

Some paper produced, printed,
uploaded etc. in Sept 2014

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

Oct 2000 to Dec 2001 Lake Chilton

salinity, depth + water temperature

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

profiler transect data

to share with Richard Byggs at UWA.

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

J 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,

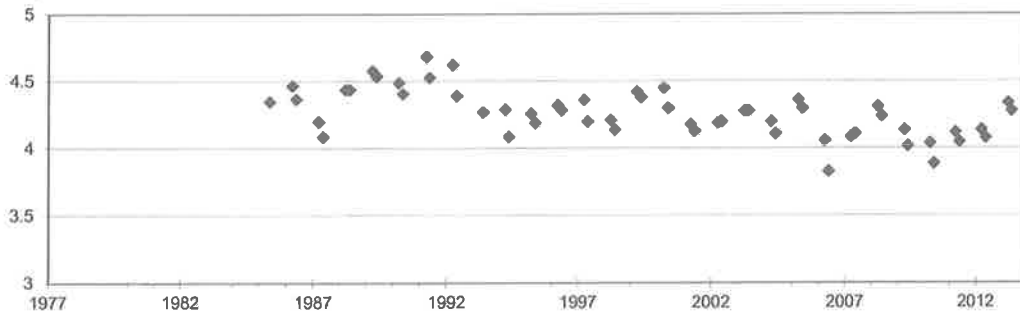
Jim

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).						
<p>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)'. </p>						
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	9/11/1983	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	8/11/1990	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	26.4			
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		35.67	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

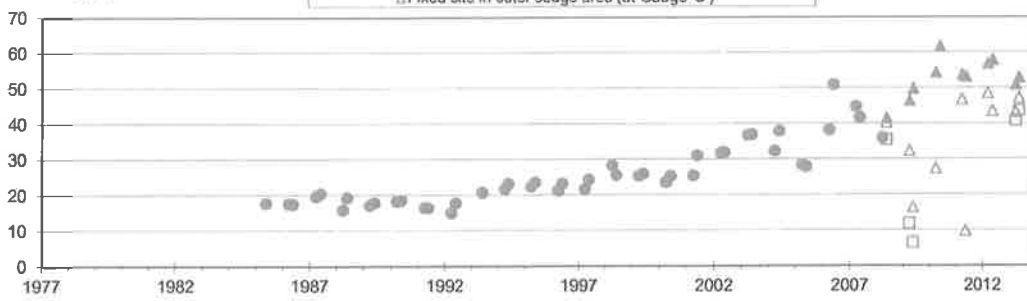
CLIFPLOT (data supplied to R.Beggs in Sep2014)

ROUTINE SEPTEMBER AND NOVEMBER DATA ONLY

Depth mLD



Salinity (ppt)



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.



