Extracts relating to 2000 - 2001

Salinity transects of Lake Clifton,

extracted from J. Lewis file

labelled "Lake Clifton - Salinity Increase + Recovery Plan"

"Vol. 1 : Sep 2000 - July 2002"

30/8/2014.

T. Lane's CLM 018A

Vol 2 : Aug 2002 →

LAKE CLIFTON — SALINITY INCREASE & RECOVERY PLAN

Including salinity transects of Lake Clifton

Photocopied from Grant Parsons
" 03/01 to 11/01
Field Notebook
on 29/4/2012

18/4/01

Lake Cliffe
ODP to Hauraki Station tracks with Argo
on L. Cliffe.
Depth c 3-64m

M	78·1 ms	76·0 ms	1·2
	21·4	21·4	
M2	118·5 ms	120	1·2 ms
	21·6	21·7	
M3	—	—	
	23·9	24·0	0·8

Mesh became wet + unreliable
Took samples from dark bits
Sample & returned to Vehicle
Cleaned & dried at Gold Coast

Photocopied from Mr. Grant Pearson's field notebook "7/01 to 12/01" on 29/4/2012

WTW unit 3.97 GG

	Clifton 19/7/01				
All	Tot Con	Tot	Btm Con	Btm Temp	Delta
A1	61.1	12.6	60.8	12.6	1.5
A2	61.3	12.3	61.2	12.3	2.0?
A3	61.4	12.3	61.4	12.3	1.0
B1	60	12.6	60.0	12.7	0.6
B2	60.1	12.3	60.3	12.3	1.0
B3	58.9	11.1	59.2	12.0	0.2
C1	53.3				0.5
C2	54.4	13.01	54.9	13.4	1.3
C3	53.9				
D1	?	14.1	?		0.5
D2	?		?		1.0
D3	?		?		0.1

Some files taken - No reading E3 message.

Lake Clifton 19/7/07

Galliano Fardin
2686 Old Coast Road
Herron W.A. 6210
Tel 97391154

Consultation

Photocopied from front
Pearsons field notebook
03/01 to 11/01
on 29/4/2012

8/11/01

Page 11

Date Changed 8/11/01

Dead Meb ok bolt Dead or 109.

Log in C1 bolt C1 leg.

	Top C	Temp	Bottom C	Temp	Depth	
A1	51.2	21.2	~~50.2~~	20.9	1.2	
A2	52.1	20.8	52.6	21.2	1.?	
A3	51.5	19.1	51.4	19.0	.8	
B1	51.4	23.3	51.4	23.4	0.6	
B2	51.5	20.3	51.4 Same	20.3	0.9	
B3	51.3	22.7	51.4	22.6	0.5	0.5
C1	51.3	20.9	50.5	22.2	0.6	0.6
C2	51.4	21.4	51.3	21.3	0.9	0.9
C3	50.4	22.6	50.4	22.2	0.3	
D1	48.0	25.1	47.9	25.1	0.3	
D2	48.5	23.6	48.3	23.9	0.6	
D3	48.8	24.4	48.6	24.4	0.4	

Photographed from Grant Pearson's field notebook dated 03/01 to 11/01 on 29/4/2002

12.40

12.55

1430

Lane, Jim

From: Lane, Jim

Sent: Sunday, 29 April 2012 1:35 PM

To: Clarke, Alan; Winchcombe, Yvonne

Subject: Lake Clifton salinity transects in 2000 and 2001 (and 2002?)

Alan, Yvonne,

I'm in the process of pulling together all materials relating to this work by Alan and Grant in 2000 and 2001 (and 2002?).

Alan you will remember this one. You and/or Grant conducted monthly salinity sampling/measurements along four E-W transects on Lake Clifton, starting in October 2000 and finishing in December 2001 (or perhaps later?).

Would you plse dig out all field notes (Alan), reports, digital files, emails etc. that you have that relate directly to this project and give or copy them to me.

Thanks,

Jim

To follow up

29/4/2012

Printed 28/4/2012

Lake Clifton salinity transects (2000 to 2001 (or 2002?)) project (Lane, Pearson, Clarke)

A list (prepared by JAKL on 28/4/2012) of all folios (pages) relating directly to the salinity transects project. This list has been prepared to facilitate a write-up of the project sometime in the future.

Volume	Folios	Date (column entries incomplete)	Subject (column entries incomplete)
1	6-9		Map of Transects A-D
1	8-9		Transect data
1	20		
1	25		
1	32-33		
1	35		Map of Transects A-D (see separate wallet for more-complete aerial photos)
1	36	16-Oct-00	
1	37-38	16-Oct-00	Sampling instructions
1	39-43		
1	44		
1	52-56		Sampling results
1	61		
1	64-69		Sampling results
1	71		Sampling results
1	72		
1	75		
1	78-79		
1	83		
1	87		
1	92		
1	94		
1	102-103		
1	107		
1	114		
1	116		
1	118		
1	121		
1	124-125		
1	130		
1	134		plus comment re Harvey River
1	136-139		
1	142-143		
1	145		
1	146-147		See folios 155-161 and 165-172
1	150		
1	151		plus comment re Harvey River
1	155-172		
1	176-177		
1	196-205		
1	208-211		
1	216-241		Grant Pearson' report on monthly transect sampling from Oct 2000 to Dec 2001 incl.
1	243-246		
2	3-6		
2	10-17		

Volume	Folios	Date (column entries incomplete)	Subject (column entries incomplete)
2	19-33		
2	36-41		
2	42-50		Grant Pearson's 28 Oct 2002 report on transect sampling.
2	51-52		
2	63-65		
2	69-70		
2	72		
2	75-77		
2	81-82		
2	88-90		
2	94-95		
2	97-98		
2	106-108		
2	112-113		
2	115		
2	123		
2	136-137		
2	139		
2	141-142		
2	144		
2	153		
2	155		
2	179-182		Final Knott, Lane et al (2003) JRSWA paper.
Plastic Wallet			Lake Clifton salinity transects map & photos

TO DO: Still need to check to see if all of the collected data (transects salinities) is in the above. If not, need to search Grant Pearson's files, emails, notebooks etc. If that fails, could ask WA Chemistry Chem Centre for relevant results of analyses. Also check if Alan Clarke's notes, results etc. are included in the above.

Is the salinity of Lake Clifton (Yalgorup National Park) increasing?

B Knott[1], L Bruce[2], J Lane[3], Y Konishi[1] & C Burke[1,4]

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✉ bknott@cyllene.uwa.edu.au, bruce@cwr.uwa.edu.au, jiml@calm.wa.gov.au, C.Burke@utas.edu.au.

(Manuscript received December 2000; accepted November 2003)

Abstract

Salinity of Lake Clifton, within Yalgorup National Park, Western Australia, varies annually in step with the annual change in water level. During the 1980s, salinity in the northernmost, permanent basin of the lake was hyposaline, varying between 8-32 g L^{-1}. By the late 1990s, however, recorded salinity values varied between 25-49 g L^{-1}. This brief communication serves to initiate discussion on whether salinity in the lake really is increasing. If the salinity is increasing, then the scientific values of this lake are threatened.

Keywords: Lake Clifton, salinity, Western Australia

Introduction

The limnologically-diverse lakes forming the Yalgorup National Park wetland (Fig 1) in south-western Western Australia constitute a natural laboratory of international scientific significance. The 10 km long reef of thrombolitic microbialites along the eastern shoreline of Lake Clifton (Moore *et al.* 1984) is a significant natural laboratory for investigating biogeochemical processes (Burne & Moore 1987; Moore 1987, 1990; Moore & Turner 1988; Moore & Burne 1994; Konishi *et al.* 2001). The lake is listed (jointly with lakes McLarty and Mealup and the Peel-Harvey Estuary) under the "Ramsar" Convention on wetlands as a Wetland of International Importance Especially as Waterfowl Habitat (Anon 1990).

Lake Clifton comprises essentially three basins; the northernmost is ~4.5 m deep and together with the middle basin is permanent; the southernmost basin dries out in summer. With no surface outflow and only occasional minor surface input (Davies & Lane 1996), the ~1 m annual fluctuation in water level of the lake is controlled by ground water and the balance between rainfall and evaporation.

Lake salinity

In March, 1972, Williams & Buckney (1976) recorded a salinity of 15.3 g L^{-1} in Lake Clifton. Moore (cited in Moore *et al.* 1984) recorded a salinity range of 17-30 g L^{-1} in 1979. In July 1983, after heavy rain, salinity of the lake near the aquifer outflow was 8.4 g L^{-1}. During the 1980s, Lake Clifton was hyposaline and the following salinity ranges were recorded; 17-26 g L^{-1} adjacent to transect A, 15-32 g L^{-1} adjacent to transect C, from two sites measured monthly in 1984 (Moore 1993). Values recorded monthly between May 1985, and July 1986, at the surface and near the bottom of the water column at three sites in

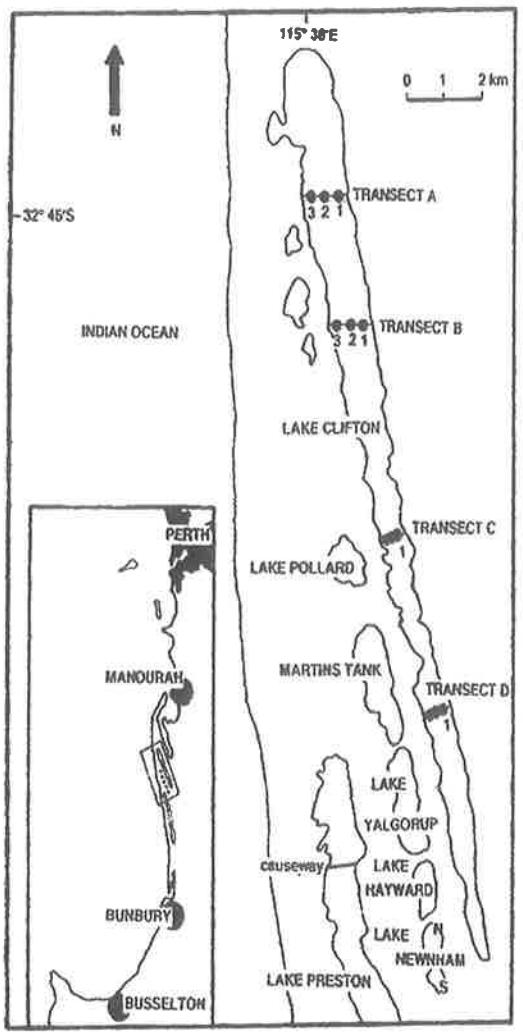

Figure 1. Lake Clifton and other lakes of the Yalgorup National Park. The inset shows the area of the main map, and the position of Lake Clifton relative to Bunbury and Mandurah. Sites C4 and F12 (in Moore 1993) are equivalent to transects A and C, respectively.

Table 1

Salinity values (g L^{-1}), Lake Clifton, 1985-86. Transects and sites are shown in Fig 1. Salinities in bold represent an average of differing top and bottom values.

	1985							1986					
	23 May	8 July	9-10 Aug	20 Sept	11-13 Oct	9-10 Nov	13-15 Dec	21-22 Jan	18-20 Feb	14-16 Mar	18-19 Apr	16-18 June	20-22 July
A1	32*	20	20	18	17	18	22	26	30	30	**31.5**	31	**27**
A2	32*	20	20	18	17	18	22	**25.5**	30	30	32	31	**27.5**
A3	31*	20	20	18	17	18	20	**25.5**	30	30	32	31	**28.5**
B1	26**		19	16	16	18	22	27	32	30	30	30	28
B2	27**		**20**	**17.5**	17	**17.5**	**21.5**	26.5	30	32	32	30.5	29
B3	27**		20	17	**15.5**	18	21	26	32	32	32	30	28
C1	30.5*	15	15	15	16	16	22	30	38	36	38	33	28
C2	30*	14	16	**14.5**	16	16	22	30	38	36	38	33	27
C3	32*	14	16	14	16	16	22	31				26	29
D1	26*	13	10	12	**13**	15	22	30	43	45	48	36	26
D2	26*	14	10	12	**13.5**	15	22	34	42	43	48	38	26
D3	26*	14	10	12	12	15	22	36	47			42	28

* 23 May 1985; ** 31 May 1985.

each of four transects (Table 1) showed ranges in the permanent, northern basin, transects A and B, of 17-32 and 15.5-32 g L^{-1} respectively. Salinity gradients reflect interactions between the position of freshwater inflow along the eastern margin, lake bathymetry and wind strength, which are sufficient to mix this lake vertically, but not horizontally. Salinity increased from north to south during the period of low water level (January-March 1986, Table 1), due to the increasing impact of evaporative concentration on successively shallower southern bodies of water. The gradient is reversed with high water level (in spring *e.g.* October 1985, Table 1); the northern basin (transect A) is most saline because of the higher salt load in the larger volume of water contained in the deeper basin. Successively lower salinities occurred along transects B-D during high water level, reflecting the greater impact of the freshwater input in shallower basins. Aquifer input was sufficient to generate an east-west salinity gradient, from 2 g L^{-1} immediately over the aquifer outflow, to 15 g L^{-1} at the edge of the rushes (*Juncus* sp; 23 August 1984, CM Burke & B Knott, unpublished data). Gilgies, *Cherax quinquecarinatus* (Gray), were active in this lens of fresher water at night.

A series of *ad hoc* salinity readings late in the 1990s suggest that salinity has increased since the 1980s. Values recorded at times of low water level have been; 44 g L^{-1} (adjacent to transect A; 17 May 1997, Konishi 1997); 49-34 g L^{-1} at site 2 (adjacent to transect C), and 45-25 g L^{-1} at site 3 (adjacent to transect D; Gartrell 1998); 48 g L^{-1} (adjacent to transect A, 24 April 1999). During the 1990s salinity values at times of high water level, too, have been higher than those noted in the 1980s; 25 g L^{-1} (both adjacent to transect A, 22 September 1999, and again on 5 September 2000).

Despite the limited evidence available, the data indicate that there has been an increase in salinity since the 1980s. The total annual rainfall at the two nearest meteorological stations, Bunbury and Mandurah, are plotted against water levels measured at Lake Clifton in September 1986 to 1999 (at the end of the rainy season) in Fig 2A. It is clear that there is a direct correlation between rainfall and water level in the lake. Measurements of salinity during the same period are shown in Fig 2B (J Lane, CALM, unpublished data). As expected, there is an inverse correlation between water level and salinity. However, if rainfall was the only driving factor in determining the lake's salinity, then increased rainfall in the late 1990s and the subsequent water level rise should have returned the salinity to the lower levels observed in the 1980s (during years of similar rainfall and water level). This trend has not been observed. An approximate estimation of the total salt content of the lake was calculated as the salinity multiplied by the total lake volume. Measurements of salinity were made in September when the lake was fully mixed, and lake volume was calculated as a function of water level based on bathymetry data supplied by the Water and Rivers Commission. These calculations indicate that although the mass of salt in Lake Clifton remained relatively constant from 1985 to 1992, it has since increased by 40% from 1993 to 2000 (Fig 2C). Since this calculation is independent of rainfall, this indicates a possible increase in proportion of brackish ground water to fresh ground water inflow into the lake. Clearly, further investigations are necessary to substantiate whether the observed increases in salinity of Lake Clifton are permanent, and if so what are the cause(s).

Consequences

If the salinity of Lake Clifton is increasing and continues to do so, then changes in the pattern of microbialite growth, reduction in faunal diversity within the lake, and change in usage by waterbirds, are inevitable consequences unless the cause(s) are identified and corrected. Even if the salinity is increasing, any ecological perturbations already in train may not yet be irreversible given immediate remedial action. The limnology of Lake Hayward altered substantially during the dry summer of 1987/1988, but subsequently returned to its pre-drought pattern, probably through internal homeostatic mechanisms (Burke & Knott 1997). With a permanent change to hypersalinity, the international scientific significance of the lake may well be lost. It must

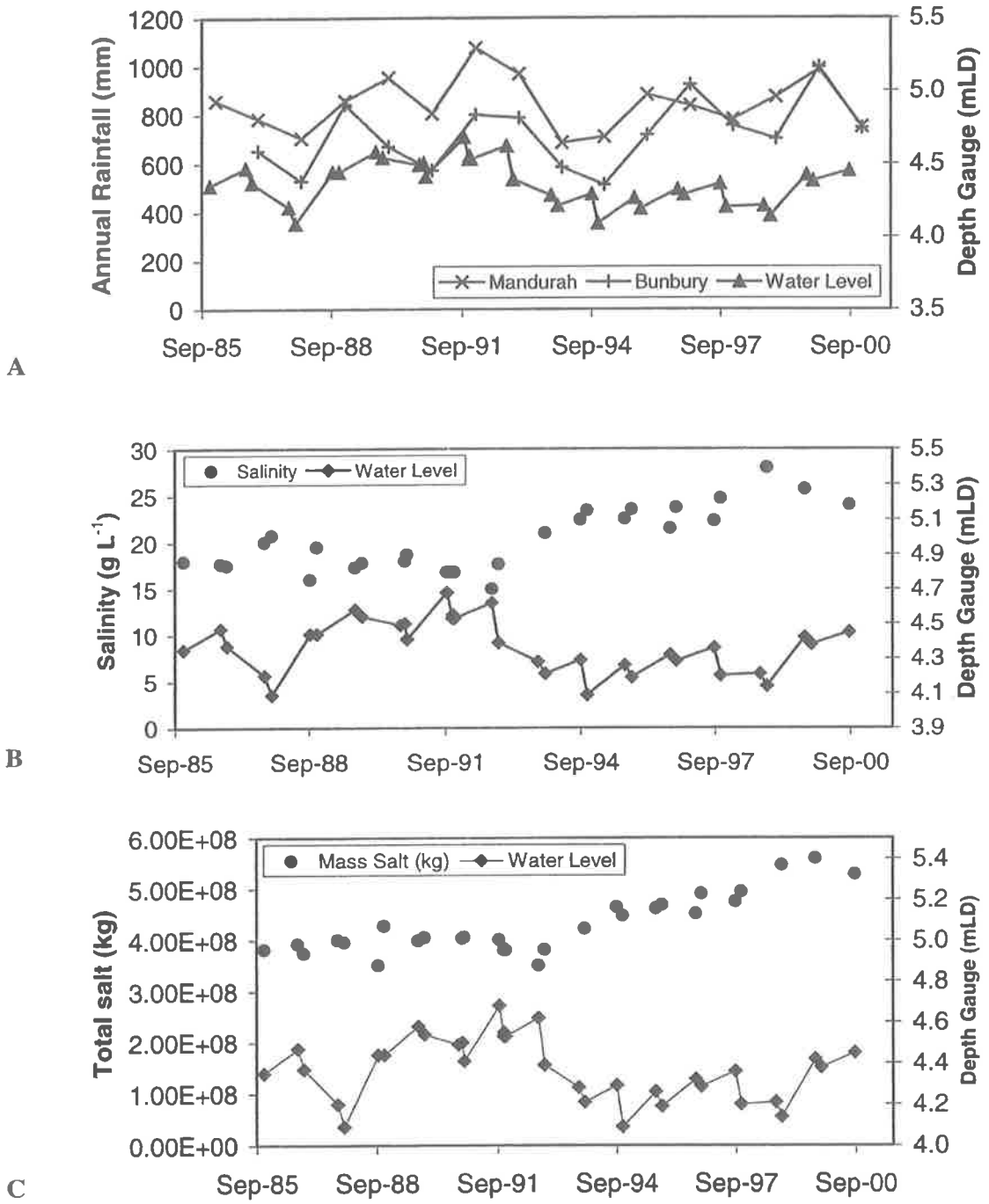

Figure 2. A comparison of changes in annual rainfall, water level and salinity of Lake Clifton 1985 to 1999. A: Rainfall and water level data. B: Salinity and water level data. C: Total salt and water level data. mLD = mean lake data, equivalent to Australian height datum + 4.035 m. Rainfall data from the Commonwealth of Australia Bureau of Meteorology; water level and salinity measurements from the Western Australian Department of Conservation and Land Management.

also be acknowledged that concerted action by the government departments responsible for managing the environment may be required to prevent them presiding over the irreversible loss of a major scientific laboratory of international standing.

Acknowledgements: We wish to acknowledge bathymetric and mass balance data from the Water and Rivers Commission, and help from CALM National Park Rangers T Smith and S Dutton.

References

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Lang, Jim

From: grantp@calm.wa.gov.au
Sent: Wednesday, April 04, 2001 3:31 AM
To: jiml
Subject: fwd: Results of samples received 30/3/01


00E1224.XLS


BEYOND.RTF

scored electronically to CLIFTON folder
30/5/03

Jim
Attached results from Chem Centre for Clifton March 16 2001. My readings to
come.
Grant
---------- Original Text ----------

From: "Jenny McGuire" <jmcguire@ccwa.wa.gov.au>, on 03/04/2001 10:16 AM:
To: Grant Pearson@WOOD.SID@CALM

86.

Lane, Jim

From: Brenton Knott [bknott@cyllene.uwa.edu.au]
Sent: Tuesday, January 28, 2003 2:36 PM
To: bruce@cwr.uwa.edu.au; Lane, Jim
Subject: MSS

Dear Louise and Jim

Please find attached, for your information, copies of the covering letter and text of the mss which will be hand-delivered to Phil this afternoon.

Your comments were particularly helpful, Jim, and identified statements which, in the kindest sense, were ambiguous. I have made clear the relevance of measures in the area of the northern basin (permanent, and deepest). The extra data points in Figure 2 had been given to Louise by Phil Commander, and she has now removed them from the figure. Because this mss has been around for a long time, I am returning it to Phil now, and I hope that I do not assume in vain that your departmental will give the paper their blessing. I do not presume that on the quality, but on the premise that it will help the debate on the issue.

Many thanks for everyone's help

Kind regards

Brenton

Brenton Knott
M092 Zoology
The University of Western Australia
35 Stirling Highway
CRAWLEY WA 6009
'phone: +618 9380 2223; fax: +618 9380 1029

85.

Lane, Jim

From: Lane, Jim
Sent: Tuesday, January 21, 2003 5:19 PM
To: 'Brenton Knott'
Subject: RE: AGAIN

Brenton

Attached is a copy with my suggested changes and several queries. The most important are those concerning actual data values.

Most of the suggested textual changes are simply aimed at improving clarity and/or precision. I won't be put out if you don't adopt them.

When the Note has been finalised to your satisfaction, would you please e-mail me a copy to put through the CALM approval-to-publish process.

Thanks and apologies for the delay.

Regards

JL

-----Original Message-----
From: Brenton Knott [mailto:bknott@cyllene.uwa.edu.au]
Sent: Tuesday, January 21, 2003 1:18 PM
To: Lane, Jim
Subject: RE: AGAIN

Dear Jim

Sounds good. Will look forward to your corrections.

I hope that you had a pleasant leave.

Cheers

Brenton

-----Original Message-----
From: Lane, Jim [mailto:jiml@calm.wa.gov.au]
Sent: Tuesday, 21 January 2003 10:30 AM
To: Brenton Knott
Subject: RE: AGAIN

Brenton. Are you there? I am back from leave and can attend to today. JL

-----Original Message-----
From: Brenton Knott [mailto:bknott@cyllene.uwa.edu.au]
Sent: Wednesday, January 08, 2003 8:50 AM
To: Lane, Jim
Subject: RE: AGAIN

84.

Dear Jim

Greetings! I hope that you had a pleasant Christmas break, and now you are fired up to face 2003.

In the hurly-burley of the pre-Christmas rush, somehow our lines of communication have come unstuck: either you overlooked sending the corrections, or my machine has failed to receive your message. Either way, can I jog your memory/request another copy? Phil Withers will be back in the department next week, and I want to deliver the Note to him so that we can all forget it!

Kind regards

Brenton

-----Original Message-----
From: Lane, Jim [mailto:jiml@calm.wa.gov.au]
Sent: Tuesday, 10 December 2002 8:49 AM
To: Brenton Knott
Subject: RE: AGAIN

Brenton. Just letting you know that I will be sending you a few suggested changes to the Note, but it will be the end of the week before I can do so. Regards. JL

-----Original Message-----
From: Brenton Knott [mailto:bknott@cyllene.uwa.edu.au]
Sent: Thursday, December 05, 2002 1:24 PM
To: bruce@cwr.uwa.edu.au; Lane, Jim; C.Burke@utas.edu.au
Subject: AGAIN

Dear All

I am attaching what I hope will be the final iteration of this manuscript. If I do not here from you by yesterday, I will assume that all of you are happy. The reason why I am persisting with this short note is because the catalyst for the setting up of the Lake Clifton recovery team should be established. It is in our interest. Besides, I think, per kindness of data from Jim presented at the last Recovery Group meeting, that the salinity in still increasing.

I will also forward a copy of this to John Blyth and to Robin Phillimore so that it can be acknowledged in the Interim report as 'submitted'. The earlier iterations were reviewed as though they were a scientific paper, not a Note for provoking discussion. I think that in reducing the length of the manuscript, Phil will find it more acceptable as a Note.

Louise, many thanks for your comments yesterday. I think that the paragraph you wrote, plus the Figure 2, increases the substance of the Note substantially, and makes it much more readable.

Kind regards

Brenton

Lane, Jim

From: Lane, Jim
Sent: Thursday, December 05, 2002 11:15 AM
To: Mitchell, Dave
Subject: RE: Lake clifton salinity

Dave. As dicussed, I don't know of any. There probably is, scattered amongst Chem Centre, Uni researchers and other curious bods. JL

-----Original Message-----
From: Mitchell, Dave
Sent: Wednesday, December 04, 2002 10:43 AM
To: Lane, Jim
Subject: Lake clifton salinity

Jim,

re my phone call.....

I have just spoken to a reporter at the Mandurah Mail, doing a story on the Lake Clifton thrombolites and changes/threats from drought - (following the sunday times article)

she asked about salinity prior to 1985, and I said I had to get back to her as I didn't know...

is there any pre-1985 salinity data for Lake Clifton? has there been an increasing trend before then or was it stable?

Cheers

DSMi

David Mitchell
Regional Leader Nature Conservation
Swan Region
Ph: (08) 9368 4399 Fax: (08) 9368 4299

(50.

Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jim Lane
From: Grant Pearson

Date: 28 October 2002
Subject: Lake Clifton Analyses

Jim
Accompanying this is a disk containing an Excel file with all conductivity data collected for Lake Clifton between October 2000 and December 2001. Analyses by the WA Chemistry Centre and DCLM are included and reported in Ms/cm.

(in the 1980s)

Sampling of the four transects A,B,C,D visited by B Knott began on October 24 2000.

2001

Conductivity measurements were made using the TPS 90 FLMV meter until February when the low water levels in the lake required the use of a surf ski. In this case the more water proof TPS WP-84 meter was used. For which months? Both units were calibrated prior to each visit to a 2,764 US/cm at 25C conductivity standard. Problems with meter operation were encountered on a number of occasions when salt spray flooded the TPS WP-84 meter causing erroneous readings. The manufacturers claim for water resistance of this meter is evidently optimistic. This lack of water resistance was most evident in March 2001 and April 2001 when the surf ski was used. On these occasions the meter became unusable. Conductivity measurements for these dates for each site were obtained from surface water samples analysed by the WA Chemistry Centre.

Surveys were conducted by boat when water levels permitted, by surf ski as levels dropped and by foot at the southern sites during periods of very low water level.

Surface samples were obtained for analysis by the WA Chemistry Centre by filling a 120 ml bottle with lake water from about 15 cm below the surface at each site. The bottles were marked according the site number and dated. They were delivered to the Chemistry Centre that day or the following day.

The samples were also periodically analysed for chloride and major ions. Results of these are also attached to this report as separate tables.

Where are the results?

At the beginning of each survey the water depth on the DCLM depth gauge was recorded and these are reported in the file.

The depth at each site was also recorded during each measurement.

Where are the results?

meter — TPS 90 FLMV | TPS WP-84 (Check exactly which months)

CONDUCTIVITY
LAKE CLIFTON TOP

	OCT 00	DEC 00	JAN 01	FEB 01	MARCH 01		APRIL 01		MAY 01	
	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM
	10/24/2000	12/15/2000	1/22/2001	2/20/2001	3/16/2001	3/16/2001	4/18/2001	4/18/2001	5/23/2001	5/23/2001
DCLM DPTH (m) METRES	4.33 m	4.12 m	3.93 m	3.73 m	3.67 m		3.64 m		3.74 m	
A1	41.4	48.9	61.8	67.7	error	70.8	78.1	82.1	73.3	61.1
A2	41.4	49.3	62	68.3	error	70.1	118.3	82	69.4	60.1
A3	41.4	49.4	61.6	68.7	error	69.7	error	82.1	71.5	59.8
B1	40.8	49.8	66.5	68.3	69.4	71.6	error	84.8	69.9	57.7
B2	40.8	49.4	62.1	68.4	69.4	70.7	error	83	69.3	58.2
B3	40.8	49.6	66.5	68.2	67.9	68	error	80.7	69.9	57.1
C1	38	50	71.4	79.5	86.4	87.3	error	76.5	65.3	54.1
C2	38.5	49.7	71	81.8	87	87.4	error	93.7	66.7	55
C3	37.9	50.5	74.1	86.3	45.9	90.2	error	94.4	67.7	no sample
D1	33.1	49.7	85.2	N/A	N/A	135	error	175	73.8	60
D2	32.5	48.9	81.4	93	N/A	119	error	151	75	60.3
D3	31.8	49.8	83.1	N/A	N/A	N/A	no sample	no sample	75.2	60.9
BOTTOM										
	10/24/2000	12/15/2000	1/22/2001	2/20/2001	3/16/2001		4/18/2001		5/23/2001	
A1	41.3	49.2	61.5	67.5	error		76		73.3	
A2	41.6	49.2	61.9	63.2	error		120		68.3	
A3	41.8	49	61.5	65.5	error		error		70.9	
B1	41.3	50	66.4	68.4	68.3		error			
B2	41.3	49.7	62.1	68.2	69.5		error		69.9	
B3	41.3	50	65.9	67.8	error		error			
C1	38.5	50.1	71.4	79.4	85.6		error		66.1	
C2	38.6	50.1	70.9	79.1	83.1		error		66.7	
C3	37.9	50.6	75.2	86.5	N/A		error			
D1	33	49.7	84.4	91.8	N/A		error		73.8	
D2	32.5	49.8	81.1	94.9	N/A		error		75.2	
D3	31.9	50.1	82.6	98.5	N/A		no sample		N/A	

Queries

- Chloride results? Major ion results?
- On-site depth measurements?
- Explanations of "N/A", "error" and "no sample"?

JUN 01		JUL 01		AUG 01		SEP 01		OCT 01		NOV 01		DEC 01
DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM
6/21/2001	6/21/2001	7/19/2001	7/19/2001	8/9/2001	8/9/2001	9/20/2001	9/20/2001	10/12/2001	10/12/2001	11/8/2001	11/8/2001	12/12/2001
3.82 m		3.97 m		4.06 m		4.16 m		4.23 m		4.11 m		4.00 m
66.5	69	61.1	50.1	61.4	58.7	50.5	49.6	49	51.4	51.2	51.4	58
67.4	69.1	61.2	48.7	61.5	58.7	50.4	49.9	49.4	51.5	52.1	54.5	58.2
64.3	68.9	61.4	48.3	61.6	58.7	49.2	48.8	49.2	51	51.5	54.7	58.4
63.6	62.8	60	47	58.2	55.4	50.1	48.8	47.7	49.5	51.4	54.8	58.2
63.7	64.8	60.3	47.1	58.7	55.7	49.9	48.8	48.8	50.7	51.5	52.5	58.6
61.7	64.5	58.9	46.2	58.2	55.6	48.5	47.5	48.5	50.3	51.3	54.4	59.2
55.2	56.9	53.3	42.2	52.3	49.6	42.8	41.9	43.2	44.7	51.3	51	59.9
57.4	59.2	54.6	43.1	53.1	49.8	42.7	42	45.7	47.8	51.4	54.2	60
59.5	60.9	53.9	42.7	52.6	49.3	40.6	39.9	45.3	47.3	50.4	52.7	61.8
55.3	54.6	N/A	37.8	48.7	44	37.7	36.6	38.4	39.9	48	50.4	61.4
55.6	55.6	N/A	38.4	47.9	44.3	37.4	36.3	40.1	41.2	48.5	50.5	63.7
55.2	54.1	N/A	38.7	46.3	43.1	36.8	35.9	39.8	39.8	49.8	50.6	63.4
6/21/2001		7/19/2001		8/9/2001		9/20/2001		10/12/2001		11/8/2001		
65.9		60.8		61.3		50.4		49.7		51.1		58.3
61.2		61.2		60		50.4		49		52.8		58.2
64		61.4		61		49.4		49.2		51.4		58.5
63.4		60		58.1		50.4		47.7		51.4		58.4
58.7		60.3		58.8		49.8		48.8		51.4		58.7
		58.3		58.8		48.7		48.3		51.4		59.4
55.3		53.4		52		44.2		42.5		50.5		60.3
58.5		54.9		53.1		43.7		45.7		51.3		60.2
55.3		53.9		52.5		40.7		45.3		50.4		N/A
55.3		N/A		48.5		37.7		38.4		47.9		61.4
55.6		N/A		47.9		37.4		40.1		48.3		63.7
55.9		N/A		46.3		36.9		39.8		43.6		63.4

DEC 01

CHEM CNT
MS/CM

12/12/2001

51.7 A1
51.7 A2
51.8 A3
51.3 B1
51.7 B2
52.2 B3
52.6 C1
52.8 C2
54.3 C3
54.3 D1
55.9 D2
55.7 D3

A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3

45

	Site	Date	Cl⁻	Cond
01E0363/013	A 1	8/9/2001		5870
01E0363/014	A 2	8/9/2001		5870
01E0363/015	A 3	8/9/2001		5870
01E0363/016	B 1	8/9/2001		5540
01E0363/017	B 2	8/9/2001		5570
01E0363/018	B 3	8/9/2001		5560
01E0363/019	C 1	8/9/2001		4960
01E0363/020	C 2	8/9/2001		4980
01E0363/021	C 3	8/9/2001		4930
01E0363/022	D 1	8/9/2001		4400
01E0363/023	D 2	8/9/2001		4430
01E0387/004	B1	9/20/2001	19000	4880
01E0387/005	B2	9/20/2001	19000	4880
01E0387/006	B3	9/20/2001	19000	4750
01E0387/007	C1	9/20/2001	17000	4190
01E0387/008	C2	9/20/2001	16000	4200
01E0387/009	C3	9/20/2001	15000	3990
01E0387/010	D1	9/20/2001	14000	3660
01E0387/011	D2	9/20/2001	14000	3630
01E0387/012	D3	9/20/2001	13000	3590
01E0561/001	A 1	10/12/2001	17000	5140
01E0561/002	A 2	10/12/2001	17000	5150
01E0561/003	A 3	10/12/2001	17000	5100
01E0561/004	B 1	10/12/2001	17000	4950
01E0561/005	B 2	10/12/2001	18000	5070
01E0561/006	B 3	10/12/2001	18000	5030
01E0561/007	C 1	10/12/2001	15000	4470
01E0561/008	C 2	10/12/2001	16000	4780
01E0561/009	C 3	10/12/2001	17000	4730
01E0561/010	D 1	10/12/2001	14000	3990
01E0561/011	D 2	10/12/2001	14000	4120
01E0561/012	D 3	10/12/2001	15000	3980
01E0561/013	A 1	11/8/2001		5140
01E0561/014	A 2	11/8/2001		5450
01E0561/015	A 3	11/8/2001		5470
01E0561/016	B 1	11/8/2001		5480
01E0561/017	B 2	11/8/2001		5250
01E0561/018	B 3	11/8/2001		5440
01E0561/019	C 1	11/8/2001		5100
01E0561/020	C 2	11/8/2001		5420
01E0561/021	C 3	11/8/2001		5270
01E0561/022	D 1	11/8/2001		5040
01E0561/023	D 2	11/8/2001		5050
01E0561/024	D 3	11/8/2001		5060
01E0787/001	A1	12/12/2001	23000	5170
01E0787/002	A2	12/12/2001	21000	5170
01E0787/003	A3	12/12/2001	21000	5180
01E0787/004	B1	12/12/2001	22000	5130
01E0787/005	B2	12/12/2001	22000	5170
01E0787/006	B3	12/12/2001	22000	5220
01E0787/007	C1	12/12/2001	22000	5260
01E0787/008	C2	12/12/2001	22000	5280
01E0787/009	C3	12/12/2001	23000	5430
01E0787/010	D1	12/12/2001	23000	5430
01E0787/011	D2	12/12/2001	22000	5590
01E0787/012	D3	12/12/2001	22000	5570

AUG 01

SEP 01

OCT 01

NOV 01

DEC 01

Site Date Cl⁻ Cond Hardness → More ions. next page.

CCWA ID	Client ID		Cl		CO3	Fe	HCO3	Hardness	Ca	K	Mg
			mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
00E0553/001	A 1	10/24/2000	16000		<2	0.06	201	5400	437	270	1050
00E0553/002	A 3	10/24/2000	16000		<2	0.06	220	5300	432	267	1030
00E0553/003	B 1	10/24/2000	15000		<2	0.06	220	5400	434	268	1040
00E0553/004	B 3	10/24/2000	15000		<2	0.05	214	5400	461	266	1030
00E0553/005	C 1	10/24/2000	14000		<2	0.05	201	4900	394	245	948
00E0553/006	C 3	10/24/2000	13000		<2	0.05	195	4800	388	244	939
00E0553/007	D 1	10/24/2000	12000		36	<0.05	73	4100	329	207	797
00E0553/008	D 3	10/24/2000	11000		48	<0.05	24	4000	317	200	776

OCT 00

CCWA ID	Client ID	Sampled on	Cl	ECond	NS						
			iCL1WAAA	iEC1WZSE	iNo Sample						
00E1224/001	A 1	3/16/2001	30000	7080							
00E1224/002	A 2	3/16/2001	30000	7010							
00E1224/003	A 3	3/16/2001	30000	6970							
00E1224/004	B 1	3/16/2001	29000	7160							
00E1224/005	B 2	3/16/2001	29000	7070							
00E1224/006	B 3	3/16/2001	27000	6800							
00E1224/007	C 1	3/16/2001	41000	8730							
00E1224/008	C 2	3/16/2001	40000	8740							
00E1224/009	C 3	3/16/2001	38000	9020							
00E1224/010	D 1	3/16/2001	78000	13500							
00E1224/011	D 2	3/16/2001	65000	11900							

MAR 01

00E1346/001	A 1	4/18/2001		8210							
00E1346/002	A 2	4/18/2001		8200							
00E1346/003	A 3	4/18/2001		8210							
00E1346/004	B 1	4/18/2001		8480							
00E1346/005	B 2	4/18/2001		8300							
00E1346/006	B 3	4/18/2001		8070							
00E1346/007	C 1	4/18/2001		7650							
00E1346/008	C 2	4/18/2001		9370							
00E1346/009	C 3	4/18/2001		9440							
00E1346/010	D 1	4/18/2001		17500							
00E1346/011	D 2	4/18/2001		15100							

APR 01

00E1444/001	A 1	5/23/2001	29000	6110							
00E1444/002	A 2	5/23/2001	28000	6010							
00E1444/003	A 3	5/23/2001	28000	5980							
00E1444/004	B 1	5/23/2001	27000	5770							
00E1444/005	B 2	5/23/2001	26000	5820							
00E1444/006	B 3	5/23/2001	26000	5710							
00E1444/007	C 1	5/23/2001	24000	5410							
00E1444/008	C 2	5/23/2001	24000	5500							
00E1444/009	C 3	5/23/2001	ns	ns	x						
00E1444/010	D 1	5/23/2001	29000	6000							
00E1444/011	D 2	5/23/2001	28000	6030							
00E1444/012	D 3	5/23/2001	29000	6090							

MAY 01

01E0363/001	A 1	6/21/2001	24000	6900							
01E0363/002	A 2	6/21/2001	25000	6910							
01E0363/003	A 3	6/21/2001	23000	6890							
01E0363/004	B 1	6/21/2001	22000	6280							
01E0363/005	B 2	6/21/2001	23000	6480							
01E0363/006	B 3	6/21/2001	22000	6450							
01E0363/007	C 1	6/21/2001	20000	5690							
01E0363/008	C 2	6/21/2001	20000	5920							
01E0363/009	C 3	6/21/2001	22000	6090							
01E0363/010	D 1	6/21/2001	21000	5460							
01E0363/011	D 2	6/21/2001	20000	5560							
01E0363/012	D 3	6/21/2001	20000	5410							

JUN 01

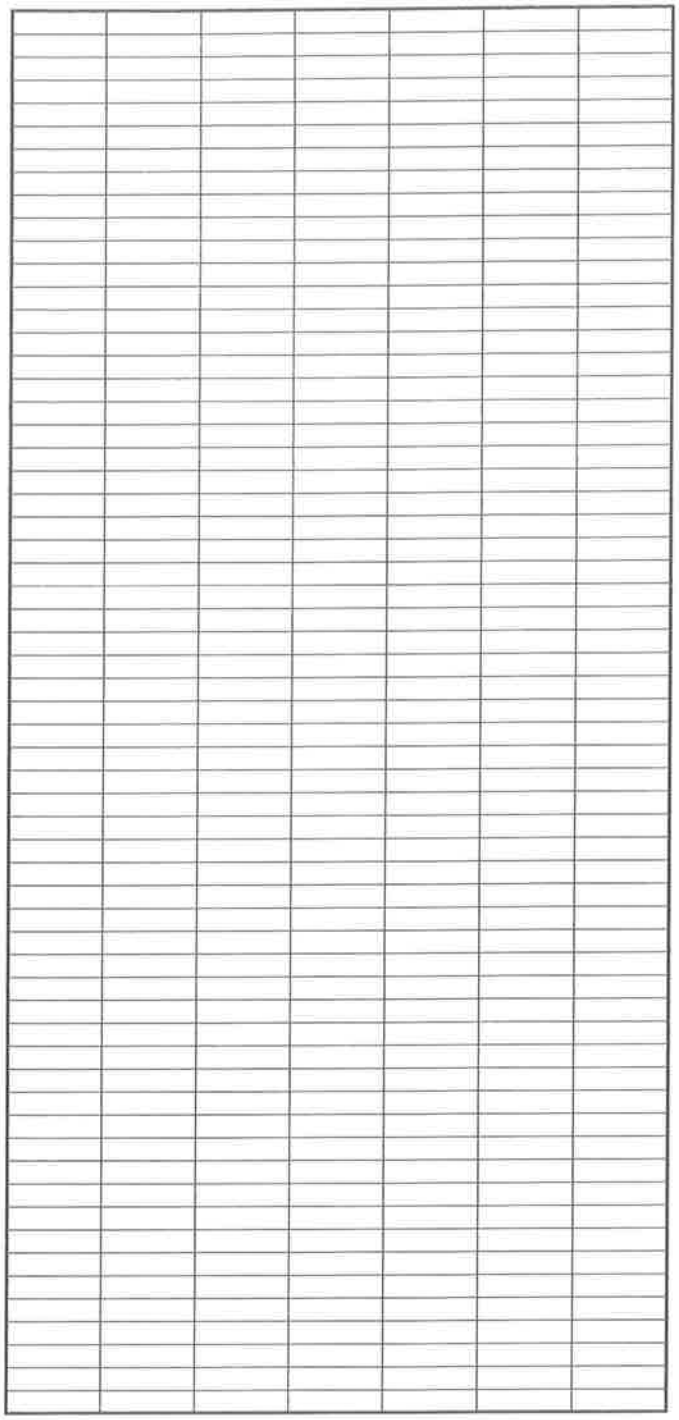
01E0122/001	A1	7/31/2001	21000	5010							
01E0122/002	A2	7/31/2001	22000	4870							
01E0122/003	A3	7/31/2001	22000	4830							
01E0122/004	B1	7/31/2001	22000	4700							
01E0122/005	B2	7/31/2001	22000	4710							
01E0122/006	B3	7/31/2001	22000	4620							
01E0122/007	C1	7/31/2001	18000	4220							
01E0122/008	C2	7/31/2001	20000	4310							
01E0122/009	C3	7/31/2001	20000	4270							
01E0122/010	D1	7/31/2001	17000	3780							
01E0122/011	D2	7/31/2001	18000	3840							
01E0122/012	D3	7/31/2001	18000	3870							

JUL 01

from page 1

pH

Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	alON_BAL
mg/L	mg/L	mg/L	mg/L	mg/L		%
<0.02	0.02	8510	1910	25	8	-2.3
<0.02	0.01	8430	1740	26	8	-0.6
<0.02	0.01	8550	1750	26	8	2.9
<0.02	0.01	8460	1730	26	8.1	1.8
<0.02	0.01	7830	1600	26	8	1.4
<0.02	0.01	7850	1580	25	8.1	3.9
<0.02	0.01	6700	1350	21	8.4	1.4
<0.02	0.01	6470	1320	19	8.8	2.2



Lane, Jim

From: Lane, Jim
Sent: Tuesday, September 24, 2002 10:34 AM
To: Pearson, Grant
Cc: Clarke, Alan
Subject: RE: Lake Clifton Transect data

Grant

At this stage only a simple "we did this, this way, and here are the (tabulated) results" report is needed. Subsequent publication of the data will necessarily involve me and Brenton Knott and possibly one or two others, because the data you collected are for comparison with 1980s data that Brenton has collated. Only 5 or so copies of your initial report will be needed, for use by me, Brenton, Tony Barr and yourselves.

Jim

-----Original Message-----
From: Pearson, Grant
Sent: Monday, September 23, 2002 3:53 PM
To: Lane, Jim; Clarke, Alan
Subject: RE: Lake Clifton Transect data

Jim
I've spoken to Al about a report and agreed that i will prepare an intro and he will do the a map and a graph of each site on each transect showing changes in salinity.We will discuss the discussion when all that is completed. He can publish this as senior author.
Lets know if this is ok.
cheers
Grant

-----Original Message-----
From: Lane, Jim
Sent: Friday, 20 September 2002 10:28 AM
To: Clarke, Alan; Pearson, Grant
Subject: Lake Clifton Transect data

Grant/Alan

I need someone to prepare a report on your transect work, presenting all data and suitable for forwarding to Tony Barr of CSIRO so he can incorporate the data into the modelling he is doing. I'd like to have it done by the end of October so that Tony can receive and consider it prior to the next meeting (Tues 12 Nov) of the Lake Clifton Recovery Team. Would you plse discuss and let me know who (of you) will do it.

JL

DRAFT

COMPARISON OF 1985-86 AND 2000-02 LAKE CLIFTON SALINITY TRANSECTS DATA

Salinities are in g/L (parts per thousand)

1985-86 RESULTS (SOURCE: B. KNOTT)

Site	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
A1	17	18	22	26	30	30	31.5		31	27
A2	17	18	22	25.5	30	30	32		31	27.5
A3	17	18	20	25.5	30	30	32		31	28.5
B1	16	18	22	27	32	30	30		30	28
B2	17	17.5	21.5	26.5	30	32	32		30.5	29
B3	15.5	18	21	26	32	32	32		30	28
C1	16	16	22	30	38	36	38		33	28
C2	16	16	22	30	38	36	38		33	27
C3	16	16	22	31					26	29
D1	13	15	22	30	43	45	48		36	26
D2	13.5	15	22	34	42	43	48		38	26
D3	12	15	22	36	47				42	28

2000-01 RESULTS (SOURCE: J. LANE)

Site	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
A1	25		30	41	45	48	56	41	47	33
A2	25		30	41	44	47	56	40	47	32
A3	25		30	41	45	47	56	40	47	32
B1	25		30	45	46	49	58	38	42	31
B2	25		30	42	46	48	57	39	44	31
B3	25		30	45	46	46	55	38	43	30
C1	23		31	48	54	60	52	36	48	27
C2	23		30	48	55	60	65	36	49	28
C3	23		31	51	60	62	66		41	28
D1	20		30	58	64	> 71	> 71	40	36	24
D2	19		30	56	65	> 71	> 71	40	37	25
D3	19		31	57	69			41	36	25

Compiled by J. Lane, Department of Conservation and Land Management, 19 August 2002.

Photos, maps, aerial photos and the covers of a couple of reports, relating to 2000 - 2001 salinity transects of Lake Clifton.

JK 08/9/2014.

Note that there might be other photos (prints/slides) in GBP's collection that are relevant. I didn't search for photos. JK 08/9/2014

Photos (4)

Lake Clifton

on 15 Dec 2000

Taken by GSS Pearson

While conducting salinity transects.

26/9/2014

Photo N° 2.

Lake Clifton 15/12/2000 by GBP

Photo N° 3.

Lake Clifton 15/12/2000 by GBP

06/9/2014

GP Jan 01 <No. 4>

Photo taken by GB Pearson
at Lake Clifton
on 15/12/2000.

06/9/2014

GP Jan 01 <No. 5>

Photo taken by GB Pearson
at Lake Clifton
on 15/12/2000

06/9/2014

Photo N° 4

Lake Clifton 2000 by GBC
(15/12/2000)

Photo N° 5

Lake Clifton 15/12/2000 by GBC

06/9/2014

GP Jan 01 <No. 2>

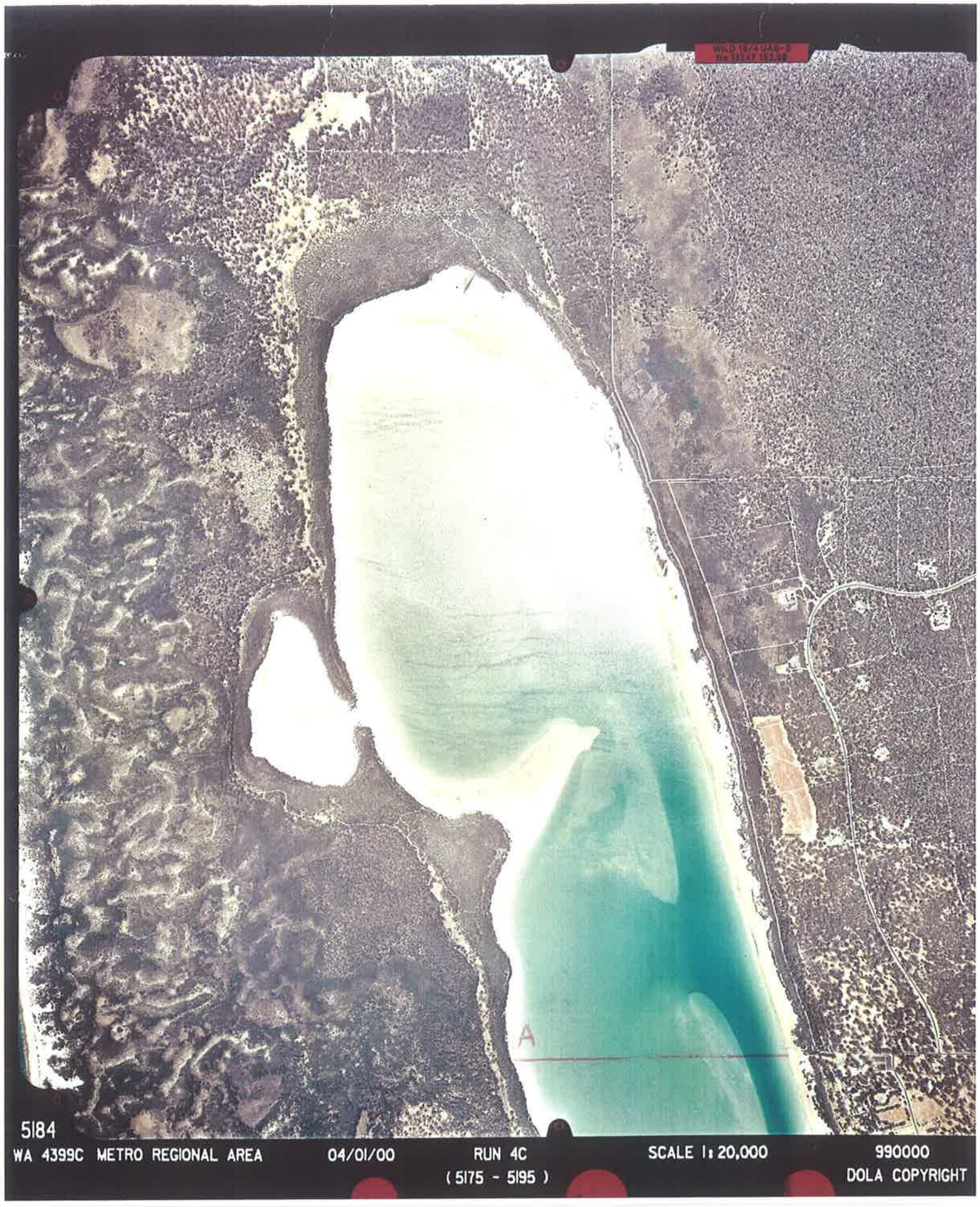
Photo taken by GB Pearson
at Lake Clifton
on 15/12/2000

06/9/2014

GP Jan 01 <No. 3>

Photo taken by GB Pearson
at Lake Clifton
on 15/12/2000

06/9/2014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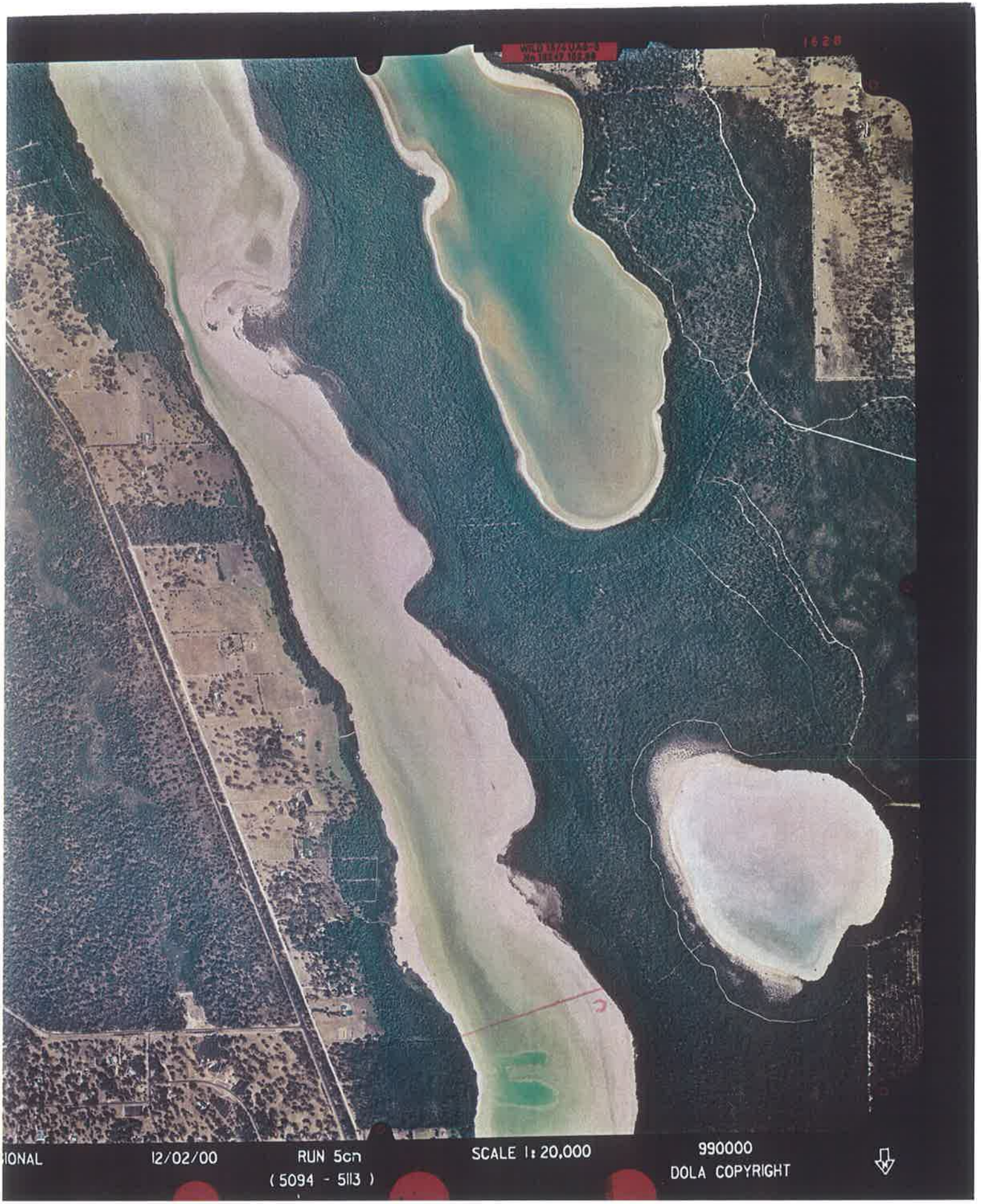
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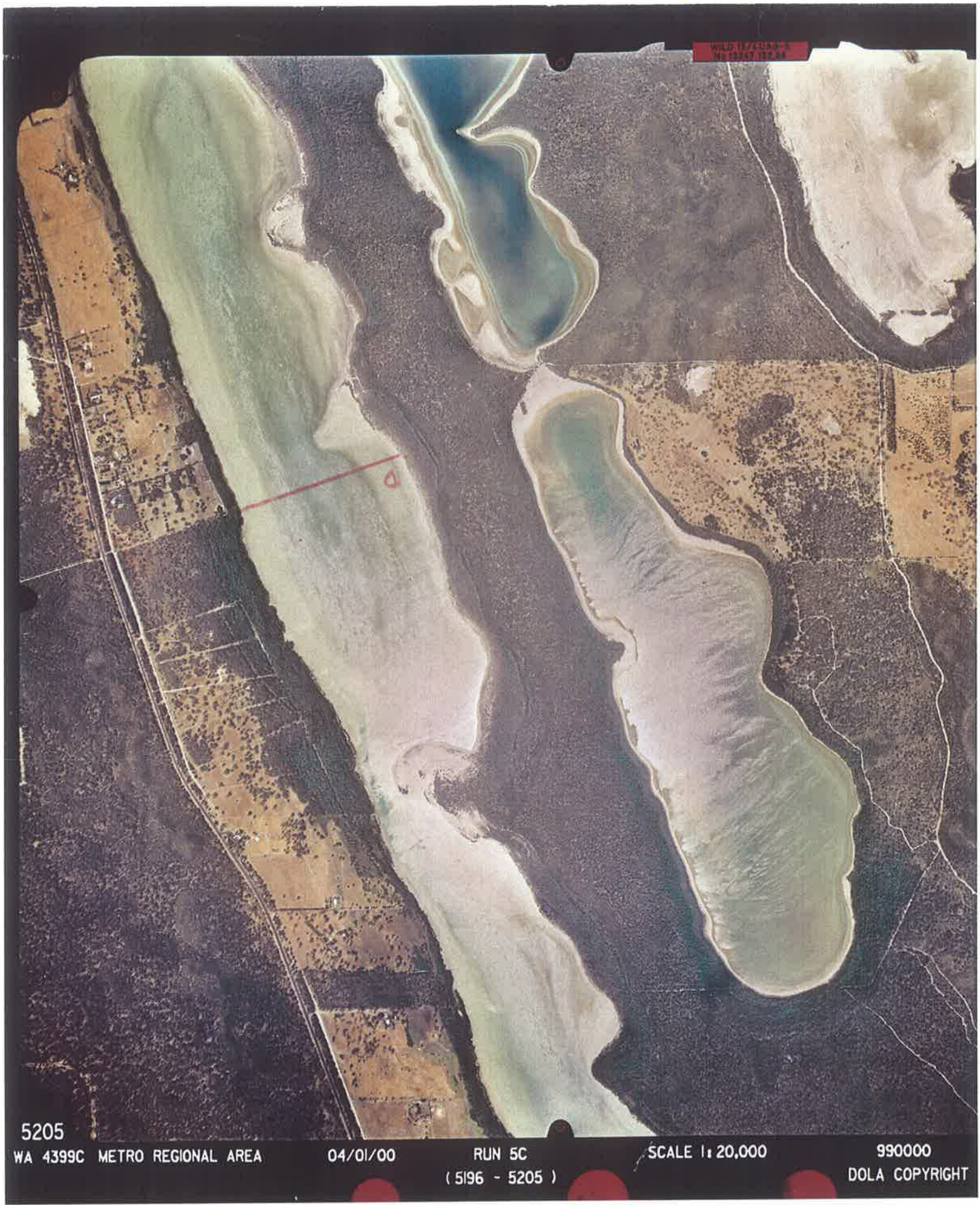
DOLA COPYRIGHT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WA 4399C METRO REGIONAL AREA
04/01/00
RUN 5C
(5196 - 5205)
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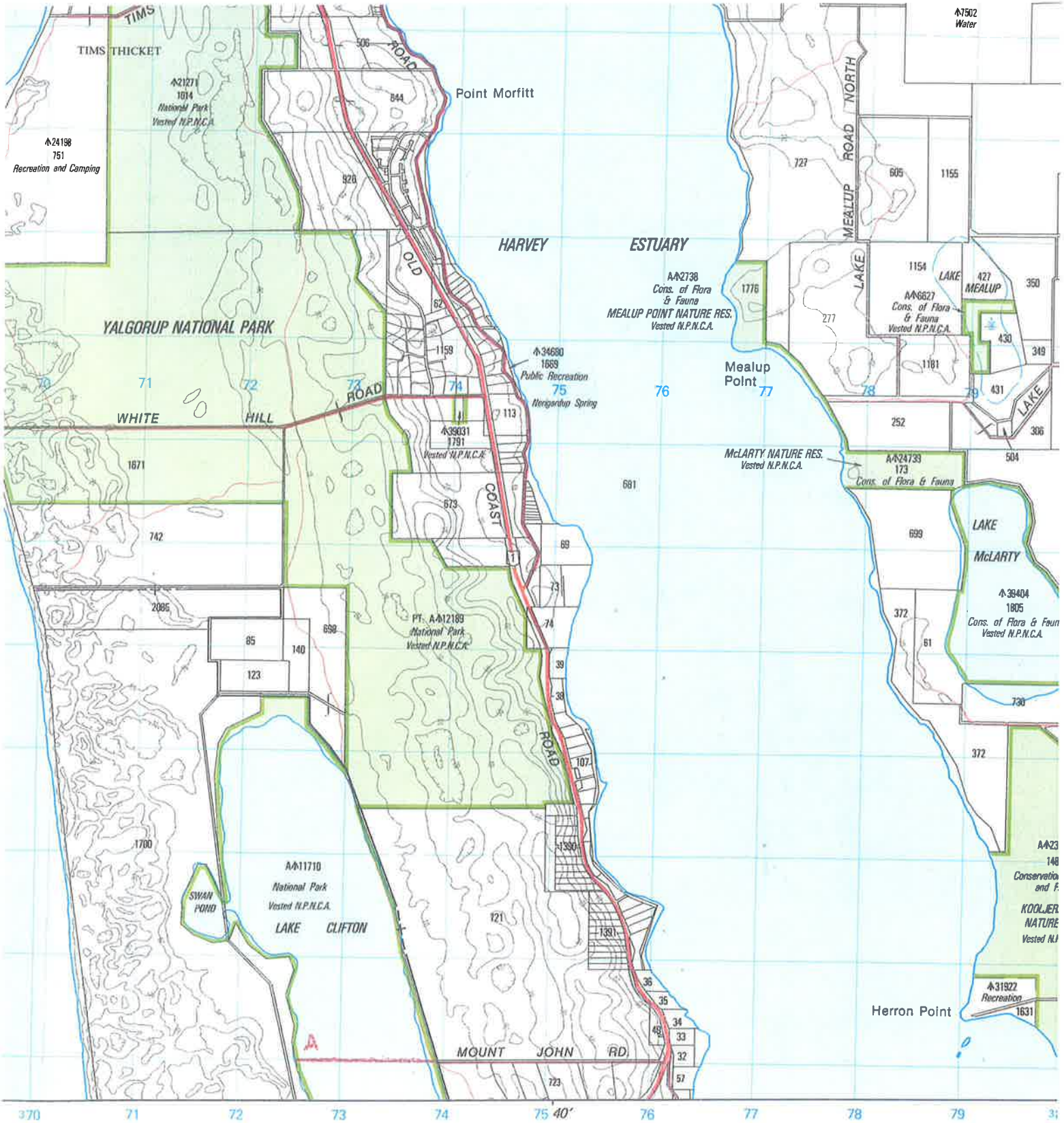


WELLINGTON LAND DISTRICT

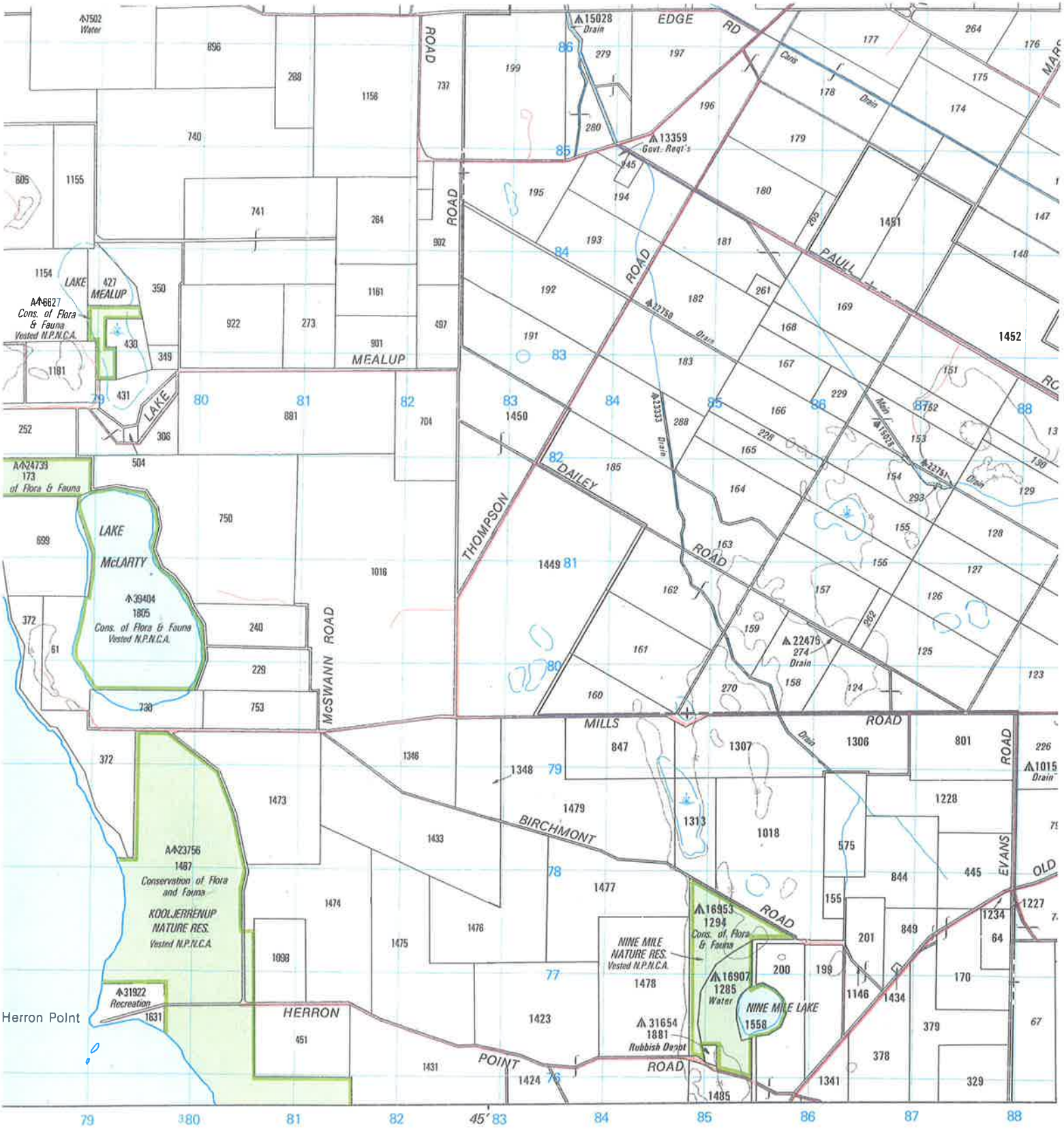
KEY TO SYMBOLS

- e Risk (Quarantine) Boundary
- lantation (C.A.L.M.)
- rivate; Share Farming
- l. Lands
- rated Forest
- Area
- tated Mined Area
- Dominant)
- Occurrence)
- o (Dominant)
- (Dominant)

- Building
- Tower
- Survey Reference Tree Theodolite
- Survey Reference Tree Compass
- Permanent Water Point
- Loading Ramp
- Recreation Site
- Sawmill
- Perennial Lake; Swamp
- Contours with Value

1

PREPARI
Executive
Manager
COMPILE
and supp
informati
PRINTED
DISTRIBI
Administ
Manager



SCALE 1 : 50 000

1 0 1 2 3 4 5 6 Kilometres

PREPARED by the Mapping Branch under the direction of the Executive Director of the Department of Conservation and Land Management, Western Australia.

