of sheep and limits the use that can be made of the available pastures.

Some extensive areas of the Warroora system (e.g. in Home Tank paddock and East Bore paddock) are little used due to the excessive distance from stock waters. Additional good quality supplies are required so that pastures can be fully used.

4. Trealla land system (13.1%)

Acacia Mixed Shrub pastures and Bluebush pastures are in fair or good condition. Areas in fair condition such as Bulbarli paddock would benefit from spelling over a number of growing seasons.

5. Chargoo land system (5.9%)

Saltbush, Bluebush and Samphire pastures are nearly all in fair or good condition. Good quality waters are needed in order to make maximum use of the saline pastures.

6. Coast land system (2.4%)

This system was not intensively sampled. Where seen south of the homestead it supported buffel grass pastures which were in good condition. Pasture condition elsewhere is expected to be good as much to the system is distant from water supplies. However, the system is inherently susceptible to wind erosion if the vegetation is depleted and thus, if it is to be brought into full use, very careful control of stocking intensity would be essential. About 1 sq km of bare sandy blowout occurs on the coast close to Upper Bulbarli well and, ideally, this area should be fenced out.

7. Jubilee (3.4%), Firecracker (2.3%), Marloo (0.1%) and Gearle (0.1%) systems

These isolated systems were not examined. They are all distant from water and very little used and are expected to be in good range condition.

8. The station is inadequately watered and many of the existing waters are fairly saline which restricts the use that can be made of the available pastures in particular the saline pasture types. As mentioned under 2, 3 and 5 additional good quality waters (probably from dams) are required.

9. The recommended sheep unit capacity for present condition and assuming the station is fully watered (which is not the case, see 8) is 16,350.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 18,500.

Individual station report

Warroora station - 107,653 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Cardabia	329	SOSP	245	18	—	—	4,233	4,383
		HASP	61	5	—	—	322	330
Donovan	309	BLUE	105	65	—	—	2,913	3,400
		ACMS	84	9	—	—	1,770	1,860
		SOSP	40	6	—	—	717	767
Warroora	145	BLUE	54	11	—	—	1,218	1,300
		SALT	48	10	—	—	1,085	1,160
		SAMP	18	4	—	—	85	88
Trealla	140	ACMS	44	89	—	—	1,770	2,660
		BLUE	5	2	—	—	125	140
Chargoo	64	SALT	15	16	4	—	525	700
		SAMP	10	9	—	—	70	76
		BLUE	4	5	1	—	149	200
Jubilee	37	HASP	17	3	—	—	95	100
		SOSP	13	2	—	—	233	250
		ACCR	2	—	—	—	40	40
Coast	26	CDSH	15	5	—	1	223	263
		TUGR	5	—	—	—	250	250
Firecracker	25	BLUE	25	—	—	—	500	500
Marloo	1	TUGR	1	—	—	—	18	18
Gearle	1	BLUE	1	—	—	—	20	20
Totals	1,077		812	259	5	1	16,361	18,505

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 16,350

Capability sheep unit capacity 18,500

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 13,329

highest (1974) 17,853

lowest (1981,83) 8,669

Williambury station - Carnarvon and Upper Gascoyne Shires

Area 2,728 km²

Location

Williambury station is located on the Winning Pool and Kennedy Range 1:250,000 map sheets. The homestead is about 135 km east of the Minilya River bridge which is on the North-West Coastal Highway about 135 km north of Carnarvon. The station shares common boundaries with Lyndon, Mangaroon, Minnie Creek, Mardathuna and Middalya stations and the Kennedy Range National Park.

Description

Twenty-five different land systems occur on the station and landforms are complex and variable. The Minilya River and the Minilya River south branch run through northern and central parts.

The eastern part of the station is comprised of rugged hills and ridges of the Agamemnon (9.8%) and James (3.5%) systems and stony uplands and plains of the Phillips (7.9%) and Durlacher (9.9%) systems. These systems are all based on or derived from Proterozoic age granitic and gneissic rocks and frequently have a surface mantle of white quartz fragments. They support scattered tall shrublands of mulga and other acacias. Pastoral value varies from very low to moderate depending on the accessibility to stock.

The Two Hills (4.0%), Pells (3.7%) and Fossil (2.8%) systems occur as lines of hills, mesas and ridges running from the north to the south-east through the station. They are based on sedimentary rocks of Permian age. Parts of these systems are poorly accessible and pastoral value is generally low.

Two important plain systems derived from Permian age sediments, namely Jimba (19.9%) and Mantle (5.8%) occur in the western half of the station. The Jimba system consists of gently sloping alluvial plains with broad drainage tracts and minor pebbly plains. It supports scattered shrublands with numerous palatable low shrubs. Pastoral value is moderate to high, but the system is prone to degradation and erosion. The Mantle system is more stable in that most of its undulating plains are protected by a surface mantle of stones and pebbles.

A number of sandplain and sand dune systems are found in the north-west and south-west. These are the systems Divide (4.5%), Yalbalgo (1.2%), Giralia (1.0%) and Kennedy (4.9%). Kennedy occurs as a remarkable elevated red sand dune system perched on the high plateaux surface of the Kennedy Range. It supports spinifex hummock grasslands with numerous shrubs and is of very little use for grazing.

Numerous other small systems occur and of these River (2.7%), Wash (2.3%), Gneudna (1.8%) and Bidgemia (1.1%) are of high pastoral value.

All systems on the station are further summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from data recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Williambury station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Moogooloo - deeply dissected plateaux, mesas and hills of sedimentary rocks, steep footslopes and narrow valleys; scattered tall shrublands of mulga and other acacias	8.0
Low (20-30 ha/s.u.)	Agamemnon - rough hills and ridges of crystalline rocks; scattered tall shrublands of mulga and other acacias	9.8
	Kennedy - elevated sandy plains with large linear and reticulate dunes; hard spinifex hummock grasslands with numerous shrubs	4.9
	Two Hills - Hills and stony footslopes of sedimentary rocks; scattered tall shrublands of mulga and other acacias	4.0
	Pells - low hills, ridges and mesas of sedimentary rocks, stony slopes and lower plains; scattered tall shrublands of mulga and other acacias	3.7
	James - low granite hills and ridges, undulating stony plains and lower plains; scattered tall shrublands of mulga and other acacias	3.5
	Fossil - rugged hills, ridges and plateaux of sedimentary rocks; scattered tall shrublands of mulga and other acacias	2.8
	Glenburgh - rugged granite hills, stony uplands and lower plains; scattered tall shrublands of mulga and other acacias	1.1
	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; very scattered tall shrublands of mulga and other acacias	< 0.1
		29.8

Table 1 continued...

Pastoral value	Land systems	Area %
Moderate (10-19 ha/s.u.)	Jimba - gently sloping alluvial plains with diffuse drainage tracts, minor pebbly plains and low ridges; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	19.9
	Durlacher - gently sloping stony plains with broad drainage tracts and low stony rises; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	9.9
	Phillips - undulating stony uplands and low hills of crystalline rocks; scattered tall shrublands of mulga and other acacias	7.9
	Mantle - gently undulating stony plains with sluggish drainage tracts, stony rises and low summits, scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	5.8
	Divide - gently undulating sandplains with occasional low dunes; hard spinifex tussock grassland with numerous shrubs	4.5
	Lyons - sandy alluvial plains with numerous large claypans and reticulate and linear dunes; tall shrublands of numerous acacias	1.6
	Yinnietharra - gently sloping sandy plains and broad drainage tracts, minor stony plains and low granite hills; scattered tall shrublands of mulga and other acacias	1.4
	Yaibalgo - sandplains with linear and reticulate dunes; moderately close tall shrublands of wanyu	1.2
	Giralia - sandy plains with large linear dunes; hummock grasslands of soft and hard spinifex with numerous shrubs	1.0
	Wooramel - sandy plains and stony plains often with hardpan at shallow depth; tall shrublands of mulga and other acacias	0.5
		53.7
High (5-9 ha/s.u.)	River - narrow active floodplains and major channels; fringing woodlands of river gum and tall shrublands	2.7
	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; moderately close tall shrublands of spreading gidgee and other acacias	2.3
	Gneudna - almost flat plains with calcareous soils and parallel bands of siltstone and limestone outcrop, tall shrublands of acacias and chenopods	1.8
	Bidgemia - tributary alluvial plains with sandy banks and minor dunes; tall shrublands of acacias and some chenopods	1.1
	Cahill - sandy outwash plains with channels; moderately close tall shrublands of acacias	0.4
	Wandagee - nearly flat stony and clayey plains with broad drainage zones and outcrop rises of sedimentary rocks; scattered tall shrublands of snakewood and other acacias	0.2
		8.5
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (334 recordings on 18 land systems)

Williambury

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Agamemnon	6	100	—	—	—	—	—	50	50	—	—	50	50
Divide	21	95	5	—	—	62	24	—	14	—	86	—	14
Durlacher	56	87	13	—	—	—	5	30	51	14	5	30	65
Fossil	4	75	25	—	—	—	—	100	—	—	—	100	—
Gneudna	20	80	10	10	—	—	—	35	30	30	—	35	65
Jimba	107	55	23	15	7	1	25	37	25	12	26	36	38
James	1	100	—	—	—	—	—	—	100	—	—	—	100
Kennedy	11	100	—	—	—	100	—	—	—	—	100	—	—
Lyons	7	100	—	—	—	86	14	—	—	—	100	—	—
Moogooloo	5	80	—	20	—	60	20	—	20	—	80	—	20
Mantle	34	88	9	3	—	—	9	41	38	12	9	38	53
Pells	7	57	29	14	—	—	14	72	14	—	14	72	14
Phillips	26	92	8	—	—	—	27	57	4	12	27	58	15
River	9	89	11	—	—	34	33	22	11	—	67	22	11
Thomas	2	100	—	—	—	—	—	100	—	—	—	100	—
Two Hills	8	74	13	13	—	13	25	49	13	—	38	49	13
Wash	6	67	33	—	—	—	—	83	17	—	—	83	17
Yalbalgo	4	100	—	—	—	—	50	50	—	—	50	50	—
Total over all land systems	334	77	14	7	2	11	16	37	26	10	28	35	37

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 21 sites on 10 land systems.

Range condition and recommendations

1. Jimba land system (19.9%)

The Jimba system is derived from soft sediments of Permian age with much less stony surface mantle than some other Permian systems such as Mantle. It is inherently highly susceptible to erosion if the vegetative cover is depleted.

Stony Chenopod (STCH) and Acacia Short Grass Forb (ASGF) pastures vary in condition from good to very poor. In many instances desirable low shrubs such as sago bush, ruby saltbush and Gascoyne mulla mulla are seriously depleted. (Some 37% of traverse records indicated poor or very poor pasture condition).

Water erosion in the form of rills, shallow gullies and surface sheeting and ranging in severity from minor to severe is common on unprotected plains.

At least 24 km² of the system is extremely degraded with severe erosion and pasture depletion and should not be used for grazing. The areas of concern are concentrated in West Gneudna paddock (southern end), Shearing paddock and South Branch paddock. A programme of regeneration involving protection from grazing and possibly soil cultivation and seeding needs to be undertaken.

Other parts of the Jimba system such as in Norton's paddock and Kimber's paddock have not received as heavy use and are in better condition. However, even here the inherent fragility of the system is evidenced by active erosion near Kimber well. The Jimba system in these two paddocks is not well watered and additional supplies are required so that more use can be made of the available pastures. However, very careful control of grazing intensity and season of use will be needed in order to ensure that soil stability is maintained.

2. Durlacher land system (9.9%)

Stony Chenopod and Acacia Short Grass Forb pastures are all more or less degraded. Almost two-thirds of the traverse records indicated poor or very poor pasture condition. There is very little erosion as most of the system has a stony surface mantle which protects the soil.

3. Agamemnon land system (9.8%)

This rough hill system was not intensively sampled, but where seen the Stony Short Grass Forb (SSGF) pastures were in fair or poor condition. Much of the system is little used because of lack of permanent water supplies and some difficulty of access. Over all pasture condition is likely to be good. The pastures provide little in the way of durable shrubs for drought times, but opportunistic use of annuals can be made after good seasons.

4. Moogooloo land system (8%)

This rugged system is difficult of access and provides only very limited rough grazing. Pasture condition is mostly good.

5. Phillips land system (7.9%)

This stony system supports Stony Short Grass Forb pastures with minor areas of better quality Acacia Creek-line (ACCR) and Stony Chenopod pastures. Pasture condition is mostly fair and there is negligible erosion.

6. Mantle land system (5.8%)

This accessible system supports useful Stony Chenopod pastures with some areas of less productive Stony Short Grass Forb pastures. Much of the system occurs in paddocks close to the old Moogooree homestead and pastures are degraded to poor or very poor condition, but there is little erosion. Further afield the system is mostly in fair condition.

7. Kennedy land system (4.9%)

This sand dune system lies on top of the Kennedy Range. Vegetation is predominantly Hard Spinifex (HASP) and the area is not used for grazing.

