

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

SOUTHERN YORKE PENINSULA GROUNDWATER SURVEY

WATER WELL SURVEY
HD. WARRENBEN

by

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FIELD ASSISTANT

11th July, 1977.

Rept.Bk.No.	77/76
G.S.	No. 5901
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ABSTRACT

The hundred of Warrenben has little exploitable fresh underground water, the existing water occurring as thin layers overlying salt water. There are approximately 80 wells in use with relatively small supplies, with the odd well capable of 165 m³/day. Salinity ranges from 300 mg/l to 20,000 mg/l. Water quality can quickly deteriorate by saline intrusion as a result of over pumping.

INTRODUCTION

As part of an investigation of the groundwater resources on southern Yorke Peninsula, a water well survey was undertaken in the hundred of Warrenben. This was carried out from the twelfth of July to the first of October, 1976. The aim of this survey was to update previous information, collect new information, photo plot and take water samples from wells in the hundred.

The hundred of Warrenben occupies the south western tip of southern Yorke Peninsula. The northern boundary is located 5 km north of the Carribie homestead and the eastern boundary 5 km east of Hillock Point, with both boundaries intersecting the main Warooka-Marion Bay road at a point 23 km north east of Marion Bay.

PHYSIOGRAPHY AND LAND USE

The hundred of Warrenben is a low lying region with cliffs and coastal dunes rising to 31 m along the southern boundary. Towards the centre of the hundred the land falls to below 15 m. It then slowly rises to 76 m in the north east corner and to a 61 m knoll in the south east corner of the hundred.

About one quarter of the south western portion of the hundred is covered by salt lagoons and gypsum workings. These salt lagoons are scattered throughout that area.

There are numerous sink holes and cavities throughout the hundred. Some of these are very large and probably play a significant role in recharge of the aquifer. In the north east corner of the hundred, the cavities have caused problems with mud drilling due to loss of circulation. Tractors that are used to clear the land have been known to break through the crust, which had been thinned by the formation of cavities.

There are two parks in the hundred, the Innes National Park, which covers four fifths of the south western portion and the Warrenben Conservation Park, which covers approximately one sixth of the north eastern portion.

Natural vegetation covers about three quarters of the hundred. There are scattered areas of crop and stock grazing. These are concentrated mainly near the eastern boundary and the southern and western coasts, with minor areas through the centre of the hundred. Some minor areas that have previously been cleared are again covered by natural vegetation. There are no creeks or rivers in the hundred.

RAINFALL

Fig. 2 shows rainfall recorded from 1936 to 1950 at Stenhouse Bay. The recording station operated intermittently from 1951 till 1954 when it closed.

The recording station at Carribie has not produced a full year's data for the time it was operating between 1973 to 1975.

GEOLOGY

The south and south western parts of the hundred are underlain by lower Proterozoic paragneisses and gneisses. Along the western and southern coastlines these rocks are visible at Point Margaret, Royston Head, West Cape, Cape Spencer, Stenhouse Bay and Hillock Point.

In the north and north eastern part of the hundred, the older rocks are overlain by Permian boulder till with erratics derived from the south-east and fluvioglacial sands and clay stones with marine foraminifera. There is no exposed Permian within the hundred, its occurrence being determined from borehole logs.

The lowermost rock units of the Quaternary period is aeolianite with associated calcrete which is exposed in the western and southern coastal cliffs.

Overlying the whole hundred is Quaternary calcrete, undifferentiated according to age and origin, including crusts, sheets, calcareous loess, with concretions and reworked recemented material.

Amongst the salt lakes and clay pans in the south western portion of the hundred there is a minor area of beach dunes and ridges, partly cemented, with sheet calcrete and gypsum dunes. These are Pleistocene to Recent in age.

Around most of the coast there is a strip of Recent beach sand and coastal dunes up to 2 km in width.

HYDROGEOLOGY

In the hundred of Warrenben there are records of 126 drilled wells, 105 hand dug wells and 11 waterholes. Of these, 12 drilled wells have been abandoned and 23 hand dug wells have been filled in.

There were only 100 wells and waterholes located during this survey. Most of those not located were drilled in areas covered by heavy scrub. Many wells were drilled for Waratah Gypsum Ltd., as part of investigations to locate water suitable for the washing of gypsum. When the water was found to be unsuitable, the well was either back filled or abandoned, with no accurate record being kept of its location.

Most previous information has been supplied by H.O. Nelson. This was in the form of letters and location plans of the wells that he had come across during the years he was prospecting throughout the hundred. Some of the information was on wells dating back to the last century.

Well yields range up to $165 \text{ m}^3/\text{day}$ and salinities range from 300 mg/l to 20,000 mg/l. The distribution of reasonably good quality water is shown in Fig. 6. This water occurs as a thin layer overlying salt water with generally no separate confining bed. It has therefore been found that with extended pumping period the salinity tends to increase. In section 43 the wells have only 0.70 m of water with a total salt content of 700 mg/l, the farmer finding that if he goes any deeper, saline water enters the well making it unsuitable for stock.

Recharge to the unconfined aquifer results from percolation of rainfall. Lack of significant run-off from the area is shown by the absence of drainage channels.

Most wells are used to supply stockwater; very few are used for domestic supply. On section 58 there is a pumping network that was set up to supply water to Waratah Gypsum Company. These wells are equipped with diesel pump jacks and the water is pumped to storage tanks and then to Stenhouse Bay.

HISTORICAL TRENDS

From examination of existing data the wells on section 58 have increased in salinity from 1,000 mg/l to over 3,000 mg/l since 1958. Any other changes throughout the hundred would mainly be seasonal.

GENERAL COMMENTS

The Hundred of Warrenben is considered to have limited potential for large scale groundwater development. There were very few complaints of over exploitation, but there is always the possibility of contamination of the fresh water by over pumping.

NT:JS
11th July, 1977.


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REFERENCES

BARNES, T.A.: Underground water survey, Hds. Warrenben and Coonarie. R.B. 36/34 (unpub.).

BLEYS, C.: Progress report on Groundwater Investigations of portion of the Hundred of Warrenben. R.B. 46/171 (unpub.).

CRAWFORD, A.R.: The Geology of Yorke Peninsula. Geol. Surv. S. Aust. Bull. 39.

NELSON, H.O.: Enquiry re Gypsum Deposit Sec. 32 Hd. Warrenben. DM 1608/53 (unpub.).

WARATAH GYPSUM: Water supply, Stenhouse Bay Gypsum Works. DM 1413/55 (unpub.).

WARATAH GYPSUM: Water supply, Stenhouse Bay Gypsum Works (cont.) DM 683/62 (unpub.).

APPENDIX I WATER WELL DATA

Hd. WARREN BEN NORTH EAST PORTION

1.

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
3B		1.21				Hand dug well	Not located this survey. Information from bore card	1
3B		1.21				Waterhole	" " " " " " " "	2
3B		2.13				Hand dug well	Filled in. Not located this survey. Information from bore card	3
3B		2.13				Hand dug well	Filled in. Not located this survey. Information from bore card	4
3B		1.82				Hand dug well	Not located this survey. Information from bore card	5
3B		0.76				Hand dug well	" " " " " " " "	6
3B						Waterhole	" " " " " " " "	7
3B						Hand dug well	Filled in. Not located this survey. Information from bore card	8
3B		1.06				Hand dug well	Partly filled in, this survey. Information from bore card	9
3B	W.A. Norris	2.40	1.80	1230	23-7-76	Hand dug well		10
4A	T. Bennett		20.73		18-8-76	Drilled well	No water sample	33
4A	T. Bennett	27.43	13.37		18-8-76	Drilled well	No water sample	1
4A		12.19				Drilled well	Abandoned. Not located this survey. Information from bore card	2
4A		18.28				Drilled well	Abandoned. Not located this survey. Information from bore card	3
4A		31.69	18.28	1044	23-6-58	Drilled Well *	Not located this survey. Information from bore card	4
4C	J.W. & A.R. Thomas	13.41	7.86	322 2220	13-7-76 1-9-76	Drilled well *	1st water sample bailer 2nd water sample pumped	5 5
4C		18.28			16-10-59	Drilled well *	Abandoned. Information from bore card. Not located this survey	6
4C		16.76	13.10	1057	19-11-59	Drilled well *	Not located this survey. Information from bore card	7
4C		18.89				Drilled well *	Abandoned. Not located this survey. Information from bore card.	8
4C		19.50	13.71	1178	8-12-59	Drilled well *	" " " " " " " " bore card	9
4C	J.W. & A.R. Thomas	34.76	22.94	620	1-9-76	Drilled well		31
4C	J.W. & A.R. Thomas		13.21	815	13-7-76	Drilled well		32
4D	R.J. Butler	3.35	2.67	1100	13-7-76	Hand dug well		10
4D		9.14		3199	8-7-57	Drilled well	Not located this survey. Information from bore card	11

