Department of Conservation and Land Management

Wildlife Research Branch

1985 REVIEW OF RAINFALL AND WETLANDS IN THE SOUTH-WEST OF WESTERN AUSTRALIA

J.A.K. Lane and D.R. Munro

November 28, 1985

DR B. WILSON
DIRECTOR NATURE CONSERVATION

RE: 1986 DUCK SHOOTING SEASON

INTRODUCTION

Duck shooting seasons in the South West and Eucla Land Divisions are determined annually. In past years I have been required to recommend to the Director of Fisheries and Wildlife whether or not, on biological grounds, a shooting season may be declared and, if so, the opening and closing dates and times, game species, bag limits etc. which should be applied.

The purpose of this memorandum is to present recommendations for the 1986 season.

BACKGROUND

From first European settlement to 1874 there were no restrictions on the taking of wild duck in Western Australia. In 1875 an Act of Parliament was proclaimed limiting duck hunting to the non-breeding period each year. Duck seasons were subsequently declared each year until 1969. In that year severe drought conditions over the entire South West and Eucla Land Divisions prompted a NO SEASON decision. Since 1969 conditions have varied considerably from year to year and as a consequence a number of NO SEASONS, RESTRICTED SEASONS and FULL SEASONS have been declared.

In recent years, recommendations concerning impending duck shooting seasons have been based on a consideration of biological principles, rainfall statistics and an assessment of the condition (water level) of a sample of south-west wetlands. Over the past seven years depth gauges have been installed on more than 120 wetlands from Dongara to Esperance. 79 of these gauged wetlands are now monitored by research staff in September and November each year. Data gathered provide an objective measure of the conditions which have prevailed during the waterfowl breeding season and the conditions which are likely to prevail during the impending shooting season.

The practice followed by the Department of Fisheries and Wildlife over the past decade or so has been to declare a FULL SEASON when conditions for breeding have been average or better than average, a RESTRICTED SEASON when conditions have been poor, and a NO SEASON when conditions have been particularly poor for a number of years.

Specifications of FULL and RESTRICTED hunting seasons were standardized in 1979 and are as follows:

	FULL SEASON	RESTRICTED SEASON
Opening Date	2nd weekend in January	2nd weekend in January
Opening Day	Saturday	Sunday
Opening Time	1800 hrs (WST)	0600 hrs (WST)
Season Length	10 weeks	4 weeks
Bag Limit	10 birds of any game species	5 birds of any game species

The principal objective of the FULL, RESTRICTED or NO system has been to ensure that shooting does not cause a serious reduction in the size of the breeding stock during dry years or periods of prolonged drought. For a more detailed account of the system and rationale see Lane J.A.K. and Munro D.R. (1983). 1982 Review of Rainfall and Wetlands in the South-West of Western Australia. Dept. Fish. Wildl. Rept. 58 : 1-41

It should also be noted that during the late 1970's and the 1980's the Department of Fisheries and Wildlife was endeavouring to both simplify the data-gathering and decision-making procedures and to place the decision-making procedure on a more objective and less controversial footing. The decision to standardise season specifications and to base season determinations on an assessment of conditions was fundamental to this aim.

1986 DUCK SHOOTING SEASON

The figures and tables which follow provide a detailed description of 1985 rainfall patterns and wetland conditions.

Rainfall

Rainfalls in the five Meteorological Districts of the south west varied from 17% (South Coastal) to 28% (North Coastal and North Central) below normal and were significantly lower than District Average Rainfalls in the preceding four years (Figure 1).

Viewed on a monthly basis the most significant features of 1985 rainfall were the very low rainfalls recorded from January to June and the near average falls from July to September (Figure 2).

Detailed analysis of rainfall distribution reveals that falls in the central agricultural area (Pingelly - Merredin - Newdegate) and pockets of the northern agricultural area and the western south coast were Very Much Below Average (Figure 3). Falls were generally Average in an area bounded by Rockingham - Boyup Brook - Wagin - Badgebup (approximately 30 km east of Katanning) and on the south coast from Albany to Cape Arid. An isolated pocket of the northern agricultural area also received Average falls.

Wetlands

November 1985 water levels of monitored wetlands are provided in Appendix 1 together with depths recorded in previous years. These data and data from September each year have been used to prepare graphs showing Cumulative Percentages of Wetland Depths (Figure 4). These graphs give a visual impression of how "wet" or "dry" each year has been, from 1980 to the present. Thus Figure 4 indicates that, on the basis of water levels of gauged wetlands, 1984 and 1983 (when FULL SEASONS were declared) were "wetter" than 1983 and 1982 (RESTRICTED SEASONS) and that these in turn were "wetter" than 1985. The "driest" of the past six years was 1980 when a NO SEASON was declared. Note that all differences are statistically significant (paired t-tests, p generally <0.01)

Given that overall conditions (water levels) in 1985 are approximately "midway" between those of 1980 (NO SEASON) and 1981 and 1982 (RESTRICTED SEASONS) it is useful to consider 1980 to 1985 water level changes on the basis of individual wetlands.

Table 1 shows that 23% (14 of 60) of wetlands monitored in both years had water levels 0.50m or more higher in November 1985 than in November 1980. The largest increases were in the Upper Greater Southern. Note that Lake Dumbleyung (approximately 5,300 ha), which was virtually dry in 1980, was more than 2.5 m deep in November 1985.

The two wetlands which decreased in depth by more than 0.50 m are situated near Albany (Lake Pleasant View) and Hopetoun (Jerdacuttup Lake). This limited section of the south coast had exceptionally high water levels in 1980. These levels have not been reached in succeeding years.

CONCLUSION AND RECOMMENDATION

Due to lower than average rainfall over much of the south west, conditions for waterfowl during the 1985 breeding season have generally been poor. Monitoring of water levels of gauged wetlands indicates that water levels are lower in 1985 then in 1982 and 1981 when RESTRICTED SEASONS were declared. 1985 water levels are higher, however, than those of 1980 when a NO SEASON was declared. In view of the above, and taking into account the fact that 1984 and 1983

have been years of average or better than average conditions for waterfowl breeding,

IT IS RECOMMENDED THAT A RESTRICTED DUCK SHOOTING SEASON BE DECLARED FOR 1986.

Such a decision would be consistent with the policy and practice of previous years, that is that "...FULL SEASONS (be declared) when conditions for breeding have been average or better than average, RESTRICTED SEASONS when conditions have been poor, and NO SEASONS when conditions have been particularly poor for a number of years..."

Specifications of the recommended RESTRICTED SEASON are as follows:

Opening Day:	Sunday 12 January 1986
Opening Time:	0600 hrs
Season Length:	4 weeks
Closing Day:	Sunday 9 February 1986
Closing Time:	2359 hrs.

Bag limit (per day) :5 birds of any game species

Game Species:

Wandering Whistling-Duck	(Dendrocygna arcuata)
Plumed Whistling-Duck	(D. eytoni)
Australian Shelduck (Mountain Duck)	(Tadorna tadornoides)
Pacific Black Duck	(Anas superciliosa)
Grey Teal	(A. gibberifrons)
Chestnut Teal	(A. castanea)
Australasian Shoveler	(A. rhynchotis)
Pink-eared Duck	(Malacorhynchus membranaceus)
Hardhead (White-eyed Duck)	(Aythya australis)
Maned Duck (Wood Duck)	(Chenonetta jubata)

Based on experience gained over the past eight years of involvement in duck season decisions, particularly the determination of RESTRICTED SEASONS, I would also recommend in the strongest possible terms that the standard specifications recommended for 1986 not be modified, however inconsequential any contemplated modification might appear to be.