8. Divide land system (4.5%)

This system supports predominantly Hard Spinifex pastures with some areas of more useful shrubs. Pasture condition is good or very good and there is no erosion.

9. Two Hills (4%), Pells (3.7%), James (3.5%), and Fossil (2.8%) land systems

Parts of these hill systems are almost inaccessible to stock. Elsewhere they provide only limited rough grazing. They were not intensively sampled but where seen the pastures were in fair or good condition.

10. River land system (2.7%)

The banks and narrow floodplains of this system flank the Minilya River and support Acacia Creek-line pastures and buffel grass Tussock Grass pastures (TUGR). Pasture condition is mostly good or very good.

11. Gneudna land system (1.8%)

This small, but potentially productive system supports Bluebush (BLUE) pastures and Stony Chenopod pastures. The system is attractive to stock and appears to have been preferentially grazed in the past. Pasture condition is about evenly distributed between fair, poor and very poor and there are localized areas of erosion. Degraded areas occur near Gneudna bore and Mymabalya tank and these areas require spelling for a number of growing seasons.

12. The remaining 11 land systems collectively occupy less than 11% of the total station area. They were not intensively sampled, but where seen were generally in reasonable condition.

13. Williambury is a very large station with many diverse landforms and pasture types making management difficult. Many land systems are rugged and stony and provide only poor to fair grazing. However, these systems are resistant to erosion and are in better condition than the softer plain systems. If possible, more use should be made of the stony systems in the east and south-east so that grazing pressure on degraded systems elsewhere can be reduced.

14. Some of the most productive systems on the station are those plain systems derived from Permian and Devonian age sediments (Jimba, Mantle and Gneudna) and also the Durlacher system and the flood plain River system. Unfortunately some of these (especially Jimba) are highly susceptible to erosion, are degraded and are currently producing at well below their potential. Special treatments

including complete protection from grazing, protection at strategic times during growing seasons and conservative use at other times are needed in order to improve condition. Some areas may require soil cultivation and seeding to hasten recovery.

15. In general the station is well developed in terms of paddocks and water supplies.

16. The recommended sheep unit capacity for present condition is 14,050.

17. The capability sheep unit capacity if all country was in good range condition is estimated at 20,150.

Individual station report

Williambury station - 272,756 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Jimba	543	STCH	95	113	121	24	1,760	2,942
		ASGF	30	76	30	—	478	680
		ACSA	12	24	18	—	322	450
Durlacher	269	STCH	8	30	96	—	537	1,117
		ASGF	3	37	68	—	308	540
		ACCR	—	14	13	—	205	540
Agamemnon	268	SSGF	164	63	14	—	894	964
		ACCR	18	7	2	—	440	540
		ASGF	126	81	11	—	928	1,090
Moogooloo Phillips	214	SSGF	50	106	15	—	587	688
		STCH	—	16	16	—	133	267
		ACCR	—	6	5	—	85	220
Mantle	159	STCH	4	37	62	—	425	858
		SSGF	3	23	30	—	149	224
		HASP	132	—	—	—	665	665
Kennedy Divide	132	HASP	95	—	16	—	515	555
		ACCR	10	—	2	—	210	240
		SSGF	42	55	14	—	379	444
Two Hills Pells	103	ASGF	7	33	6	—	160	230
		SSGF	6	30	5	—	134	164
		ACCR	2	12	2	—	170	320
James	95	SSGF	41	27	13	—	280	324
		STCH	7	5	2	—	90	117
		ASGF	24	43	9	—	286	380
Fossil River	73	ACCR	25	8	4	—	600	740
		TUGR	17	6	3	—	982	1,300
		No veg	10	—	—	—	—	—
Wash	62	ASGF	—	37	—	—	123	185
		ACCR	—	19	—	—	190	380
		TUGR	—	3	3	—	62	200
Gneudna	49	BLUE	—	9	16	—	213	500
		STCH	—	8	16	—	93	200
Lyons	43	ACSA	22	—	—	—	183	183
		CBMS	5	4	—	—	150	180
		ACCR	3	—	—	—	60	60
Yinnietharra	37	No veg	9	—	—	—	—	—
		ASGF	4	6	7	—	58	85
		STCH	2	6	5	—	63	108
Yalbalgo	32	ACCR	3	3	1	—	95	140
		ACSA	8	8	—	—	117	133
		HASP	8	8	—	—	67	80
Bidgemia	30	ACSA	—	5	15	—	100	167
		CBMS	—	2	5	—	90	140
		SALT	—	1	2	—	30	60
Glenburgh	29	SSGF	29	—	—	—	116	116
		HASP	16	1	—	—	85	85
		SOSP	10	1	—	—	183	183
Wooramel	14	ACSA	3	2	3	—	40	67
		ASGF	2	2	2	—	20	30
		ACSA	5	5	—	—	50	83
Cahill	12	TUGR	1	1	—	—	75	100
		SALT	1	1	1	—	40	60
		STCH	—	1	—	—	5	8
Wandagee	6	ACCR	—	1	—	—	10	20
		HASP	1	—	—	—	5	5
		SSGF	1	—	—	—	4	4
Billy	2	ASGF	1	—	—	—	5	5
		ASGF	1	—	—	—	5	5
		ASGF	1	—	—	—	5	5
Totals	2728		1125	1028	551	24	14,054	20,166

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 14,050

Capability sheep unit capacity 20,150

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 11,651

highest (1975) 16,125

lowest (1980) 4,412

Winderie station - Upper Gascoyne Shire

Area 692 km²

Location

Winderie station is located on the Wooramel 1:250,000 map sheet. The homestead is about 36 km south of Gascoyne Junction and the station has common boundaries with Jimba Jimba, Bidgemia, Dairy Creek, Towrana, Pimbee and Yalbalgo stations.

Description

Nearly 60% of the station consists of sandplain and linear dunes of the Yalbalgo land system. The system supports a moderately close tall shrubland of wanyu or woodland of sand dune gidgee with a ground layer of wanderrie grasses. Pastoral value is moderate.

The Bidgemia system (11.4%) occurs, closely associated with the Jimba system (7.6%), in the north-east of the station. Bidgemia consists of tributary alluvial plains with sandy banks and minor dunes; Jimba consists of gently sloping plains with diffuse drainage tracts, minor pebbly plains and low rises on Permian sediments. Both systems support scattered tall acacia shrublands with numerous

palatable low shrubs. Pastoral value is high or moderate, but the systems are highly susceptible to erosion if the pastures are degraded.

The Sandiman land system (9.0%) occurs scattered through the central and eastern parts of the station. It consists of undulating stony uplands with low breakaways and ridges. It supports tall shrublands with mulga and other acacias and scattered palatable low shrubs. Pastoral value is moderate.

The Wooramel system (6.7%) occurs in the east as sandy plains and stony plains often with hardpan at shallow depth. It supports moderately close tall shrublands of wanyu on the sandy parts with sparser tall shrublands of mulga and other acacias on the stony plains. Pastoral value is moderate.

The Fossil system (4.5%) occurs as low hills and ridges in the centre of the station and also as isolated hills and mesas such as Round Hill. It supports tall acacia shrublands and pastoral value is low.

Two other minor systems Sandplain (2.4%) and Yagina (0.2%) occur but are of little significance. All systems on the station are further summarized in table 1.

Condition statements for each land system and for the whole station (total over all land systems) have been prepared from information recorded whilst traversing on the station and are presented in table 2.

Table 1. Land systems on Winderie station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	Fossil - hills, ridges and mesas of sedimentary rocks; scattered tall shrublands of mulga and other acacias	4.5
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; moderately close tall shrublands of wanyu or woodlands of sand dune gidgee	58.2
	Sandiman - undulating stony uplands with low breakaways and ridges, scattered tall shrublands of mulga and other acacias	9.0
	Jimba - gently sloping alluvial plains with diffuse drainage tracts, minor pebbly plains; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	7.6
	Wooramel - sandy plains and stony plains often with hardpan at shallow depth; tall shrublands of wanyu or mulga and other acacias	6.7
	Sandplain - nearly flat to gently undulating red sandplains; moderately close tall shrublands of wanyu or woodlands of sand dune gidgee	2.4
	Yagina - low stony plains, soil covered plains, stony claypans and minor sandy banks and dunes; tall acacia shrublands	0.2
		84.1
High (5-9 ha/s.u.)	Bidgemia - tributary alluvial plains with sandy banks and minor dunes; scattered tall and low shrublands of wanyu and other acacias, also chenopods	11.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (128 recordings on 7 land systems)

Winderie

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Bidgemia	14	44	21	21	14	—	—	7	57	36	—	7	93
Fossil	5	100	—	—	—	—	—	80	20	—	—	80	20
Jimba	19	47	21	32	—	—	—	32	42	26	—	32	68
Sandiman	15	100	—	—	—	—	—	80	20	—	—	80	20
Sandplain	4	100	—	—	—	—	50	50	—	—	50	50	—
Wooramel	10	100	—	—	—	—	60	40	—	—	60	40	—
Yalbalgo	61	98	—	2	—	3	28	52	15	2	31	53	16
Total over all land systems	128	85	5	8	2	2	20	46	23	9	21	48	31

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 11 sites on 5 land systems.

Range condition and recommendations

1. Yalbalgo land system (58.2%)

This system supports the Acacia Sandplain (ACSA) pasture type which has an upper layer of trees characterized by sand dune gidgee or of tall shrubs of wanyu. The lower layers consist of very scattered low shrubs including a few palatable species and a prominent grass layer of various wanderrie grasses. Pasture condition was predominantly fair although some considerable areas were also in good condition. Restricted areas, usually in the vicinity of water points, show loss of desirable low shrubs and were in poor condition. There is no erosion.

Because of the general sparsity of palatable shrubs, even when in good condition, and the rather short lived nature of wanderrie grass, the system has limited drought value. Opportunistic use can be made of the grass pastures and wanyu beans provide useful feed in favourable seasons, but management needs to be flexible in times of drought.

Fire may be a useful management tool on this system, but its use has not been researched.

2. Bidgemia land system (11.4%)

Pastures are Acacia Sandplain on the sandy units of the system and Currant Bush Mixed Shrub (CBMS) and some Saltbush (SALT) on the more clayey alluvial plains and inter-bank areas. In general the pastures (particularly the Currant Bush Mixed Shrub and Saltbush types) are degraded to poor or very poor condition. Wind and water erosion in the form of hummocking, surface stripping, rilling and guttering is widespread on the duplex soils of the interbank areas. About 13km² (16%) of the system is severely degraded. In order to encourage the recovery of desirable shrubs these areas, which are mostly in Secret paddock, should be fully protected from grazing for a number of years. Special remedial treatments including soil cultivation works and seeding need to be considered as a means of hastening rehabilitation.

3. Sandiman land system (9.0%)

Pastures are useful Stony Chenopod (STCH) on the lower units of the system and Stony Short Grass Forb (SSGF) on the ridges and breakaways. Pasture condition is nearly all fair although minor areas are poor. There is no erosion.

4. Jimba land system (7.6%)

The system is derived from soft Permian sediments and, except for minor stony and cobbly plains, is inherently highly susceptible to erosion if the vegetative cover is depleted.

Stony chenopod and Acacia Short Grass Forb (ASGF) pastures vary in condition from fair to very poor. In many instances desirable low shrubs such as sago bush, ruby saltbush, Gascoyne bluebush and Gascoyne mulla mulla are seriously depleted and the pastures are producing at well below their potential. Elsewhere pasture degradation takes effect as changes in botanical composition and dramatic increases in undesirable woody shrubs. This is the case in parts of Ram paddock where there has been a remarkable increase in grey cassia and crinkled cassia at the expense of more desirable shrubs. Water erosion in the form of thin sheeting, rilling and guttering is common.

At least 14 km² (26%) of the system in Secret paddock is very severely degraded and should not be grazed. A programme of regeneration involving protection from grazing and possibly cultivation works and seeding needs to be undertaken. Such a programme would include areas of the Bidgemia system (see 2). Subdivisional fencing of Secret paddock needs to be considered so that the affected areas can be protected from grazing while other parts can still be grazed.

5. Wooramel land system (6.7%)

The system supports Acacia Sandplain and Acacia Short Grass Forb pastures which are in good or fair condition. There is no erosion and the system is relatively stable under grazing.

6. Fossil (4.5%) and Sandplain (2.4%) land systems

These systems were not intensively sampled but, where seen, were generally in fair or good range condition. They are not prone to erosion.

7. Although the station is quite well developed in terms of paddocks and water points there are a number of areas that are not in use or are not fully used in that they are > 5 km from permanent stock water supplies. Areas in this category include parts of Bibra and West Bore paddocks. Consideration needs to be given to bringing these areas into use so

that grazing pressure on degraded parts of the station can be reduced.