Hd. WARRENSEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
4D	R.J. Butler	9.14	5.09	1010	31.8.76	Drilled well		12
4D		9.14		386	8.7.57	Drilled well	Not located this survey Information from bore card	13
4D	R.J. Butler	9.14	2.72	1771	20.2.58	Drilled well	No water sample this survey	14
4D	R.J. Butler	5.00	4.50	1150	31.8.76	Hand dug well		15
4D		4.87				Drilled well	Not located this survey. Information from bore card	16
4D	R.J. Butler	1.52	Surface	11 000	31.8.76	Soak		17
4D							Not located this survey No Information	18
4D		6.09		Dry		Hand dug well	" " " " Information from broe card	19
4D		10.05	2.43	8140	22.4.76	Drilled well*	Water sample from 9.44m Not located this survey	20
				1768	16.6.58		Sample from 3.04m Information from bore card	
4D		12.80	1.82	361	3.5.58	Drilled well*	Sample from 2.43m Not located this survey	21
				19 992	3.5.58		Sample from 12.80m Information from bore card	
4D		12.80	2.43	677	7.5.58	Drilled well*	Sample from 2.74m Not located this survey	22
				12 852	7.5.58		Sample from 12.19m Information from bore card	
4D		14.93	2.43	538	29.4.58	Drilled well*	Sample from 2.89m Not located this survey	23
				6 926	29.4.58		Sample from 14.63m Information from bore card	
4D		14.93	2.43	12 709	28.4.58	Drilled well*	Sample from 14.63m Not located this survey	24
				401	6.6.58		Sample from 2.89m Information from bore card	
4D		12.80	2.28	714	18.4.58	Drilled well*	Sample from 2.74m Not located this survey	25
				9 282	19.4.58		Sample from 12.49m Information from bore card	
4D		9.14	2.13	11 138	8.7.57	Drilled well	Not located this survey. Information from bore card	26
4D		9.14	2.13	3 570		Drilled well	" " " " " " " "	27
4D		24.38	3.81	1 142	19.5.58	Drilled well*	Water sample from 4.26m Not located this survey	28
				3 613	20.5.58		Water sample from 4.26m Information from bore care	
4D		6.09		Dry		Hand dug well	Not located this survey Information from bore card	29
4D	R.J. Butler	57.60	16.23	455	22.7.76	Drilled well		30
	W. Butler	36.57	17.04	2 285	20.5.53	Drilled well	No water sample this survey. Information from bore card	1

Hd. WARRENBEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
5	W. Butler	21.94	6.26	515	1.9.76	Drilled well	Mallee roots in well, S.W.L. reading could be false	2
5A							Not located this survey. No Information	1
6	F. Greenslade	6.40		890	2.9.76	Drilled well*		1
6	F. Greenslade	60.96	29.90	942	14.3.56	Drilled well*	No water sample this survey Information from bore card	2
6	F. Greenslade	57.91	53.34	900	14.3.56	Drilled well*	Not located this survey Information from bore card	3
6	F. Greenslade	25.60	15.80	543	14.3.56	Drilled well*	No water sample this survey Information from bore card	4
6	F. Greenslade	9.55	6.91	535	1.10.76	Drilled well		5
6				2 578	8.8.46	Hand dug well	Not located this survey Information from bore card	6
6	Dept. of Mines	19.81		Dry		Drilled well*		7
6	Dept. of Mines	24.99	15.24	749	5.11.63	Drilled Well*	Not located this survey Information from bore card	8
6	Dept. of Mines	14.32	12.19	488	29.1.65	Drilled Well*	No water sample this survey Information from bore card. Abandoned	9
6	F. Greenslade			1 295	1.10.76	Drilled Well	No further information	11
6	F. Greenslade					Drilled well	No water sample this survey. No further information	12
6	F. Greenslade					Drilled well	No water sample this survey. No further information	13
6A		18.28		Dry	29.9.76	Hand dug well		10
7		12.19				Drilled well		1
7	T. Bennett					Drilled well	No water sample this survey No further information	2
8B	T. Bennett	17.06	12.22	1 542	21.3.56	Drilled well	No water sample this survey Information from bore card	1
8B	T. Bennett	27.43	15.24	700	20.5.53	Drilled well	Not located this survey Information from bore card	2
8B	T. Bennett	14.83	12.19	4 056	16.1.56	Hand dug well	Not located this survey Information from bore card	3
8B	T. Bennett	19.81	18.17	3 923	27.6.58	Drilled well*	No water sample this survey Information from bore card	4
8B	T. Bennett	18.28	9.29	814	20.6.58	Drilled well*	1st water sample 15.24m Not located this survey	5
				613	20.6.58		2nd water sample 17.67m Information from bore card	
8B	T. Bennett	16.15	9.50		18.8.76	Drilled well*	No water sample this survey.	6
8B	Dept. of Mines	16.15	12.19	732	15.12.64	Drilled well*	Not located this survey Information from bore card Abandoned	7
8B	T. Bennett		16.00			Drilled well	No water sample this survey No further information	8

Note: * Indicates Geological Log A available

Hd. WARRENBEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
27	B & M Carmichael	23.47	20.11	2 640	1.9.76	Drilled well*		1
27	B. & M Carmichael	16.76		Dry	18.2.55	Drilled well*	Not located this survey Information from bore card	2
27	B. & M. Carmichael			1 375	29.9.76	Drilled well	No further information	3
28		33.52				Drilled well	Not located this survey Information from bore card	1
29	R. Schulze	24.38		Dry		Drilled well	No water sample this survey	1
29		27.73		Dry	18.2.55	Drilled well*	Not located this survey Information from bore card	2
29		15.69		Dry	18.2.55	Drilled well*	Not located this survey Information from bore card	3
29		10.05		Dry	18.2.55	Drilled well*	Not located this survey Information from bore card	4
29	R. Schulze	58.90	29.50	1 985	2.9.76	Drilled well		5
38	E.C. Webb	17.70	17.20	2 395	18.8.76	Hand dug well		1
38	E.C. Webb		15.19	5 500	18.8.76	Drilled well		2
39		21.33				Drilled well	Not located this survey Information from bore card	1
39						Hand dug well	Abandoned	1
39	E.C. Webb		17.85		18.8.76	Drilled well	Not located this survey Information from bore card	2
39	E.C. Webb		14.79		18.8.76	Drilled well	No water sample this survey No further information	3
39	E.C. Webb	17.90	14.55	1 795	18.8.76	Hand dug well	No water sample this survey No further information	4
40		42.67	18.28	8 687	21.3.66	Drilled well	Not located this survey Information from bore card	5
40		11.58				Drilled well	Not located this survey Information from bore card	1
40	R.A. Webb		13.05			Drilled well	Abandoned	2
40	R.A. Webb	59.28	24.38	15 000	2.10.70	Drilled well*	No water sample this survey No further information	3
40				Dry		Drilled well	No water sample this survey	4
40	R.A. Webb	39.72		6 000	28.1.70	Drilled well	Not located this survey Information from bore card	5
40	R.A. Webb		11.52			Drilled well	Not located this survey Information from bore card	6
41	T. Webb	24.38		341	19.8.76	Drilled well	No water sample this survey No further information	7
41	A.J. Webb	9.14		Dry	19.8.76	Hand dug well		1
41		27.43				Drilled well		2
41	T. Webb		11.85	990	19.8.76	Drilled well	Not located this survey Information from bore card	3
41	E.C. Webb		19.58			Drilled well		4
41		21.33				Drilled well	No sample this survey No further information	5
41	R. Schulze	27.43	18.28	13 655	23.20.70	Drilled well	Not located this survey Information from bore card	6
							Abandoned	
							Not located this survey Information from bore card	