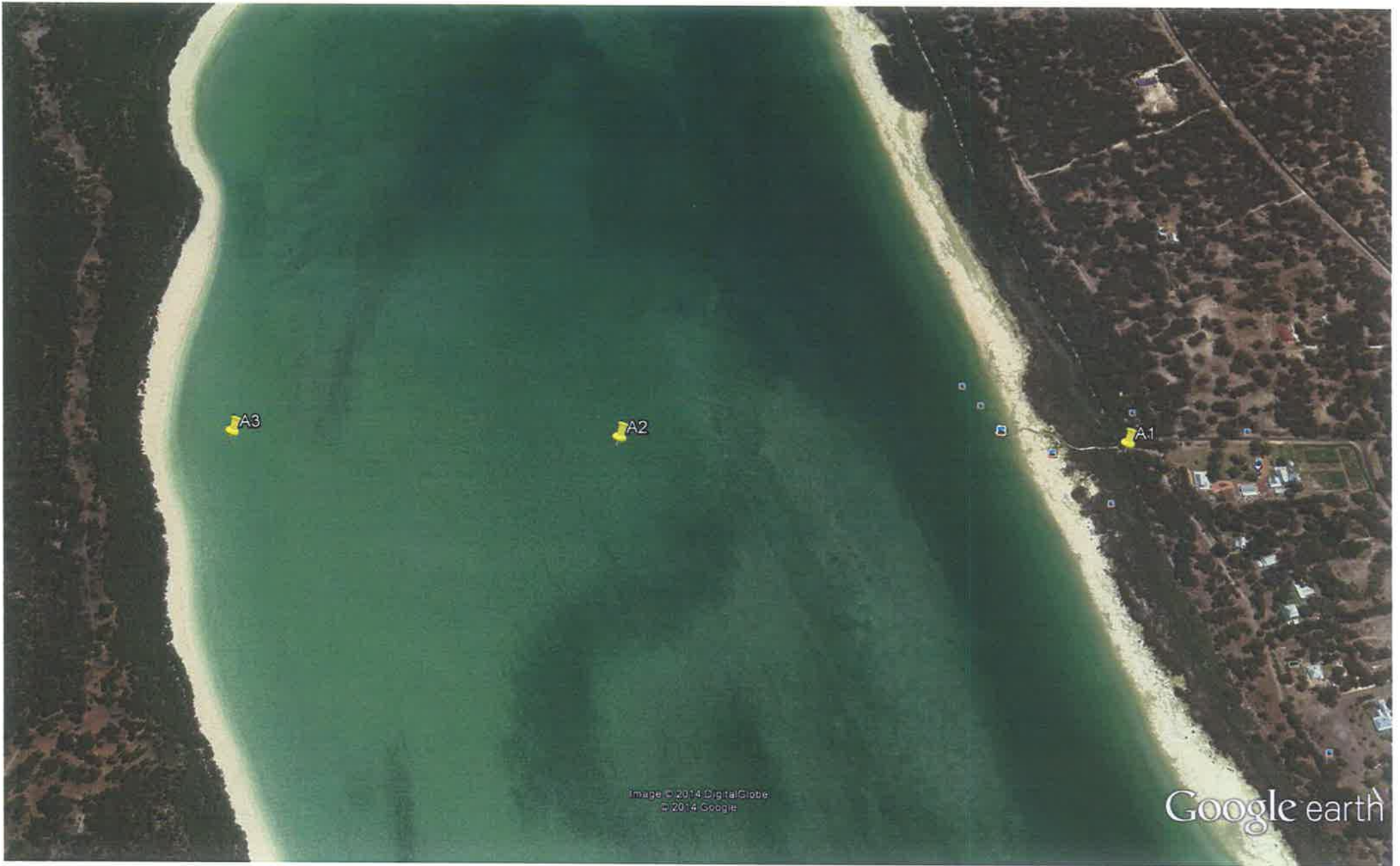
Correct position for "A1"

J 08/9/2014



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

[Handwritten signature]