J.A.K. LANE
Senior Research Officer
Wildlife Research Branch

November 27 1985

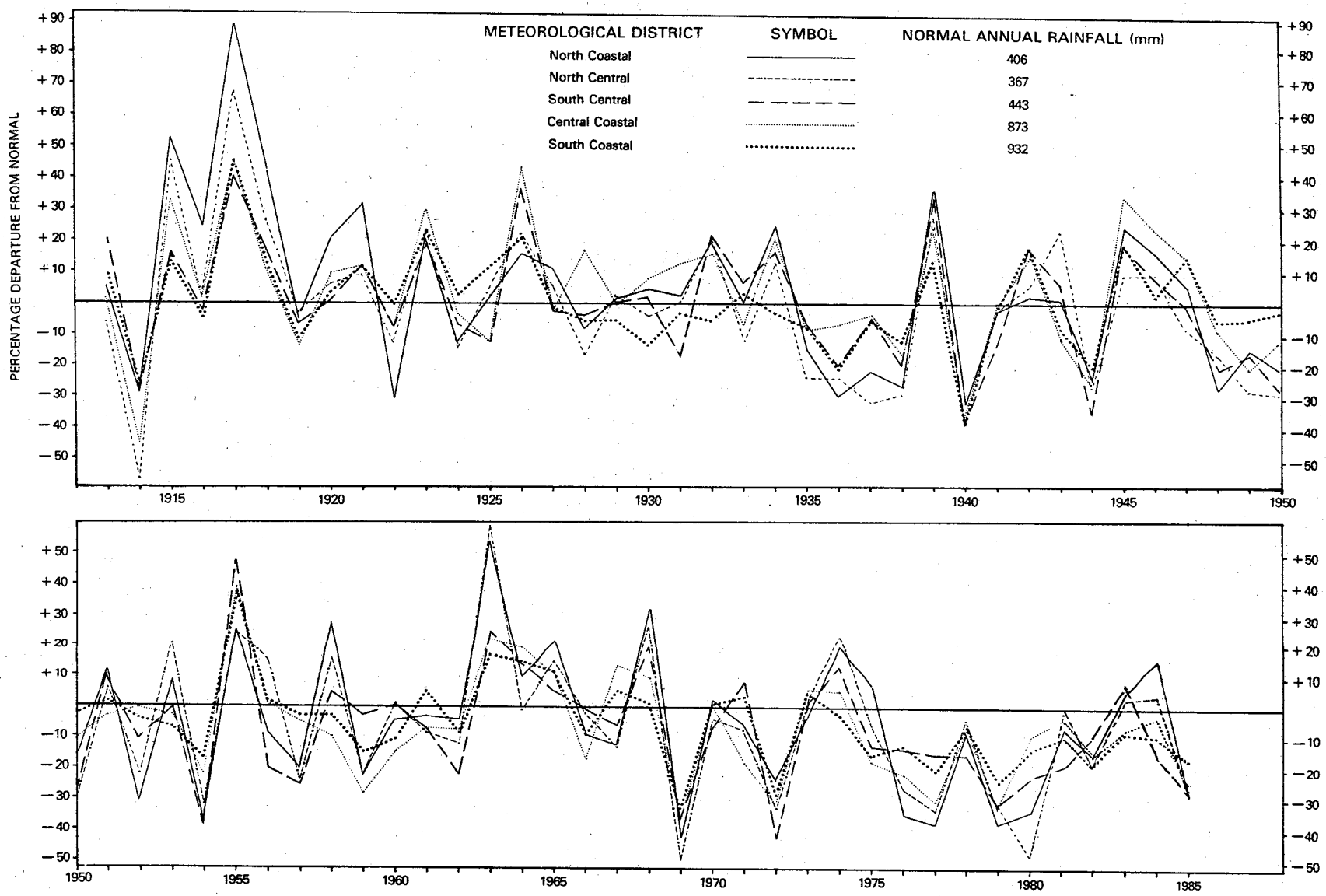


FIGURE 1. Rainfall recorded annually in each of the Meteorological Districts of the south-west, from 1913 to 1985 expressed as percentage departures from normal.

Percentage departures from normal for 1985 are based on January-October rainfall.
Normal rainfalls for this period are 93-96% of annual totals.

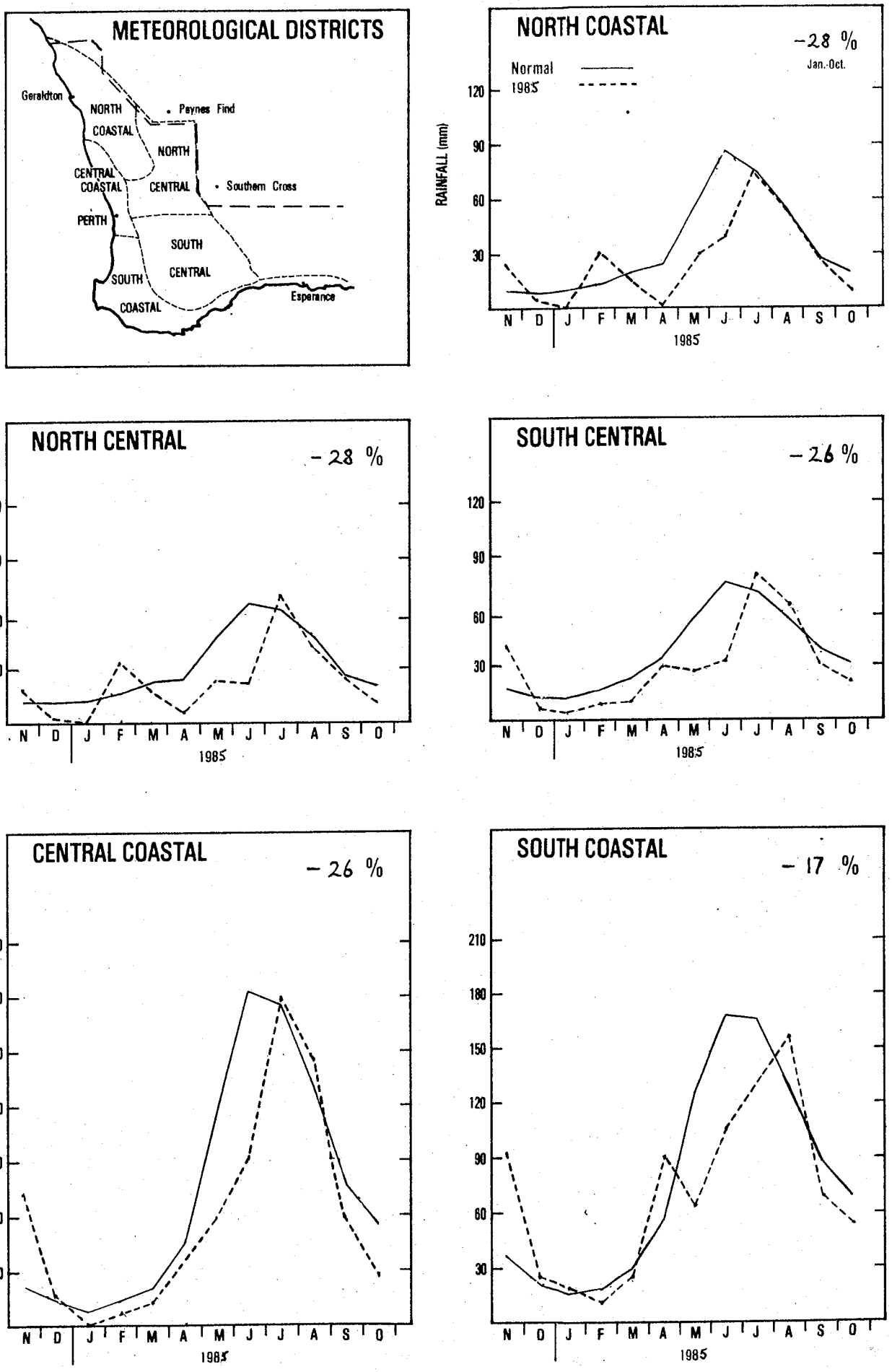


FIGURE 2. Rainfall recorded monthly in each of the five Meteorological Districts of the south-west, November 1984 to October 1985 and November to October Normal. Percentage departures from Normal (Jan.-Oct.) for each Meteorological District are also shown.

DECILE RANGE		Description
	1	VERY MUCH BELOW AVERAGE
	2-3	MUCH BELOW AVERAGE – BELOW AVERAGE
	4-7	AVERAGE
	8-9	ABOVE AVERAGE – MUCH ABOVE AVERAGE
	10	VERY MUCH ABOVE AVERAGE

EXPLANATION: Decile range 1 is the range of the driest 10% of rainfalls which have been recorded for the January-October period. Decile 2 is the next driest 10% and so on. The middle 40% (Decile ranges 4-7) is considered "average".