Hd. WARRENBEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
41				657	16.1.56	Drilled well	Not located this survey Information from bore card	8
42		16.76	14.93	949	21.5.53	Hand dug well	Not located this survey Information from bore card	1
43		1.37				Hand dug well	Well over spring Not located this survey Information from bore card	1
43		2.43	1.52	428	21.2.58	Hand dug well	Not located this survey Information from bore card	2
43		0.91				Hand dug well	Not located this survey Information from bore card	3
43	K. Schmidt	2.25	1.50	430	21.7.76	Hand dug well	Not located this survey Information from bore card	4
43		3.15				Hand dug well	Not located this survey Information from bore card	5
43	K. Schmidt	1.80	1.10	700	21.7.76	Hand dug well	Not located this survey Information from bore card	6
43		0.91				Hand dug well	Not located this survey Information from bore card	7
43		1.52	0.76			Water hole	Not located this survey Information from bore card	8
43						Hand dug well	Not located this survey Information from bore card	9
43		1.67				Hand dug well	Not located this survey Information from bore card	10
43		1.82				Hand dug well	Not located this survey Information from bore card	11
43		1.67				Water hole	Not located this survey Information from bore card	12
43		16.45	1.82	843	28.5.58	Drilled well*	1st water sample from 2.74m Not located this survey	13
				5 576	28.5.58		2nd water sample from 15.53m Information for bore card	
43		12.49	1.98	1 699	27.5.58	Drilled well*	Water sample from 2.74m Not located this survey	14
				7 727	27.5.58		Water sample from 12.49m Information from bore card	
43				9 333	28.9.51	Whiting Quarry	Not located this survey Information from bore card	14
43				21 905	28.9.51	Main Whiting Works	Not located this survey Information from bore card	16
44	T. Bennett	28.34	19.50	844	15.12.64	Drilled well*	Not located this survey Information from bore card	1
45	Warrenben Conservation Pk	21.03				Drilled well*	No water sample this survey No further information	1
54	Warrenben Conservation Park	20.09	10.52	575	1.10.76	Drilled well*		1
56		2.59	1.98	771	16.1.56	Hand dug well	Not located this survey Information from bore card	1
56		2.13				Hand dug well	Well filled in Not located this survey Information from bore card	2

Hd. WARRENBEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well status	Comments	Well No.
								1
58	Waratah Gypsum	17.67	3.86	4 164	23.7.59	Drilled well*	No water sample this survey	2
58	Waratah Gypsum	16.15	2.61	665	1.9.76	Drilled well*		3
58	Waratah Gypsum	13.41	4.46	2 673	23.10.76	Drilled well*	No water sample this survey Information from bore card	4
58	Waratah Gypsum	15.85	4.57	2 755	21.8.73	Drilled well*	No water sample this survey Information from bore card	5
58	Waratah Gypsum	18.59	9.70	1 830	21.8.73	Drilled well*	No water sample this survey Information from bore card	6
58	Waratah Gypsum	18.28	3.86	2 685	21.8.73	Drilled well*	No water sample this survey Information from bore card	7
58		5.18	4.26	1 742	19.6.59	Hand dug well	Not located this survey Information from bore card	8
58	Waratah Gypsum	18.28	6.42	3 315	21.8.73	Drilled well*	No water sample this survey Information from bore card	9
58	Waratah Gypsum	16.76	6.09	2 285	21.8.73	Drilled well*	No water sample this survey Information from bore card	10
58	Waratah Gypsum	22.55	7.07	1 145	21.8.73	Drilled well*	No water sample this survey Information from bore card	11
58	Waratah Gypsum	18.89	9.14	1 170	25.7.58	Drilled well*	Not located this survey Information from bore card	12
58		15.24				Hand dug well	Not located this survey Information from bore card	13
58		26.51		Dry	29.5.62	Drilled Well*	Not located this survey Information from bore card	14
58						Drilled well	No water sample this survey No further information	1
58	D.J. Bennett		3.70			Hand dug well		2
61	J.R. Black	6.30	5.60	1 755	22.7.76	Hand dug well		3
61	D.J. Bennett	5.10	4.25	1 270	12.7.76	Hand dug well		4
61	J.R. Black	17.00	13.60	1 275	22.7.76	Drilled well*		5
61	J.R. Black	15.24	10.60	1 890	22.7.76	Drilled well*		6
61	J.R. Black	15.24		Dry	22.7.76	Hand dug well		7
61	J.R. Black	18.28	13.39	730	22.7.76	Drilled well*		8
61	J.R. Black	3.40	2.80	980	22.7.76	Hand dug well		1
61	J.R. Black	10.66		1 870	22.7.76	Drilled well*		1
62	R.A. Webb	13.80	11.80	1 095	19.8.76	Hand dug well		1
65	F. G. Greenslade			1 150	1.10.76	Drilled well	No further information	1
68	T. Boord	1.82		Dry	22.7.76	Hand dug well		2
68	T. Boord	1.21		1 015	22.7.76	Water hole		3
68							No information	4
68	T. Boord			2 420	23.7.76	Drilled well	No further information	

Note * Indicates Geological Log Available

Hd. WARREN BEN NORTH EAST PORTION							Well Status	Comments	Well No
Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled				
69		1.67					Waterhole	Not located this survey Information from bore card	1
69		1.67					Hand dug well	Well filled in Not located this survey Information from bore card	2
70	T. Bennett	15.85	10.72	416	31.8.76		Drilled well		1
70	T. Bennett		13.05	925	31.8.76		Drilled well	No further information	2
70	T. Bennett		15.01	615	31.8.76		Drilled well	For further information	3
71		3.04	2.43	6 854	10.2.58		Drilled well	Not located this survey Information from bore card	1
71							Hand dug well	Well filled in. Not located this survey. Information from bore card	2
71		1.67					Hand dug well	Silted in Not located this survey Information from bore card	3
71		1.67					Hand dug well	Not located this survey Information from bore card	4
71		1.82					Hand dug well	Well filled in Not located this survey Information from bore card	5
71								No information	6
71		1.82					Hand dug well	Not located this survey Information from bore card	7
71		2.43					Drilled well	Not located this survey Information from bore card	8
71		1.98					Hand dug well	Well filled in Not located this survey Information from bore card	9
71		1.82					Hand dug well	Well filled in No located this survey Information from bore card	10
71		1.98					Hand dug well	Well filled in Not located this survey Information from bore card	11
71		1.82					Hand dug well	Well filled in Not located this survey Information from bore card	12
71							Hand dug well	Well filled in Not located this survey Information from bore card	13
72		13.56	12.49	800	16.1.56		Drilled well	Not located this survey Information from bore card	1
72		15.24					Drilled well	Not located this survey Information from bore card	2
72		15.24					Hand dug well	Not located this survey Information from bore card	3
74	W. Butler		12.25	1 600	1.9.76		Drilled well		1
75		30.48		Dry			Hand dug well	Not located this survey Information from bore card	1
75	W. Butler	39.00	24.09	10 000	1.9.76		Drilled well		2
78		6.09	5.94	557	6.8.49		Hand dug well	Not located this survey Information from bore card	1

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
78		7.32	6.70	2 171	19.2.58	Hand dug well	Not located this survey Information from bore card	2
78				7 585	15.9.66	Drilled well	Not located this survey Information from bore card	3
79		4.57	1.82	1 057	10.4.58	Drilled well*	Water sample from 2.13m Not located this survey	1
				17 850	10.4.58		Water sample from 4.26m Information from bore card	
79		5.89	1.82	6 355	12.4.58	Drilled well*	Water sample from 2.43m Not located this survey	2
				8 854	14.4.58		Water sample from 5.18m Information from bore card	
79		8.53	2.43	1 100	15.4.58	Drilled well*	Water sample from 2.74m Not located this survey	3
				12 995	15.4.58		Water sample from 8.23m Information from bore card	
79	T. M ^C Auliff	7.01	2.59	3 100	20.8.76	Drilled well*		4
79		4.57	2.13	19 278	7.5.58	Drilled well*	Not located this survey Information from bore card	5
79	T. M ^C Auliff	2.60	2.00	1 300	23.7.76	Hand dug well		6
79		1.52	1.42	1 085	19.2.58	Hand dug well	Not located this survey Information from bore card	7
79		1.82				Hand dug well	Not located this survey Information from bore card	8
69	T. M ^C Auliff	3.00	2.65			Hand dug well	No water sample this survey No further information	9
79							No information	10
79							No information	11
79	T. M ^C Auliff	2.20	1.65	980	23.7.76	Hand dug well		12
79	T. M ^C Auliff	7.10	6.50	2 100	20.8.76	Hand dug well		13
79	T. M ^C Auliff		4.57			Drilled well	No water sample this survey No further information	14
80		3.04	2.43	1 770	15.9.66	Hand dug well	Not located this survey Information from bore card	1
80						Drilled well	No water sample this survey No further information	2
81		21.33	15.85	1 571	21.5.53	Hand dug well	Not located this survey Information from bore card	1
81		28.04				Drilled well	Not located this survey Information from bore card	2
							Abandoned	
90		2.28				Hand dug well	Not located this survey Information from bore card	1
90		2.28				Hand dug well	Not located this survey Information from bore card	2
90		2.28				Hand dug well	Not located this survey Information from bore card	3
90		2.74				Hand dug well	Not located this survey Information from bore card	4
90		1.82				Hand dug well	Well filled in Not located this survey Information from bore card	5
90		1.67				Hand dug well	Well filled in Not located this survey Information from bore card	6