"A1" in wrong position
8/8/2014



Clifton

B3

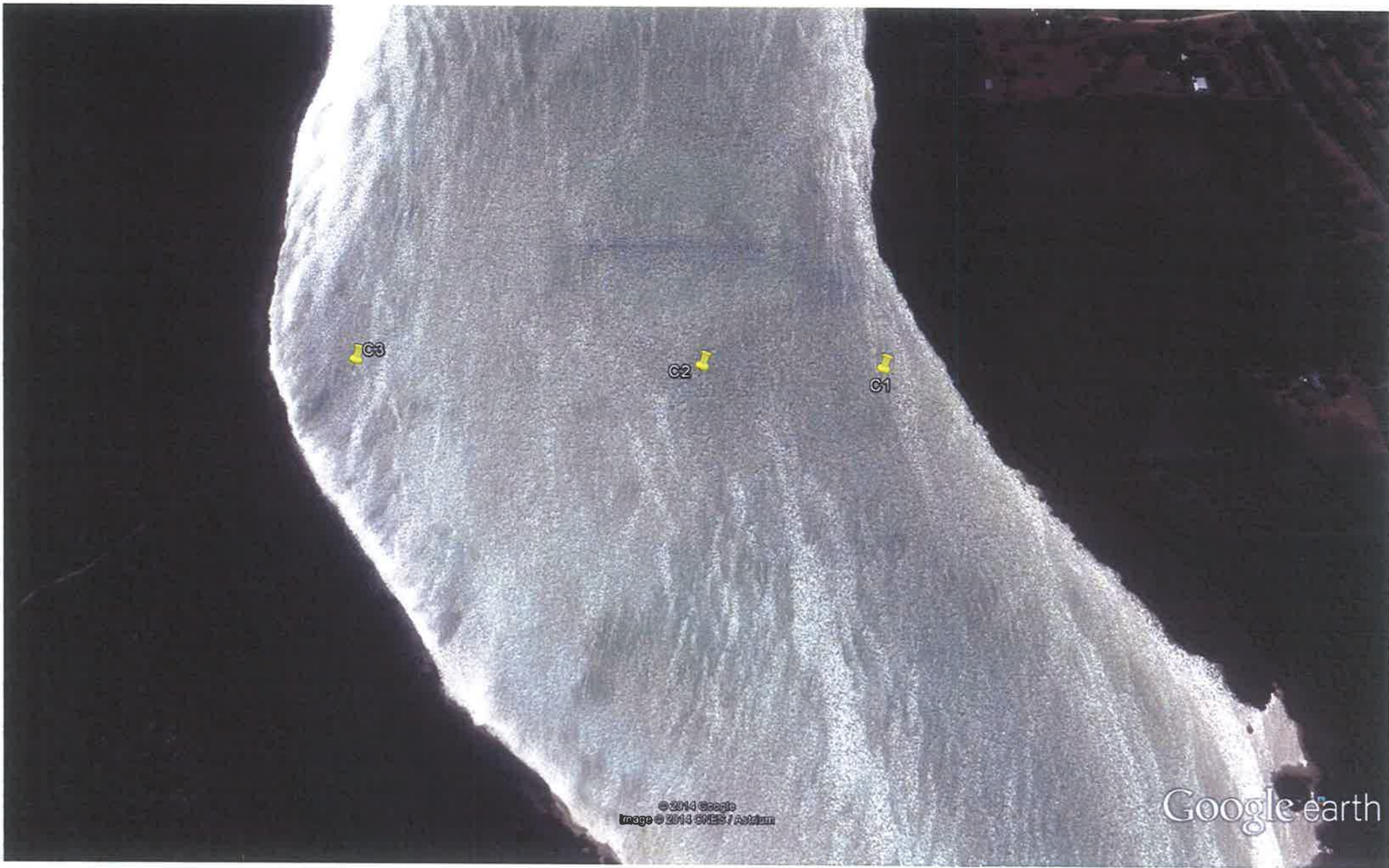
B2

Lago Clifton

B1

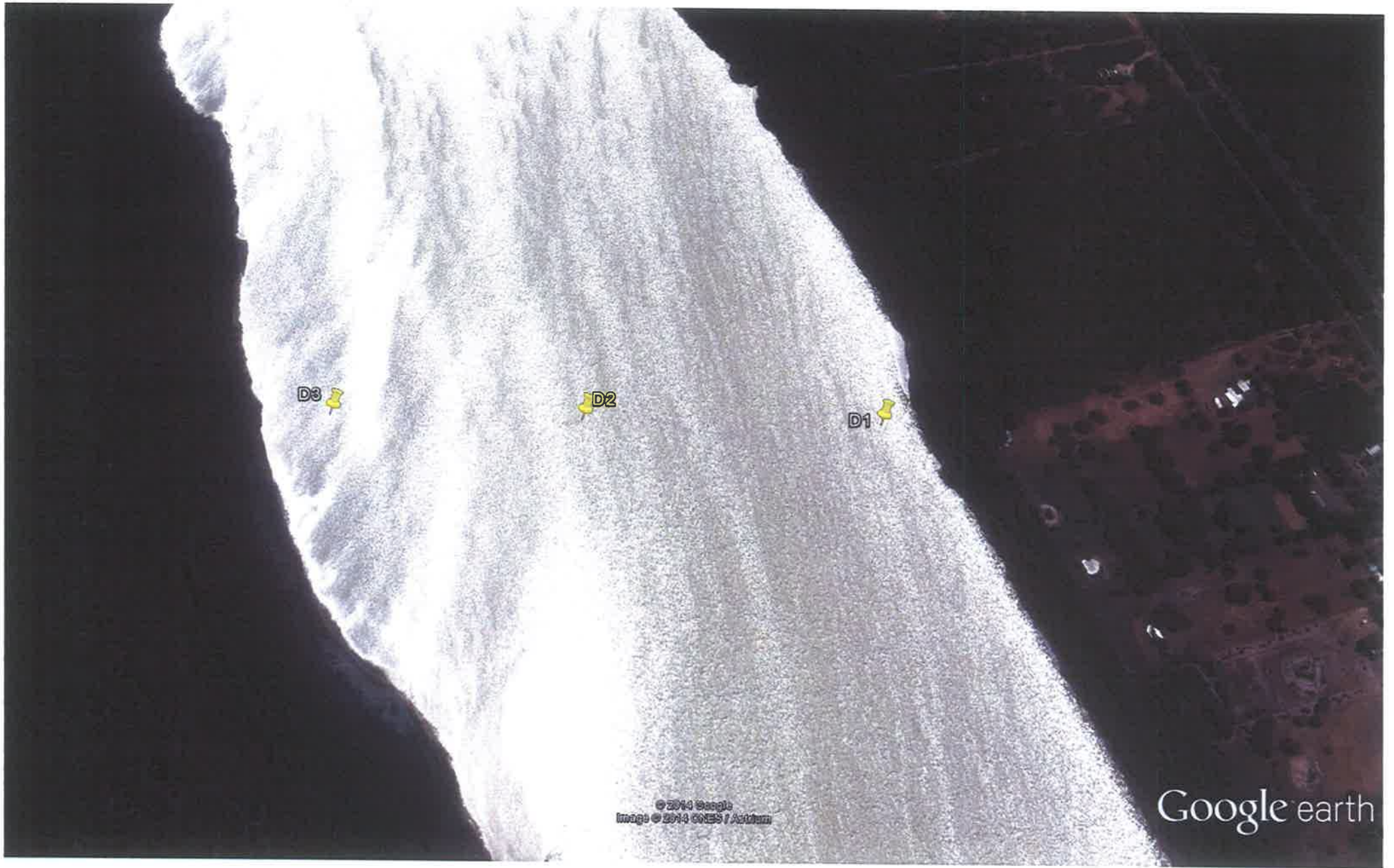
Image © 2014 DigitalGlobe
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Google earth