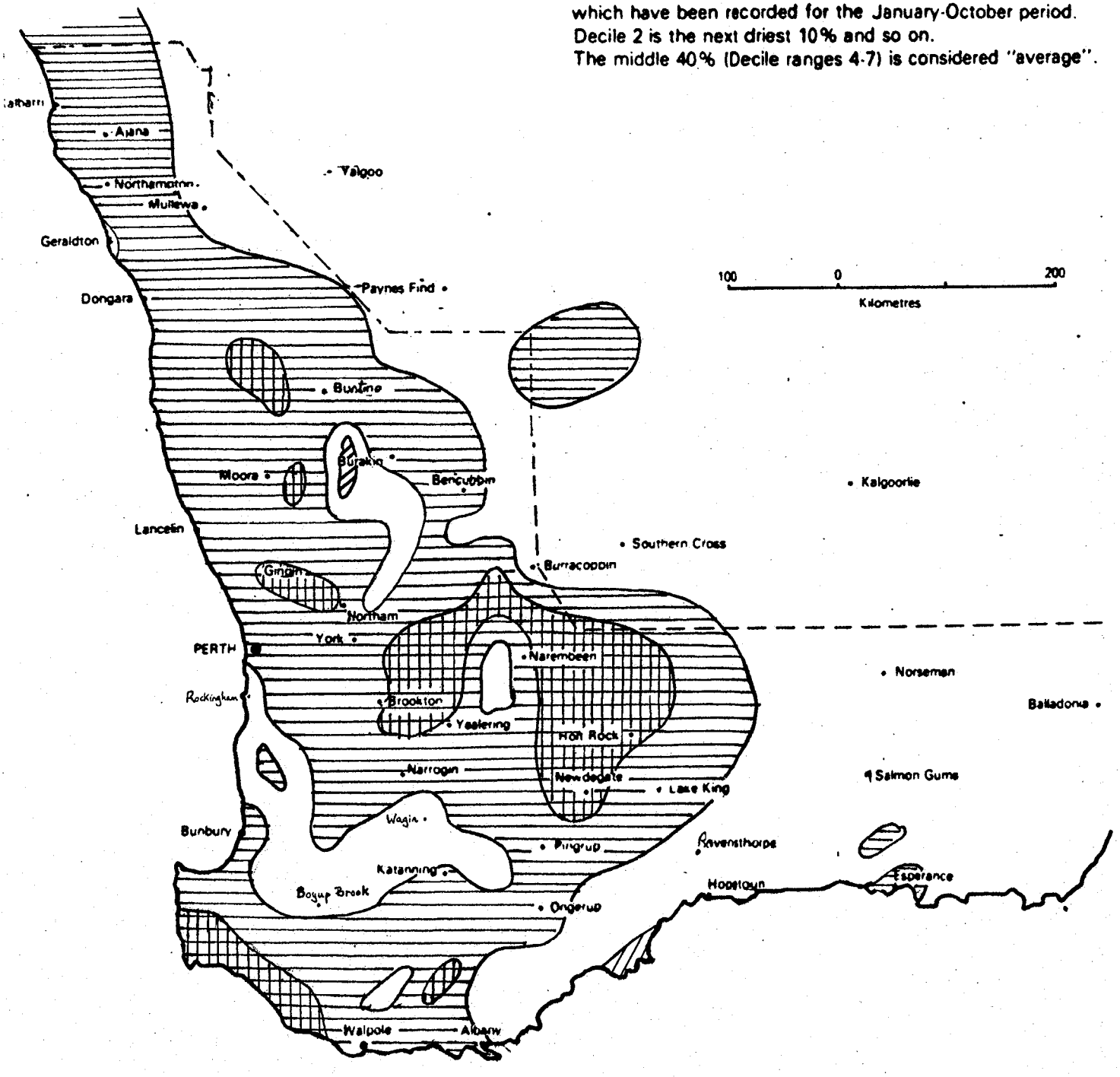


FIGURE 3. Distribution of Decile Range numbers of rainfall. Jan Oct 1985

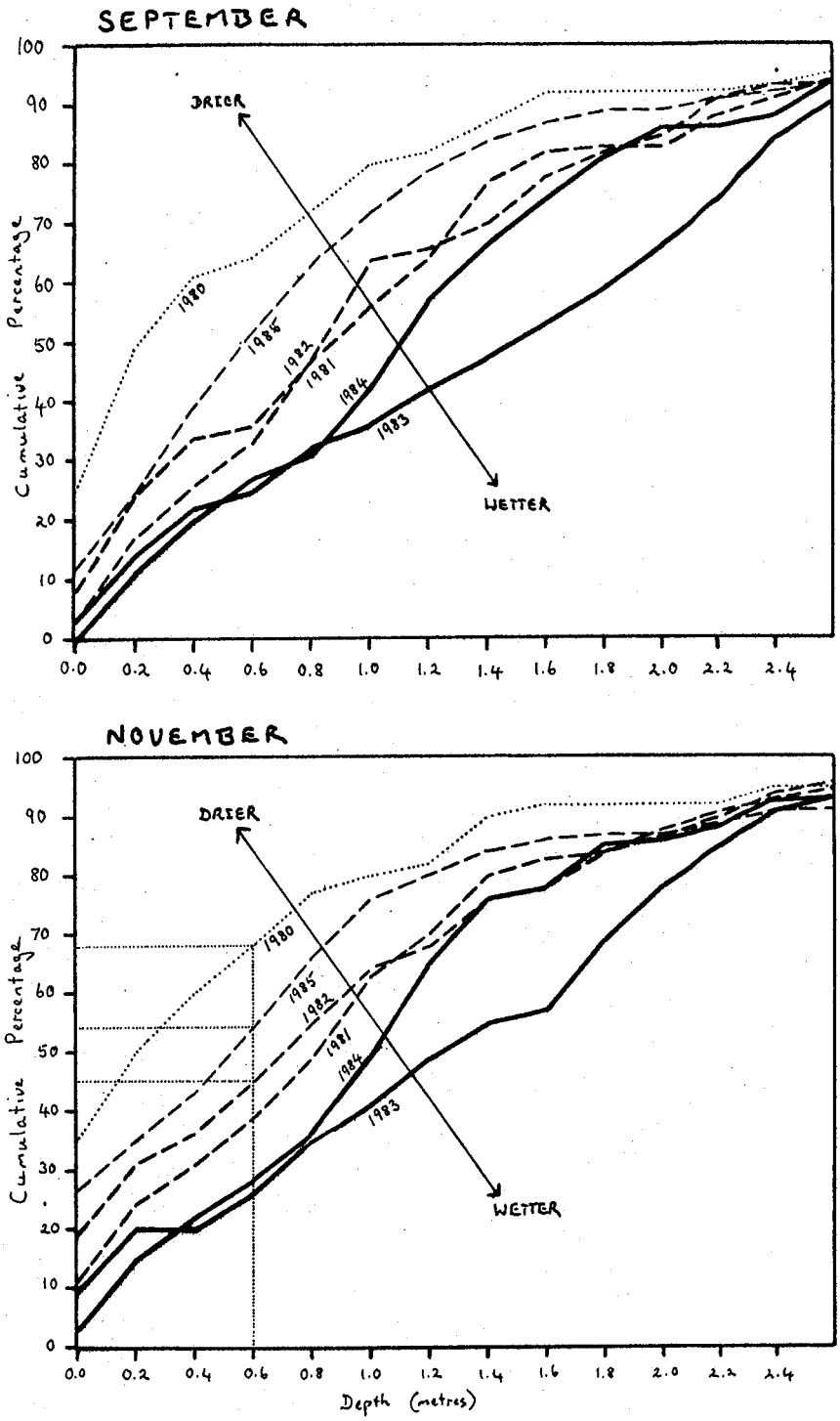


FIGURE 4. CUMULATIVE PERCENTAGES OF WETLAND DEPTHS.

This figure shows that water levels were higher overall in September and November of 1985 than in the same months of 1980 when a NO (.....) season was declared.

Water levels in 1985 were lower, however, than in 1981 – 1984 when FULL (——) or RESTRICTED (– – –) seasons were declared.

Differences are statistically significant (paired t-test).

[Thus in November 1980 68% of gauged wetlands were less than 0.6 metres deep whereas in Novembers of 1985 and 1982 54% and 45% respectively were less than 0.6 metres, etc..]