COMPILED from existing mapping, updated from aerial photography and supplemented by data from various other sources. Topographic information correct as at 1985

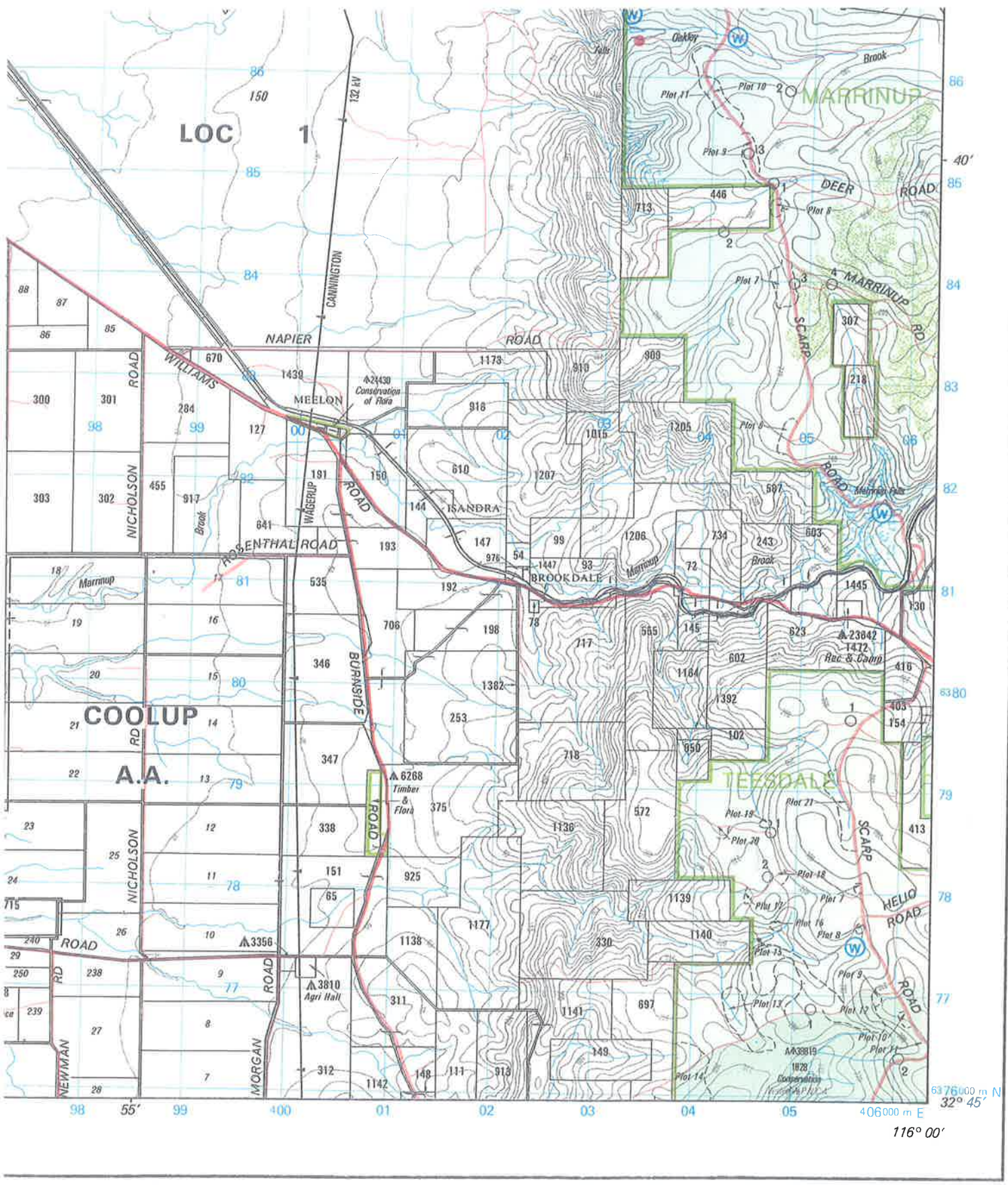
PRINTED by Printing Division, Dept. of Services, Feb. 1988

DISTRIBUTED by Central Map Agency, Dept. of Land Administration, Perth, W.A., and Dept. of Conservation and Land Management, Como, W.A.

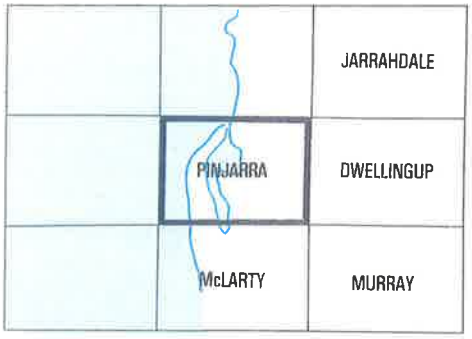
PROJECTION: Universal Transverse Mercator C.M. 117° E, Zone 50.
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum 1971.

Contour Interval: 10 metres

An Australian Map Grid (A.M.G.) interval of 1 000 metres is shown blue on the face of this map.



INDEX TO ADJOINING SHEETS

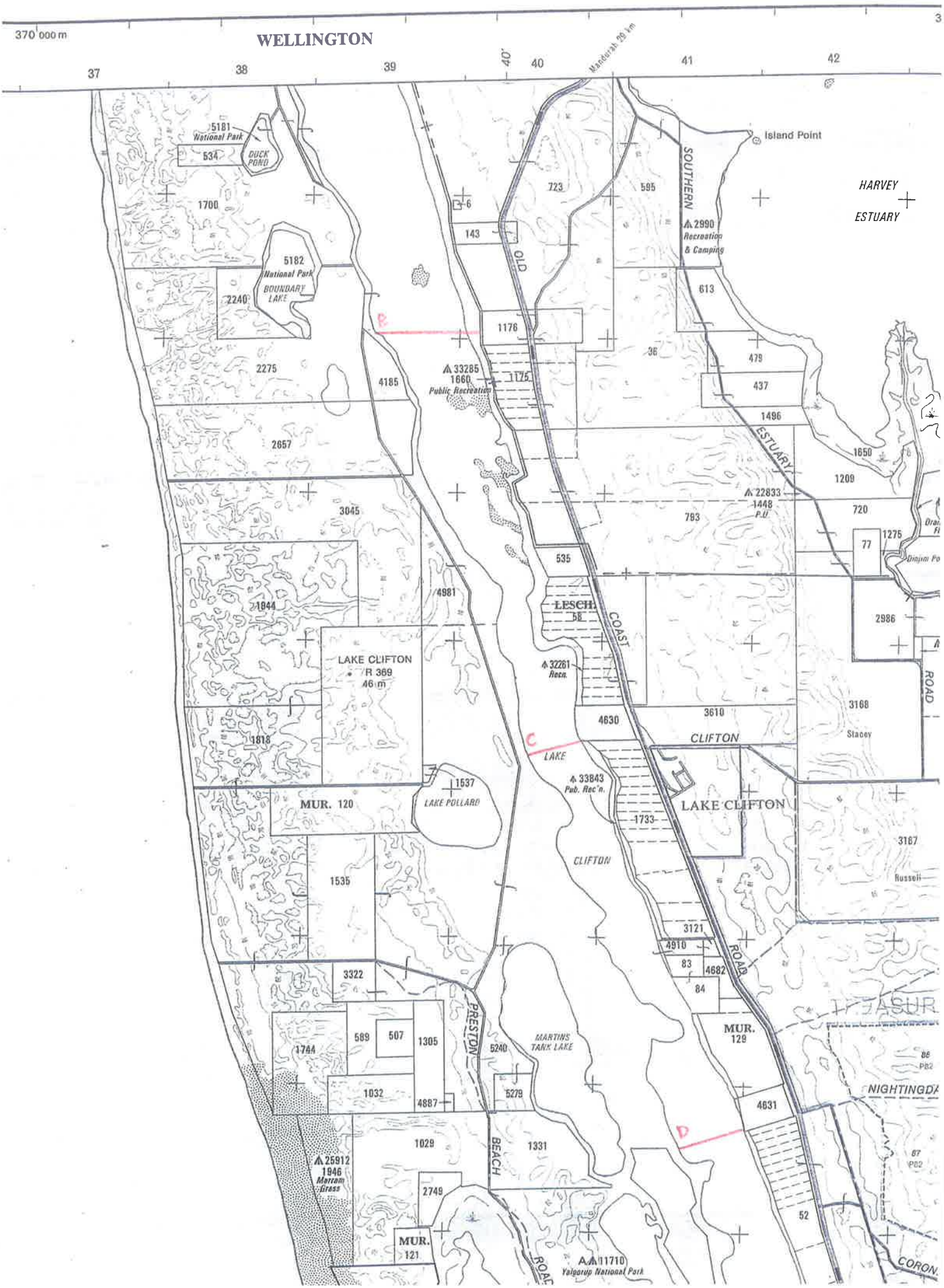


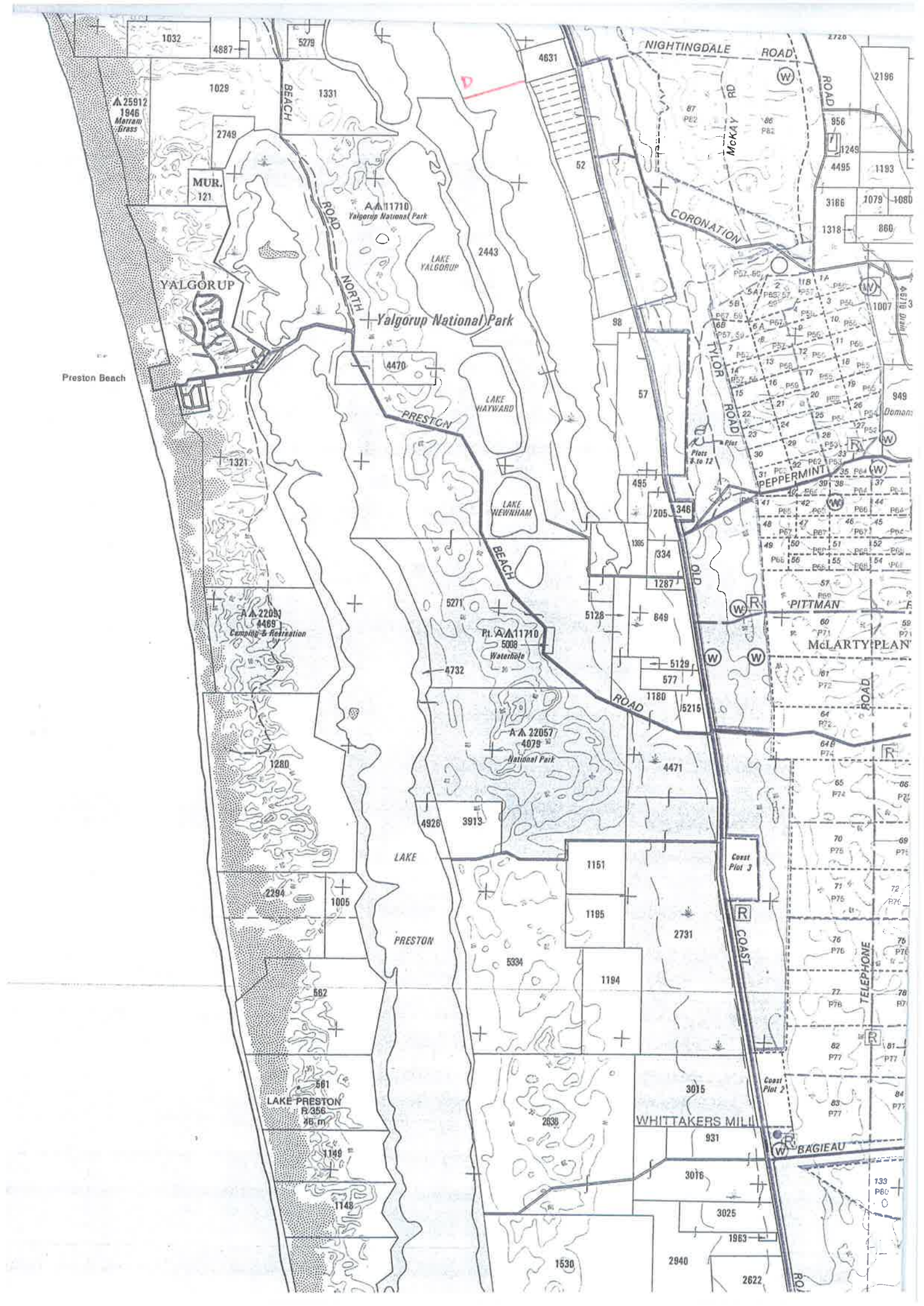
NATIONAL MAP REFERENCE 2032-IV AND 2032-I

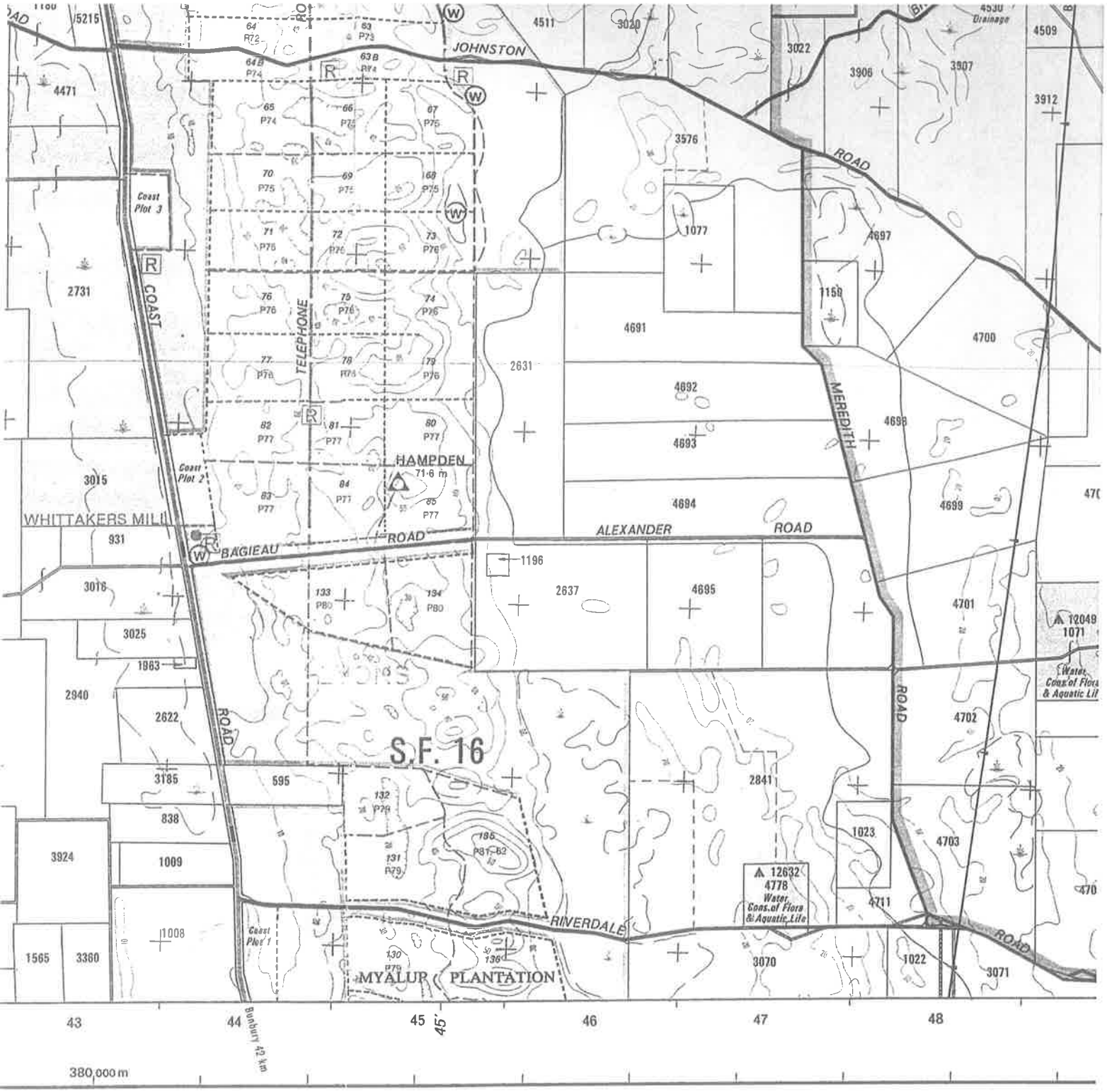
PINJARRA

WESTERN AUSTRALIA

CALMAP


370 000 m
WELLINGTON
37
38
39
40
41
42
Island Point
HARVEY
ESTUARY
SOUTHERN
OLD
COAST
ROAD
ESTUARY
LESCH
LAKE CLIFTON
R 369
46 m
LAKE POLLARD
MUR. 120
CLIFTON
LAKE
LAKE CLIFTON
Stacey
Russell
MUR. 129
MUR. 121
PRESTON
BEACH
MARTINS TANK LAKE
Yalgorup National Park
NIGHTINGDA
CORON
5181
National Park
DUCK POND
5182
National Park
BOUNDARY LAKE
Public Recreation
Recreation & Camping
Recn.
Pub. Rec'n.
Morram Grass


NIGHTINGDALE ROAD
BEACH ROAD
NORTH ROAD
CORONATION ROAD
TYLOR ROAD
OLD COAST ROAD
PRESTON BEACH ROAD
PEPPERMINT
PITTMAN
McLARTY PLAN
WHITTAKERS MILL
BAGIEAU
YALGORUP
Yalgorup National Park
LAKE YALGORUP
LAKE HAYWARD
LAKE HEWNHAM
LAKE PRESTON
PRESTON
Preston Beach
Camping & Recreation
Waterhole
National Park
TELEPHONE
Coast Plot 3
Coast Plot 2
Plots 8 to 12
MURRAY
MCKAY



SCALE 1 : 50 000

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Projection Universal Transverse Mercator C.M. 117° E, Zone 50
Horizontal Datum: Australian Geodetic Datum 1966
Vertical Datum: Australian Height Datum

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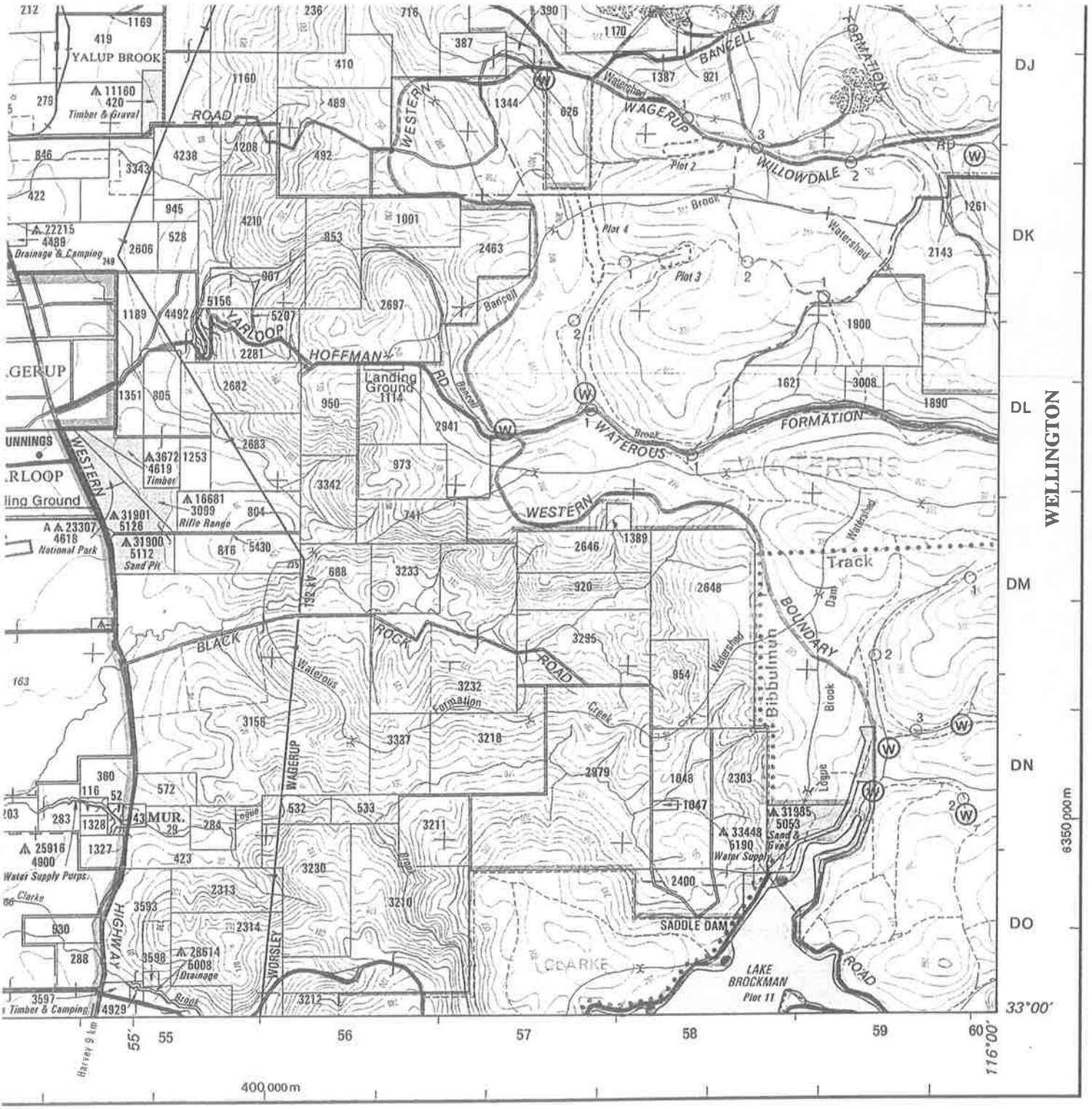

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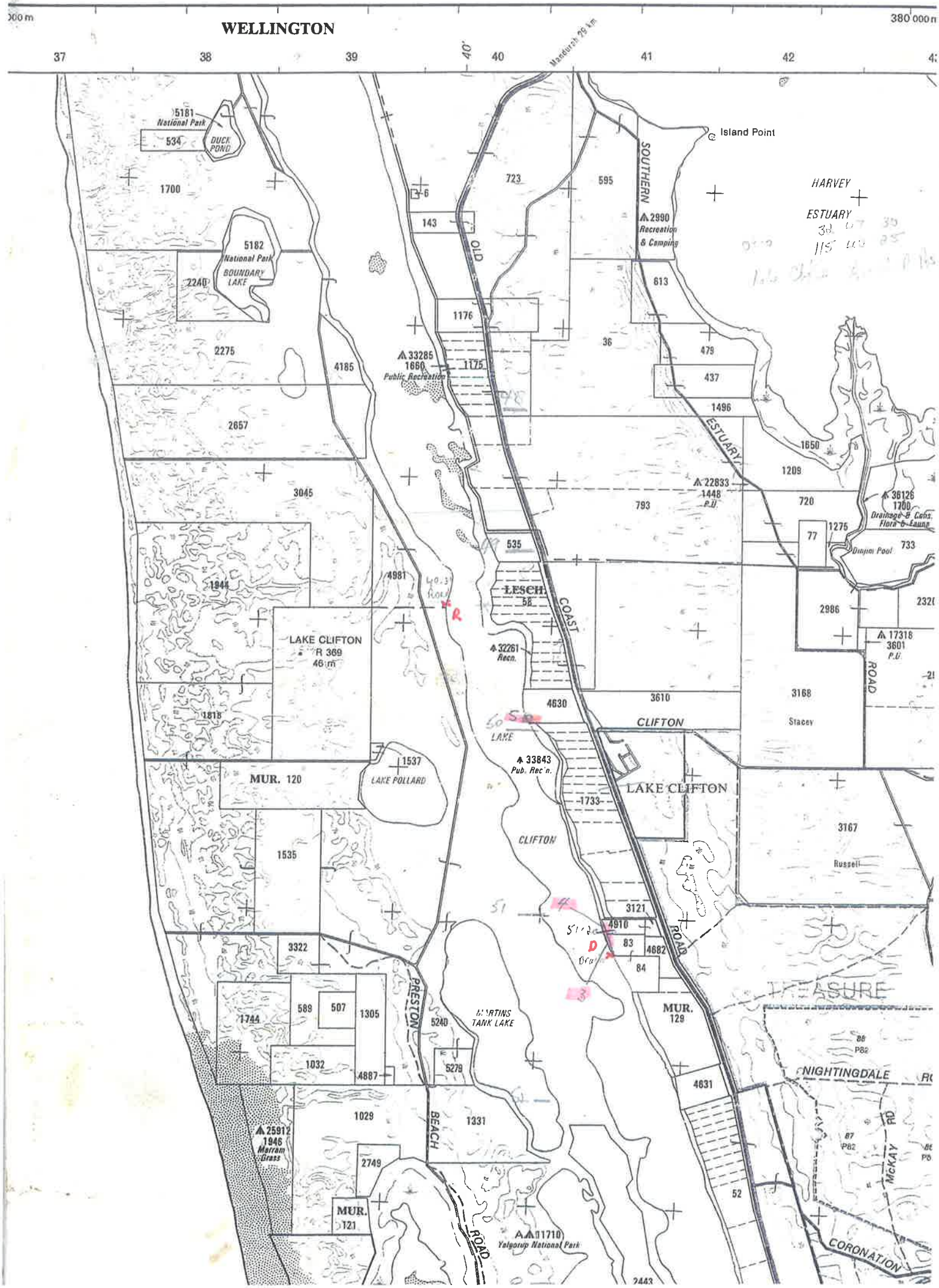
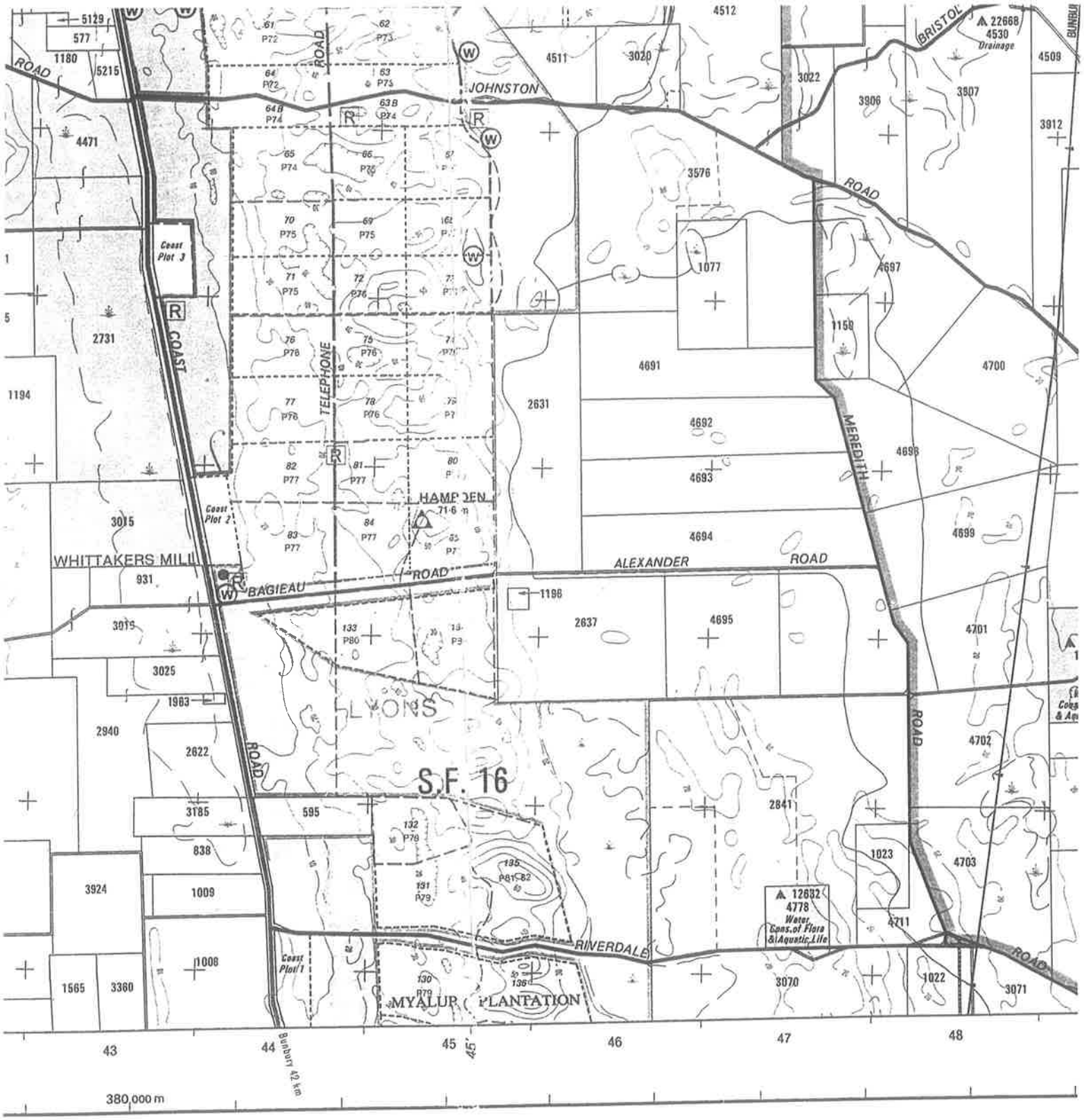
PINJARRA	DWELLINGUP
McLARTY	MURRAY
HARVEY	TALLANALLA

McLARTY

NATIONAL MAP REFERENCE 2032 III & II
EDITION 2


WELLINGTON
380 000 m
37
38
39
40
41
42
Mandurah 29 km
5181
National Park
534
DUCK POND
1700
5182
National Park
BOUNDARY LAKE
2240
2275
4185
2657
3045
1944
4981
1818
LAKE CLIFTON
R 369
46 m
MUR. 120
1537
LAKE POLLARD
1535
3322
1744
589
507
1305
1032
4887
5240
5279
1029
1331
2749
MUR. 121
25912
1946
Marram Grass
723
595
6
143
OLD
1176
33285
1660
Public Recreation
1175
36
613
SOUTHERN
2990
Recreation & Camping
Island Point
HARVEY ESTUARY
479
437
1496
ESTUARY
1650
1209
22833
1448
P.U.
793
720
36126
1700
Drainage & Cons. Flora & Fauna
77
1275
Dingon Pool
733
535
LESCH
58
COAST
2986
17318
3601
P.U.
ROAD
32261
Recn.
4630
3610
3168
Stacey
CLIFTON
LAKE
33843
Pub. Rec'n.
1733
LAKE CLIFTON
3167
Russell
CLIFTON
3121
4910
83
4682
84
ROAD
MARTINS TANK LAKE
MUR. 129
4631
52
TREASURE
NIGHTINGDALE
McKAY RD
CORONATION
PRESTON BEACH ROAD
11710
Yalgorup National Park
2443


Preston Beach
YALGORUP
Yalgorup National Park
LAKE YALGORUP
LAKE HAYWARD
LAKE NEWNHAM
LAKE PRESTON
PRESTON
LAKE
NORTH ROAD
BEACH ROAD
OLD COAST ROAD
CORONATION ROAD
PEPPERMINT GROVE
PITTMAN ROAD
McLARTY PLANTATION ROAD
TELEPHONE ROAD
McKAY ROAD
TAYLOR ROAD
WHITTAKERS MILL
BAGIEAU ROAD
Coast Plot 3
Coast Plot 2
Plots 9 to 12
Waterhole
Camping & Recreation
National Park
LYONS



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1 0 1 2 3 4 5 6 Kilometres

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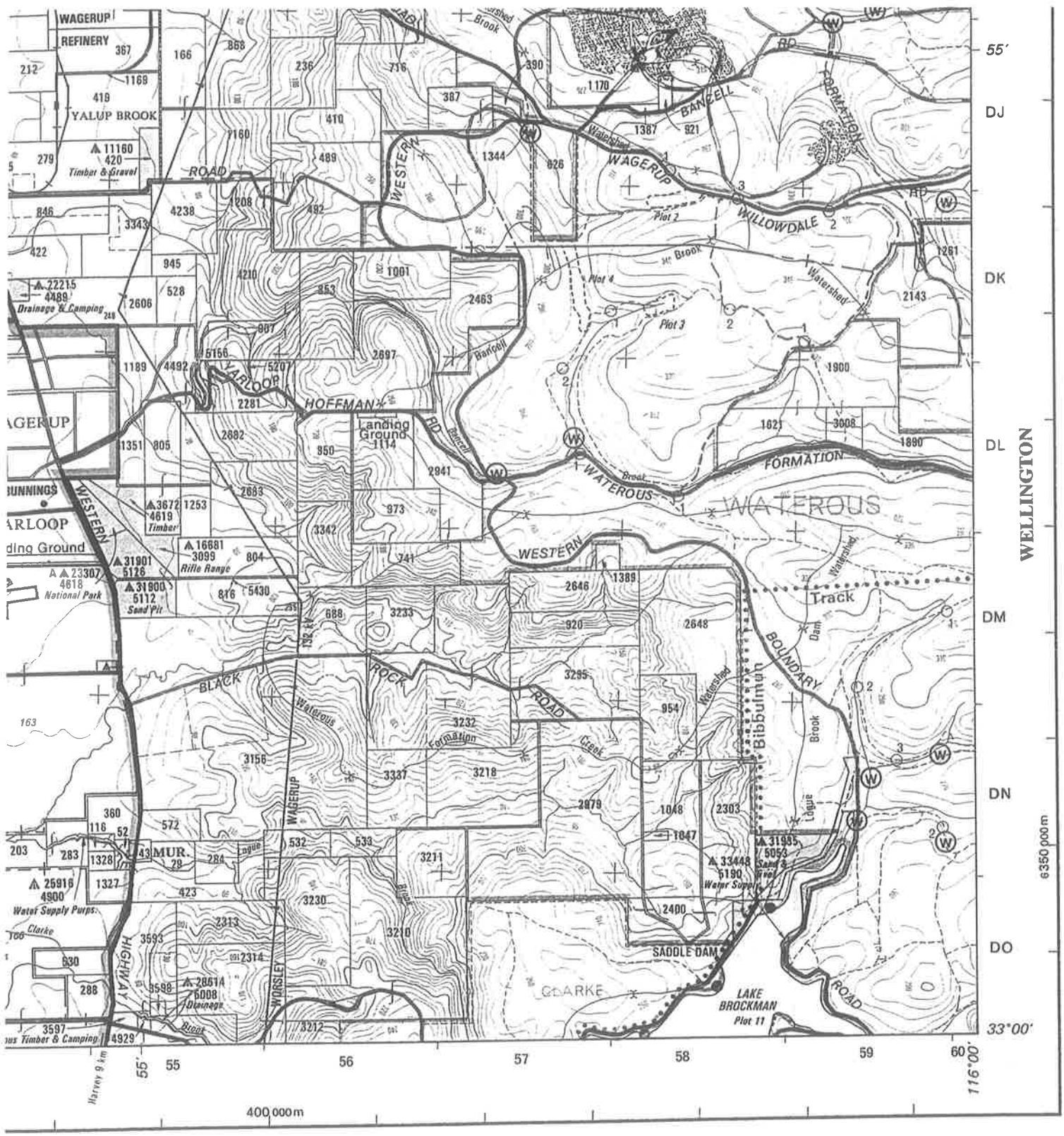

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McLARTY

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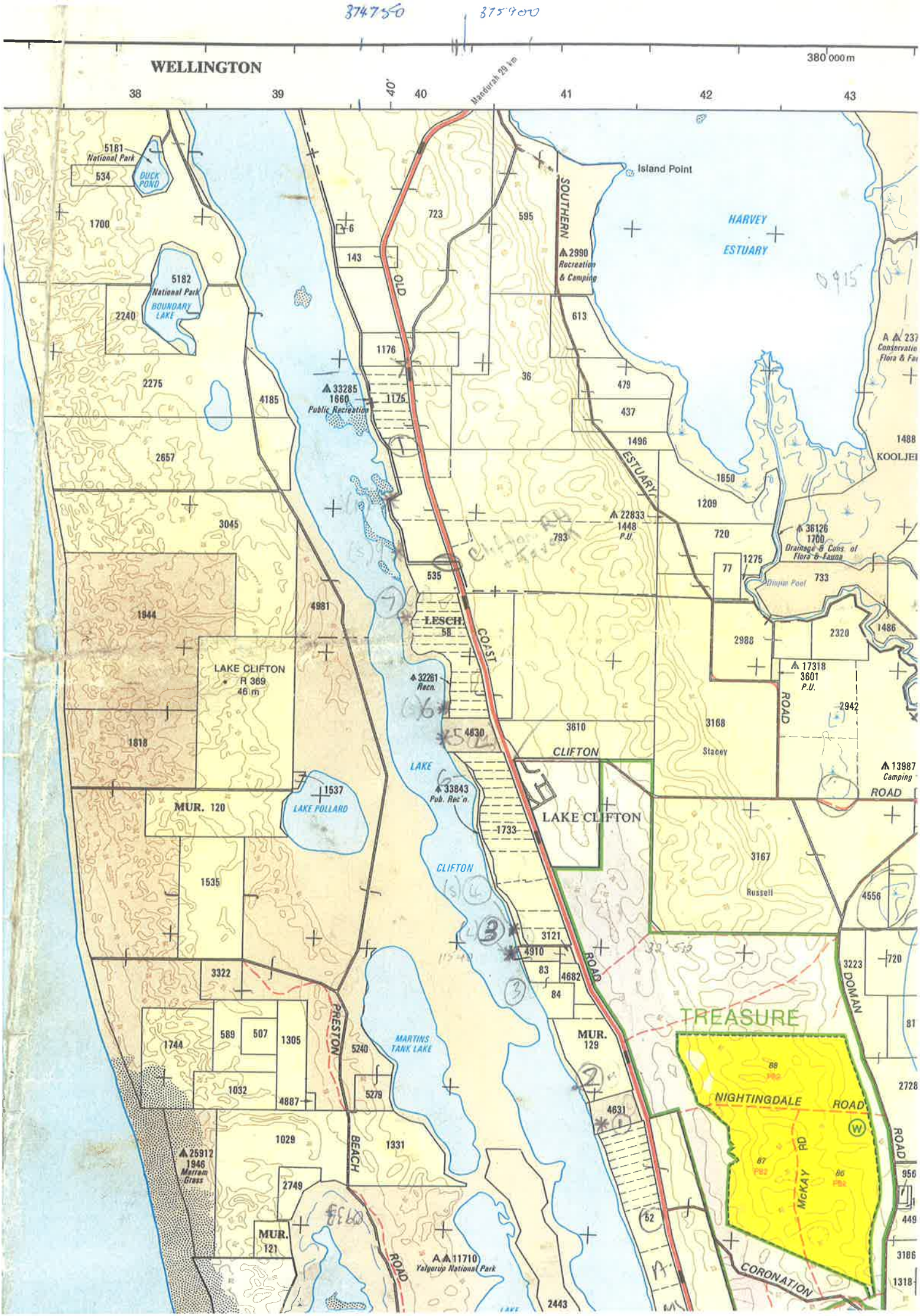
374750
375000
WELLINGTON
380 000 m
38
39
40'
40
Mandurah 29 km
41
42
43
5181
National Park
534
DUCK POND
1700
5182
National Park
BOUNDARY LAKE
2240
2275
2657
3045
1844
1818
4185
4981
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ESTUARY
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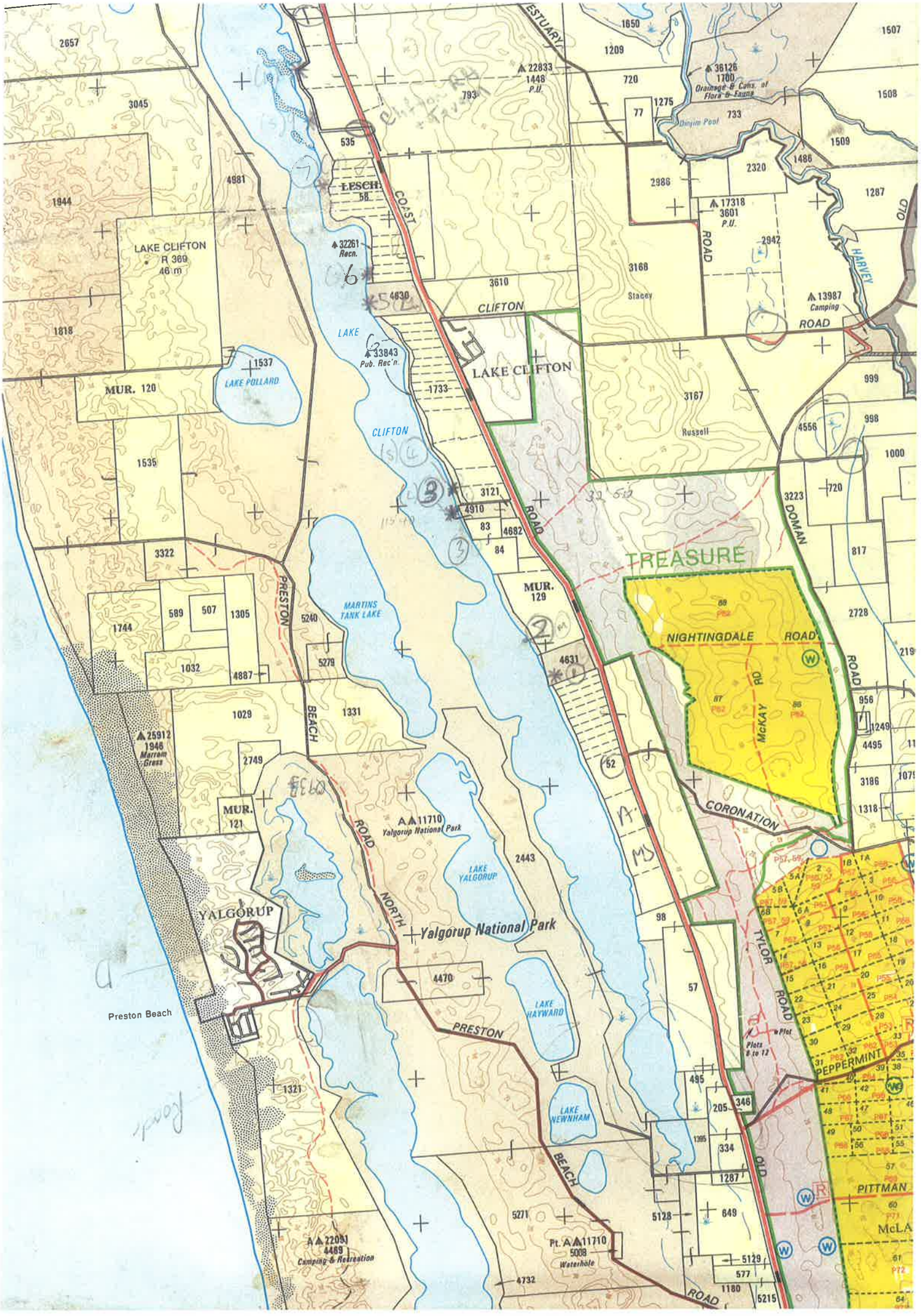
KOOLJEI
1650
1209
22833
1448
P.U.
793
720
36126
1700
Drainage & Cons. of Flora & Fauna
1275
77
733
Dingup Pool
535
LESCH
58
4981
2988
2320
1486
17318
3601
P.U.
2942
3610
4830
3168
Stacey
CLIFTON
LAKE
32261
Recn.
33843
Pub. Rec'n.
LAKE CLIFTON
R 369
46 m
MUR. 120
1537
LAKE POLLARD
1733
3167
Russell
13987
Camping
ROAD
4556
3121
4910
83
4682
84
3223
DOMAN
720
81
2728
TREASURE
NIGHTINGDALE ROAD
McKAY RD
956
449
3186
1318
CORONATION
MUR. 129
4631
52
PRESTON BEACH ROAD
5240
5279
MARTINS TANK LAKE
25912
1946
Merram Grass
MUR. 121
11710
Yalgorup National Park
LAKE


LAKE CLIFTON
R 369
46 m
LESCH
58
COAST
ROAD
LAKE
CLIFTON
LAKE POLLARD
MUR. 120
MUR. 129
MUR. 121
MARTINS TANK LAKE
PRESTON
BEACH
ROAD
NORTH
Yalgorup National Park
YALGORUP
LAKE YALGORUP
LAKE HAYWARD
LAKE NEWNHAM
Preston Beach
TREASURE
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ROAD
McKAY
RD
DOMAN
ROAD
CORONATION
ROAD
TYLOR
ROAD
OLD
PEPPERMINT
PITTMAN
HARVEY
OLD
ROAD
Stacey
Russell
Camping
Drainage & Cons. of Flora & Fauna
Pt. AA11710
5008
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AA22031
4469
Camping & Recreation
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Marram Grass
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33843
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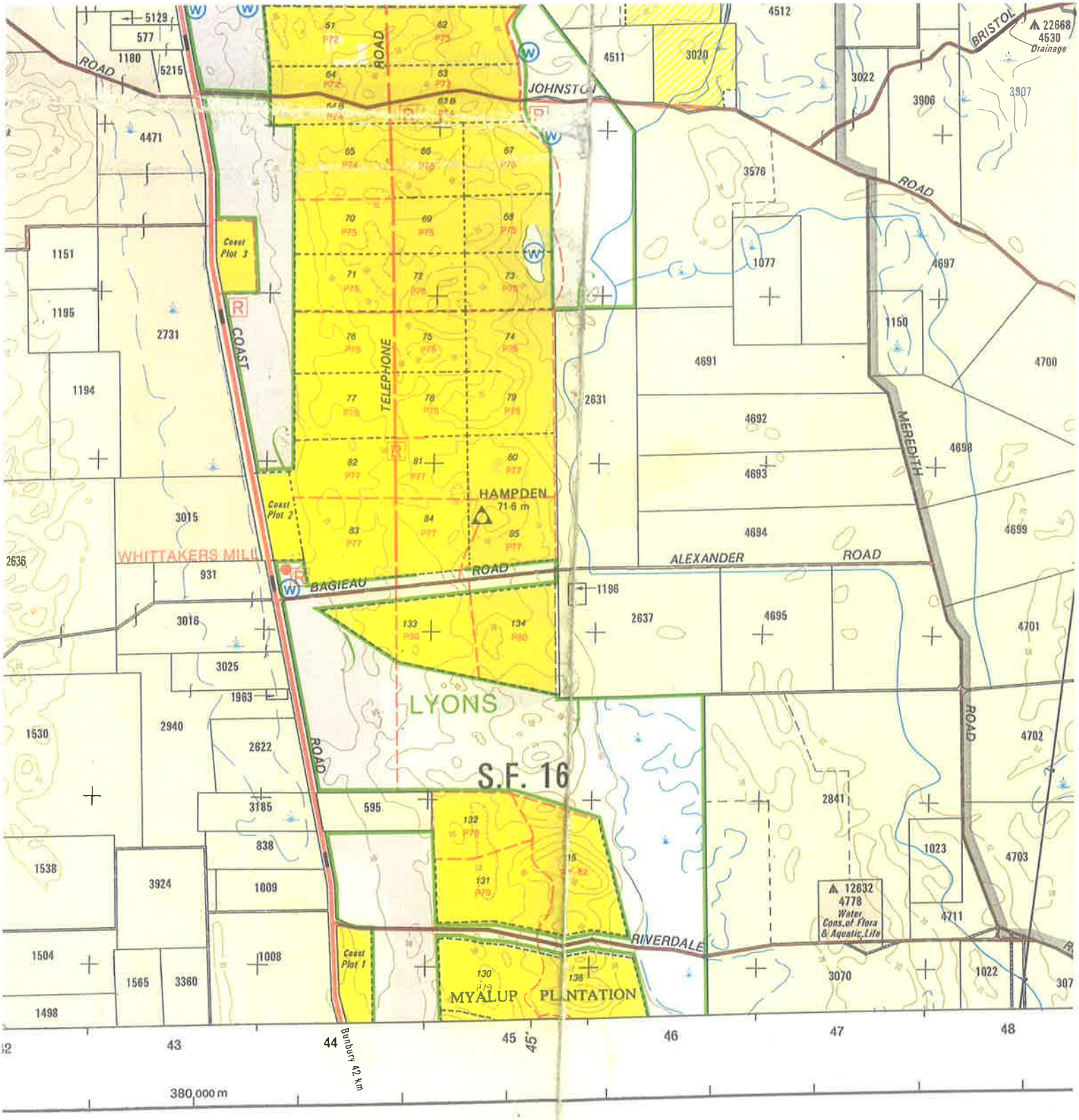
1700
13987
Camping



SCALE 1:50 000

1 0 1 2 3 4 5 6 Kilometres

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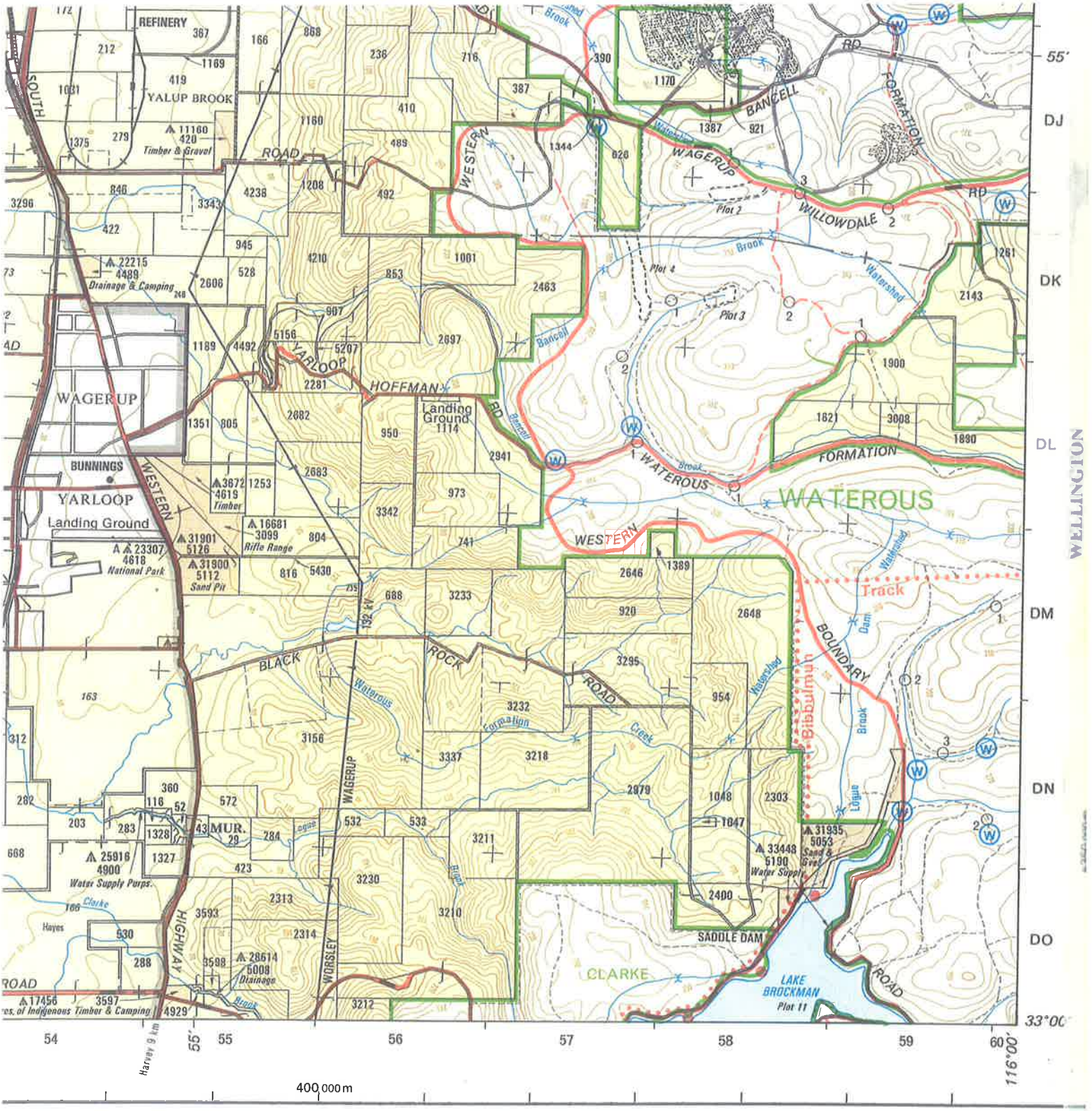

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HARVEY	TALLANALLA

McLARTY

NATIONAL MAP REFERENCE 2032 III & II
EDITION 2

Lake Clifton

Climate and land use impacts on groundwater levels in the Lake Clifton and Lake Preston Area.

By: Richard P.Lindsay, BSc Hons, MSc

This thesis is prepared in partial fulfilment of the requirement for the award of Post Graduate Diploma in Applied Geology (Hydrogeology)

November 2002

School of Applied Geology
Curtin University of Technology

Criteria of environmental acceptability for land use proposals within the catchment of Lake Clifton

Environmental Protection Authority
Perth, Western Australia
Bulletin 788
November 1995

Extracts relating to 2000 - 2001

Salinity transects of Lake Clifton,

extracted from J. Lane's file

labelled "Lake Clifton – Salinity Increase + Recovery Plan"

"Vol. 2 : Aug 2002 → ..."

30/8/2014

J. Lakes

CLM 18

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

FILE No.	

Vol 1 : Sep 2000 → July 2002

SUBJECT: LAKE CLIFTON — ~~APPROVALS~~ SALINITY INCREASE + RECOVERY PLAN

Amalgamated Files .....

Previous Papers ..... Further Papers .....

DISPOSAL ACTION

Repository .....

Destruction .....

Archives .....

INDEXED

RELEVANT FILES

OTHER DEPARTMENTS FILES

CLOSED : SEE VOL 2

Including salinity transects of Lake Clifton.

Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jim Lane
From: Grant Pearson

Date: March 1 2002
Subject: Lake Clifton Salinity

Attached are data on the monthly recordings at Lake Clifton. Insitu measurements of conductivity were taken using a TPS 90 FLMV conductivity meter or a TPS handheld WP 84 unit. Both were calibrated prior to the surveys using a standard "AR" grade ionic solution at 2.76 mS/cm @25^0 C purchased from Rowe Scientific.

The surveys were carried out, whenever possible, on scheduled days established at the beginning of the year. In most cases the surveys could be performed using a punt launched from the Site A jetty or from a shore location at Site C. When lake depths became too shallow for the punt and motor a surf ski was used. This was carried by vehicle to each transect and launched from the eastern side of the lake. On several occasions the wind conditions made this operation an extremely wet experience and the conductivity meter failed due to the extreme conditions. There are gaps in this data set as a result of this.

Water samples were collected at all sites along the four transects. These were analysed at the WA Chemistry Centre for conductivity. Chloride levels were measured from the same sample from March 2001 and on a further 6 of the subsequent survey dates.

The depth at the CALM depth gauge was recorded on each occasion.
The field surveys relate to the following dates:

DATE	FIELD COND.	CHEM CNTR COND	CHLORIDE	CALM GAUGE	SAMPLER
17/10/00	Y	N	N	4.33	GP
24/10/00	Y	N	N	4.36	GP
15/12/00	Y	N	N	4.12	GP
22/01/01	Y	N	N	3.93	GP
20/02/01	Y	N	N		GP
16/03/01	Y	Y	Y	3.67	GP
18/04/01	Y	Y	N	3.64	GP
23/05/01	Y	Y	Y	3.74	AC
23/06/01	Y	Y	Y	3.82	GP
19/07/01	Y	Y	Y	3.97	GP
09/08/01	Y	Y	N		AC
20/09/01	Y	Y	Y	4.16	GP
12/10/01	Y	Y	Y	4.23	GP
08/11/01	Y	Y	N	4.11	GP
12/12/01	Y	Y	Y	4.00	AC

Further more detailed treatment of the data is necessary. This data is provided as preliminary results.

Grant Pearson
March 1 2001

24°.

Samples from South side of jetty about 100 m from shore.

Site 1.

WPT025 0372884
eastern shore 6375966

WPT026 0372588.
western shore 6375966.

~~326~~
650.
~~3876~~
1300
2576

WPT028 0373231
6375966.

Lake Clifton 17/10/00

Transect A.

Site	Bottom.
1	Depth: 70 cm.
3	1.4 m.
2.	2.0 m.

Site	Cond.	Sal.	Temp°	Cond	Sal.	Temp.
1.	40.0ms	24.0ppt.	20.9.	40.5ms	24.4	20.5
3.	40.3	24.4	19.3	40.7	24.5	19.1
2	41.0	24.7	19.7	41.0	24.7	19.5

Note: Site 1 is peisometer site 100 m offshore.

A1 Samples from south side hilly (239.

530 / 390 / 1020

345 / 450 / 1095

3773773

~~3758~~ 6375966 East b

mid ~~60.3~~

Wat 60.3

(0374645)

~~0374490~~ 6372890 wft 33

250

~~0374490~~ 6372890 ~~wft 36~~ wft 35

(0374639) 0374739 6372890 wft 34

wft 59 (~~58~~ 44) 20

3759 6364456

0375670 6368456

0375302 6368456

tank 823

3777223 6364207 19.8

19.8

3777278 6364197

wft 34 Hugo mole in/m wft 40 19.0

wft 38 Western Side 375302 6368456

wft 39 Eastern Side D 377680 6364197

40 376873 6364197

405

3777278

24/10/00

Sile	Top C.	Tol%	Temp	D	Bottom C	%	T
A1	41.4	24.9	21.3	70	41.3	24.9	21.1
A2	41.4	25.0	~~30.8~~	20.8 1.44	41.6	25.0	20.6
A3	41.4	25.0	20.9	2.0	41.48	25.2	20.3
B33	40.8	24.6	21.9 ~~22.1~~	.55	41.3	24.9	21.7
B2	40.8	24.6	21.4	620	41.3	24.9	21.0 ~~21.8~~
B1	~~39.6~~ 40.8	24.6	22.1	.86	41.3	24.8	21.6
C1	38.0	22.8	21.6	1.15	38.5	23.0	21.5
C2	38.5	23.1	21.7	1.16	38.6	23.1	21.7
C3	37.9	22.6	22.4	.57	37.9	22.7	22.4
D1	33.1	19.6	22.5	.83	33.0	19.6	22.6
D2	32.5	19.1	22.5	.9	32.5	19.1	22.7
D3	31.8	18.8	23.1	.7	31.9	18.8	23.1

2.~~35~~ 45 @ 27.0 meter reading at completion

Calibrated meter at 2.76 MS/cm at start of survey

17/10/00 Cleffan

Site A.

Samples taken in a line out from shore at the jetty (Transect A) site on 17/10/00

depth		Shore sampled	‰	T
17cm.	(12m)	10m	40.8 ms	24.6 ppt 22.7°C
30cm.	(20m)	20m surface	40.8	24.5 23.1
		20m bottom	40.6	24.4 23.1
35cm.		30m surface	40.5	24.4 22.7
		30m bottom	40.6	24.4 22.7
41cm.		40m surface	40.6	24.4 22.5
		40m bottom	40.6	24.4 22.4
44cm.		50m surface	40.9	24.6 21.9
		50m bottom	40.9	24.6 21.8
42cm		60m surface	40.9	24.6 21.6
		60m bottom	41.0	24.6 21.6
46cm.		70m surface	40.8	24.6 21.3
		70m bottom	40.9	24.6 21.2

Depth Guage (33) 4.33 m

15/12/00		COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	CLM gg
1050hrs	A1	48.9	29.9	26.1	49.2	30.0	26.1	0.6	4.12m at Calm gauge
	A2	49.3	30.1	25.1	49.2	30.0	24.9	1.6	
	A3	49.4	30.2	25.9	49.0	29.9	25.0	1.2	
	B1	49.8	30.4	26.3	50.0	30.5	26.3	0.5	
	B2	49.4	30.2	25.5	49.7	30.3	25.5	0.8	
	B3	49.6	30.3	26.7	50	30.5	26.4	0.4	
	C1	50.0	30.5	26.3	50.1	30.6	26.2	0.8	
	C2	49.7	30.3	26.6	50.1	30.6	26.5	0.8	
	C3	50.5	31.0	29.1	50.6	31	29.1	0.25	
	D1	49.7	30.3	28.0	49.7	30.3	27.9	0.4	
	D2	48.9	29.9	27.2	49.8	30.4	26.9	0.3	
1315hrs	D3	49.8	30.4	28.6	50.1	30.6	28.4	0.4	

22/01/2001		ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	61.8	41.4	24.2	61.5	41.2	24.4	1	3.93m at Calm gauge
	A2	62.0	41.5	23.8	61.9	41.5	24.0	1.6	
	A3	61.6	41.3	23.9	61.5	41.2	24.0	1.1	
	B1	66.5	44.8	25.5	66.4	44.8	25.5	0.3	
	B2	62.1	41.6	24.4	62.1	41.6	24.5	0.6	
	B3	66.5	44.8	24.9	65.9	44.4	25.0	0.3	
	C1	71.4	48.4	24.7	71.4	48.4	24.9	0.5	
	C2	71.0	48.1	24.3	70.9	48.1	24.3	0.6	
	C3	74.1	50.4	25.5	75.2	51.3	25.1	0.2	
	D1	85.2	58.7	26.2	84.4	58.1	26.3	0.3	
	D2	81.4	55.9	25.6	81.1	55.6	25.6	0.3	
	D3	83.1	57.1	27.1	82.6	56.8	27.1	0.2	

16/3/01 (236.