Note *Indicates Geological Log Available

Hd. WARRENBEN NORTH EAST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
90		1.98				Hand dug well	Well filled in Not located this survey Information from bore card	7
97		6.70				Hand dug well	Not located this survey Information from bore card	1
102	Innes National Park	1.82				Hand dug well	Well abandoned Not located this survey Information from bore card	1
102	Innes National Park	0.91				Hand dug well	Well abandoned Not located this survey Information from bore card	2
102	Innes National Park	6.09		Dry		Drilled well	Not located this survey Information from bore card	3
B ^k E		1.21	0.91	7 968	26.5.53	Waterhole	Not located this survey Information from bore card	1
B ^k E		7.31	1.98	1 909	2.5.58	Drilled well*	Water sample from 2.43m Well not located this survey	2
				11 995	2.5.58		Water sample from 7.01m Information from bore card	
B ^k E		8.83	2.74	2 722	30.4.58	Drilled well*	Water sample from 3.20m Well not located this survey	3
				7 211	1.5.58		Water sample from 8.53m Information from bore card	
B ^k E		8.23	1.82	1 714	17.4.58	Drilled well*	Water sample from 2.43m Well not located this survey	4
				10 996	17.4.58		Water sample from 8.07m Information from bore card	
G		0.91				Hand dug well	Well not located this survey Information from bore card	1
G		1.82				Hand dug well	Well not located this survey Information from bore card	2
G		1.52				Hand dug well	Well filled in Not located this survey Information from bore card	3
G		1.52				Hand dug well	Well filled in Not located this survey Information from bore card	4
G		2.13				Hand dug well	Not located this survey Information from bore card	5
G	W.A. Norris	3.20	2.40	4 110	23.7.76	Hand dug well		6
G		1.52				Water hole	Not located this survey Information from borecard	7

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
1	Innes National Park	91.44				Drilled well	Oil well, abandoned Not located this survey information from bore card	1
1	" " "	7.05	4.40	12 000	4.8.76	Drilled well	Drilled well inside hand dug well	2
1	" " "			116 019	10.8.49	Inneston Lake	Information from bore card	3
1	" " "	1.52		45 427	28.9.51	Inneston Lake	Information from bore card	4
1	" " "	4.27	3.96	4 175	23.7.49	Hand dug well	Not located this survey Information from bore card	5
1	" " "	3.04		118 159	28.9.51	Inneston Lake	Information from bore card	6
1	" " "	3.04		40 515	28.9.51	Inneston Lake	Information from bore card	7
2	" " "	3.20	2.60	2 045	3.8.76	Hand dug well		1
2	" " "	1.68	1.37	2 799	17.1.56	Hand dug well	Filled in 3.8.76	2
2	" " "					Hand dug well	Not located this survey Information from bore card	3
2	" " "	9.14	8.83	3 727	1949	Hand dug well	Not located this survey Information from bore card	4
2	" " "	2.00				Hand dug well	Not located this survey Information from bore card	5
2	" " "	2.03				Hand dug well	Not located this survey Information from bore card	6
2	" " "	2.03				Hand dug well	Not located this survey Information from bore card	7
2	" " "	1.52				Hand dug well	Not located this survey Information from bore card	8
2	" " "	2.74	1.82	500	5.8.49	Hand dug well	Not located this survey Information from bore card	9
2	Innes National Park	1.75	1.45	3 660	4.8.76	Hand dug well		10
2	" " "	1.52				Hand dug well	Not located this survey Information from bore card	11
2	" " "	3.25	2.59	2 085	17.1.56	Hand dug well	Not located this survey Information from bore card	12
2	" " "	1.52	0.91	7 991	1.8.49	Hand dug well	Not located this survey Information from bore card	13
2	" " "	123.74			2.2.61	Drilled well*	Not located this survey Information from bore card	14
2	" " "			36 792	9.8.49	Sea Water	Water sample from Stenhouse Bay	15
20	" " "	1.52	0.91	415	15.9.66	Hand dug well	No water sample Information from bore card	1
31	W.A. Norris	2.10	1.60	3 810	3.8.76	Hand dug well		1
32	W.A. Norris	1.95	1.20	2 050	3.8.76	Hand dug well		1
33	W.A. Norris	1.85	0.90	1 260	3.8.76	Hand dug well		1
33	W.A. Norris	1.50	1.00	8 000	3.8.76	Hand dug well		2
46	" " "	2.43				Hand dug well	Not located this survey Information from borecard	1

Hd. WARRENBEN SOUTH WEST PORTION

Sec. No.	Owner	Depth m	S.W.L. m	Salinity mg/l	Date Sampled	Well Status	Comments	Well No.
46		1.52				Waterhole	Not located this survey Information from bore card	2
49		1.82				Hand dug well	Not located this survey Information from bore card	1
59		2.60	2.00	860	3.8.76	Hand dug well		1
95	Innes National Park	1.52	0.91	770	23.3.66	Hand dug well	No water sample Information from bore card	1
95	"					Waterhole	No water sample No information	2
100	"	6.80	6.24	2 185	17.1.56	Hand dug well	Not located this survey Information from bore card	1
100	"		6.36	1 795	13.7.76	Drilled well		2
101	"			125 477	29.7.49	Lake sample	Information from bore card	1
101	"	1.52		7 204	5.8.49	Water hole	Not located this survey Information from bore card	2
101	"	60.96				Drilled well	Not located this survey Information from bore card	3
101	"	1.82		99 967	28.9.51	Marion Lake	Lake sample Information from bore card	4
101	"	7.01	7.01	1 562		Hand dug well*	Not located this survey Information from bore card	5
102	"	1.70	1.30	13 000	4.8.76	Hand dug well		4