8. The recommended sheep unit capacity for present condition is 3,900.

9. The capability sheep unit capacity if all country was in good range condition is estimated at 5,800.

Individual station report

Winderie station - 69,230 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	403	ACSA	125	214	64	—	2,635	3,358
Bidgemia	79	ACSA	—	26	25	—	263	425
		CBMS	—	—	7	13	44	400
		SALT	—	—	8	—	50	160
Sandiman	62	STCH	—	28	12	—	180	333
		SSGF	—	22	—	—	73	88
Jimba	53	STCH	—	11	10	14	88	292
		ASGF	—	4	9	—	36	65
		ACSA	—	5	—	—	31	42
Wooramel	46	ACSA	19	9	—	—	215	233
		ASGF	—	18	—	—	60	90
Fossil	31	ASGF	—	25	6	—	98	155
Sandplain	16	ACSA	8	8	—	—	117	133
Yagina	2	ASGF	—	2	—	—	7	10
Totals	692		152	372	141	27	3,897	5,784

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 3,900

Capability sheep unit capacity 5,800

Declared stock numbers (sheep units or equivalent)

1968-1984 (no data for 1971):

average (mean) 8,480

highest (1969) 13,237

lowest (1980) 2,145

Winning station - West Pilbara and Carnarvon Shires

Area 1,585 km²

Location

Winning station is located on the Winning Pool 1:250,000 map sheet. The homestead is about 240 km north of Carnarvon on the North-West Coastal Highway and the station has common boundaries with Marrilla, Giralia, Nyang, Towera, Lyndon, Mia Mia and Cardabia stations.

Description

Many varied landforms occur on the station with a total of 17 land systems being represented.

The largest system is Winning (29.3% of total station area) which occurs throughout the station except in the far west. It consists of extensive low plains and broad drainage tracts with occasional low hills and ridges. It supports scattered tall shrublands usually dominated by snakewood and pastoral value is high.

The Spot system (15.1%) covers extensive areas in the centre of the station. It consists of alluvial plains and plains with low reticulate sandy banks interspersed with circular and elongated inter-bank areas with more clayey soils. It supports scattered tall shrublands of acacias such as bardie bush, silver bark wattle and snakewood with numerous low shrubs and some spinifex. Pastoral value is high.

Broad, almost flat sandy plains of the Uaroo system (10.4%) occur in the north and south-east. These plains frequently have calcrete at shallow

depth and they support hummock grasslands of hard spinifex and some soft spinifex with numerous shrubs. Pastoral value is moderate.

The O'Brien system (8.9%) which occurs in the centre of the station consists of tributary alluvial plains and slightly more elevated upper plains and interfluvies. It supports patchy tall and low shrublands with spreading gidgee, snakewood, *Cassia* and *Eremophila* species and some chenopods. The vegetation is often arranged in dense clumps or groves with sparser cover between and the soil frequently has a mantle of pebbles and radiolarite rock fragments. Pastoral value is moderate.

An important system in the west is Gearle (7.6%) which consists of gently sloping alluvial plains, minor low rises and more sloping plains marginal to the slightly more elevated Carleeda (5.9%) system. The Gearle system supports patchy tall shrublands with wait-a-while and snakewood above Gascoyne bluebush and other chenopods. Pastoral value is high. The Carleeda system consists of undulating limestone plains and platforms with short marginal slopes to narrow lower plains and drainage floors. It supports soft spinifex hummock grasslands with numerous shrubs and pastoral is high.

Other smaller high pastoral value systems of local importance are Wash (4.0%), Wandagee (2.4%) and Donovan (0.7%). Other useful systems of moderate pastoral value include Giralia (3.6%), Windalia (2.4%) and Jimba (2%). All systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Winning station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	Lake - large, mostly bare pans and lake beds with narrow marginal sandy banks supporting spinifex	3.9
Low (20-30 ha/s.u.)	Billy - low plateaux, mesas and buttes with stony footslopes and narrow drainage floors; scattered tall acacia shrublands	2.0
	Fossil - rough hills, ridges and plateaux of sedimentary rocks; scattered tall acacia shrublands	0.3
		2.3
Moderate (10-19 ha/s.u.)	Uaroo - nearly flat sandy plains and minor pebbly plains with calcrete at shallow depth; hummock grasslands of hard and soft spinifex with numerous shrubs	10.4
	O'Brien - Tributary alluvial plains and slightly more elevated upper plains and interfluvies; patchy tall and low shrublands of spreading gidgee, snakewood, <i>Cassia</i> and <i>Eremophila</i> species and some chenopods often arranged in groves	8.9
	Giralia - sandy plains with large linear dunes; hummock grasslands of hard and soft spinifex with numerous shrubs	3.6
	Windalia - stony plains and narrow dissected upper interfluvies on radiolarite; scattered tall shrublands of spreading gidgee and other acacias often arranged in groves	2.4
	Jimba - gently sloping alluvial plains with diffuse drainage tracts, minor pebbly plains and low ridges; scattered tall and low shrublands of <i>Acacia</i> and <i>Eremophila</i> species and chenopods	2.0
	Channel - major channels with narrow flood plains and dissected marginal slopes; scattered tall acacia shrublands	1.1
		28.4

Table 1 continued...

Pastoral value	Land systems	Area %
High (5-9 ha/s.u.)	Winning - extensive low plains and broad drainage tracts with low ridges and narrow footslopes; scattered tall shrublands of snakewood	29.3
	Spot - alluvial plains with sandy banks and more clayey inter-bank areas; tall shrublands of acacia and cassia also bluebush and some spinifex	15.1
	Gearle - gently sloping alluvial plains, minor low rises with more sloping marginal plains; scattered tall and low shrublands of wait-a-while, snakewood and chenopods	7.6
	Carleeda - undulating limestone plains and platforms with short marginal slopes to narrow lower plains and drainage floors; soft spinifex hummock grasslands with numerous shrubs	5.9
	Wash - sandy alluvial plains and broad drainage zones receiving more concentrated sheet flow; scattered to moderately close tall shrublands of spreading gidgee and other acacias	4.0
	Wandagee - nearly flat stony and clayey plains with broad drainage zones and outcrop rises of sedimentary rocks; scattered tall acacia shrublands with numerous low shrubs including chenopods	2.5
	Donovan - gently sloping outwash plains and minor limestone plains; tall shrublands of snakewood and other acacias	0.8
	River - narrow, active flood plains and major channels; fringing woodlands of river red gum and tall acacia shrublands	0.2
		65.4
		—
		—
		100.0
Very High (< 5 ha/s.u.)	—	—

Table 2. Condition statements derived from traverse records (227 recordings on 12 land systems)

Winning

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Carleeda	10	100	—	—	—	50	40	—	10	—	90	—	10
Gearle	22	90	5	5	—	9	36	27	23	5	45	23	32
Giralia	4	100	—	—	—	25	50	25	—	—	75	25	—
Jimba	9	89	11	—	—	—	33	45	22	—	33	45	22
Lake	9	67	33	—	—	33	45	11	11	—	78	11	11
O'Brien	27	89	7	4	—	—	11	22	41	26	11	26	67
River	1	100	—	—	—	—	100	—	—	—	100	—	—
Spot	29	93	7	—	—	17	21	14	31	17	38	14	48
Uaroo	14	100	—	—	—	100	—	—	—	—	100	—	—
Wandagee	11	100	—	—	—	—	9	73	18	—	9	73	18
Winning	71	67	27	6	—	—	14	20	41	25	14	20	66
Wash	20	100	—	—	—	15	40	40	5	—	55	40	5
Total over all land systems	227	85	12	3	—	15	22	23	26	14	37	22	41

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 13 sites on 8 land systems.

Range condition and recommendations

1. Winning land system (29.3%)

This system supports Bluebush (BLUE) pastures beneath snakewood with some minor areas of Stony Chenopod (STCH) and Soft Spinifex (SOSP) pastures. In general the pastures are considerably degraded to poor or very poor condition with only minor areas being in fair or good condition. Soil erosion, mostly minor, but some of moderate severity, was recorded at more than 30% of the traverse points.

About 19 km² of the system in Post Office - MRD paddock and Kiligidri paddock near 4 mile bore shows severe degradation with almost total loss of desirable perennial shrubs and some erosion. To encourage recovery this area needs to be fully protected from grazing for a number of years and cultivation and seeding treatments considered.

Elsewhere the system, although degraded, is still productive in terms of annual forage and remaining desirable shrubs. However, it is producing at well below potential and its durability in drought times is considerably reduced. The system has the capability to recover well if a programme of strategic spelling over a number of growing seasons and conservative use at other times can be commenced in paddocks such as Querie No. 5, Tripod and Silent.

2. Spot land system (15.1%)

This system supports useful Currant Bush Mixed Shrub (CBMS) pastures with some Bluebush and Hard Spinifex (HASP). Pasture condition varies from good to very poor but is predominantly poor. There is no erosion. About 3 km² in the vicinity of 4 Mile bore is severely degraded.

3. Uaroo (10.4%) and Giralia (3.6%) land systems

These spinifex based systems are all in good range condition. Pastures are Hard Spinifex and Soft Spinifex which are relatively stable under grazing.

Hard spinifex is rarely grazed, but soft spinifex has moderate value with good drought durability. Old spinifex stands are useless for grazing and management must be aimed at being able to present some areas in an attractive condition to stock at all times. Spinifex should be burnt on a fairly regular basis every 4-5 years and burning should be late in the year. Burnt areas should not be grazed for about 8-10 weeks over the growing season following the fire to encourage establishment of durable grasses, shrubs and spinifex seedlings.

The spinifex land systems are generally resistant to degradation, although some wind erosion results if a prolonged dry spell occurs after burning. However, there is a rapid re-establishment of vegetation and return to stability after rain.

4. O'Brien land system (8.9%)

The system supports mixed Stony Chenopod (STCH) and Acacia Short Grass Forb (ASGF) pasture and, on the groves and creek-lines, denser Acacia Creek-line (ACCR) pastures. When in good condition the Stony Chenopod pastures carry a range of desirable low shrubs such as sago bush, Gascoyne bluebush, ruby saltbush and Gascoyne mulla mulla beneath the taller snakewood. Elsewhere the pastures consist of non-saline types such as Wilcox bush and cotton bush beneath spreading gidgee. In many areas desirable shrubs are considerably depleted and pasture condition is largely poor or very poor. There is some minor soil erosion on the system but this is not a significant problem. A programme of spelling from grazing over a number of growing seasons is required to encourage recovery of desirable shrubs.

5. Gearle land system (7.6%)

This system supports productive Bluebush and Saltbush (SALT) pastures which are predominantly in good or fair condition with restricted parts showing shrub depletion to poor condition. Buffel grass has successfully colonized disturbed sites adjacent to watering points and elsewhere.

6. Carleeda land system (5.9%)

This limestone based system supports Soft Spinifex and Hard Spinifex pastures with some Tussock Grass pastures (TUGR) on narrow drainage floors and alluvial plains. Pasture condition is almost all good or very good and the system is not prone to erosion. Nearly all of the system in Carleeda paddock is well in excess of 5 km from permanent stock waters. Additional water supplies are required so that pastures can be fully used and stock numbers reduced on degraded parts of the station.

7. Wash land system (4.0%)

The system supports Acacia Short Grass Forb pastures on the broad plains with denser Acacia Creek-line pastures in drainage tracts and groves. Pasture condition is mostly good, but varies from fair to very good. There is no erosion. In the far south of the station in Kiolowibri West paddock the system is in very good condition with numerous desirable low shrubs such as flat leaf bluebush, Wilcox bush, currant bush, tall cassia and cotton bush beneath spreading gidgee.

8. Wandagee (2.5%) and Jimba (2.0%) land systems

These complex plain systems derived from Permian age sediments in the south-east of the station support a mosaic of useful pasture types including Stony Chenopod, Saltbush, Acacia Short Grass Forb and Acacia Creek-line. Pasture condition is predominantly fair with lesser areas in good or poor condition. There is no erosion on the Wandagee system, but occasional minor erosion occurs on the Jimba system which is inherently susceptible to erosion if the vegetation is depleted.

9. The remaining minor land systems on the station were not extensively sampled but, where seen, were in fair range condition. They are not expected to show any problems of severe degradation.