MARCH SITE	2001 TIME	GBP ANAL.	TOP CON MS/CM	TOP TEMP C	B. CON MS/CM	B. TEMP C	DEPTH (M)	COMMENTS DEPTH GAUGE = 3.67M at Calm gauge
A1		CLM	29.2 18.3	19.3	29.2 18.3	19.6	3.67 GG 0.7	
		CC						
A2		CLM	26.5	18.8	33.7	19.7	1.4	
		CC	16.5		21.4			
A3		CLM	26.3	18.3	22.3	19.0	0.6	
		CC	16.3		12.7			
B1		CLM	69.4	20.4	68.3	20.4	0.2	
		CC	47.0		46.2			
B2		CLM	69.4	20.2	69.5	20.4	0.35	
		CC	47.0		47.0			
B3		CLM	67.9	24.1	-	-	0.05	
		CC	45.9					
C1	1350	CLM	86.4	21.9	85.6	22.0	0.2	WPT 069
		CC	59.6		59.0			
C2		CLM	87.0	21.2	83.1	20.0	0.4	
		CC	60.1		57.1			
C3		CLM	45.9	25.9	-	-	0.05	WPT 071
		CC	30.0					
D1	1530	CLM	-	-	-	-	0.05	
		CC						
D2		CLM	-	-	-	-	0.1	
		CC						

CLM- Analysis from CALM Woodvale
CC- Analysis from Chemistry Centre

feb 01

15/12/00

	20/09/2000	24/10/2000	15/12/2000	22/01/2001	20/02/2001	
A1	50.5	41.3	48.9	61.8	67.7	45.3
A2	50.4	41.6	49.3	62	68.3	46.2
A3	49.2	41.8	49.4	61.6	68.7	46.5
B1	50.1	41.3	49.8	66.5	68.3	46.2
B2	49.9	41.3	49.4	62.1	68.4	46.2
B3	48.5	41.3	49.6	66.5	68.2	46.1
C1	42.8	38.5	50	71.4	79.5	54.4
C2	42.7	38.6	49.7	71	81.8	56.2
C3	40.6	37.9	50.5	74.1	86.3	59.5
D1	37.7	33	49.7	85.2 na		
D2	37.4	32.5	48.9	81.4	93	64.6
D3	36.8	31.9	49.8	83.1 na		

BOTTOM

		24/10/2000	15/12/2000	22/01/2001	20/02/2001	
A1	50.4	41.4	49.2	61.5	67.5	45.6
A2	50.4	41.4	49.2	61.9	63.2	42.4
A3	49.4	41.4	49	61.5	65.5	44.1
B1	50.4	40.8	50	66.4	68.4	46.2
B2	49.8	40.8	49.7	62.1	68.2	46.1
B3	48.7	40.8	50	65.9	67.8	45.7
C1	44.2	38	50.1	71.4	79.4	54.6
C2	43.7	38.5	50.1	70.9	79.1	54.2
C3	40.7	37.9	50.6	75.2	86.5	59.7
D1	37.7	33.1	49.7	84.4	91.8	62.7
D2	37.4	32.5	49.8	81.1	94.9	64.0
D3	36.9	31.8	50.1	82.6	98.5	67.7

April 3.64

16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
	78.1	73.3	66.5	61.1	61.4	50.5
	118.3	69.4	67.4	61.2	61.5	50.4
	na	71.5	64.3	61.4	61.6	49.2
69.4	na	69.9	63.6	60	58.2	50.1
69.4	na	69.3	63.7	60.3	58.7	49.9
67.9	na	69.9	61.7	58.9	58.2	48.5
86.4	na	65.3	55.2	53.3	52.3	42.8
87	na	66.7	57.4	54.6	53.1	42.7
45.9	na	67.7	59.5	53.9	52.6	40.6
	na	73.8	55.3	na	48.7	37.7
	na	75	55.6	na	47.9	37.4
	na	75.2	55.2	na	46.3	36.8

16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
	76	73.3	65.9	60.8	61.3	50.4
	120	68.3	61.2	61.2	60	50.4
	na	70.9	64	61.4	61	49.4
68.3	na		63.4	60	58.1	50.4
69.5	na	69.9	58.7	60.3	58.8	49.8
na	na			58.3	58.8	48.7
85.6	na	66.1	55.3	53.4	52	44.2
83.1	na	66.7	58.5	54.9	53.1	43.7
na	na		55.3	53.9	52.5	40.7
na	na	73.8	55.3	na	48.5	37.7
na	na	75.2	55.6	na	47.9	37.4
na	na	na	55.9	na	46.3	36.9

April 01

Meter failure. Samples collected for Chem Centre Analysis

18 April 2001

Weather failed

Water samples collected

for Chem Centre.

3.664

on grass

	Top		Bot		
	Cond	Temp	Cond	Temp	OM
A1	73.1	21.	7610	21.4	0.7
A2	115.3	21.6	120	21.7	1.2
A3	—	23.9		24.0	1.8
B1	water		wolfram clay		0.10
B2					
B3	wet	Bo	7cm from S.L.		0.05
C1					0.05
C2					30
C3	wet	81	180	in from	0.05
D1					0.02
D2	wet	82			0.10
D3			4 inch deep		

18/4/01

Survey conducted by Helen Cleaver 23/5/01
using the Ocean Kayak.

23/5/01

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	73·3		18·6		73·3	18·1	0·7	
	A2	373229		69·4		17·1		68·3	17·1	1·45	
	A3	372708		71·5		17·4		70·9	17·1	0·9KOD	
	B1	374648	6372890	69·9		19·6		–	–	0·300	
	B2	374250		69·3		19·8		69·9	19·9	0·500	
	B3	373752		69·9		19·9		–	–	0·300	
	C1	375867	6368456	65·3		18·6		66·1	18·1	0·400	
	C2	375670		66·7		17·5		66·7	17·5	0·300	
	C3	375302		67·7		19·7		–	–	0·200	28m east of position
	D1	377628	6364207	73·8		15·4		73·8	15·4	0·330	
	D2	377272		75·0		15·7		75·2	15·8	0·220	
	D3	376971		75·2		16·7		–	–	0·150	30m east of position

Depth gauge (No. 2) at ST JOHN ROAD read 3·74m at 1645 hrs.

NOTE: Problems with TPS not settling down water samples need to be re-measured and checked against field values.

DATE	23/6/01						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1		CALM	78.1	21	76.0	21.4	1.0
		CC					
A2		CALM	E	21.6	E	21.7	1.2
		CC					
A3		CALM	E	23.9	E	24.0	0.3
		CC					
B1		CALM	E		E		0.1
		CC					
B2		CALM	E		E		0.5
		CC					
B3		CALM	E		E		0.05
		CC					
C1		CALM	E		E		0.05
		CC					
C2		CALM	E		E		0.3
		CC					
C3		CALM	E		E		0.05
		CC					
D1		CALM	E		E		0.02
		CC					
D2		CALM	E		E		0.01
		CC					
D3		CALM	-				
		CC					-

"E" denotes Error in TPS conductivity meter recording

19/7/01

230.

60.8

WTW unit 3.77 GG.

Cliffview 19/7/01

	Tol Con	Tol	Btm Con	Btm Tool	Drill
A1	61.1	12.6	60.9	12.6	1.5
A2	61.2	12.3	61.2	12.3	2.0?
A3	61.4	12.3	61.4	12.3	1.0
B1	60	12.6	60.0	12.7	0.6
B2	60.3	12.3	60.3	12.3	1.0
B3	58.9	13.1	58.3	13.0	0.2
				53.4	13.5 1300
C1	53.3	13.2	53.4	53.4	~~1.0~~ OK
C2	54.6	13.1	54.9	13.4	1.3
C3	53.9	14.5	53.9	14.8	0.6 ~~1.0~~ 0.1 1320
D1	?	14.1	?		0.5
D2	?		?		1.0
D3	?		?		0.1

Sample taken - No reading
E3 message

ALAN CLARKE
CLAIR M'GUIRE

9/6/04

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	61·4		16·2	61·3		15·1	1·010	10·40
	A2	373229		61·5		14·9	60·0		14·7	2·000	
	A3	372708		61·6		14·9	61·0		15·3	1·410	
	B1	374648	6372890	58·2		15·9	58·1		15·8	0·58	
	B2	374250		58·7		15·3	58·8		15·4	0·90	
	B3	373752		58·2		16·7	58·8		16·1	0·43	
	C1	375867	6368456	52·3		16·0	52·0		16·0	0·88	
	C2	375670		53·1		15·7	53·1		15·7	0·92	12·30pm
	C3	375302		52·6		16·2	52·5		16·3	0·35	40m east of pond
	D1	377628	6364207	48·7		16·3	48·6		16·3	0·46	
	D2	377272		47·9		15·9	47·9	/	16·0	0·73	
	D3	376971		46·3		16·5	46·3		16·5	0·42	1·00pm

20/9/01

Depth Gauge = 4.016

DATE	~~23/6/01~~						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1	1115	CALM 18 ppt	50.5	17.1	50.4	17.1	1.1
		CC					
A2		CALM	50.4	17.3	50.4	17.3	1.8
		CC					
A3		CALM	49.2	16.4	49.4	16.4	1.2
		CC					
B1		CALM 19 ppt	50.1	16.8	50.4	16.9	0.8
		CC					
B2		CALM	49.9	16.3	49.8	16.3	0.8
		CC					
B3		CALM	48.5	16.5	48.7	16.5	0.4
		CC					
C1		CALM 11 ppt	42.8	16.5	44.2	16.9	0.8
		CC					
C2		CALM	42.7	16.3	43.7	16.5	1.0
		CC					
C3		CALM	40.6	15.8	40.7	15.8	0.4
		CC					
D1		CALM 12 ppt	37.7	16.6	37.7	16.6	0.5
		CC					
D2		CALM	37.4	16.5	37.4	16.5	0.7
		CC					
D3		CALM	36.8	16.3	36.9	16.3	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Calibrated at 2760 MS. 20/9/

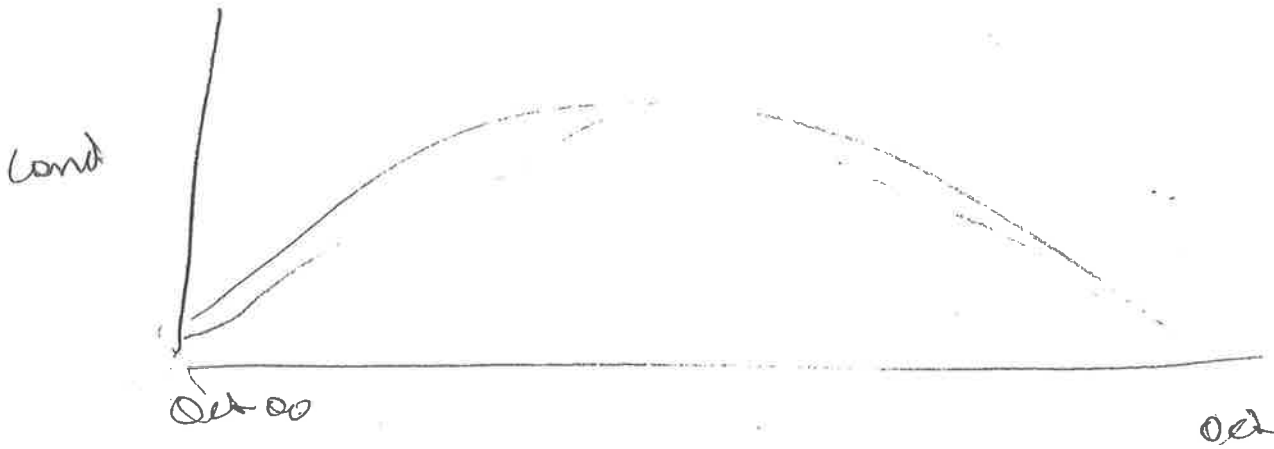
12/10/01

227.

DATE	12/10/01	G Pearson	[illegible]	[illegible]			
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH 4.23
A1	11.13	CALM	49.0	17.9	49.7	17.9	1.2
		CC					
A2	11.9	CALM	49.4	17.8	49.0	17.9	2.0
		CC					
A3	11.00	CALM	49.2	17.9	49.2	17.8	0.60
		CC					
B1	10.25	CALM	47.7	16.9	47.7	16.9	0.60
		CC					
B2	10.30	CALM	48.8	17.6	48.8	17.6	0.90
		CC					
B3	10.35	CALM	48.5	17.8	48.3	17.8	0.50
		CC					
C1	09.30	CALM	[illegible]	16.6	[illegible]	16.9	0.70
		CC	43.2	16.9	42.5	16.9	
C2	09.44	CALM	45.7	17.7	45.7	17.1	0.9
		CC					
C3	09.50	CALM	45.3	17.7	45.3	17.8	0.4
		CC					
D1	10.16	CALM	38.4	17.4	38.4	17.4	0.4
		CC					
D2	10.10	CALM	40.1	17.7	40.1	17.7	0.6
		CC					
D3	10.05	CALM	39.8	17.8	39.8	17.8	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

" Wind - 15-20 Km/Hr SW.



0201

8/11/01 226.

Lake Chelan 8/11/01

Dead Mob at WP1 Dead at 109.

Begin C1 WP1 C1 log.

8/11/01

		Top C	Temp	Bottom C	Temp	Depth	4.0"
	A1	51.2	21.2	~~50.2~~	20.9	1.2	Probably a.m.
	A2	52.1	20.8	52.0	21.2	1.9?	
	A3	51.5	19.1	51.4	19.0	.8	
	B1	51.4	23.3	51.4	23.4	0.6	
	B2	51.5	20.3	51.4	20.3	0.9	
	B3	51.3	22.7	51.4	22.6	0.5	0.5
1240	C1	51.3	20.9	50.5	22.2	0.6	0.6
	C2	51.4	21.4	51.3	21.3	0.9	0.9
1255	C3	50.4	22.6	50.4	22.2	0.3	
	D1	48.0	25.1	47.9	25.1	0.3	
	D2	48.5	23.6	48.3	23.9	0.6	
1430	D3	48.3	24.1	48.6	24.4	0.4	

DATE 12/12/01 SAMPLER ALAN CLARKE

depth at gauge 2 was 4.00m.

SITE	EAST WGS84	NORTH WGS84	EAST AUS G 66	NORTH AUS G 66	COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	TIME
A1	374048	6376114	373909	6375966	58·0		22·4	58·3		22·0	0·84	12 40
A2	373368		373229		58·2		22·0	58·2		21·6	1·52	
A3	372847		372708		58·4		22·4	58·5		22·2	1·18	1215
B1	374787	637038	374648	6372890	58·2		23·1	58·4		22·4	0·46	1200
B2	374389		374250		58·6		22·8	58·7		22·5	0·78	
B3	373891		373752		59·2		24·1	59·4		24·0	0·34	11·44
C1	376001	6368604	375867	6368456	59·9		21·8	60·3		21·6	0·67	
C2	375809		375670		60·0		21·6	60·2		21·3	0·78	
C3	375441		375302		61·8		23·7				0·22	one reading only
D1	377767	6364355	377628	6364207	61·4		21·8	61·4		21·8	0·38	10·45
D2	377411		377272		63·3		20·6	63·7		20·5	0·49	
D3	377110		376971		63·2		21·1	63·4		21·1	0·28	10·25

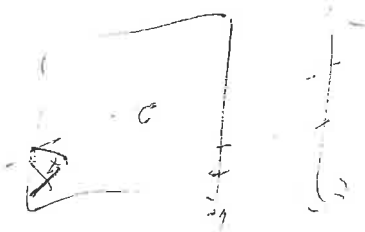
Calibration of TPS 90-FLMV

2·76ms/cm (field quantity) read 2·75ms @ 22·4°c

Calibration O.K. span 103·2%

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/2001	30000	7080
00E1224/002	A 2	16/03/2001	30000	7010
00E1224/003	A 3	16/03/2001	30000	6970
00E1224/004	B 1	16/03/2001	29000	7160
00E1224/005	B 2	16/03/2001	29000	7070
00E1224/006	B 3	16/03/2001	27000	6800
00E1224/007	C 1	16/03/2001	41000	8730
00E1224/008	C 2	16/03/2001	40000	8740
00E1224/009	C 3	16/03/2001	38000	9020
00E1224/010	D 1	16/03/2001	78000	13500
00E1224/011	D 2	16/03/2001	65000	11900

Chemistry Centre Analyses



(223.

CCWA ID	Client ID	ECond
		iEC1WZSE
		mS/m
00E1346/001	A 1	8210
00E1346/002	A 2	8200
00E1346/003	A 3	8210
00E1346/004	B 1	8480
00E1346/005	B 2	8300
00E1346/006	B 3	8070
00E1346/007	C 1	7650
00E1346/008	C 2	9370
00E1346/009	C 3	9440
00E1346/010	D 1	17500
00E1346/011	D 2	15100

56.4
56.3
56.4
58.4
57.1
55.3
52.2
65.1
65.6

CCWA ID	Client ID	Sampled on	Cl	ECond	NS
			iCL1WAAA	iEC1WZSE	iNo Sample
			mg/L	mS/m	
00E1444/001	A 1	23/05/2001	29000	6110	
00E1444/002	A 2	23/05/2001	28000	6010	
00E1444/003	A 3	23/05/2001	28000	5980	
00E1444/004	B 1	23/05/2001	27000	5770	
00E1444/005	B 2	23/05/2001	26000	5820	
00E1444/006	B 3	23/05/2001	26000	5710	
00E1444/007	C 1	23/05/2001	24000	5410	
00E1444/008	C 2	23/05/2001	24000	5500	
00E1444/009	C 3	23/05/2001			1
00E1444/010	D 1	23/05/2001	29000	6000	
00E1444/011	D 2	23/05/2001	28000	6030	
00E1444/012	D 3	23/05/2001	29000	6090	

June 01 (221.

Aug 01

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0363/001	A 1	21/06/2001	24000	6900
01E0363/002	A 2	21/06/2001	25000	6910
01E0363/003	A 3	21/06/2001	23000	6890
01E0363/004	B 1	21/06/2001	22000	6280
01E0363/005	B 2	21/06/2001	23000	6480
01E0363/006	B 3	21/06/2001	22000	6450
01E0363/007	C 1	21/06/2001	20000	5690
01E0363/008	C 2	21/06/2001	20000	5920
01E0363/009	C 3	21/06/2001	22000	6090
01E0363/010	D 1	21/06/2001	21000	5460
01E0363/011	D 2	21/06/2001	20000	5560
01E0363/012	D 3	21/06/2001	20000	5410
01E0363/013	A 1	09/08/2001		5870
01E0363/014	A 2	09/08/2001		5870
01E0363/015	A 3	09/08/2001		5870
01E0363/016	B 1	09/08/2001		5540
01E0363/017	B 2	09/08/2001		5570
01E0363/018	B 3	09/08/2001		5560
01E0363/019	C 1	09/08/2001		4960
01E0363/020	C 2	09/08/2001		4980
01E0363/021	C 3	09/08/2001		4930
01E0363/022	D 1	09/08/2001		4400
01E0363/023	D 2	09/08/2001		4430
01E0363/024	D 3	09/08/2001		4310

July 01

220.

CCWA ID	Client ID	Cl	ECond	
		iCL1WAAA	iEC1WZSE	
		mg/L	mS/m	
01E0122/001	A1	21000	5010	33.0
01E0122/002	A2	22000	4870	32.0
01E0122/003	A3	22000	4830	31.7
01E0122/004	B1	22000	4700	30.7
01E0122/005	B2	22000	4710	30.8
01E0122/006	B3	22000	4620	30.2
01E0122/007	C1	18000	4220	27.3
01E0122/008	C2	20000	4310	28.0
01E0122/009	C3	20000	4270	27.7
01E0122/010	D1	17000	3780	24.3
01E0122/011	D2	18000	3840	24.7
01E0122/012	D3	18000	3870	24.9

Sep 01

214.

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0387/001	A1	20/09/2001	19000	4960
01E0387/002	A2	20/09/2001	18000	4990
01E0387/003	A3	20/09/2001	19000	4880
01E0387/004	B1	20/09/2001	19000	4880
01E0387/005	B2	20/09/2001	19000	4880
01E0387/006	B3	20/09/2001	19000	4750
01E0387/007	C1	20/09/2001	17000	4190
01E0387/008	C2	20/09/2001	16000	4200
01E0387/009	C3	20/09/2001	15000	3990
01E0387/010	D1	20/09/2001	14000	3660
01E0387/011	D2	20/09/2001	14000	3630
01E0387/012	D3	20/09/2001	13000	3590

32.6

oct 01

Nov 01

218.

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0561/001	A 1	12/10/2001	17000	5140
01E0561/002	A 2	12/10/2001	17000	5150
01E0561/003	A 3	12/10/2001	17000	5100
01E0561/004	B 1	12/10/2001	17000	4950
01E0561/005	B 2	12/10/2001	18000	5070
01E0561/006	B 3	12/10/2001	18000	5030
01E0561/007	C 1	12/10/2001	15000	4470
01E0561/008	C 2	12/10/2001	16000	4780
01E0561/009	C 3	12/10/2001	17000	4730
01E0561/010	D 1	12/10/2001	14000	3990
01E0561/011	D 2	12/10/2001	14000	4120
01E0561/012	D 3	12/10/2001	15000	3980
01E0561/013	A 1	08/11/2001		5140
01E0561/014	A 2	08/11/2001		5450
01E0561/015	A 3	08/11/2001		5470
01E0561/016	B 1	08/11/2001		5480
01E0561/017	B 2	08/11/2001		5250
01E0561/018	B 3	08/11/2001		5440
01E0561/019	C 1	08/11/2001		5100
01E0561/020	C 2	08/11/2001		5420
01E0561/021	C 3	08/11/2001		5270
01E0561/022	D 1	08/11/2001		5040
01E0561/023	D 2	08/11/2001		5050
01E0561/024	D 3	08/11/2001		5060

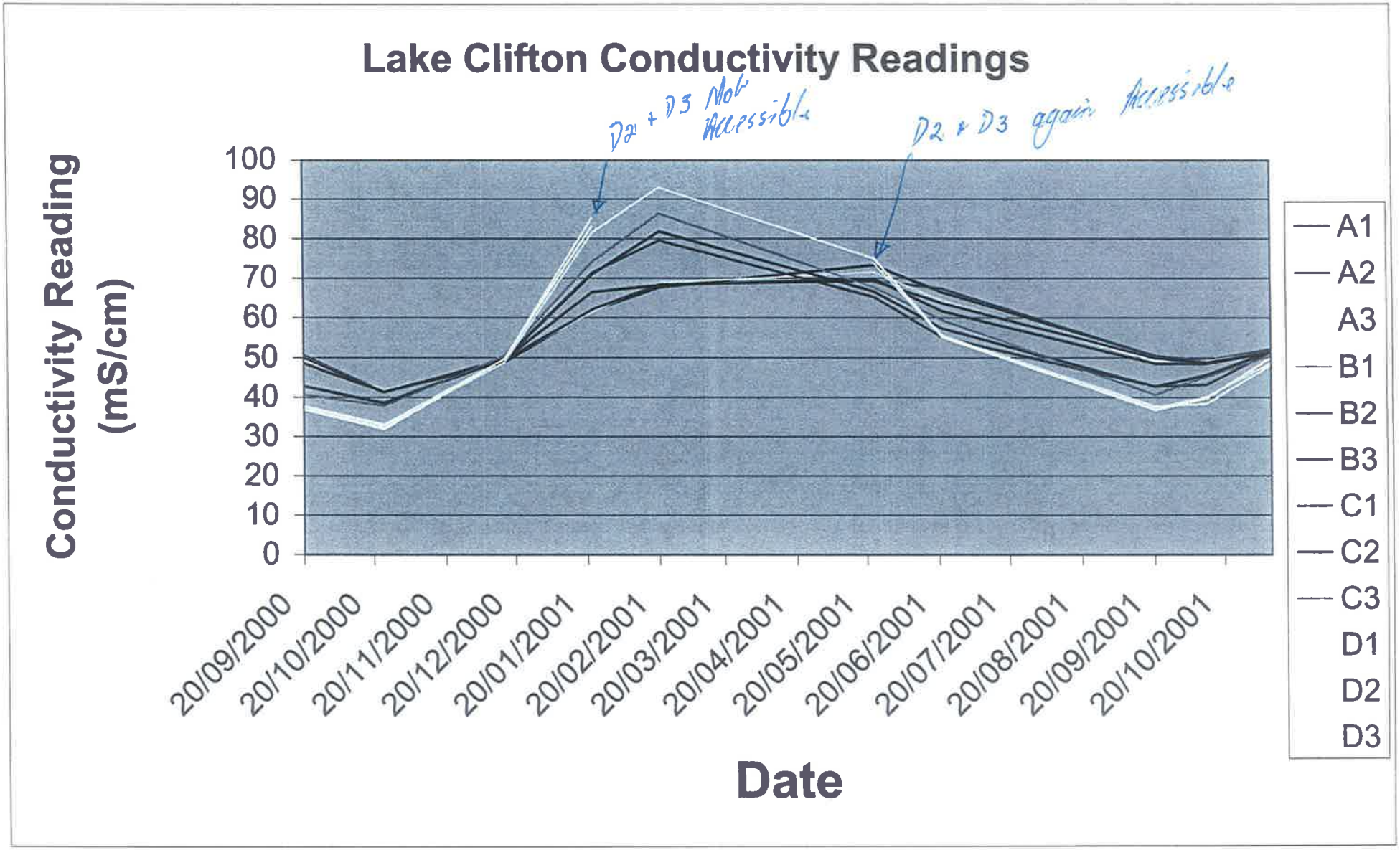
Sal (Williams)

33.9 A1 Nov 01

36.1 A2

36.3 A3

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0787/0	A1	12/12/2001	23000	5170
01E0787/0	A2	12/12/2001	21000	5170
01E0787/0	A3	12/12/2001	21000	5180
01E0787/0	B1	12/12/2001	22000	5130
01E0787/0	B2	12/12/2001	22000	5170
01E0787/0	B3	12/12/2001	22000	5220
01E0787/0	C1	12/12/2001	22000	5260
01E0787/0	C2	12/12/2001	22000	5280
01E0787/0	C3	12/12/2001	23000	5430
01E0787/0	D1	12/12/2001	23000	5430
01E0787/0	D2	12/12/2001	22000	5590
01E0787/0	D3	12/12/2001	22000	5570


Lake Clifton Conductivity Readings
D2 + D3 Not accessible
D2 + D3 again accessible
Conductivity Reading (mS/cm)
100
90
80
70
60
50
40
30
20
10
0
20/09/2000
20/10/2000
20/11/2000
20/12/2000
20/01/2001
20/02/2001
20/03/2001
20/04/2001
20/05/2001
20/06/2001
20/07/2001
20/08/2001
20/09/2001
20/10/2001
Date
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3

Lane, Jim

From: Pearson, Grant
Sent: Monday, 8 October 2001 9:58 AM
To: Mitchell, Dave
Cc: Lane, Jim
Subject: RE: lake clifton

David,
Sorry about the delay in responding. The conductivity figures for the surface samples at sites A1,B1,C1,and D1 for October 2000 were between 11% and 18% lower than the figures recorded for September 2001. This is fairly consistent for all 12 sites (A1,2,3 B1,2,3 etc). Lake levels were 4.45 in September 2000 and 4.18 in September 2001 (6% change) so this additional lake water depth in 2000 will have the effect of lowering conductivity for that year. I haven't graphed this out at this stage. Sampling began in October last year so the figures for this October will be a better guide to relative changes.
Cheers
Grant

-----Original Message-----
From: Mitchell, Dave
Sent: Monday, 8 October 2001 8:12 AM
To: Pearson, Grant
Subject: FW: lake clifton

grant,

you have probably observed another decline in the tuarts at Yalgorup NP over the last few weeks - purpling and death of branches/foliage.

I am thinking that this might be a response to the poor winter rains this year. - but if this waas the case it might also show up in your monthly water monitoring at Lake Clifton.

I was wondering have you observed any changes to levels or salinity that might fit in with that?

Cheers

DSMi

David Mitchell
Regional Leader Nature Conservation
Swan Region
Ph: (08) 9368 4399 Fax: (08) 9368 4299

-----Original Message-----
From: Mitchell, Dave
Sent: Tuesday, 25 September 2001 3:09 PM
To: Pearson, Grant
Subject: lake clifton

grant,

you have probably observed another decline in the tuarts at Yalgorup NP over the last few weeks - purpling and death of branches/foliage.

I am thinking that this might be a response to the poor winter rains this year. - but if this waas the case it might also show up in your monthly water monitoring at Lake Clifton.

I was wondering have you observed any changes to levels or salinity that might fit in with that?

(John Blyth may ask you the same question as I just spoke to him about it...)

Cheers

Lane, Jim

From: Pearson, Grant
Sent: Tuesday, 24 July 2001 5:52 PM
To: Lane, Jim
Cc: Clarke, Alan
Subject: RE: Lake Clifton sampling dates: Aug-Dec 2001.

Jim
Chloride measurements were begun in December 2000. Al is happy to do the sampling in August and September. I can continue with the sampling in October.
Cheers
Grant

-----Original Message-----
From: Lane, Jim
Sent: Monday, 23 July 2001 5:15 PM
To: Pearson, Grant
Cc: Clarke, Alan
Subject: Lake Clifton sampling dates: Aug-Dec 2001.

Grant

In order to compare with earlier work (1985), sampling dates for Lake Clifton transects over the next few months should be as follows.

August 9th or 10th.

September 20th.

October 11th, 12th or 13th.

November 9th or 10th

[and December 13th, 14th or 15th - if chloride ion content was not analysed before February 2001. In this regard, please let me know, before 31 July, when chloride ion analyses were first commenced].

Thanks

JL

196.

Lane, Jim

From: Lane, Jim
Sent: Monday, July 23, 2001 5:15 PM
To: Pearson, Grant
Cc: Clarke, Alan
Subject: Lake Clifton sampling dates: Aug-Dec 2001.

Grant

In order to compare with earlier work (1985), sampling dates for Lake Clifton transects over the next few months should be as follows.

August 9th or 10th.

September 20th.

October 11th, 12th or 13th.

November 9th or 10th

[and December 13th, 14th or 15th - if chloride ion content was not analysed before February 2001. In this regard, please let me know, before 31 July, when chloride ion analyses were first commenced].

Thanks

JL

177.

Lane, Jim

From: grantp@calm.wa.gov.au
Sent: Wednesday, 4 April 2001 3:31 AM
To: jiml
Subject: fwd: Results of samples received 30/3/01

Jim
Attached results from Chem Centre for Clifton March 16 2001. My readings to come.
Grant
---------- Original Text ----------

From: "Jenny McGuire" <jmcguire@ccwa.wa.gov.au>, on 03/04/2001 10:16 AM:
To: Grant Pearson@WOOD.SID@CALM

Yvonne
Also can't open :-)
28/6/01

The path 'Microsoft office 2000 Professional' cannot be found. Verify you have access to this location or try to find installation package data1.msi in a folder from which you can install the product Microsoft office Professional.

Save to C: first
Then can open in Excel.
Microsoft office 2000 Professional. Feature not available
data1.msi

Error 1706 No valid source could be found for product Microsoft office Professional. Windows Installer cannot continue

Windows Installer failed to install program associated with this file.

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/01	30000	7080
00E1224/002	A 2	16/03/01	30000	7010
00E1224/003	A 3	16/03/01	30000	6970
00E1224/004	B 1	16/03/01	29000	7160
00E1224/005	B 2	16/03/01	29000	7070
00E1224/006	B 3	16/03/01	27000	6800
00E1224/007	C 1	16/03/01	41000	8730
00E1224/008	C 2	16/03/01	40000	8740
00E1224/009	C 3	16/03/01	38000	9020
00E1224/010	D 1	16/03/01	78000	13500
00E1224/011	D 2	16/03/01	65000	11900

To: Alan Clarke@WOOD.SID@CALM,Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: Expenditure
Attachment: BEYOND.RTF
Date: 06/Mar/2001 2:27 PM

166.

Gentlemen

Thanks for providing the summaries of committed and proposed Salinity Action Plan expenditure.

As discussed, we look certain to spend all of this year's SAP allocation and probably to over-expend by some thousands.

The situation is manageable provided we restrict further SAP expenditure this year to essentials.

The Hinds & Ninan work is to be completed ASAP. The "Esperance" depth gauge monitoring run is to be done ASAP.

The Campion & Walyormouring maintenance run is to be DEFERRED until Sep/Nov 2001.

The proposed bathymetric work at Dumbleyung and Coyrecup is to be DEFERRED until 2002.

Lake Clifton expenditure is to be RESTRICTED. Until we receive a specific allocation for this work, the only Chem Centre analyses are to be for CHLORIDE ION, every SECOND month only (as advised by Jeff Turner CSIRO). However, do continue to monitor conductivity every month along all four transects.

Please ensure all other expenditure is minimised. If we can recover any existing expenditure that would help. Do ensure all expenditure is correctly allocated.

I'm in the process of contacting Bob McCarthy to postpone tomorrow's bathymetry meeting until June-July.

On the bright side, it is good that we are finishing our field program early this year!

JL

152.

To: Dave Mitchell@KELM.RGN@CALM,Grant Pearson@WOOD.SID@CALM,Jim Lane@BUSS.SID@CALM,SMTP[jeff@per.clw.csiro.au]
From: John Blyth@WOOD.SID@CALM
Cc:
Subject: Notes from December meeting on Lake Clifton
Attachment: MEETING 21-12 FINAL.DOT.DOC,BEYOND.RTF
Date: 16/Jan/2001 1:36 PM

saved as c:\calm\21dec00_f.doc.

Sorry for the delay, but attached is a brief summary of discussion and action items from the meeting held at Woodvale on 21.12.2000.

23/4/01

Please let me know of any shortcomings in the notes. If I do not hear from you by 24.12.01 I will assume that you all agree they represent a reasonable summary.

John Blyth
WA Threatened Species and Communities Unit
Department of Conservation and Land Management
Wildlife Research Centre, PO Box 51, Wanneroo, 6065
Phone: 08 94055161 Facs: 08 93061641 email:Johnbl@calm.wa.gov.au

Principal Ecologist
WA Wildlife Research Centre, Wildlife Place, Woodvale
Postal Address: PO Box 51, Wanneroo, WA 6946

Tel: +61 8 9405 5128 Fax: +61 8 9306 1066
Email: johnbl@calm.wa.gov.au

To: Jim Lane, David Mitchell, Grant Pearson, Jeff Turner

NOTES FROM MEETING RE RESEARCH TASKS RELATING TO SALINITY LEVELS WITHIN LAKE CLIFTON:

HELD AT WOODVALE, 21/12/2000

Present: John Blyth, Jim Lane, David Mitchell, Grant Pearson (CALM); Jeff Turner (CSIRO)

The objective of the meeting was to help clarify the possible reasons for increasing salinity levels in Lake Clifton, to identify the most urgent tasks for which CALM has some responsibility, and to identify potential funding sources.

Jeff Turner was invited to this CALM intra-departmental meeting because of his expertise and first-hand knowledge of the Yalgorup lakes, and because he had been unavailable for the meeting held at Mandurah on 7/11/00.

As the major questions are hydrological in nature, Jeff Turner gave a brief presentation on work he and his colleagues have conducted on the Yalgorup lakes and what is known about the relationship between ground water and the waters of Lake Clifton. While there is a significant amount of useful information about several of the Yalgorup Lakes, the detailed nature of links between groundwater and the various lakes has not been elucidated.

The three obvious hypotheses as to what has brought about the recent salinity increases in Lake Clifton are climate (rainfall/evaporation) change, increased groundwater pressure caused by the Dawesville Channel, and a thinning of the fresh water lens, perhaps caused by overuse of the groundwater. Obviously, a combination of some or all of these is possible.

To gain more understanding about the drivers of the recent salinity increases we need to understand the water and solute mass balance for Lake Clifton.

Jim Lane made the point that the southern end of the Harvey Estuary becomes more saline earlier in summer/autumn than it did before the Dawesville Channel was opened, and high north-westerly winds, particularly during late autumn and early winter, push more sea water to higher levels at that end of the Estuary. These two factors appear to be driving the widespread death of fringing vegetation along the western shoreline of the Estuary, south of the Channel.

In response to a question from Grant Pearson, Jeff Turner agreed that isotopic studies could help to clarify whether additional groundwater from the Harvey Estuary was a significant factor in changing the water table under or into Lake Clifton. Jeff noted that the WSIBal model, developed by his laboratory, is capable of including isotope balances in analyses.

The point was also made that it is important that regular monitoring of the health of the thrombolites themselves is conducted, in an attempt to observe any changes in the composition of the microbial community. Linda Moore has advised in the past that this can only be done by examining fine sections under the microscope. Given the > 40% increase in salinity over the last seven years, this task is urgent.

The following urgent research tasks were identified.

1. Continue monthly monitoring of Brenton Knott's four transects across Lake Clifton for 12 months. Measurements taken should include chloride levels every second month to allow calibration with regular salinity measurements.

TO DO

Action: Jim Lane to implement, and, in liaison with John Blyth, seek funds from CALM-managed programs to cover costs.

2. Assemble and analyse all existing data relating to the Lake Clifton system that can be used to help clarify the balance between the three possible drivers of increased salinity. This should include as much relevant climatic data as possible.

Actions: John Blyth to discuss with Louise Bruce (UWA Centre for Water Research) what she is doing in this regard, and if appropriate, ask her to discuss with Jeff Turner.

Jeff Turner/Tony Barr to take responsibility for determining what the data and analysis needs are, and to develop a funding proposal to gather such data, and oversee this step, if necessary.

3. Use the data gathered under 2 above to produce a water and solute mass balance for Lake Clifton.

Actions: Jeff Turner to provide John Blyth with a proposal and costing for this work.

Once funds are obtained, Jeff Turner/Tony Barr to conduct necessary analyses, including running the data through their WSIBal model.

4. Assess the health and composition of the microbial community responsible for the construction of the Lake Clifton thrombolites.

Action: John Blyth to discuss with Linda Moore and if necessary develop with her a funding proposal for this work.

5. Investigate the need for, and if necessary conduct, research/monitoring to enable regular assessment of the level of the interface between the fresh water lens feeding Lake Clifton and the underlying saline groundwater.

Action: John Blyth to contact Philip Commander (Water & Rivers Commission) on his return from leave and discuss progress with the opening of his multi-slotted bore and whether data from that bore are likely to be adequate to identify level of the fresh-saline interface. If not, to develop with Philip a strategy for gathering the necessary data.

John Blyth
15/1/2001

- Phil C. will leave Lake will Tony Barr and get back to John B.

PC said - Strong correlation between low rainfall and ↑ in salinity. 3/4 winters that rainfall explains it. Would like a bit more expertise & Democratic element.

(it was the wet years when water level in the lake went below 0.0 m AHD? (or other level)

↑ notes from phone conversation with John Blyth on Mon 12/3/01

To: Jim Lane@BUSS.SID@CALM
From: Grant Pearson@WOOD.SID@CALM
Cc: Alan Clarke@WOOD.SID@CALM
Subject: re: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 01/Feb/2001 10:52 AM

Jim
I spoke to Jeff Turner today regarding his thoughts on the analysis for Clifton samples.
He concurs that continuing to sample at Knott's 4 transects is ok.

Where the water has receded beyond the 100 metre off -shore sites, we should sample further out from the shore (mark the position by GPS). These should probably be taken from water that is at least 20 cm deep? (advise please)
Continue with the collection of a sample from the surface (at 10 cm depth) from each site and conductivity readings from the surface and the bottom at each site.
Analyse for chloride and EC if cost is a factor or major ions and EC if funds are available.
Alan will be sampling Clifton next and will assess site 4 for remaining surface water. The other 3 sites should have surface water.
I have samples from the last survey that could be analysed for Chloride and EC now if you wish. Please advise.
Grant

From: Jim Lane@BUSS.SID@CALM, on 11/08/2000 1:35 PM:

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake Clifton transects. Assuming you can do all four transects in the one day, any one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you know which parameters closer to the day, when I have found out more about the nutrient monitoring that has been done in the past.

Thanks

JL

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: re: fwd: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 19/Jan/2001 4:32 PM

Grant

We won't start on sampling for nutrients until I have a specific allocation of funds for this work.

Measure conductivity, temperature and depth as before. Calibrate instrument against conductivity standard, not salinity standard. No point in recording salinity.

DON'T have samples analysed for ALL major ions, but DO have samples analysed for CHLORIDE.

Give Jeff Turner a call and ask if you need to take a chloride sample from every sampling point, top and bottom (hopefully not, as this would require 24 analyses). If not, how many samples should be taken and where from?

Jim

From: Grant Pearson@WOOD.SID@CALM, on 19/Jan/2001 2:03 PM:

Jim
I plan to visit Clifton again on Monday and would like to know what parameters you would like me to measure/collect/ analyse please.
Thanks
gp

From: Jim Lane@BUSS.SID@CALM, on 11/08/2000 1:35 PM:
To: Grant Pearson@WOOD.SID@CALM
Cc: John Blyth@WOOD.SID@CALM

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake Clifton transects. Assuming you can do all four transects in the one day, any one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you know which parameters closer to the day, when I have found out more about the nutrient monitoring that has been done in the past.

Thanks

JL

To: Jim Lane@BUSS.SID@CALM
From: Grant Pearson@WOOD.SID@CALM
Cc:
Subject: clifton data
Attachment: CLIFTONDEC002.XLS,BEYOND.RTF
Date: 20/Dec/2000 11:41 AM

Jim
Attached are the results of the Clifton survey. The reference to Aus G 66 is the GPS navigation system used to locate the sample sites. I have samples for the chem centre to analyse for major ions from the surface of each site. Waiting for your advice on the nutrient requirements.
cheers
Grant

15/12/00		EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH 4.12M
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
1050hrs	A1	373909	6375966	48.9	29.9	26.1	49.2	30	26.1	0.6
	A2	373229		49.3	30.1	25.1	49.2	30	24.9	1.6
	A3	372708		49.4	30.2	25.9	49	29.9	25	1.2
	B1	374648	6372890	49.8	30.4	26.3	50	30.5	26.3	0.5
	B2	374250		49.4	30.2	25.5	49.7	30.3	25.5	0.8
	B3	373752		49.6	30.3	26.7	50	30.5	26.4	0.4
	C1	375867	6368456	50	30.5	26.3	50.1	30.6	26.2	0.8
	C2	375670		49.7	30.3	26.6	50.1	30.6	26.5	0.8
	C3	375302		50.5	31	29.1	50.6	31	29.1	0.25
	D1	377628	6364207	49.7	30.3	28	49.7	30.3	27.9	0.4
	D2	377272		48.9	29.9	27.2	49.8	30.4	26.9	0.3
1315hrs	D3	376971		49.8	30.4	28.6	50.1	30.6	28.4	0.4

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: re: various
Attachment: BEYOND.RTF
Date: 18/Dec/2000 6:17 PM

Grant

Lake Clifton: Please send me the results as soon as you can (after careful checking). Yes, do read the depth gauge on each occasion, and record the depth at each sampling site. Sue Elscot will be coming in tomorrow to investigate the nutrient monitoring issue for me. Will provide advice on what to analyse for soon.

Work program: we can talk about intertidal work this Wed or Thurs at Woodvale. Please have a copy of the relevant SPP handy for us to refer to.

Bathymetry: I will make first contact Bob McCarthy about the bathymetric work. I'll try to ring him tomorrow.

Broome airport relocation: Please seek and incorporate comment from the District before sending report to me.

I'll have a look at the Hickey Humour at Woodavle, assuming you have saved it.

In future, please send separate e-mails about separate subjects. This will facilitate my filing.

See you Wed PM

JL

From: Grant Pearson@WOOD.SID@CALM, on 18/Dec/2000 9:57 AM:

Jim,
Had a look at Clifton on Friday with Alan (my vol dropped out unexpectedly). Lake depth had dropped to 4.12m and salinities were up by 15 %+. I'll type them up and send them to you. I have collected water samples for major ions and nutrients from the surface of each site.

The work program looks fine although I would like to talk to you about future intertidal work.

The trip to 80 Mile Beach and Broome was extremely successfull if the Broome Council attitude is anything to gauge it by. I'll do up a separate report for this.

Have you contacted Bob McCarthy for the the bathymetry or should I?

I have lost many emails that I kept as records of communications between us and I'm now starting afresh with this new computer. So if I appear to repeat queries you'll know why.

I met Marie Ward last Friday and she has asked us to respond to the consultants report on the airport location - as we discussed in Busselton. I expect to spend today and Tuesday on this and will forward it to you for comment. They want it by the end of the week.

Attached is a bit of humour from Bob Hickey.
Cheers
Grant

From: "Bob Hickey" <Bob.Hickey@cwu.EDU>, on 12/12/2000 9:39 AM:
To: iSMTP@CALM.COMO.1@Servers[<Graeme.Aggett@cwu.EDU>]

it's absolutely hilarious. Trust me.

87.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 10/11/00

TO: JIM LANE

FROM: ALAN CLARKE

NO OF PAGES: 2

(INCLUDING FACE SHEET)

MESSAGE:

AHD of DOLA BM is 1.378m

LAKE Light of BM is 5.413

AHD of 5m gauge is 0.965 Lake Light of gauge 5.000

AHD of 4m gauge is -0.032 Lake Light of gauge 4.003

original gauge Lights to gauge 1 5.003

gauge 2 4.007

0m AHD = 5.413
− 1.378
4.035 "Lake Height"

⇒ deduct 4.035 m from all Lake depth readings to get depths in m AHD.

LAKE CLIFTON

BENCH MARK AND GAUGE DETAILS

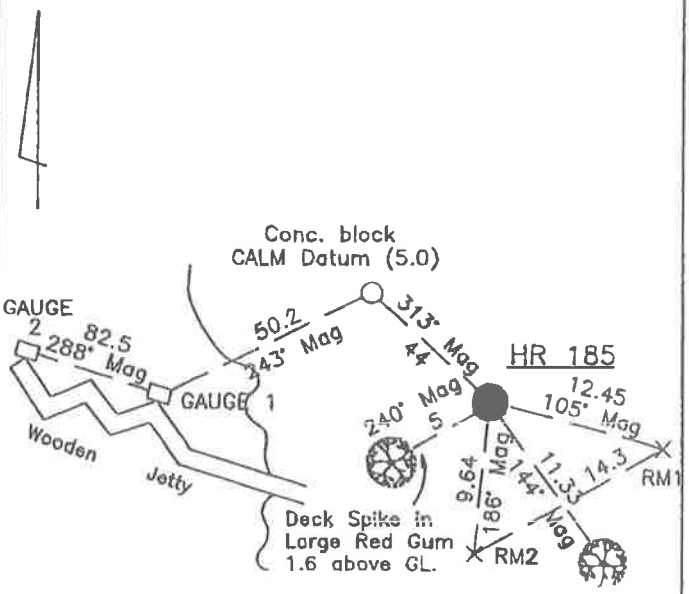
BM NAME: HR 185
DATE VERIFIED: 6 MAY 1999
INSTALLED BY: DOLA
BM LOCATION: SEE SKETCH

BM HEIGHT: (HR 185) 5.413
HEIGHT OF GAUGE 1: 5.000
HEIGHT OF GAUGE 2: 4.003

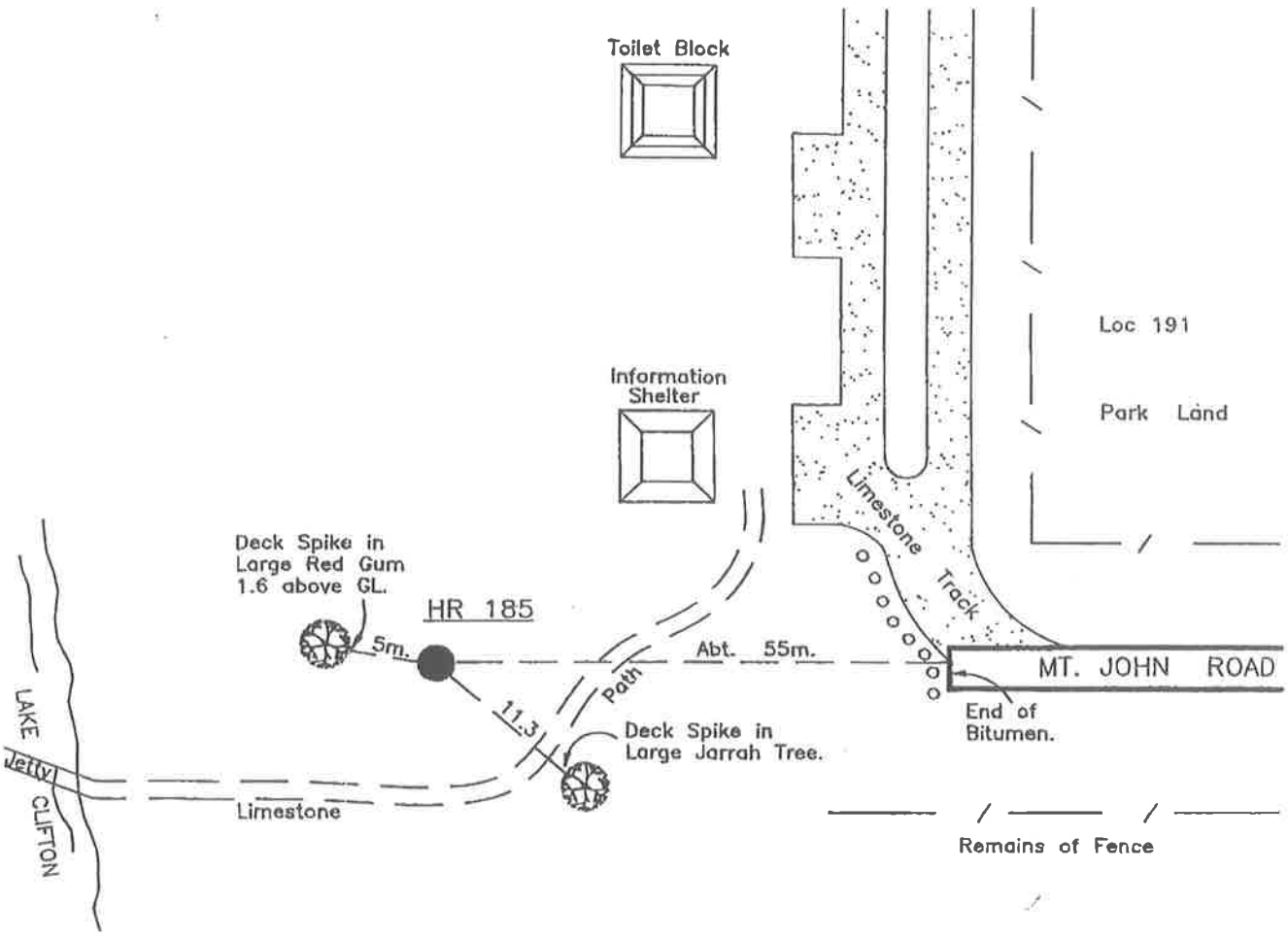
OTHER INFORMATION
HEIGHT OF GAUGE 3: NIL
HEIGHT OF GAUGE 4: NIL
AMG 84 COORDS: E 373900
(+/- 100m) N 6375950
AHD OF BM: 1.378
NEAREST AHD BM: HR 185
GAUGE MAINTENANCE: DATE: 6 MAY 1999
WHO: CALM
DATE DRAWN: 9 JUNE 1999

DRAWN BY SCANLAN SURVEYS FOR THE DEPT OF CONSERVATION & LAND MANAGEMENT.

BENCH MARK AND GAUGE LOCATION



LOCATION SKETCH



To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc: John Blyth@WOOD.SID@CALM
Subject: Lake Clifton transects
Attachment:
Date: 08/Nov/2000 1:35 PM

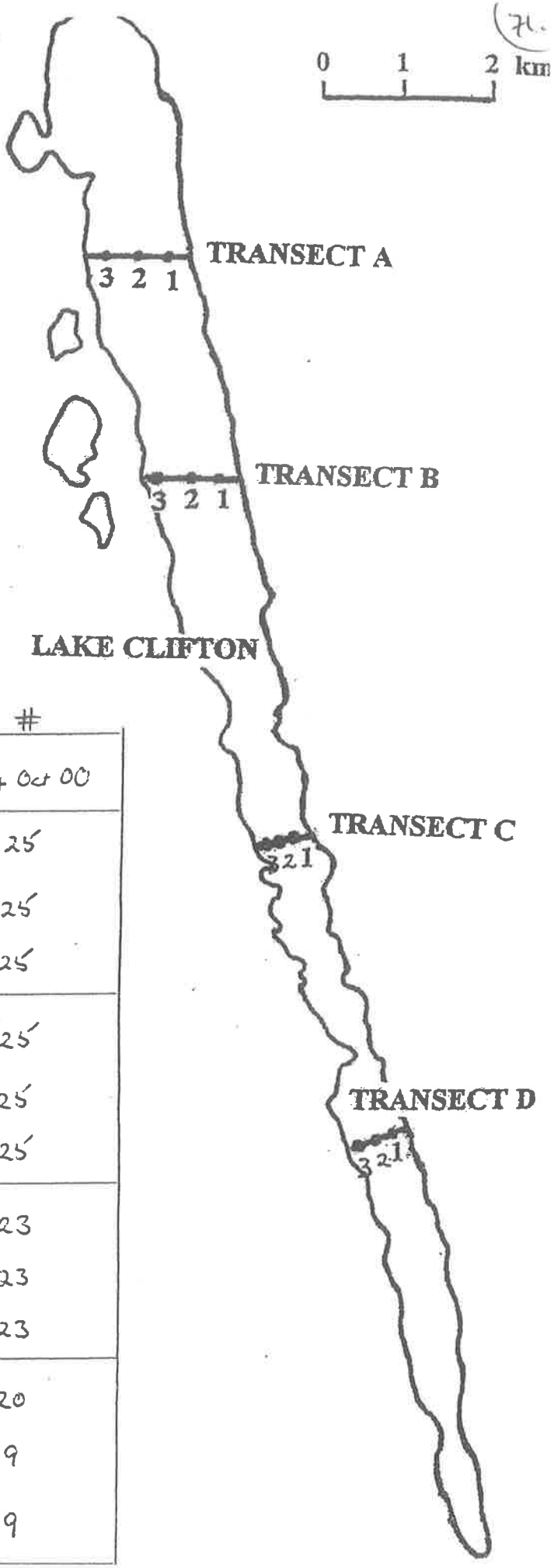
Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake Clifton transects. Assuming you can do all four transects in the one day, any one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you know which parameters closer to the day, when I have found out more about the nutrient monitoring that has been done in the past.

Thanks

JL



Handed out by me at meeting at Perth on 7/11/00

Salinities (g/L)

	* 11-13 Oct 85	* 9-10 Nov 85	# 24 Oct 00
A1	17	18	25
A2	17	18	25
A3	17	18	25
B1	16	18	25
B2	17	17.5	25
B3	15.5	18	25
C1	16	16	23
C2	16	16	23
C3	16	16	23
D1	13	15	20
D2	13.5	15	19
D3	12	15	19

* Data from Brenton Knott (UWA Zool)

" " J. in Lane (CALM Bsn)

68.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 7/11/00

TO: Jan Lane

FROM: G Ranson

NO OF PAGES: 2

(INCLUDING FACE SHEET)

MESSAGE: Not off the press.

(17.)

CHEM CENTRE RESULTS

Lake Clifton 24/10/00

Version 2.

CCWA ID	Client ID	CO3	Ca	Cl	ECond	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L	mg/L	mS/m	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	<2	437	16000	4160	0.06	201	5400	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 3	<2	432	16000	4180	0.06	220	5300	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	<2	434	15000	4150	0.06	220	5400	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 3	<2	461	15000	4140	0.05	214	5400	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8
00E0553/005	C 1	<2	394	14000	3830	0.05	201	4900	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 3	<2	388	13000	3770	0.05	195	4800	244	939	<0.02	0.01	7850	1580	25	8.1	3.9
00E0553/007	D 1	36	329	12000	3270	<0.05	73	4100	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 3	48	317	11000	3150	<0.05	24	4000	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

CHEM CENTRE CONDUCTIVITY

(66)

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 7/11/00

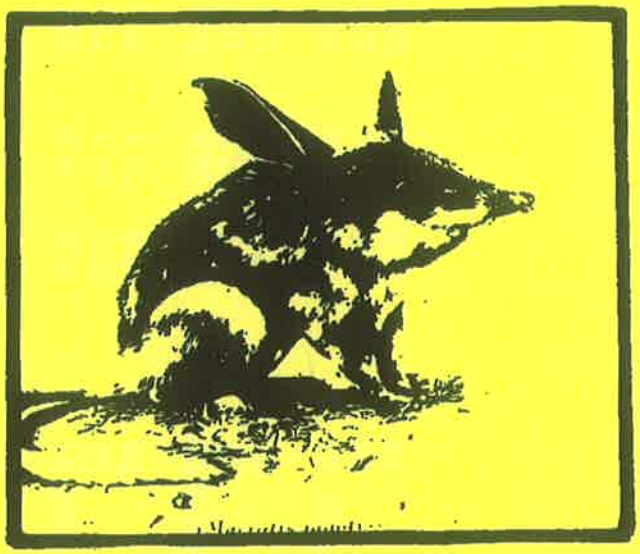
TO: Jim LANE (CALM)

FROM: G PEARSON

NO OF PAGES: 3

(INCLUDING FACE SHEET)

MESSAGE: Conductivity figures for Lake Clifton taken on 24/10/00



G. Pearson

Conductivity / Salinity of sites A, B, C, D.

24/10/00

Lake Clifton
G Pearson

24/10/2000
.

Northing	SITE (B. Knott)	Con top ms/cm	Sal top ppt	Temp top C	Con bottom ms/cm	Sal bottom ppt	Temp bottom C	depth m
6375966	A1	41.4	24.9	21.3	41.3	24.9	21.1	0.7
	A2	41.4	25	20.8	41.6	25	20.6	1.4
	A3	41.4	25	20.9	41.8	25.2	20.3	2
6372890	B1	40.8	24.6	22.1	41.3	24.8	21.6	0.86
	B2	40.8	24.6	21.4	41.3	24.9	21	1.2
	B3	40.8	24.6	21.9	41.3	24.9	21.7	0.55
6368456	C1	38	22.8	21.6	38.5	23	21.5	1.15
	C2	38.5	23.1	21.7	38.6	23.1	21.7	1.15
	C3	37.9	22.6	22.4	37.9	22.7	22.4	0.57
6364207	D1	33.1	19.6	22.5	33	19.6	22.6	0.83
	D2	32.5	19.1	22.5	32.5	19.1	22.7	0.9
	D3	31.8	18.8	23.1	31.9	18.8	23.1	0.7

CHEM CENTRE RESULTS of Major Ions

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850	1580	25	8.1	3.9
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

Jim

This arrived today less the conductivity results.

Jenny McGuire will forward them later today.

64

56.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 19/10

TO: Jim Lane

FROM: CH

NO OF PAGES: 2

(INCLUDING FACE SHEET)

MESSAGE: Second version Units in MS/cm

Saturday Hrafila. (55)

L. Beeson Lake Clifton 17/10/2000

	Cond. (mS/cm)		Salinity (‰)		Temp (°C)		Depth (cm)
	Top	Bottom	Top	Bottom	Top	Bottom	
Transect A (Bkwater)							1200 hrs
Site 1	40.0 ms	40.5 ms	24.0 ‰	24.4	20.9 c	20.5	70 cm
Site 3	40.3	40.7	24.4	24.5	19.3	19.1	1.4 m
Site 2	41.0	41.0	24.7	24.7	19.7	19.5	2.0 m

	Top			Bottom			Depth
Site A	Cond. mS/cm	Salinity ‰	Temp °C	Cond. mS/cm	Salinity ‰	Temp °C	1500 hrs
1m from Shore	-						10 cm
10m from shore	40.8	24.6	22.7				17 cm
20m	40.8	24.5	23.1	40.6	24.4	23.1	30 cm
30m	40.5	24.4	22.7	40.6	24.4	22.7	35 cm
40m	40.6	24.4	22.5	40.6	24.4	22.4	44 cm
50m	40.9	24.6	21.9	40.9	24.6	21.8	44 cm
60m	40.9	24.6	21.6	41.0	24.6	21.6	42 cm
70m	40.8	24.6	21.3	40.9	24.6	21.2	46 cm

Depth gauge Read + 33 cm (4.33?)