© 2014 Google
Image © 2014 CNES / Astrium

Google earth



D3

D2

D1

© 2014 Google
Image © 2014 GORE / Action

Google earth

Several pages - only 1st printed. J.

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 conversation 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 03/19/2014

This is the latest /03/19/2014 9:03AM

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 J. 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 10cm) and near the bottom of the water column at all locations, except when some of the locations were dry, or when snow/ice 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 (new DPA's) depth gauges at the 'dry' near sampling site A1. These measurements are reported in the Spreadsheet in the CALM 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 mAND). 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 the Spreadsheet where specifically referred to in Field Notes or Field Reports. Field measurements of electrical conductivity, salinity and temperature were made by means of a TPS 95 FLMV meter (Dec 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 'AM' probe 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 23/06/2001 data was incorrectly referred to as 23/05/2001 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. Field has also been used in the 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, etc. in the 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 skis 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 noting the proposed 2000-2001 Lake Clifton salinity transect 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. Komshi, Y & Burke, C (2003) Is the salinity of Lake Clifton (Yarloop National Park) increasing? Journal of the Royal Society of Western Australia 83: 118-122. Lane, JAK, Clarke, AG & Winchcombe, YC (2013) South West Wetlands Monitoring Program Report 19/12/13. WA Department of Parks and Wildlife Report. 168pp.

Table with columns: CCWA ID (sample ID), Sample Site, Date of sampling / measrmt, Cl, ECCond, CO3, Fe, HCO3, Hardness, Co, K, Mg, Mn, N, NO3, Na, SO4, S, SiO2, Si, pH, aION, BAL, Time, Site Easting (WGS84), Site Northing (WGS84), Site Easting (AUS2000), Site Northing (AUS2000), Field ECCond (Surf.), Field Salinity (Surf.), Field Temp. (Surf.), Field ECCond (Bott.), Field Salinity (Bott.), Field Temp. (Bott.), Depth at Site, CALM Depth Gauge Reading, Sampler, Comments, More Comments.