10. The recommended sheep unit capacity for present condition is 13,450.

11. The capability sheep unit capacity if all country was in good range condition is estimated at 22,300.

Individual station report

Winning station - 158,507 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Winning	465	BLUE	39	52	216	19	2,780	6,520
		SOSP	47	23	—	—	975	1,167
		STCH	5	26	38	—	298	575
Spot	240	CBMS	7	30	104	3	1,165	2,880
		BLUE	2	10	36	—	390	960
		HASP	48	—	—	—	240	240
Uaroo	165	HASP	116	—	—	—	580	580
		SOSP	49	—	—	—	817	817
O'Brien	142	ASGF	28	—	43	—	248	355
		STCH	—	8	28	—	133	300
		ACCR	—	35	—	—	350	700
Gearle	120	BLUE	18	22	32	—	835	1,440
		SALT	11	14	11	—	464	720
		TUGR	12	—	—	—	400	400
Carleeda	93	SOSP	59	—	6	—	1,007	1,083
		HASP	17	—	2	—	90	95
		TUGR	8	—	1	—	271	300
Wash	64	ASGF	22	14	2	—	162	190
		ACCR	11	7	1	—	295	380
		TUGR	4	2	1	—	37	200
Lake	62	SOSP	6	—	—	—	100	100
		No veg	56	—	—	—	—	—
Giralia	58	HASP	26	9	—	—	160	175
		SOSP	17	6	—	—	333	383
Wandagee	39	SALT	2	15	3	—	246	400
		STCH	1	6	1	—	42	67
		ACCR	1	4	1	—	65	120
		HASP	5	—	—	—	25	25
Windalia	38	ASGF	14	10	6	—	203	150
		ACCR	3	1	—	—	70	80
		STCH	—	2	2	—	17	33
Jimba	32	STCH	7	9	5	—	120	175
		ASGF	3	4	1	—	31	40
		ACSA	1	1	1	—	19	25
Billy	31	SSGF	10	9	—	—	70	76
		ASGF	6	6	—	—	50	60
Channel	17	STCH	3	4	2	—	52	75
		ACCR	2	2	1	—	65	100
		No veg	3	—	—	—	—	—
Donovan	12	BLUE	5	2	—	—	125	140
		ACMS	2	2	—	—	60	80
		SOSP	1	—	—	—	17	17
Fossil River	5	ASGF	5	—	—	—	25	25
	2	ACCR	—	2	—	—	20	40
Totals	1,585		682	337	544	22	13,452	22,288

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 13,450

Capability sheep unit capacity 22,300

Declared stock numbers (sheep units or equivalent)
1968-1984 (no data for 1972):

average (mean) 19,912

highest (1971) 40,795

lowest (1973) 6,575

Woodleigh station - Shark Bay Shire

Area 2,331 km²

Location

The station is located on the Yaringa and Wooramel 1:250,000 map sheets. The homestead is about 44 km east of the North-West Coastal Highway with the turn-off from the highway at about 177 km south from Carnarvon. The station has common boundaries with Meedo, Gilroyd, Yalardy, Talisker, Hamelin, Carbla and Yaringa stations.

Description

Only four land systems, Sandplain, Yaringa, Yalbalgo and Snakewood occur on the station. By far the largest of these is Sandplain (97.8% of the total station area) which consists of almost flat to gently undulating red sandplain supporting moderately close tall shrublands usually dominated by wanyu. Pastoral value is moderate.

The Yaringa system (0.8%) in the far west of the station consists of sandy plains overlying calcrete at shallow depth and minor calcrete outcrop plains. Vegetation is a tall shrubland of wanyu and other acacias. Pastoral value is high.

The Yalbalgo system (0.7%) is restricted to one isolated area in the north-west of the station. It consists of sandplains with well developed linear dunes. Vegetation is sand dune gidgee woodland with wanyu shrubland and pastoral value is moderate.

The Snakewood (0.7%) system is found as a small area in the south-west of the station. It consists of almost flat plains with duplex soils supporting a distinctive tall shrubland of snakewood with a saltbush understorey. Pastoral value is high. All systems on the station are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land system) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Woodleigh station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate 10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplains; moderately close to close tall shrublands of wanyu	97.8
	Yalbalgo - sandplains with linear and reticulate dunes; gidgee woodlands and moderately close tall shrublands of wanyu	0.8
		98.6
High (5-9 ha/s.u.)	Yaringa - sandy plains and limestone plains with occasional low dunes; tall shrublands of wanyu and other acacias	0.7
	Snakewood - nearly flat plains with duplex soils, tall shrublands of snakewood with saltbush understorey	0.7
		1.4
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (316 recordings on 3 land systems)

Woodleigh

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Sandplain	307	100	—	—	—	16	41	34	8	1	57	34	9
Yalbalgo	2	100	—	—	—	—	100	—	—	—	100	—	—
Yaringa	7	100	—	—	—	—	29	42	29	—	29	42	29
Total over all land systems	316	100	—	—	—	16	40	34	9	1	57	34	9

Range evaluation sites

Detailed description and measurements of landform, vegetation, soils and range condition were made at 10 sites on 1 land system.

Range condition and recommendations

1. Sandplain land system (97.8%)

The Acacia Sandplain (ACSA) pastures of the system are mostly in fair, good or very good condition. Good condition is indicated by the presence of desirable low shrubs such as warty leaf eremophila, Wilcox bush, cotton bush, flat leaf bluebush, tall saltbush and wanderrie grasses beneath the taller acacia shrubs.

Desirables are very scattered below dense stands of tall shrubs but increase markedly in density and species diversity if the tall shrub layer thins or is lost. In this respect past fires on parts of the Sandplain system on Woodleigh have improved the pastures for livestock production. Strategic burning is likely to be a useful management tool on the system but its use has not been researched. Evidence seen during the survey suggests that the effects of fire are extremely long-term in that wanyu may take more than 50 years to reach its pre-fire density.

2. Yaringa land system (0.8%)

The system supports Acacia Sandplain pastures on the sandplain unit and Acacia Mixed Shrub (ACMS) pastures on the stony limestone plain unit. Pasture condition is predominantly fair with restricted parts in good and poor condition. There is no erosion on the system.

3. Yalbalgo land system (0.7%)

This minor system was not intensively sampled but, where seen, the Acacia Sandplain pastures were in good condition. The system as a whole is expected to be in good condition.

4. Snakewood land system (0.7%)

This small system was not inspected. It supports Saltbush (SALT) pastures which frequently receive preferential grazing. However, because the system is some distance from permanent water supplies, pasture condition is expected to be fair to good.

5. Parts of the station are well developed in terms of paddocks and water supplies. However, about 40% of the total station area is poorly used or not used as it is > 5 km from permanent waters. These under used areas are largely in the north-east, east and south. Consideration needs to be given to the provision of additional water supplies.

6. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case, see 5) is 17,050.

7. The area currently commanded by water is capable of carrying about 10,250 sheep units.

8. The capability sheep unit capacity if all country was in good range condition (and fully watered) is estimated at 19,650.

Individual station report

Woodleigh station - 233,136 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	2,280	ACSA	1,300	775	205	—	16,497	19,000
Yaringa	19	ACSA	—	9	6	—	80	125
		ACMS	4	—	—	—	80	80
Yalbalgo	17	ACSA	17	—	—	—	142	142
Snakewood	15	SALT	6	6	—	—	195	240
		ACMS	2	—	—	—	40	40
		ACSA	1	—	—	—	8	8
Totals	2,331		1,330	790	211	—	17,042	19,635

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 17,050

Capability sheep unit capacity 19,650

Declared stock numbers (sheep units or equivalent)
1968-1984:

average (mean) 17,641

highest (1974) 22,575

lowest (1981) 9,200

Wooramel station - Carnarvon Shire

Area 1,414 km²

Location

Wooramel station is located on the Wooramel 1:250,000 map sheet. The homestead is about 120 km south of Carnarvon via the North-West Coastal Highway. The station has common boundaries with Edaggee, Wahroonga, Meedo and Yaringa stations and with the coast line of Shark Bay in the west.

Description

The unpredictable and highly intermittent Wooramel River runs through the station from the east to the south-west where it discharges into Shark Bay just north of Gladstone. Much of the station consists of broad, more or less saline alluvial plains of the Sable (28.2% of total station area), Sandal (22.8%) and Delta (18.7%) land systems.

The Sable system occurs as a wide strip along the north-western edge of the station. It consists of almost flat, saline plains with duplex soils and minor sandy banks. It supports a characteristic moderately close low shrubland of bluebush and saltbush interspersed with tall acacia shrublands on the sandy rises. Pastoral value is high.

The Sandal system occurs in the north-west adjacent to and inland from the Sable system. It consists of alluvial plains with numerous low sandy banks and rises. It supports tall acacia shrublands with numerous useful low shrubs and pastoral value is high.

The Delta system occurs in the centre of the station as almost flat, active alluvial flood plains associated with the Wooramel River. It supports degraded tall

and low shrublands with various acacias and remnant chenopod shrubs. Pastoral value is variable depending on the degree of degradation. Potential pastoral value when in good condition is high.

An important system in the south and centre of the station is Foscil (9.3%) which consists of gently sloping outwash plains below low limestone plateaux and mesas. It supports mixed tall and low shrublands of saltbush, bluebush, other useful low shrubs and acacias. Pastoral value is high. The Yaringa land system (8.7 per cent) occurs as sandy plains and limestone plains in central, northern and south eastern parts. It supports moderately close tall shrublands of wanyu and other acacias. Pastoral value is high.

Two sandplain and dune systems, Lyons (7.0%) and Yalbalgo (3.9%) occur in the east. The Lyons system is characterized by numerous large claypans on sandy alluvial plains with numerous reticulate and linear dunes. The Yalbalgo system consists of sand plains with linear dunes and sandy swales. Both systems support scattered to moderately close tall shrublands of wanyu and other acacias.

The Salune system (0.9%) occurs as an isolated area in the east. It consists of distinctive highly saline plains and pans with scattered low dunes. Vegetation consists of low shrublands of bluebush, saltbush and samphire and some tall acacia shrublands. Pastoral value is moderate.

Two other minor systems, Littoral (0.5%) and Sandplain (< 0.1%) are found on the station. All systems are further summarised in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Wooramel station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Lyons - sandy alluvial plains with numerous large claypans and reticulate and linear dunes; scattered to moderately close tall shrublands of acacias	7.0
	Yalbalgo - sandplains with linear and reticulate dunes; moderately close tall shrublands of wanyu	3.9
	Salune - saline plains and pans with scattered low dunes; low shrublands of bluebush, saltbush and samphire and tall acacia shrublands	0.9
	Littoral - low coastal foredunes, samphire flats and tidal flats and mangrove fringes; low shrublands of samphire and tall shrublands of acacias	0.5
	Sandplain - nearly flat to gently undulating red sandplains; moderately close tall shrublands of wanyu	< 0.1
		12.3
High (5-9 ha/s.u.)	Sable - nearly flat, saline alluvial plains with minor sandy banks; low shrublands of bluebush and saltbush, also tall acacia shrublands	28.2
	Sandal - alluvial plains with numerous low sandy banks and rises, duplex and sand soils; tall shrubland of acacias and currant bush	22.8
	Delta - almost flat, active alluvial floodplains; degraded tall and low shrublands of acacias, saltbush and bluebush	18.7

Table 1 continued...

Pastoral value	Land systems	Area %
	Foscal - gently sloping outwash plains beneath low limestone plateaux and mesas; tall acacia shrublands and low shrublands of saltbush and bluebush	9.3
	Yaringa - sandy plains and limestone plains with occasional low dunes; tall shrublands of wanyu and other acacias	8.7
		87.7
Very high < 5 ha/s.u.	—	—
		100.0

Table 2. Condition statements derived from traverse records (310 recordings on 10 land systems)

Wooramel

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Delta	88	11	20	43	26	—	3	18	33	46	3	15	82
Foscal	32	78	13	9	—	—	28	19	37	16	28	19	53
Littoral	6	83	17	—	—	50	50	—	—	—	100	—	—
Lyons	14	65	21	14	—	—	14	43	29	14	14	43	43
Sable	70	77	17	6	—	24	35	27	11	3	59	27	14
Sandal	68	97	3	—	—	—	9	38	47	6	9	38	53
Sandplain	1	100	—	—	—	—	100	—	—	—	100	—	—
Salune	4	100	—	—	—	—	25	75	—	—	27	75	—
Yalbalgo	15	93	—	7	—	27	40	20	13	—	67	20	13
Yaringa	12	83	17	—	—	8	50	25	17	—	28	25	17
Total over all land systems	310	64	14	15	7	8	20	26	29	17	28	25	47

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 23 sites on 7 land systems.

Range condition and recommendations

1. Sable land system (28.2%)

This system supports productive Bluebush and Saltbush (BLUE, SALT) pastures on the broad plains and Acacia Sandplain (ACSA) pastures on the restricted sandy rises. Pasture condition is mostly good or very good with localized areas in the vicinity of watering points showing loss of desirable shrubs to poor or very poor condition. There is some minor erosion in the form of wind piling around shrubs and breaking of the surface crust on parts of the system, but generally erosion is not a problem. An exception to this is in 5 Mile paddock and the southern end of Coolbara paddock where about 5 km² of the system is severely degraded with almost complete loss of desirable shrubs and active erosion.

Much of the system is considerably > 5 km from permanent water supplies and is little used by stock. Additional good quality water supplies need to be provided so that the pastures can be brought into full production and the stocking pressure reduced on other degraded parts of the station.

2. Sandal land system (22.8%)

The system supports Currant Bush Mixed Shrub (CBMS) and Acacia Sandplain pastures with some minor areas of Bluebush. The pastures are still quite

productive but the Currant Bush Mixed Shrub pastures in particular are largely degraded to fair or poor condition. There is no significant erosion on the system. Over all, about 10%, 40% and 50% of the traverse observations indicated good, fair and poor range condition respectively. The poorer parts of the system could be readily improved by spelling from grazing over a number of growing seasons.