Note: * Indicates Geological Log available

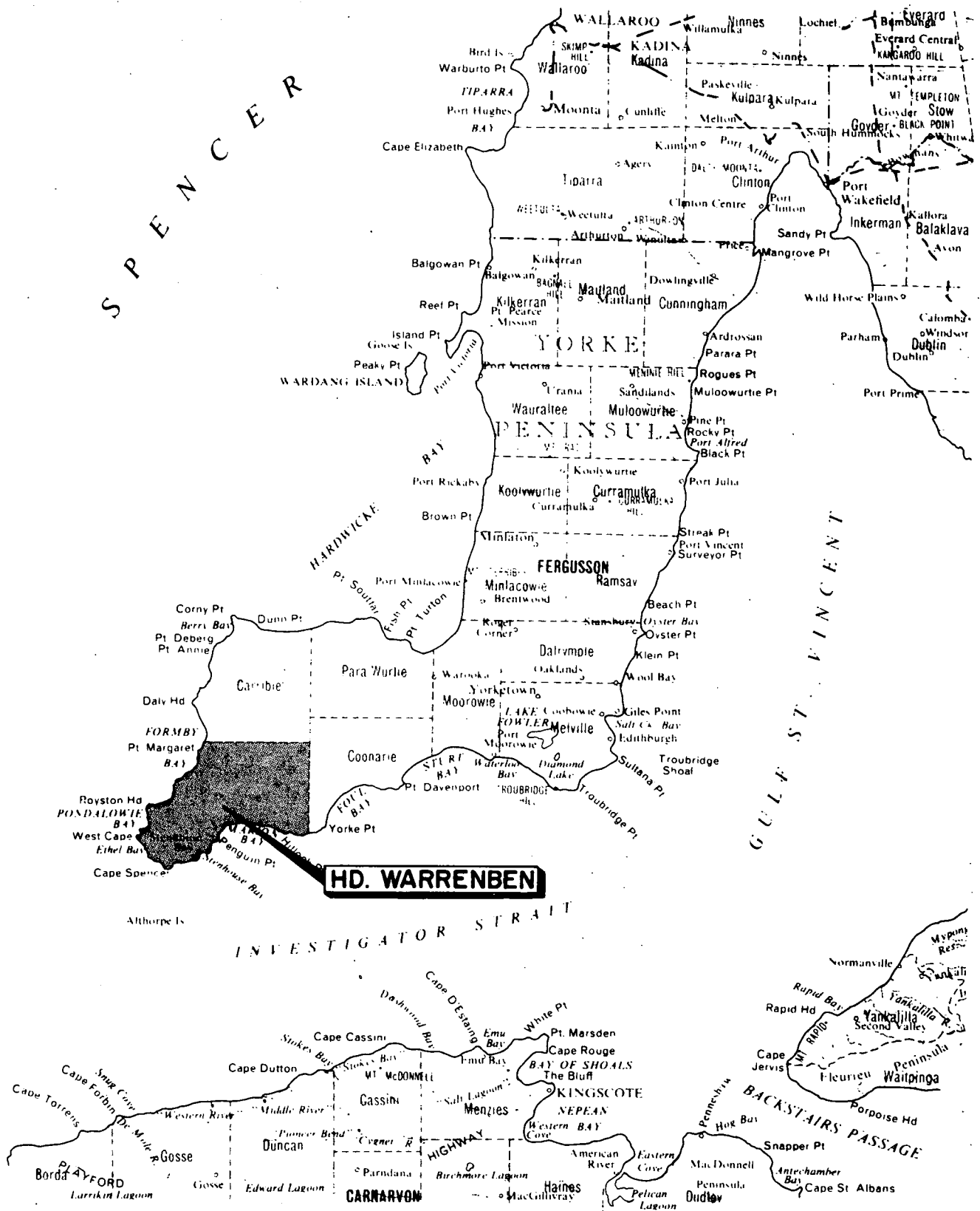
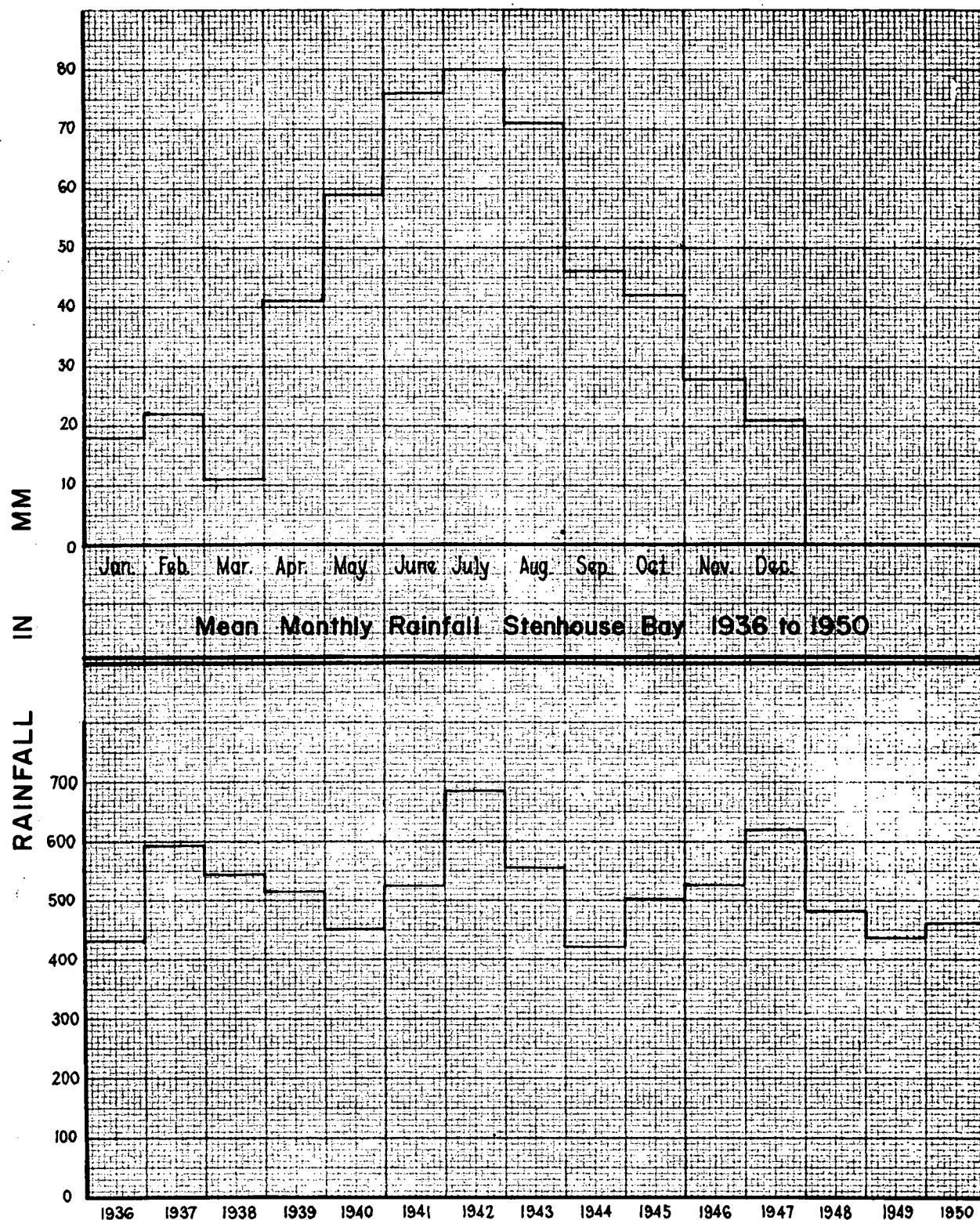


FIG. 1

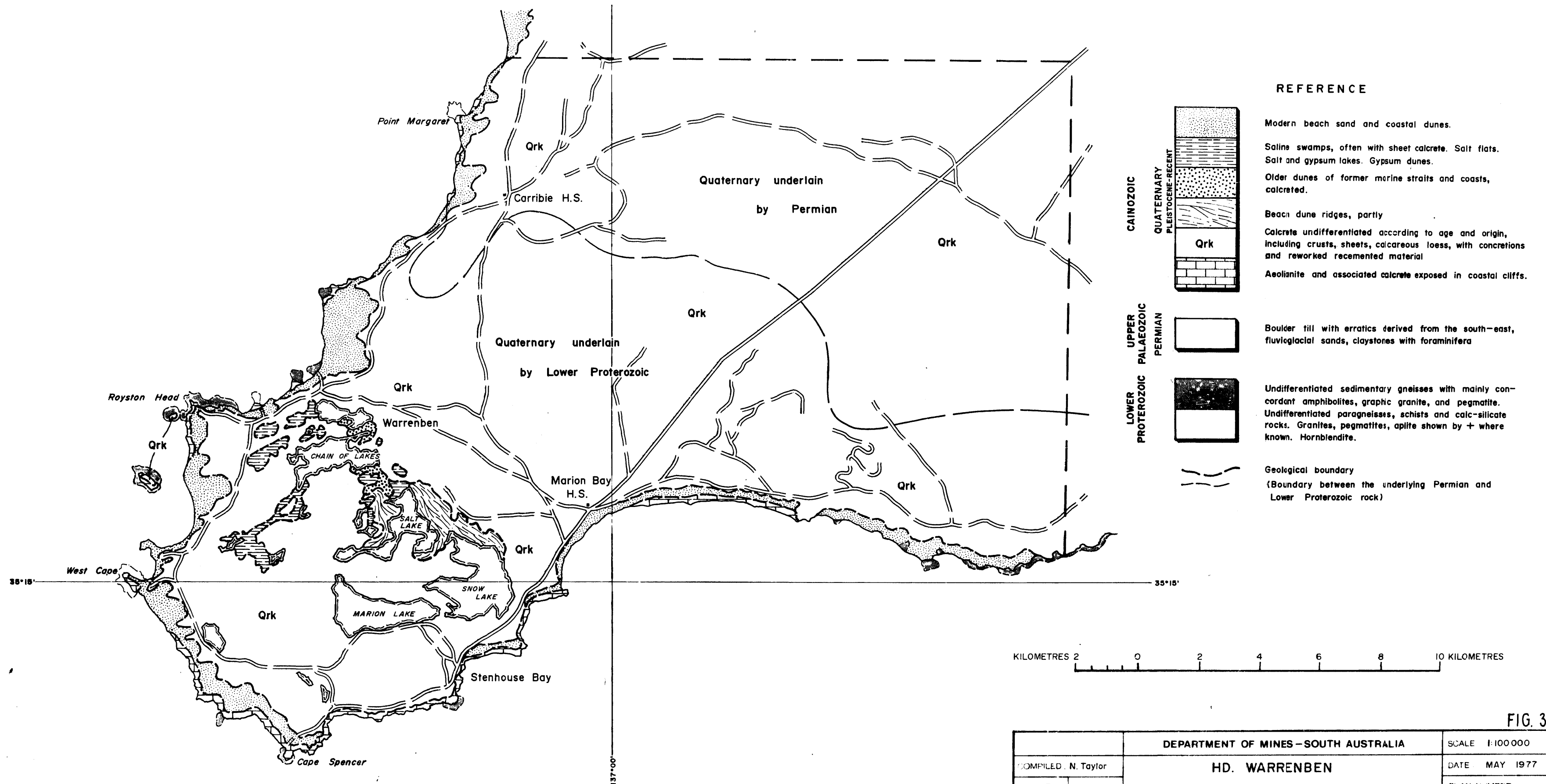
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HD. WARREN BEN WATER WELL SURVEY		DATE 30 May 1977
COMPILED NT		PLAN NUMBER
DRN TE	CKD	S 12697
LOCALITY PLAN		