Wind Conditions - 5-10 km/hr Coming to and of Sorry. Strong/Forced to 20 km/h after completion

MS/cm

44.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

14 QUEEN STREET, BUSSELTON WA 6280
PHONE – (08) 9752 1677 FAX – (08) 9752 1432

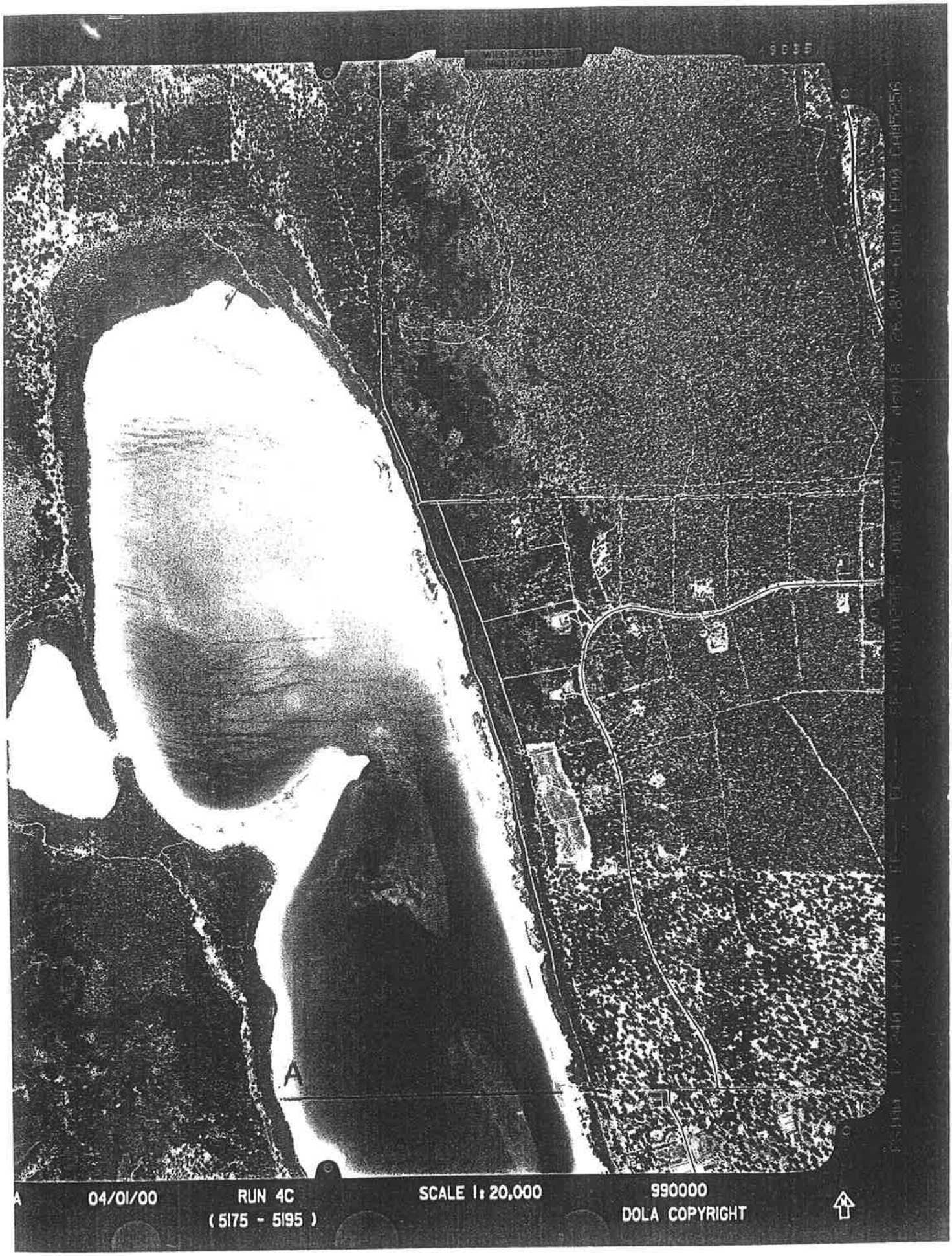
FAXED

FACSIMILE TRANSMITTAL SHEET

TO:	FROM: JIM LANE
COMPANY: CALM MANDURAH.	DATE: 17/10/2000
FAX NUMBER: 95829725	TOTAL NO. OF PAGES INCLUDING COVER: 6.
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE:	YOUR REFERENCE NUMBER:

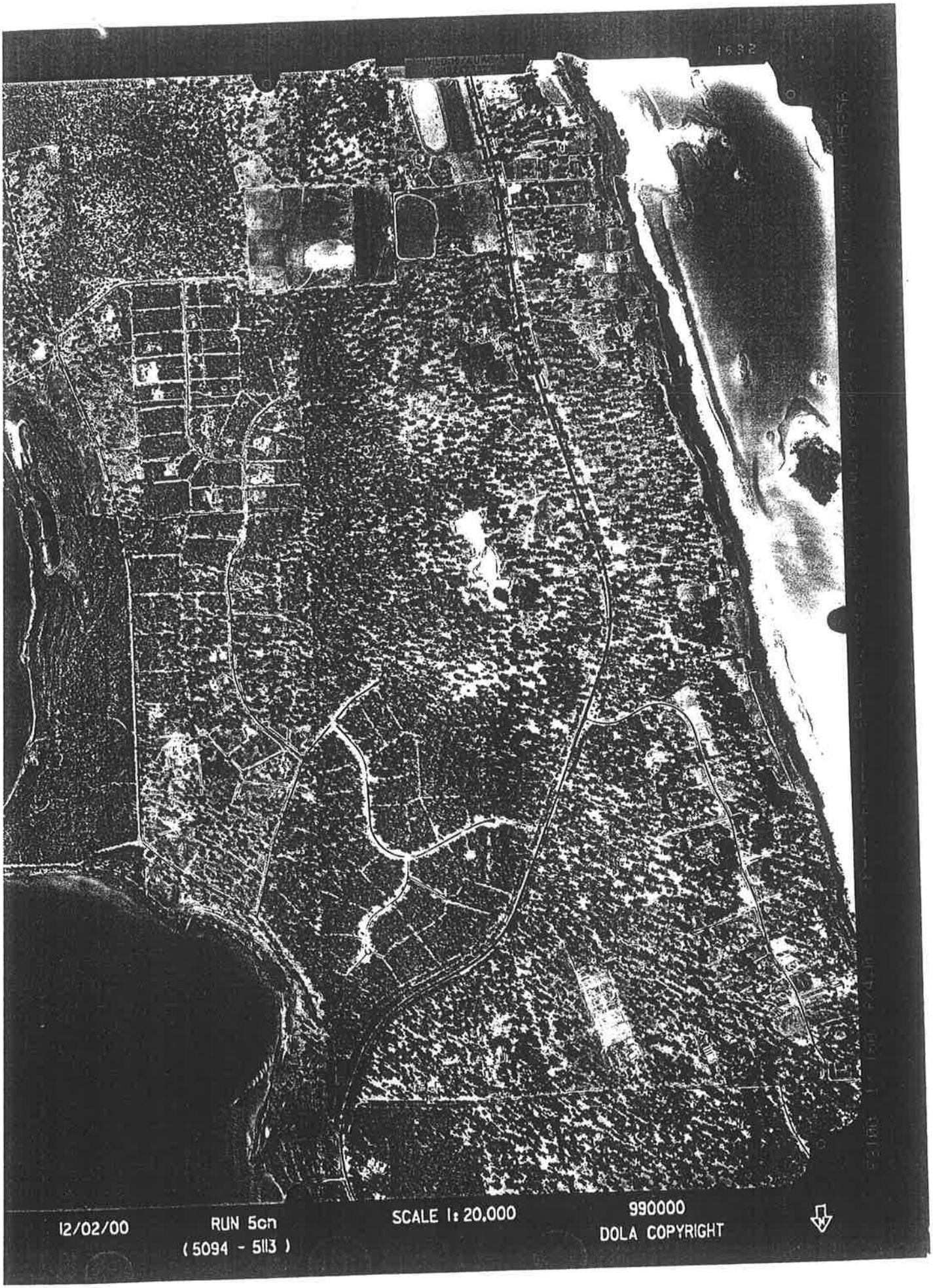
NOTES/COMMENTS: Copies of transects - Lake Clifton

Joanne

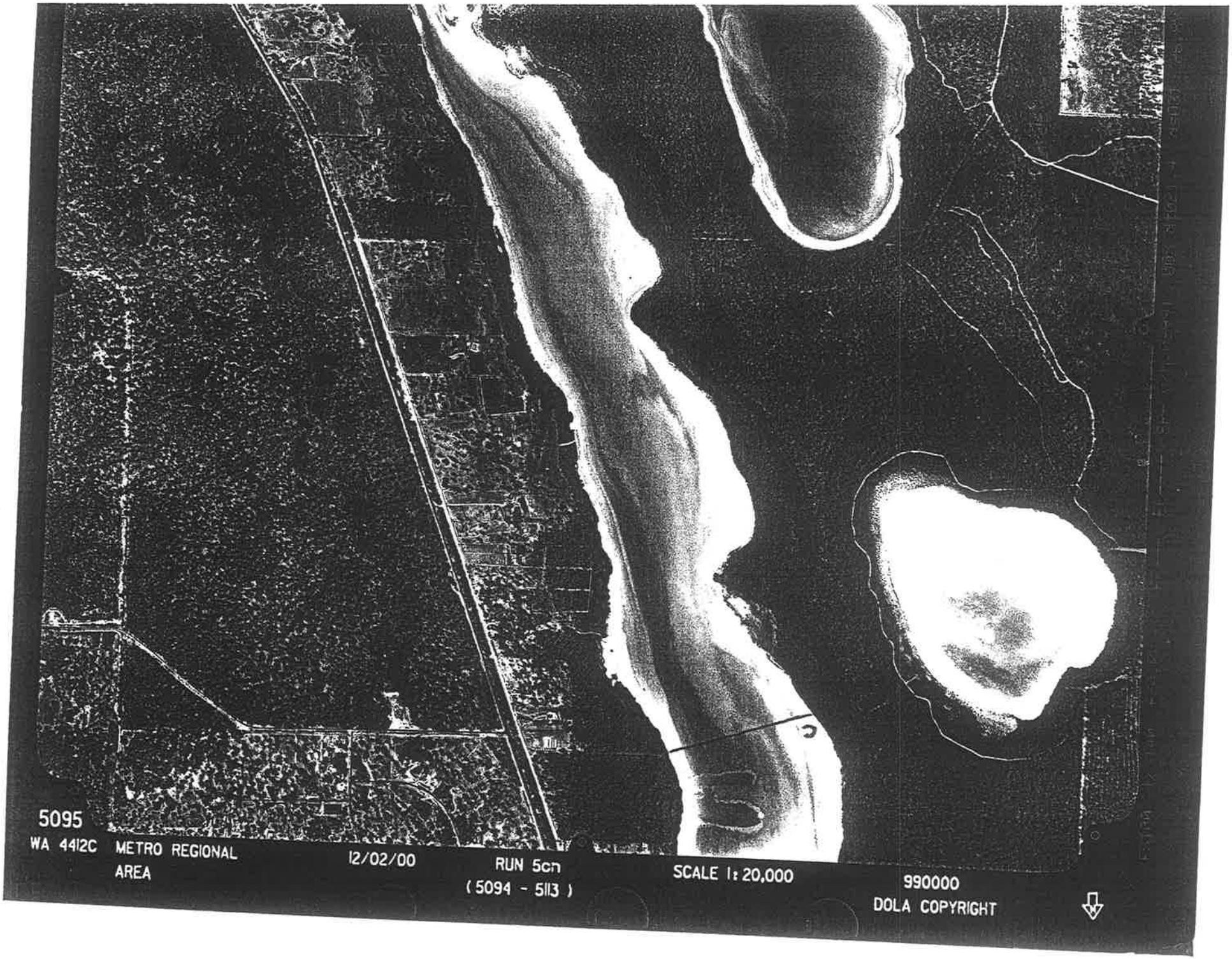


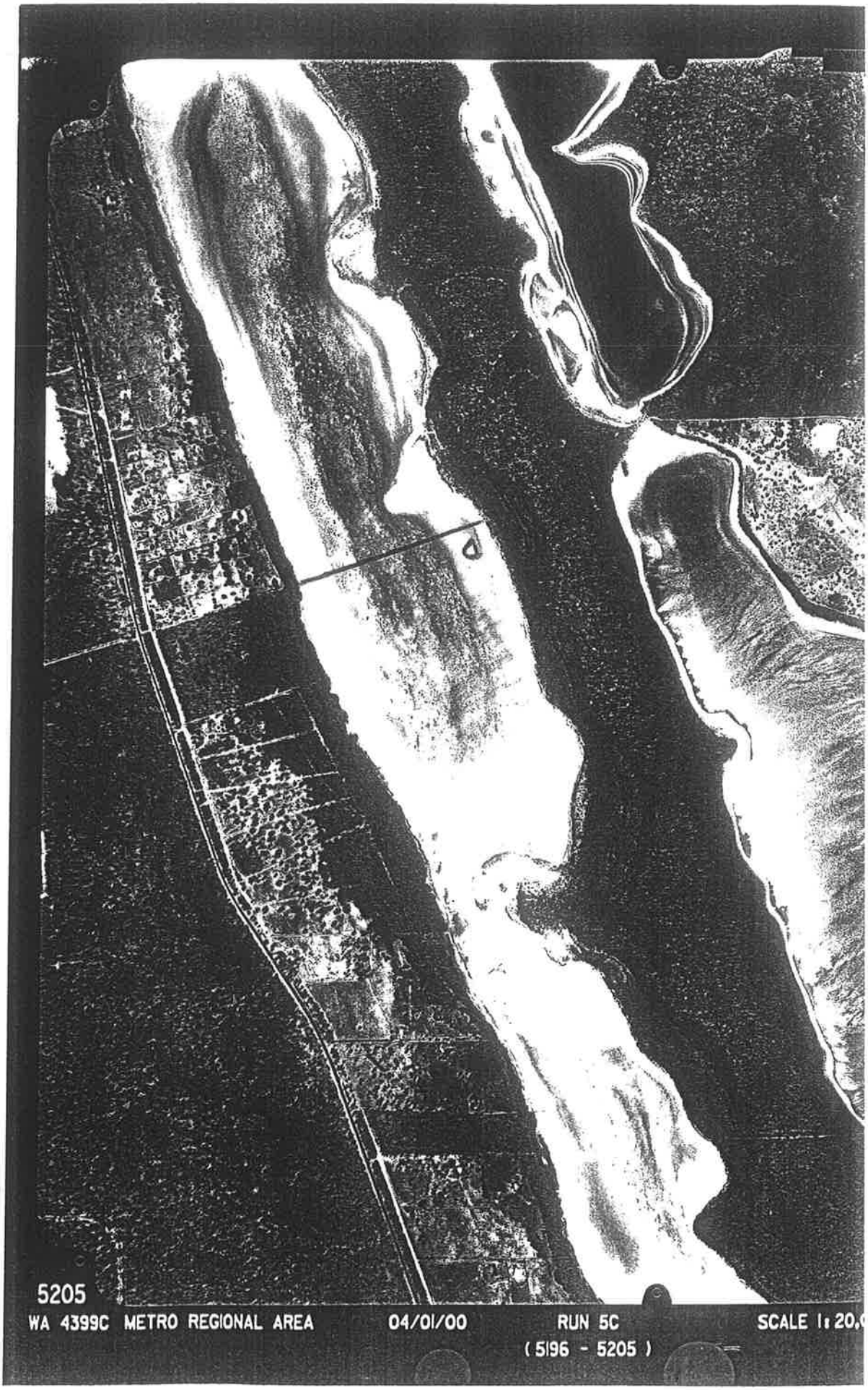
5184
WA 4399 C METRO REGIONAL AREA

5186 WA 4399C METRO REGIONAL AREA



5099
WA 4412C METRO REGIONAL AREA.


5095
WA 4412C METRO REGIONAL AREA
12/02/00
RUN 5cn
(5094 - 5113)
SCALE 1: 20,000
990000
DOLA COPYRIGHT



SCALE 1 : 20,000 990000
DOLA

N

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 16/Oct/2000 1:59 PM

Grant

I have couriered to you some recent (Jan 2000) colour air photos and a couple of maps on which Sue has marked the locations of the four transects (A, B, C, D). I have also faxed you an A4 map from Brenton Knott giving an overview.

SAMPLING

Along each transect you should sample from 3 locations, labelled A1, A2, A3, B1, B2 etc.

Sampling locations A1, B1, etc. are to be approx 100 metres out from the eastern shoreline.

Sampling locations A2, B2, etc. are to be midway between the eastern and western shorelines.

Sampling locations A3, B3, etc. are to be approx 100 metres from the western shoreline.

At each sampling location, measure the conductivity near the surface and near the bottom, measure the water depth, and record the position by GPS.

Also take surface water samples at A1, A3, B1, B3, etc. Send these eight samples to WA Chemistry Centre to measure conductivity and analyse for ionic composition (major ions).

ACCESS

On this occasion you will need to launch your boat (punt) at the eastern end of each transect in order to be sure that the transect is correctly located.

Brenton had the following recollections (from 15 years ago!) concerning access.

Transect A: where our depth gauges were originally placed, just south of the boardwalk.

Transect B: access (with permission) was through "Moyle's Farm", just north of the Lake Clifton Tavern. NOTE THAT this description seems to place Transect B further south than the A4 map indicates - perhaps the farm was further north than Brenton recalls, or perhaps the A4 map shows the transect as being further north than it really was.

Transect C: access was via the first track north of the Neville Stanley Field Station, which is approx 100m south of the Old Bunbury Rd.

Transect D: access was via a track 100-200m south of the Lake Clifton Roadhouse, just north of some farmland. NOTE that Brenton might be under-estimating this distance.

Brenton said that placed marker buoys at each sampling location - presumably they are not still there!

GOOD LUCK

JL

36.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

14 QUEEN STREET, BUSSELTON WA 6280
PHONE – (08) 9752 1677 FAX – (08) 9752 1432

FACSIMILE TRANSMITTAL SHEET

FAXED

TO: GRANT PEARSON

FROM: JIM LANE

COMPANY:

DATE: 16/10/00

FAX NUMBER:

TOTAL NO. OF PAGES INCLUDING COVER: 2

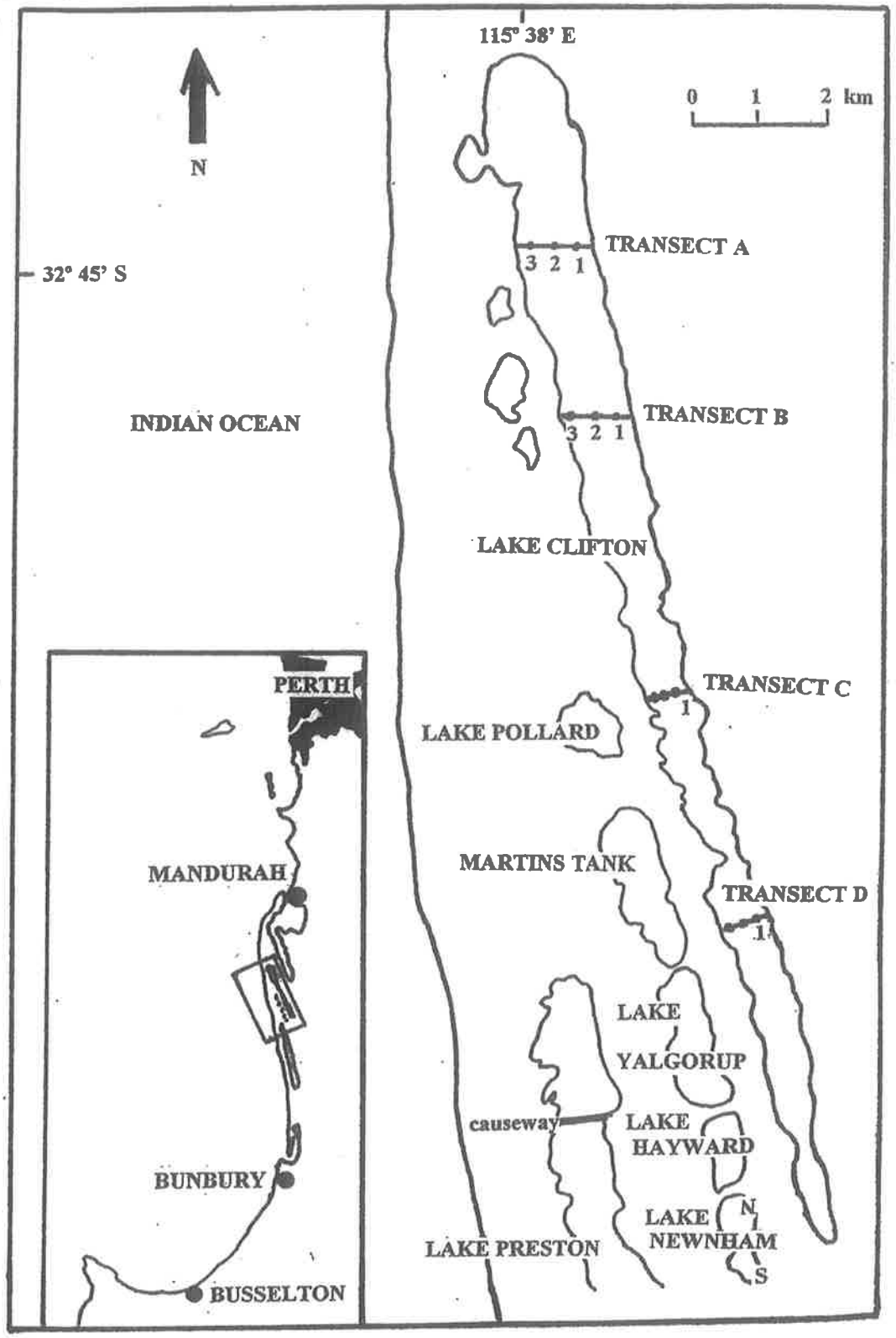
PHONE NUMBER:

SENDER'S REFERENCE NUMBER:

RE:

YOUR REFERENCE NUMBER:

NOTES/COMMENTS: Attached is a map showing the location of the four transects to be done tomorrow at Lake Clifton. Will e-mail more info later today.


115° 38' E
0 1 2 km
N
32° 45' S
INDIAN OCEAN
TRANSECT A
3 2 1
TRANSECT B
3 2 1
LAKE CLIFTON
TRANSECT C
1
LAKE POLLARD
MARTINS TANK
TRANSECT D
1
LAKE
YALGORUP
causeway
LAKE
HAYWARD
LAKE
NEWNHAM
N
S
LAKE PRESTON
PERTH
MANDURAH
BUNBURY
BUSSELTON

To: Jim Lane@BUSS.SID@CALM
From: John Blyth@WOOD.SID@CALM
Cc:
Subject: Lake Clifton
Attachment: SALINE1.JPG,SALINITY04X002.DOC,BEYOND.RTF
Date: 05/Oct/2000 5:18 PM

Hi Jim

I attach the paper by Brenton Knott and others, which they are about to submit to Journal of WA Royal Society, about an apparent increase in salinity in Lake Clifton since the middle to late 1980s. Please do not circulate it to anyone else, or use it publicly, without seeking Brenton's agreement.

While it is not as clear cut as Brenton suggested in conversation, there are suggestions that the water of the lake itself is more saline than it was in the 1980s. There are a couple of things that make the data less convincing than they might otherwise be. First, on pages 6 and 7 the authors refer to a high readings in April 1999 and September 2000, but do not say where these were taken from. In the case of the April reading this is important because if it was at or near transect A it would be very high, whereas if it was from near transect D it would not be unduly so for that time of year.

Secondly, it is not clear whether any measurement of the salinity of the aquifer itself has been done and if so whether it appears to have increased. Given that their thesis is that the increase in the lake's salinity is a result of increased salinity of the aquifer, this is a significant omission.

Unfortunately Brenton is away for a week or so now and I cannot clarify the above questions.

Nevertheless, the data suggest that, at the very least, it is important to conduct regular monitoring of the water of the lake and of the aquifer. I spoke to Richard Pickett (Bunbury WRC) a week or so ago who thought that there had been some monitoring of the aquifer over the last few years and that it had not shown any significant change. However, he was going to look at their data and assess them in the light of Brenton's results. I have sent the paper to him.

Cheers

John

John Blyth
WA Threatened Species and Communities Unit
Department of Conservation and Land Management
Wildlife Research Centre, PO Box 51, Wanneroo, 6065
Phone: 08 94055161 Facs: 08 93061641 email:Johnbl@calm.wa.gov.au

IMPENDING "DEATH" OF AN INTERNATIONALLY IMPORTANT LAKE?: LAKE CLIFTON, YALGORUP NATIONAL PARK.

Brenton Knott, Yuki Konishi and Chris. Burke*,

Department of Zoology, The University of Western Australia, Nedlands, Western Australia. 6907.

- Present address: School of Aquaculture, University of Tasmania at Launceston, Locked Bag 1-370, Launceston, Tasmania. 7250

Email: bknott@cyllene.uwa.edu.au, ykonishi@cyllene.uwa.edu.au, C.Burke@utas.edu.au.

Recognition of the scientific importance of the interdunal lakes of Yalgorup National Park (YNP; Figure 1) has a comparatively short history. Indeed, although the eight main lakes forming the Yalgorup wetland (a chain of rectangular lakes, Pollard, Martins Tank, Yalgorup, Hayward, North and South Newman flanked by long lakes, Preston to the west, Clifton to the east) display an array of limnologies, several unique, making them of international scientific importance; none of this was known when YNP was proclaimed. YNP comprises a set of parcels of land and recommendations for proclamation of a National Park commenced in 1955 (Western Australian Subcommittee, Australian Academy of Science 1965). At the time, most attention was devoted to the heathland communities, with the lakes described as " open shallow lakes of salt water and their bottoms are covered with a fine silt" (Western Australian Subcommittee, Australian Academy of Science 1965: p. 126). The Department of Conservation and Environment of Western Australia (1983: p. 104) recognised only recreational value in the lakes. A Management Plan for YNP covering the years 1995-2005 summarises details of the Park history, attributes and significance (Department of Conservation and Land Management, undated).

Table 1. Salinity values (g/L), Lake Clifton, 1984. Data from Moore (1993). Site C4 is at Mount John, equivalent to transect A, F12 is equivalent to transect C, in Table 2.

	J	F	M	A	M	J	J	A	S	O	N	D
C4	20	24	26	26	22	20	18	17	17	17	18	20
F12	23	32	32	27	20	16	15	15	15	15	16	20

Table 2. Salinity values (g/L), Lake Clifton, 1985-86. Transects and sites are shown in Figure 1. Salinities underlined represent an average of differing top and bottom values. * measured 23 May, 1985; ** measured 31 May, 1985.

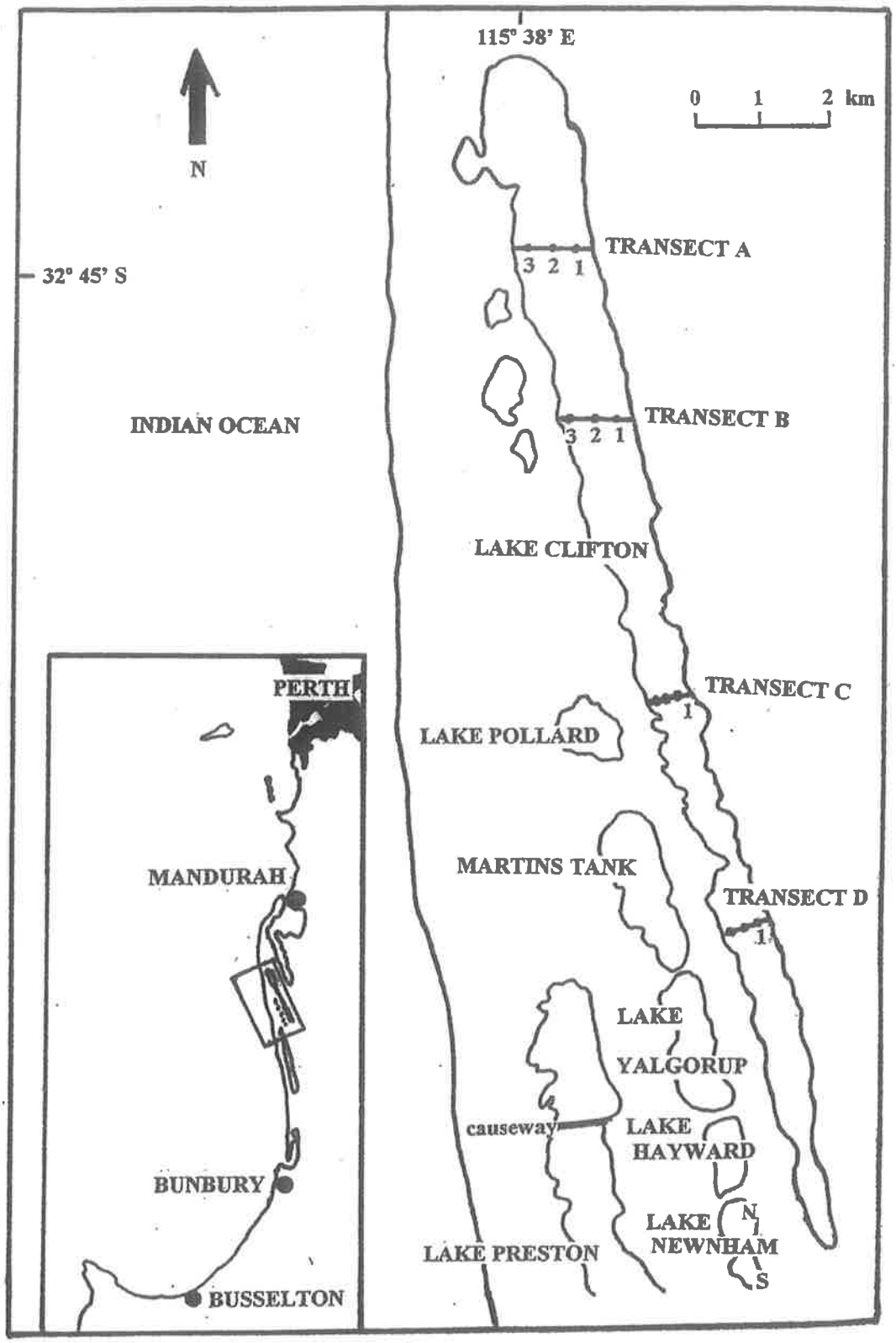
	1985							1986					
	23 May	**8 July**	**9-10 Aug**	**20 Sept**	**11-13 Oct**	**9-10 Nov**	**13-15 Dec**	**21-22 Jan**	**18-20 Feb**	**14-16 Mar**	**18-19 Apr**	**16-18 June**	**20-22 July**
A1	32*	20	20	18	17	18	22	26	30	30	31.5	31	27
A2	32*	20	20	18	17	18	22	25.5	30	30	32	31	27.5
A3	31*	20	20	18	17	18	20	25.5	30	30	32	31	28.5
B1	26**		19	16	16	18	22	27	32	30	30	30	28
B2	27**		20	17.5	17	17.5	21.5	26.5	30	32	32	30.5	29
B3	27**		20	17	15.5	18	21	26	32	32	32	30	28
C1	30.5*	15	15	15	16	16	22	30	38	36	38	33	28
C2	30*	14	16	14.5	16	16	22	30	38	36	38	33	27
C3	32*	14	16	14	16	16	22	31				26	29
D1	26*	13	10	12	13	15	22	30	43	45	48	36	26
D2	26*	14	10	12	13.5	15	22	34	42	43	48	38	26
D3	26*	14	10	12	12	15	22	36	47			42	28

Table 3. Salinity (g/L) of Lake Clifton, from Gartrell (1998). Transects 1, 2 and 3 were close to transects A, C and D as reported in Table 2.

Date	Transect 1	Transect 2	Transect 3
12.June 1998	49	45	45
13 July 1998	38	30	25
20 July 1998	34	28	25
Average	40.3	34.3	31.7

Table 4. Annual total rainfall (mm) for Mandurah (site # 009572) and Bunbury [*composite of 3 sites: # 009514 (1980-1985); #.009885 (1986-1995); # 009965 (1996-2000)]. Data for year 2000, January-August; means include data for the year 2000. (Information from the Commonwealth of Australia Bureau of Meteorology.)

YEAR	MANDURAH PARK	BUNBURY*
1980	903	831
1981	825	798
1982	954	827
1983	836	
1984	973	827
1985	858	
1986	784	653
1987	704	529
1988	858	843
1989	953	669
1990	805	571
1991	1075	800
1992	969	787
1993	685	584
1994	709	512
1995	882	716
1996	837	924
1997	781	754
1998	873	701
1999	987	996
2000	750**	746**
MEAN	863	740


115° 38' E
0 1 2 km
N
32° 45' S
INDIAN OCEAN
TRANSECT A
3 2 1
TRANSECT B
3 2 1
LAKE CLIFTON
TRANSECT C
1
LAKE POLLARD
MARTINS TANK
TRANSECT D
1
LAKE
YALGORUP
causeway
LAKE
HAYWARD
LAKE
NEWNHAM
N
S
LAKE PRESTON
PERTH
MANDURAH
BUNBURY
BUSSELTON

Some data produced, printed, utilised etc. in Sept 2014

when preparing an Excel spreadsheet (also here) of all our

Oct 2000 to Dec 2001 Lake Clifton

salinity, depth + water temperature

~~Data~~ (and major ions, etc.)

~~Projection~~ transect data

to share with Richard Biggs at UWA.

See digital files on JL's computer for all related emails, etc.

JL 08/9/2014

Lane, Jim

From: Lane, Jim
Sent: Saturday, 6 September 2014 10:12 AM
To: Richard Beggs (21350696@student.uwa.edu.au)
Cc: Winchcombe, Yvonne
Subject: Lake Clifton SWWMP data
Attachments: CLIFPLOT (data supplied to R.Beggs in Sep2014).xlsx

Richard,

All Sep & Nov SWWMP data and plots attached, as promised last week.

Cheers,

Jim

LAKE CLIFTON - ALL SEP & NOV 'SWWMP' DATA - SUPPLIED TO R.BEGGS BY J.LANE SEP 2014.

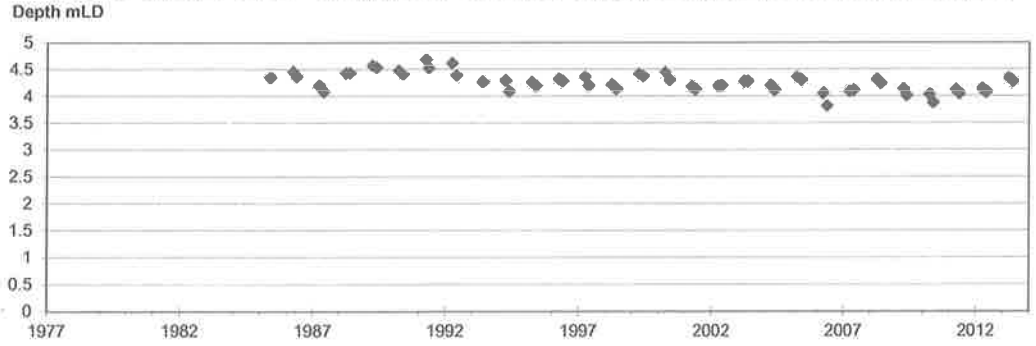
EXPLANATORY EXCERPT FROM 1977-2012 SWWMP REPORT (LANE et al. 2013).

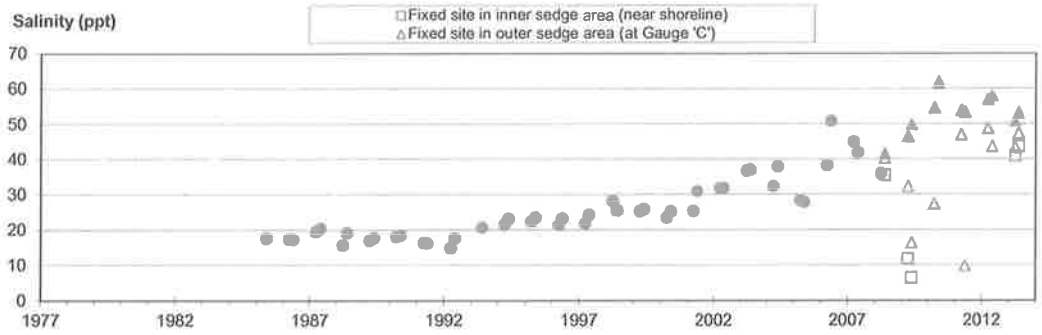
'Clifton (Mandurah): The trend of increasing salinities and salt loads in Lake Clifton from the early 1990s to 2000 (Knott et al. 2003) and onwards continues, with record and near-record high levels in September 2012 and November 2012 respectively. In November 2008 the authors initiated routine sampling at three fixed sites extending from near the shoreline to the end of the boardwalk (jetty), rather than one non-fixed site in this general area, as previously. In November 2008 (at water level 4.24m) the salinity values at these three sites were fairly similar, however in September 2009 (water level 4.14m) and November 2009 (water level 4.02m) the values were very different, due to the influence of freshwater seepage near the shoreline. Substantial salinity differences were also apparent in September 2010 and November 2011. Lower water levels prevented sampling at the 'inner sedge area' sampling site in both sampling months of 2010-2012 and at the 'outer sedge area' site in November 2010.
The pattern of water level change at Clifton is similar in appearance to that of 'Harvey 12632' (12 km south-east) and Nine Mile (11 km east)'.

Lake	Sample Date	Depth (m)	Salinity (ppt)			
			Non-fixed site in general area of depth gauge(s)	Fixed site in inner sedge area (near shoreline)	Fixed site in outer sedge area (at Gauge 'C')	Fixed site in open water (at end of 'jetty')
CLIF	9/11/1985	4.35	17.9			
CLIF	15/09/1986	4.47	17.7			
CLIF	8/11/1986	4.37	17.6			
CLIF	14/09/1987	4.2	19.8			
CLIF	12/11/1987	4.09	20.6			
CLIF	16/09/1988	4.44	16			
CLIF	9/11/1988	4.44	19.4			
CLIF	14/09/1989	4.58	17.3			
CLIF	10/11/1989	4.54	18			
CLIF	13/09/1990	4.49	18.4			
CLIF	6/11/1990	4.41	18.7			
CLIF	22/09/1991	4.68	16.6			
CLIF	4/11/1991	4.63	16.5			
CLIF	17/09/1992	4.62	15.1			
CLIF	12/11/1992	4.39	17.9			
CLIF	13/11/1993	4.27	20.83			
CLIF	15/09/1994	4.29	21.8			
CLIF	7/11/1994	4.09	23.3			
CLIF	11/09/1995	4.26	22.5			
CLIF	6/11/1995	4.19	23.7			
CLIF	16/09/1996	4.32	21.4			
CLIF	5/11/1996	4.285	23.4			
CLIF	13/09/1997	4.36	21.9			
CLIF	4/11/1997	4.2	24.5			
CLIF	19/09/1998	4.21	28.4			
CLIF	13/11/1998	4.14	25.7			
CLIF	16/09/1999	4.42	25.5			
CLIF	9/11/1999	4.38	26.05			
CLIF	14/09/2000	4.45	23.7			
CLIF	9/11/2000	4.3	25.4			
CLIF	13/09/2001	4.18	25.56			
CLIF	5/11/2001	4.13	31.14			
CLIF	17/09/2002	4.19	32			
CLIF	4/11/2002	4.2	32.1			
CLIF	15/09/2003	4.28	36.87			
CLIF	3/11/2003	4.28	37.09			
CLIF	13/09/2004	4.2	32.42			
CLIF	12/11/2004	4.11	38.03			
CLIF	14/09/2005	4.36	28.5			
CLIF	9/11/2005	4.3	28			
CLIF	12/09/2006	4.06	38.4			
CLIF	8/11/2006	3.83	51.06			
CLIF	9/09/2007	4.09	44.94			
CLIF	3/11/2007	4.11	41.95			
CLIF	13/09/2008	4.31	36.08			
CLIF	9/11/2008	4.24		35.57	40.42	41.66
CLIF	20/09/2009	4.14		12.06	32.49	46.56
CLIF	7/11/2009	4.02		6.67	16.6	49.95
CLIF	16/09/2010	4.04			27.53	54.48
CLIF	11/11/2010	3.89				61.81
CLIF	14/09/2011	4.12			47	53.81
CLIF	7/11/2011	4.05			9.95	53.29
CLIF	8/09/2012	4.14			48.77	57.01
CLIF	6/11/2012	4.08			43.7	57.98
CLIF	17/09/2013	4.34		40.93	43.33	51.06
CLIF	2/11/2013	4.28		43.7	47.37	53.06

CLIFPLOT (data supplied to R.Beggs in Sep2014)

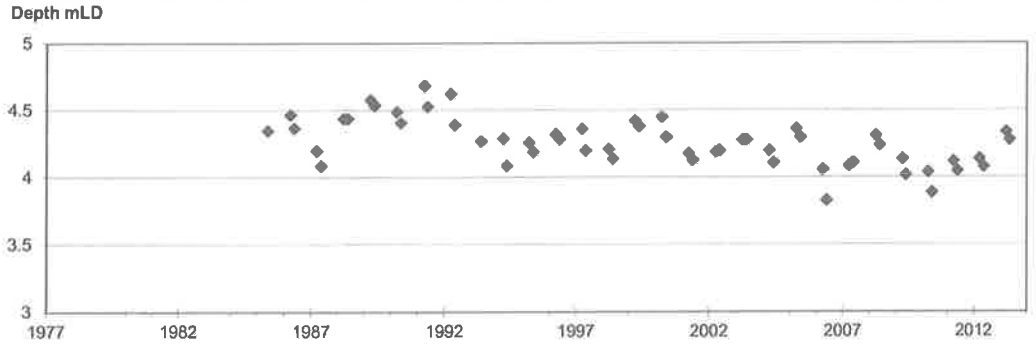
ROUTINE SEPTEMBER AND NOVEMBER DATA ONLY

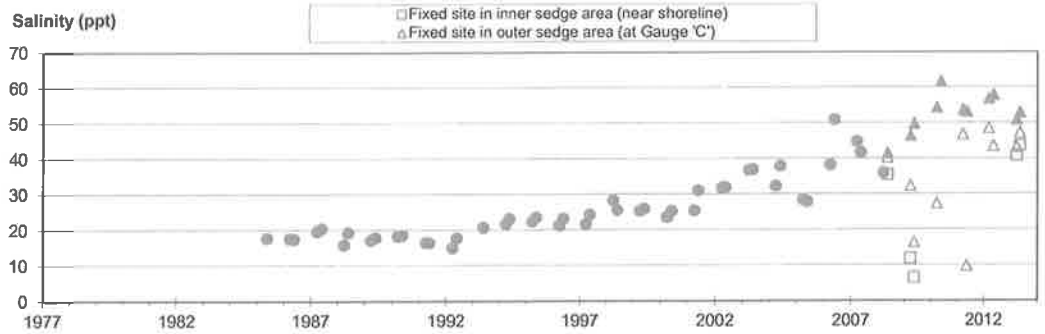




CLIFPLOT (data supplied to R.Beggs in Sep2014)

ROUTINE SEPTEMBER AND NOVEMBER DATA ONLY





Lane, Jim

From: Lane, Jim
Sent: Thursday, 4 September 2014 2:38 PM
To: 'Richard Beggs'
Subject: RE: Lake Clifton Oct 2000 - Dec 2001 transect data.
Attachments: Lake Clifton - positioning of site 'A1' of 2000-2001.docx

Richard,

I've carefully scrutinised various jottings in GP's field notebook. He recorded many Eastings and Northings during his reconnaissance visit on 17/10/2000 and not all of them were labelled.

By a process of elimination I have derived the following corrected coordinates for **site 'A1': 373913 E, 6376113 N (WGS84).** I have labelled this position on the attached as **'A1 (2nd alternative)'.**

From discussion with Alan, who did several of the surveys, it seems that although the original location of A1 was on (near the edge of) the thrombolite reef near the 'jetty', on at least some subsequent occasions the A1 measurements were actually taken 'just off' the edge of the reef, to avoid potentially causing damage to the reef. This would explain some/most of the variation in calculated lake bed level at A1.

There was no 'reef constraint' at the other 11 sampling sites (A2-D3).

Cheers,

Jim

From: Richard Beggs [mailto:21350696@student.uwa.edu.au]
Sent: Thursday, 4 September 2014 11:48 AM
To: Lane, Jim
Subject: Re: Lake Clifton Oct 2000 - Dec 2001 transect data.

Yes, I did a similar thing yesterday on ArcGIS just to see where the transects were and noticed that A1 was off the water surface on my old basemap - I thought perhaps it had been a very wet year! Presumably the depth readings are OK so we just need to get an approximation of where they were taken.

The transects line up nicely but of course each reading then would have strayed somewhat from the points according to conditions.

Richard

On 4 September 2014 11:24, Lane, Jim <Jim.Lane@dpaw.wa.gov.au> wrote:

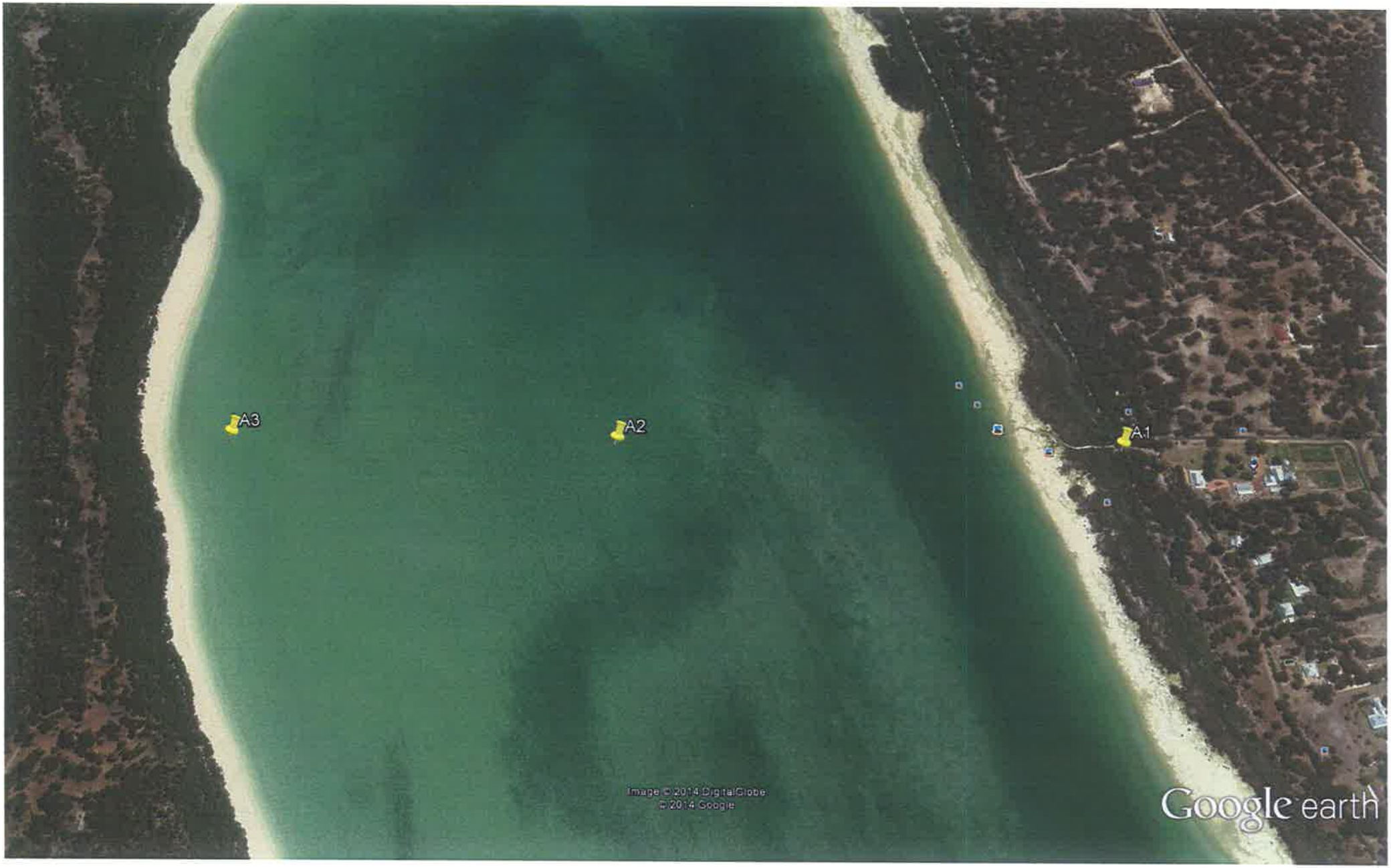
Actually they look quite good – see attached.

Except A1 – looks like Grant waypointed the carpark. I'll investigate.

Correct position for "A1"

08/9/2014

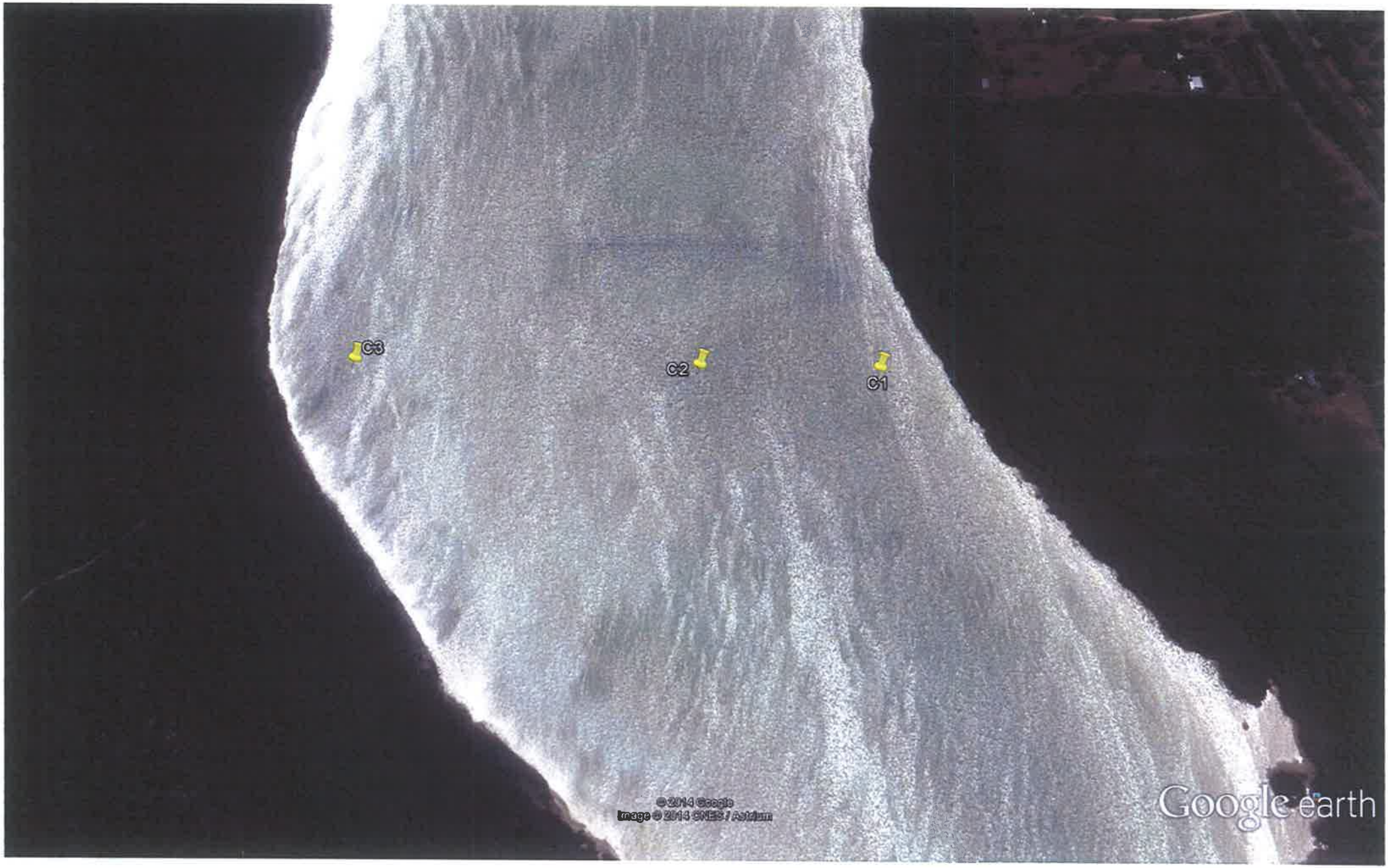
"A1" in wrong position. K 08/9/2014

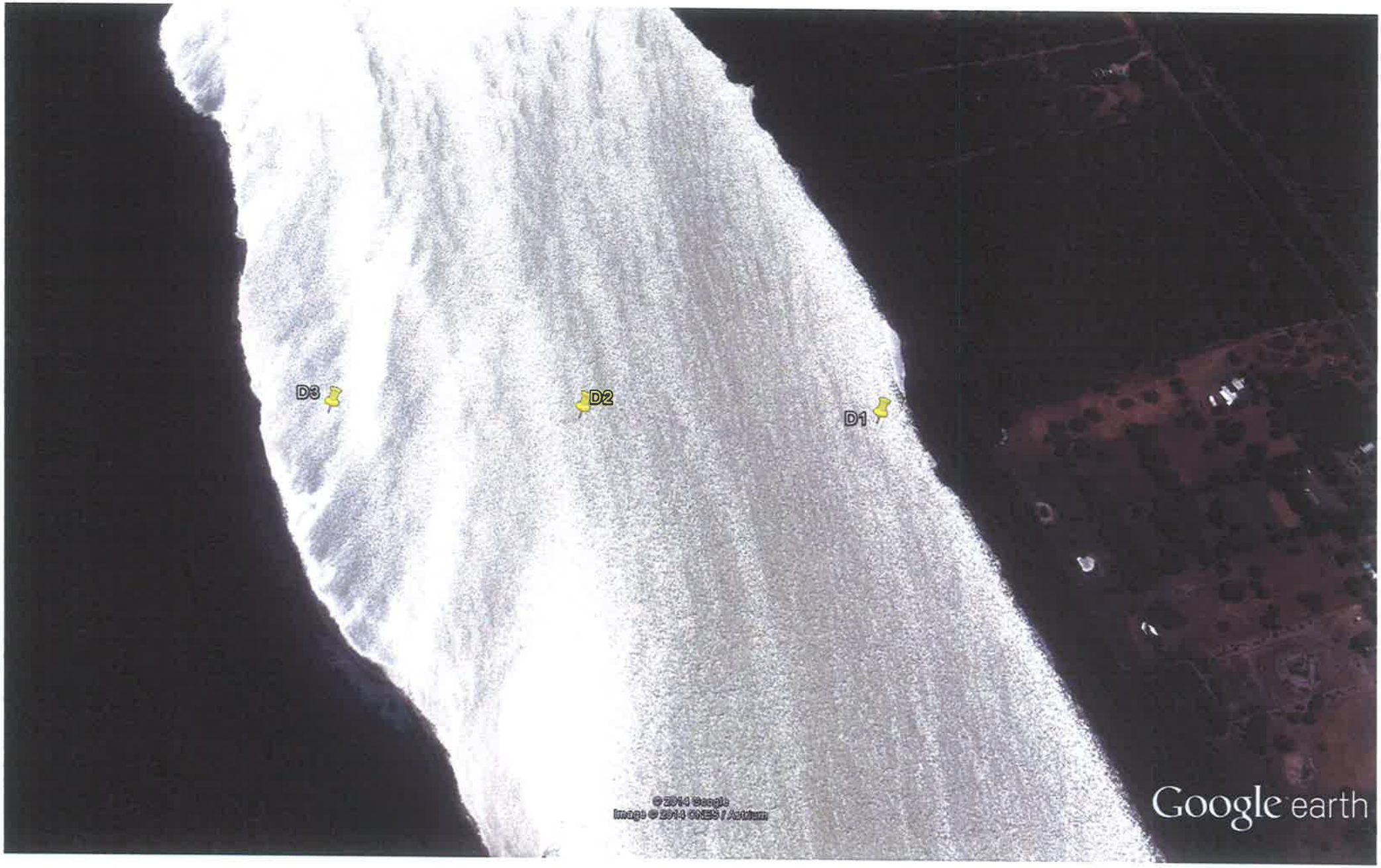


"A1" in wrong position

8/9/2014


Clifton
B3
B2
Lake Clifton
B1
Image © 2014 DigitalGlobe
© 2014 GeoEye
Image © 2014 CNES / Astrium
Google earth


C3
C2
C1
© 2014 Google
Image © 2014 CNES / Astrium
Google earth


D3
D2
D1
© 2014 Google
Image © 2014 CNES / Astrium
Google earth

Several pages – only 1st printed. K

Lane, Jim

From: Lane, Jim
Sent: Tuesday, 2 September 2014 3:36 PM
To: 'Richard Beggs'
Subject: Lake Clifton Oct 2000 - Dec 2001 transect data.
Attachments: Lake Clifton - all 2000-2001 transect data of Lane, Pearson & Clarke.xlsx

Hello Richard,

Spreadsheet of all my Oct 2000 – Dec 2001 Lake Clifton depth, conductivity/salinity, temperature transect data attached, as agreed in earlier emails

I have carefully checked the entries against original materials, but do let me know if you detect anything that you think might require further checking – or explanation.

Good luck with the thesis. I would be pleased to receive a PDF copy in due course.

Regards.

Jim Lane

From: Richard Beggs [mailto:21350696@student.uwa.edu.au]
Sent: Monday, 1 September 2014 8:45 AM
To: Lane, Jim
Subject: Re: Lake Clifton bathymetry - Navy.

Thanks Jim that's good to know it's worth chasing up the Navy data, and thanks also for putting your transect data into a spreadsheet - that's one less thing I have to do!

Richard

On 1 September 2014 07:05, Lane, Jim <Jim.Lane@dpaw.wa.gov.au> wrote:

Hello Richard,

While collating the 2000-2001 Clifton salinity & depth transect data I have come across a file note recording an Oct 2000 phone conservation between my technical officer Grant Pearson and Jeff Turner of CSIRO. In part it reads: 'Bathymetric data available for Clifton – Navy, may have digitised it'. So it looks as though it is worthwhile chasing it up with the Navy. Perhaps also Jeff Turner?

I'm well advanced in collating the all transect data into an Excel spreadsheet and should be able to send to you tomorrow.

Regards,

Excel file →

Printed 08/9/2014. This is the latest 08/9/2014 9:03am version

LAKE CLIFTON - SALINITY TRANSECTS OF 2000 & 2001 — A COMPILATION OF ALL DATA.

All data were collected by Senior Technical Officer Grant B. Pearson (GP) and Technical Officer Alan G. Clarke (AC). Project supervision by Principal Research Scientist JAK Lane, WA Department of Conservation & Land Management.
The data were collected at approximately monthly intervals from October 2000 to December 2001 from three sampling locations (1-3) along each of four east-west transects (transects A-D) in Lake Clifton, south of Mandurah, Western Australia.
There were thus 12 sampling locations: A1-A3, B1-B3, C1-C3 & D1-D3. These are the same sampling locations as those reported in Knott *et al.* (2003).
The purpose of collecting the 2000-2001 data was to compare it with the 1985-1986 data of Knott *et al.* (2003), and to thereby establish whether the single point data of Lane — see Lane *et al.* 2013 for the most-recently reported (1985-2012) data — is indicative of a long term increase in salinity throughout the lake.
Electrical conductivity, water temperature and water depth were measured at the surface (top 15cm) and near the bottom of the water column at all locations, except when some of the locations were dry, or when shallowness necessitated a single measurement, or when instrumentation malfunctioned.
The Lake Clifton water level on the day of each survey was determined by reading the CALM (now DPaW) depth gauges at the 'jetty' near sampling site A1. These measurements are reported in this Spreadsheet in 'mCALM'.
Lake water level (CALM depth gauge) readings may be converted to metres Australian Height Datum (mAHD) by deducting 4.035m (i.e. 4.035 mCALM = 0.00 mAHD).
Surface water samples collected in all months were analysed by the Western Australian Chemistry Centre (WACC) for electrical conductivity.
Surface water samples collected in most months were analysed by WACC for chloride ions.
Surface water samples collected in Oct 2000 only were analysed by WACC for major ions, conductivity, 'hardness' and pH.
No field measurements of pH were made as part of this project, however pH measurements are made routinely in Sept & Nov each year under the South West Wetlands Monitoring Program (SWWMP, Lane *et al.* 2013).

Additional Notes:
The GPS coordinates (Eastings & Northings) of the sampling sites (A1-D3) were first recorded in October 2000. They are only shown in this Spreadsheet where specifically referred to in Field Notes or Field Reports.
Field measurements of electical conductivity, salinity and temperature were made by means of a TPS 90 FLMV meter (Oct 2000 - Jan 2001) and then a somewhat more waterproof TPS WP-84 meter (Feb 2001- Dec 2001). Both units were calibrated prior to each sampling trip with an 'AR' grade 2.764 mS/cm at 25°C commercially-sourced standard.
When erroneous meter readings occurred, surface water samples were collected for determination of electrical conductivity by the WACC.
The 19/02/2001 data was incorrectly referred to as 20/02/2001 data in some early papers. The 23/05/2001 data was incorrectly referred to as 23/06/2001 data in some early papers.
On some occasions it was not possible to take measurements or collect water samples at the precise location of A1, A2, etc. On those occasions measurements were made and samples collected nearby. These data are indicated in red in the Spreadsheet.
Red has also been used in this Spreadsheet to draw attention to some specific data quality issues and other related issues.
Where field measurements could not be made, or were obviously erroneous at the time, or samples could not be collected, this is variously indicated by blank cells, 'error', 'ns', etc. in this Spreadsheet.
Strong winds and wind-induced waves at times caused problems in data collection, especially on those occasions when low water levels necessitated the use of a surf ski to access sites. The accuracy of depth measurements was particularly affected by wave action.
It appears that GP's visit to Transect 'A' on 17/10/2000 was for the purpose of trialing the proposed 2000-2001 Lake Clifton salinity transects procedures. He collected data and some water samples at sites A1-A3 and at eight additional sites extending 1-70m from the eastern shoreline at or close to Transect 'A'.

References

Knott, B, Bruce, L, Lane, J, Klomsri, Y & Burke, C (2003). *Is the salinity of Lake Clifton (Yalgorup National Park) increasing?* Journal of the Royal Society of Western Australia 86:119-122.
Lane, JAK, Clarke, AG & Winchcombe, YC (2013). *South West Wetlands Monitoring Program Report 19/1-2012*. WA Department of Parks and Wildlife Report. 166pp.