3. Delta land system (18.7%)

When in good condition the floodplains of this system support mixed Saltbush and Bluebush pastures. Pasture condition is predominantly very poor or poor with marked loss of desirable low shrubs and, in some areas dramatic increases in undesirables such as needle bush. Moderate to severe soil erosion is common.

The system has lost much of its drought durability although it still supplies useful annual feed in season. Buffel grass is well established along the levees and banks of the Wooramel River, but has not spread significantly to adjacent degraded areas.

About 155 km² (58%) of the system shows extreme pasture degradation with moderate to severe erosion. These areas should not be used for grazing and require special remedial treatments including cultivation works and seeding to facilitate rehabilitation. Less severely degraded areas could be improved by regular spelling from grazing over a number of growing seasons. The major areas of concern are located in Home, Mongers, Coondoo, 5 Mile and Yaldbiddy paddocks.

4. Foscal land system (9.3%)

Pastures are Saltbush, Bluebush and Acacia Mixed Shrub (ACMS). Pasture condition is predominantly poor, but is extremely variable ranging from good in Wooly paddock to very poor in southern parts of Big Woorra paddock. Erosion in the form of windpiling, sheeting and guttering is common in the latter area, but elsewhere the system is relatively stable.

5. Yaringa land system (8.7%)

The system supports Acacia Sandplain pastures dominated by wanyu on the sandy units and Acacia Mixed Shrub pastures on plains with limestone at shallow depth. Pasture condition is predominantly good or fair and there is no significant erosion.

6. The remaining three minor systems, Salune, Littoral and Sandplain, were not intensively sampled but, where seen, were in fair or good range condition.

7. The lease is inadequately watered. Large areas of Bluebush and Saltbush pastures on the Sable land system (see 1) are poorly watered and under used. Elsewhere pastures on land systems flanking the Wooramel River have been heavily over used and are severely degraded.

8. A programme of rehabilitation involving additional fencing, destocking in some paddocks, cultivation and seeding works and the provision of extra water points is urgently required on the severely degraded sections.

9. The recommended sheep unit capacity for present condition and assuming the station is fully watered (which is not the case, see 7) is 13,000.

10. The capability sheep unit capacity if all country was in good range condition is estimated at 22,550.

Individual station report

Wooramel station - 141,395 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sable	398	SALT	115	38	21	5	2,906	3,580
		BLUE	102	33	24	—	2,603	3,180
		ACSA	29	26	5	—	424	500
Sandal	322	CBMS	4	41	100	—	1,218	2,900
		ACSA	16	59	54	—	718	1,075
		BLUE	8	24	16	—	560	960
Delta	265	BLUE	2	16	23	78	384	2,380
		SALT	2	14	13	77	296	2,120
		ACSA	14	13	13	—	250	333 ^a
Foscal	131	SALT	36	6	28	2	970	1,440
		BLUE	5	4	37	—	381	920
		ACMS	2	4	7	—	124	260
Yaringa	123	ACSA	81	17	—	—	781	817
		ACMS	8	9	8	—	300	500
Lyons	99	ACSA	7	37	6	—	314	417
		CBMS	6	—	10	6	183	440
		ACCR	2	—	6	—	70	160
Yalbalgo	55	No veg	19	—	—	—	—	—
		ACSA	37	11	7	—	405	458
Salune	13	ACSA	—	6	—	—	38	50
		SAMP	5	—	—	—	20	20
		BLUE	—	2	—	—	25	40
Littoral	7	No veg	6	—	—	—	—	—
		SAMP	1	—	—	—	4	4
		CDSH	—	—	—	—	—	—
Sandplain	1	ACSA	1	—	—	—	8	8
Totals	1,414		508	360	378	168	12,982	22,562

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 13,000

Capability sheep unit capacity 22,550

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 17,103

highest (1968) 27,675

lowest (1980) 2,023

Yalardy station - Shark Bay Shire

Area 1,012 km²

Location

Yalardy station is located on the Yaringa 1:250,000 map sheet. The access road to the station joins the North-West Coastal Highway at a point about 25 km north of the Overlander Roadhouse and the homestead is about 92 km east by road from the highway. The station has common boundaries with Gilroyd, Byro, Talisker and Woodleigh stations.

Description

More than 82% of the station consists of almost flat to gently undulating red sandplain of the Sandplain land system supporting a moderately close to close tall shrubland of wanyu. Pastoral value is moderate.

The Yalbalgo land system (9.6%) occurs in the north and north-east of the station. It consists of longitudinal dunes of red sand with sandy swales and

inter-dunal plains. It supports tall shrublands of wanyu and some sugarbrother and pastoral value is moderate.

The Wooramel system (7.6%) runs from the eastern boundary of the station westward to the centre of the station near the homestead. It consists of sandy plains and hardpan plains with a broad diffuse drainage zone running from east to west through the system. Vegetation is moderately close tall shrublands with wanyu, minnie ritchi and scattered mulga and gidgee. Pastoral value is moderate.

Only one other land system (Lyons 0.6%) occurs on the station and this is of little significance. All systems are summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Yalardy station

Pastoral value	Land systems	Area %
Very low— (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Sandplain - nearly flat to gently undulating red sandplains; moderately close tall shrublands of wanyu Yalbalgo - sandplains with linear and reticulate dunes; moderately close tall shrublands of wanyu Wooramel - sandy plains and plains with hardpan at shallow depth, moderately close tall shrublands of wanyu, mulga and other acacias Lyons - sandy alluvial plains with numerous claypans and reticulate and linear dunes; scattered to moderately close tall shrublands of acacias	82.1 9.6 7.6 0.6 99.9
High (5-9 ha/s.u.)	—	—
Very high (< 5 ha/s.u.)	—	—
	Bare claypans	0.1
		100.0

Table 2. Condition statements derived from traverse records (189 recordings on 4 land systems)

Yalardy

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Lyons	3	100	—	—	—	—	—	67	33	—	—	67	33
Sandplain	154	100	—	—	—	22	51	21	6	—	73	21	6
Wooramel	20	85	15	—	—	5	35	5	35	20	40	5	55
Yalbalgo	12	100	—	—	—	17	58	25	—	—	75	25	—
Total over all land systems	189	98	2	—	—	20	48	20	10	2	68	20	12

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 2 land systems.

Range condition and recommendations

1. Sandplain land system (82.1%)

This system supports the Acacia Sandplain (ACSA) pasture type which has a characteristic, moderately dense, tall shrub layer of wanyu. The lower layer consists of very scattered low shrubs including some palatable species and a prominent grass layer dominated by wanderrie grasses.

About half of the pastures seen were in good condition with the remainder being about evenly distributed between fair and very good condition. There is no erosion. Good condition is indicated by the presence of some desirable low shrubs such as warty leaf poverty bush, Wilcox bush, cotton bush and flat leaf bluebush and wanderrie grasses. Because of the general sparsity of desirable shrubs, even when in good condition, and the rather short-lived nature of wanderrie grasses, the system has only limited drought value.

Desirable low shrubs and grasses increase markedly if the tall shrub layer thins or is lost. In this respect past fires on parts of the Sandplain system have improved the pastures for livestock production. Strategic burning is likely to be a useful management tool on the system, but its use has not been researched. Evidence seen during survey suggests that the effects of fire are extremely long term in that wanyu may take 50 years or more to reach its pre-fire density.

Much of the Sandplain system in the east and also in the south-west is little used for grazing as it is well in excess of 5 km from stock water supplies.

2. Yalbalgo land system (9.6%)

The system supports the same Acacia Sandplain pastures as found on the Sandplain system. Condition is predominantly good but varies from fair to very good. Considerable parts of the system in the east are little grazed due to their excessive distance from water supplies.

3. Wooramel land system (7.6%)

This system supports Acacia Sandplain pastures on the more sandy parts and Acacia Short Grass Forb (ASGF) pastures on the areas with shallow soils over hardpan. Pasture condition varies from very poor to very good, largely dependent on distance from water and history of past use. Areas in the vicinity of the homestead show loss of desirable shrub species and are degraded to poor condition. There is occasional minor erosion on parts of the system but this is not a significant problem.

4. Lyons land system (0.6%)

This very small system was not intensively sampled but where seen its pastures were in fair or poor condition.

5. The station has been developed only relatively recently and, as yet, is inadequately watered. Because of this some parts, especially in the east, are little or not used for grazing. At the time of survey about 45% of the pastures on the station were > 5 km from permanent stock waters. Additional water supplies are required so that pastures can be better used and stock distributed more equitably.

6. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case, see 5) is 7,550.

7. The capability sheep unit capacity if all country was in good range condition and was fully watered is estimated at 8,350.

Individual station report

Yalardy station - 101,171 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	831	ACSA	607	175	49	—	6,348	6,925
Yalbalgo	97	ACSA	73	24	—	—	758	808
Wooramel	77	ACSA	17	—	29	—	258	383
		ASGF	16	5	10	—	122	155
Lyons	6	ACSA	3	—	—	—	25	25
		CBMS	—	1	—	—	13	20
		ACCR	1	—	—	—	20	20
		No veg	1	—	—	—	—	—
Large clay pans	1	No veg	1	—	—	—	—	—
Totals	1,012		719	205	88	—	7,544	8,336

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 7,550

Capability sheep unit capacity 8,350

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 4,963

highest (1976) 7,062

lowest (1981) 2,800

Yalbalgo station - Carnarvon Shire

Area 865 km²

Location

Yalbalgo station is located on the Wooramel 1:250,000 map sheet. The homestead is about 125 km east south-east from Carnarvon via the North-West Coastal Highway and access road through Callagiddy and Ella Valla stations. The station has common boundaries with Jimba Jimba, Winderie, Pimbee, Wahroonga, Marron, Ella Valla and Doorawarra stations.

Description

Nearly 90% of the station consists of red sandy plains and dunes of the Yalbalgo (49.5%) and Ella (40%) land systems.

The Yalbalgo system occurs throughout the south-east and consists of longitudinal and reticulate sand dunes with relief up to 15 m and sandy swales. The system supports a moderately close tall shrubland of wanyu and pastoral value is moderate.

The Ella system is found in the north and west of the station. It consists of short, linear sand dunes and narrow inter-dunal plains. The inter-dunal plains frequently have central run-on areas or drainage foci which support denser vegetation than the surrounding plains. Vegetation on the sandy units of the system is a moderately close tall shrubland of wanyu and some woodlands of sand

dune gidgee. On the lower parts of the system the vegetation is more patchy tall shrubland with spreading gidgee and other acacias and scattered gidgee trees. Pastoral value is high.

The Target system (4.5%) occurs in the centre of the station and consists of plains with sandy banks, more clayey inter-bank areas and prominent small drainage foci. Vegetation is a tall shrubland of wanyu on sandy parts and a tall mixed shrubland elsewhere becoming moderately close or close in the drainage foci. Pastoral value is high.

A number of patches of the Mary land system (3.7%) occur on the centre of the station. The system consists of gently sloping plains with calcrete at shallow depth and a few low calcrete rises. It supports moderately close tall shrublands with silver bark wattle, spreading gidgee and snakewood with a prominent low shrub layer of cassias. Pastoral value is high.

Wooramel land system is a minor system found in the centre of the station (2.3%). It consists of sandy plains and plains with some stony surface strew and hardpan at shallow depth. It supports patchy tall shrublands with mulga, wanyu and gidgee. Pastoral value is moderate.

All land systems are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Yalbalgo station

Pastoral value	Land systems	Area %
Very low (> 30 ha/s.u.)	—	—
Low (20-30 ha/s.u.)	—	—
Moderate (10-19 ha/s.u.)	Yalbalgo - sandplains with linear and reticulate dunes; moderately close tall shrublands of wanyu and some woodlands of sand dune gidgee	49.5
	Wooramel - sandy plains and plains with hardpan at shallow depth; scattered tall shrublands of wanyu, mulga and gidgee	2.3
		51.8
High (5-9 ha/s.u.)	Ella - plains with short linear dunes and sandy banks, inter-dunal plains with more clayey soils and drainage foci; tall shrublands of wanyu and some woodlands of sand dune gidgee, other shrublands of acacias	40.0
	Target - plains with sandy banks, more clayey inter-bank areas and numerous small prominent drainage foci; tall shrublands of wanyu and other acacias	4.5
	Mary - gently sloping plains with calcrete at shallow depth, occasional low rises of calcrete; tall shrublands silver bark wattle, spreading gidgee and cassias	3.7
		48.2
Very high (< 5 ha/s.u.)	—	—
		100.0

Table 2. Condition statements derived from traverse records (137 recordings on 5 land systems)

Yalbalgo

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Ella	62	97	3	—	—	2	23	49	24	2	24	50	26
Mary	13	85	15	—	—	—	—	46	46	8	—	46	54
Target	10	80	20	—	—	—	—	30	50	20	—	30	70
Wooramel	6	66	17	17	—	—	17	33	17	33	17	33	50
Yalbalgo	46	100	—	—	—	9	22	56	13	—	30	57	13
Total over all land systems	137	94	5	1	—	4	18	50	24	4	22	50	28

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 9 sites on 4 land systems.

