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The State of the Groundwater Resources of Jersey During 1999

M J Bird and N S Robins

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Contents

1. INTRODUCTION

1.1 Background

The groundwater monitoring programme continued throughout 1999. Monitoring of selected groundwater levels has been undertaken on a monthly basis, whereas samples for chemical analysis are collected twice yearly. The field work was undertaken jointly by Kate Little and Clare Le Breuilley at the Public Services Department and the inorganic chemical analyses overseen by Kate Little. A dialogue was maintained during the year with the British Geological Survey at Wallingford and an advisory visit was made to Jersey by Mike Bird. As in 1998, the database has been maintained at Bellozanne, although duplicate groundwater level data are retained at Wallingford. Only one site has been lost during the year, that at JEC at St Helier. However, collection of pump volume meter readings has been discontinued at all sites visited only for that purpose; the density of data being collected on pumping rates had become inadequate and the residual data of limited value. This area can be reassessed in the event that appropriate supportive legislation is invoked.

Additional activities include a data recovery exercise from the foundation site engineering work that has been carried out in recent years around St Helier. This has produced a catalogue of hydrogeological data, their whereabouts and format, and a report (Cheney, 2000). In addition a number of ad hoc enquiries have been answered relating to specific problems. These include the proposed extension to Granite Products Limited quarry, the St Ouen's fire ground pollution incident, and issues raised by the Department of Agriculture and Fisheries.

This report presents the state of the groundwater resources of Jersey for the calendar year 1999. It is not intended as a stand-alone report and reference should also be made to the main project report presented in 1998 (Robins and Smedley, 1998) which describes the groundwater resources of the island in some detail.

1.2 Objectives

The objectives throughout 1999 were:

1. to provide advice to Public Services Department on data collection, collation and interpretation within the groundwater abstraction and the water level and water quality monitoring programmes;

2. to provide advice on the management of the groundwater resources of Jersey in general and, from time to time, on other specific issues relating to groundwater, especially groundwater protection.

2. CURRENT GROUNDWATER STATUS AND TRENDS

2.1 Groundwater Levels

The results of the 1999 monitoring of island-wide groundwater levels show few differences from the patterns established in 1997 and 1998. No notable extremes were seen, but levels towards the start of the year tended to be generally higher than average, with those at the end of the year generally lower than usual. This pattern is seen in most monitoring wells throughout the island and is the result of a slightly unusual rainfall distribution.

Water levels in the UK generally reach a maximum (nearest the ground surface or "shallowest") during March or April, with the minimum (furthest from the ground surface or "deepest") occurring

around October. This pattern is dependent on the amount and length of winter recharge and summer drought. Water levels in Jersey follow a similar pattern but with slightly different emphases. It is not uncommon in Jersey for the maximum water level to be reached before March and the minimum any time between August and November. This reflects the shallow "hard rock" character of the island's aquifers.

The majority of the borehole hydrographs for 1999 are of a similar pattern to each other, with maximum water levels occurring in January and with water levels still falling through December. However, intensive rain at the end of December was beginning to show an upturn in levels by the year end (Appendix 1). The normal spring maximum is seen as a step before levelling out, before the summer recession begins. Some wells show a small or negligible upturn around September, these include:

Apple Barn	Aviemore	Jubilee YC	La Chenee
Lobster Pot	Maison du Puits	Mont Sohier Cottage	La Ronce
Oak Villas	Redwood	Royal Golf Course	Rue du Pont
Sefton Farm	St Martins PS	States Farm Well	Trinity PS
Trinity School	Cooleys Place		

One source, The Elms, continued to fall all year. Those wells which do not show an upturn in September, end in some cases, with water levels at or near their lowest for many years. These include:

Bon-air Stables	La Hougue Bie	Morel Farm	Norwood
St Georges Estate	St Mary's School	Val Bachelier Farm	

The end of 1998 saw water levels generally reaching minima, rather late, at around October, with a sharp rise during the next three months to January. This indicates a period of rapid recharge over this short period, with very little or almost no recharge occurring during the subsequent winter months. Water levels began to fall early and continued to do so throughout the summer. Autumn and early winter recharge has been small, but the prolonged heavy rainfall and localised flooding experienced over New Year should have provided significant recharge.

2.2 Inorganic Chemistry

The inorganic chemistry of Jersey groundwaters continues to show remarkable consistency with time (Appendix 2, see also Figure 16, in Robins and Smedley, 1998). Of the 48 samples collected in November 1999, 54% exceeded the EC maximum admissible concentration of N of 11.3 mg l^{-1}; the mean value for all the samples was 16.6 mg l^{-1}, marginally higher than in November 1998. Only one source exceeded 50 mg l^{-1} N although 16 fell within the range 20 to 50 mg l^{-1} N (there were 14 in 1998). The reported improved control over nitrogen fertiliser application will take several years before there is a significant reflection in concentrations in groundwater.