Lane, Jim

2 pages - both printed
J

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

Return 31/08/2014


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: March 1 2002
Subject: Lake Clifton Salinity

Attached are data on the monthly recordings at Lake Clifton. In situ 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 @25⁰ 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 <u>COND</u>	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 2.11 ✓	Y ✓	3.82	GP
19/07/01	Y	Y (30/7) ✓	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

? 20/01/01

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

"Page 11 of PDF "Lake Clifton - T. Line - Vol. 2"

R

18 April 2001
Musher failed
Water samples collected
for Chem Centre.

3.664
on ground
184

	Cond	Temp	Cond	Temp	OP
A1	78.1	21.	76.0	20.4	0.7
A2	216.5	21.6	120	21.7	1.2
A3	-	21.9		24.0	0.8
B1	water	water			0.10
B2					
B3	water	80	700m from		0.05
C1					0.05
C2					30
C3	water	81	180m from		0.05
D1					0.02
D2	water	82			0.10
D3			lined deep		

18/4/01

Printed 02/9/2014

Page 17 of

Field Notebook GBP-78 (GBP Person) 2001.03-2001.11

J

10/21/01

Lake Clift

0900 to Resegistered tractors with traps on by Clift

Depth = 3-64m

101	78.1 m/s	76.0 m/s	1.2m
	21.4	21.4	

102	118.3 m/s	120	1.2 m/s
	21.6	21.7	

103	-	-	
	23.9	24.0	0.8

Mechan became wet & unworkable took samples from wet site Sample & returned to Vehicle Cleared & tried at Gulf. Bergrate

Printed 02/9/2014

"Page 3 of PDF" Lake Clifton
- J. Lane - Vol. 2.

J.

Photocopy from Great Passions
Field Notebook "03/01 to 11/01"
on 29/4/2012

J.

10/8/01

Lake Clifton:

0900 to 1000 hours fresh water with Argo
on by Clifton

Depth = 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

A3 - - 0.8
23.9 24.0

Water became dark & uncatchable
fish samples from next site
Samples & returned to vehicle
Cleaned & dried at Gull Bay

VEY CONDUCTED BY ALAN CLARKE 20/2/01
 using the ocean Reeper.

19/2/2001

NOTUS/
 SAMPLE SITE

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 °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	374260	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	375887	6368456	79.5	24.3	79.4	24.4	0.3				
C2	375670	81.8	23.5	79.1	25.2	0.4		375433			
C3	375302	86.3	26.9	86.5	26.5	0.15	6368448				
D1	377628	6364207	-		91.8	28.0	0.13				
D2	377272	93.0	26.9	94.9	24.4	0.23		377127			
D3	376971	-		98.5	28.4	0.13	6364200				

Depth gauge at ST 50111
 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 etc.

CLIFA1
 CLIFA2
 CLIFA3
 CLIFA4 etc.

Where I could not
 reach the site because of
 the low water level
 I have recorded the
 sample site coordinates.

AC

Page 51

Printed 02/9/2014 from PDF "Lebe Clifton - G. Pearson - Folio of loose pages -"

AC

(28)

19/02/01

10.00_{am}

Lab. Weston

Calibration of TPS WP-84

metre read 1.39 μm in 2.97 ms/cm

to calibrate metre only allowed

2.76 ms/cm standard so I

used the point on 2.76 ms/cm

metre read 2.63 ms in 2.76 ms ^{STAN}

$K = 1.02$

@ 20.6°C

calibration O.K.

(29)

19/02/01

11:00_{UTC}

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	65.2	22.0°C

A3 NTPU/GPS

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

(30)

12:55 pm

19/02/01

D2 water sample now 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 357127
6364200

D1 water sample now taken

0.13 91.8ms 28.0°C

about ~~30~~ 30m from D1 GPS position
on same line.

31

2:00 pm

19/02/01

L1

Top 79.5ms 24.3°C
0.30 Bottom 79.4ms 24.4°C

NTPU GPS

L2 NTPU GPS

Top 81.8ms 23.5°C
0.4 Bottom 79.1ms 25.2°C

L3 stopped 130m on line from CHFL3
water 50m away | 375433

Top 86.3ms 26.9°C 368448
0.15 Bottom 86.5ms ~~26.9°C~~ 25.5°C

15-20 knots SW. ~~windy~~ ^{windy}

(32)

1510 hrs

19/02/01

B1 NTPU GPS

Top 68.3ms 26.7°C

0.20 bottom 68.7ms 26.8°C

B2 NTPU GPS

Top 68.4ms 25.5°C

0.40 bottom 68.2ms 25.5

B3 NTPU GPS

373862

Top 68.2ms 27.2°C 6372883

0.20 bottom 67.8ms 27.2°C