Range condition and recommendations

1. Yalbalgo land system (49.5%)

The system supports Acacia Sandplain (ACSA) pastures which consist of very scattered palatable low shrubs and wanderie grasses beneath a moderately close tall shrub layer of wanyu. Because of the general sparsity of useful low shrubs, even when in good condition, and the rather short lived nature of wanderie grasses the system has only limited value in times of drought.

Pasture condition is predominantly fair with other areas, particularly those distant from water supplies, being in good or very good condition. Restricted parts show loss of desirable shrubs and are partly degraded to poor condition. There is no erosion and the system is stable under grazing.

Controlled burning may be a useful management tool on this land system, but its use has not been researched.

2. Ella land system (40%)

Pastures on this system are Acacia Sandplain (ACSA) on the sandy banks and dunes and Currant Bush Mixed Shrub (CBMS) on the more clayey interdunal plains.

Condition of the Acacia Sandplain pastures is mostly fair or good but the Currant Bush Mixed Shrub pastures have been preferentially overgrazed. Condition is now partly degraded to fair or poor. Desirable shrubs such as climbing saltbush, currant bush, Wilcox bush and flat leaf bluebush have been reduced in density and, in some cases, replaced by undesirable cassias and waxy leaf eremophila. Although the Currant Bush Mixed Shrub pastures are still moderately productive in terms of annuals and remaining perennials they have lost considerable drought durability. Strategic spelling over a number of consecutive growing seasons and conservative stocking at other times will improve pasture condition.

The condition of pastures on the Ella system in the far north of the station is better than elsewhere. The paddock to the north of East Jimalgo paddock was unwatered at the time of survey. It should be brought into use in order to relieve grazing pressure elsewhere.

3. Target land system (4.5%)

This productive system is concentrated in Moogly and West Bald Hill paddocks to the north of the homestead. It supports Acacia Sandplain pastures on the sandy banks, Currant Bush Mixed Shrub pastures on the inter-bank plains and denser Acacia Creek-line (ACCR) pastures on the drainage foci. Condition of the Acacia Sandplain and Acacia Creek-line pastures is fair or good but the Currant Bush Mixed Shrub pastures are mostly degraded to poor condition. There is some minor water erosion in the form of patchy sheeting, rilling and wind hummocking. The two paddocks require strategic spelling to encourage pasture recovery.

4. Mary land system (3.7%)

The system supports Acacia Mixed Shrub (ACMS) pastures and minor areas of Bluebush (BLUE) pastures. When in good condition Acacia Mixed Shrub pastures have many useful low shrubs such as ruby saltbush, climbing saltbush, warty leaf eremophila and felty bluebush beneath the taller cassias and acacias. Bluebush pastures carry Gascoyne bluebush and other bluebush types below snakewood. Pasture condition on this system is about evenly distributed between fair and poor meaning that many of the desirable species have been depleted.

5. Wooramel land system (2.3%)

Although this small system was not intensively sampled the indications are that pastures are generally degraded and there is some patchy erosion.

6. The station is not fully watered. About 35% of the station's pastures are >5 km from permanent stock water supplies. This applies especially to the Ella land system in the west and north and to parts of the Yalbalgo system in the north-east and south of the station. Consideration needs to be given to providing additional water supplies to some of these areas at least (e.g. northern parts as mentioned in 3) so that pastures can be better utilized and stock distributed more equitably.

7. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case, see 6) is 6,300.

8. The capability sheep unit capacity if all country was in good range condition and was fully watered is estimated at 9,050.

Individual station report

Yalbalgo station - 86,517 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Yalbalgo	428	ACSA	128	244	56	—	2,816	3,567
Ella	346	ACSA	75	150	17	—	1,631	2,017
		CBMS	—	22	47	—	569	1,380
		ACCR	26	9	—	—	610	700
Target	39	CBMS	—	2	16	—	125	360
		ACSA	6	10	—	—	113	133
		ACCR	4	1	—	—	90	100
Mary	32	ACMS	—	14	16	—	240	600
		BLUE	—	1	1	—	19	40
Wooramel	20	ACSA	2	4	6	—	66	100
		ASGF	1	3	4	—	25	40
Totals	865		242	460	163	—	6,304	9,037

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 6,300

Capability sheep unit capacity 9,050

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 8,325

highest (1968) 12,200

lowest (1980) 815

Yaringa station - Carnarvon and Shark Bay Shire

Area 1,228 km²

Location

Yaringa station is located on the Wooramel and Yaringa 1:250,000 map sheets. The homestead is about 150 km south of Carnarvon on the North-West Coastal Highway. The station has common boundaries with Wooramel, Meedo, Woodleigh and Carbla station and has a coastline to Shark Bay in the west.

Description

The largest land system is Sandplain (47.6%) which occupies the whole of the eastern part of the station. It consists of almost flat to gently undulating red sandplain supporting a moderately close tall shrubland of wanyu. Pastoral value is moderate.

The Yaringa system (24.8%) occurs in the north-west and central parts of the station. It consists of residual sandplain overlying limestone, occasional low sand dunes and minor areas of limestone plains. The sandy parts support the same tall shrublands of wanyu as for the Sandplain system and the limestone plains support tall shrublands of Hamelin wattle and other acacias. Pastoral value is high.

The Foscal system (15.4%) consisting of low limestone mesas and plateaux and broad, gently sloping outwash plains occurs in the north and west of the station. It supports tall shrublands of various *Acacia* species and low shrublands of bladder saltbush, silver saltbush and Gascoyne saltbush. Pastoral value is high.

The Salune system (4.3%) in the north of the station consists of low lying saline plains and pans with scattered low dunes. Vegetation consists of low shrublands of bladder saltbush, Gascoyne bluebush and samphire and tall shrublands of wanyu. Pastoral value is moderate.

Other land systems on the station are Yalbalgo (3.4%), Tooloonga (3.3%), Littoral (1.0%) and Sable (0.2%). Yalbalgo consists of longitudinal and reticulate sand dunes and swales supporting moderately close tall shrublands of wanyu. Pastoral value is moderate. Tooloonga consists of stony limestone plains supporting tall shrublands of Hamelin wattle, silver bark wattle and other acacias. Pastoral value is high.

All land systems are further summarized in table 1.

Condition statements for land systems and for the station as a whole (total over all land systems) are presented in table 2. These statements were derived from traverse records.

Table 1. Land systems on Yaringa station

Pastoral value	Land systems	Area %
Very low (> 30 ha/su)	—	—
Low 20-30 ha/su	—	—
Moderate (10-19 ha/su)	Sandplain - nearly flat to gently undulating red sandplain; moderately close to close tall shrublands of wanyu	47.6
	Salune - saline plains with scattered low dunes; low shrublands of saltbush, bluebush and samphire and tall shrublands of wanyu	4.3
	Yalbalgo - sandplains with linear and reticulate dunes; tall shrublands of wanyu	3.4
	Littoral - low coastal fore-dunes with acacia shrublands, samphire and tidal flats and mangrove fringes	1.0
		56.3
High (5-9 ha/su)	Yaringa - sandy plains and limestone plains with occasional low dunes, tall shrublands of wanyu, Hamelin wattle and other acacias	24.8
	Foscal - low limestone mesas and plateaux and broad, gently sloping outwash plains; tall acacia shrublands and low shrublands of saltbush and bluebush	15.4
	Tooloonga - stony limestone plains; tall shrublands of Hamelin wattle, silver bark wattle and other acacias	3.3
	Sable - nearly flat, saline alluvial plains and minor sandy banks; low shrublands of saltbush and bluebush, some tall acacia shrublands	0.2
		43.7
Very high (< 5 ha/su)	—	—
		100.0

Table 2. Condition statements derived from traverse records (169 recordings on 7 land systems)

Yaringa

Land system	No. of recordings	Total erosion (%)				Pasture condition (%)					Range condition (%)		
		nil	minor	mod.	severe	exc.	good	fair	poor	v.poor	good	fair	poor
Foscal	55	96	4	—	—	18	31	36	11	4	49	36	15
Sable	1	100	—	—	—	—	100	—	—	—	100	—	—
Sandplain	62	100	—	—	—	2	31	38	23	6	32	39	29
Salune	7	86	14	—	—	—	43	14	43	—	43	14	43
Toolonga	10	100	—	—	—	—	20	50	20	10	20	50	30
Yalbalgo	4	100	—	—	—	—	25	25	50	—	25	25	50
Yaringa	30	97	3	—	—	—	33	43	17	7	33	44	23
Total over all land systems	169	98	2	—	—	7	31	38	19	5	38	38	24

Range evaluation sites

Detailed descriptions and measurements of landform, vegetation, soils and range condition were made at 8 sites on 4 land systems.

Range condition and recommendations

1. Sandplain land system (47.6%)

The system supports Acacia Sandplain (ACSA) pastures which consist of very scattered palatable low shrubs and wanderie grasses beneath a moderately close tall shrub layer of wanyu. Because of the general sparsity of useful low shrubs, even when in good condition, and the rather short lived nature of wanderie grasses the system has only limited value in drought times.

Pasture condition is mostly fair although some extensive areas are in good condition and lesser parts, particularly near water supplies, are partly degraded to poor condition. There is no erosion and the system is stable under grazing.

Controlled burning may be a useful management tool on this pasture type, but its use has not been researched. Evidence seen during survey suggests that the effects of fire may be extremely long term in that wanyu stands may take 50 years or more to reach their pre-fire height and density. Where the wanyu over-storey has been killed by fire the low shrub layer and the ground layer increases considerably in diversity of species and in density. This fire-induced sub-climax appears to be considerably more productive for livestock production than is the mature wanyu situation.

Much of this system in the far east is little used or not used for grazing as it is considerably > 5 km from stock water supplies.

2. Yaringa land system (24.8%)

The system supports Acacia Sandplain pastures on the sandy units and Acacia Mixed Shrub (ACMS) pastures on the small limestone plains. Pasture condition is largely fair or good; some localized areas near waters show loss of desirable shrubs and are in poor condition. There is no significant erosion on the system.

3. Foscal land system (15.4%)

Pastures are Acacia Mixed Shrub and Saltbush (SALT) and Bluebush (BLUE). When in good condition a wide range of desirable low shrubs such

as Wilcox bush and ragged leaf scaevola occur on the non saline sites and bladder saltbush, silver saltbush, Gascoyne bluebush, tall saltbush and ruby saltbush are found on the saline sites. Management should be aimed at maintaining these species in the stand.

Pasture condition varies widely from very poor to very good, but is predominantly fair or good. In particular pasture condition in No 3 and No 4 paddocks in the south-west of the station is nearly all good or very good. Pastures here are highly saline and high salt intakes by livestock may be restricting pasture use and grazing radius. It is essential that stock water supplies are well-distributed throughout these pastures.

4. Salune land system (4.3%)

Condition of the Saltbush and Bluebush pastures on the system ranges from good to partly degraded to poor condition. The Acacia Sandplain pastures of the sandy rises and low dunes on the system were not intensively sampled but where seen were in fair condition.

5. Yalbalgo land system (3.4%)

This sand dune system supporting Acacia Sandplain pastures was not intensively sampled. However it is stable under grazing and is mostly in fair condition.

6. Tooloonga land system (3.3%)

The system supports Acacia Mixed Shrub pastures which, when in good condition, have numerous desirable low shrubs such as ragged leaf scaevola, ruby saltbush, green cassia and cotton bush beneath the taller shrubs of Hamelin wattle, minni ritchi and silver bark wattle. Pasture condition is predominantly fair and there is no erosion.

7. The station is not fully watered, particularly in the east (see 1) and also in the north, north-east, and far north-west of No 3 paddock. About 50% of pastures on the station are > 5 km from permanent stock water supplies.

8. The recommended sheep unit capacity for present condition and assuming that the station is fully watered (which is not the case, see 7) is 10,000.

9. The capability sheep unit capacity if all country was in good range condition and was fully watered is estimated at 13,550.

Individual station report

Yaringa station - 122,757 ha

Land system	Area km ²	Pasture lands	Range condition (km ²)				Recommended sheep unit capacity	Capability sheep unit capacity
			Good	Fair	Poor	E.d.*		
Sandplain	585	ACSA	187	228	170	—	3,663	4,875
Yaringa	305	ACSA	71	122	51	—	1,558	2,033
		ACMS	31	10	20	—	845	1,220
Foscal	190	SALT	68	28	8	—	1,760	2,080
		BLUE	25	21	21	—	894	1,340
		ACMS	5	11	3	—	229	380
Salune	53	ACSA	—	24	—	—	150	200
		SAMP	18	—	—	—	72	72
		BLUE	5	2	4	—	150	220
Yalbalgo	42	ACSA	11	11	20	—	240	350
Toolonga	40	ACMS	7	18	11	—	389	720
		ACSA	—	2	—	—	13	17
		ASGF	—	2	—	—	7	10
Littoral	12	No veg	10	—	—	—	—	—
		SAMP	1	—	—	—	4	4
		CDSH	1	—	—	—	13	13
Totals	1,227		440	479	308	—	9,987	13,534

* Area of extreme degradation; severe erosion and/or pasture degradation, zero carrying capacity.