CCWA ID (sample ID)	Sample Site	Date of sampling / measrmnt	Cl (iCL1WAAA) mg/L	ECond (iEC1WZSE) mS/m	CO3 (iALK1WATI) mg/L	Fe (iMET1WCIP) mg/L	HCO3 mg/L	Hardness mg/L	Ca (iMET1WCIP) mg/L	K mg/L	Mg mg/L	Mn mg/L	N_NO3 mg/L	Na mg/L	SO4_S mg/L	SiO2_Si mg/L	pH	aION_BAL %	Time	*Site Easting (WGS84)*	*Site Northing (WGS84)*	Site Easting (AUSG66)	Site Northing (AUSG66)	Field ECond (Surf.) mS/cm	Field Salinity (Surf.) ppt	Field Temp. (Surf.) °C	Field ECond (Bott.) mS/cm	Field Salinity (Bott.) ppt	Field Temp. (Bott. °C	Depth at Site m	CALM Depth Gauge Reading mCALM	Sampler	Comments	Moro Comments
00E0523/009	A1	17/10/2000	15000	4050	<2	<0.25			442																								GP	'Site 1 is peisometer site 100m off shore'	A1 coords corrected 08/9/14. See emails of 04/9/14.
	A2	17/10/2000																																
00E0523/010	A3	17/10/2000	15000	4090	<2	<0.25			450													373231	6375966	41	24.7	19.7	41	24.7	19.3	2	4.33	GP	Depth corrected 04/09/2014	Coordinates added 04/09/2014
																			1325			372588	6375966	40.3	24.4	19.3	40.7	24.5	19.1	1.4	4.33	GP	Depth corrected 04/09/2014	Coordinates added 04/09/2014
00E0523/001	A001	17/10/2000		3990															1500															'Sampled from 10cm depth' 'Wind 5-10 km/hr easing to end of survey'	
00E0523/007	A010	17/10/2000		4020																				40.6	24.6	22.7				0.1	4.33	GP	'Site A - 1m from [East] shore'	
00E0523/003	A020	17/10/2000		3930																				40.6	24.6	23.1	40.6	24.4	23.1	0.17	4.33	GP	'Site A - 10m from [East] shore'	Might be 12m from shore, not 10m.
00E0523/004	A030	17/10/2000		4050																				40.6	24.6	23.1	40.6	24.4	23.1	0.3	4.33	GP	'Site A - 20m from [East] shore'	
00E0523/005	A040	17/10/2000		4050																				40.6	24.4	22.7	40.6	24.4	22.7	0.35	4.33	GP	'Site A - 30m from [East] shore'	
00E0523/006	A050	17/10/2000		4080																				40.6	24.4	22.5	40.6	24.4	22.4	0.41	4.33	GP	'Site A - 40m from [East] shore'	
00E0523/007	A060	17/10/2000		3990																				40.6	24.6	21.9	40.6	24.6	21.6	0.44	4.33	GP	'Site A - 50m from [East] shore'	
00E0523/008	A070	17/10/2000		4100																				40.6	24.6	21.6	41	24.6	21.6	0.47	4.33	GP	'Site A - 60m from [East] shore'	
																								40.6	24.6	21.9	40.6	24.6	21.2	0.46	4.33	GP	'Site A - 70m from [East] shore'	
00E0553/001	A1	24/10/2000	16000	4160	<2	0.06	201	5400	437	270	1050	<0.02	0.02	8510	1910	25	8	-2.3					6375900	41.4	24.9	21.3	41.3	24.9	21.1	0.7	4.36	GP		CALM gauge 4.45m on 14/9/00 & 4.30m on 09/11/00, so 4.36m on 24/10 looks OK
	A2	24/10/2000																						41.4	25	20.8	41.6	25	20.6	1.4	4.36	GP		
00E0553/002	A3	24/10/2000	16000	4180	<2	0.06	220	5300	432	267	1030	<0.02	0.01	8430	1740	26	8	-0.6						41.4	25	20.9	41.8	25.2	20.3	2	4.36	GP		
00E0553/003	B1	24/10/2000	15000	4150	<2	0.06	220	5400	434	268	1040	<0.02	0.01	8550	1750	26	8	2.9					6372890	40.8	24.6	22.1	41.3	24.8	21.6	0.86	4.36	GP		
	B2	24/10/2000																						40.8	24.6	21.4	41.3	24.9	21	1.2	4.36	GP		
00E0553/004	B3	24/10/2000	15000	4140	<2	0.05	214	5400	461	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8						40.8	24.6	21.9	41.3	24.9	21.7	0.55	4.36	GP		
00E0553/005	C1	24/10/2000	14000	3830	<2	0.05	201	4900	384	245	948	<0.02	0.01	7830	1600	26	8	1.4					6368456	38	22.6	21.6	38.5	23	21.5	1.15	4.36	GP		
	C2	24/10/2000																						38.5	23.1	21.7	38.6	23.1	21.7	1.15	4.36	GP		
00E0553/006	C3	24/10/2000	13000	3770	<2	0.05	195	4800	388	244	939	<0.02	0.01	7850	1580	25	8.1	3.9						37.9	22.6	22.4	37.9	22.7	22.4	0.57	4.36	GP		
00E0553/007	D1	24/10/2000	12000	3270	36	<0.05	73	4100	329	207	797	<0.02	0.01	6700	1350	21	8.4	1.4					6364207	33.1	19.6	22.5	33	19.6	22.6	0.83	4.36	GP		
	D2	24/10/2000																						32.5	19.1	22.5	32.5	19.1	22.7	0.9	4.36	GP		
00E0553/008	D3	24/10/2000	11000	3150	48	<0.05	24	4000	317	200	776	<0.02	0.01	6470	1320	19	8.8	2.2						31.6	18.8	23.1	31.9	18.8	23.1	0.7	4.36	GP		
00E1084/001	A1	15/12/2000	15000	4060															1050	373913	6376113	373913	6375900	48.9	29.9	26.1	49.2	30	26.1	0.6	4.12	GP		
00E1084/002	A2	15/12/2000	8600	2400																373368		373229		49.3	30.1	25.1	49.2	30	24.9	1.6	4.12	GP		
00E1084/003	A3	15/12/2000	12000	3500																372847		372708		49.4	30.2	25.9	49	29.9	25	1.2	4.12	GP		
00E1084/004	B1	15/12/2000	9000	2700																374787	6373038	374648	6372890	49.8	30.4	26.3	50	30.5	26.3	0.5	4.12	GP		
00E1084/005	B2	15/12/2000	12000	3690																374389		374250		49.4	30.2	25.5	49.7	30.3	25.5	0.8	4.12	GP		
00E1084/006	B3	15/12/2000	11000	3290																373891		373752		49.6	30.3	26.7	50	30.5	26.4	0.4	4.12	GP		
00E1084/007	C1	15/12/2000	11000	3420																376001	6368604	375867	6368456	50	30.5	26.3	50.1	30.6	26.2	0.8	4.12	GP	Probably should be 376006.	
00E1084/008	C2	15/12/2000	10000	3020																375809		375670		49.7	30.3	26.6	50.1	30.6	26.5	0.8	4.12	GP		
00E1084/009	C3	15/12/2000	8100	2900																375441		375302		50.5	31	29.1	50.6	31	29.1	0.25	4.12	GP		
00E1084/010	D1	15/12/2000	8300	2820																377767	6364355	377628	6364207	49.7	30.3	28	49.7	30.3	27.9	0.4	4.12	GP		
00E1084/011	D2	15/12/2000	12000	3580																377411		377272		48.9	29.9	27.2	49.8	30.4	26.9	0.3	4.12	GP		
00E1084/012	D3	15/12/2000	12000	3150															1315	377110		376971		49.8	30.4	28.6	50.1	30.6	28.4	0.4	4.12	GP		
00E1084/013	A1	22/01/2001	16000	4460																													'Site A1 was dry so a reading was taken about 10m due west of the normal site'	'Wind strength 20-30 K/h (knots?) causing considerable wave action that may affect the accuracy of the depth readings.
00E1084/014	A2	22/01/2001	11000	5970																		373229	6375966	61.8		24.3	61.5		24.4	1	3.93	GP		
00E1084/015	A3	22/01/2001	10000	2600																		372708		62		23.8	61.9		24	1.6	3.93	GP		
00E1084/016	B1	22/01/2001	17000	4690																		374645	6372890	61.6		23.9	61.8		24	1.1	3.93	GP		
00E1084/017	B2	22/01/2001	9830	2710																		374250		66.5		25.8	66.4		25.5	0.3	3.93	GP		
00E1084/018	B3	22/01/2001	15000	3100																		373752		62.1		24.4	62.1		24.5	0.6	3.93	GP		
00E1084/019	C1	22/01/2001	14000	4000																		375867	6368456	66.5		24.9	65.9		25	0.3	3.93	GP		
00E1084/020	C2	22/01/2001	19000	7380																		375670		71.4		24.7	71.4		24.9	0.5	3.93	GP		
00E1084/021	C3	22/01/2001	9300	2950																		375302		71		24.3	70.9		24.3	0.6	3.93	GP		
00E1084/022	D1	22/01/2001	22000	7180																		377628	6364207	74.1		25.5	75.2		25.1	0.2	3.93	GP		
00E1084/023	D2	22/01/2001	26000	6820																		377272		85.2		26.2	84.4		26.3	0.3	3.93	GP		
00E1084/024	D3	22/01/2001	28000	6860																		376971		81.4		25.6	81.1		25.6	0.3	3.93	GP		
																								83.1		27.1	82.6		27.1	0.2	3.93	GP		
00E1084/025	A1	19/02/2001	24000	5960															1100					67.7		22.4	67.5		22.3	0.8	3.73	AC	Sample site 373759E 6375975N	CALM gauge read on 22/2, not 19/2
00E1084/026	A2	19/02/2001	24000	7080																				68.3		21.7	63.2		22	1.3	3.73	AC		CALM gauge read on 22/2, not 19/2
00E1084/027	A3	19/02/2001	24000	7100																				68.7		21.6	65.5		21.9	0.8	3.73	AC		CALM gauge read on 22/2, not 19/2
00E1084/028	B1	19/02/2001	26000	7260															1510					68.3		25.7	66.4		26.8	0.2	3.73	AC	'15-20 knot SW wind'	CALM gauge read on 22/2, not 19/2
00E1084/029	B2	19/02/2001	27000	6550																				68.4		25.5	66.2		25.5	0.4	3.73	AC		CALM gauge read on 22/2, not 19/2
00E1084/030	B3	19/02/2001	28000	7260																				66.2		27.2	67.8		27.2	0.2	3.73	AC	Sample site 373862E 6372883N	CALM gauge read on 22/2, not 19/2
00E1084/031	C1	19/02/2001	33000	8460															1400					79.5		24.3	79.4		24.4	0.3	3.73	AC		CALM gauge read on 22/2, not 19/2
00E1084/032	C2	19/02/2001	33000	8730																				81.8		23.5	79.1		25.2	0.4	3.73	AC		CALM gauge read on 22/2, not 19/2

CCWA ID (sample ID)	Sample Site	Date of sampling / measrmnt	Cl (Cl1WAAA) mg/L	ECond (EC1WZSE) mS/m	CO3 (ALK1WATI) mg/L	Fe (MET1WCIP) mg/L	HCO3 mg/L	Hardness mg/L	Ca (MET1WCIP) mg/L	K mg/L	Mg mg/L	Mn mg/L	N_NO3 mg/L	Na mg/L	SO4_S mg/L	SiO2_Si mg/L	pH	aION_BAL %	Time	Site Easting (WGS84)	Site Northing (WGS84)	Site Easting (AUSG66)	Site Northing (AUSG66)	Field ECond (Surf.) mS/cm	Field Salinity (Surf.) ppt	Field Temp. (Surf.) °C	Field ECond (Bott.) mS/cm	Field Salinity (Bott.) ppt	Field Temp. (Bott. °C	Depth at Site m	CALM Depth Gauge Reading mCALM	Sampler	Comments	More Comments
00E1084/033	C3	19/02/2001	37000	8840																				86.3		26.9	86.5		25.5	0.15	3.73	AC	'Stopped 130m on line from C2, water 50m away', 'Sample site 375433E 6368448N'.	CALM gauge read on 22/2, not 19/2
	D1	19/02/2001																									91.8		26	0.13	3.73	AC	'About 30m from D1 GPS position on same line'.	CALM gauge read on 22/2, not 19/2
00E1084/034	D2	19/02/2001																	1255					93		26.9	94.9		24.4	0.23	3.73	AC	Water sample taken at D3, not D2?	CALM gauge read on 22/2, not 19/2
	D3	19/02/2001	40000	9850																							98.5		28.4	0.13	3.73	AC	Sample site '150m from D3 GPS position along the line 377127E, 6336342005'. Original field notes say sample collected at D3, not D2 as later reported.	CALM gauge read on 22/2, not 19/2
00E1224/001	A1	16/03/2001	30000	7080																											3.67	GP		
00E1224/002	A2	16/03/2001	30000	7010															920					Error		19.3	Error		19.6		3.67	GP		
00E1224/003	A3	16/03/2001	30000	6970																				Error		18.8	Error		19.7	1.4	3.67	GP		
00E1224/004	B1	16/03/2001	29000	7160															1215					Error		18.3	Error		19	0.6	3.67	GP		
00E1224/005	B2	16/03/2001	29000	7070																				69.4		20.4	68.3		20.4	0.2	3.67	GP		
00E1224/006	B3	16/03/2001	27000	6800																				69.4		20.2	69.5		20.4	0.35	3.67	GP		
00E1224/007	C1	16/03/2001	41000	8730																				67.9		24.1				0.05	3.67	GP		
00E1224/008	C2	16/03/2001	40000	8740															1350					86.4		21.9	85.8		22	0.2	3.67	GP	'WPT 069'	
00E1224/009	C3	16/03/2001	38000	9020																				87		21.2	83.1		20	0.4	3.67	GP		
																								45.9		25.9				0.05	3.67	GP	'WPT 071'	
00E1224/010	D1	16/03/2001	78000	13500																										0.035	3.67	GP	'D1 depth 3.5cm. Took sample only'. Depth given as 0.05m in later printouts.	
00E1224/011	D2	16/03/2001	65000	11900																										0.1	3.67	GP	Depth given as 0.1m in printouts only	
	D3	16/03/2001																													3.67	GP		
00E1346/001	A1	18/04/2001		8210																				78.1		21.4	76		21.4	0.7	3.64	GP	Depth recorded as 1.2m in re-write of field notes, but 0.7m in original	'Meter failed. Water samples collected
00E1346/002	A2	18/04/2001		8200																				118.3		21.6	120		21.7	1.2	3.64	GP		'Meter failed. Water samples collected
00E1346/003	A3	18/04/2001		8210																				Error		23.9	Error		24	0.8	3.64	GP		'Meter failed. Water samples collected
00E1346/004	B1	18/04/2001		8480																				Error			Error			0.1	3.64	GP		'Meter failed. Water samples collected
00E1346/005	B2	18/04/2001		8300																				Error			Error			0.5	3.64	GP	Can't find (as at 02/09/2014) where this depth of 0.5m has come from. Might be incorrect.	'Meter failed. Water samples collected
00E1346/006	B3	18/04/2001		8070																				Error			Error			0.05	3.64	GP	'WPT 80' '70m from [B3] site'.	'Meter failed. Water samples collected
00E1346/007	C1	18/04/2001		7650																				Error			Error			0.05	3.64	GP		'Meter failed. Water samples collected
00E1346/008	C2	18/04/2001		9370																				Error			Error			0.3	3.64	GP	Depth recorded simply as '30'	'Meter failed. Water samples collected
00E1346/009	C3	18/04/2001		9440																				Error			Error			0.05	3.64	GP	'WPT 81' '180m from [C3] site'.	'Meter failed. Water samples collected
00E1346/010	D1	18/04/2001		17500																				Error			Error			0.02	3.64	GP		'Meter failed. Water samples collected
00E1346/011	D2	18/04/2001		15100																				Error			Error			0.01	3.64	GP	'WPT 82'	'Meter failed. Water samples collected
	D3	18/04/2001																														GP	Site D3? 'Knee deep'.	
00E1444/001	A1	23/05/2001	29000	6110																372800	6375000			73.3		18.6	72.3		18.1	0.7	3.74	AC	'Using the Ocean Kayak'	'Problems with TPS not settling down
00E1444/002	A2	23/05/2001	29000	6010																373229				69.4		17.1	68.3		17.1	1.45	3.74	AC		'Problems with TPS not settling down
00E1444/003	A3	23/05/2001	28000	5980															1620	372708				71.5		17.4	70.9		17.1	0.94	3.74	AC		'Problems with TPS not settling down
00E1444/004	B1	23/05/2001	27000	5770																374648	6372690			69.9		19.6				0.3	3.74	AC		'Problems with TPS not settling down
00E1444/005	B2	23/05/2001	26000	5820																374250				69.3		19.7	69.9		19.9	0.5	3.74	AC		'Problems with TPS not settling down
00E1444/006	B3	23/05/2001	26000	5710																373752				69.9		19.9				0.3	3.74	AC		'Problems with TPS not settling down
00E1444/007	C1	23/05/2001	24000	5410																375867	6368456			65.3		18.6	66.1		18.1	0.4	3.74	AC		'Problems with TPS not settling down
00E1444/008	C2	23/05/2001	24000	5500																375670				66.7		17.5	66.7		17.5	0.3	3.74	AC		'Problems with TPS not settling down
00E1444/009	C3	23/05/2001	ns	ns																375302				67.7		19.7				0.2	3.74	AC		'Problems with TPS not settling down
00E1444/010	D1	23/05/2001	29000	6000																377628	6364207			73.8		15.4	73.8		15.4	0.33	3.74	AC	'28m east of [C3] position'.	'Problems with TPS not settling down
00E1444/011	D2	23/05/2001	26000	6030															1050	377272				75		15.7	75.2		15.8	0.22	3.74	AC		'Problems with TPS not settling down
00E1444/012	D3	23/05/2001	29000	6090																376971				75.2		16.7				0.15	3.74	AC	'30m east of [D3] position'.	'Problems with TPS not settling down
01E0363/001	A1	21/06/2001	24000	5900																														
01E0363/002	A2	21/06/2001	25000	6910																				66.5		16.3	65.9		16.4	1.2	3.82	GP		
01E0363/003	A3	21/06/2001	23000	6890																				67.4		16.1	67.2		16.1	1.5	3.82	GP		
01E0363/004	B1	21/06/2001	22000	6280																				64.3			64		16.8	0.5	3.82	GP		
01E0363/005	B2	21/06/2001	23000	6480																				63.6		15.3	63.4		15.3	0.3	3.82	GP		
01E0363/006	B3	21/06/2001	22000	6450																				63.7		15.3	38.7		15.6	0.7	3.82	GP		
01E0363/007	C1	21/06/2001	20000	5690																				61.7		16.1				0.1	3.82	GP		
01E0363/008	C2	21/06/2001	20000	5920																				55.2		16.7	55.3		16.7	0.5	3.82	GP		
01E0363/009	C3	21/06/2001	22000	6090																				57.4		16.5	56.5		16.5	1	3.82	GP		
01E0363/010	D1	21/06/2001	21000	5460																				59.5		17.1	55.3		17.1	0.1	3.82	GP	'WPT 100'	
01E0363/011	D2	21/06/2001	20000	5560																				55.3		16.7	55.3		16.7	0.3	3.82	GP		
01E0363/012	D3	21/06/2001	20000	5410																				55.6		16.3	55.6		16.4	0.5	3.82	GP		
																								55.2		17.3	55.9			0.1	3.82	GP		
01E0122/001	A1	19/07/2001	21000	5010																				61.1		12.6	60.8		12.6	1.9	3.97	GP		Correct date is 19/7, not 31/7
01E0122/002	A2	19/07/2001	22000	4870																				61.2		12.3	61.2		12.3	2	3.97	GP	Depth recorded as '2.07'	Correct date is 19/7, not 31/7
01E0122/003	A3	19/07/2001	22000	4830																				61.4		12.3	61.4		12.3	1	3.97	GP		Correct date is 19/7, not 31/7
01E0122/004	B1	19/07/2001	22000	4700																				60		12.6	60		12.7	0.6	3.97	GP		Correct date is 19/7, not 31/7
01E0122/005	B2	19/07/2001	22000	4710																				60.3		12.3	60.3		12.3	1	3.97	GP		Correct date is 19/7, not 31/7
01E0122/006	B3	19/07/2001	22000	4620																				58.9		13.1	58.3		13	0.2	3.97	GP		Correct date is 19/7, not 31/7
01E0122/007	C1	19/07/2001	18000	4220																				53.3		13.2	53.4		13.5	0.8	3.97	GP		Correct date is 19/7, not 31/7
01E0122/008	C2	19/07/2001	20000	4310															1300					54.6		13.1	54.9		13.4	1.3	3.97	GP		Correct date is 19/7, not 31/7
01E0122/009	C3	19/07/2001	20000	4270																				53.9		14.6	53.9		14.8	0.1	3.97	GP		Correct date is 19/7, not 31/7
01E0122/010	D1	19/07/2001	17000	3780															1320					Error		14.1	Error			0.5	3.97	GP	'Samples taken E3 message'	Correct date is 19/7, not 31/7
01E0122/011	D2	19/07/2001	18000	3940																				Error			Error			1	3.97	GP	'Samples taken E3 message'	Correct date is 19/7, not 31/7

CCWA ID (sample ID)	Sample Site	Date of sampling / measrmnt	Cl	ECond	CO3	Fe	HCO3	Hardness	Ca	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	aION_BAL	Time	Site Easting (WGS84)	Site Northing (WGS84)	Site Easting (AUSG66)	Site Northing (AUSG66)	Field ECond (Surf.)	Field Salinity (Surf.)	Field Temp. (Surf.)	Field ECond (Bott.)	Field Salinity (Bott.)	Field Temp. (Bott.	Depth at Site	CALM Depth Gauge Reading	Sampler	Comments	More Comments
			iCL1WAAA mg/L	iEC1WZSE mS/m	iALK1WATI mg/L	iMET1WCIP mg/L	mg/L	mg/L	iMET1WCIP mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%						mS/cm	ppt	°C	mS/cm	ppt	°C	m	mCALM			
01E0122/012	D3	19/07/2001	18000	3870																				Error			Error			0.1	3.97	GP	Samples taken E3 message	Correct date is 19/7, not 31/7
01E0363/013	A1	9/08/2001		5870															1049			373909	6375960	61.4		15.2	61.3		15.1	1.01	4.06	AC		
01E0363/014	A2	9/08/2001		5870																		373229		61.5		14.9	60		14.7	2	4.06	AC		
01E0363/015	A3	9/08/2001		5870																		372708		61.6		14.9	61		15.3	1.41	4.06	AC		
01E0363/016	B1	9/08/2001		5540																		374648	6372890	58.2		15.9	58.1		15.8	0.58	4.06	AC		
01E0363/017	B2	9/08/2001		5570																		374290		58.7		15.5	58.6		15.4	0.9	4.06	AC		
01E0363/018	B3	9/08/2001		5560																		373762		58.2		16.7	58.6		16.1	0.43	4.06	AC		
01E0363/019	C1	9/08/2001		4960																		375867	6368456	52.3		16	52		16	0.88	4.06	AC		
01E0363/020	C2	9/08/2001		4980															1230			375670		53.1		15.7	53.1		15.7	0.52	4.06	AC		
01E0363/021	C3	9/08/2001		4930																		375302		52.6		16.2	52.5		16.3	0.35	4.06	AC	'40m east of [C3] point'	
01E0363/022	D1	9/08/2001		4400																		377028	6364207	48.7		16.3	48.6		16.3	0.46	4.06	AC		
01E0363/023	D2	9/08/2001		4430																		377272		47.9		15.9	47.9		16	0.73	4.06	AC		
01E0363/024	D3	9/08/2001		4310															1300			376971		46.3		16.5	46.3		16.5	0.42	4.06	AC		
01E0367/001	A1	20/09/2001	19000	4960															1115					50.5		17.1	50.5		17.1	1.1	4.16	GP		CALM gauge read 4.18m on 14/9/01, so 4.16m on 20/9/01 looks OK
01E0367/002	A2	20/09/2001	18000	4990																				50.4		17.3	50.4		17.3	1.8	4.16	GP		
01E0367/003	A3	20/09/2001	19000	4880																				49.2		16.4	49.4		16.4	1.2	4.16	GP		
01E0367/004	B1	20/09/2001	19000	4880																				50.1		16.8	50.4		16.9	0.8	4.16	GP		
01E0367/005	B2	20/09/2001	19000	4880																				49.9		16.3	49.8		16.3	0.8	4.16	GP		
01E0367/006	B3	20/09/2001	19000	4750																				48.5		16.5	48.7		16.5	0.4	4.16	GP		
01E0367/007	C1	20/09/2001	17000	4190																				42.8		16.5	44.7		16.5	0.8	4.16	GP		
01E0367/008	C2	20/09/2001	16000	4200																				42.7		16.3	43.7		16.5	1	4.16	GP		
01E0367/009	C3	20/09/2001	15000	3990																				40.6		15.8	40.7		15.8	0.4	4.16	GP		
01E0367/010	D1	20/09/2001	14000	3860																				37.7		16.6	37.7		16.6	0.5	4.16	GP		
01E0367/011	D2	20/09/2001	14000	3630																				37.4		16.5	37.4		16.5	0.7	4.16	GP		
01E0367/012	D3	20/09/2001	13000	3590																				36.5		16.3	36.9		16.3	0.4	4.16	GP		
01E0561/001	A1	12/10/2001	17000	5140															1113					49		17.9	49.7		17.9	1.2	4.23	GP		
01E0561/002	A2	12/10/2001	17000	5150															1109					49.4		17.8	49		17.9	2	4.23	GP	Wind 15-20km/hr SW	
01E0561/003	A3	12/10/2001	17000	5100															1100					49.2		17.9	49.2		17.8	0.6	4.23	GP		
01E0561/004	B1	12/10/2001	17000	4950															1025					47.7		16.9	47.7		16.9	0.6	4.23	GP		
01E0561/005	B2	12/10/2001	16000	5070															1030					48.6		17.6	48.8		17.6	0.9	4.23	GP		
01E0561/006	B3	12/10/2001	16000	5030															1035					48.5		17.8	48.3		17.8	0.5	4.23	GP		
01E0561/007	C1	12/10/2001	15000	4470															930					43.2		16.9	42.5		16.9	0.7	4.23	GP		
01E0561/008	C2	12/10/2001	16000	4780															944					45.7		17.7	45.7		17.7	0.9	4.23	GP		
01E0561/009	C3	12/10/2001	17000	4730															950					45.3		17.7	45.3		17.8	0.4	4.23	GP		
01E0561/010	D1	12/10/2001	14000	3990															1016					38.4		17.4	38.4		17.4	0.4	4.23	GP		
01E0561/011	D2	12/10/2001	14000	4120															1010					40.1		17.7	40.1		17.7	0.6	4.23	GP		
01E0561/012	D3	12/10/2001	15000	3980															1005					39.8		17.8	39.8		17.8	0.4	4.23	GP		
01E0561/013	A1	8/11/2001		5140																				51.2		21.2	51.1		20.9	1.2	4.11	GP		CALM gauge read 4.13 on 5/11/01, so 4.11m on 08/11/01 looks OK
01E0561/014	A2	8/11/2001		5450																				52.1		20.8	52.8		21.2	2	4.11	GP	AZ site depth recorded as 1.9m, but noted as 'Possibly 2.0'	
01E0561/015	A3	8/11/2001		5470																				51.5		19.1	51.4		19	0.8	4.11	GP		
01E0561/016	B1	8/11/2001		5480																				51.4		23.3	51.4		23.4	0.6	4.11	GP		
01E0561/017	B2	8/11/2001		5250																				51.5		20.3	51.4		20.3	0.9	4.11	GP		
01E0561/018	B3	8/11/2001		5440																				51.3		23.7	51.4		22.6	0.5	4.11	GP		
01E0561/019	C1	8/11/2001		5100															1240					51.3		20.9	50.5		22.2	0.6	4.11	GP		
01E0561/020	C2	8/11/2001		5420																				51.4		21.4	51.3		21.3	0.9	4.11	GP		
01E0561/021	C3	8/11/2001		5270															1255					50.4		22.6	50.4		22.3	0.3	4.11	GP		
01E0561/022	D1	8/11/2001		5040																				48		25.1	47.8		25.1	0.3	4.11	GP		
01E0561/023	D2	8/11/2001		5050																				48.5		25.6	48.3		23.5	0.6	4.11	GP		
01E0561/024	D3	8/11/2001		5060															1430					49.8		24.4	48.6		24.4	0.4	4.11	GP		
01E0787/001	A1	12/12/2001	23000	5170															1240	373913	6376113	374090	6375906	58		22.4	58.3		22	0.84	4	AC	CALM gauge read 4.00m	
01E0787/002	A2	12/12/2001	21000	5170																373368		373229		58.2		22	58.2		21.6	1.92	4	AC	CALM gauge read 4.00m	
01E0787/003	A3	12/12/2001	21000	5180															1215	372847		372708		58.4		22.4	58.5		22.2	1.18	4	AC	CALM gauge read 4.00m	
01E0787/004	B1	12/12/2001	22000	5130															1200	374287	6373038	374648	6372890	58.2		23.1	58.4		22.4	0.49	4	AC	CALM gauge read 4.00m	
01E0787/005	B2	12/12/2001	22000	5170																374389		374290		58.6		22.8	58.7		22.5	0.78	4	AC	CALM gauge read 4.00m	
01E0787/006	B3	12/12/2001	22000	5220															1144	373891		373752		59.2		24.1	59.4		24	0.34	4	AC	CALM gauge read 4.00m	
01E0787/007	C1	12/12/2001	22000	5260																376001	6368604	375867	6368456	58.9		21.8	60.3		21.6	0.67	4	AC	CALM gauge read 4.00m	Probably should be 376006
01E0787/008	C2	12/12/2001	22000	5280																375809		375670		60		21.6	60.2		21.3	0.78	4	AC	CALM gauge read 4.00m	
01E0787/009	C3	12/12/2001	23000	5430																375441		375302		61.6		23.7				0.22	4	AC	CALM gauge read 4.00m	
01E0787/010	D1	12/12/2001	23000	5430															1045	377767	6364355	377628	6364207	61.4		21.8	61.4		21.8	0.38	4	AC	CALM gauge read 4.00m	
01E0787/011	D2	12/12/2001	22000	5590																377411		377272		63.7		20.6	63.7		20.5	0.48	4	AC	CALM gauge read 4.00m	
01E0787/012	D3	12/12/2001	22000	5570															1025	377119		376971		63.2		21.1	63.4		21.1	0.28	4	AC	CALM gauge read 4.00m	Surface conductivity hand-written 32 63.2 on original (?) sheet, but as 63.4 in later printouts.

2 pages – both printed

Lane, Jim

From: Lane, Jim
Sent: Thursday, 28 August 2014 11:20 AM
To: 'Richard Beggs'
Subject: Lake Clifton transect and single-point data (depth and salinity).

Hello Richard,

I do have some additional data that might be of interest.

A decade or so ago, probably around the time of or soon after preparation of the 2003 paper, we undertook depth and salinity profiling (basic hand-held stuff) on a number of (four?) E-W transects of the lake. They were the same transects and approximately the same sampling points as measured by (UWA?) workers a couple of decades or thereabouts previously.

It has been my intention to write that work up but, as an alternative, I would be prepared to supply the data to you for possible use in your MSc, and for subsequent reporting and/or publication, on condition of acknowledgement of source in your Thesis and co-authorship in any report or publication making significant use of that data.

If you are agreeable to those conditions, I could dig the data out and send to you in the next week or so. It will probably be in the form of scanned copies of field notebook entries plus a map of the transects. I don't think the data has been entered into a spreadsheet, but I can check.

How does that sound?

Regards,

Jim Lane
(08) 9752 5526

PS: We have also continued the single-location sampling each September and November since the 2003 paper and could supply that data too.

PPS: If you have a look at Table 6 (page 42) in our 1977-2012 SWWMP report (I'll send you a PDF separately) you will see that Knott et al. (2003) referred to bathymetric mapping of Lake Clifton by/for Department of Water. I've not seen it. Maybe you could chase it up with DoW. I also have a very vague – and possibly totally unreliable! – recollection that the Navy or some other Australian Government body did some bathymetric mapping of Clifton several decades ago, maybe as a training exercise (at a guess).

From: Richard Beggs [mailto:21350696@student.uwa.edu.au]
Sent: Thursday, 28 August 2014 9:31 AM
To: Lane, Jim
Subject: Email from Science Internet web site

Richard Beggs (21350696@student.uwa.edu.au) submitted the following message from the Science Internet web page on Thursday, 28 August 2014 at 9:30 am WST.

Hi Jim, I'm currently doing an Msc in Environmental Management at UWA and in my research project I am attempting to construct accurate mass balance models for water and salt for Lake Clifton. My aim is ultimately to get some good estimates of salt inflows in groundwater. My supervisors are Matt Hipsey, Louise Bruce and Ryan Vogwill. Naturally your name has come up

on several occasions in connection with monitoring of South West wetlands and Louise has already shared with me some of the data you provided for the 2003 paper "Is the salinity of Lake Clifton increasing." I wondered if you would be willing to share any other data you have on Lake Clifton salinity and water level to help me construct a clearer picture of the lake's long term trends? Getting accurate estimates of lake volume and surface area at different depths is also key to the success of this project and has so far proved problematic. Lidar data from DoW doesn't penetrate the lake surface for example so only gives a partial picture of the lake profile. Ideally I would undertake some soundings of the lake but time and budget prohibit that so I wonder if you know if any sounding has ever been taken there. Naturally I will acknowledge any data I end up using. Kind regards, Richard

Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jim Lane
From: Grant Pearson

Date: March 1 2002
Subject: Lake Clifton Salinity

Attached are data on the monthly recordings at Lake Clifton. Insitu measurements of conductivity were taken using a TPS 90 FLMV conductivity meter or a TPS handheld WP 84 unit. Both were calibrated prior to the surveys using a standard "AR" grade ionic solution at 2.76 mS/cm @25^0 C purchased from Rowe Scientific.

The surveys were carried out, whenever possible, on scheduled days established at the beginning of the year. In most cases the surveys could be performed using a punt launched from the Site A jetty or from a shore location at Site C. When lake depths became too shallow for the punt and motor a surf ski was used. This was carried by vehicle to each transect and launched from the eastern side of the lake. On several occasions the wind conditions made this operation an extremely wet experience and the conductivity meter failed due to the extreme conditions. There are gaps in this data set as a result of this.

Water samples were collected at all sites along the four transects. These were analysed at the WA Chemistry Centre for conductivity. Chloride levels were measured from the same sample from March 2001 and on a further 6 of the subsequent survey dates.

The depth at the CALM depth gauge was recorded on each occasion.
The field surveys relate to the following dates:

DATE	FIELD COND.	CHEM CNTR COND	CHLORIDE	CALM GAUGE	SAMPLER
17/10/00	Y	N	N	4.33	GP
24/10/00	Y	N	N	4.36	GP
15/12/00	Y	N	N	4.12	GP
22/01/01	Y	N	N	3.93	GP
20/02/01	Y	N	N		GP
16/03/01	Y	Y	Y	3.67	GP
18/04/01	Y	Y	N	3.64	GP
23/05/01	Y	Y	Y	3.74	AC
23/06/01	Y	Y	Y	3.82	GP
19/07/01	Y	Y	Y	3.97	GP
09/08/01	Y	Y	N		AC
20/09/01	Y	Y	Y	4.16	GP
12/10/01	Y	Y	Y	4.23	GP
08/11/01	Y	Y	N	4.11	GP
12/12/01	Y	Y	Y	4.00	AC

Further more detailed treatment of the data is necessary. This data is provided as preliminary results.

Grant Pearson
March 1 2001

Printed 02/9/2014

"Fgs" 11 of PDF "LakeClifton-Trees-Vol.2"

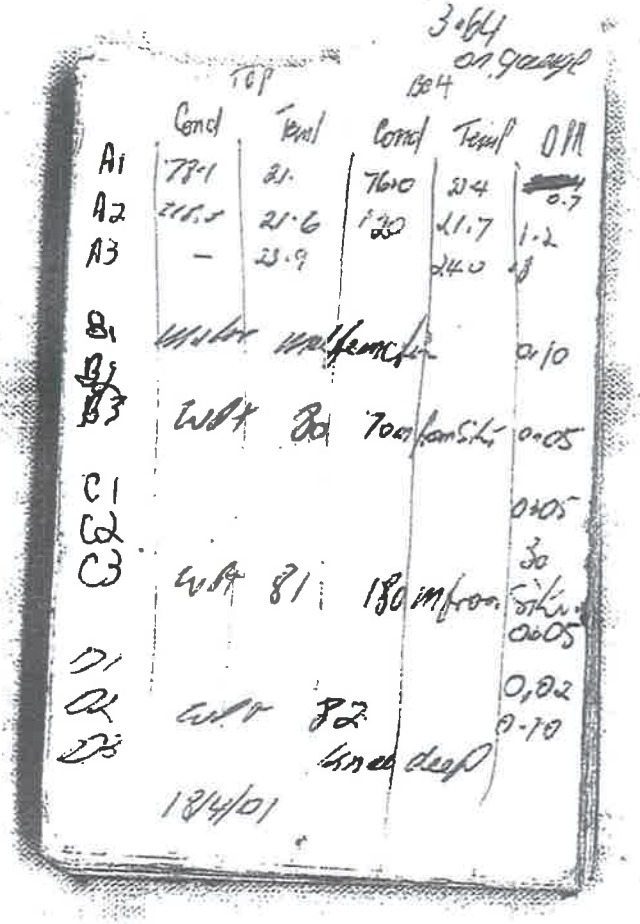
R

18 April 2001

Weather fouled

Water samples Collected

for Thesis Centre.



(24)

Printed 02/9/2014

Page 17 of 6

"Field Notebook GBP_78(GBPlasma) 2006.03-2001.11"

(25)

18/1/01

Lake Cliff

Dgps to Houghton tracks with Argo on L. Cliff.

Depth = 3-64m

HA1	78·1 mS	76·0 mS	1·2m
	21·4	21·4	
HA2	178·3 mS	120	1·2 mS
	21·6	21·7	
HA3	-	-	
	23·9	24·0	0·3

Water became cool + unsuitable for samples from Dock to the Sample + returned to Vehicle Cleaned + dried at Gull. Complete

Printed 02/9/2014
"Page" 3 of PDF "Lake Clifton - Trans - Vol. I."

Photocopied from Grant Pearsons Field Notebook on 29/4/2012

from 03/01 to 11/01

10/8/01

Lake Cliff

0900 to Houghton treches with Argo on L Cliff.

Deff = 3.64m

A1	78.1 ms	76.0 ms	1.2
	21.4	21.4	
A2	118.5 ms	120	1.2 ms
	21.6	21.7	
B3	-	-	
	23.9	24.0	0.8

Water became cool & unsuitable took samples from each bite Samples & returned to Vehicle Cleaned & dried at Gold Coast

VEY CONDUCTED BY ALAN CLARKE ~~20/2/01~~ 19/2/2001 JK

using the ocean Kayak.

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	NOTES/ SAMPLE SITE
		AUS G 66	AUS G 66	ms/cm	ppt	C °C	ms/cm	ppt	C °C	Mtrs	373750
	A1	373909	6375966	67·7		22·4	67·5		22·3	0·8	*6375975
	A2	373229		68·3		21·7	63·2		22·0	1·3	
	A3	372708		68·7		21·6	65·5		21·9	0·8	
	B1	374648	6372890	68·3		26·7	68·4		26·8	0·2	
	B2	374250		68·4		25·5	68·2		25·5	0·4	
	B3	373752		68·2		27·2	67·8		27·2	0·2	→ 373862 6372883
	C1	375867	6368456	79·5		24·3	79·4		24 4	0·3	
	C2	375670		81·8		23·5	79·1		25·2	0·4	
	C3	375302		86·3		26·9	86 5		25·5	0 15	→ 375433 6368448
	D1	377828	6364207	–			91·8		280	0·13	
	D2	377272		93·0		26·9	94·9		24 4	0·23	
	D3	376971		–			98 5		28 4	0·13	→ 377127 6364200

Dept. garage at ST JOHN

Road read 3·73 on

22/02/01

NOTES: Gauge not read on day of profile survey.

Grant I have entered the profile readings from the reference data into the GIS 12 Comma .txt.

CLIFA1
CLIFA2
CLIFA3
CLIFA1 etc.

Where I could not reach the pit because of the low water level I have recorded the ~~depth~~ distance only.

DC

Page 51

Printed 02/9/2014 from BF "Lake Clifton – G. Pearson – 'Folder of Loose Papers"

19/02/01

10.00 cm.

Lake Clifton

Calibration of TPS WP-84

metre read 1.39 ppk in 2.97 ms/cm

to calibrate metre only allowed

2.76 ms/cm standard so I

used the paste or 2.76 ms/cm

metre read 2.63 ms in 2.76 ms STAN

K = 1.02 @ 20.6°C

calibration O.K.

19/02/01

11.00am

SITE A1

Bottom	depth	top
67.5ms 22.3°C	0.8	67.7ms 22.4

position 373750
6375975

A2 navigated to point using Garmin GPS

TOP	68.3ms	21.7°C
1.3m Bottom	63.2	22.0°C

A3 NTPU GPS

TOP	68.7ms	21.6°C
0.80 Bottom	65.5ms	21.9°C

12.55pm 19/02/01

D2 water sample not taken

Top 93.0ms 26.9°C

0.23 bottom 94.9ms 24.4°C

D3

0.13 98.5ms 28.4°C

150m from D3 GPS position along the line 377127 6364200

D1 water sample not taken

0.13 91.8ms 28.0°C

about 30m from D1 GPS position on depth line.

2·00 pm. 19/02/01

C1

top 79·5 m/s 24·3°C

0·30 bottom 79·4 m/s 24·4°C

NTPU GPS

C2 NTPU. GPS

top 81·8 m/s 23·5°C

0·4 bottom 79·1 m/s 25·2°C

C3 stopped 130m on line from CLIFC3

water 50m ~~approx~~ 375433

top 86·3 m/s 26·9°C 6368448

0·15 bottom 86·5 m/s ~~25·5°C~~ 25·5°C

15-20 knots SW. ~~windy~~ (32)

1510 hrs 19/02/01

B1 NTPU GPS

top 68.3 m/s 26.7°C

0.20 bottom 68.4 m/s 26.8°C

B2 NTPU GPS

top 68.4 m/s 25.5°C

0.40 bottom 68.2 m/s 25.5

B3 NTPU GPS 373862

top 68.2 m/s 27.2°C 6372883

0.20 bottom 67.8 m/s 27.2°C

Twinlock Acco

Crystalfile Classic

with float action runners for smooth operation.

DATA PANEL

These papers relate to the 2000 + 2001 security fragments of Lake Clifton Project

30/4/12

CLM 18

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

FILE No.

GRANT PEARSON'S FILE ↓ 30/4/2012

SUBJECT: Lake Chilton
Transect Surveys
Oct 2000 →

Closed
Vol. 1

Amalgamated Files

Previous Papers ... Further Papers

DISPOSAL ACTION

Repository

Destruction

Archives

INDEXED

OTHER DEPARTMENTS FILES

RELEVANT FILES

5163

= Planned

MCD 131724.

Pages numbered in "as found" order on 30/8/2014 by me (GL)

30/8/14

CONDUCTIVITY
LAKE CLIFTON

TOP	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	CHEM CNT MS/CM
	24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001	16/03/2001
A1	41.4	48.9	61.8	67.7	error	70.8
A2	41.4	49.3	62	68.3	error	70.1
A3	41.4	49.4	61.6	68.7	error	69.7
B1	40.8	49.8	66.5	68.3	69.4	71.6
B2	40.8	49.4	62.1	68.4	69.4	70.7
B3	40.8	49.6	66.5	68.2	67.9	68
C1	38	50	71.4	79.5	86.4	87.3
C2	38.5	49.7	71	81.8	87	87.4
C3	37.9	50.5	74.1	86.3	45.9	90.2
D1	33.1	49.7	85.2	N/A	N/A	135
D2	32.5	48.9	81.4	93	N/A	119
D3	31.8	49.8	83.1	N/A	N/A	N/A

BOTTOM					
	24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001
A1	41.3	49.2	61.5	67.5	error
A2	41.6	49.2	61.9	63.2	error
A3	41.8	49	61.5	65.5	error
B1	41.3	50	66.4	68.4	68.3
B2	41.3	49.7	62.1	68.2	69.5
B3	41.3	50	65.9	67.8	error
C1	38.5	50.1	71.4	79.4	85.6
C2	38.6	50.1	70.9	79.1	83.1
C3	37.9	50.6	75.2	86.5	N/A
D1	33	49.7	84.4	91.8	N/A
D2	32.5	49.8	81.1	94.9	N/A
D3	31.9	50.1	82.6	98.5	N/A

(80)

DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM
18/04/2001	18/04/2001	23/05/2001	23/05/2001	21/06/2001	21/06/2001	19/07/2001	19/07/2001
78.1	82.1	73.3	61.1	66.5	69	61.1	50.1
118.3	82	69.4	60.1	67.4	69.1	61.2	48.7
error	82.1	71.5	59.8	64.3	68.9	61.4	48.3
error	84.8	69.9	57.7	63.6	62.8	60	47
error	83	69.3	58.2	63.7	64.8	60.3	47.1
error	80.7	69.9	57.1	61.7	64.5	58.9	46.2
error	76.5	65.3	54.1	55.2	56.9	53.3	42.2
error	93.7	66.7	55	57.4	59.2	54.6	43.1
error	94.4	67.7	no sample	59.5	60.9	53.9	42.7
error	175	73.8	60	55.3	54.6	N/A	37.8
error	151	75	60.3	55.6	55.6	N/A	38.4
no sample	no sample	75.2	60.9	55.2	54.1	N/A	38.7

18/04/2001	23/05/2001	21/06/2001	19/07/2001
76	73.3	65.9	60.8
120	68.3	61.2	61.2
error	70.9	64	61.4
error		63.4	60
error	69.9	58.7	60.3
error			58.3
error	66.1	55.3	53.4
error	66.7	58.5	54.9
error		55.3	53.9
error	73.8	55.3	N/A
error	75.2	55.6	N/A
no sample	N/A	55.9	N/A

DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM
09/08/2001	09/08/2001	20/09/2001	20/09/2001	12/10/2001	12/10/2001	08/11/2001	08/11/2001
61.4	58.7	50.5	49.6	49	51.4	51.2	51.4
61.5	58.7	50.4	49.9	49.4	51.5	52.1	54.5
61.6	58.7	49.2	48.8	49.2	51	51.5	54.7
58.2	55.4	50.1	48.8	47.7	49.5	51.4	54.8
58.7	55.7	49.9	48.8	48.8	50.7	51.5	52.5
58.2	55.6	48.5	47.5	48.5	50.3	51.3	54.4
52.3	49.6	42.8	41.9	43.2	44.7	51.3	51
53.1	49.8	42.7	42	45.7	47.8	51.4	54.2
52.6	49.3	40.6	39.9	45.3	47.3	50.4	52.7
48.7	44	37.7	36.6	38.4	39.9	48	50.4
47.9	44.3	37.4	36.3	40.1	41.2	48.5	50.5
46.3	43.1	36.8	35.9	39.8	39.8	49.8	50.6

09/08/2001	20/09/2001	12/10/2001	08/11/2001
61.3	50.4	49.7	51.1
60	50.4	49	52.8
61	49.4	49.2	51.4
58.1	50.4	47.7	51.4
58.8	49.8	48.8	51.4
58.8	48.7	48.3	51.4
52	44.2	42.5	50.5
53.1	43.7	45.7	51.3
52.5	40.7	45.3	50.4
48.5	37.7	38.4	47.9
47.9	37.4	40.1	48.3
46.3	36.9	39.8	43.6

DCLM MS/CM	CHEM CNT MS/CM	
12/12/2001	12/12/2001	
58	51.7	A1
58.2	51.7	A2
58.4	51.8	A3
58.2	51.3	B1
58.6	51.7	B2
59.2	52.2	B3
59.9	52.6	C1
60	52.8	C2
61.8	54.3	C3
61.4	54.3	D1
63.7	55.9	D2
63.4	55.7	D3

58.3	A1
58.2	A2
58.5	A3
58.4	B1
58.7	B2
59.4	B3
60.3	C1
60.2	C2
N/A	C3
61.4	D1
63.7	D2
63.4	D3

1/2

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470

CCWA ID	Client ID	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L		%
00E0553/001	A 1	1910	25	8	-2.3
00E0553/002	A 3	1740	26	8	-0.6
00E0553/003	B 1	1750	26	8	2.9
00E0553/004	B 3	1730	26	8.1	1.8
00E0553/005	C 1	1600	26	8	1.4
00E0553/006	C 3	1580	25	8.1	3.9
00E0553/007	D 1	1350	21	8.4	1.4
00E0553/008	D 3	1320	19	8.8	2.2

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Pearson, Grant

To: Lane, Jim
Subject: Lake Clifton

Jim
Attached is a report on the work at Clifton and excel files with the conductivity measurements and chloride analyses. One analysis was done for major ions ans is included in the report. Not sure how far you want me to go with this but it's a start.
Grant


cliftonreport Oct 02.rtf


cliftonall.xls


cliftondataDCLM CHMCNT.xls

Grant Pearson
Research Centre Manager
WA Wildlife Research Centre

Mar 01

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/2001	30000	7080
00E1224/002	A 2	16/03/2001	30000	7010
00E1224/003	A 3	16/03/2001	30000	6970
00E1224/004	B 1	16/03/2001	29000	7160
00E1224/005	B 2	16/03/2001	29000	7070
00E1224/006	B 3	16/03/2001	27000	6800
00E1224/007	C 1	16/03/2001	41000	8730
00E1224/008	C 2	16/03/2001	40000	8740
00E1224/009	C 3	16/03/2001	38000	9020
00E1224/010	D 1	16/03/2001	78000	13500
00E1224/011	D 2	16/03/2001	65000	11900

CCWA ID	Client ID	ECond
		iEC1WZSE
		mS/m
00E1346/001	A 1	8210
00E1346/002	A 2	8200
00E1346/003	A 3	8210
00E1346/004	B 1	8480
00E1346/005	B 2	8300
00E1346/006	B 3	8070
00E1346/007	C 1	7650
00E1346/008	C 2	9370
00E1346/009	C 3	9440
00E1346/010	D 1	17500
00E1346/011	D 2	15100

May 01

CCWA ID	Client ID	Sampled on	Cl	ECond	NS
			iCL1WAAA	iEC1WZSE	iNo Sample
			mg/L	mS/m	
00E1444/001	A 1	23/05/2001	29000	6110	
00E1444/002	A 2	23/05/2001	28000	6010	
00E1444/003	A 3	23/05/2001	28000	5980	
00E1444/004	B 1	23/05/2001	27000	5770	
00E1444/005	B 2	23/05/2001	26000	5820	
00E1444/006	B 3	23/05/2001	26000	5710	
00E1444/007	C 1	23/05/2001	24000	5410	
00E1444/008	C 2	23/05/2001	24000	5500	
00E1444/009	C 3	23/05/2001			1
00E1444/010	D 1	23/05/2001	29000	6000	
00E1444/011	D 2	23/05/2001	28000	6030	
00E1444/012	D 3	23/05/2001	29000	6090	

June 01

Aug 01

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0363/001	A 1	21/06/2001	24000	6900
01E0363/002	A 2	21/06/2001	25000	6910
01E0363/003	A 3	21/06/2001	23000	6890
01E0363/004	B 1	21/06/2001	22000	6280
01E0363/005	B 2	21/06/2001	23000	6480
01E0363/006	B 3	21/06/2001	22000	6450
01E0363/007	C 1	21/06/2001	20000	5690
01E0363/008	C 2	21/06/2001	20000	5920
01E0363/009	C 3	21/06/2001	22000	6090
01E0363/010	D 1	21/06/2001	21000	5460
01E0363/011	D 2	21/06/2001	20000	5560
01E0363/012	D 3	21/06/2001	20000	5410
01E0363/013	A 1	09/08/2001		5870
01E0363/014	A 2	09/08/2001		5870
01E0363/015	A 3	09/08/2001		5870
01E0363/016	B 1	09/08/2001		5540
01E0363/017	B 2	09/08/2001		5570
01E0363/018	B 3	09/08/2001		5560
01E0363/019	C 1	09/08/2001		4960
01E0363/020	C 2	09/08/2001		4980
01E0363/021	C 3	09/08/2001		4930
01E0363/022	D 1	09/08/2001		4400
01E0363/023	D 2	09/08/2001		4430
01E0363/024	D 3	09/08/2001		4310

July 01

CCWA ID	Client ID	Cl	ECond
		iCL1WAAA	iEC1WZSE
		mg/L	mS/m
01E0122/001	A1	21000	5010
01E0122/002	A2	22000	4870
01E0122/003	A3	22000	4830
01E0122/004	B1	22000	4700
01E0122/005	B2	22000	4710
01E0122/006	B3	22000	4620
01E0122/007	C1	18000	4220
01E0122/008	C2	20000	4310
01E0122/009	C3	20000	4270
01E0122/010	D1	17000	3780
01E0122/011	D2	18000	3840
01E0122/012	D3	18000	3870

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0387/001	A1	20/09/2001	19000	4960
01E0387/002	A2	20/09/2001	18000	4990
01E0387/003	A3	20/09/2001	19000	4880
01E0387/004	B1	20/09/2001	19000	4880
01E0387/005	B2	20/09/2001	19000	4880
01E0387/006	B3	20/09/2001	19000	4750
01E0387/007	C1	20/09/2001	17000	4190
01E0387/008	C2	20/09/2001	16000	4200
01E0387/009	C3	20/09/2001	15000	3990
01E0387/010	D1	20/09/2001	14000	3660
01E0387/011	D2	20/09/2001	14000	3630
01E0387/012	D3	20/09/2001	13000	3590

oct 01

Nov 01

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CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0561/001	A 1	12/10/2001	17000	5140
01E0561/002	A 2	12/10/2001	17000	5150
01E0561/003	A 3	12/10/2001	17000	5100
01E0561/004	B 1	12/10/2001	17000	4950
01E0561/005	B 2	12/10/2001	18000	5070
01E0561/006	B 3	12/10/2001	18000	5030
01E0561/007	C 1	12/10/2001	15000	4470
01E0561/008	C 2	12/10/2001	16000	4780
01E0561/009	C 3	12/10/2001	17000	4730
01E0561/010	D 1	12/10/2001	14000	3990
01E0561/011	D 2	12/10/2001	14000	4120
01E0561/012	D 3	12/10/2001	15000	3980
01E0561/013	A 1	08/11/2001		5140
01E0561/014	A 2	08/11/2001		5450
01E0561/015	A 3	08/11/2001		5470
01E0561/016	B 1	08/11/2001		5480
01E0561/017	B 2	08/11/2001		5250
01E0561/018	B 3	08/11/2001		5440
01E0561/019	C 1	08/11/2001		5100
01E0561/020	C 2	08/11/2001		5420
01E0561/021	C 3	08/11/2001		5270
01E0561/022	D 1	08/11/2001		5040
01E0561/023	D 2	08/11/2001		5050
01E0561/024	D 3	08/11/2001		5060

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0787/0	A1	12/12/2001	23000	5170
01E0787/0	A2	12/12/2001	21000	5170
01E0787/0	A3	12/12/2001	21000	5180
01E0787/0	B1	12/12/2001	22000	5130
01E0787/0	B2	12/12/2001	22000	5170
01E0787/0	B3	12/12/2001	22000	5220
01E0787/0	C1	12/12/2001	22000	5260
01E0787/0	C2	12/12/2001	22000	5280
01E0787/0	C3	12/12/2001	23000	5430
01E0787/0	D1	12/12/2001	23000	5430
01E0787/0	D2	12/12/2001	22000	5590
01E0787/0	D3	12/12/2001	22000	5570

Site 1.

WP10 25 0373871
eastern shore. 6375946

WP10 26. 0372588.
western shore. 6375966.

~~326~~
650.
~~3876~~
1300
2576

WP10 28. 0373231
6375966.

Lake Clifton 17/10/00

Transect A

Site 1 Top Bottom.
3 Depth: 70 cm.
2. 1.4 m.
2.0 m.

Site	Cond.	Sal.	Temp°	Cond	Sal.	Temp.
1.	40.0ms	24.0ppk	20.9.	40.5ms	24.4	20.5
3. 15:25	40.3	~~24.2~~ ~~24.1~~ 24.4	19.3	40.7	24.5	19.1
2	41.0	24.7	19.7	41.0	24.7	19.5

Note: Site 1 is peisometer site 100 m offshore.

(65)

530
390
1920

845
450
1095

3773773

~~3758~~ 6375966 East 60

mid ~~60.3~~

Wait 60.3

(0374645)
~~0374~~ 6372890 wpt 33
250
0374~~739~~ 6372890 ~~wpt 34~~
(0374739) wpt 35 wpt 34
0374739 6372890
wpt 59 (~~6384~~)
3759 59 6368456

0375670 6368456
0375302 6368456

~~track~~ 824
3777823 6364207 19.8

3777878 6364197 19.8
wpt 36 hazy mole in/out wpt 40 19.8
wpt 38 Western Side 3758024 6368456
wpt 39 Eastern Side D 3776780 6364197
40 376873 6364197
405
3777878

MS/cm
Low

24/10/60 Clear Windy 15°C

Site	Top	Tol	Temp	D	Bottom		T
A1	41.4	24.9	21.3	70	41.3	24.9	22.1
A2	41.4	25.0	~~20.8~~	20.8 1.4	41.6	25.0	20.6
A3	41.4	25.0	20.9	2.0	41.48	25.2	20.3
B33	40.8	24.6	21.9 ~~20.8~~ 1	.55	41.3	24.9	21.7
B2	40.8 40.8	24.6	21.4	420	41.3	24.9	21.0 ~~20.8~~
B1	~~39.6~~	24.6	22.1	.86	41.3	24.8	21.6
C1	38.0	22.8	21.6	1.15	38.5	23.0	21.5
C2	38.5	23.1	21.7	1.16	38.6	23.1	21.7
C3	37.9	22.6	~~22.4~~	.57	37.9	22.7	22.4
D1	33.1	19.6	22.5	.83	33.0	19.6	22.6
D2	32.5	19.1	22.5	.90	32.5	19.1	22.7
D3	31.8	18.8	23.1	.70	31.9	18.8	23.1

2. ~~Mg~~ NaS 27.0

17/10/00 Clifton

Site A.

depth	Shore sampled	C.	‰	T
17cm. (12m)	10m	40.8 ms	24.6 ppt	22.7°C
30cm. (20m)	20m surface	40.8	24.5	23.1
	20m bottom	40.6	24.4	23.1
35cm.	30m surface	40.5	24.4	22.7
	30m bottom	40.6	24.4	22.7
41cm.	40m surface	40.6	24.4	22.5
	40m bottom	40.6	24.4	22.4
44cm.	50m surface	40.9	24.6	21.9
	50m bottom	40.9	24.6	21.8
42cm.	60m surface	40.9	24.6	21.6
	60m bottom	41.0	24.6	21.6
46cm.	70m surface	40.8	24.6	21.3
	70m bottom	40.9	24.6	21.2

Depth Guage (33) 4.33 m

15/12/00		COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	CLM gg
1050hrs	A1	48.9	29.9	26.1	49.2	30.0	26.1	0.6	4.12m at CALM gauge
	A2	49.3	30.1	25.1	49.2	30.0	24.9	1.6	
	A3	49.4	30.2	25.9	49.0	29.9	25.0	1.2	
	B1	49.8	30.4	26.3	50.0	30.5	26.3	0.5	
	B2	49.4	30.2	25.5	49.7	30.3	25.5	0.8	
	B3	49.6	30.3	26.7	50	30.5	26.4	0.4	
	C1	50.0	30.5	26.3	50.1	30.6	26.2	0.8	
	C2	49.7	30.3	26.6	50.1	30.6	26.5	0.8	
	C3	50.5	31.0	29.1	50.6	31	29.1	0.25	
	D1	49.7	30.3	28.0	49.7	30.3	27.9	0.4	
	D2	48.9	29.9	27.2	49.8	30.4	26.9	0.3	
1315hrs	D3	49.8	30.4	28.6	50.1	30.6	28.4	0.4	

22/01/2001		ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	61.8		24.2	61.5		24.4	1	3.93m at Calm gauge
	A2	62.0		23.8	61.9		24.0	1.6	
	A3	61.6		23.9	61.5		24.0	1.1	
	B1	66.5		25.5	66.4		25.5	0.3	
	B2	62.1		24.4	62.1		24.5	0.6	
	B3	66.5		24.9	65.9		25.0	0.3	
	C1	71.4		24.7	71.4		24.9	0.5	
	C2	71.0		24.3	70.9		24.3	0.6	
	C3	74.1		25.5	75.2		25.1	0.2	
	D1	85.2		26.2	84.4		26.3	0.3	
	D2	81.4		25.6	81.1		25.6	0.3	
	D3	83.1		27.1	82.6		27.1	0.2	

16/3/01

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MARCH	2001	GBP						
SITE	TIME	ANAL.	TOP CON MS/CM	TOP TEMP C	B. CON MS/CM	B. TEMP C	DEPTH (M)	COMMENTS DEPTH GAUGE = 3.67M at Calm gauge
A1		CLM	29.2	19.3	29.2	19.6	3.67 GG	
		CC						
A2		CLM	26.5	18.8	33.7	19.7	1.4	
		CC						
A3		CLM	26.3	18.3	22.3	19.0	0.6	
		CC						
B1		CLM	69.4	20.4	68.3	20.4	0.2	
		CC						
B2		CLM	69.4	20.2	69.5	20.4	0.35	
		CC						
B3		CLM	67.9	24.1	-	-	0.05	
		CC						
C1	1350	CLM	86.4	21.9	85.6	22.0	0.2	WPT 069
		CC						
C2		CLM	87.0	21.2	83.1	20.0	0.4	
		CC						
C3		CLM	45.9	25.9	-	-	0.05	WPT 071
		CC						
D1	1530	CLM	-	-	-	-	0.05	
		CC						
D2		CLM	-	-	-	-	0.1	
		CC						

CLM- Analysis from CALM Woodvale
CC- Analysis from Chemistry Centre

15/12/00

	20/09/2000	24/10/2000	15/12/2000	22/01/2001	20/02/2001
A1	50.5	41.3	48.9	61.8	67.7
A2	50.4	41.6	49.3	62	68.3
A3	49.2	41.8	49.4	61.6	68.7
B1	50.1	41.3	49.8	66.5	68.3
B2	49.9	41.3	49.4	62.1	68.4
B3	48.5	41.3	49.6	66.5	68.2
C1	42.8	38.5	50	71.4	79.5
C2	42.7	38.6	49.7	71	81.8
C3	40.6	37.9	50.5	74.1	86.3
D1	37.7	33	49.7	85.2 na	
D2	37.4	32.5	48.9	81.4	93
D3	36.8	31.9	49.8	83.1 na	

BOTTOM

		24/10/2000	15/12/2000	22/01/2001	20/02/2001
A1	50.4	41.4	49.2	61.5	67.5
A2	50.4	41.4	49.2	61.9	63.2
A3	49.4	41.4	49	61.5	65.5
B1	50.4	40.8	50	66.4	68.4
B2	49.8	40.8	49.7	62.1	68.2
B3	48.7	40.8	50	65.9	67.8
C1	44.2	38	50.1	71.4	79.4
C2	43.7	38.5	50.1	70.9	79.1
C3	40.7	37.9	50.6	75.2	86.5
D1	37.7	33.1	49.7	84.4	91.8
D2	37.4	32.5	49.8	81.1	94.9
D3	36.9	31.8	50.1	82.6	98.5

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April 3.64

16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
	78.1	73.3	66.5	61.1	61.4	50.5
	118.3	69.4	67.4	61.2	61.5	50.4
	na	71.5	64.3	61.4	61.6	49.2
	69.4 na	69.9	63.6	60	58.2	50.1
	69.4 na	69.3	63.7	60.3	58.7	49.9
	67.9 na	69.9	61.7	58.9	58.2	48.5
	86.4 na	65.3	55.2	53.3	52.3	42.8
	87 na	66.7	57.4	54.6	53.1	42.7
	45.9 na	67.7	59.5	53.9	52.6	40.6
	na	73.8	55.3 na		48.7	37.7
	na	75	55.6 na		47.9	37.4
	na	75.2	55.2 na		46.3	36.8

16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
	76	73.3	65.9	60.8	61.3	50.4
	120	68.3	61.2	61.2	60	50.4
	na	70.9	64	61.4	61	49.4
	68.3 na		63.4	60	58.1	50.4
	69.5 na	69.9	58.7	60.3	58.8	49.8
na	na			58.3	58.8	48.7
	85.6 na	66.1	55.3	53.4	52	44.2
	83.1 na	66.7	58.5	54.9	53.1	43.7
na	na		55.3	53.9	52.5	40.7
na	na	73.8	55.3 na		48.5	37.7
na	na	75.2	55.6 na		47.9	37.4
na	na	na	55.9 na		46.3	36.9

April 01

Meter failure. Samples collected for them

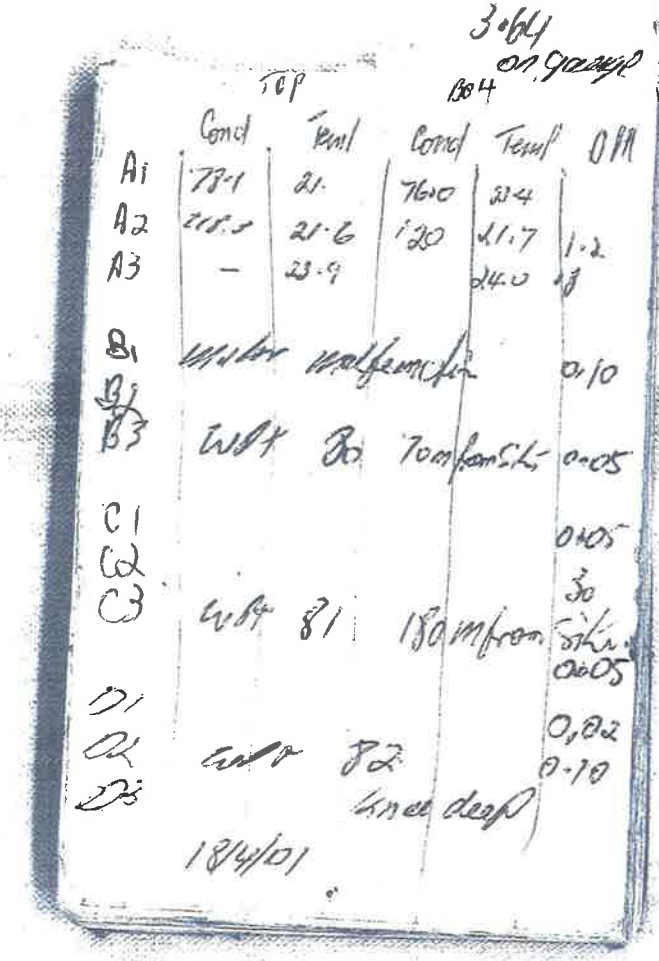
Centre Analysis

15 April 2001

Meter failed

Water samples collected

for Chem Centre



3.6L
on gauge

	Top Cond	Top Temp	B4 Cond	B4 Temp	OM
A1	78.1	21.	76.0	23.4	
A2	215.3	21.6	120	21.7	1.2
A3	—	23.9		24.0	
B1	water		malfunction		0.10
B2					
B3	WBH	B2	70m from S.L.		0.05
C1					0.05
C2					30
C3	wet	81	180m from		0.05
D1					
D2	wet	B2			0.02
D3			knee deep		0.10

18/4/01

Survey conducted in Avon Estuary 23/5/01
using the Ocean Kayak.

23/5/01 (58)

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	73·3		18·6		73·3	18·1	0·7	
	A2	373229		69·4		17·1		68·3	17·1	1·45	
	A3	372708		71·5		17·4		70·9	17·1	0·940	
	B1	374648	6372890	69·9		19·6		–	–	0·300	
	B2	374250		69·3		19·8		69·9	19·9	0·500	
	B3	373752		69·9		19·9		–	–	0·300	
	C1	375867	6368456	65·3		18·6		66·1	18·1	0·400	
	C2	375670		66·7		17·5		66·7	17·5	0·300	
	C3	375302		67·7		19·7		–	–	0·200	28m east of position
	D1	377628	6364207	73·8		15·4		73·8	15·4	0·330	
	D2	377272		75·0		15·7		75·2	15·8	0·220	
	D3	376971		75·2		16·7		–	–	0·150	30m east of position

Depth gauge (No. 2) at ST JOHN ROAD read 3·74m at 1645 hrs.

NOTE: Problems with TPS not settling down water samples need to be re-measured and checked against field values.

DATE	23/6/01						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1		CALM	78.1	21	76.0	21.4	1.0
		CC					
A2		CALM	E	21.6	E	21.7	1.2
		CC					
A3		CALM	E	23.9	E	24.0	0.3
		CC					
B1		CALM	E		E		0.1
		CC					
B2		CALM	E		E		0.5
		CC					
B3		CALM	E		E		0.05
		CC					
C1		CALM	E		E		0.05
		CC					
C2		CALM	E		E		0.3
		CC					
C3		CALM	E		E		0.05
		CC					
D1		CALM	E		E		0.02
		CC					
D2		CALM	E		E		0.01
		CC					
D3		CALM	-				
		CC					-

"E" denotes Error in TPS conductivity meter recording

19/7/01

60.8

WTW unit 3.77 GJ

	Chiller Tol Con	Tol	19/7/01 Btm Con	Btm Tool	Delta
A1	61.1	12.6	60.8	12.6	1.5
A2	61.2	12.3	61.2	12.3	2.0
A3	61.4	12.3	61.4	12.3	1.0
B1	60	12.6	60.0	12.7	0.6
B2	60.3	12.3	60.3	12.3	1.0
B3	58.9	13.1	58.3	13.0	0.2
				53.4	13.5 1300
C1	53.3	13.2	53.4	53.4	Off
C2	54.0	13.1	54.9	13.4	1.3
C3	53.9	14.5	53.9	14.8	0.6 0.1 1320
D1	?	14.1	?		0.5
D2	?		?		1.0
D3	)		)		0.1

Same files taken - No reading
E3 message

ALAN CLARKE
CLAIR M'GUIRE

4/8/04

(45)

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	61·4		16·2	61·3		15·1	1·010	10·40
	A2	373229		61·5		14·9	60·0		14·9	2·000	
	A3	372708		61·6		14·9	61·0		15·3	1·410	
	B1	374648	6372890	58·2		15·9	58·1		15·8	0·58	
	B2	374250		58·7		15·3	58·8		15·4	0·90	
	B3	373752		58·2		16·7	58·8		16·1	0·43	
	C1	375867	6368456	52·3		16·0	52·0		16·0	0·88	
	C2	375670		53·1		15·7	53·1		15·7	0·92	12·30pm
	C3	375302		52·6		16·2	52·5		16·3	0·35	40m east of point
	D1	377628	6364207	48·7		16·3	48·6		16·3	0·46	
	D2	377272		47·9		15·9	47·9		16·0	0·73	
	D3	376971		46·3		16·5	46·3		16·5	0·42	1·00pm

Depth = 4.06M

20/9/07

Depth Gauge = 4.016

(154)

DATE	~~23/6/01~~						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1	1115	CALM 12 ppt	50.5	17.1	50.4	17.1	1.1
		CC					
A2		CALM	50.4	17.3	50.4	17.3	1.8
		CC					
A3		CALM	49.2	16.4	49.4	16.4	1.2
		CC					
B1		CALM 18 ppt	50.1	16.8	50.4	16.9	0.8
		CC					
B2		CALM	49.9	16.3	49.8	16.3	0.8
		CC					
B3		CALM	48.5	16.5	48.7	16.5	0.4
		CC					
C1		CALM 11 ppt	42.8	16.5	44.2	16.9	0.8
		CC					
C2		CALM	42.7	16.3	43.7	16.5	1.0
		CC					
C3		CALM	40.6	15.8	40.7	15.8	0.4
		CC					
D1		CALM 12 ppt	37.7	16.6	37.7	16.6	0.5
		CC					
D2		CALM	37.4	16.5	37.4	16.5	0.7
		CC					
D3		CALM	36.8	16.3	36.9	16.3	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Calibrated at 2760 µS. 20/9/07

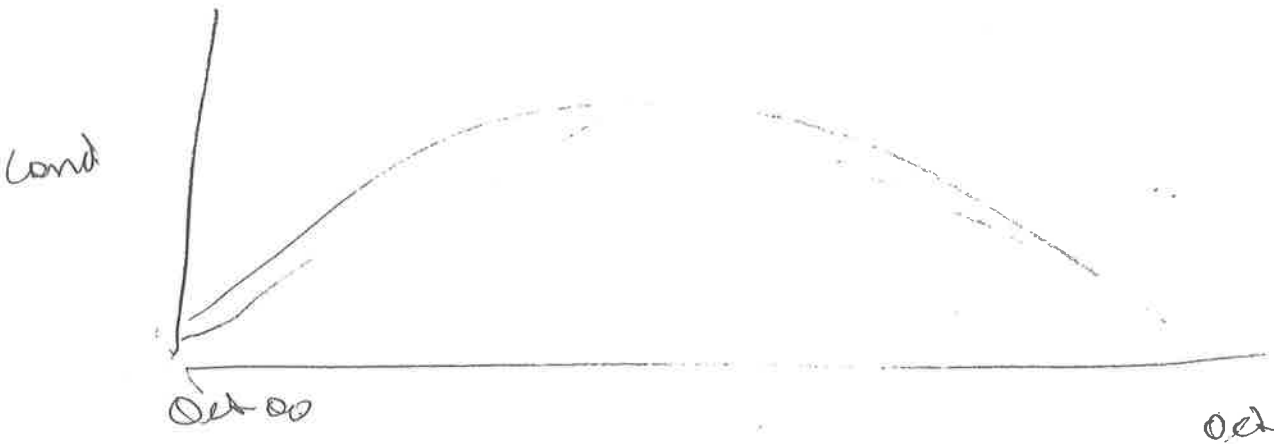
12/10/01

53

DATE	12/10/01	Gleeson	[illegible]	[illegible]			
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH 4.23
A1	11.13	CALM	49.0	17.9	49.7	17.9	1.2
		CC					
A2	11.9	CALM	49.4	17.8	49.0	17.9	2.0
		CC					
A3	11 00	CALM	49.2	17.9	49.2	17.8	0.60
		CC					
B1	10 26	CALM	47.7	16.9	47.7	16.9	0.60
		CC					
B2	1030	CALM	48.8	17.6	48.8	17.6	0.90
		CC					
B3	1035	CALM	48.5	17.8	48.3	17.8	0.50
		CC					
C1	0930	CALM	[illegible]	16.6	[illegible]	16.9	0.70
		CC	43.2	16.9	42.5	16.9	
C2	0944	CALM	45.7	17.7	45.7	17.7	0.9
		CC					
C3	0950	CALM	45.3	17.7	45.3	17.8	0.4
		CC					
D1	1016	CALM	38.4	17.4	38.4	17.4	0.4
		CC					
D2	1010	CALM	40.1	17.7	40.1	17.7	0.6
		CC					
D3	1005	CALM	39.8	17.8	39.8	17.8	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Wind - 15-20 Km/Hr SW.