Annual Rainfall Stenhouse Bay 1936 to 1950

FIG. 2

Compiled: N. T.		DEPARTMENT OF MINES - SOUTH AUSTRALIA		Scale: Graphical
Drn. TE		HD. WARRENBEN WATER WELL SURVEY		Date: 25 Feb. 1977
Ckd.		RAINFALL STATISTICS		Drg. No.
		STENHOUSE BAY POST OFFICE		S 12698



DEPARTMENT OF MINES - SOUTH AUSTRALIA		SCALE 1:100 000
HD. WARREN BEN		DATE MAY 1977
REGIONAL GEOLOGY		PLAN NUMBER 77-525
COMPILED N. Taylor		
DRN T.E. QKD		

WARRENBEN

C^o FERGUSSON

S.W. PORTION

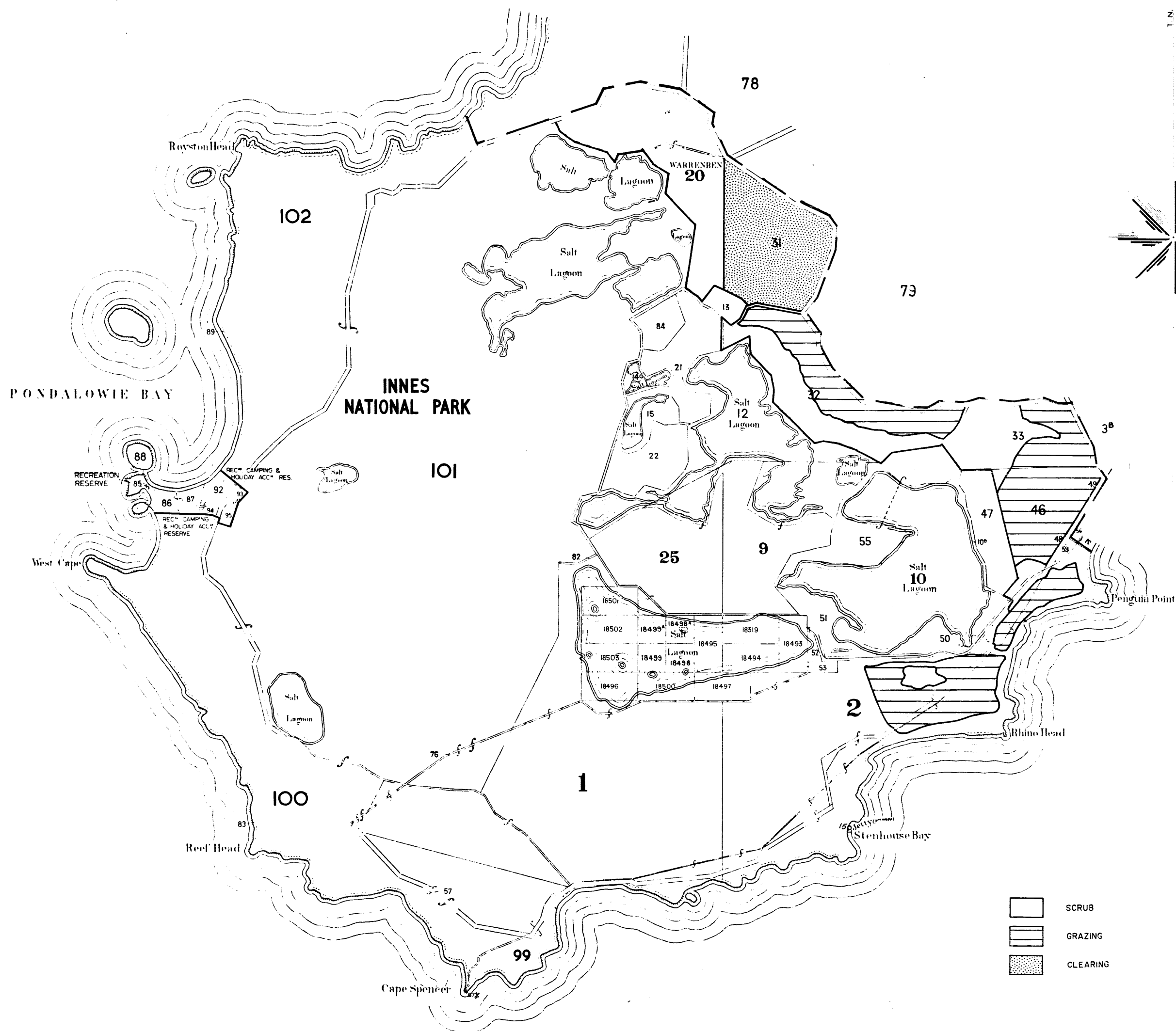


FIG. 4.1

SCALE
1:31,680 or 40 CHAINS TO 1 INCH

CHAINS 80 40 0 40 80
METRES 1,000 500 0 500 1,000
MILES 2 1 0 1 2
KILOMETRES 5 2.5 0 2.5 5

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
HD WARRENBEN SOUTH-WEST PORTION LAND USE PLAN, SEPTEMBER 1976			
Director of Mines	X. Sibenthaler GEOLOGIST	Drn. N.T. Tcd. T.E.	SCALE: 1:31680
		Ckd.	77-527
		Exd.	DATE: 30 May 1977