TABLE 1

SUMMARY OF NOVEMBER 1980 (NO SEASON) TO NOVEMBER 1985 DEPTH CHANGES

OF 60 WETLANDS MONITORED IN BOTH YEARS

14 Increased in depth by more than 0.50 m
44 Varied in depth by 0.50 m or less
2 Decreased in depth by more than 0.50 m

LARGEST DEPTH INCREASES

Wetland Name (No.)	Depth Nov '80	Depth Nov '85	Difference (m)
Towerinning (31)	0.54	3.32	+2.78
Dumbleyung (24)	0.13	2.62	+2.49
Coblinine (23)	1.27	3.22	+1.95
Parkeyerring (26)	0.05	1.25	+1.20
Martinup (29)	0.24	1.32	+1.08
Coyrecup (21)	0.06	1.13	+1.07
Crackers (45)	0.00	0.96	+0.96
Eganu (2)	0.00	0.89	+0.89
Gundaring (25)	0.67	1.54	+0.87
West Arthur 5456 (30)	0.00	0.85	+0.85
Pinjarrega (3)	0.00	0.82	+0.82
Casuarina (22)	0.24	1.05	+0.81
Ninan (6)	0.00	0.60	+0.60
Flagstaff (27)	0.14	0.71	+0.57

LARGEST DEPTH DECREASES

Wetland Name (No.)	Depth Nov '80	Depth Nov '85	Difference (m)
Pleasant View (68)	1.52	0.48	-1.04
Jerdacuttup (71)	1.30	0.54	-0.76

APPENDICES

1. November depths of monitored wetlands; 1980-1985

2. Location of monitored wetlands in relation to rainfall distribution, Jan-Oct 1985.

3. Depth variations of selected wetlands; 1979-1985. (Eganu, Mears, Dumbleyung, Towerinning, Pleasant View, Chandala, Joondalup, Byenup, Moates, Shark).

APPENDIX I : NOVEMBER DEPTHS OF MONITORED WETLANDS; 1980-1985.

Unnamed Wetlands are referred to by Shire and Reserve Number (eg. Wetland No. 7 : Mt Marshall 26687)

WET-LAND No.	WETLAND NAME	DEPTH (metres) NOV 1980	NOV 1981	NOV 1982	NOV 1983	DEPTH 1984	NOV 1985	MAXIMUM RECORDED NOV-JAN DEPTH DECREASE * (metres)
1	LOGUE	DRY	1.55	0.48	2.00	1.24	DRY	0.65
2	EGANU	DRY	2.28	2.00	2.33	2.24	0.89	0.53
3	PINJARREGA	DRY	2.14	0.85	2.13	2.06	0.82	0.56
4	STREETS	DRY	1.21	0.12	1.23	1.22	0.03	0.52
5	HINDS	DRY	1.00	<0.20	1.34	1.10	0.32	0.39
6	NINAN	DRY	1.96	0.78	2.13	1.72	0.60	0.58
7	MT MARSHALL 26687		0.03	DRY	DRY	DRY	DRY	0.03
8	WALYORMOURING	DRY	0.51	<0.08	0.63	0.51	0.06	0.41
9	CAMPION	DRY	0.65	0.21	DRY	0.63	DRY	0.57
10	NOONYING	DRY	1.18	0.48	1.19	1.13	DRY	0.48
11	DOBADERRY	DRY	0.49	0.14	0.58	0.48	DRY	0.58
12	BEVERLEY	0.24	1.70	1.24	1.63	1.68	0.56	0.50
13	MEARS	DRY	1.00	0.66	2.03	1.58	0.24	0.55
14	WHITE WATER		1.08	DRY	1.70	0.66	DRY	0.35
15	BROWN	DRY	1.46	0.65	1.75	1.08	DRY	0.49
16	YEALERING	0.32	1.94	1.61	2.15	1.08	0.78	0.56
17	TOOLIBIN	DRY	1.35	1.05	1.93	1.11	DRY	0.27
18	TAARBLIN	DRY	<0.08	DRY	2.00	1.12	0.15	0.32
19	LITTLE WHITE	0.47	0.81	0.81	1.30	0.69	0.41	0.33
20	KWOBRUP	DRY	DRY	0.71	1.06	0.33	DRY	0.35
21	COYRECUP	<0.13	0.35	1.89	2.24	1.69	1.13	0.35
22	CASUARINA	<0.49	0.90	0.60	0.94	0.95	1.05	0.46
23	COBLININE	1.27	1.21	2.60	5.06	4.11	3.22	0.40
24	DUMBLEYUNG	0.13	0.25	2.00	4.46	3.51	2.62	0.41
25	GUNDARING	0.67	0.95	1.65	2.12	1.34	1.54	0.48
26	PARKEYERRING	<0.10	0.60	1.28	1.84	1.06	1.25	0.43
27	FLAGSTAFF	0.14	0.26	0.64	1.62	0.90	0.71	0.38
28	WARDERING	0.66	0.99	0.70	1.02	1.03	1.04	0.40
29	MARTINUP	0.24	0.33	1.34	1.72	1.28	1.32	0.37
30	WEST ARTHUR 5456	DRY	0.80	0.51	0.82	0.85	0.85	0.37
31	TOWERINNING	0.54	1.10	3.14	3.40	3.17	3.32	0.51
32	CORRIGIN 12900			0.19	1.20	0.59	DRY	0.59
33	KONDININ	DRY	0.62	0.25	1.99	0.87	<0.18	0.45
34	GOUNTER	DRY	0.10	0.10	DRY	0.18	DRY	0.18
35	VARLEY		DRY	DRY	DRY	0.04	DRY	0.04
36	PALLARUP	DRY	<0.07	DRY	DRY	DRY	DRY	-
37	BRYDE	DRY	DRY	DRY	1.54	0.81	DRY	0.31
38	ALTHAM		DRY	DRY	1.07	0.21	DRY	0.29
39	YAALUP			1.28	1.69	1.33	0.59	0.34

* Allows prediction of probable depth at commencement of 1986 Duck Shooting Season (ie. second full weekend of January 1986)

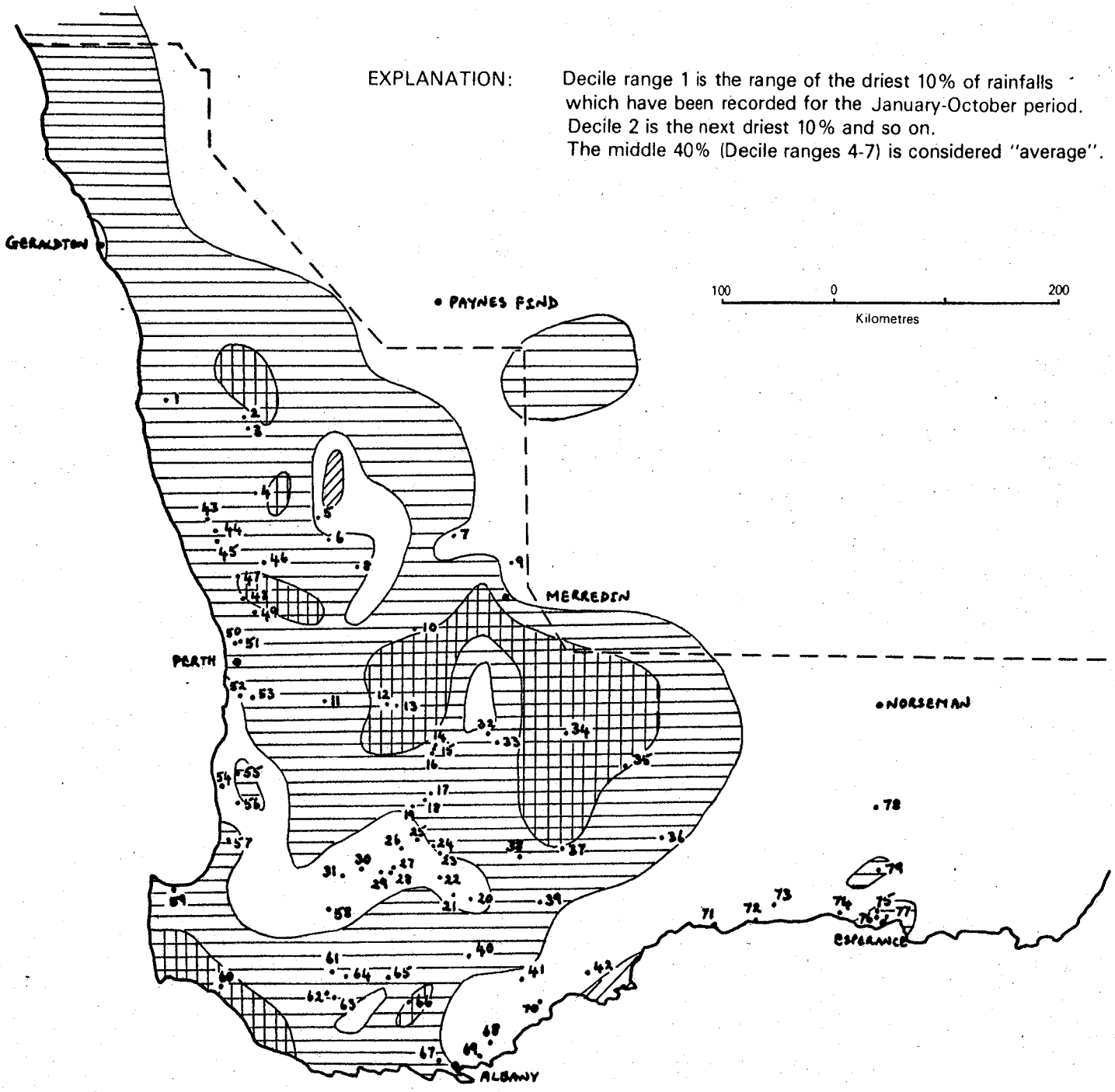
APPENDIX I - cont'd...