8/11/01

52

Lake Chelan 8/11/01

Good Wind ok with Dead
to 109.

Begin C1 with C1/29.

8/11/01

		Surface	Temp	Bottom	Temp	Depth	4.9"
	A1	51.2	21.2	~~50.2~~ 51.2	20.9	1.2	
	A2	52.1	20.8	52.0	21.2	1.9	No data 2.0
	A3	51.5	19.1	51.4	19.0	.8	
	B1	51.4	23.3	51.4	23.4	0.6	
	B2	51.5	20.3	51.4 Marks	20.3	1.0	
	B3	51.3	22.7	51.4	22.6	0.5	0.5
1240	C1	51.3	20.9	50.5	22.2	0.6	0.6
	C2	51.4	21.4	51.3	21.3	0.9	0.9
1255	C3	50.4	22.6	50.4	22.2	0.3	
	D1	48.0	25.1	47.9	25.1	0.3	
	D2	48.5	23.6	48.3	23.9	0.6	
1430	D3	48.8	24.4	48.6	24.4	0.4	

DATE 12/12/01 SAMPLER ALAN CLARKE

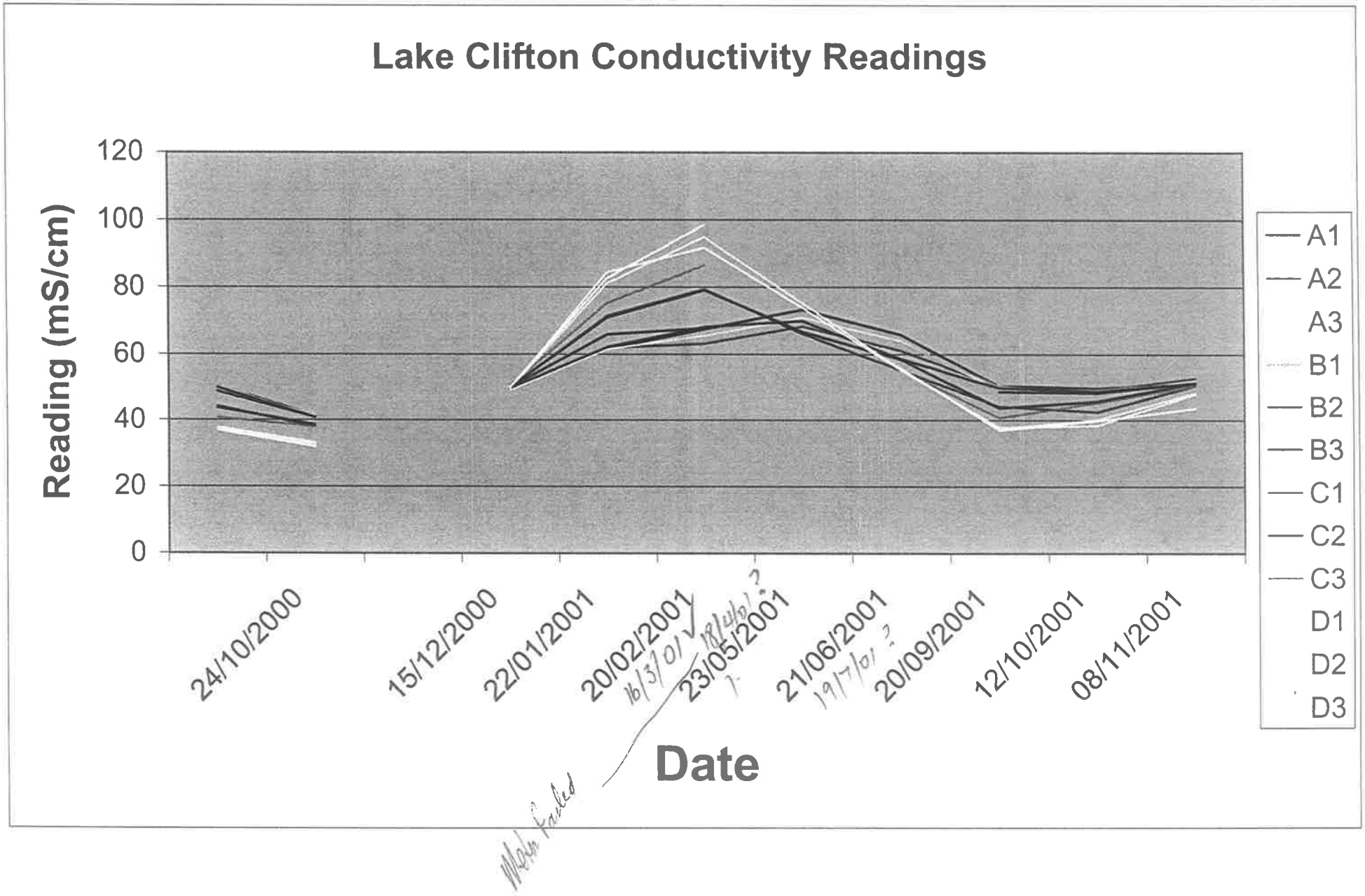
depth at gauge 2 was 4.00m.

SITE	EAST WGS84	NORTH WGS84	EAST AUS G 66	NORTH AUS G 66	COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	TIME
A1	374048	6376114	373909	6375966	58.0		22.4	58.3		22.0	0.84	12 40
A2	373368		373229		58.2		22.0	58.2		21.6	1.52	
A3	372847		372708		58.4		22.4	58.5		22.2	1.18	1215
B1	374787	637038	374648	6372890	58.2		23.1	58.4		22.4	0.46	1200
B2	374389		374250		58.6		22.8	58.7		22.5	0.78	
B3	373891		373752		59.2		24.1	59.4		24.0	0.34	11.44
C1	376001	6368604	375867	6368456	59.9		21.8	60.3		21.6	0.67	
C2	375809		375670		60.0		21.6	60.2		21.3	0.78	
C3	375441		375302		61.8		23.7				0.22	one reading only
D1	377767	6364355	377628	6364207	61.4		21.8	61.4		21.8	0.38	10.45
D2	377411		377272		63.3		20.6	63.7		20.5	0.48	
D3	377110		376971		63.2		21.1	63.4		21.1	0.28	10.25

Calibration of TPS 90-FLMV

2.76ms/cm (field quantity) read 2.75ms @ 22.4°c

Calibration O.K. Span 103.2%


Lake Clifton Conductivity Readings
Reading (mS/cm)
120
100
80
60
40
20
0
24/10/2000
15/12/2000
22/01/2001
20/02/2001
23/05/2001
21/06/2001
20/09/2001
12/10/2001
08/11/2001
Date
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3

DATE	SIT	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
22/01/01								3.93
		ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	61.8		24.2	61.5		24.4	1
	A2	62		23.8	61.9		24	1.6
	A3	61.6		23.9	61.5		24	1.1
	B1	66.5		25.5	66.4		25.5	0.3
	B2	62.1		24.4	62.1		24.5	0.6
	B3	66.5		24.9	65.9		25	0.3
	C1	71.4		24.7	71.4		24.9	0.5
	C2	71		24.3	70.9		24.3	0.6
	C3	74.1		25.5	75.2		25.1	0.2
	D1	85.2		26.2	84.4		26.3	0.3
	D2	81.4		25.6	81.1		25.6	0.3
	D3	83.1		27.1	82.6		27.1	0.2

DATE	12/10/01	Gleerson	[redacted]	[redacted]			
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH 4'23
A1	11·13	CALM	49·0	17·9	49·7	17·9	1·2
		CC					
A2	11·9	CALM	49·4	17·8	49·0	17·9	2·0
		CC					
A3	11 00	CALM	49·2	17·9	49·2	17·8	0·60
		CC					
B1	10 25	CALM	47·7	16·9	47·7	16·9	0·60
		CC					
B2	1030	CALM	48·8	17·5	48·8	17·6	0·90
		CC					
B3	1035	CALM	48·2	17·8	48·3	17·8	0·50
		CC					
C1	09 30	CALM	[redacted]	16·6	[redacted]	16·7	0·70
		CC	43·2	16·9	42·8	16·9	
C2	0944	CALM	45·7	17·7	45·7	17·7	0·9
		CC					
C3	0950	CALM	45·3	17·7	45·3	17·8	0·4
		CC					
D1	1016	CALM	38·4	17·4	38·4	17·4	0·4
		CC					
D2	1010	CALM	40·1	17·7	40·1	17·7	0·6
		CC					
D3	1005	CALM	39·8	17·8	39·8	17·8	0·4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Wind – 15-20 Km/Hr SW.

01E0363/002	A 2	21/06/2001	25000	6910
01E0363/003	A 3	21/06/2001	23000	6890
01E0363/004	B 1	21/06/2001	22000	6280
01E0363/005	B 2	21/06/2001	23000	6480
01E0363/006	B 3	21/06/2001	22000	6450
01E0363/007	C 1	21/06/2001	20000	5690
01E0363/008	C 2	21/06/2001	20000	5920
01E0363/009	C 3	21/06/2001	22000	6090
01E0363/010	D 1	21/06/2001	21000	5460
01E0363/011	D 2	21/06/2001	20000	5560
01E0363/012	D 3	21/06/2001	20000	5410
01E0122/001	A1	31/07/2001	21000	5010
01E0122/002	A2	31/07/2001	22000	4870
01E0122/003	A3	31/07/2001	22000	4830
01E0122/004	B1	31/07/2001	22000	4700
01E0122/005	B2	31/07/2001	22000	4710
01E0122/006	B3	31/07/2001	22000	4620
01E0122/007	C1	31/07/2001	18000	4220
01E0122/008	C2	31/07/2001	20000	4310
01E0122/009	C3	31/07/2001	20000	4270
01E0122/010	D1	31/07/2001	17000	3780
01E0122/011	D2	31/07/2001	18000	3840
01E0122/012	D3	31/07/2001	18000	3870
01E0363/013	A 1	09/08/2001		5870

G. Pearson

Conductivity / Salinity of Sites A, B, C, D.

24/10/00

Lake Clifton
G Pearson

24/10/2000
.

Northing	SITE (B. Knott)	Con top ms/cm	Sal top ppt	Temp top C	Con bottom ms/cm	Sal bottom ppt	Temp bottom C	depth m
6375966	A1	41.4	24.9	21.3	41.3	24.9	21.1	0.7
	A2	41.4	25	20.8	41.6	25	20.6	1.4
	A3	41.4	25	20.9	41.8	25.2	20.3	2
6372890	B1	40.8	24.6	22.1	41.3	24.8	21.6	0.86
	B2	40.8	24.6	21.4	41.3	24.9	21	1.2
	B3	40.8	24.6	21.9	41.3	24.9	21.7	0.55
6368456	C1	38	22.8	21.6	38.5	23	21.5	1.15
	C2	38.5	23.1	21.7	38.6	23.1	21.7	1.15
	C3	37.9	22.6	22.4	37.9	22.7	22.4	0.57
6364207	D1	33.1	19.6	22.5	33	19.6	22.6	0.83
	D2	32.5	19.1	22.5	32.5	19.1	22.7	0.9
	D3	31.8	18.8	23.1	31.9	18.8	23.1	0.7

CHEM CENTRE RESULTS of Major Ions

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850	1580	25	8.1	3.9
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

Jim

This arrived today less the conductivity results.

Jenny McGuire will forward them later today.

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470

CHEM CENTRE RESULTS of Major Ions

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850	1580	25	8.1	3.9
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

Jim

This arrived today less the conductivity results.

Jenny McGuire will forward them later today.

(57)

G. Pearson

Conductivity / Salinity of Sites A, B, C, D.

24/10/00

Lake Clifton
G Pearson

24/10/2000
.

Northing	SITE (B. Knott)	Con top ms/cm	Sal top ppt	Temp top C	Con bottom ms/cm	Sal bottom ppt	Temp bottom C	depth m
6375966	A1	41.4	24.9	21.3	41.3	24.9	21.1	0.7
	A2	41.4	25	20.8	41.6	25	20.6	1.4
	A3	41.4	25	20.9	41.8	25.2	20.3	2
6372890	B1	40.8	24.6	22.1	41.3	24.8	21.6	0.86
	B2	40.8	24.6	21.4	41.3	24.9	21	1.2
	B3	40.8	24.6	21.9	41.3	24.9	21.7	0.55
6368456	C1	38	22.8	21.6	38.5	23	21.5	1.15
	C2	38.5	23.1	21.7	38.6	23.1	21.7	1.15
	C3	37.9	22.6	22.4	37.9	22.7	22.4	0.57
6364207	D1	33.1	19.6	22.5	33	19.6	22.6	0.83
	D2	32.5	19.1	22.5	32.5	19.1	22.7	0.9
	D3	31.8	18.8	23.1	31.9	18.8	23.1	0.7

20/9/07

(45)

Depth Gauge = 4.16

DATE	~~23/6/01~~						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1	1115	CALM	50.5	17.1	50.4	17.1	1.1
		CC					
A2		CALM	50.4	17.3	50.4	17.3	1.8
		CC					
A3		CALM	49.2	16.4	49.4	16.4	1.2
		CC					
B1		CALM	50.1	16.8	50.4	16.9	0.8
		CC					
B2		CALM	49.9	16.3	49.8	16.3	0.8
		CC					
B3		CALM	48.5	16.5	48.7	16.5	0.4
		CC					
C1		CALM	42.8	16.5	44.2	16.9	0.8
		CC					
C2		CALM	42.7	16.3	43.7	16.5	1.0
		CC					
C3		CALM	40.6	15.8	40.7	15.8	0.4
		CC					
D1		CALM	37.7	16.6	37.7	16.6	0.5
		CC					
D2		CALM	37.4	16.5	37.4	16.5	0.7
		CC					
D3		CALM	36.8	16.3	36.9	16.3	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Calibrated at 2760 uS. 20/9.

(40)

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51
Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mob. 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Woodvale
Date: 17/10/2000
Subject: Lake Clifton samples

I would be grateful if you would please analyse the accompanying ~~eight~~ 8 surface water samples from Lake Clifton for conductivity ~~and ionic composition (major ions)~~.

22 Samples (frozen) from S/West Wetland Monitoring Program to add to samples from delivered in September. Total N.

1 Sample from Lake Niwan Total N Conductivity

2 Samples Lake Clifton from Transect A Sites A1 + A3

Conductivity Major ions

39

CHEMISTRY CENTRE

Your Ref :
Our Ref :
Enquiries to 01E0561; 3.1.1
Telephone Jenny McGuire

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

24 samples of water received on 13 November 2001

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
01E0561/001	A 1	12/10/01	17000	5140
01E0561/002	A 2	12/10/01	17000	5150
01E0561/003	A 3	12/10/01	17000	5100
01E0561/004	B 1	12/10/01	17000	4950
01E0561/005	B 2	12/10/01	18000	5070
01E0561/006	B 3	12/10/01	18000	5030
01E0561/007	C 1	12/10/01	15000	4470
01E0561/008	C 2	12/10/01	16000	4780
01E0561/009	C 3	12/10/01	17000	4730
01E0561/010	D 1	12/10/01	14000	3990
01E0561/011	D 2	12/10/01	14000	4120
01E0561/012	D 3	12/10/01	15000	3980
01E0561/013	A 1	08/11/01	-	5140
01E0561/014	A 2	08/11/01	-	5450
01E0561/015	A 3	08/11/01	-	5470
01E0561/016	B 1	08/11/01	-	5480
01E0561/017	B 2	08/11/01	-	5250
01E0561/018	B 3	08/11/01	-	5440
01E0561/019	C 1	08/11/01	-	5100
01E0561/020	C 2	08/11/01	-	5420
01E0561/021	C 3	08/11/01	-	5270
01E0561/022	D 1	08/11/01	-	5040
01E0561/023	D 2	08/11/01	-	5050
01E0561/024	D 3	08/11/01	-	5060

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

Chemistry Centre of Western Australia
Environmental Chemistry Section

REPORT OF EXAMINATION

These results apply only to the sample(s) as received. Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

20 November 2001

37

CHEMISTRY CENTRE

Your Ref :
Our Ref : 01E0787; 3.1.1
Enquiries to Jenny McGuire
Telephone

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

12 samples of water received on 8 January 2002

01E0787/001 Clifton
01E0787/002 Clifton
01E0787/003 Clifton
01E0787/004 Clifton
01E0787/005 Clifton
01E0787/006 Clifton
01E0787/007 Clifton
01E0787/008 Clifton
01E0787/009 Clifton
01E0787/010 Clifton
01E0787/011 Clifton
01E0787/012 Clifton

Analyte		Cl	ECond
Unit		mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**	
01E0787/001	A1	12/12/01	23000 5170
01E0787/002	A2	12/12/01	21000 5170
01E0787/003	A3	12/12/01	21000 5180
01E0787/004	B1	12/12/01	22000 5130
01E0787/005	B2	12/12/01	22000 5170
01E0787/006	B3	12/12/01	22000 5220
01E0787/007	C1	12/12/01	22000 5260
01E0787/008	C2	12/12/01	22000 5280
01E0787/009	C3	12/12/01	23000 5430
01E0787/010	D1	12/12/01	23000 5430
01E0787/011	D2	12/12/01	22000 5590
01E0787/012	D3	12/12/01	22000 5570

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

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Chemistry Centre of Western Australia
Environmental Chemistry Section

REPORT OF EXAMINATION

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Jenny McGuire
Principal Chemist
Environmental Chemistry Section

16 January 2002

Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Research Centre Manager
Date: 23/10/01
Subject: Lake Clifton –24 samples from October and November 2001

I would be grateful if you would analyse the accompanying 12 samples of water from Lake Clifton taken on October 12 2001 for conductivity and chloride and the twelve samples taken on November 8 for conductivity.

Many thanks

Grant Pearson

Your Ref :
Our Ref : 00E1444; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

12 samples of water received on 29 May 2001

Analyte / **Unit**			Cl mg/L	ECond mS/m	NS
CCWA ID	**Client ID**	**Sampled**			
00E1444/001	A 1	23/05/01	29000	6110	-
00E1444/002	A 2	23/05/01	28000	6010	-
00E1444/003	A 3	23/05/01	28000	5980	-
00E1444/004	B 1	23/05/01	27000	5770	-
00E1444/005	B 2	23/05/01	26000	5820	-
00E1444/006	B 3	23/05/01	26000	5710	-
00E1444/007	C 1	23/05/01	24000	5410	-
00E1444/008	C 2	23/05/01	24000	5500	-
00E1444/009	C 3	23/05/01	-	-	1
00E1444/010	D 1	23/05/01	29000	6000	-
00E1444/011	D 2	23/05/01	28000	6030	-
00E1444/012	D 3	23/05/01	29000	6090	-

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.
NS	iNo Sample	Sample not received

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

00E1444
13 June 2001

Chemistry Centre (WA)
125 Hay Street, East Perth,Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

Chemistry Centre of Western Australia
Environmental Chemistry Section

REPORT OF EXAMINATION

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

13 June 2001

DATE SAMPLER

SITE	EAST	NORTH	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
	WGS84	WGS84	AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
A1	374048	6376114	373909	6375966							
A2	373368		373229								
A3	372847		372708								
B1	374787	637038	374648	6372890							
B2	374389		374250								
B3	373891		373752								
C1	376001	6368604	375867	6368456							
C2	375809		375670								
C3	375441		375302								
D1	377767	6364355	377628	6364207							
D2	377411		377272								
D3	377110		376971								

(31)

CHEMISTRY CENTRE

Your Ref :
Our Ref : 00E1347; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Preview Report on:

2 samples of water received on 4 May 2001

Analyte			ECond	K	N_total
Unit			mS/m	mg/L	mg/L
CCWA ID	**Client ID**	**Sampled**			
00E1347/001	WRC 2	10/04/01	150	118	100
00E1347/002	WRC 2	10/04/01	159	125	110

Analyte	**Method**	**Description**
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.
K	iMET1WCIP	Potassium.
N_total	iNP1WTFIA	Nitrogen, persulphate total by FIA

These results apply only to the sample(s) as received. Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

11 May 2001

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

Your Ref :
Our Ref : 00E1346; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

11 samples of water received on 4 May 2001

Analyte		ECond
Unit		mS/m
CCWA ID	**Client ID**	
00E1346/001	A 1	8210
00E1346/002	A 2	8200
00E1346/003	A 3	8210
00E1346/004	B 1	8480
00E1346/005	B 2	8300
00E1346/006	B 3	8070
00E1346/007	C 1	7650
00E1346/008	C 2	9370
00E1346/009	C 3	9440
00E1346/010	D 1	17500
00E1346/011	D 2	15100

Analyte	**Method**	**Description**
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

11 May 2001

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jim Lane
From: Grant Pearson
Date: 23/1/01
Subject: Lake Clifton Survey

A survey to obtain conductivity and samples of lake waters along transects A, B, C, and D at Lake Clifton was carried out on Monday January 22 2001. Water level on the CALM depth gauge was 3.93. Wind strength was 20-30 K/h causing considerable wave action that may affect the accuracy of the depth reading. A volunteer Mr Jeff Hansen assisted me.

Surface water had receded about 50 metres beyond the reed line. No conductivities were recorded in this shallow zone.
Site A! was dry so a reading was taken about 10 metres due west of the normal site.
A 3.6 metre dinghy with 15 HP 4 stroke outboard was launched from the western most part of the jetty. Future surveys during periods of water level below 3.9 metres should be carried out using canoe or ski.

Sites at transect D were accessed by rowing from about 1 km north of the transect.

Water samples were collected from the top 15 cm and conductivity and temperature were recorded at each at each sample site. Dr Jeff Turner will be consulted for advice on his return from leave on the nature of analyses that should take place. In the meantime the samples have been frozen and will remain at Woodvale.

Algal (Chara?) growth on the lakebed at transect 1 was less common than previous visits.

Waterbirds were not actively counted during the survey but it appeared that numbers continued to be quite high. Approximate counts for the main species are:

Pacific Black Duck	500
Grey Teal	1000
Australian Shelduck	1500
Musk Duck	300
Maned Duck	2
Black Swan	1500
Red Necked Stint	50
Medium waders	100
Small waders	100
Greenshank	5

An account of the conductivities recorded is appended.

Grant Pearson

DATE 22/01/01	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH 3.93
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966	61.8		24.2	61.5		24.4	1
	A2	373229		62		23.8	61.9		24	1.6
	A3	372708		61.6		23.9	61.5		24	1.1
	B1	374648	6372890	66.5		25.5	66.4		25.5	0.3
	B2	374250		62.1		24.4	62.1		24.5	0.6
	B3	373752		66.5		24.9	65.9		25	0.3
	C1	375867	6368456	71.4		24.7	71.4		24.9	0.5
	C2	375670		71		24.3	70.9		24.3	0.6
	C3	375302		74.1		25.5	75.2		25.1	0.2
	D1	377628	6364207	85.2		26.2	84.4		26.3	0.3
	D2	377272		81.4		25.6	81.1		25.6	0.3
	D3	376971		83.1		27.1	82.6		27.1	0.2

CCWA ID	Client ID	ECond	CO3	Ca	Cl	Fe
		iEC1WZSE	iALK1WATI	iMET1WCIP	iCL1WAAA	iMET1WCIP
		mS/m	mg/L	mg/L	mg/L	mg/L
00E0523/001	Lake Clifton Shore	3990				
00E0523/002	Lake Clifton 12m	4020				
00E0523/003	Lake Clifton 20m	3930				
00E0523/004	Lake Clifton 30m	4050				
00E0523/005	Lake Clifton 40m	4050				
00E0523/006	Lake Clifton 50m	4080				
00E0523/007	Lake Clifton 60m	3990				
00E0523/008	Lake Clifton 70m	4100				
00E0523/009	Lake Clifton A1	4050	<2	442	15000	<0.25
00E0523/010	Lake Clifton A3	4090	<2	450	15000	<0.25
00E0523/011	Lake Ninin	13100				

Word ?

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966							
	A2	373229								
	A3	372708								
	B1	374648	6372890							
	B2	374250								
	B3	373752								
	C1	375867	6368456							
	C2	375670								
	C3	375302								
	D1	377628	6364207							
	D2	377272								
	D3	376971								

GDAit. program used to derive coords (DOLA APPROVED) STEVE JONES GDA.tf run esa file grid file ajustment

WGS84 EQUIVALENT COORDS

A1 374048 6376114

A2 373368 6376114

A3 372847 6376114

B1 374787 6373038

B2 374389 6373038

B3 373891 6373038

C1 376006 6368604

C2 375809 6368604

C3 375441 6368604

D1 377767 6364355

D2 377411 6364355

D3 377110 6364355

SURVEY CONDUCTED BY ALAN CLARKE 23/5/01 using the Ocean Kayak.

(25)

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	73·3		18·6		73·3	18·1	0·7	
	A2	373229		69·4		17·1		68·3	17·1	1·45	
	A3	372708		71·5		17·4		70·9	17·1	0·940	
	B1	374648	6372890	69·9		19·6		–	–	0·300	
	B2	374250		69·3		19·8		69·9	19·9	0·500	
	B3	373752		69·9		19·9		–	–	0·300	
	C1	375867	6368456	65·3		18·6		66·1	18·1	0·400	
	C2	375670		66·7		17·5		66·7	17·5	0·300	
	C3	375302		67·7		19·7		–	–	0·200	28m east of position
	D1	377628	6364207	73·8		15·4		73·8	15·4	0·330	
	D2	377272		75·0		15·7		75·2	15·8	0·220	
	D3	376971		75·2		16·7		–	–	0·150	30m east of position

Depth gauge (No. 2) at ST JOHN ROAD read 3·74m at 1645 hrs.

NOTE: Problems with TPS not settling down water samples need to be re-measured and checked against field values.

(24)

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Chemistry Centre

From: Grant Pearson
Date: 28 Feb 2001
Subject: Lake Clifton analyses

I would be grateful if you would analyse the accompanying 34 samples from Lake Clifton for conductivity and chloride.
The samples are marked according to date and sample site location.

15/12/00	12 samples
22/01/01	12 samples
19/01/01	10 samples

Grant Pearson

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/2001	30000	7080
00E1224/002	A 2	16/03/2001	30000	7010
00E1224/003	A 3	16/03/2001	30000	6970
00E1224/004	B 1	16/03/2001	29000	7160
00E1224/005	B 2	16/03/2001	29000	7070
00E1224/006	B 3	16/03/2001	27000	6800
00E1224/007	C 1	16/03/2001	41000	8730
00E1224/008	C 2	16/03/2001	40000	8740
00E1224/009	C 3	16/03/2001	38000	9020
00E1224/010	D 1	16/03/2001	78000	13500
00E1224/011	D 2	16/03/2001	65000	11900

Your Ref :
Our Ref : Lake Clifton
Enquiries to : 00E1224; 3.1.1
Telephone : Jenny McGuire

CHEMISTRY CENTRE

22

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

11 samples of water received on 30 March 2001

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
00E1224/001	A 1	16/03/01	30000	7080
00E1224/002	A 2	16/03/01	30000	7010
00E1224/003	A 3	16/03/01	30000	6970
00E1224/004	B 1	16/03/01	29000	7160
00E1224/005	B 2	16/03/01	29000	7070
00E1224/006	B 3	16/03/01	27000	6800
00E1224/007	C 1	16/03/01	41000	8730
00E1224/008	C 2	16/03/01	40000	8740
00E1224/009	C 3	16/03/01	38000	9020
00E1224/010	D 1	16/03/01	78000	13500
00E1224/011	D 2	16/03/01	65000	11900

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

(21)

REPORT OF EXAMINATION

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

3 April 2001

CCWA ID	Client ID	ECond
		iEC1WZSE
		mS/m
00E1346/001	A 1	8210
00E1346/002	A 2	8200
00E1346/003	A 3	8210
00E1346/004	B 1	8480
00E1346/005	B 2	8300
00E1346/006	B 3	8070
00E1346/007	C 1	7650
00E1346/008	C 2	9370
00E1346/009	C 3	9440
00E1346/010	D 1	17500
00E1346/011	D 2	15100

(19)

15/12/00		EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH 4.12M
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
1050hrs	A1	373909	6375966	48.9	29.9	26.1	49.2	30	26.1	0.6
	A2	373229		49.3	30.1	25.1	49.2	30	24.9	1.6
	A3	372708		49.4	30.2	25.9	49	29.9	25	1.2
	B1	374648	6372890	49.8	30.4	26.3	50	30.5	26.3	0.5
	B2	374250		49.4	30.2	25.5	49.7	30.3	25.5	0.8
	B3	373752		49.6	30.3	26.7	50	30.5	26.4	0.4
	C1	375867	6368456	50	30.5	26.3	50.1	30.6	26.2	0.8
	C2	375670		49.7	30.3	26.6	50.1	30.6	26.5	0.8
	C3	375302		50.5	31	29.1	50.6	31	29.1	0.25
	D1	377628	6364207	49.7	30.3	28	49.7	30.3	27.9	0.4
	D2	377272		48.9	29.9	27.2	49.8	30.4	26.9	0.3
1315hrs	D3	376971		49.8	30.4	28.6	50.1	30.6	28.4	0.4

Chlorides every second month

Cond every month

Depth at

(17)

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: re: fwd: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 01/19/2001 4:32 PM

Grant

We won't start on sampling for nutrients until I have a specific allocation of funds for th

Measure conductivity, temperature and depth as before. Calibrate instrument against conduct
salinity standard. No point in recording salinity.

DON'T have samples analysed for ALL major ions, but DO have samples analysed for CHLORIDE.

Give Jeff Turner a call and ask if you need to take a chloride sample from every sampling p
(hopefully not, as this would require 24 analyses). If not, how many samples should be take

Jim

From: Grant Pearson@WOOD.SID@CALM, on 19/Jan/2001 2:03 PM:

Jim
I plan to visit Clifton again on Monday and would like to know what parameters
you would like me to measure/collect/ analyse please.
Thanks
gp

From: Jim Lane@BUSS.SID@CALM, on 11/08/2000 1:35 PM:
To: Grant Pearson@WOOD.SID@CALM
Cc: John Blyth@WOOD.SID@CALM

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake
Clifton transects. Assuming you can do all four transects in the one day, any
one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you
know which parameters closer to the day, when I have found out more about the
nutrient monitoring that has been done in the past.

Thanks

JL

(15)

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Date: 30/3/01
Subject: Water analysis 20 February 2001

Dear Jenny,
I would be grateful if you would analyse the accompanying 11 samples from Lake Clifton for:
Chloride
Conductivity.

Grant Pearson

Your Ref :
Our Ref : 00E1084; 3.1.2
Enquiries to: Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

34 samples of water received on 28 February 2001

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
00E1084/001	A1	15/12/00	15000	4060
00E1084/002	A2	15/12/00	8600	2400
00E1084/003	A3	15/12/00	12000	3500
00E1084/004	B1	15/12/00	9000	2700
00E1084/005	B2	15/12/00	12000	3690
00E1084/006	B3	15/12/00	11000	3260
00E1084/007	C1	15/12/00	11000	3420
00E1084/008	C2	15/12/00	10000	3520
00E1084/009	C3	15/12/00	8100	2900
00E1084/010	D1	15/12/00	8300	2820
00E1084/011	D2	15/12/00	12000	3580
00E1084/012	D3	15/12/00	12000	3150
00E1084/013	A1	22/01/01	16000	4460
00E1084/014	A2	22/01/01	11000	5970
00E1084/015	A3	22/01/01	10000	2600
00E1084/016	B1	22/01/01	17000	4690
00E1084/017	B2	22/01/01	9830	2710
00E1084/018	B3	22/01/01	15000	3100
00E1084/019	C1	22/01/01	14000	4000
00E1084/020	C2	22/01/01	19000	7380
00E1084/021	C3	22/01/01	9300	2950
00E1084/022	D1	22/01/01	22000	7180
00E1084/023	D2	22/01/01	26000	6820
00E1084/024	D3	22/01/01	28000	6880
00E1084/025	A1	19/02/01	24000	5960
00E1084/026	A2	19/02/01	24000	7080
00E1084/027	A3	19/02/01	24000	7100
00E1084/028	B1	19/02/01	26000	7260
00E1084/029	B2	19/02/01	27000	6550
00E1084/030	B3	19/02/01	28000	7260

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

Chemistry Centre of Western Australia
Environmental Chemistry Section

REPORT OF EXAMINATION

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
00E1084/031	C1	19/02/01	33000	8460
00E1084/032	C2	19/02/01	33000	8730
00E1084/033	C3	19/02/01	37000	8840
00E1084/034	D2	19/02/01	40000	9850

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

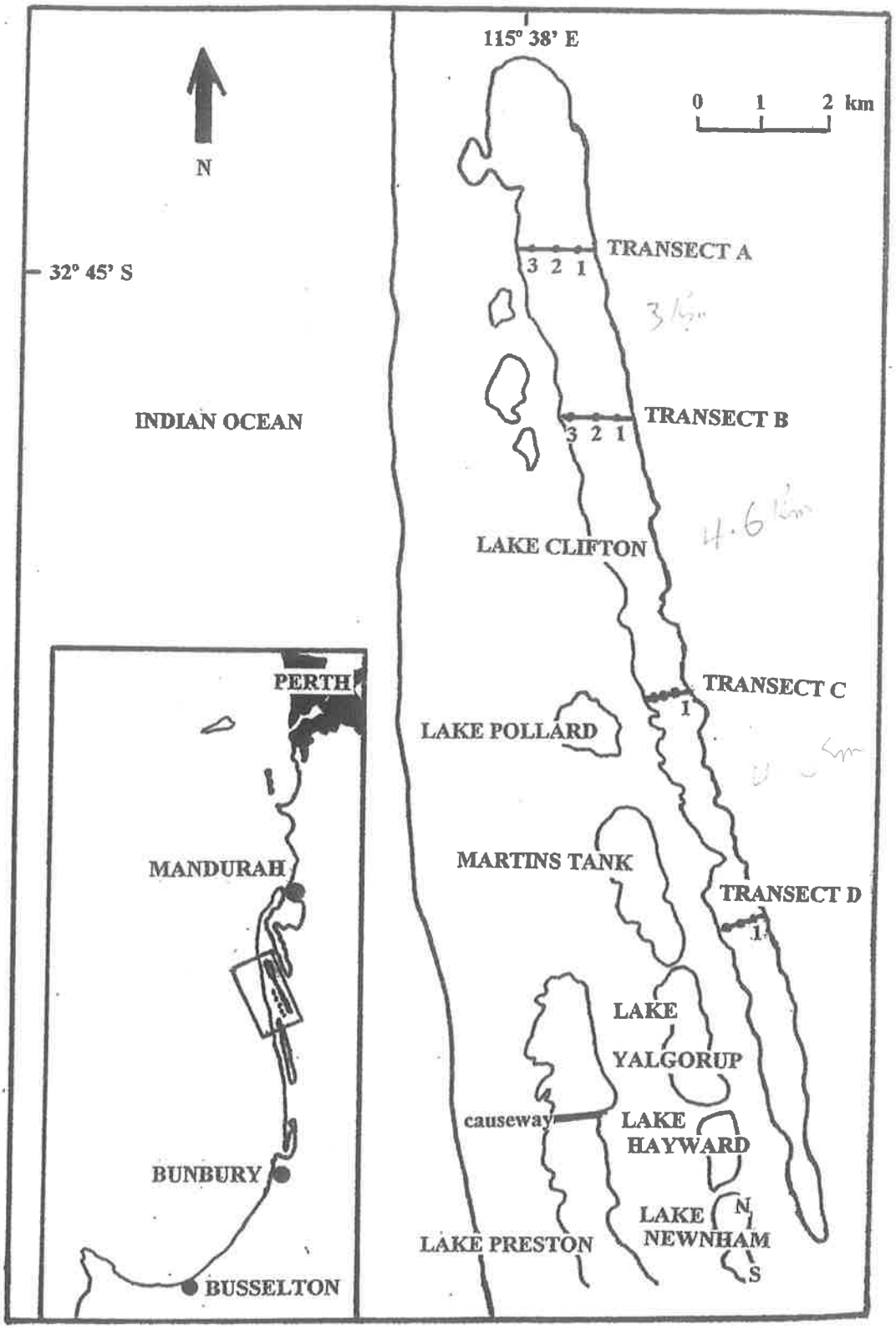
These results apply only to the sample(s) as received. Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

7 March 2001

00E1084
7 March 2001


115° 38' E
N
0 1 2 km
32° 45' S
INDIAN OCEAN
TRANSECT A
3 2 1
TRANSECT B
3 2 1
LAKE CLIFTON
TRANSECT C
1
LAKE POLLARD
MARTINS TANK
TRANSECT D
1
LAKE
YALGORUP
causeway
LAKE
HAYWARD
LAKE
NEWNHAM
N
S
LAKE PRESTON
PERTH
MANDURAH
BUNBURY
BUSSELTON

(12)

Lake Clifton salinity profiling 19/02/01

by Allen Clarke.

Calibration notes

The Metre used was the TPS WP-84

I washed the electrode in distilled water and placed it into a washed beaker of 2.97 mS/cm. The metre did not calibrate, it showed an error "Calibration Unsuccessful."

I washed the probe and the beaker with distilled water and placed the probe in the 2.76 mS/cm standard. The metre read 2.63 mS/cm. Calibration was unsuccessful. @ 20.6°C

"K = 1.02"

"Calibration O.K."

according to the TPS WP-84 manual allowable standards are 150 µS/cm, 1413 µS/cm, 2.76 mS/cm, 12.88 mS/cm, and 58.0 mS/cm.

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966							
	A2	373229								
	A3	372708								
	B1	374648	6372890							
	B2	374250								
	B3	373752								
	C1	375867	6368456							
	C2	375670								
	C3	375302								
	D1	377628	6364207							
	D2	377272								
	D3	376971								

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966							
	A2	373229								
	A3	372708								
	B1	374648	6372890							
	B2	374250								
	B3	373752								
	C1	375867	6368456							
	C2	375670								
	C3	375302								
	D1	377628	6364207							
	D2	377272								
	D3	376971								

15/12/00		EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH 4.12M
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
1050hrs	A1	373909	6375966	48.9	29.9	26.1	49.2	30	26.1	0.6
	A2	373229		49.3	30.1	25.1	49.2	30	24.9	1.6
	A3	372708		49.4	30.2	25.9	49	29.9	25	1.2
	B1	374648	6372890	49.8	30.4	26.3	50	30.5	26.3	0.5
	B2	374250		49.4	30.2	25.5	49.7	30.3	25.5	0.8
	B3	373752		49.6	30.3	26.7	50	30.5	26.4	0.4
	C1	375867	6368456	50	30.5	26.3	50.1	30.6	26.2	0.8
	C2	375670		49.7	30.3	26.6	50.1	30.6	26.5	0.8
	C3	375302		50.5	31	29.1	50.6	31	29.1	0.25
	D1	377628	6364207	49.7	30.3	28	49.7	30.3	27.9	0.4
	D2	377272		48.9	29.9	27.2	49.8	30.4	26.9	0.3
1315hrs	D3	376971		49.8	30.4	28.6	50.1	30.6	28.4	0.4

DATE 22/01/01	SIT	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH 3.93
NAV SYS		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966	61.8		24.2	61.5		24.4	1
	A2	373229		62		23.8	61.9		24	1.6
	A3	372708		61.6		23.9	61.5		24	1.1
	B1	374648	6372890	66.5		25.5	66.4		25.5	0.3
	B2	374250		62.1		24.4	62.1		24.5	0.6
	B3	373752		66.5		24.9	65.9		25	0.3
	C1	375867	6368456	71.4		24.7	71.4		24.9	0.5
	C2	375670		71		24.3	70.9		24.3	0.6
	C3	375302		74.1		25.5	75.2		25.1	0.2
	D1	377628	6364207	85.2		26.2	84.4		26.3	0.3
	D2	377272		81.4		25.6	81.1		25.6	0.3
	D3	376971		83.1		27.1	82.6		27.1	0.2

DATE 22/01/01 NAV SYS	SITE	EAST AUS G 66	NORTH AUS G 66	COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt
	A1	373909	6375966	61.8		24.2	61.5	
	A2	373229		62		23.8	61.9	
	A3	372708		61.6		23.9	61.5	
	B1	374648	6372890	66.5		25.5	66.4	
	B2	374250		62.1		24.4	62.1	
	B3	373752		66.5		24.9	65.9	
	C1	375867	6368456	71.4		24.7	71.4	
	C2	375670		71		24.3	70.9	
	C3	375302		74.1		25.5	75.2	
	D1	377628	6364207	85.2		26.2	84.4	
	D2	377272		81.4		25.6	81.1	
	D3	376971		83.1		27.1	82.6	

TEMP BTM C	DEPTH 3.93 Mtrs
24.4	1
24	1.6
24	1.1
25.5	0.3
24.5	0.6
25	0.3
24.9	0.5
24.3	0.6
25.1	0.2
26.3	0.3
25.6	0.3
27.1	0.2

(6)

Lake Clifton 24/10/2000

Northing	SITE (B. Knott)	Con top ms/cm	Sal top ppt	Temp top C	Con bottom ms/cm	Sal bottom ppt	Temp bottom C
6375966	A1	41.4	24.9	21.3	41.3	24.9	21.1
	A2	41.4	25	20.8	41.6	25	20.6
	A3	41.4	25	20.9	41.8	25.2	20.3
6372890	B1	40.8	24.6	22.1	41.3	24.8	21.6
	B2	40.8	24.6	21.4	41.3	24.9	21
	B3	40.8	24.6	21.9	41.3	24.9	21.7
6368456	C1	38	22.8	21.6	38.5	23	21.5
	C2	38.5	23.1	21.7	38.6	23.1	21.7
	C3	37.9	22.6	22.4	37.9	22.7	22.4
6364207	D1	33.1	19.6	22.5	33	19.6	22.6
	D2	32.5	19.1	22.5	32.5	19.1	22.7
	D3	31.8	18.8	23.1	31.9	18.8	23.1

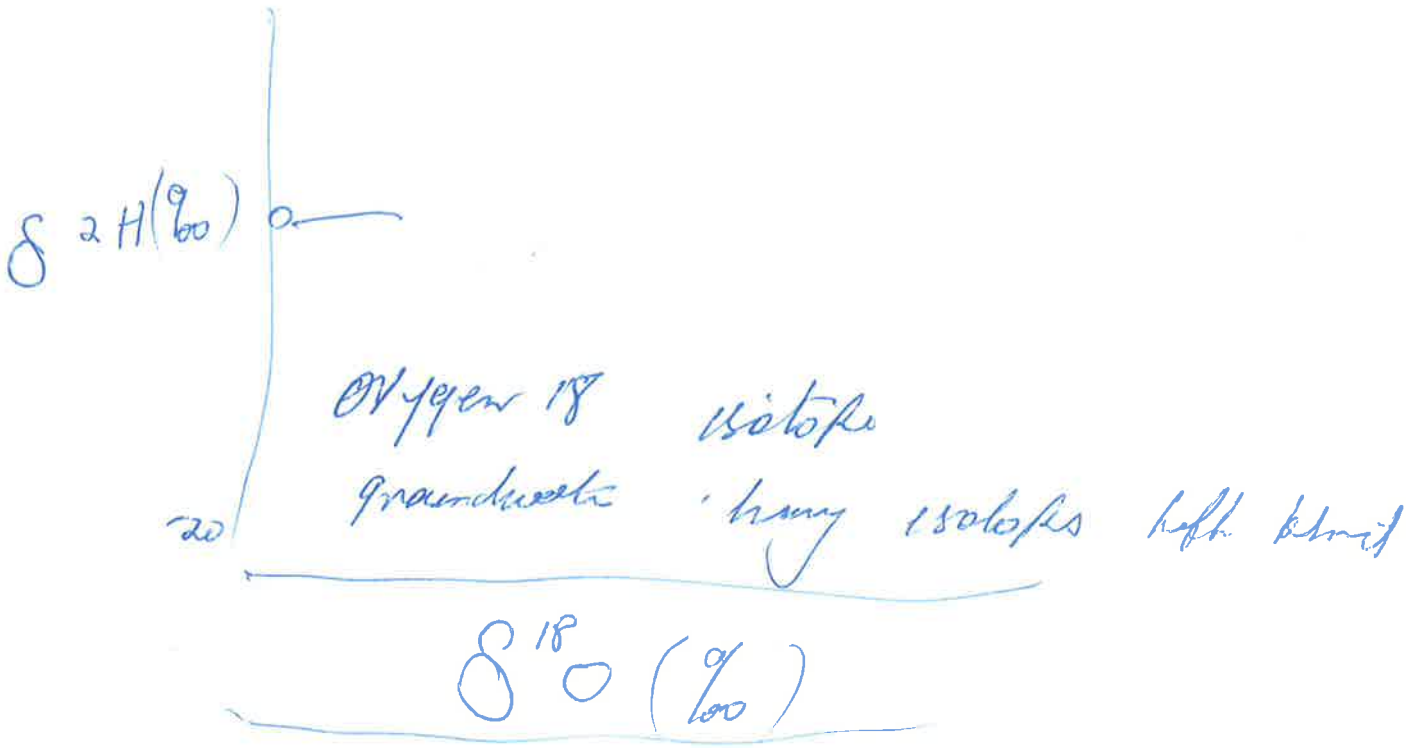
1995

Jeff Turner

6A

Mrs Commerford
Legend Mrs
Louise ?

40



Brenton — life forms dependant on
~~affected~~ by
freshwater seeps

Measure Nutrients monthly from Jan

depth
m

0.7
1.4
2

Melbourne samples

Thrombolites

* look at bathymetry of Clifton by boat
to Len Lake to Salt.

0.86
1.2
0.55

Bathymetric data available for Clifton - Navy, may have digitised it.
Jeff thinks it's worthwhile

1.15
1.15
0.57

All three sites A 1 2 3 etc

0.83
0.9
0.7

* Chlorides important every 2nd mth
* Cond. Monthly

21/12/00
Ground water is the real driver of lake water levels
Maybe a PhD Project

Salinities don't build up because the salt is transported out to sea by u/ground flow
Sea ~19 000
PLH 15 - 25 000

6000
9000 12 m
36 - 38 000 - 18

* Landsat of veg of Reed / Honey.
Pumping east of Clifton - allows salt water
(1) ingress to Clifton
(2)(3) evap ~~of~~ + rainfall may influence
Run a water & solute mass balance.

Salinity Profile. (4)

C. Benson — Lake Clifton — 17/10/2000

	Cond. (mS)		Salinity (‰)		Temp (°C)		Depth (cm)
	Top	Bottom	Top	Bottom	Top	Bottom	
Transect A							
Site 1	40.0 mS	40.5 ms	24.0‰	24.4	20.9°	20.5	70 cm
Site 3	40.3	40.7	24.4	24.5	19.3	19.1	1.4 m
Site 2	41.0	41.0	24.7	24.7	19.7	19.5	2.0 m
Site A.							1500 hrs.
1m from Shore	– Sampled from 10cm depth						10cm
10m from shore	40.8	24.6	22.7				17cm
20m	40.8	24.5	23.1	40.6	24.4	23.1	30cm
	~~40.6~~	~~24.4~~	~~23~~				
30m	40.5	24.4	22.7	40.6	24.4	22.7	35 cm
40m	40.6	24.4	22.5	40.6	24.4	22.4	41 cm
50m	40.9	24.6	21.9	40.9	24.6	21.8	44 cm
60m	40.9	24.6	21.6	41.0	24.6	21.6	42 cm
70m	40.8	24.6	21.3	40.9	24.6	21.2	46 cm
	Depth gauge Read + 33 cm						(4.33?)

(3)

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51
Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mob. 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Woodvale
Date: 17/10/2000
Subject: Lake Clifton samples

I would be grateful if you would please analyse the accompanying eight surface water samples from Lake Clifton for conductivity and ionic composition (major ions).

Salinity Profiles. (2)

C. Pearson — Lake Clifton — 17/10/2000

	Cond. (mS/cm) Top	Cond. (mS/cm) Bottom	Salinity (‰) Top	Salinity (‰) Bottom	Temp (°C) Top	Temp (°C) Bottom	Depth (cm)
Transect A (Bluff)							1300 hrs
Site 1	40.0 ms	40.5 ms	24.0‰	24.4	20.9°	20.5	70 cm
Site 3	40.3	40.7	24.4	24.5	19.3	19.1	1.4 m
Site 2	41.0	41.0	24.7	24.7	19.7	19.5	2.0 m

	Top Cond. ms/cm	Top Salinity ‰	Top Temp °C	Bottom Cond. ms/cm	Bottom Salinity ‰	Bottom Temp °C	Depth 1500 hrs.
Site A							
1m from shore							10 cm
10m from shore	40.8	24.6	22.7				17 cm
20m	40.8	24.5	23.1	40.6	24.4	23.1	30 cm
30m	40.5	24.4	22.7	40.6	24.4	22.7	35 cm
40m	40.6	24.4	22.5	40.6	24.4	22.4	41 cm
50m	40.9	24.6	21.9	40.9	24.6	21.8	44 cm
60m	40.9	24.6	21.6	41.0	24.6	21.6	42 cm
70m	40.8	24.6	21.3	40.9	24.6	21.2	46 cm

Depth gauge Road + 33 cm (4.33?)

Wind conditions — 5–10 km/hr easing to end of survey. Strong/stronger to 20 km/h after completion

MS/cm

Saturday Profiles. (1)

L. Benson Lake Clifton 17/10/2000

	Cond. (mS/cm) Top	Cond. (mS/cm) Bottom	Salinity (‰) Top	Salinity (‰) Bottom	Temp (°C) Top	Temp (°C) Bottom	Depth (cm)
Transect A (Bkwtr)							1300 hrs
Site 1	40.0 ms	40.5 ms	24.0 ‰	24.4	20.9 c	20.5	70 cm
Site 3	40.3	40.7	24.4	24.5	19.3	19.1	1.4 m
Site 2	41.0	41.0	24.7	24.7	19.7	18.5	2.0 m

Site A	Top Cond. ms/cm	Top Salinity ‰	Top Temp °C	Bottom Cond. ms/cm	Bottom Salinity ‰	Bottom Temp °C	Depth 1500 hrs.
1m from Shore							10 cm
10m from shore	40.8	24.6	22.7				17 cm
20m	40.8	24.5	23.1	40.6	24.4	23.1	30 cm
30m	40.5	24.4	22.7	40.6	24.4	22.7	35 cm
40m	40.6	24.4	22.5	40.6	24.4	22.4	41 cm
50m	40.9	24.6	21.9	40.9	24.6	21.8	44 cm
60m	40.9	24.6	21.6	41.0	24.6	21.6	42 cm
70m	40.8	24.6	21.3	40.9	24.6	21.2	46 cm

Depth gauge Read + 33 cm (4033?)

Wind Conditions — 5–10 km/hr easing to end of survey.

Strong/Rising to 20 km/h after completion

MS/cm

Wilford Projects

Clifton 2001

Conductivity
9/4/24 44444

GRANT PEARSON

FOLDER OF

LOOSE PAPERS

RE SALINITY TRANSECTS

OF LAKE CLIFTON

IN 2000 + 2001

Organised today into
approximate chronological order
30/8/2014

30/8/2014

Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jim Lane
From: Grant Pearson

Date: 28 October 2002
Subject: Lake Clifton Analyses

Jim
Accompanying this is a disk containing an Excel file with all conductivity data collected for Lake Clifton between October 2000 and December 2001. Analyses by the WA Chemistry Centre and DCLM are included and reported in Ms/cm.

Sampling of the four transects A,B,C,D visited by B Knott began on October 24 2000.

METHOD
Conductivity measurements were made using the TPS 90 FLMV meter until February when the low water levels in the lake required the use of a surf ski. In this case the more water proof TPS WP-84 meter was used.
Both units were calibrated prior to each visit to the 2,764 US/cm at 25C conductivity standard. Problems were encountered on a number of occasions when salt spray flooded the TPS WP-84 meter causing erroneous readings. The manufacturers claim for water resistance of this meter is evidently optimistic. This lack of water resistance was most evident in March 2001 and April 2001 when the surf ski was used. On these occasions the meter became unusable. Conductivity measurements for these dates for each site were obtained from surface water samples analysed by the WA Chemistry Centre.

Surveys were conducted by boat when water levels permitted, by surf ski as levels dropped and by foot at the southern sites during periods of very low water level.

Surface samples were obtained for analysis by the WA Chemistry Centre by filling a 120 ml bottle with lake water from about 15 cm below the surface at each site. The bottles were marked according the site number and dated. They were delivered to the Chemistry Centre that day or the following day.

The samples were also periodically analysed for chloride and major ions. Results of these are also attached to this report.

At the beginning of each survey the water depth on the DCLM depth gauge was recorded.

The depth at each site was also recorded during each measurement.

CCWA ID	Client ID		Cl		CO3	Fe	HCO3	Hardness	Ca	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	%ION_BA
			mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	24/10/2000	16000		<2	0.06	201	5400	437	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 2	24/10/2000	16000		<2	0.06	220	5300	432	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	24/10/2000	15000		<2	0.06	220	5400	434	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 2	24/10/2000	15000		<2	0.05	214	5400	451	265	1030	<0.02	0.01	8480	1730	26	8.1	1.6
00E0553/005	C 1	24/10/2000	14000		<2	0.05	201	4900	394	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 2	24/10/2000	13000		<2	0.05	195	4800	388	244	939	<0.02	0.01	7859	1580	25	8.1	3.9
00E0553/007	D 1	24/10/2000	12000		36	<0.05	73	4100	329	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 2	24/10/2000	11000		48	<0.05	24	4000	317	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

CCWA ID	Client ID	Sampled on	Cl	ECond	NS
			#CL1WAA#E	C1WZSE	#No Sample
00E1224/001	A 1	16/03/2001	30000	7090	
00E1224/002	A 2	16/03/2001	30000	7010	
00E1224/003	A 3	16/03/2001	30000	6970	
00E1224/004	B 1	16/03/2001	29000	7160	
00E1224/005	B 2	16/03/2001	29000	7070	
00E1224/006	B 3	16/03/2001	27000	6800	
00E1224/007	C 1	16/03/2001	41000	8730	
00E1224/008	C 2	16/03/2001	40000	8740	
00E1224/009	C 3	16/03/2001	38000	9020	
00E1224/010	D 1	16/03/2001	78000	13500	
00E1224/011	D 2	16/03/2001	65000	11900	
00E1346/001	A 1	18/04/2001		8210	
00E1346/002	A 2	18/04/2001		8200	
00E1346/003	A 3	18/04/2001		8210	
00E1346/004	B 1	18/04/2001		8480	
00E1346/005	B 2	18/04/2001		8300	
00E1346/006	B 3	18/04/2001		8070	
00E1346/007	C 1	18/04/2001		7650	
00E1346/008	C 2	18/04/2001		9370	
00E1346/009	C 3	18/04/2001		9440	
00E1346/010	D 1	18/04/2001		17500	
00E1346/011	D 2	18/04/2001		15100	
00E1444/001	A 1	23/05/2001	29000	6110	
00E1444/002	A 2	23/05/2001	28000	6010	
00E1444/003	A 3	23/05/2001	28000	5980	
00E1444/004	B 1	23/05/2001	27000	5770	
00E1444/005	B 2	23/05/2001	26000	5620	
00E1444/006	B 3	23/05/2001	26000	5710	
00E1444/007	C 1	23/05/2001	24000	5410	
00E1444/008	C 2	23/05/2001	24000	5500	
00E1444/009	C 3	23/05/2001	ns	ns	x
00E1444/010	D 1	23/05/2001	28000	6000	
00E1444/011	D 2	23/05/2001	28000	6030	
00E1444/012	D 3	23/05/2001	28000	6090	
01E0363/001	A 1	21/06/2001	24000	6900	
01E0363/002	A 2	21/06/2001	25000	6910	
01E0363/003	A 3	21/06/2001	23000	6890	
01E0363/004	B 1	21/06/2001	22000	6250	
01E0363/005	B 2	21/06/2001	23000	6480	
01E0363/006	B 3	21/06/2001	22000	6450	
01E0363/007	C 1	21/06/2001	20000	5690	
01E0363/008	C 2	21/06/2001	20000	5820	
01E0363/009	C 3	21/06/2001	22000	6080	
01E0363/010	D 1	21/06/2001	21000	5460	
01E0363/011	D 2	21/06/2001	20000	5560	
01E0363/012	D 3	21/06/2001	20000	5410	
01E0122/001	A1	31/07/2001	21000	5010	
01E0122/002	A2	31/07/2001	22000	4870	
01E0122/003	A3	31/07/2001	22000	4830	
01E0122/004	B1	31/07/2001	22000	4700	
01E0122/005	B2	31/07/2001	22000	4710	
01E0122/006	B3	31/07/2001	22000	4620	
01E0122/007	C1	31/07/2001	18000	4220	
01E0122/008	C2	31/07/2001	20000	4310	
01E0122/009	C3	31/07/2001	20000	4270	
01E0123/010	D1	31/07/2001	17000	3780	
01E0123/011	D2	31/07/2001	18000	3840	
01E0123/012	D3	31/07/2001	18000	3870	
01E0363/013	A 1	09/08/2001		5670	
01E0363/014	A 2	09/08/2001		5670	
01E0363/015	A 3	09/08/2001		5670	
01E0363/016	B 1	09/08/2001		5540	
01E0363/017	B 2	09/08/2001		5570	
01E0363/018	B 3	09/08/2001		5560	
01E0363/019	C 1	09/08/2001		4960	
01E0363/020	C 2	09/08/2001		4980	
01E0363/021	C 3	09/08/2001		4930	
01E0363/022	D 1	09/08/2001		4400	
01E0363/023	D 2	09/08/2001		4430	
01E0367/004	B1	20/09/2001	19000	4580	
01E0367/005	B2	20/09/2001	19000	4680	
01E0367/006	B3	20/09/2001	18000	4750	
01E0367/007	C1	20/09/2001	17000	4190	
01E0367/008	C2	20/09/2001	16000	4200	
01E0367/009	C3	20/09/2001	15000	3980	
01E0367/010	D1	20/09/2001	14000	3660	
01E0367/011	D2	20/09/2001	14000	3630	
01E0367/012	D3	20/09/2001	13000	3590	
01E0561/001	A 1	12/10/2001	17000	5140	
01E0561/002	A 2	12/10/2001	17000	5150	
01E0561/003	A 3	12/10/2001	17000	5100	
01E0561/004	B 1	12/10/2001	17000	4950	
01E0561/005	B 2	12/10/2001	18000	5070	
01E0561/006	B 3	12/10/2001	18000	5030	
01E0561/007	C 1	12/10/2001	15000	4470	
01E0561/008	C 2	12/10/2001	16000	4780	
01E0561/009	C 3	12/10/2001	17000	4720	
01E0561/010	D 1	12/10/2001	14000	3990	
01E0561/011	D 2	12/10/2001	14000	4120	
01E0561/012	D 3	12/10/2001	15000	3980	
01E0561/013	A 1	08/11/2001		5140	
01E0561/014	A 2	08/11/2001		5450	
01E0561/015	A 3	08/11/2001		5470	
01E0561/016	B 1	08/11/2001		5480	
01E0561/017	B 2	08/11/2001		5250	
01E0561/018	B 3	08/11/2001		5440	
01E0561/019	C 1	08/11/2001		5100	
01E0561/020	C 2	08/11/2001		5420	
01E0561/021	C 3	08/11/2001		5270	
01E0561/022	D 1	08/11/2001		5040	
01E0561/023	D 2	08/11/2001		5050	
01E0561/024	D 3	08/11/2001		5060	
01E0787/001	A1	12/12/2001	23000	5170	
01E0787/002	A2	12/12/2001	21000	5170	
01E0787/003	A3	12/12/2001	21000	5180	
01E0787/004	B1	12/12/2001	22000	5130	
01E0787/005	B2	12/12/2001	22000	5170	
01E0787/006	B3	12/12/2001	22000	5220	
01E0787/007	C1	12/12/2001	22000	5260	
01E0787/008	C2	12/12/2001	22000	5280	
01E0787/009	C3	12/12/2001	23000	5430	
01E0787/010	D1	12/12/2001	23000	5430	
01E0787/011	D2	12/12/2001	22000	5560	
01E0787/012	D3	12/12/2001	22000	5570	

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470

CCWA ID	Client ID	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L		%
00E0553/001	A 1	1910	25	8	-2.3
00E0553/002	A 3	1740	26	8	-0.6
00E0553/003	B 1	1750	26	8	2.9
00E0553/004	B 3	1730	26	8.1	1.8
00E0553/005	C 1	1600	26	8	1.4
00E0553/006	C 3	1580	25	8.1	3.9
00E0553/007	D 1	1350	21	8.4	1.4
00E0553/008	D 3	1320	19	8.6	2.2

CONDUCTIVITY
LAKE CLIFTON

TOP	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	DCLM MS/CM	CHEM CNT MS/CM
	24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001	16/03/2001
A1	41.4	48.9	61.8	67.7	error	70.8
A2	41.4	49.3	62	68.3	error	70.1
A3	41.4	49.4	61.6	68.7	error	69.7
B1	40.8	49.8	66.5	68.3	69.4	71.6
B2	40.8	49.4	62.1	68.4	69.4	70.7
B3	40.8	49.6	66.5	68.2	67.9	68
C1	38	50	71.4	79.5	86.4	87.3
C2	38.5	49.7	71	81.8	87	87.4
C3	37.9	50.5	74.1	86.3	45.9	90.2
D1	33.1	49.7	85.2	N/A	N/A	135
D2	32.5	48.9	81.4	93	N/A	119
D3	31.8	49.8	83.1	N/A	N/A	N/A

BOTTOM

	24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001
A1	41.3	49.2	61.5	67.5	error
A2	41.6	49.2	61.9	63.2	error
A3	41.8	49	61.5	65.5	error
B1	41.3	50	66.4	68.4	68.3
B2	41.3	49.7	62.1	68.2	69.5
B3	41.3	50	65.9	67.8	error
C1	38.5	50.1	71.4	79.4	85.6
C2	38.6	50.1	70.9	79.1	83.1
C3	37.9	50.6	75.2	86.5	N/A
D1	33	49.7	84.4	91.8	N/A
D2	32.5	49.8	81.1	94.9	N/A
D3	31.9	50.1	82.6	98.5	N/A

DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM
18/04/2001	18/04/2001	23/05/2001	23/05/2001	21/06/2001	21/06/2001	19/07/2001	19/07/2001
78.1	82.1	73.3	61.1	66.5	69	61.1	50.1
118.3	82	69.4	60.1	67.4	69.1	61.2	48.7
error	82.1	71.5	59.8	64.3	68.9	61.4	48.3
error	84.8	69.9	57.7	63.6	62.8	60	47
error	83	69.3	58.2	63.7	64.8	60.3	47.1
error	80.7	69.9	57.1	61.7	64.5	58.9	46.2
error	76.5	65.3	54.1	55.2	56.9	53.3	42.2
error	93.7	66.7	55	57.4	59.2	54.6	43.1
error	94.4	67.7	no sample	59.5	60.9	53.9	42.7
error	175	73.8	60	55.3	54.6	N/A	37.8
error	151	75	60.3	55.6	55.6	N/A	38.4
no sample	no sample	75.2	60.9	55.2	54.1	N/A	38.7

18/04/2001	23/05/2001	21/06/2001	19/07/2001
76	73.3	65.9	60.8
120	68.3	61.2	61.2
error	70.9	64	61.4
error		63.4	60
error	69.9	58.7	60.3
error			58.3
error	66.1	55.3	53.4
error	66.7	58.5	54.9
error		55.3	53.9
error	73.8	55.3	N/A
error	75.2	55.6	N/A
no sample	N/A	55.9	N/A

DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM	DCLM MS/CM	CHEM CNT MS/CM
09/08/2001	09/08/2001	20/09/2001	20/09/2001	12/10/2001	12/10/2001	08/11/2001	08/11/2001
61.4	58.7	50.5	49.6	49	51.4	51.2	51.4
61.5	58.7	50.4	49.9	49.4	51.5	52.1	54.5
61.6	58.7	49.2	48.8	49.2	51	51.5	54.7
58.2	55.4	50.1	48.8	47.7	49.5	51.4	54.8
58.7	55.7	49.9	48.8	48.8	50.7	51.5	52.5
58.2	55.6	48.5	47.5	48.5	50.3	51.3	54.4
52.3	49.6	42.8	41.9	43.2	44.7	51.3	51
53.1	49.8	42.7	42	45.7	47.8	51.4	54.2
52.6	49.3	40.6	39.9	45.3	47.3	50.4	52.7
48.7	44	37.7	36.6	38.4	39.9	48	50.4
47.9	44.3	37.4	36.3	40.1	41.2	48.5	50.5
46.3	43.1	36.8	35.9	39.8	39.8	49.8	50.6

09/08/2001	20/09/2001	12/10/2001	08/11/2001
61.3	50.4	49.7	51.1
60	50.4	49	52.8
61	49.4	49.2	51.4
58.1	50.4	47.7	51.4
58.8	49.8	48.8	51.4
58.8	48.7	48.3	51.4
52	44.2	42.5	50.5
53.1	43.7	45.7	51.3
52.5	40.7	45.3	50.4
48.5	37.7	38.4	47.9
47.9	37.4	40.1	48.3
46.3	36.9	39.8	43.6

DCLM MS/CM	CHEM CNT MS/CM	
12/12/2001	12/12/2001	
58	51.7	A1
58.2	51.7	A2
58.4	51.8	A3
58.2	51.3	B1
58.6	51.7	B2
59.2	52.2	B3
59.9	52.6	C1
60	52.8	C2
61.8	54.3	C3
61.4	54.3	D1
63.7	55.9	D2
63.4	55.7	D3

58.3	A1
58.2	A2
58.5	A3
58.4	B1
58.7	B2
59.4	B3
60.3	C1
60.2	C2
N/A	C3
61.4	D1
63.7	D2
63.4	D3

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To: Jim Lane
From: Grant Pearson

Date: March 1 2002
Subject: Lake Clifton Salinity

Attached are data on the monthly recordings at Lake Clifton. Insitu measurements of conductivity were taken using a TPS 90 FLMV conductivity meter or a TPS handheld WP 84 unit. Both were calibrated prior to the surveys using a standard "AR" grade ionic solution at 2.76 mS/cm @25^0 C purchased from Rowe Scientific.