Recommended sheep unit capacity 10,000

Capability sheep unit capacity 13,550

Declared stock numbers (sheep units or equivalent)

1968-1984:

average (mean) 9,434

highest (1976) 15,385

lowest (1980) 159

APPENDIX 2

List of Common Perennial Plant Species

<i>Abutilon geranioides</i>	oval leaf	<i>Boerhavia diffusa</i>	tar vine
<i>Abutilon otocarpum</i>	lantern bush	<i>Bonamia species</i>	
<i>Abutilon species</i>	jam	<i>Bossiaea rufa</i>	
<i>Acacia acuminata</i>	sugar brother	<i>Brachychiton gregorii</i>	kurrajong
<i>Acacia aff. coolgardiensis</i>		<i>Brachycome latisquamea</i>	
<i>Acacia amblyophylla</i>		<i>Bursaria occidentalis</i>	Australian blackthorn
<i>Acacia anasterna</i>	sand dune gidgee	<i>Bursaria spinosa</i>	native pine
<i>Acacia ancistrocarpa</i>	Fitzroy wattle	<i>Callitris columellaris</i>	one sided bottle brush
<i>Acacia andrewsii</i>		<i>Calothamnus chrysanthorus</i>	one sided bottle brush
<i>Acacia aneura</i>	mulga	<i>Calothamnus formosus</i>	
<i>Acacia aphylla</i>		<i>Calothamnus glaber</i>	
<i>Acacia arida</i>		<i>Calothamnus kalbarriensis</i>	Kalbarri bottlebrush
<i>Acacia bivenosa</i>	marpoo	<i>Calytrix longiflora</i>	star flower
<i>Acacia blakeyi</i>		<i>Calytrix muricata</i>	star flower
<i>Acacia brachystachya</i>	turpentine mulga	<i>Canthium latifolium</i>	native orange
<i>Acacia citrinoviridis</i>	golden wattle or black mulga	<i>Canthium lineare</i>	native currant
<i>Acacia colletoides</i>		<i>Capparis spinosa</i>	coastal caper
<i>Acacia coolgardiensis</i>	sugar brother	<i>Carpobrotus species</i>	pig face
<i>Acacia coriacea</i>	weeping acacia	<i>Cassia artemisioides</i>	silver cassia
<i>Acacia craspedocarpa</i>	hop mulga	<i>Cassia charlesiana</i>	
<i>Acacia cuspidifolia</i>	wait-a-while	<i>Cassia chatelainiana</i>	tall cassia
<i>Acacia cuthbertsonii</i>		<i>Cassia desolata</i>	grey cassia
<i>Acacia drepanophylla</i>	Hamelin wattle	<i>Cassia hamersleyensis</i>	
<i>Acacia eremaea</i>	snakewood	<i>Cassia helmsii</i>	crinkled cassia
<i>Acacia farnesiana</i>	false mesquite	<i>Cassia luerseii</i>	
<i>Acacia galeata</i>		<i>Cassia nemophila</i>	desert cassia
<i>Acacia grasbyi</i>	minni ritchi	<i>Cassia notabilis</i>	cockroach bush
<i>Acacia gregorii</i>		<i>Cassia oligophylla</i>	blood bush
<i>Acacia idiomorpha</i>		<i>Cassia phyllodinea</i>	silver cassia
<i>Acacia inaequilatera</i>		<i>Cassia pruinosa</i>	silver cassia
<i>Acacia kempeana</i>		<i>Cassia sturtii</i>	green or straight leaf cassia
		<i>Cassia venusta</i>	
		<i>Cassytha aurea</i>	dodder laurel
		<i>Cenchrus ciliaris</i>	buffel grass
		<i>Cenchrus setigerus</i>	Birdwood grass
		<i>Chamelaucium species</i>	
		<i>Chenopodium auricomum</i>	swamp bluebush
		<i>Chenopodium</i>	earlobe saltbush
		<i>gaudichaudianum</i>	
		<i>Chorizema ericifolium</i>	
		<i>Chrysopogon fallax</i>	ribbon or weeping grass
		<i>Chthonocephalus</i>	
		<i>tomentellus</i>	
		<i>Clematis microphylla</i>	small leaf clematis
		<i>Cleome viscosa</i>	tick weed
		<i>Codonocarpus cotinifolius</i>	fire bush or native poplar
		<i>Commicarpus australis</i>	tar vine
		<i>Conospermum species</i>	smoke bush
		<i>Conostylis species</i>	cats paw
		<i>Corchorus sidoides</i>	flannel weed
		<i>Corchorus walcottii</i>	wooly corchorus
		<i>Corynotheca lateriflora</i>	
		<i>Cratystylis subspinescens</i>	sage
		<i>Crotalaria cunninghamii</i>	green bird flower
		<i>Cymbopogon ambiguus</i>	lemon scented grass
		<i>Cynanchum floribundum</i>	native pear
		<i>Cyperus bifax</i>	downs nut grass
		<i>Dampiera incana</i>	hoary dampiera
		<i>Dampiera spicigera</i>	spiked dampiera
		<i>Danthonia caespitosa</i>	ringed wallaby grass
		<i>Daviesia benthamii</i>	
		<i>Daviesia species</i>	bacon and eggs
		<i>Dianella revoluta</i>	native lily
		<i>Dichrostachys spicata</i>	pied piper bush
		<i>Dicrasyllis costelloi</i>	
		<i>Dicrasyllis linearifolia</i>	cabbage bush
		<i>Digitaria aff. brownii</i>	cotton panic grass
		<i>Diplolaena dampieri</i>	
		<i>Diplolaena grandiflora</i>	
		<i>Diplopeltis eriocarpa</i>	caper bush
		<i>Dissocarpus paradoxus</i>	cannonball
		<i>Dodonaea inaequifolia</i>	hop bush
		<i>Dodonaea pachyneura</i>	hop bush
		<i>Dodonaea viscosa</i>	sticky hop bush
		<i>Duboisia hopwoodii</i>	pituri
		<i>Ecdeiocolea monostachya</i>	
		<i>Enchylaena tomentosa</i>	ruby saltbush
		<i>Enneapogon polyphyllus</i>	limestone grass
		<i>Enneapogon species</i>	nigger heads
		<i>Enteropogon acicularis</i>	curly windmill grass
		<i>Eragrostis australasica</i>	swamp or cane grass
		<i>Eragrostis dielsii</i>	Murchison or red grass
		<i>Eragrostis eriopoda</i>	woolly butt
		<i>Eragrostis japonica</i>	fairy grass
		<i>Eragrostis lanipes</i>	creeping wanderrie
		<i>Eragrostis oldfieldii</i>	
		<i>Eragrostis setifolia</i>	never fail grass
		<i>Eragrostis xerophila</i>	Roebourne plains grass
		<i>Eremaea ebractea</i>	
		<i>Eremaea species</i>	
<i>Acacia leptospermoides</i>	umbrella wattle		
<i>Acacia ligulata</i>	bowgada		
<i>Acacia linophylla</i>			
<i>Acacia microcalyx</i>	fire wattle		
<i>Acacia murrayana</i>	nelia or miljee		
<i>Acacia oswaldii</i>	gidgee or yalardy		
<i>Acacia pruinocarpa</i>	kanji		
<i>Acacia pyrifolia</i>	wanyu		
<i>Acacia ramulosa</i>	flat leafed minni ritchi		
<i>Acacia rhodophloia</i>			
<i>Acacia rostellifera</i>	needle myall		
<i>Acacia royeri</i>	silver bark wattle		
<i>Acacia sclerosperma</i>	Gascoyne or flannel myall		
<i>Acacia sibilans</i>			
<i>Acacia spathulifolia</i>	spreading gidgee		
<i>Acacia subtessarogona</i>	curara		
<i>Acacia tetragonophylla</i>	poverty wattle		
<i>Acacia translucens</i>	prickly acacia or bardie bush		
<i>Acacia victoriae</i>	kerosine bush		
<i>Acacia wiseana</i>			
<i>Acacia xanthina</i>	snakewood		
<i>Acacia xiphophylla</i>			
<i>Acanthocarpus preissii</i>	bitter bush		
<i>Adenanthos acanthophyllus</i>	dwarf sheok		
<i>Adriana tomentosa</i>	native hibiscus		
<i>Allocasuarina campestris</i>			
<i>Alyogyne cuneiformis</i>	sand plain hibiscus		
<i>Alyogyne huegelii</i>	dysentery bush		
<i>Alyogyne pinoniana</i>	coast angianthus		
<i>Alyxia buxifolia</i>			
<i>Angianthus cunninghamii</i>	kangaroo paw		
<i>Angianthus microcephalus</i>			
<i>Anigozanthos species</i>			
<i>Anthobolus foveolatus</i>			
<i>Anthocercis littorea</i>	erect kerosene grass		
<i>Aristida browniana</i>	weeping Mitchell grass		
<i>Astrelia elymoides</i>	barley Mitchell grass		
<i>Astrelia pectinata</i>	bull Mitchell grass		
<i>Astrelia squarrosa</i>	swamp or river saltbush		
<i>Atriplex amnicola</i>	silver salt bush		
<i>Atriplex bunburyana</i>	old man saltbush		
<i>Atriplex nummularia</i>	marsh saltbush		
<i>Atriplex paludosa</i>	bladder saltbush		
<i>Atriplex vesicaria</i>			
<i>Atylosia species</i>	mangrove		
<i>Avicennia marina</i>			
<i>Baeckia species</i>			
<i>Banksia ashbyi</i>	Ashby's banksia		
<i>Banksia lindleyana</i>	Lindley's banksia		
<i>Banksia sceptrum</i>			
<i>Beaufortia dampieri</i>			