WET-LAND NO.	WETLAND NAME	DEPTH (metres) NOV 1980	NOV 1981	NOV 1982	NOV 1983	NOV 1984	NOV 1985	MAXIMUM RECORDED NOV-JAN DEPTH DECREASE (metres)
40	ANDERSON		0.20	2.12	1.61	1.00	0.53	0.35
41	GNOWANGERUP 26264	0.07	DRY	0.84	0.10	<0.06	DRY	0.45
42	YELLILUP	-	-	-	-	-	0.75	-
43	ENEMINGA	DRY	2.42	1.39	2.52	1.35	0.19	0.54
44	GURAGA			2.14	2.40	1.85	0.70	0.44
45	CRACKERS	DRY	0.05	DRY	0.96	0.96	0.96	0.35
46	WANNAMAL	1.24	1.23	1.30	1.32	1.28	0.92	0.45
47	YURINE	0.66	2.20	1.42	1.75	1.50	0.32	0.60
48	BAMBUN	2.31	2.32	2.26	2.35	2.25	2.30	0.50
49	CHANDALA	0.82	0.70	0.81	0.79	0.73	0.76	0.44
50	JANDABUP	1.22	1.27	1.15	1.12	1.11	0.98	0.41
51	JOONDALUP	2.88	2.92	3.03	3.02	3.02	2.78	0.35
52	THOMSONS	0.86	0.90	0.92	0.78	1.03	0.78	0.44
53	FORRESTDALE	0.79	0.93	0.64	0.76	0.78	0.55	0.47
54	CLIFTON	-	-	-	-	-	4.35	-
55	NINE MILE		1.37	1.77	1.96	1.83	1.61	0.36
56	HARVEY 12632	1.16	1.08	1.47	1.38	1.05	1.22	0.54
57	EGRET	-	-	-	-	-	0.44	-
58	BOYUP BROOK 18239	<0.05	DRY	DRY	0.65	0.13	DRY	0.37
59	BROADWATER	-	-	-	-	-	0.84	-
60	JASPER	-	-	-	-	-	9.40	-
61	UNICUP	0.60	0.64	0.19	0.94	0.70	0.34	0.35
62	MUIR	0.17	0.52	<0.02	0.42	0.26	0.20	0.42
63	TORDIT-GARRUP	2.75	2.88	2.65	2.49	2.54	2.29	0.29
64	YARNUP	0.80	0.94	0.80	0.94	0.95	0.97	0.22
65	WARRINUP	0.21	0.12	DRY	0.14	0.19	DRY	0.21
66	KWORNICUP	0.26	0.39	<0.09	0.14	0.51	0.14	0.33
67	POWELL		0.96	0.94	0.69	1.00	0.71	0.25
68	PLEASANT VIEW	1.52	1.15	0.79	0.46	0.39	0.48	0.39
69	MOATES	4.51	4.32	4.22	4.26	4.34	4.38	0.46
70	METTLER			0.44	0.11	0.15	0.25	0.21
71	JERDACUTTUP	1.30	0.62	0.43	0.78	1.11	0.54	0.40
72	SHASTER	0.17	0.20	DRY	0.20	0.40	0.36	0.40
73	ESPERANCE 26410		DRY	DRY	DRY	0.14	DRY	0.14
74	GORE	1.35	1.32	1.04	0.58	1.67	1.50	0.39
75	SHARK	2.25	2.29	2.22	1.66	2.34	2.13	0.32
76	WARDEN	<0.84	0.66	0.40	<0.19	1.34	0.63	0.42
77	MULLET	0.57	0.53	0.58	0.05	0.56	0.66	0.41
78	DUNDAS 33113			DRY	DRY	<0.34	DRY	0.34
79	ESPERANCE 27985		DRY	DRY	DRY	<0.02	DRY	<0.02

RAINFALL

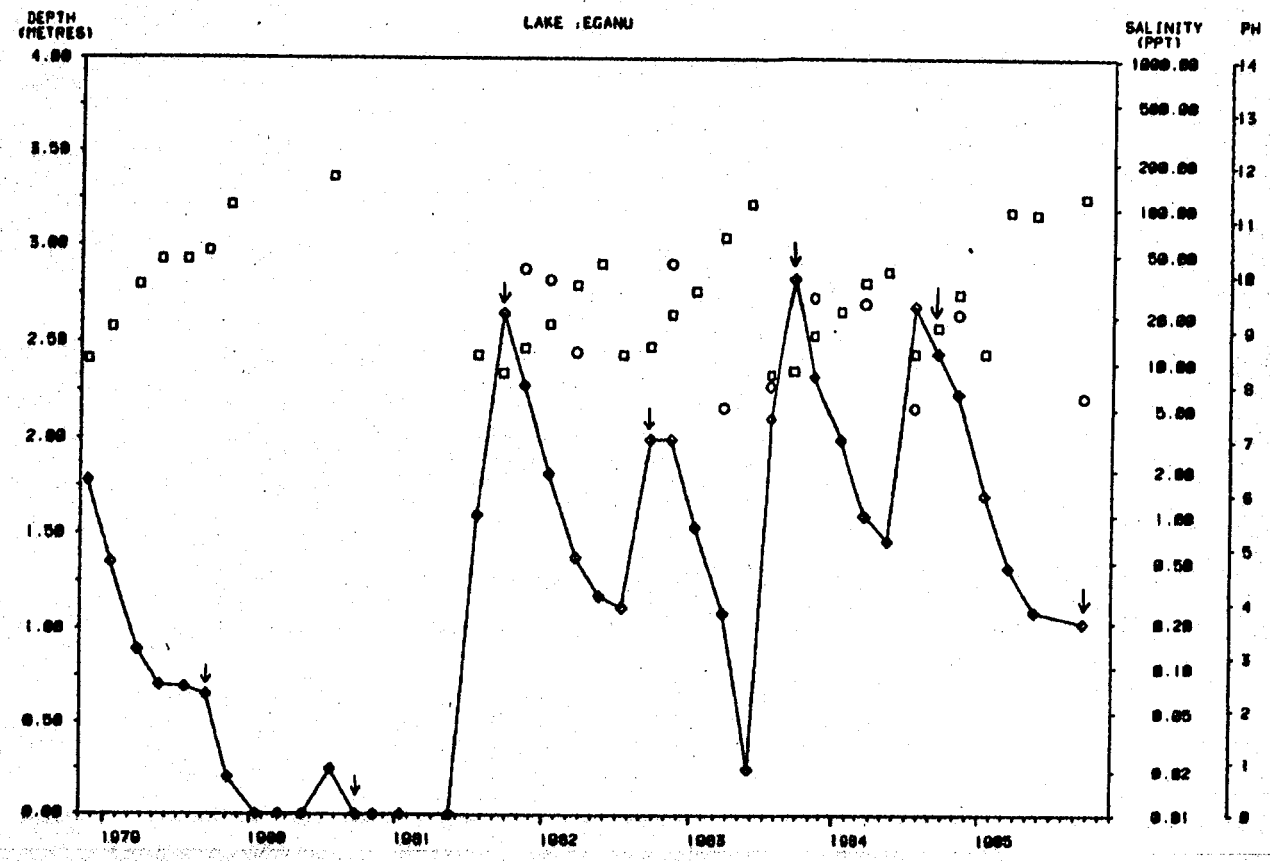
DECILE RANGE	Description
1	VERY MUCH BELOW AVERAGE
2-3	MUCH BELOW AVERAGE – BELOW AVERAGE
4-7	AVERAGE
8-9	ABOVE AVERAGE – MUCH ABOVE AVERAGE
10	VERY MUCH ABOVE AVERAGE