The surveys were carried out, whenever possible, on scheduled days established at the beginning of the year. In most cases the surveys could be performed using a punt launched from the Site A jetty or from a shore location at Site C. When lake depths became too shallow for the punt and motor a surf ski was used. This was carried by vehicle to each transect and launched from the eastern side of the lake. On several occasions the wind conditions made this operation an extremely wet experience and the conductivity meter failed due to the extreme conditions. There are gaps in this data set as a result of this.

Water samples were collected at all sites along the four transects. These were analysed at the WA Chemistry Centre for conductivity. Chloride levels were measured from the same sample from March 2001 and on a further 6 of the subsequent survey dates.

The depth at the CALM depth gauge was recorded on each occasion.
The field surveys relate to the following dates:

DATE	FIELD COND.	CHEM CNTR COND	CHLORIDE	CALM GAUGE	SAMPLER
17/10/00	Y	N	N	4.33	GP
24/10/00	Y	N	N	4.36	GP
15/12/00	Y	N	N	4.12	GP
22/01/01	Y	N	N	3.93	GP
20/02/01	Y	N	N		GP
16/03/01	Y	Y	Y	3.67	GP
18/04/01	Y	Y	N	3.64	GP
23/05/01	Y	Y	Y	3.74	AC
23/06/01	Y	Y	Y	3.82	GP
19/07/01	Y	Y	Y	3.97	GP
09/08/01	Y	Y	N		AC
20/09/01	Y	Y	Y	4.16	GP
12/10/01	Y	Y	Y	4.23	GP
08/11/01	Y	Y	N	4.11	GP
12/12/01	Y	Y	Y	4.00	AC

Further more detailed treatment of the data is necessary. This data is provided as preliminary results.

Grant Pearson
March 1 ~~2001~~ 2002 30/8/2014

15/12/00

	20/09/2000	24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
A1	50.5	41.3	48.9	61.8	67.7		78.1	73.3	66.5	61.1	61.4	50.5
A2	50.4	41.6	49.3	62	68.3		118.3	69.4	67.4	61.2	61.5	50.4
A3	49.2	41.8	49.4	61.6	68.7		na	71.5	64.3	61.4	61.6	49.2
B1	50.1	41.3	49.8	66.5	68.3	69.4	na	69.9	63.6	60	58.2	50.1
B2	49.9	41.3	49.4	62.1	68.4	69.4	na	69.3	63.7	60.3	58.7	49.9
B3	48.5	41.3	49.6	66.5	68.2	67.9	na	69.9	61.7	58.9	58.2	48.5
C1	42.8	38.5	50	71.4	79.5	86.4	na	65.3	55.2	53.3	52.3	42.8
C2	42.7	38.6	49.7	71	81.8	87	na	66.7	57.4	54.6	53.1	42.7
C3	40.6	37.9	50.5	74.1	86.3	45.9	na	67.7	59.5	53.9	52.6	40.6
D1	37.7	33	49.7	85.2	na		na	73.8	55.3	na	48.7	37.7
D2	37.4	32.5	48.9	81.4	93		na	75	55.6	na	47.9	37.4
D3	36.8	31.9	49.8	83.1	na		na	75.2	55.2	na	46.3	36.8

BOTTOM

		24/10/2000	15/12/2000	22/01/2001	20/02/2001	16/03/2001	18/04/2001	23/05/2001	21/06/2001	19/07/2001	09/08/2001	20/09/2001
A1	50.4	41.4	49.2	61.5	67.5		76	73.3	65.9	60.8	61.3	50.4
A2	50.4	41.4	49.2	61.9	63.2		120	68.3	61.2	61.2	60	50.4
A3	49.4	41.4	49	61.5	65.5		na	70.9	64	61.4	61	49.4
B1	50.4	40.8	50	66.4	68.4	68.3	na		63.4	60	58.1	50.4
B2	49.8	40.8	49.7	62.1	68.2	69.5	na	69.9	58.7	60.3	58.8	49.8
B3	48.7	40.8	50	65.9	67.8		na			58.3	58.8	48.7
C1	44.2	38	50.1	71.4	79.4	na		66.1	55.3	53.4	52	44.2
C2	43.7	38.5	50.1	70.9	79.1	85.6	na	66.7	58.5	54.9	53.1	43.7
C3	40.7	37.9	50.6	75.2	86.5	83.1	na		55.3	53.9	52.5	40.7
D1	37.7	33.1	49.7	84.4	91.8	na	na	73.8	55.3	na	48.5	37.7
D2	37.4	32.5	49.8	81.1	94.9	na	na	75.2	55.6	na	47.9	37.4
D3	36.9	31.8	50.1	82.6	98.5	na	na	na	55.9	na	46.3	36.9

15/12/00

	20/09/2001	12/10/2001	08/11/2001	12-Dec /2001	
A1	50.5	49	51.2	58	A1
A2	50.4	49.4	52.1	58.2	A2
A3	49.2	49.2	51.5	58.4	A3
B1	50.1	47.7	51.4	58.2	B1
B2	49.9	48.8	51.5	58.6	B2
B3	48.6	48.5	51.3	59.2	B3
C1	42.8	43.2	51.3	59.9	C1
C2	42.7	45.7	51.4	60	C2
C3	40.6	45.3	50.4	61.8	C3
D1	37.7	38.4	48	61.4	D1
D2	37.4	40.1	48.5	63.7	D2
D3	36.8	39.8	49.8	63.4	D3

BOTTOM

	20/09/2001	12/10/2001	08/11/2001		
A1	50.4	49.7	51.1	58.3	A1
A2	50.4	49	52.8	58.2	A2
A3	49.4	49.2	51.4	58.5	A3
B1	50.4	47.7	51.4	58.4	B1
B2	49.8	48.8	51.4	58.7	B2
B3	48.7	48.3	51.4	59.4	B3
C1	43.2	42.5	50.5	60.3	C1
C2	43.7	45.7	51.3	60.2	C2
C3	43.7	45.3	50.4	NA	C3
D1	37.7	38.4	47.9	61.4	D1
D2	37.4	40.1	48.3	63.7	D2
D3	36.9	39.8	43.6	63.4	D3

Dec 01

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0787/0	A1	12/12/2001	23000	5170
01E0787/0	A2	12/12/2001	21000	5170
01E0787/0	A3	12/12/2001	21000	5180
01E0787/0	B1	12/12/2001	22000	5130
01E0787/0	B2	12/12/2001	22000	5170
01E0787/0	B3	12/12/2001	22000	5220
01E0787/0	C1	12/12/2001	22000	5260
01E0787/0	C2	12/12/2001	22000	5280
01E0787/0	C3	12/12/2001	23000	5430
01E0787/0	D1	12/12/2001	23000	5430
01E0787/0	D2	12/12/2001	22000	5590
01E0787/0	D3	12/12/2001	22000	5570

DATE 12/12/01 SAMPLER ALAN CLARKE

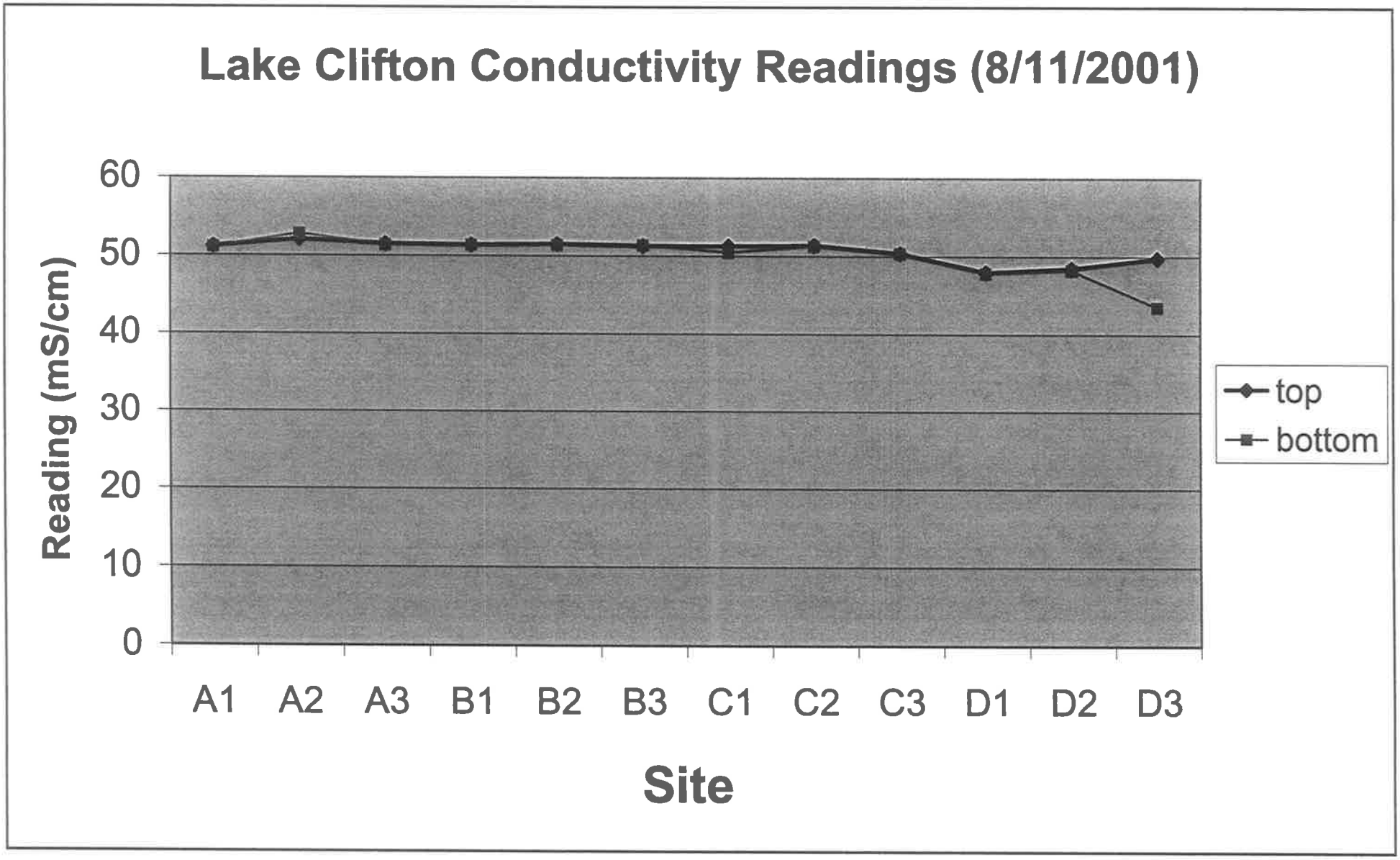
depth at gauge 2 was 4.00m.

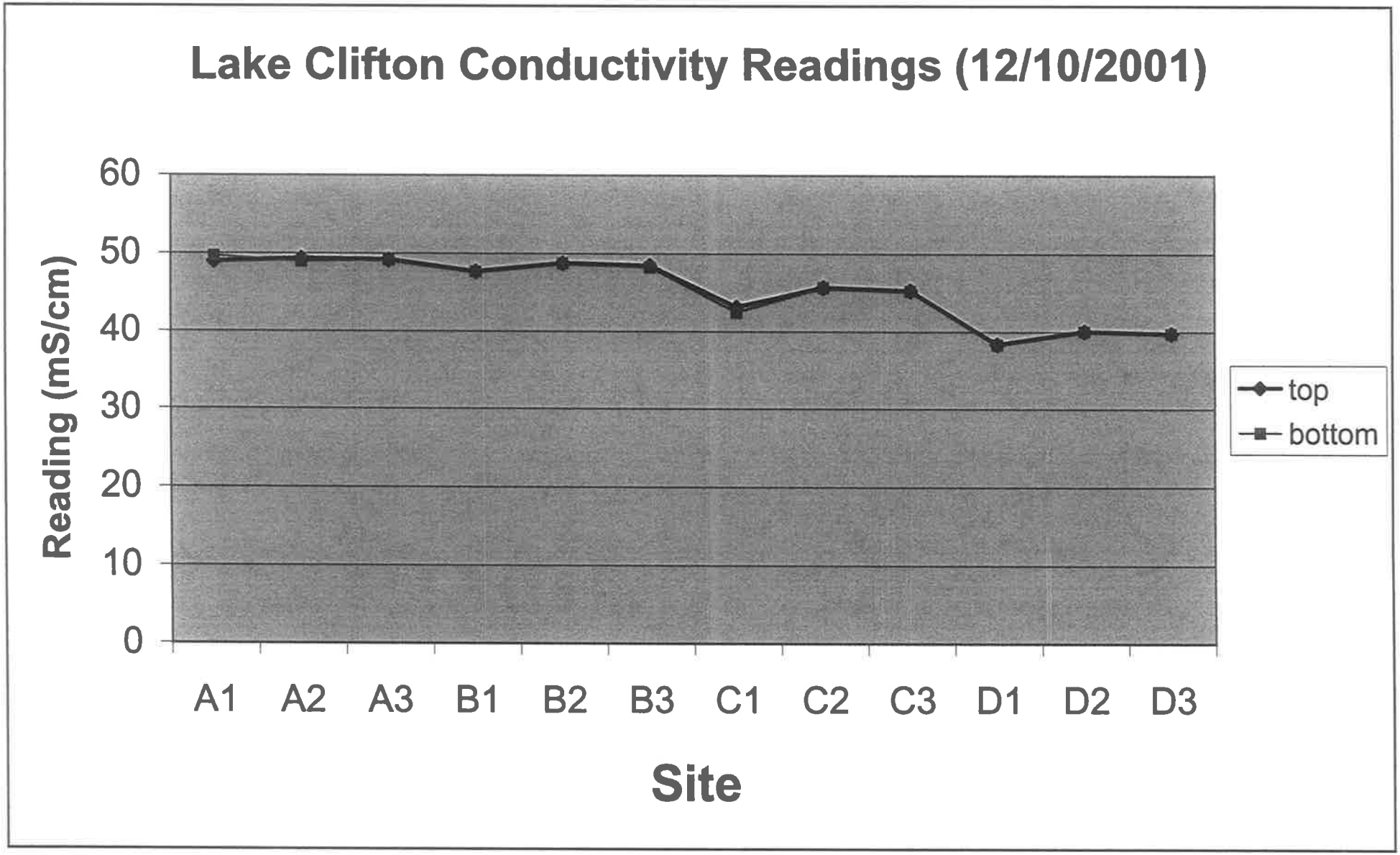
SITE	EAST WGS84	NORTH WGS84	EAST AUS G 66	NORTH AUS G 66	COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	TIME
A1	374048	6376114	373909	6375966	58·0		22·4	58·3		22·0	0·84	12 40
A2	373368		373229		58·2		22·0	58·2		21·6	1·52	
A3	372847		372708		58·4		22·4	58·5		22·2	1·18	1215
B1	374787	637038	374648	6372890	58·2		23·1	58·4		22·4	0·46	1200
B2	374389		374250		58·6		22·8	58·7		22·5	0·78	
B3	373891		373752		59·2		24·1	59·4		24·0	0·34	11·44
C1	376001	6368604	375867	6368456	59·9		21·8	60·3		21·6	0·67	
C2	375809		375670		60·0		21·6	60·2		21·3	0·78	
C3	375441		375302		61·8		23·7				0·22	one reading only
D1	377767	6364355	377628	6364207	61·4		21·8	61·4		21·8	0·38	10·45
D2	377411		377272		63·3		20·6	63·7		20·5	0·48	
D3	377110		376971		63·2		21·1	63·4		21·1	0·28	10·25

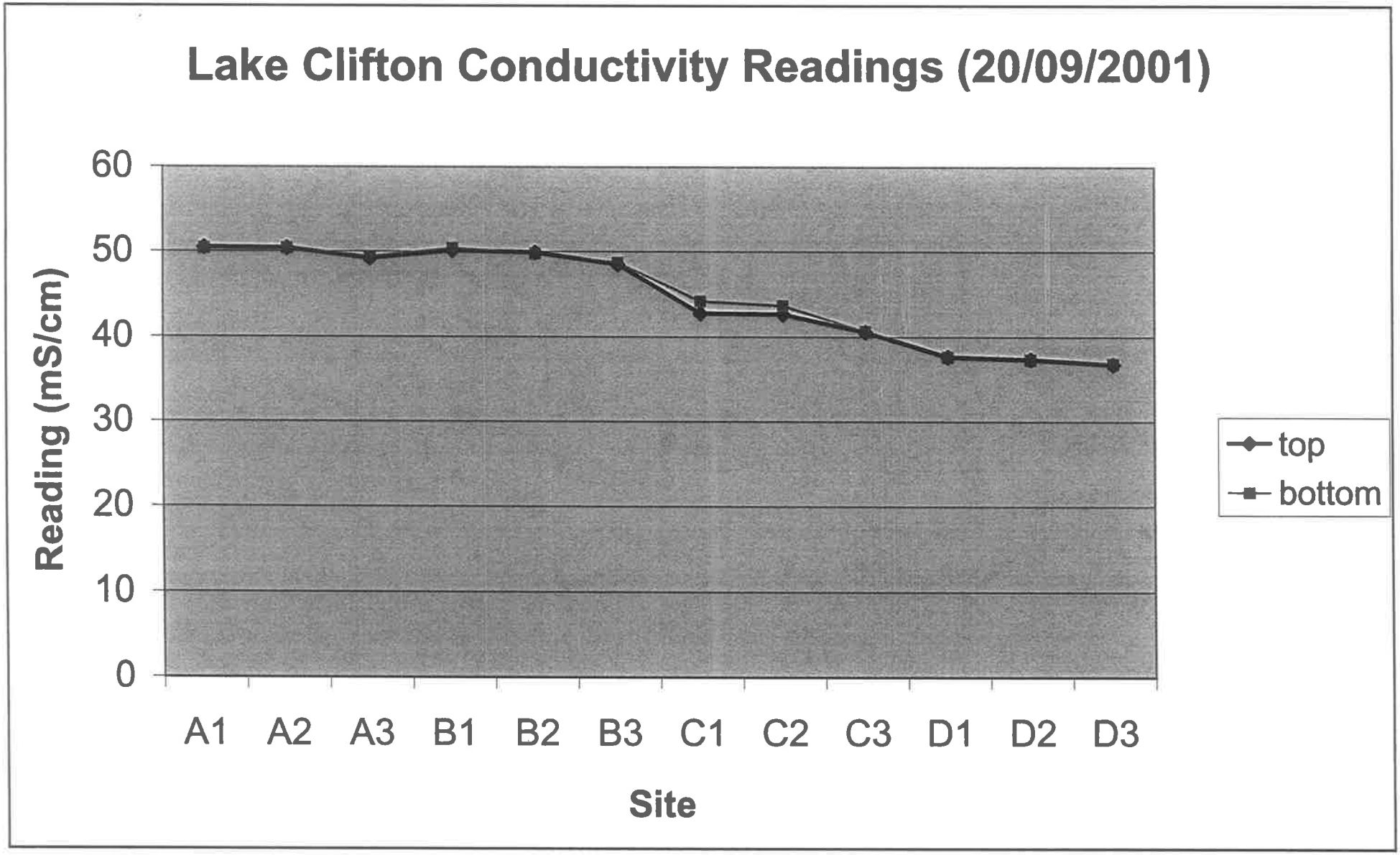
Calibration of TPS 90-FLMV

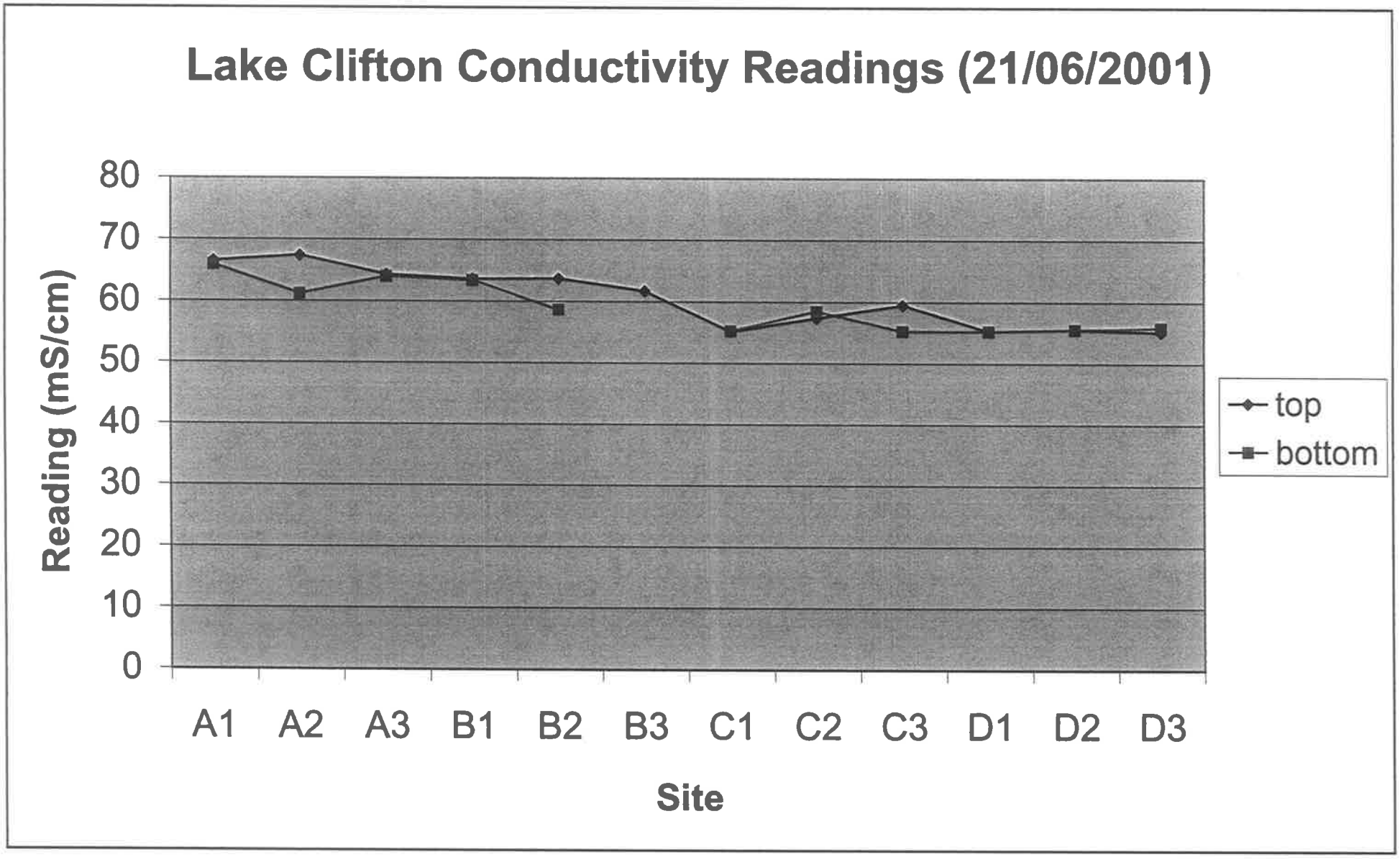
2·76ms/cm (field quantity) read 2·75ms @ 22·4°c

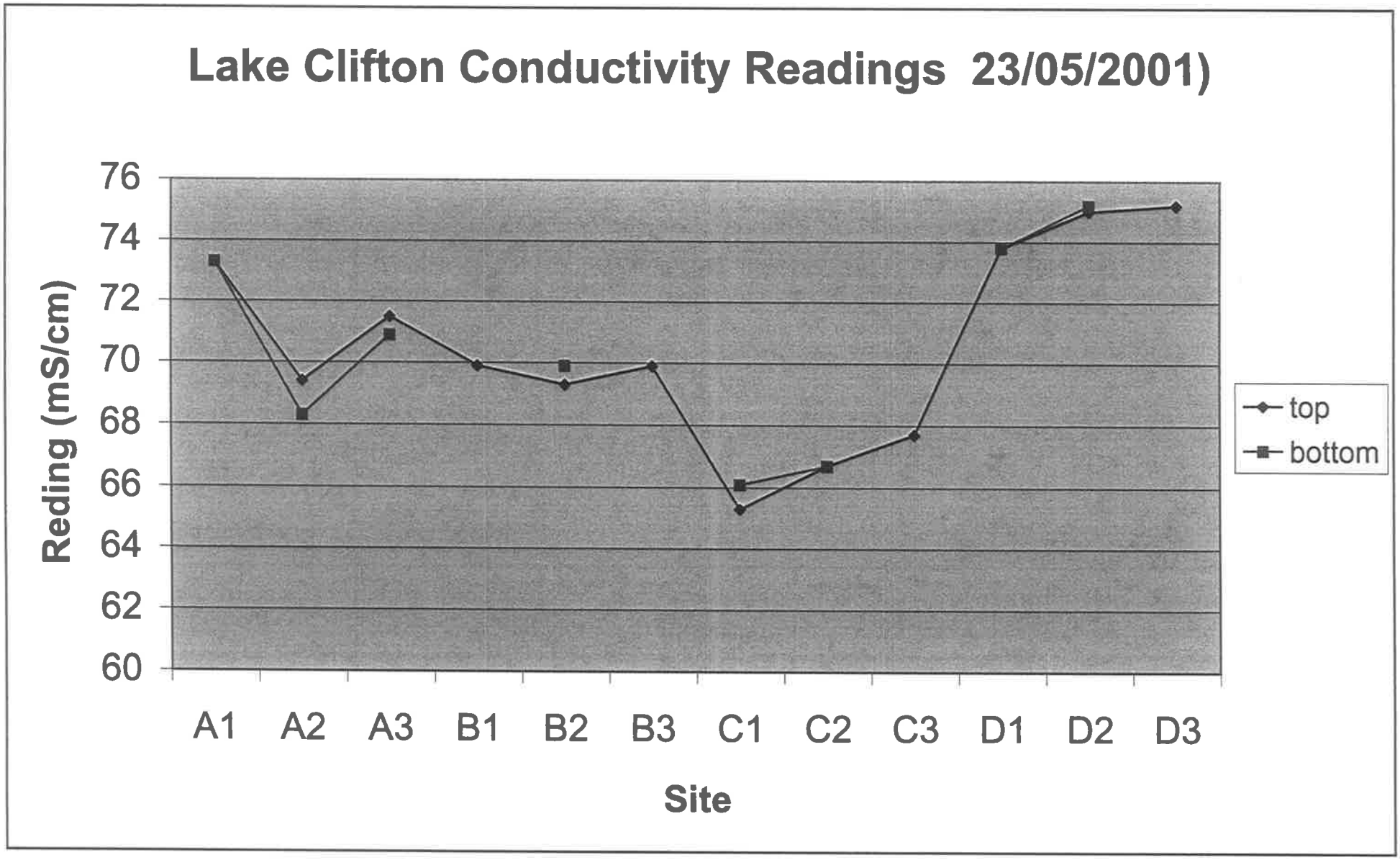
Calibration O.K Span 103·2%

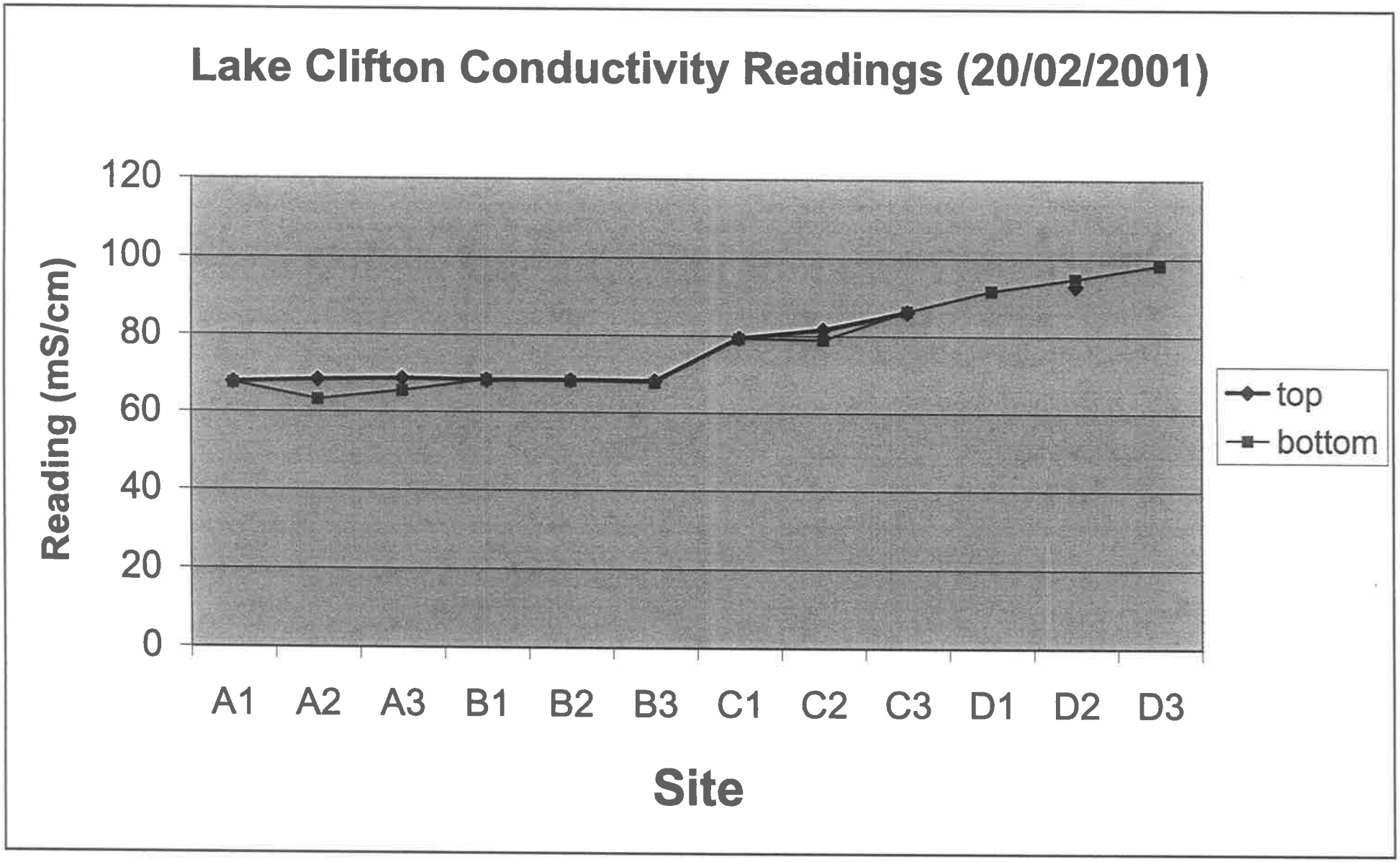

Lake Clifton Conductivity Readings (8/11/2001)
Reading (mS/cm)
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom

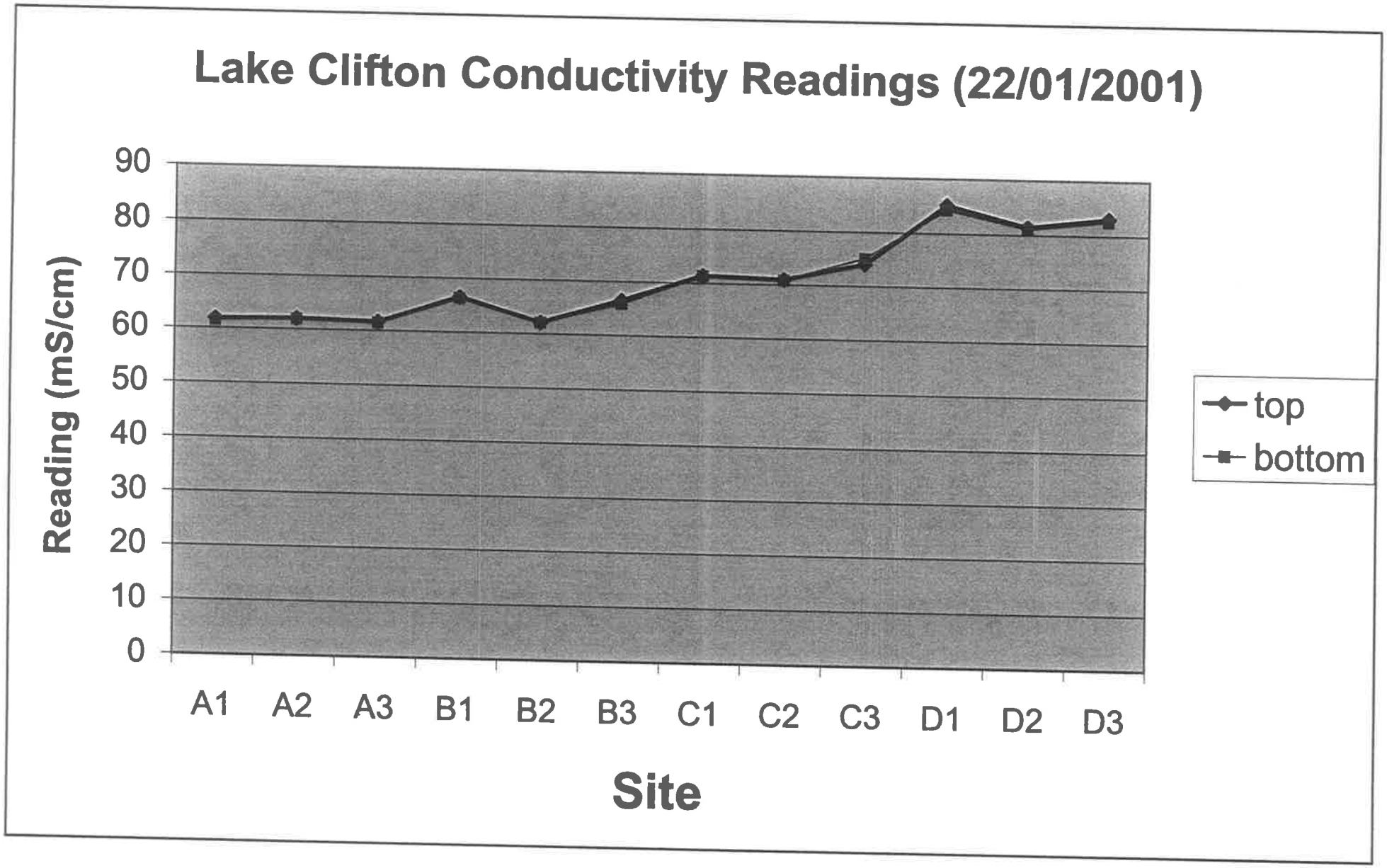

Lake Clifton Conductivity Readings (12/10/2001)
Reading (mS/cm)
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom

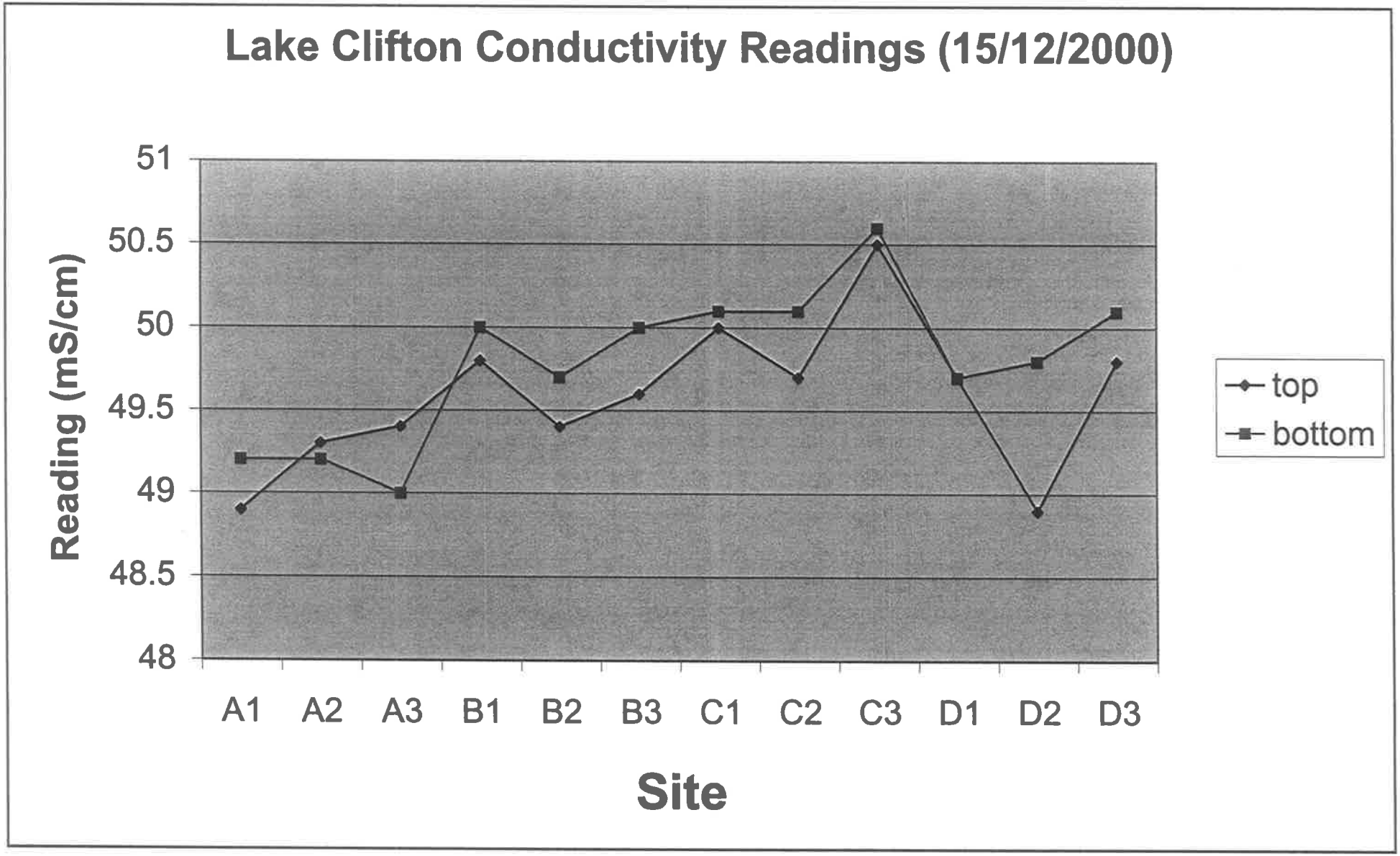

Lake Clifton Conductivity Readings (20/09/2001)
Reading (mS/cm)
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom

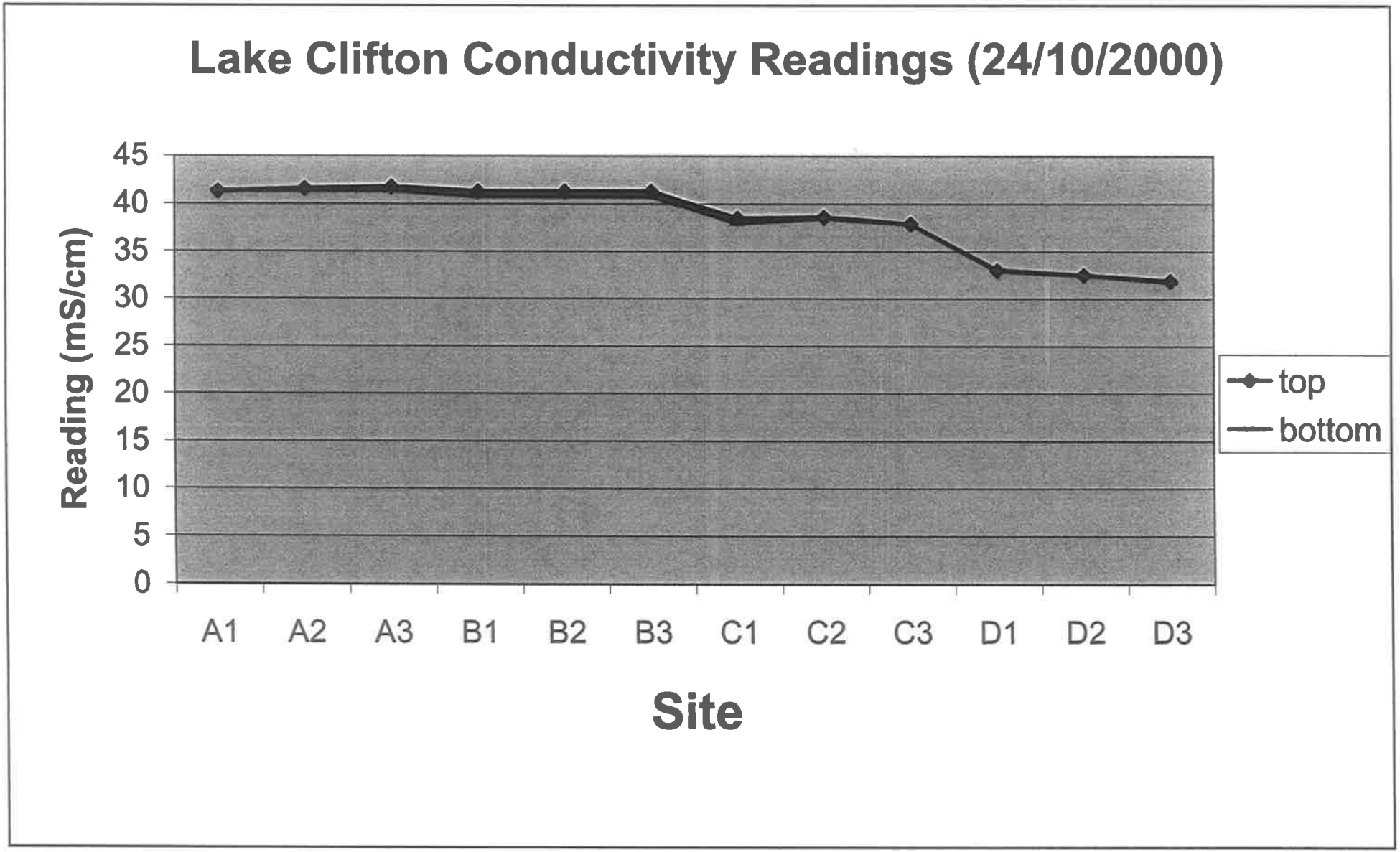

Lake Clifton Conductivity Readings (21/06/2001)
Reading (mS/cm)
80
70
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom

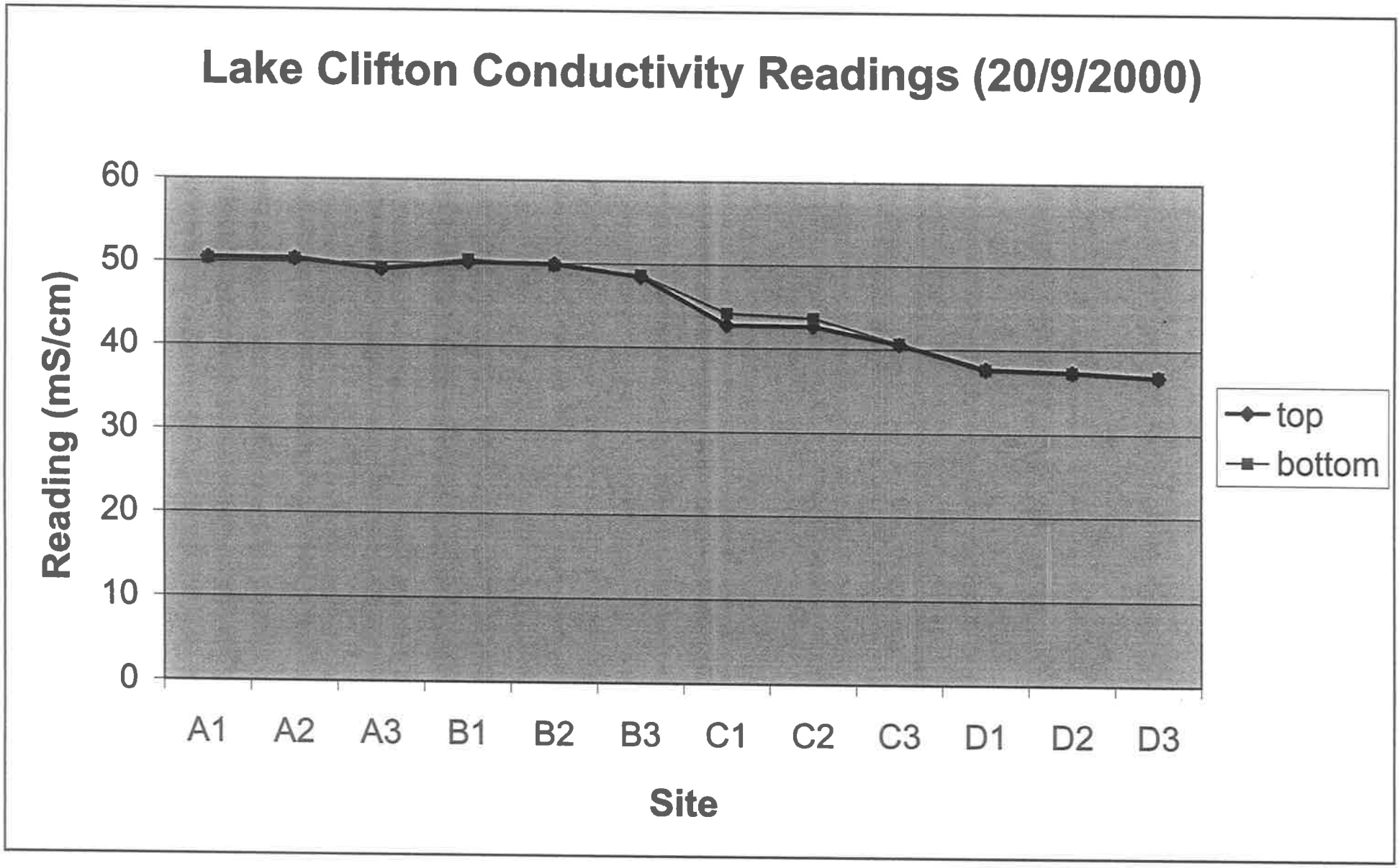

Lake Clifton Conductivity Readings 23/05/2001)
Reding (mS/cm)
76
74
72
70
68
66
64
62
60
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom


Lake Clifton Conductivity Readings (20/02/2001)
Reading (mS/cm)
120
100
80
60
40
20
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom


Lake Clifton Conductivity Readings (22/01/2001)
Reading (mS/cm)
90
80
70
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom


Lake Clifton Conductivity Readings (15/12/2000)
Reading (mS/cm)
51
50.5
50
49.5
49
48.5
48
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom


Lake Clifton Conductivity Readings (24/10/2000)
Reading (mS/cm)
45
40
35
30
25
20
15
10
5
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom


Lake Clifton Conductivity Readings (20/9/2000)
Reading (mS/cm)
60
50
40
30
20
10
0
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
Site
top
bottom

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
01E0561/001	A 1	12/10/2001	17000	5140
01E0561/002	A 2	12/10/2001	17000	5150
01E0561/003	A 3	12/10/2001	17000	5100
01E0561/004	B 1	12/10/2001	17000	4950
01E0561/005	B 2	12/10/2001	18000	5070
01E0561/006	B 3	12/10/2001	18000	5030
01E0561/007	C 1	12/10/2001	15000	4470
01E0561/008	C 2	12/10/2001	16000	4780
01E0561/009	C 3	12/10/2001	17000	4730
01E0561/010	D 1	12/10/2001	14000	3990
01E0561/011	D 2	12/10/2001	14000	4120
01E0561/012	D 3	12/10/2001	15000	3980
01E0561/013	A 1	08/11/2001		5140
01E0561/014	A 2	08/11/2001		5450
01E0561/015	A 3	08/11/2001		5470
01E0561/016	B 1	08/11/2001		5480
01E0561/017	B 2	08/11/2001		5250
01E0561/018	B 3	08/11/2001		5440
01E0561/019	C 1	08/11/2001		5100
01E0561/020	C 2	08/11/2001		5420
01E0561/021	C 3	08/11/2001		5270
01E0561/022	D 1	08/11/2001		5040
01E0561/023	D 2	08/11/2001		5050
01E0561/024	D 3	08/11/2001		5060

8/11/01

Lake Chelan 8/11/01

Lead Meb & Wife Dead
at 109.

Begin CT with Filter.

8/11/01

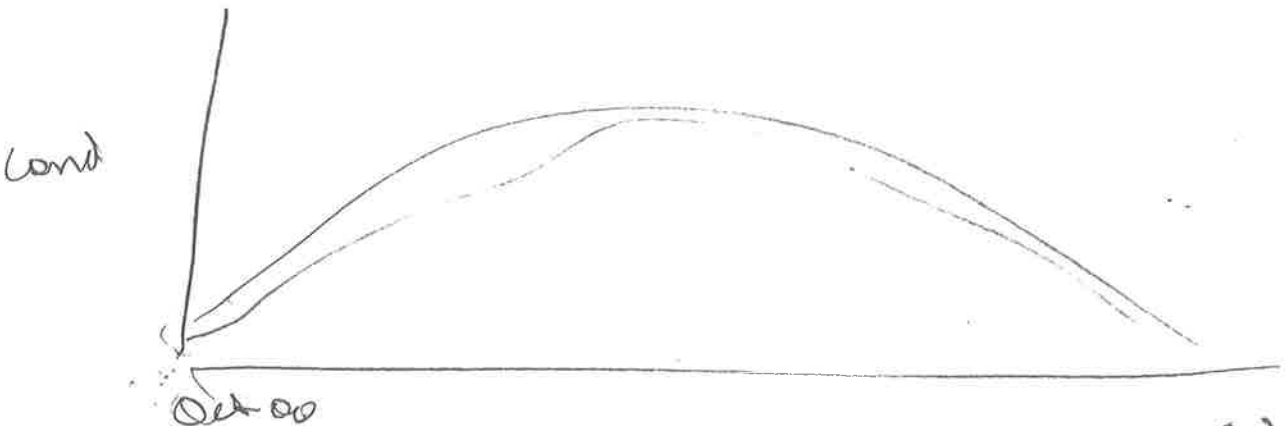
		Surface		Bottom			
		Temp		Temp		Depth	
	A1	51.2	21.2	~~50.2~~ 51.1	20.9	1.2	
	A2	52.0	20.8	52.0	21.2	1.1	
	A3	51.5	19.1	51.4	19.0	.8	
	B1	51.6	23.3	51.4	23.4	0.6	
	B2	51.5	22.3	~~51.4~~ 51.4	23.3	1.0	
	B3	51.3	22.6	51.4	22.6	0.5	0.5
1240	C1	51.3	20.9	50.5	22.2	0.6	0.6
	C2	51.4	21.4	51.3	21.3	0.9	0.9
1255	C3	50.4	22.6	50.4	22.2	0.3	
	D1	48.0	25.1	47.9	25.1	0.3	
	D2	48.5	23.6	48.3	23.9	0.6	
1430	D3	48.8	24.4	48.6	24.4	0.4	

12/10/01

DATE	12/10/01	Gleeson	[illegible]	[illegible]			
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH 4.23
A1	11.13	CALM	49.0	17.9	49.7	17.9	1.2
		CC					
A2	11.9	CALM	49.4	17.8	49.0	17.9	2.0
		CC					
A3	11.00	CALM	49.2	17.9	49.2	17.8	0.60
		CC					
B1	10.25	CALM	47.7	16.9	47.7	16.9	0.60
		CC					
B2	10.30	CALM	48.8	17.6	48.8	17.6	0.90
		CC					
B3	10.35	CALM	48.5	17.8	48.3	17.8	0.50
		CC					
C1	09.30	CALM	[illegible]	16.6	[illegible]	16.9	0.70
		CC	43.2	16.9	42.5	16.9	
C2	09.44	CALM	45.7	17.7	45.7	17.7	0.9
		CC					
C3	09.50	CALM	45.3	17.7	45.3	17.8	0.4
		CC					
D1	10.16	CALM	38.4	17.4	38.4	17.4	0.4
		CC					
D2	10.10	CALM	40.1	17.7	40.1	17.7	0.6
		CC					
D3	10.05	CALM	39.8	17.8	39.8	17.8	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Wind – 15-20 Km/Hr SW.



Your Ref : Lake Clifton
Our Ref : 01E0387; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

12 samples of water received on 2 October 2001

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
01E0387/001	A1	20/09/01	19000	4960
01E0387/002	A2	20/09/01	18000	4990
01E0387/003	A3	20/09/01	19000	4880
01E0387/004	B1	20/09/01	19000	4880
01E0387/005	B2	20/09/01	19000	4880
01E0387/006	B3	20/09/01	19000	4750
01E0387/007	C1	20/09/01	17000	4190
01E0387/008	C2	20/09/01	16000	4200
01E0387/009	C3	20/09/01	15000	3990
01E0387/010	D1	20/09/01	14000	3660
01E0387/011	D2	20/09/01	14000	3630
01E0387/012	D3	20/09/01	13000	3590

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Chemistry Centre (WA)
125 Hay Street, East Perth,Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

REPORT OF EXAMINATION

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

8 October 2001

DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
Conserving the nature of WA

CALMScience Division
Wildlife Research Centre
Wildlife Place
Woodvale WA 6026
(P O Box 51 Wanneroo WA 6946)
Telephone (08) 9405 5100
Facsimile (08) 9306 1641

FACSIMILE TRANSMISSION

To:	Jenny McGuire
Location:	Chemistry Centre
Subject:	
From:	
Date:	
Pages including this one:	

Comments: Would analyse the accompanying samples from Lake Clifton for the following:

20/9/01 Conductivity and Chloride

9/8/01 Conductivity and Chloride

21/6/01 Conductivity and Chloride

Screen West Black Grant
film making in WA
9224 7340
Ministry for Culture & Arts
www.screenwest.com.au

Gay Lane Marketing

Museum

Doc Unit at WAM.

Producer — overview
but also to screenwrite the script

9224 7350.

Liz Casey
Funding Prog Coordinator

10%

National Broadcaster

0900
Mon 5th
Law Chambers
5 75 Mary
Level 7

20/9/07

Depth Gauge = 4.16

DATE	~~23/6/01~~						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1	1115	CALM 18	50.5	17.1	50.4	17.1	1.1
		CC					
A2		CALM	50.4	17.3	50.4	17.3	1.8
		CC					
A3		CALM	49.2	16.4	49.4	16.4	1.2
		CC					
B1		CALM 19	50.1	16.8	50.4	16.9	0.8
		CC					
B2		CALM	49.9	16.3	49.8	16.3	0.8
		CC					
B3		CALM	48.5	16.5	48.7	16.5	0.4
		CC					
C1		CALM 11	42.8	16.5	44.2	16.9	0.8
		CC					
C2		CALM	42.7	16.3	43.7	16.5	1.0
		CC					
C3		CALM	40.6	15.8	40.7	15.8	0.4
		CC					
D1		CALM 12	37.7	16.6	37.7	16.6	0.5
		CC					
D2		CALM	37.4	16.5	37.4	16.5	0.7
		CC					
D3		CALM	36.8	16.3	36.9	16.3	0.4
		CC					-

"E" denotes Error in TPS conductivity meter recording

Calibrated at 2760 µS. 20/9/

Your Ref :
Our Ref : 01E0363; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

24 samples of water received on 25 September 2001

Analyte			Cl	ECond
Unit			mg/L	mS/m
CCWA ID	**Client ID**	**Sampled**		
01E0363/001	A 1	21/06/01	24000	6900
01E0363/002	A 2	21/06/01	25000	6910
01E0363/003	A 3	21/06/01	23000	6890
01E0363/004	B 1	21/06/01	22000	6280
01E0363/005	B 2	21/06/01	23000	6480
01E0363/006	B 3	21/06/01	22000	6450
01E0363/007	C 1	21/06/01	20000	5690
01E0363/008	C 2	21/06/01	20000	5920
01E0363/009	C 3	21/06/01	22000	6090
01E0363/010	D 1	21/06/01	21000	5460
01E0363/011	D 2	21/06/01	20000	5560
01E0363/012	D 3	21/06/01	20000	5410
01E0363/013	A 1	09/08/01	-	5870
01E0363/014	A 2	09/08/01	-	5870
01E0363/015	A 3	09/08/01	-	5870
01E0363/016	B 1	09/08/01	-	5540
01E0363/017	B 2	09/08/01	-	5570
01E0363/018	B 3	09/08/01	-	5560
01E0363/019	C 1	09/08/01	-	4960
01E0363/020	C 2	09/08/01	-	4980
01E0363/021	C 3	09/08/01	-	4930
01E0363/022	D 1	09/08/01	-	4400
01E0363/023	D 2	09/08/01	-	4430
01E0363/024	D 3	09/08/01	-	4310

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

REPORT OF EXAMINATION

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

3 October 2001

Your Ref :
Our Ref : 01E0122; 3.1.1
Enquiries to : Jenny McGuire
Telephone :

CHEMISTRY CENTRE

Research Centre Manager
Department of Conservation and Land Management
PO Box 51
WANNEROO
WA 6065
Attention : G Pearson

Report on:

12 samples of water received on 31 July 2001

Analyte		Cl	ECond
Unit		mg/L	mS/m
CCWA ID	**Client ID**		
01E0122/001	A1	21000	5010
01E0122/002	A2	22000	4870
01E0122/003	A3	22000	4830
01E0122/004	B1	22000	4700
01E0122/005	B2	22000	4710
01E0122/006	B3	22000	4620
01E0122/007	C1	18000	4220
01E0122/008	C2	20000	4310
01E0122/009	C3	20000	4270
01E0122/010	D1	17000	3780
01E0122/011	D2	18000	3840
01E0122/012	D3	18000	3870

Analyte	**Method**	**Description**
Cl	iCL1WAAA	Chloride
ECond	iEC1WZSE	Electrical Conductivity, 25 degrees celcius.

These results apply only to the sample(s) as received.
Unless arrangements are made to the contrary, these samples will be disposed of after 60 days of the issue of this report.

The results presented in this report have been emailed in an excel spreadsheet format. If you did not receive this please contact Jenny McGuire on 08 92223019.

Chemistry Centre (WA)
125 Hay Street, East Perth, Western Australia 6004
ABN 40-991-885-705
Telephone (08) 9222 3177 Facsimile (08) 9325 7767
Email: chemistry@ccwa.wa.gov.au Website: www.ccwa.wa.gov.au

REPORT OF EXAMINATION

Jenny McGuire
Principal Chemist
Environmental Chemistry Section

16 August 2001

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Research Centre Manager
Date: 31/7/01
Subject: Water analyses –lake Clifton

I would be grateful if you would analyse the accompanying 12 samples from Lake Clifton for conductivity and chloride.

Thanks

July Survey.

= July (2001) Survey

30/8/2014

19/7/01

WTW unit 3.77 GG.

Chiltern 19/7/01

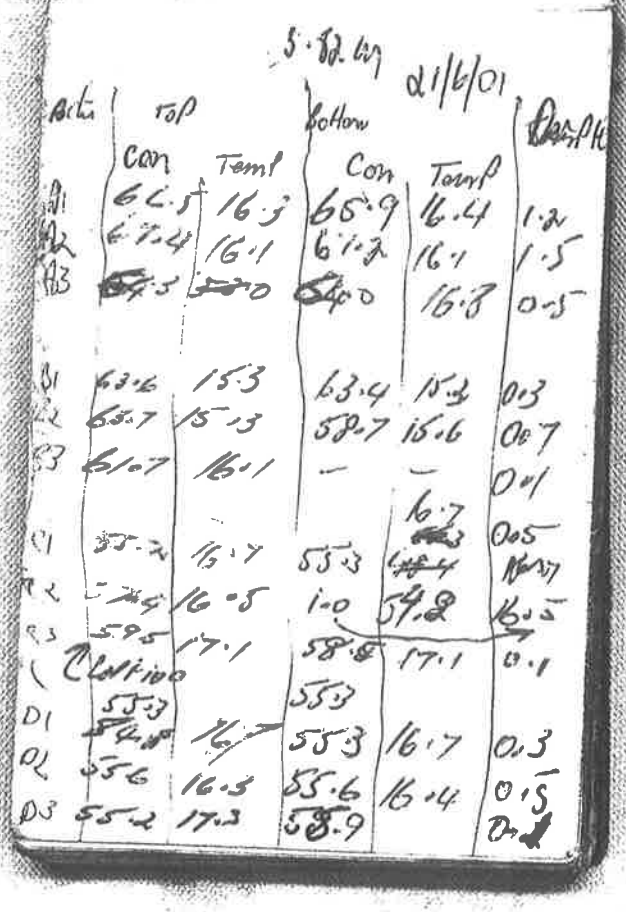
	Tof Cen	Tof	Btm Cen	Btm Tear	Drill
A1	61.1	12.6	60.9	12.6	1.5
A2	61.2	12.3	61.2	12.3	2.0!
A3	61.4	12.3	61.4	12.3	1.0
B1	60	12.6	60.0	12.7	0.6
B2	60.1	12.3	60.3	12.3	1.0
B3	58.9	[illegible]	[illegible]	[illegible]	0.4
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
C1	53.3	[illegible]	[illegible]	[illegible]	0.5
C2	53.4	13.1	53.9	13.4	1.0
C3	53.9	[illegible]	[illegible]	[illegible]	[illegible]
D1	?	14.1	?		0.5
D2	?		?		1.0
D3	?		?		0.1

Samples taken - No reading
E3 message

DATE	23/6/01						
SITE	TIME	ANALYSIS	TOP CON MS/CM	TOP TEMP C	BOTTOM CON C	BOTTOM TEMP C	DEPTH
A1		CALM	78.1	21	76.0	21.4	1.0
		CC					
A2		CALM	E	21.6	E	21.7	1.2
		CC					
A3		CALM	E	23.9	E	24.0	0.3
		CC					
B1		CALM	E		E		0.1
		CC					
B2		CALM	E		E		0.5
		CC					
B3		CALM	E		E		0.05
		CC					
C1		CALM	E		E		0.05
		CC					
C2		CALM	E		E		0.3
		CC					
C3		CALM	E		E		0.05
		CC					
D1		CALM	E		E		0.02
		CC					
D2		CALM	E		E		0.01
		CC					
D3		CALM	-				
		CC					-

"E" denotes Error in TPS conductivity meter recording

21/6/01



Site	Top		Bottom		Depth
	Con	Temp	Con	Temp	
A1	62.5	16.3	60.9	16.4	1.2
A2	62.4	16.1	61.2	16.1	1.5
A3	~~62.3~~	~~16.0~~	64.0	16.8	0.5
B1	63.6	15.3	63.4	15.2	0.3
B2	63.7	15.3	58.7	16.6	0.7
B3	61.7	16.1	—	—	0.1
C1	55.2	15.7	55.3	16.7 ~~16.4~~	0.05
C2	~~54.4~~	16.5	1.0	54.2	0.5
C3	59.5	17.1	58.8	17.1	0.1
(	Control				
D1	55.3		55.3		
D2	~~54.8~~	~~16.~~	55.3	16.7	0.3
D3	55.6	16.5	55.6	16.4	0.5
	55.2	17.3	58.9		0.4

SURVEY CONDUCTED BY ALAN CLARKE 25/5/01
using the Ocean Kayak.