<i>Eremophea aggregata</i>		<i>Ipomoea yardiensis</i>	Yardie Creek morning glory
<i>Eremophila</i> aff. <i>gibsonii</i>		<i>Isotropis atropurpurea</i>	
<i>Eremophila clarkei</i>	turpentine bush	<i>Jacksonia velutina</i>	stinkwood
<i>Eremophila cordata</i>		<i>Jasminum lineare</i>	native jasmine
<i>Eremophila crenulata</i>	waxy leafed eremophila	<i>Keraudrenia hermanniifolia</i>	crinkle leaf fire bush
<i>Eremophila cuneifolia</i>	royal poverty bush	<i>Labichea cassioides</i>	
<i>Eremophila exilifolia</i>	poverty bush	<i>Labichea lanceolata</i>	
<i>Eremophila foliosissima</i>	poverty bush	<i>Lachnostachys eriobotria</i>	
<i>Eremophila fraseri</i>	turpentine bush	<i>Lamarchea hakeifolia</i>	false paperbark
<i>Eremophila freelingii</i>	limestone fuchsia	<i>Lawrenzia chrysoderma</i>	
<i>Eremophila gibsonii</i>	poverty bush	<i>Lawrenzia densiflora</i>	
<i>Eremophila gilesii</i>	turkeybush	<i>Lechenaultia linarioides</i>	yellow lechenaultia
<i>Eremophila glabra</i>		<i>Lechenaultia subsymosa</i>	
<i>Eremophila glutinosa</i>	poverty bush	<i>Leichardtia australis</i>	cogla
<i>Eremophila latrobei</i>	warty leaf poverty bush	<i>Lepidium platypetalum</i>	peppercress
<i>Eremophila leucophylla</i>	Wilcox bush	(formerly <i>L. leptopetalum</i>)	
<i>Eremophila longifolia</i>	poverty bush	<i>Lepidium linifolium</i>	
<i>Eremophila mackinlayi</i>	poverty bush	<i>Limonium salicorniaceum</i>	
<i>Eremophila maculata</i>	native fuchsia or travel bush	<i>Lycium australe</i>	water bush or boxthorn
<i>Eremophila maitlandii</i>	sandplain poverty bush	<i>Macarthuria intricata</i>	
<i>Eremophila oldfieldii</i>	poverty bush	<i>Maireana amoena</i>	
<i>Eremophila oppositifolia</i>	twin leaf eremophila	<i>Maireana aphylla</i>	spiny bluebush
<i>Eremophila pantonii</i>	limestone poverty bush	<i>Maireana atkinsiana</i>	bronze bluebush
<i>Eremophila platycalyx</i>	granite poverty bush	<i>Maireana convexa</i>	mulga bluebush
<i>Eremophila pterocarpa</i>	silver poverty bush	<i>Maireana georgei</i>	golden or George's bluebush
<i>Eremophila spathulata</i>	spoon leaf eremophila	<i>Maireana glomerifolia</i>	ball-leaf bluebush
<i>Eremophila spectabilis</i>	showy eremophila	<i>Maireana lanosa</i>	bluebush
<i>Eremophila youngii</i>	poverty bush	<i>Maireana melanocoma</i>	pussy bluebush
<i>Eriachne</i> aff. <i>obtusata</i>	northern wanderrie grass	<i>Maireana oppositifolia</i>	
<i>Eriachne</i> aff. <i>sulcata</i>		<i>Maireana planifolia</i>	flat leafed bluebush
<i>Eriachne aristidea</i>	false broad leaf wanderrie grass	<i>Maireana platycarpa</i>	low or shy bluebush
<i>Eriachne benthamii</i>	swamp wanderrie grass	<i>Maireana polypterygia</i>	Gascoyne bluebush
<i>Eriachne flaccida</i>	crab hole grass	<i>Maireana pyramidata</i>	sago bush
<i>Eriachne helmsii</i>	buck wanderrie grass	<i>Maireana stipitata</i>	bluebush
<i>Eriachne mucronata</i>	stony wanderrie grass	<i>Maireana suaedifolia</i>	lax bluebush
<i>Eriochloa pseudoacrotricha</i>	soring or cup grass	<i>Maireana tomentosa</i>	felty leafed bluebush
<i>Eriostemon sericeus</i>		<i>Maireana triptera</i>	black or three winged bluebush
<i>Eucalyptus camaldulensis</i>	river red gum	<i>Maireana villosa</i>	bluebush
<i>Eucalyptus coolabah</i>	coolibah	<i>Melaleuca cardiophylla</i>	paper bark
<i>Eucalyptus decipiens</i>		<i>Melaleuca eleuterostachya</i>	
<i>Eucalyptus dichromophloia</i>	variable barked blood wood	<i>Melaleuca leiocarpa</i>	
<i>Eucalyptus erythrocorys</i>	illyarrie	<i>Melaleuca oldfieldii</i>	paper bark
<i>Eucalyptus eudesmioides</i>	mallee	<i>Melaleuca psammophila</i>	
<i>Eucalyptus foecunda</i>	narrow leaved red mallee	<i>Melaleuca uncinata</i>	broom honey myrtle
<i>Eucalyptus fruticosa</i>		<i>Minuria cunninghamii</i>	
<i>Eucalyptus jucunda</i>		<i>Mirbelia microphylla</i>	
<i>Eucalyptus jutsonii</i>	York gum	<i>Mirbelia ramulosa</i>	
<i>Eucalyptus loxophleba</i>		<i>Mirbelia spinosa</i>	
<i>Eucalyptus mannensis</i>		<i>Mirbelia viminalis</i>	
<i>Eucalyptus microtheca</i>	coolibah	<i>Monachather paradoxa</i>	broad leafed wanderrie
<i>Eucalyptus obtusiflora</i>		<i>Muehlenbeckia cunninghamii</i>	swamp bush or lignum
<i>Eucalyptus oldfieldii</i>	Oldfields mallee	<i>Murchisonia fragrans</i>	
<i>Eucalyptus oraria</i>		<i>Myoporum insulare</i>	
<i>Eucalyptus prominens</i>		<i>Newcastelia chrysophylla</i>	
<i>Eucalyptus royeri</i>	Royce's mallee	<i>Nitraria billardierei</i>	
<i>Eucalyptus socialis</i>		<i>Olax species</i>	
<i>Eulalia fulva</i>	silky brown top	<i>Olearia axillaris</i>	coast daisy bush
<i>Euphorbia boophthona</i>	Gascoyne spurge	<i>Osteocarpum acropterum</i>	
<i>Euphorbia drummondii</i>	balsam or caustic weed	<i>Paraneurachne muelleri</i>	
<i>Exocarpus aphyllus</i>	broom bush	<i>Paspalidium aff. clementii</i>	
<i>Exocarpus sparteus</i>		<i>Paspalidium gracile</i>	
<i>Ficus platypoda</i>	native fig	<i>Paspalidium tabulatum</i>	
<i>Frankenia pauciflora</i>		<i>Petalostylis labicheoides</i>	
<i>Geleznovia verrucosa</i>		<i>Petrophile conifera</i>	
<i>Glycine canescens</i>	native soya bean	<i>Phyllanthus fuernrohrii</i>	
<i>Grevillea annulifera</i>		<i>Phyllanthus species</i> (RJC. 1948)	
<i>Grevillea eriostachya</i>	orange grevillea	<i>Phymatocarpus porphyrocephalus</i>	
<i>Grevillea gordoniana</i>		<i>Pileanthus limacis</i>	
<i>Grevillea rogersoniana</i>	Rogersons grevillea	<i>Pileanthus peduncularis</i>	
<i>Grevillea stenobotrya</i>	rattle bush	<i>Pimelea microcephala</i>	coppercups
<i>Grevillea variifolia</i>	Cape Range grevillea	<i>Pittosporum phylliraeoides</i>	mallee riceflower
<i>Hakea arida</i>		<i>Pityrodia cuneata</i>	desert willow
<i>Hakea lorea</i>	cork wood	<i>Pityrodia oldfieldii</i>	
<i>Hakea preissii</i>	needle bush	<i>Pityrodia paniculata</i>	
<i>Hakea stenophylla</i>		<i>Pityrodia species</i>	
<i>Hakea suberea</i>	cork bark tree	<i>Plectrachne danthonioides</i>	
<i>Halgania littoralis</i>		<i>Plectrachne pungens</i>	gummy spinifex
<i>Halosarcia halocnemoides</i>	samphire	<i>Plectrachne schinzii</i>	feathertop or oat eared spinifex
<i>Halosarcia indica</i>	samphire	<i>Podolepis microcephala</i>	
<i>Halosarcia pergranulata</i>	samphire	<i>Porana sericea</i>	
<i>Halosarcia pruinosa</i>	samphire	<i>Prostanthera wilkieana</i>	
<i>Halosarcia pterygosperma</i>	samphire	<i>Psoralea species</i>	scurtped
<i>Hannafordia quadrivalvis</i>		<i>Pterigeron species</i>	smelly bush
<i>Hemiandra species</i>		<i>Ptilotus aff. drummondii</i>	narrow leaf mulla mulla
<i>Heterodendrum oleaefolium</i>	minga or rosewood	<i>Ptilotus divaricatus</i>	climbing mulla mulla
<i>Hibiscus species</i>		<i>Ptilotus obovatus</i>	cotton bush
<i>Hybanthus enneaspermus</i>		<i>Ptilotus polakii</i>	Gascoyne mulla mulla
<i>Indigofera brevidens</i>		<i>Ptilotus schwartzii</i>	horse mulla mulla
<i>Indigofera monophylla</i>			
<i>Ipomoea muelleri</i>	poison morning glory		

<i>Rhagodia drummondii</i>		<i>Sporobolus mitchellii</i>	rats tail couch
<i>Rhagodia eremaea</i>	tall or climbing saltbush	<i>Spyridium complicatum</i>	
<i>Rhagodia latifolia</i>		<i>Spyridium divaricatum</i>	
<i>Rhagodia preissii</i>		<i>Stipa crinita</i>	
<i>Ruellia primulacea</i>		<i>Stipa elegantissima</i>	feather spear-grass
<i>Rulingia loxophylla</i>		<i>Stylobasium spathulatum</i>	pebble bush
<i>Salsola kali</i>	roly poly	<i>Swainsona ecallosa</i>	
<i>Santalum acuminatum</i>	quondong	<i>Swainsona pterostylis</i>	
<i>Santalum lanceolatum</i>	bitter quondong	<i>Tecticornia verrocosa</i>	claypan samphire
<i>Santalum spicatum</i>	sandalwood	<i>Templetonia retusa</i>	cockies tongues
<i>Sarcostemma australe</i>	caustic bush	<i>Tephrosia bidwillii</i>	
<i>Scaevola crassifolia</i>		<i>Tephrosia flammea</i>	
<i>Scaevola spinescens</i>	currant bush	<i>Themeda australis</i>	kangaroo grass
<i>Scaevola tomentosa</i>	ragged leaf scaevola	<i>Threlkeldia diffusa</i>	
<i>Scholtzia leptanthia</i>		<i>Thryptomene baeckeacea</i>	
<i>Sclerolaena diacantha</i>	bindii	<i>Thryptomene decussata</i>	
<i>Sclerolaena divaricata</i>	bindii	<i>Thryptomene stronglophylla</i>	
<i>Sclerolaena species</i>	bindii	<i>Tribulus platypterus</i>	corky bark kallstroemia
<i>Sclerolaena tridens</i>		<i>Trichodesma zeylanicum</i>	native blue bell
<i>Sclerolaena uniflora</i>		<i>Tricoryne species</i>	
<i>Sclerostegia disarticulata</i>	samphire	<i>Triodia angusta</i>	spinifex
<i>Setaria dielsii</i>	chinterbii	<i>Triodia basedowii</i>	buck or hard spinifex
<i>Sida aff virgata</i>		<i>Triodia lanigera</i>	spinifex
<i>Sida calyxhymeria</i>	tall sida	<i>Triodia plurinervata</i>	spinifex
<i>Sida echinocarpa</i>		<i>Triodia pungens</i>	soft spinifex
<i>Sida kingii</i>		<i>Triodia wiseana</i>	limestone or hard spinifex
<i>Sida physocalyx</i>		<i>Triumfetta chaetocarpa</i>	
<i>Sida rohlenae</i>		<i>Verticordia forrestii</i>	feather flower
<i>Sida virgata</i>		<i>Waitzia podolepis</i>	
<i>Solanum esuriale</i>	quena or devils apple	<i>Westringia species</i>	
<i>Solanum lasiophyllum</i>	flannel bush	<i>Wurmbea odorata</i>	
<i>Solanum orbiculatum</i>	tomato bush	<i>Zygophyllum aurantiacum</i>	shrubby twin leaf
<i>Spartothamnella teucriflora</i>		<i>Zygophyllum fruticosum</i>	shrubby twin leaf
<i>Spinifex longifolius</i>	beach spinifex	<i>Zygophyllum species</i>	shrubby twin leaf

APPENDIX 3

List of endemic and near-endemic plants found in the Carnarvon Basin survey area

This list is based on specimens lodged at the Western Australian Herbarium as of February 1983 and in a few cases complemented by literature records.

For unnamed species a voucher specimen is cited in parentheses following the generic name. Species not entirely confined to the area are indicated with an asterisk (*).

Forty-two true endemics and 8 near-endemics are listed below. However, as more material becomes available this number may vary.

Abutilon geranoides (DC.) Benth.

Acacia anastema Maslin

Acacia drepanophylla Maslin

Acacia galeata Maslin

Acacia roycei Maslin

* *Acacia subtessarogona* Tindale & Maslin

Acanthocarpus sp. (Wittwer W1772)

Adenanthos acanthophyllus George

Angianthus microcephalus (F. Muell.) Benth.

Atriplex paludosa subsp. *graciflora*

* *Banksia ashbyi* E.G. Baker

Beaufortia dampierii A. Cunn.

Brachycome latisquamea F. Muell.

Brachysema macrocarpum Benth.

Calothamnus sp. (S.D. Hopper 1341)

* *Chamelaucium* sp. (R.J. Cranfield 2578)

Chthonocephalus tomentellus (F. Muell.) Benth.

Dampiera incana R.Br. var. *incana*

Eragrostis oldfieldii Domin

Eremaea sp. (A.S. George 04102)

Eremophea aggregata P.G. Wilson

Eriachne gardneri Hartley

Eucalyptus beardiana Brooker & Blaxell

Eucalyptus fruticosa Brooker

Eucalyptus prominens Brooker

Eucalyptus roycei S.G.M. Carr

Grevillea rogersoniana C.A. Gardner

Ipomoea yardiensis George

* *Labichea cassioides* Gaud.

Lamarchea hakeifolia Gaud. var. *hakeifolia*

Leschenaultia subsymosa C.A. Gardner & George

Lepidium linifolium (Desvaux) Steud.

Macarthuria intricata G.J. Keighery

Maireana stipitata P.G. Wilson

Murchisonia fragrans N.H. Brittan

Newcastelia chrysophylla C.A. Gardner

Pileanthus sp. (A.S. George 10365)

Pityrodia cuneata (Gaud.) Benth.

* *Pityrodia paniculata* (F. Muell.) Benth.

Psammagrostis wiseana C.A. Gardner & C.E. Hubbard

* *Sclerolaena tridens* (F. Muell.) Domin

Spyridium divaricatum Benth.

Stipa crinata Gaud.

Swainsona ecallosa Sprague

Tricoryne sp. (G.J. Keighery 814)

* *Triodia plurinervata* N.T. Burbidge

Tetragonia diptera F. Muell.

Waitzia podolepsis (Gaud.) Steetz

* *Wurmbea odorata* T.D. Macfarlane

Verticordia sp. (A. Payne 424)



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