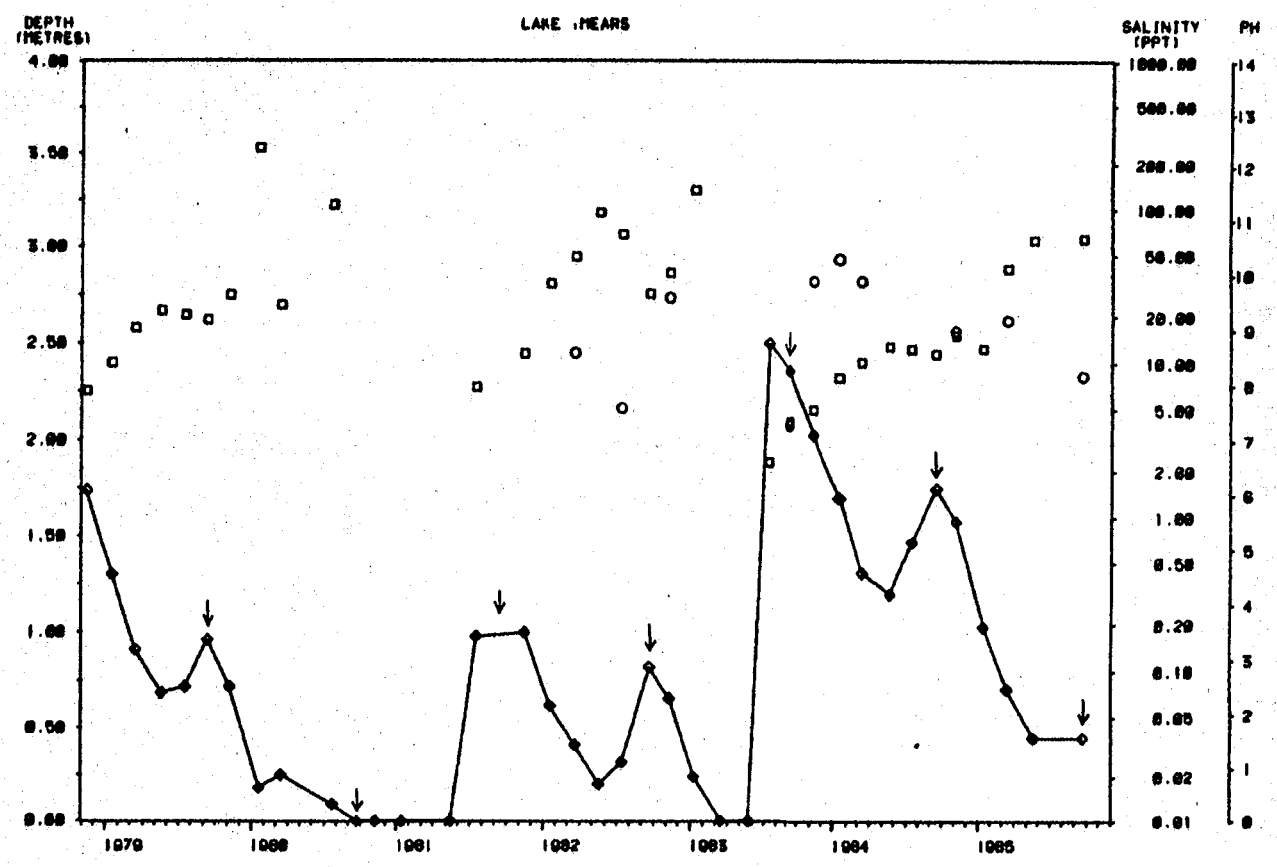
EXPLANATION: Decile range 1 is the range of the driest 10% of rainfalls which have been recorded for the January-October period. Decile 2 is the next driest 10% and so on. The middle 40% (Decile ranges 4-7) is considered "average".



APPENDIX 2. Location of gauged wetlands in relation to rainfall distribution (Jan.-Oct. 1985)

APPENDIX 3.





◇ DEPTH □ SALINITY ○ PH FACTOR

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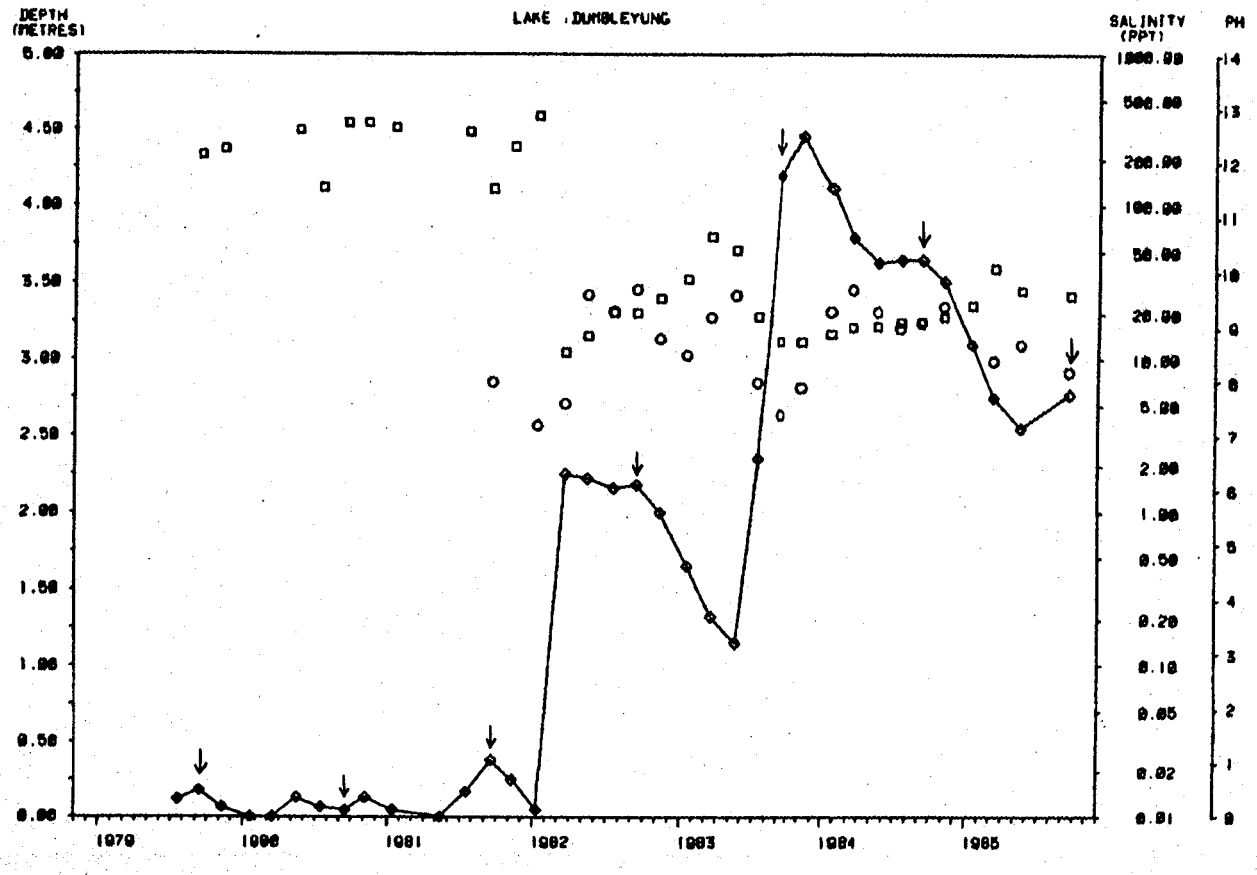