WARRENBEN

C^o FERGUSON

N.E. PORTION

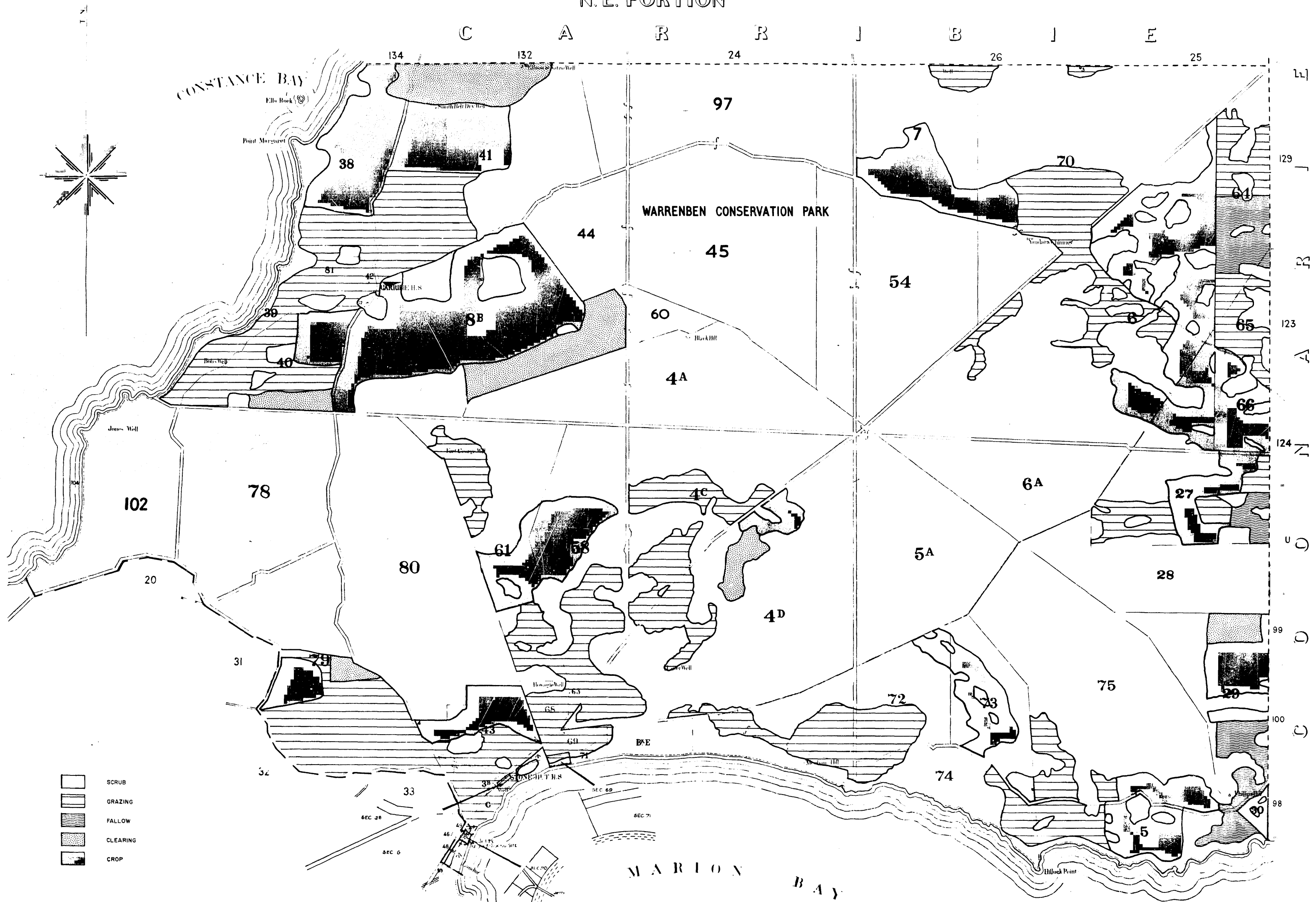


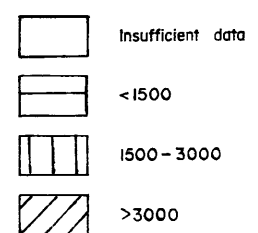
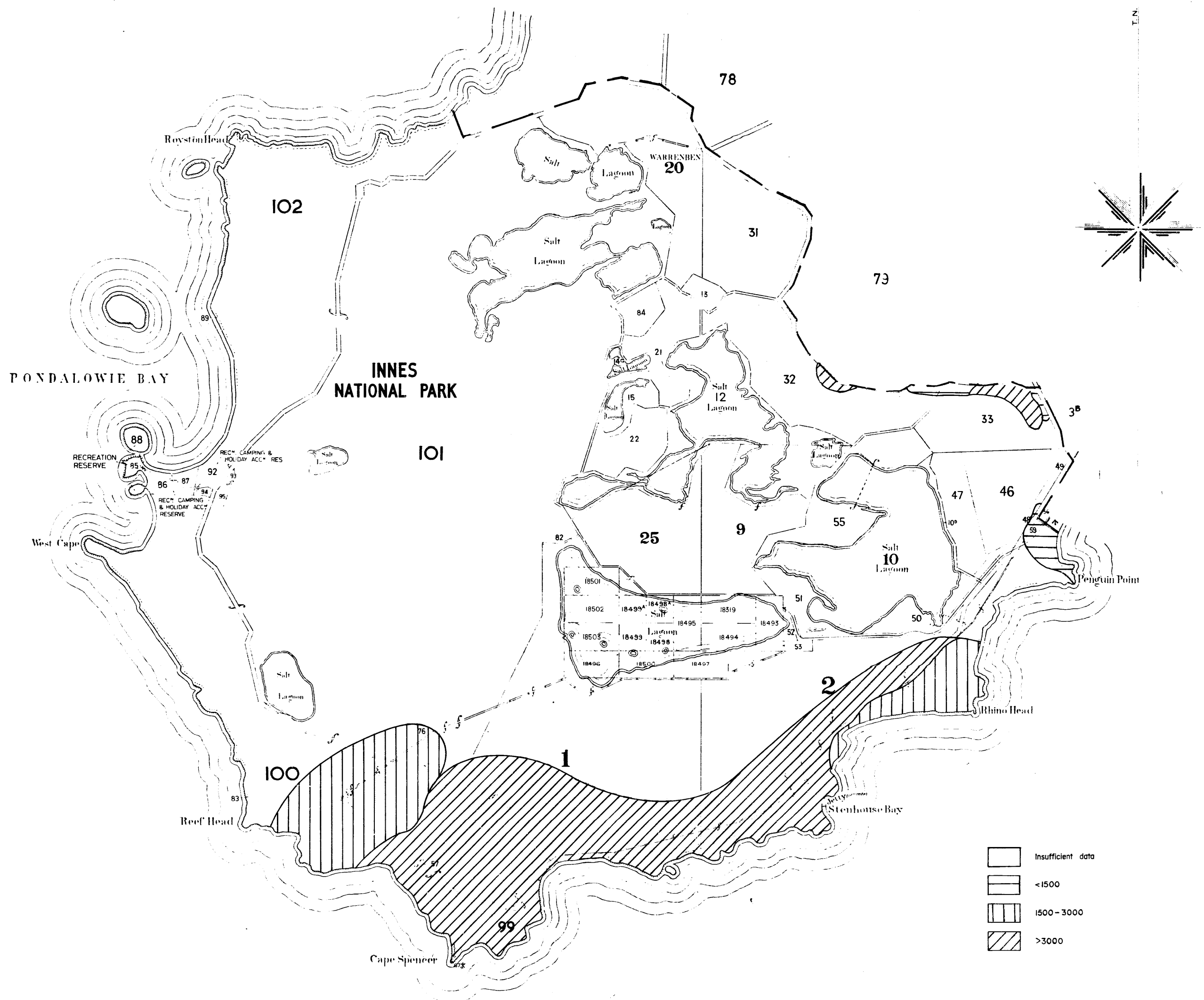
FIG. 4.2

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
HD WARRENBEN NORTH-EAST PORTION LAND USE PLAN, SEPTEMBER 1976			
X Sibbald	Dr NT	SCALE	1:31680
GEOLOGIST	Ted TE		
		77-526	
Director of Mines	Exd	DATE	30 May 1977

WARRENBEN

C^o FERGUSSON

S.W. PORTION



SCALE
1:31 680 or 40 CHAINS TO 1 INCH

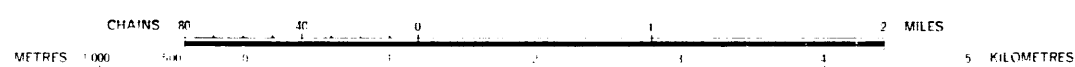


FIG 6.1

DEPARTMENT OF MINES — SOUTH AUSTRALIA

**HD WARRENBEN
SOUTH-WEST PORTION
APPROXIMATE SALINITY ZONES**

Director of Mines	X. Sibenaler	Drn. N.T.	SCALE: 1:31680
	GEOLOGIST	Tcd. TE	
	Ckd.		77-529
	Exd.		DATE: 30 May 1977