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	373909	6375966	73·3		18·6		73·3	18·1	0·7	
	A2	373229		69·4		17·1		68·3	17·1	1·45	
	A3	372708		71·5		17·4		70·9	17·1	0·900	
	B1	374648	6372890	69·9		19·6		–	–	0·300	
	B2	374250		69·3		19·8		69·9	19·9	0·500	
	B3	373752		69·9		19·9		–	–	0·300	
	C1	375867	6368456	65·3		18·6		66·1	18·1	0·400	
	C2	375670		66·7		17·5		66·7	17·5	0·300	
	C3	375302		67·7		19·7		–	–	0·200	28m east of position
	D1	377628	6364207	73·8		15·4		73·8	15·4	0·330	
	D2	377272		75·0		15·7		75·2	15·8	0·220	
	D3	376971		75·2		16·7		–	–	0·150	30m east of position

Depth gauge (No. 2) at ST JOHN ROAD read 3·74m at 1645 hrs.

NOTE: Problems with TPS not settling down water samples need to be checked measured and checked against field values.

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Research Centre Manager
Date: 4/5/01
Subject: Water Analyses

I would be grateful if you would analyse the accompanying 12 samples for conductivity.

Grant Pearson

Department of Conservation and Land Management
Woodvale Research Centre
Wildlife Place (Ocean Reef Road Woodvale)
PO Box 51, Wanneroo, 6065
Telephone: (08) 9405 5163
Fax: (08) 9306 1641
Mobile: 0418945268

To: Jenny McGuire
Chemistry Centre
From: Grant Pearson
Research Centre Manager
Date: 3/5/01
Subject: Water Analyses – file: WRCwater01

I would be grateful if you would analyse the accompanying 2 samples for nitrogen and potassium.

Grant Pearson

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/2001	30000	7080
00E1224/002	A 2	16/03/2001	30000	7010
00E1224/003	A 3	16/03/2001	30000	6970
00E1224/004	B 1	16/03/2001	29000	7160
00E1224/005	B 2	16/03/2001	29000	7070
00E1224/006	B 3	16/03/2001	27000	6800
00E1224/007	C 1	16/03/2001	41000	8730
00E1224/008	C 2	16/03/2001	40000	8740
00E1224/009	C 3	16/03/2001	38000	9020
00E1224/010	D 1	16/03/2001	78000	13500
00E1224/011	D 2	16/03/2001	65000	11900

Mar 01

CCWA ID	Client ID	Sampled on	Cl	ECond
			iCL1WAAA	iEC1WZSE
			mg/L	mS/m
00E1224/001	A 1	16/03/2001	30000	7080
00E1224/002	A 2	16/03/2001	30000	7010
00E1224/003	A 3	16/03/2001	30000	6970
00E1224/004	B 1	16/03/2001	29000	7160
00E1224/005	B 2	16/03/2001	29000	7070
00E1224/006	B 3	16/03/2001	27000	6800
00E1224/007	C 1	16/03/2001	41000	8730
00E1224/008	C 2	16/03/2001	40000	8740
00E1224/009	C 3	16/03/2001	38000	9020
00E1224/010	D 1	16/03/2001	78000	13500
00E1224/011	D 2	16/03/2001	65000	11900

16/3/01

MARCH	2001	GBP						
SITE	TIME	ANAL.	TOP CON MS/CM	TOP TEMP C	B. CON MS/CM	B. TEMP C	DEPTH (M)	COMMENTS DEPTH GAUGE = 3.67M
A1		CLM	29.2	19.3	29.2	19.6	3.67 GG	
		CC						
A2		CLM	26.5	18.8	33.7	19.7	1.4	
		CC						
A3		CLM	26.3	18.3	22.3	19.0	0.6	
		CC						
B1		CLM	69.4	20.4	68.3	20.4	0.2	
		CC						
B2		CLM	69.4	20.2	69.5	20.4	0.35	
		CC						
B3		CLM	67.9	24.1	-	-	0.05	
		CC						
C1	1350	CLM	86.4	21.9	85.6	22.0	0.2	WPT 069
		CC						
C2		CLM	87.0	21.2	83.1	20.0	0.4	
		CC						
C3		CLM	45.9	25.9	-	-	0.05	WPT 071
		CC						
D1	1530	CLM	-	-	-	-	0.05	
		CC						
D2		CLM	-	-	-	-	0.1	
		CC						

CLM- Analysis from CALM Woodvale
CC- Analysis from Chemistry Centre

16/3/01 Clifton 367

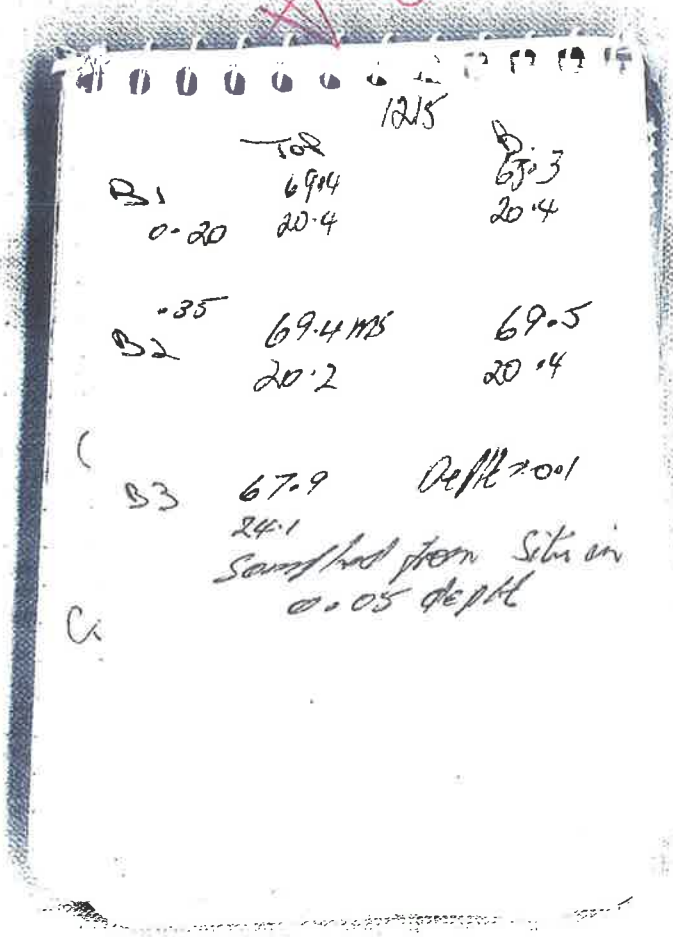
	T	B
0920 A1	54·2	59·2
	19·3	19·6
1140 A2	56·5	53·7
	18·8	19·7
A3 0460	56·3 ms	52·3 ms
	18·3	19·0

Probably 12.5 hrs

30/8/2014

12/5/2001 or 16/3/2001 ?

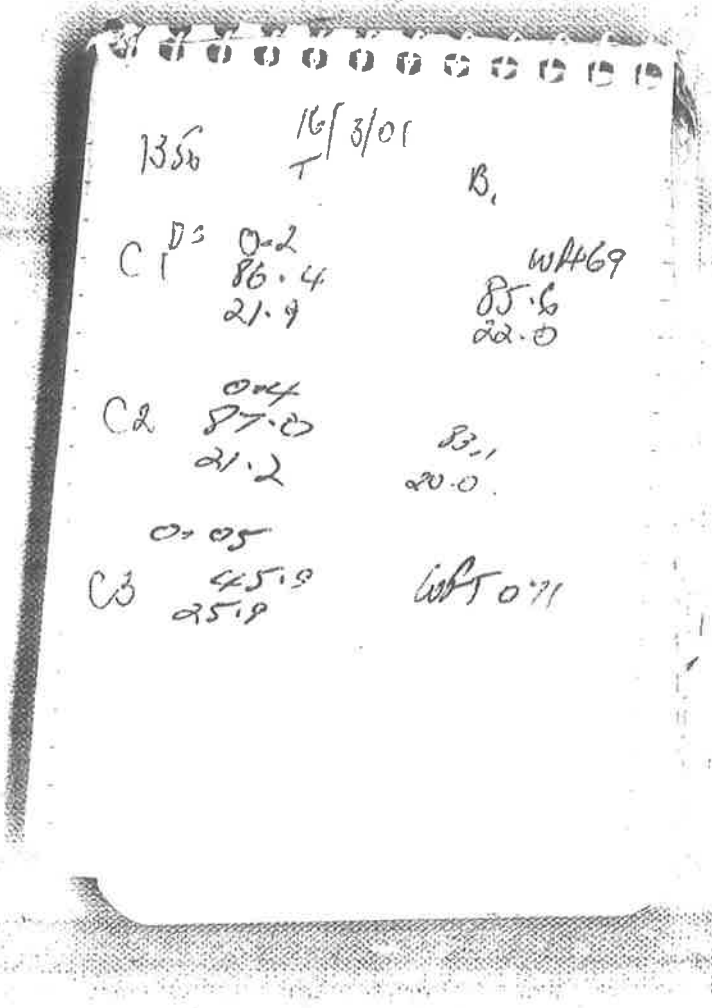
30/8/2014

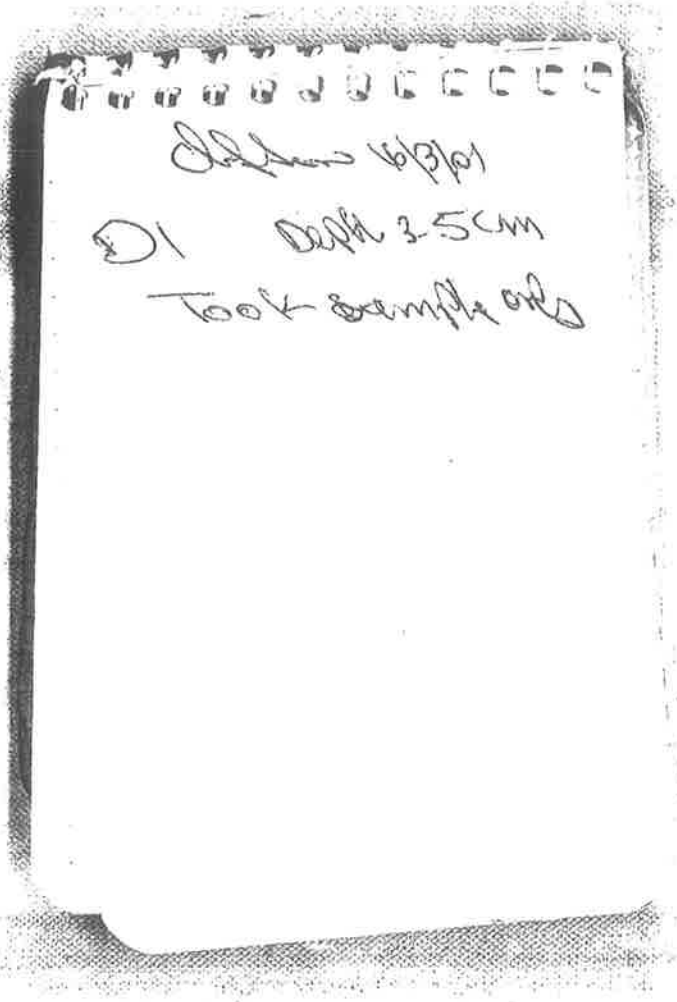


1215

	Top	Bottom
B1 0-20	69.4	69.3
	20.4	20.4
B2 -35	69.4 MS	69.5
	20.2	20.4
B3	67.9	Refusal
	24.1	

Sand/rock from Site in 0.05 depth


1356
16/3/01
T
B1
C1 DS 0-2
86.4
21.9
WA469
85.6
22.0
C2 0-4
87.0
21.2
83.1
20.0
C3 0-05
45.9
25.9
WBT 0.71


6/3/01
D1 Depth 3-5cm
Took sample

SURVEY CONDUCTED BY ALAN CLARKE 20/2/01
using the ocean Kayak.

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH	NOTES/ SAMPLES SITE
		AUS G 66	AUS G 66	ms/cm	ppt	C °C	ms/cm	ppt	C °C	Mtrs	
	A1	373909	6375966	67·7		22·4	67·5		22·3	0·8	373750 6375975
	A2	373229		68·3		21·7	63·2		22·0	1·3	
	A3	372708		68·7		21·6	65·5		21·9	0·8	
	B1	374648	6372890	68·3		26·7	68·4	26·8		0·2	
	B2	374250		68·4		25·5	68·2	25·5		0·4	
	B3	373752		68·2		27·2	67·8	27·2		0·2	373862 6372883
	C1	375867	6368456	79·5		24·3	79·4	24·4		0·3	
	C2	375670		81·8		23·5	79·1	25·2		0·4	
	C3	375302		86·3		26·9	86·5	25·5		0·15	375433 6368448
	D1	377628	6364207	–			91·8	28·0		0·13	
	D2	377272		93·0		26·9	94·9	24·4		0·23	
	D3	376971		–			98·5	28·4		0·13	377127 6364200

Depth gauge at ST JOHN Road read 3·73 on 22/02/01

NOTE: gauge not read on day of profiling survey.

Grant I have entered the profile positions from the reference sheet into the GPS 12 Garmin as.

CLIFA1
CLIFA2
CLIFA3
CLIFB1 etc.

Where I could not reach the site because of the low water level I have recorded the nearest site records.

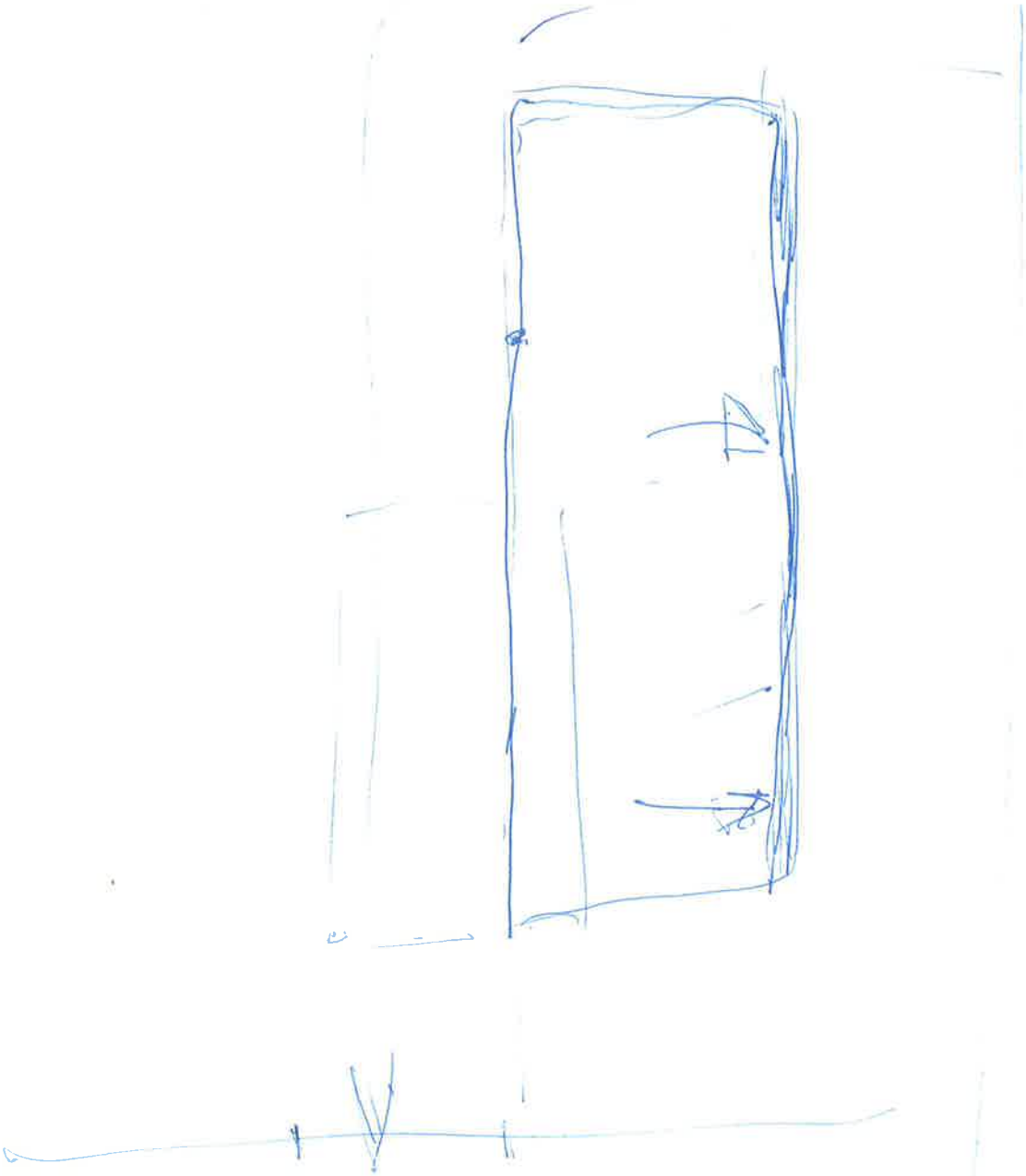
DC

DATE	SITE	EAST	NORTH	COND TOP	SAL TOP	TEMP TOP	CON BTM	SAL BTM	TEMP BTM	DEPTH
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966							
	A2	373229								
	A3	372708								
	B1	374648	6372890							
	B2	374250								
	B3	373752								
	C1	375867	6368456							
	C2	375670								
	C3	375302								
	D1	377628	6364207							
	D2	377272								
	D3	376971								

Trans
06
2.10
10.00
$53.95

Rudi Goldfuss Express
180 620 440

DATE	SITE	EAST	NORTH	COND	SAL	TEMP	CON	SAL	TEMP	DEPTH
22/01/01				TOP	TOP	TOP	BTM	BTM	BTM	3.93
		AUS G 66	AUS G 66	ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	373909	6375966			24.2			24.4	1
	A2	373229				23.8			24	1.6
	A3	372708				23.9			24	1.1
	B1	374648	6372890			25.5			25.5	0.3
	B2	374250				24.4			24.5	0.6
	B3	373752				24.9			25	0.3
	C1	375867	6368456			24.7			24.9	0.5
	C2	375670				24.3			24.3	0.6
	C3	375302				25.5			25.1	0.2
	D1	377628	6364207			26.2			26.3	0.3
	D2	377272				25.6			25.6	0.3
	D3	376971				27.1			27.1	0.2



DATE	SIT	COND	SAL	TEMP	CON	SAL	TEMP	DEPTH
22/01/01		TOP	TOP	TOP	BTM	BTM	BTM	3.93
		ms/cm	ppt	C	ms/cm	ppt	C	Mtrs
	A1	61.8		24.2	61.5		24.4	1
	A2	62		23.8	61.9		24	1.6
	A3	61.6		23.9	61.5		24	1.1
	B1	66.5		25.5	66.4		25.5	0.3
	B2	62.1		24.4	62.1		24.5	0.6
	B3	66.5		24.9	65.9		25	0.3
	C1	71.4		24.7	71.4		24.9	0.5
	C2	71		24.3	70.9		24.3	0.6
	C3	74.1		25.5	75.2		25.1	0.2
	D1	85.2		26.2	84.4		26.3	0.3
	D2	81.4		25.6	81.1		25.6	0.3
	D3	83.1		27.1	82.6		27.1	0.2

15/12/00		COND TOP ms/cm	SAL TOP ppt	TEMP TOP C	CON BTM ms/cm	SAL BTM ppt	TEMP BTM C	DEPTH Mtrs	CLM gg
1050hrs	A1	48.9	29.9	26.1	49.2	30	26.1	0.6	4.12
	A2	49.3	30.1	25.1	49.2	30	24.9	1.6	
	A3	49.4	30.2	25.9	49	29.9	25	1.2	
	B1	49.8	30.4	26.3	50	30.5	26.3	0.5	
	B2	49.4	30.2	25.5	49.7	30.3	25.5	0.8	
	B3	49.6	30.3	26.7	50	30.5	26.4	0.4	
	C1	50	30.5	26.3	50.1	30.6	26.2	0.8	
	C2	49.7	30.3	26.6	50.1	30.6	26.5	0.8	
	C3	50.5	31	29.1	50.6	31	29.1	0.25	
	D1	49.7	30.3	28	49.7	30.3	27.9	0.4	
	D2	48.9	29.9	27.2	49.8	30.4	26.9	0.3	
1315hrs	D3	49.8	30.4	28.6	50.1	30.6	28.4	0.4	

22/01/2001		ms/cm	ppt	C	ms/cm	ppt	C	Mtrs	
	A1	61.8		24.2	61.5		24.4	1	3.93
	A2	62		23.8	61.9		24	1.6	
	A3	61.6		23.9	61.5		24	1.1	
	B1	66.5		25.5	66.4		25.5	0.3	
	B2	62.1		24.4	62.1		24.5	0.6	
	B3	66.5		24.9	65.9		25	0.3	
	C1	71.4		24.7	71.4		24.9	0.5	
	C2	71		24.3	70.9		24.3	0.6	
	C3	74.1		25.5	75.2		25.1	0.2	
	D1	85.2		26.2	84.4		26.3	0.3	
	D2	81.4		25.6	81.1		25.6	0.3	
	D3	83.1		27.1	82.6		27.1	0.2	

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: re: fwd: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 01/19/2001 4:32 PM

Grant

We won't start on sampling for nutrients until I have a specific allocation of funds for th

Measure conductivity, temperature and depth as before. Calibrate instrument against conduct
salinity standard. No point in recording salinity.

DON'T have samples analysed for ALL major ions, but DO have samples analysed for CHLORIDE.

Give Jeff Turner a call and ask if you need to take a chloride sample from every sampling p
(hopefully not, as this would require 24 analyses). If not, how many samples should be take

Jim

From: Grant Pearson@WOOD.SID@CALM, on 19/Jan/2001 2:03 PM:

Jim
I plan to visit Clifton again on Monday and would like to know what parameters
you would like me to measure/collect/ analyse please.
Thanks
gp

From: Jim Lane@BUSS.SID@CALM, on 11/08/2000 1:35 PM:
To: Grant Pearson@WOOD.SID@CALM
Cc: John Blyth@WOOD.SID@CALM

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake
Clifton transects. Assuming you can do all four transects in the one day, any
one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you
know which parameters closer to the day, when I have found out more about the
nutrient monitoring that has been done in the past.

Thanks

JL

Lake Davis 91.
Stan Richter
George Platts
Glen Lambert
0418940570
Pauline Scientific
Brad.
Water Catchment

Pearson, Grant

From: jiml@calm.wa.gov.au
Sent: Friday, 19 January 2001 8:33 AM
To: grantp
Subject: re: fwd: Lake Clifton transects


BEYOND.RTF

Grant

We won't start on sampling for nutrients until I have a specific allocation of funds for this work.

Measure conductivity, temperature and depth as before. Calibrate instrument against conductivity standard, not salinity standard. No point in recording salinity.

DON'T have samples analysed for ALL major ions, but DO have samples analysed for CHLORIDE.

Give Jeff Turner a call and ask if you need to take a chloride sample from every sampling point, top and bottom (hopefully not, as this would require 24 analyses). If not, how many samples should be taken and where from?

Jim
---------- Original Text ----------

From: Grant Pearson@WOOD.SID@CALM, on 19/Jan/2001 2:03 PM:

Jim
I plan to visit Clifton again on Monday and would like to know what parameters you would like me to measure/collect/ analyse please.
Thanks
gp

From: Jim Lane@BUSS.SID@CALM, on 11/08/2000 1:35 PM:
To: Grant Pearson@WOOD.SID@CALM
Cc: John Blyth@WOOD.SID@CALM

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake Clifton transects. Assuming you can do all four transects in the one day, any one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you know which parameters closer to the day, when I have found out more about the nutrient monitoring that has been done in the past.

Thanks

JL

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: re: various
Attachment: BEYOND.RTF
Date: 12/18/2000 6:17 PM

Grant

Lake Clifton: Please send me the results as soon as you can (after careful checking). Yes, gauge on each occasion, and record the depth at each sampling site. Sue Elscot will be comi investigate the nutrient monitoring issue for me. Will provide advice on what to analyse fc

Work program: we can talk about intertidal work this Wed or Thurs at Woodvale. Please have relevant SPP handy for us to refer to.

Bathymetry: I will make first contact Bob McCarthy about the bathymetric work. I'll try to

Broome airport relocation: Please seek and incorporate comment from the District before ser

I'll have a look at the Hickey Humour at Woodavle, assuming you have saved it.

In future, please send separate e-mails about separate subjects. This will facilitate my fi

See you Wed PM

JL

From: Grant Pearson@WOOD.SID@CALM, on 18/Dec/2000 9:57 AM:

Jim,
Had a look at Clifton on Friday with Alan (my vol dropped out unexpectedly). Lake depth ha and salinities were up by 15 %+. I'll type them up and send them to you. I have collected ions and nutrients from the surface of each site.

The work program looks fine although I would like to talk to you about future intertidal wc

The trip to 80 Mile Beach and Broome was extremely successfull if the Broome Council attitu gauge it by. I'll do up a separate report for this.

Have you contacted Bob McCarthy for the the bathymetry or should I?

I have lost many emails that I kept as records of communications between us and I'm now sta new computer. So if I appear to repeat queries you'll know why.

I met Marie Ward last Friday and she has asked us to respond to the consultants report on t we discussed in Busselton. I expect to spend today and Tuesday on this and will forward it They want it by the end of the week.

Attached is a bit of humour from Bob Hickey.
Cheers
Grant

From: "Bob Hickey" <Bob.Hickey@cwu.EDU>, on 12/12/2000 9:39 AM:
To: iSMTP@CALM.COMO.1@Servers[<Graeme.Aggett@cwu.EDU>]

it's absolutely hilarious. Trust me.

Robert Hickey
Department of Geography and Land Studies
Central Washington University
Ellensburg, WA 98926
(509) 963-2178
(509) 963-1047 (fax)
rhickey@cwu.edu
http://www.cwu.edu/~rhickey/

"I'm trying to get a life, but today's not a good day to start."

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc: John Blyth@WOOD.SID@CALM
Subject: Lake Clifton transects
Attachment: BEYOND.RTF
Date: 08/11/2000 1:35 PM

Grant

Would you please mark 13-15 December in your diary for a repeat of the Lake Clifton transects. Assuming you can do all four transects in the one day, any one of those days will do.

You will also need to collect samples for nutrient analysis. I will let you know which parameters closer to the day, when I have found out more about the nutrient monitoring that has been done in the past.

Thanks

JL

93340128

041

043 807 6074
041 894 3268

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 7/11/00

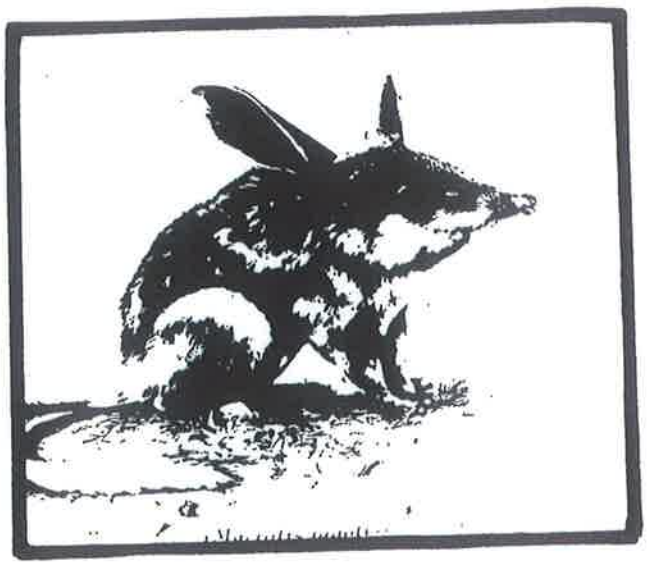
TO: Jim LANE (CALM)

FROM: G. PEARSON

NO OF PAGES: 3.

(INCLUDING FACE SHEET)

MESSAGE: Conductivity figures for Lake Clifton taken on 24/10/00



DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALMSCIENCE DIVISION
WILDLIFE RESEARCH CENTRE, WOODVALE
FAX NO (08) 9306 1641 TELEPHONE NO (08) 9405 5100

Date: 7/11/00

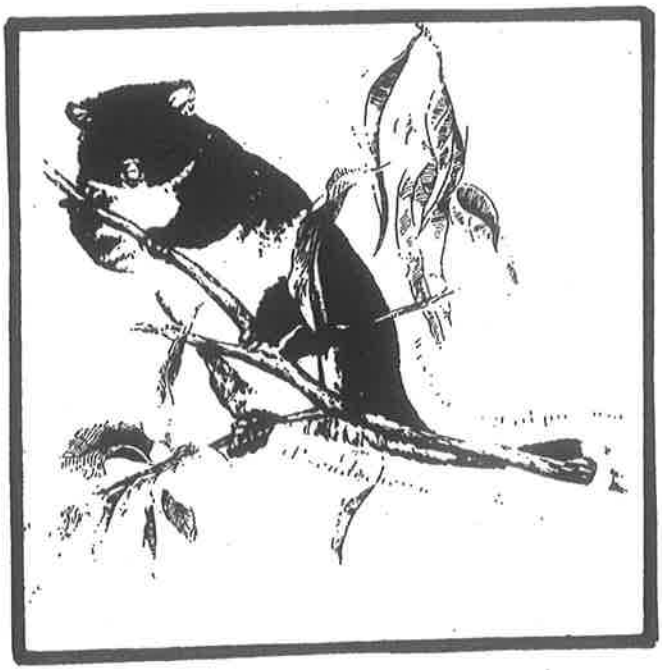
TO: Jan Lane

FROM: G. Lamson

NO OF PAGES: 2

(INCLUDING FACE SHEET)

MESSAGE: Hot off the press.



CHEM CENTRE RESULTS

Lake Clifton 24/10/00

Version 1.

CCWA ID	Client ID	CO3	Ca	Cl	ECond	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na	SO4_S	SiO2_Si	pH	alON_BAL
		mg/L	mg/L	mg/L	mS/m	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%
00E0553/001	A 1	<2	437	16000	4160	0.06	201	5400	270	1050	<0.02	0.02	8510	1910	25	8	-2.3
00E0553/002	A 3	<2	432	16000	4180	0.06	220	5300	267	1030	<0.02	0.01	8430	1740	26	8	-0.6
00E0553/003	B 1	<2	434	15000	4150	0.06	220	5400	268	1040	<0.02	0.01	8550	1750	26	8	2.9
00E0553/004	B 3	<2	461	15000	4140	0.05	214	5400	266	1030	<0.02	0.01	8460	1730	26	8.1	1.8
00E0553/005	C 1	<2	394	14000	3830	0.05	201	4900	245	948	<0.02	0.01	7830	1600	26	8	1.4
00E0553/006	C 3	<2	388	13000	3770	0.05	195	4800	244	939	<0.02	0.01	7850	1580	25	8.1	3.9
00E0553/007	D 1	36	329	12000	3270	<0.05	73	4100	207	797	<0.02	0.01	6700	1350	21	8.4	1.4
00E0553/008	D 3	48	317	11000	3150	<0.05	24	4000	200	776	<0.02	0.01	6470	1320	19	8.8	2.2

CHEM CENTRE

CONDUCTIVITY

CCWA ID	Client ID	CO3	Ca	Cl	Fe	HCO3	Hardness	K	Mg	Mn	N_NO3	Na
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
00E0553/001	A 1	<2	437	16000	0.06	201	5400	270	1050	<0.02	0.02	8510
00E0553/002	A 3	<2	432	16000	0.06	220	5300	267	1030	<0.02	0.01	8430
00E0553/003	B 1	<2	434	15000	0.06	220	5400	268	1040	<0.02	0.01	8550
00E0553/004	B 3	<2	461	15000	0.05	214	5400	266	1030	<0.02	0.01	8460
00E0553/005	C 1	<2	394	14000	0.05	201	4900	245	948	<0.02	0.01	7830
00E0553/006	C 3	<2	388	13000	0.05	195	4800	244	939	<0.02	0.01	7850
00E0553/007	D 1	36	329	12000	<0.05	73	4100	207	797	<0.02	0.01	6700
00E0553/008	D 3	48	317	11000	<0.05	24	4000	200	776	<0.02	0.01	6470

CCWA ID	Client ID	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L		%
00E0553/001	A 1	1910	25	8	-2.3
00E0553/002	A 3	1740	26	8	-0.6
00E0553/003	B 1	1750	26	8	2.9
00E0553/004	B 3	1730	26	8.1	1.8
00E0553/005	C 1	1600	26	8	1.4
00E0553/006	C 3	1580	25	8.1	3.9
00E0553/007	D 1	1350	21	8.4	1.4
00E0553/008	D 3	1320	19	8.8	2.2

CCWA ID	Client ID	SO4_S	SiO2_Si	pH	aION_BAL
		mg/L	mg/L		%
00E0553/001	A 1	1910	25	8	-2.3
00E0553/002	A 3	1740	26	8	-0.6
00E0553/003	B 1	1750	26	8	2.9
00E0553/004	B 3	1730	26	8.1	1.8
00E0553/005	C 1	1600	26	8	1.4
00E0553/006	C 3	1580	25	8.1	3.9
00E0553/007	D 1	1350	21	8.4	1.4
00E0553/008	D 3	1320	19	8.8	2.2

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Originated by: Jim Lane@BUSS.SID@CALM
Cc:
Subject: fwd: RE: Lake Clifton water levels to AHD
Attachment: BEYOND.RTF
Date: 08/11/2000 2:07 PM

Grant: for info only. Maybe it's not the Dawesville Channel. Jim

From: Jim Lane@BUSS.SID@CALM, on 08/Nov/2000 2:07 PM:
To: iSMTP@CALM.COMO.1@Servers[<philip.commander@wrc.wa.gov.au>]
Cc: John Blyth@WOOD.SID@CALM

Thanks for the interesting reply Philip.

I don't recall whether or not I have a copy of Rezina Sham's report. I will have someone attempt to dig it out next week.

Regards

Jim

From: "COMMANDER Philip" <philip.commander@wrc.wa.gov.au>, on 08/Nov/2000 1:53 PM:

Thanks, Jim.

I have been looking at Rezina Shams' information a bit more closely.

Her water level graph for Lake Clifton (from CSIRO data) in 1992/93 shows the lake level ranging from about - 0.15 to +0.6 m AHD (coinciding with high levels on your graph).

If you can't get yours to AHD, we can try matching the data points from your measurements to this graph (did you have a copy of the report?).

I have compared the water table levels for bore B4 (about 600m east of the lake and about 2km south of the tavern). The levels taken in 1979/80 and in 1995/6 are not appreciably different - so no change in water table near the lake over the period (or between these years).

Similarly, comparison of water levels in A5 (adjacent to Harvey Estuary, continuation of White Hill Rd), shows the levels in 1979/80 and 1995/96 are within 3cm of each other - so no change in Harvey Estuary, even after the cut.

Your data does show a correlation between high salinity and low water levels - but I can't see the rationale for the apparent change in baseline salinity and water level around 1993/4, in view of the water table data quoted above.

I'll await the answer on your AHDs

Phil

-----Original Message-----
From: jiml@calm.wa.gov.au [mailto:jiml@calm.wa.gov.au]
Sent: Wednesday, 8 November 2000 13:28
To: philip.commander@wrc.wa.gov.au
Cc: johnbl@calm.wa.gov.au
Subject: Lake Clifton water levels to AHD

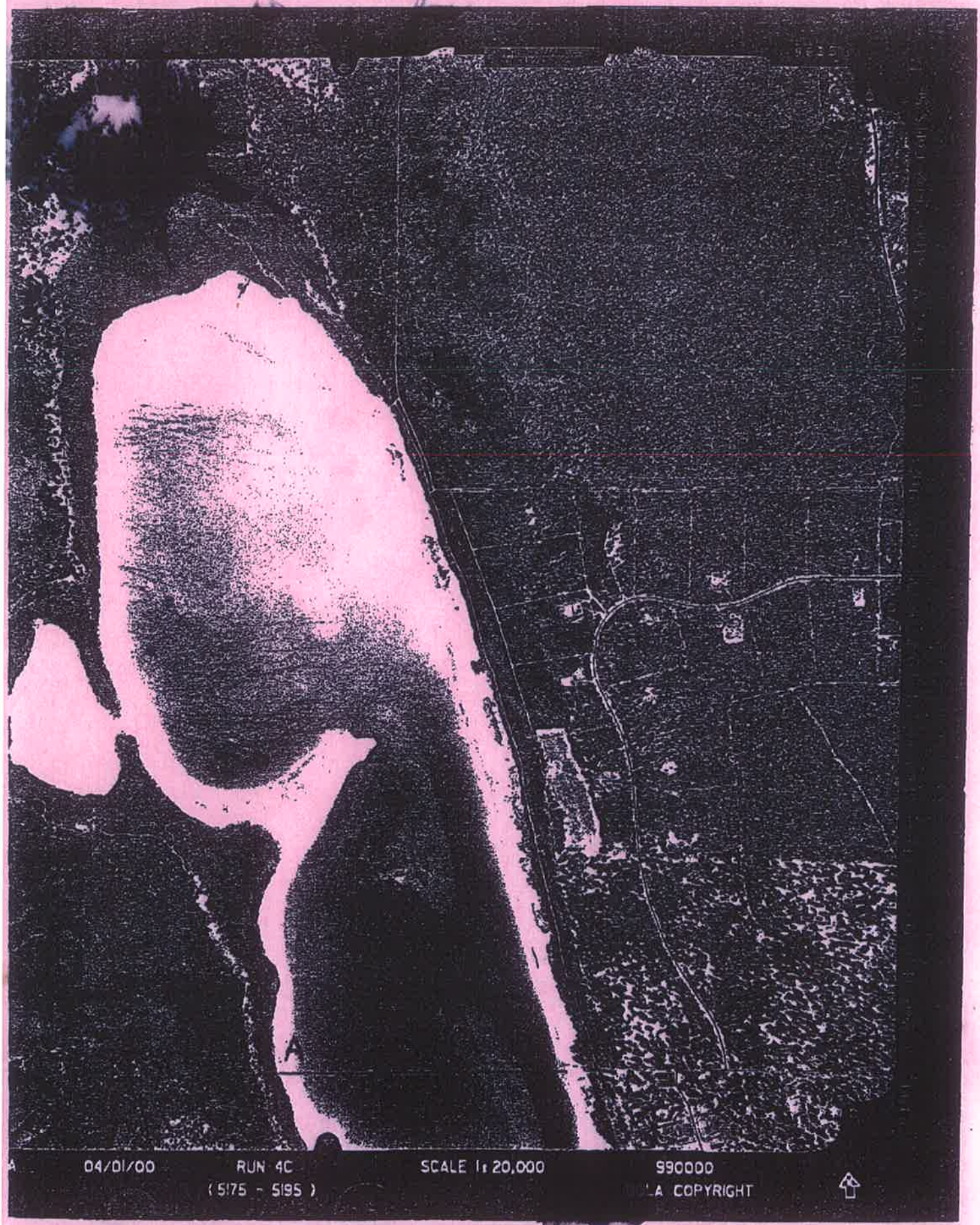
Philip

The person who handles the survey aspect of our monitoring work is in the bush
this week so the earliest I will be able to send you the levels to AHD will probably be next Tuesday.

There is a small chance that the DOLA benchmark and gauges at Lake Clifton (Mt
John Rd) have not yet been tied to AHD. If that proves to be the case, we will
arrange for the necessary surveying to be done ASAP.

Regards

Jim

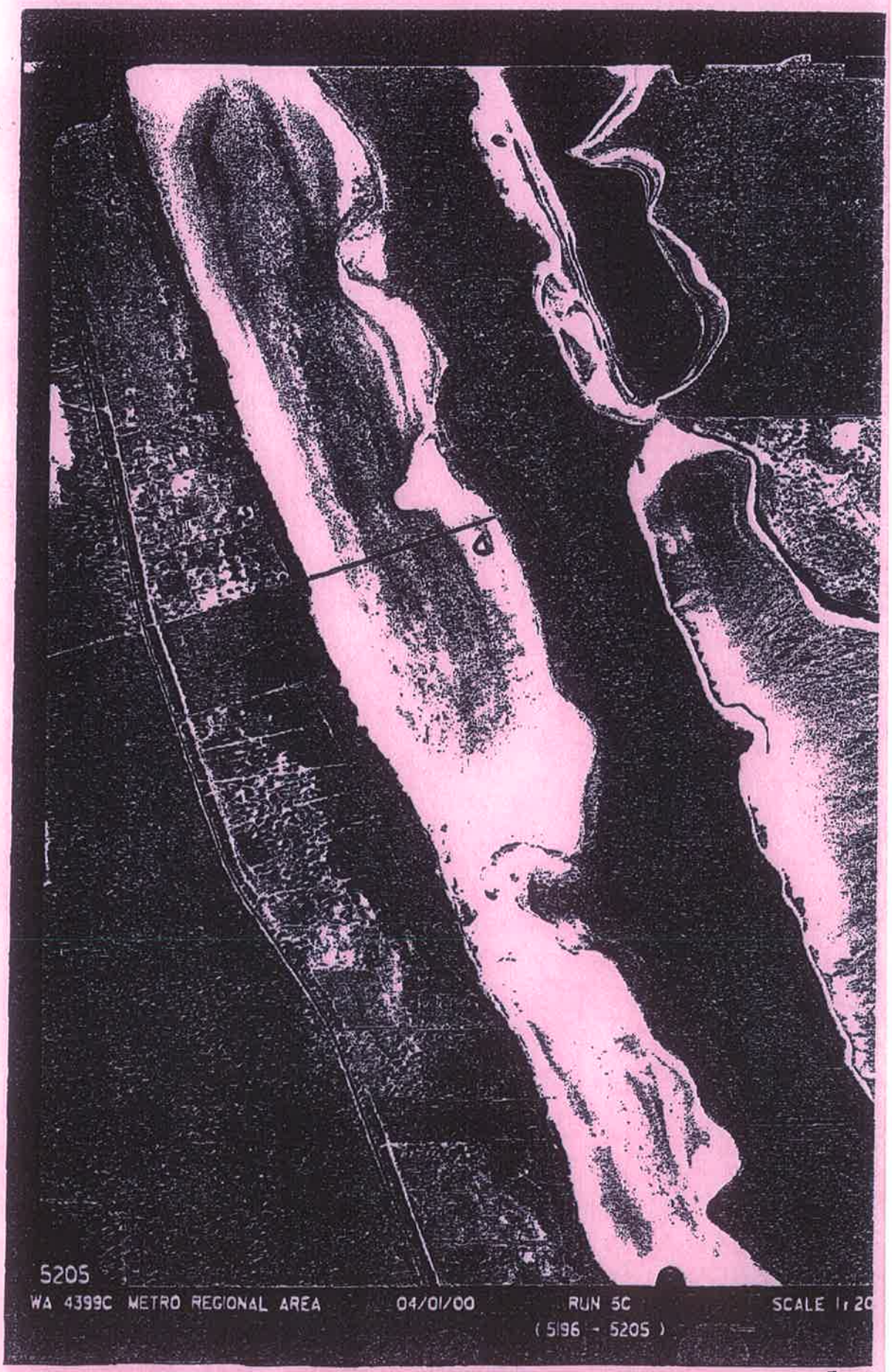


5184
WA 4399 C METRO REGIONAL AREA

5186 WA 4399C METRO REGIONAL AREA

5099
WA 4412c METRO REGIONAL AREA.

5095
WA 4420 METRO REGIONAL
AREA
12/02/00
RUN 5cn
(5094 - 5113)
SCALE 1:20,000
990000
DOLA COPYRIGHT



SCALE 1:20,000 99C000 DOLA.

N

To: Grant Pearson@WOOD.SID@CALM
From: Jim Lane@BUSS.SID@CALM
Cc:
Subject: Lake Clifton transects
Attachment:
Date: 16/10/2000 1:59 PM

Grant

I have couriered to you some recent (Jan 2000) colour air photos and a couple of maps on which Sue has marked the locations of the four transects (A, B, C, D). I have also faxed you an A4 map from Brenton Knott giving an overview.

SAMPLING

Along each transect you should sample from 3 locations, labelled A1, A2, A3, B1, B2 etc.

Sampling locations A1, B1, etc. are to be approx 100 metres out from the eastern shoreline.

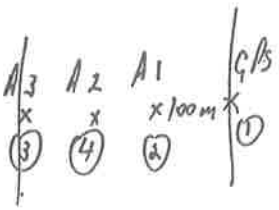
Sampling locations A2, B2, etc. are to be midway between the eastern and western shorelines.

Sampling locations A3, B3, etc. are to be approx 100 metres from the western shoreline.

At each sampling location, measure the conductivity near the surface and near the bottom, measure the water depth, and record the position by GPS.

Also take surface water samples at A1, A3, B1, B3, etc. Send these eight samples to WA Chemistry Centre to measure conductivity and analyse for ionic composition (major ions).

(1) Establish each grid locn
(2) Record posn with GPS at
bar shore.
(3) Measure with GPS 100m
(4) Establish western location
of shore. Measure western posn.
(5) Measure midpoint &
measure.



ACCESS

On this occasion you will need to launch your boat (punt) at the eastern end of each transect in order to be sure that the transect is correctly located.

Brenton had the following recollections (from 15 years ago!) concerning access.

Transect A: where our depth gauges were originally placed, just south of the boardwalk.

Transect B: access (with permission) was through "Moyle's Farm", just north of the Lake Clifton Tavern. NOTE THAT this description seems to place Transect B further south than the A4 map indicates - perhaps the farm was further north than Brenton recalls, or perhaps the A4 map shows the transect as being further north than it really was.

Transect C: access was via the first track north of the Neville Stanley Field Station, which is approx 100m south of the Old Bunbury Rd.

Transect D: access was via a track 100-200m south of the Lake Clifton Roadhouse, just north of some farmland. NOTE that Brenton might be under-estimating this distance.

Brenton said that placed marker buoys at each sampling location - presumably they are not still there!

GOOD LUCK

JL

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

14 QUEEN STREET, BUSSELTON WA 6280

PHONE – (08) 9752 1677 FAX – (08) 9752 1432

FACSIMILE TRANSMITTAL SHEET

TO: GRANT PEARSON

FROM: JIM LANE

COMPANY:

DATE: 16/10/00

FAX NUMBER:

TOTAL NO. OF PAGES INCLUDING COVER: 2

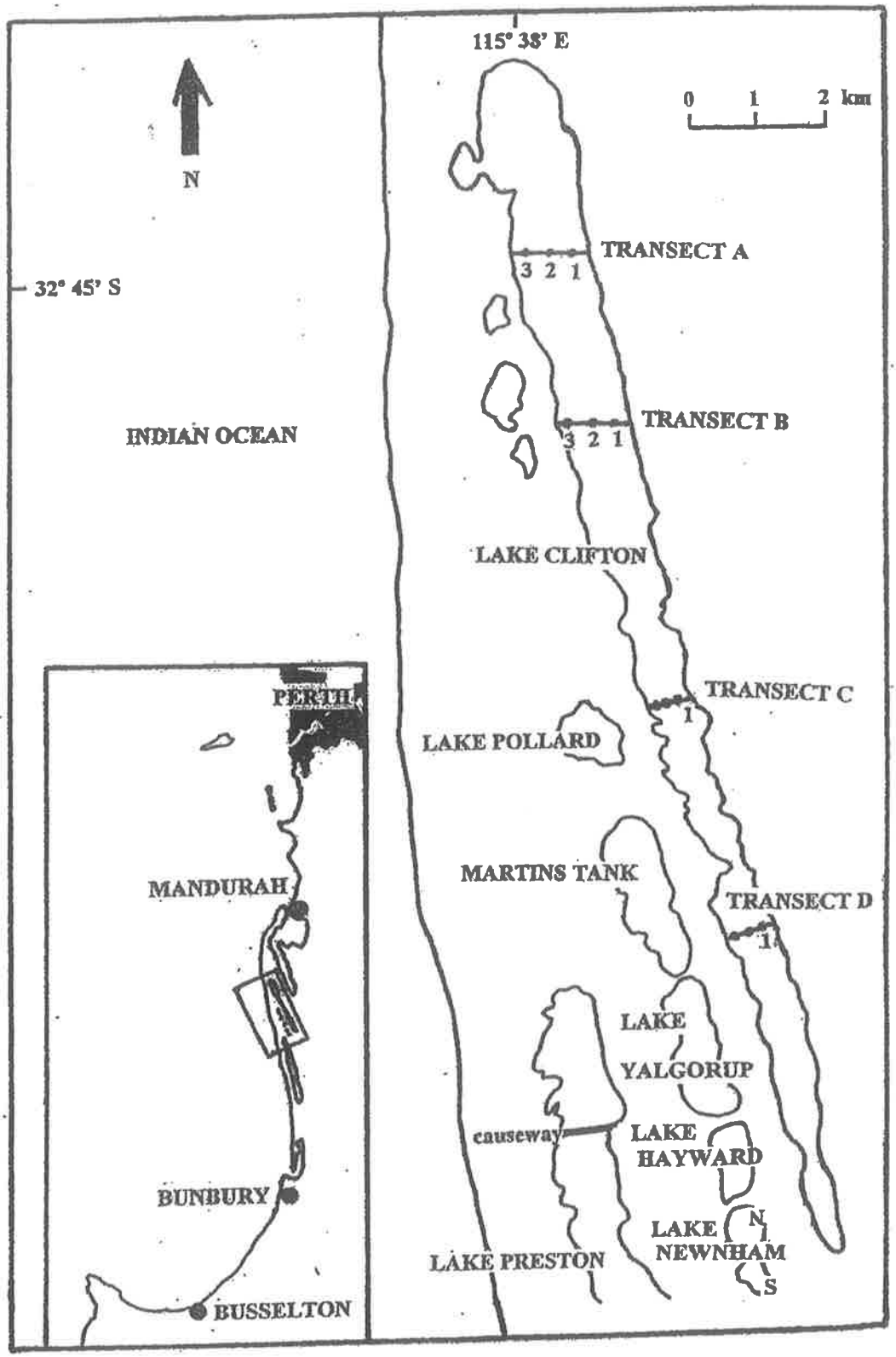
PHONE NUMBER:

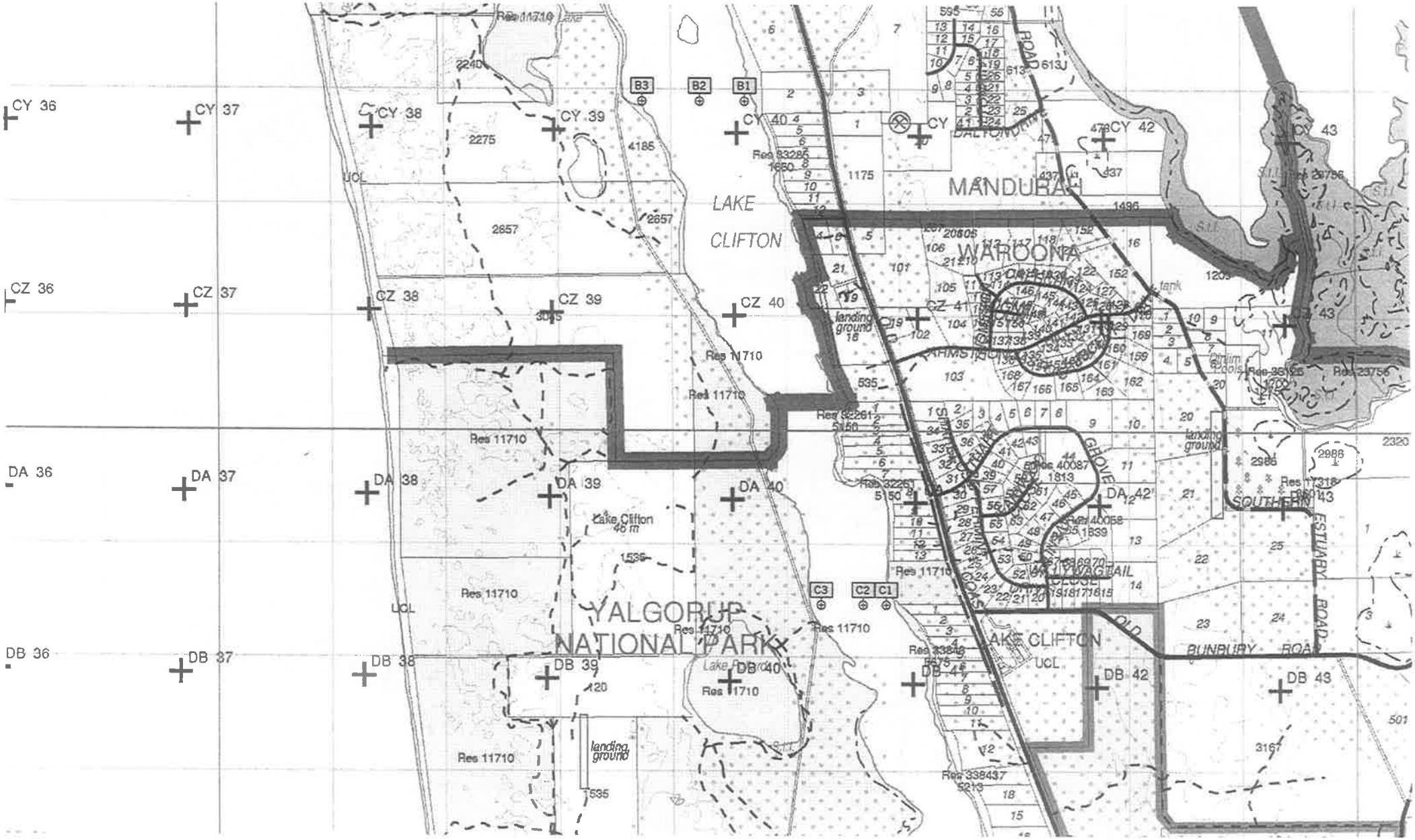
SENDER'S REFERENCE NUMBER:

RE:

YOUR REFERENCE NUMBER:

NOTES/COMMENTS: Attached is a map showing the location of the four transects to be done tomorrow at Lake Clifton. Will e-mail more info later today.


115° 38' E
0 1 2 km
N
32° 45' S
INDIAN OCEAN
TRANSECT A
3 2 1
TRANSECT B
3 2 1
LAKE CLIFTON
TRANSECT C
1
LAKE POLLARD
MARTINS TANK
TRANSECT D
1
LAKE
YALGORUP
causeway
LAKE
HAYWARD
LAKE
NEWNHAM
N
S
LAKE PRESTON
PERTH
MANDURAH
BUNBURY
BUSSELTON


CY 36
CY 37
CY 38
CY 39
CY 40
CY 42
CZ 36
CZ 37
CZ 38
CZ 39
CZ 40
CZ 41
DA 36
DA 37
DA 38
DA 39
DA 40
DA 42
DB 36
DB 37
DB 38
DB 39
DB 40
DB 41
DB 42
DB 43
B3
B2
B1
C3
C2
C1
LAKE CLIFTON
MANDURAH
WAROONA
YALGORUP NATIONAL PARK
LAKE CLIFTON
SOUTHERN
PUNBURY ROAD
ESTUARY ROAD
Res 11710
Res 32261
Res 40087
Res 40058
Res 338437
landing ground
UCL

LAKE CLIFTON

BENCH MARK AND GAUGE DETAILS

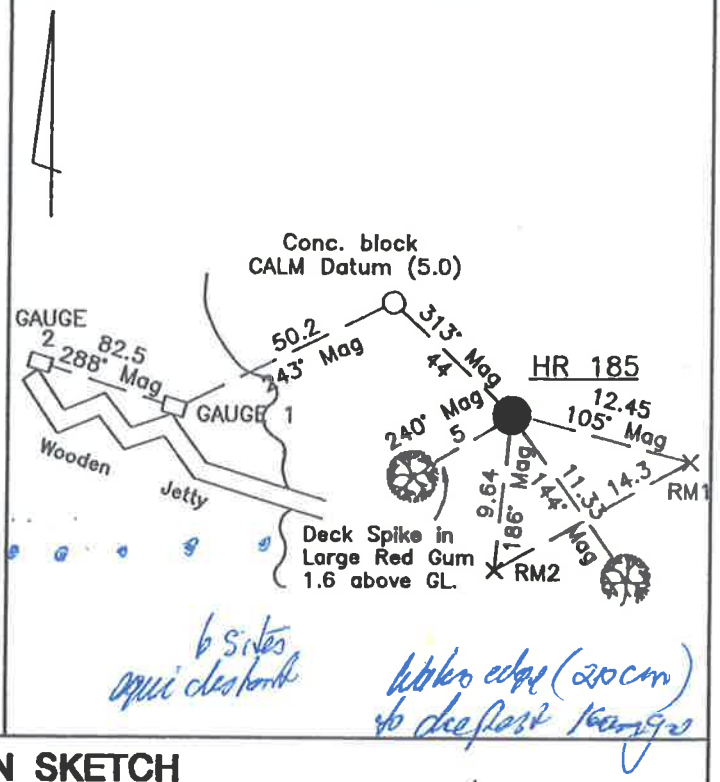
BM NAME: HR 185
DATE VERIFIED: 6 MAY 1999
INSTALLED BY: DOLA
BM LOCATION: SEE SKETCH

BM HEIGHT: (HR 185) 5.413
HEIGHT OF GAUGE 1: 5.000
HEIGHT OF GAUGE 2: 4.003

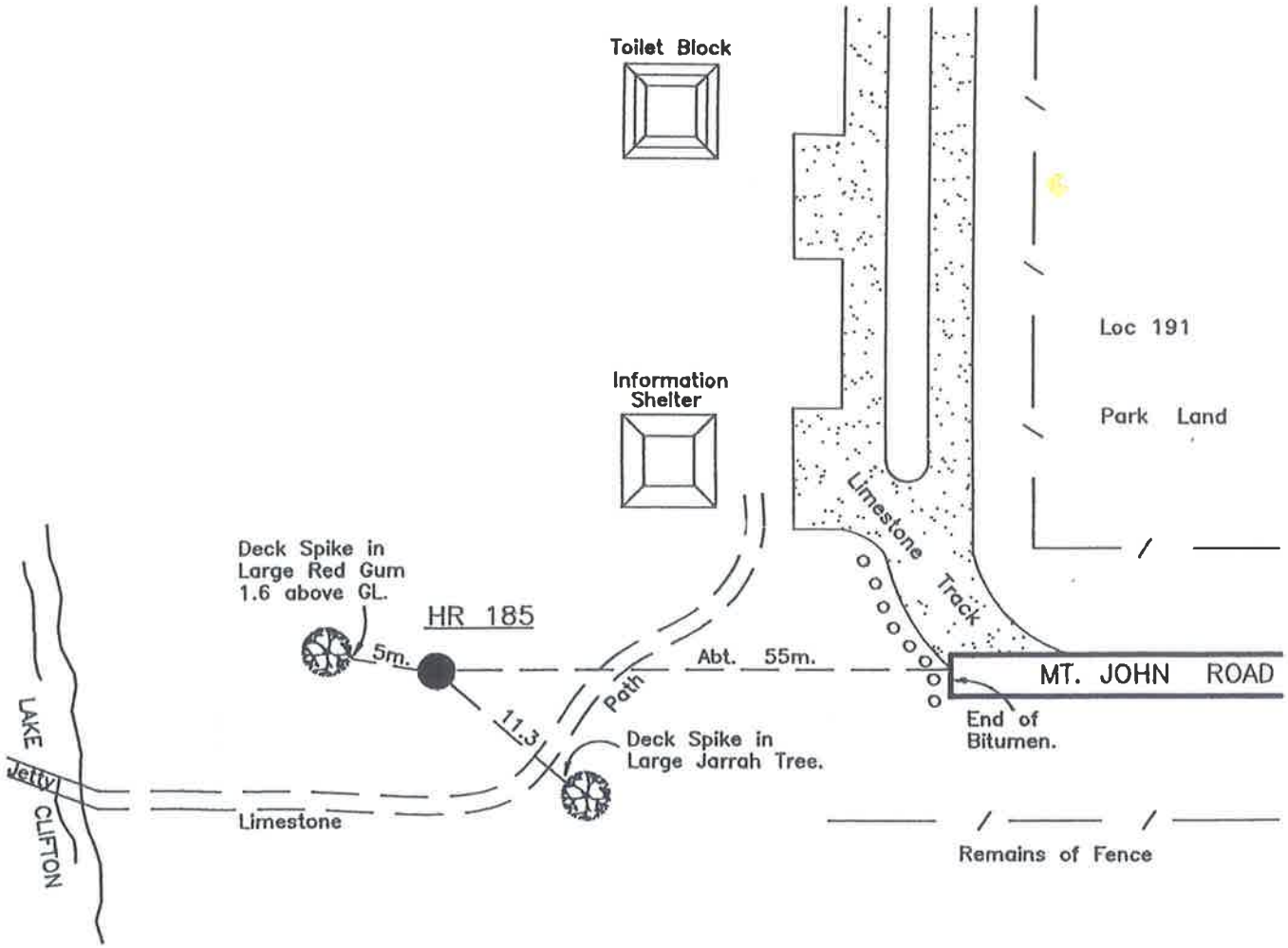
OTHER INFORMATION
HEIGHT OF GAUGE 3: NIL
HEIGHT OF GAUGE 4: NIL
AMG 84 COORDS: E 373900
(+/− 100m) N 6375950
AHD OF BM: 1.378
NEAREST AHD BM: HR 185
GAUGE MAINTENANCE: DATE: 6 MAY 1999
WHO: CALM
DATE DRAWN: 9 JUNE 1999

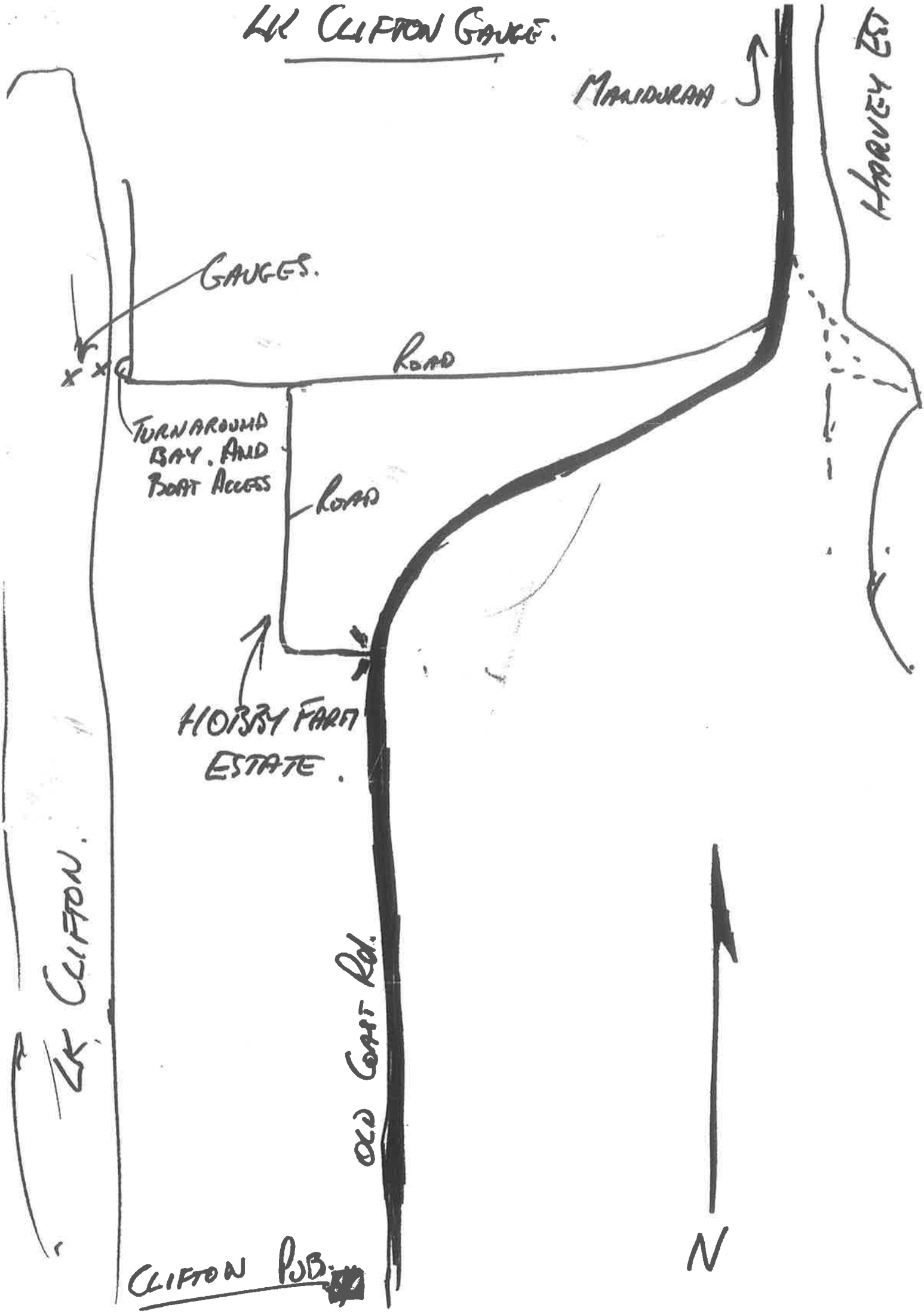
DRAWN BY SCANLAN SURVEYS FOR THE DEPT OF CONSERVATION & LAND MANAGEMENT.

BENCH MARK AND GAUGE LOCATION



LOCATION SKETCH




LK CLIFTON GAUGE.
MAALDURAH
HARVEY EST
GAUGES.
ROAD
TURNAROUND BAY. AND BOAT ACCESS
ROAD
HOBBY FARM ESTATE.
LK CLIFTON.
OLD COAST RD.
CLIFTON PUB.
N