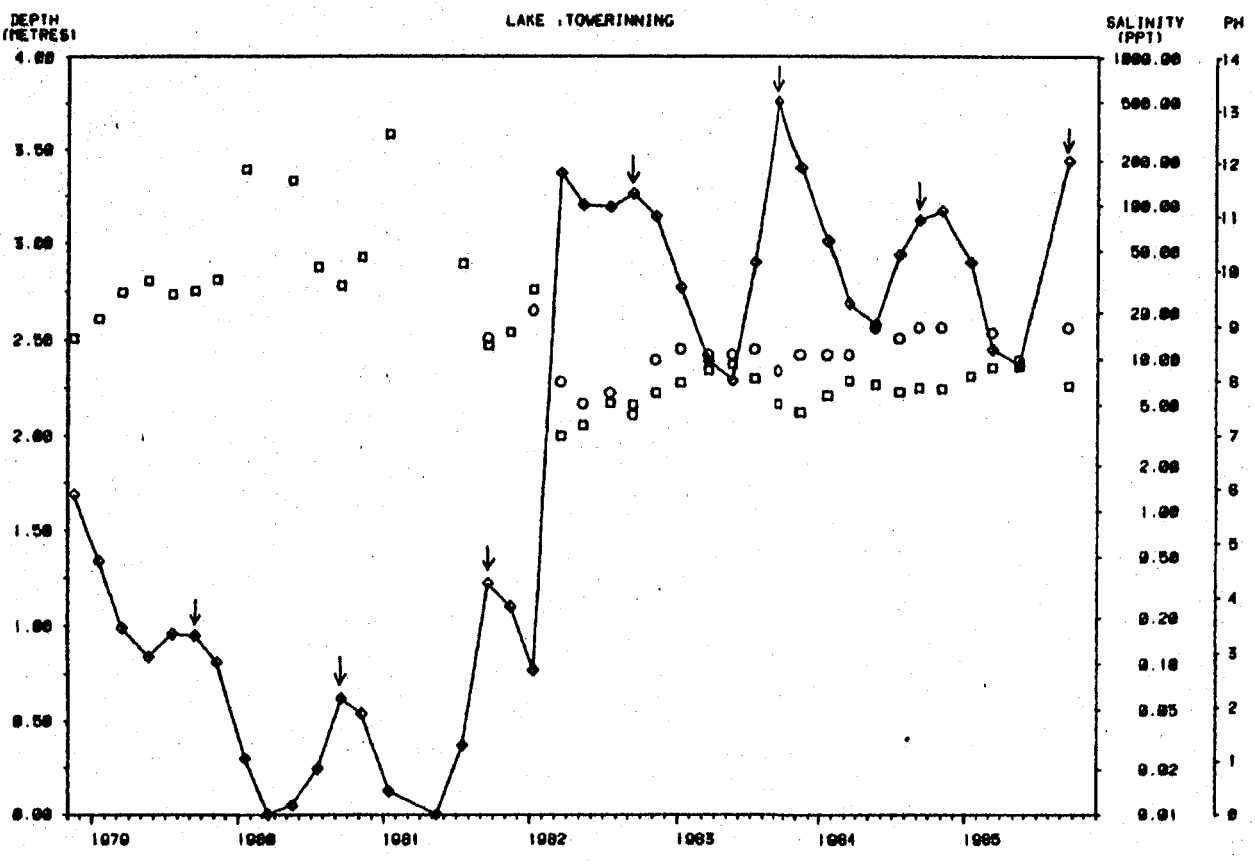

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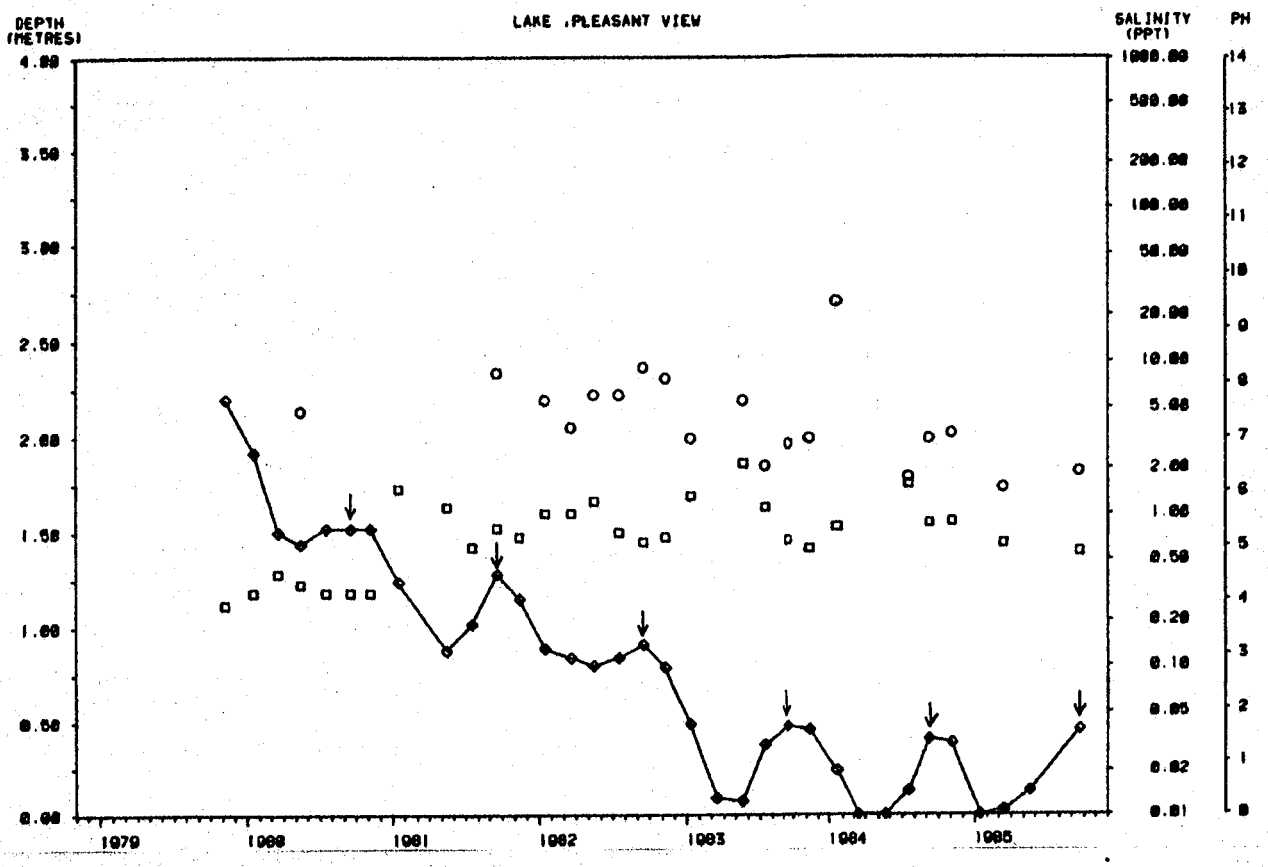