WARREN BEN

C^o FERGUSSON

S.W. PORTION

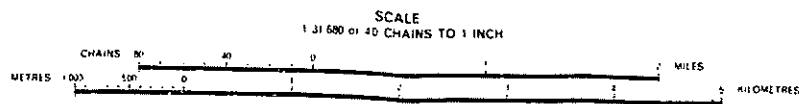
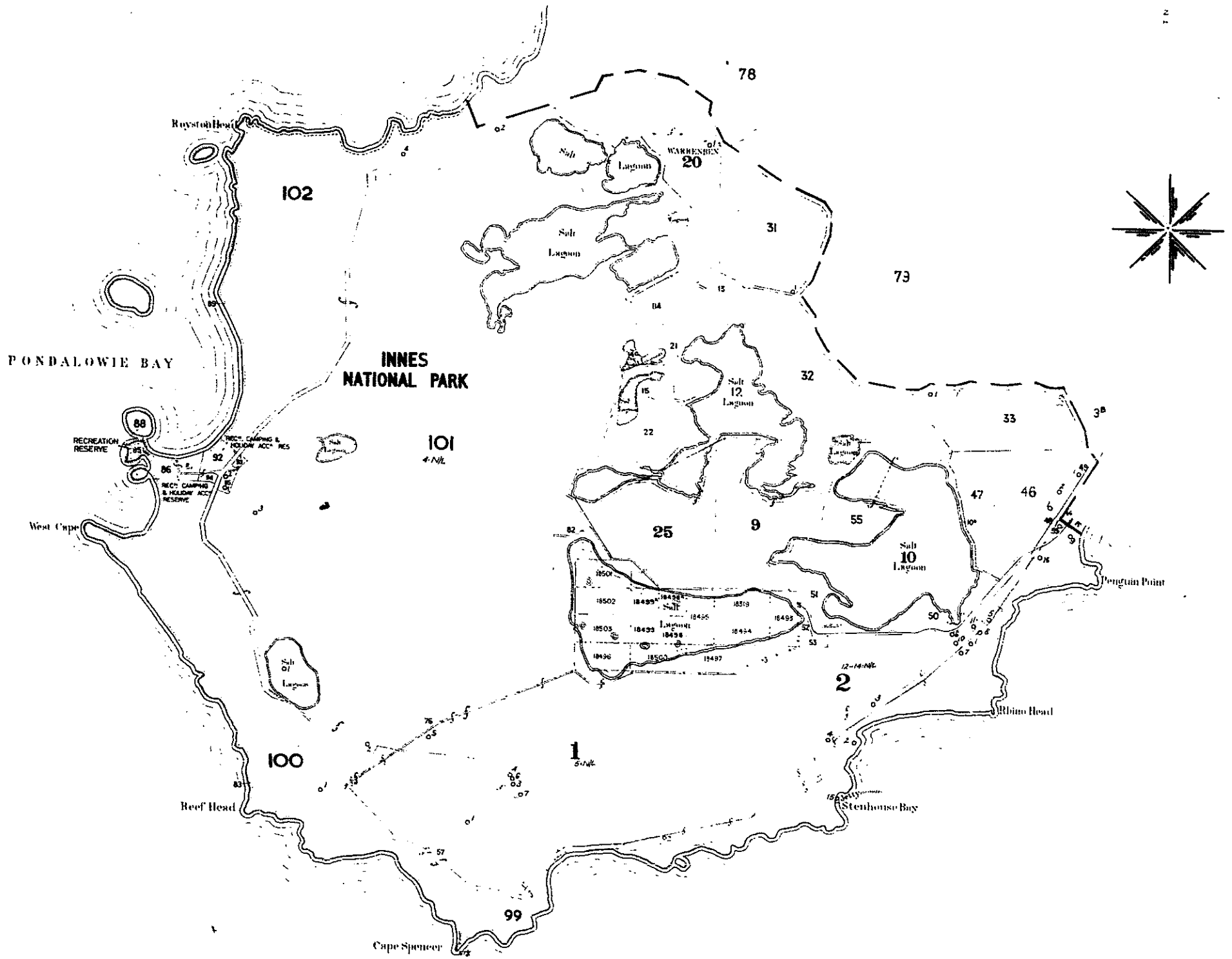


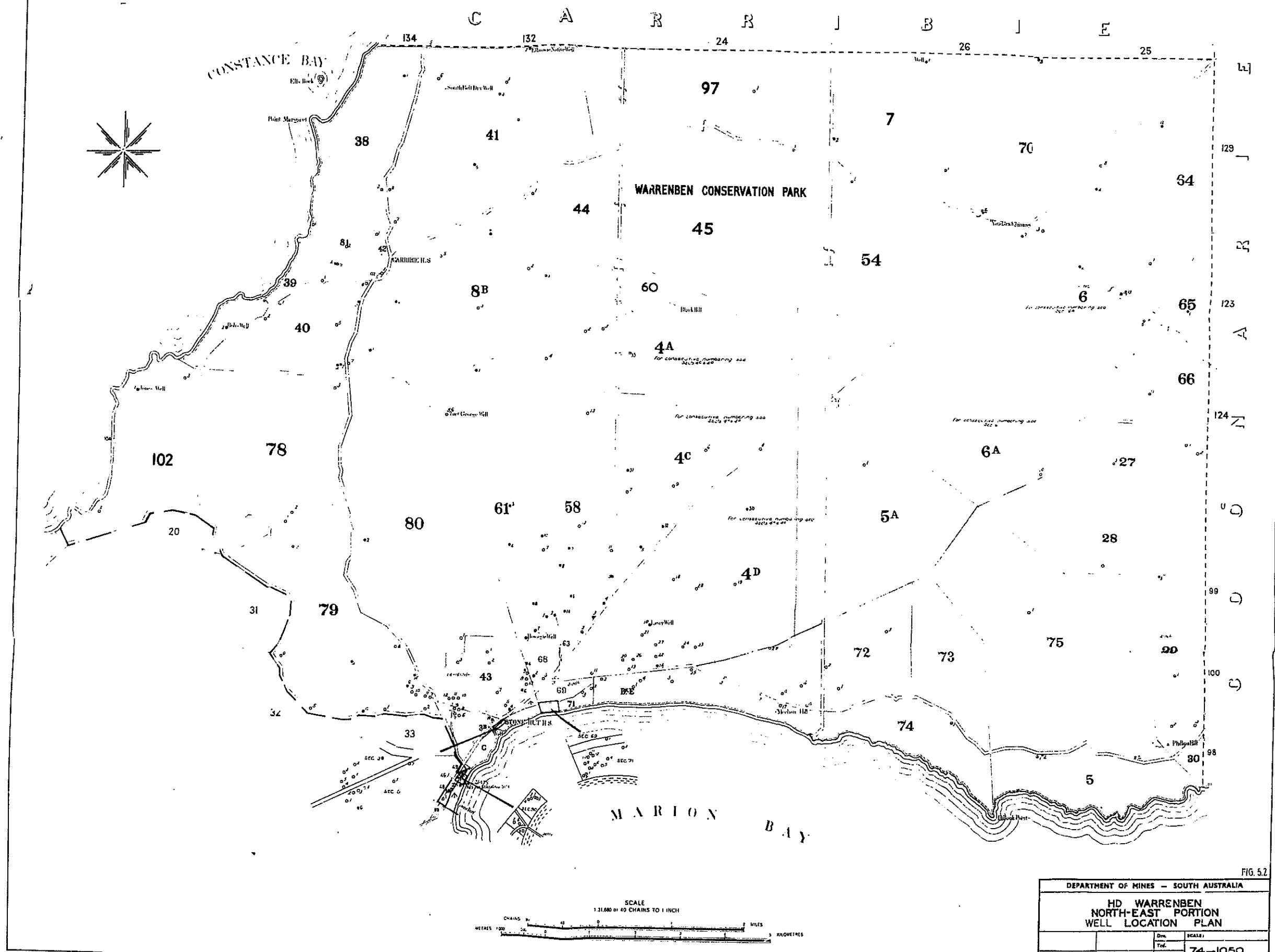
FIG. 5.1

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
HD WARREN BEN SOUTH-WEST PORTION WELL LOCATION PLAN			
Director of Mines	Drn.	SCALE:	
	Tcd.		
	Cnd.		74-1050 a
	Est.	DATE:	

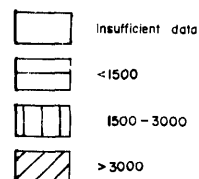
WARRENBEN

C^O FERGUSON

N.E. PORTION



C A R R I E F



M A R I O N B A Y

SCALE
1:31,680 or 40 CHAINS TO 1 INCH



FIG. 6.2

DEPARTMENT OF MINES - SOUTH AUSTRALIA

HD WARRENBEN
NORTH-EAST PORTION
APPROXIMATE SALINITY ZONES

X. Sibendler	Drn. N.T.	SCALE 131680
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GEOLOGIST	Tcd. T.E.	57 500
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Director of Mines

Exd.	DATE. 30 May 19
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