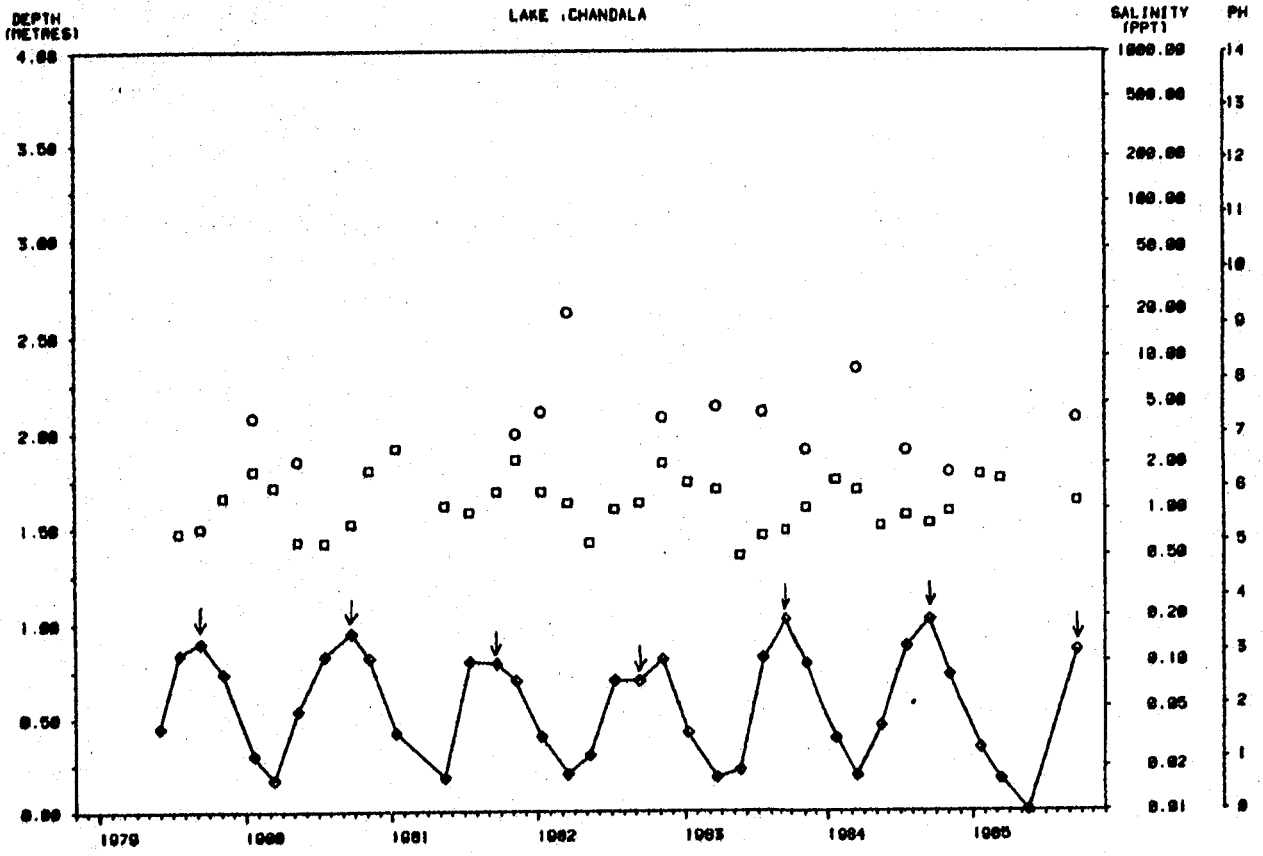

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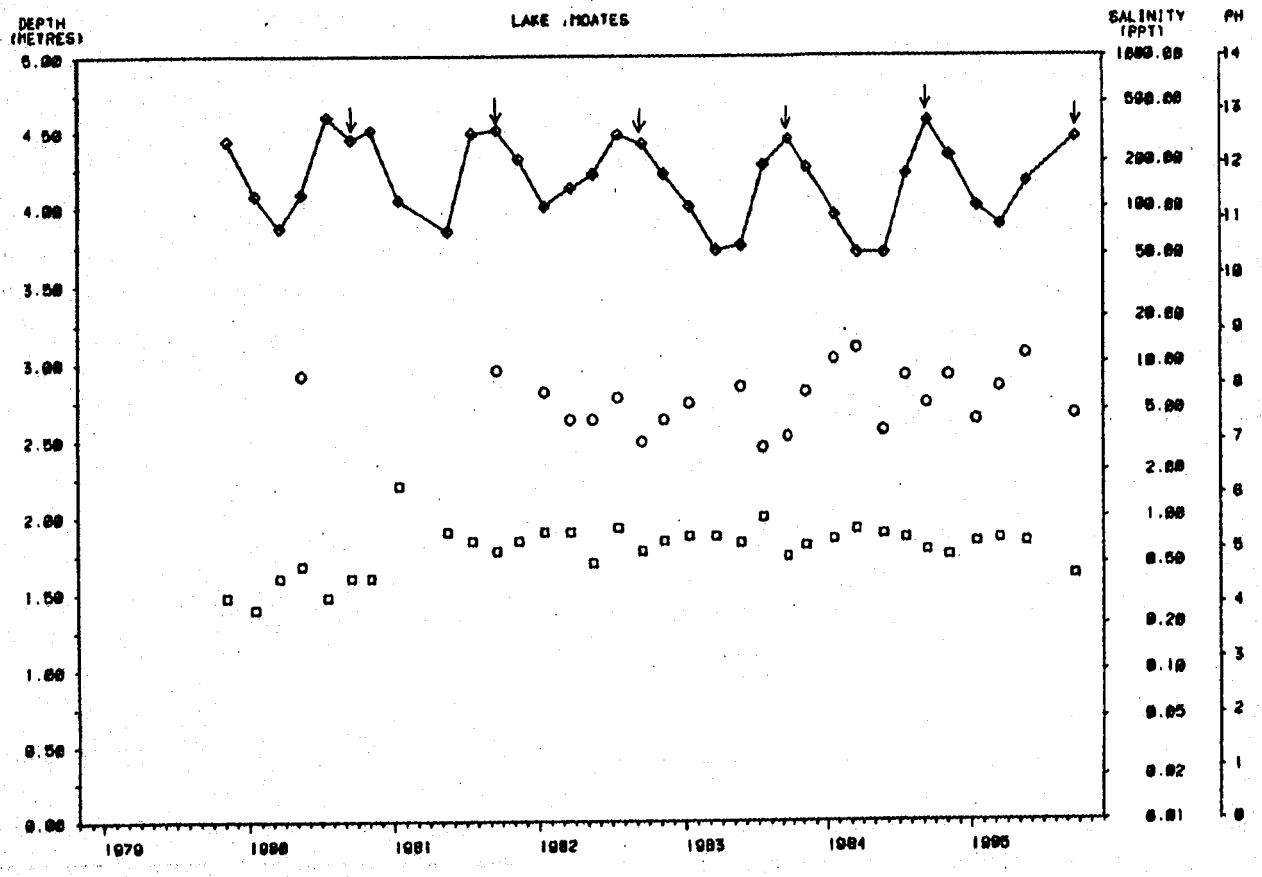

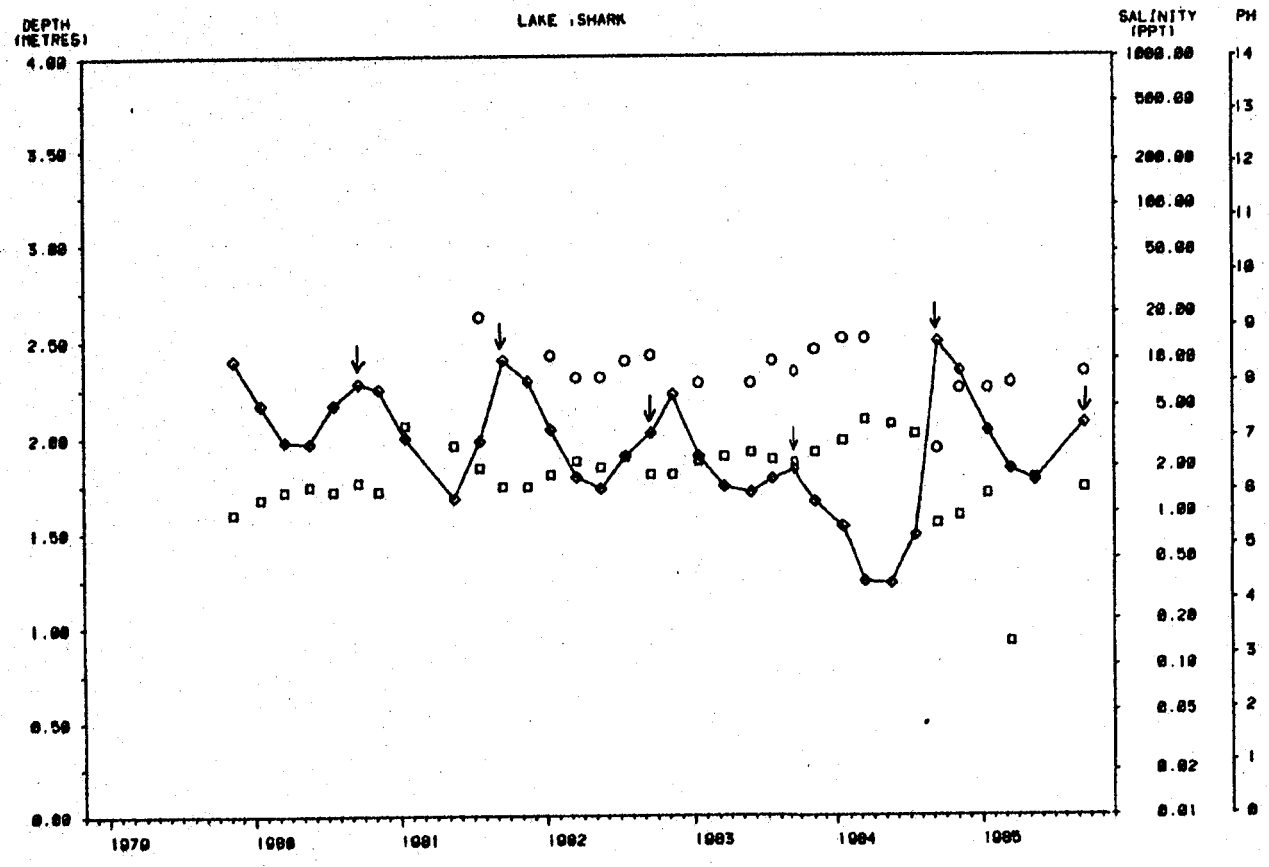

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