2.3 Organic Chemistry

Chlorthal continues to be present in many Jersey groundwaters (Appendix 2). There has been a significant increase in concentration throughout the 1990s (see Appendix 4 in Robins and Smedley, 1998). The continued presence of Simazine and Atrazine at some sites, may reflect domestic use of products still available from garden centres. In future, additional organic analyses that are available from other Departments will need to be integrated as part of the whole data set.

2.4 Groundwater Abstraction

The initial study of the groundwater resources of Jersey identified abstraction volumes for different areas of use. A comprehensive network of abstraction monitoring points was set up with water meters fitted to sources within the various use types including domestic, industrial and recreational. This work showed that within any one category the overall volumes of groundwater abstracted did not vary significantly over the long term. Seasonal patterns are apparent for the majority of non-domestic users.

Since about 1996, the network of meters has needed constant attention and renewal of equipment. The diminishing number of sources at which monitoring has been possible has now become limited and the programme retains only those meters still fully functional and (primarily) attached to the chemical sampling points. This situation can only be rectified through the provisional of suitable enabling legislation.

3. ISSUES

3.1 Legislation and Pollution

There are still few management tools with which to control groundwater pollution and the proposed Water Pollution Law is an essential component of groundwater management strategy. This has been highlighted by the recent pollution of the St Ouen's public supply aquifer with hydrocarbon ignition products and detergent. It is essential that any island manages its groundwater and surface water resource, particularly with regard to pollution, for the optimum benefit of the community.

3.2 Monitoring Network

The monitoring network continues to evolve as new alternatives become available and established sites are lost or outlive their usefulness. Current coverage for both groundwater level and groundwater quality monitoring is adequate. However, the degree and nature of organic pollution from pesticides is not adequately known and a campaign to determine the severity of the contamination problem may be worthwhile. Analytical work is now providing good quality data.

4. THE FUTURE

A number of new initiatives will take place during 2000. One of these is a review of the water resources of Jersey, which will include underground water. Anticipated implementation of the Water Pollution Law will bring an increased burden to the Public Services Department, and care should be taken to ensure that this does not jeopardise the groundwater monitoring programme.

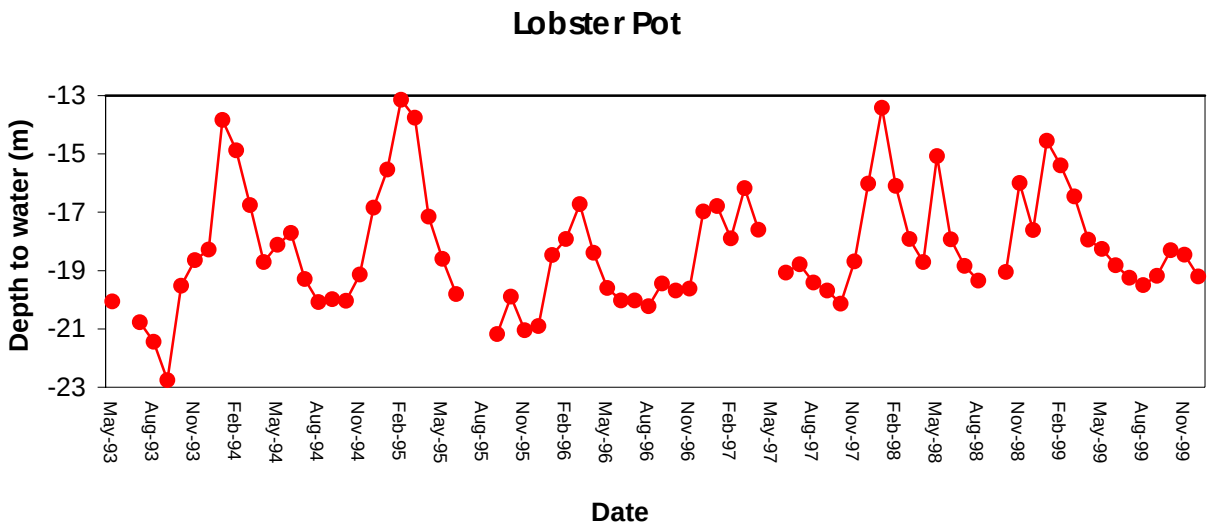
Exchange of staff between PSD and BGS or the UK Environment Agency remains desirable.

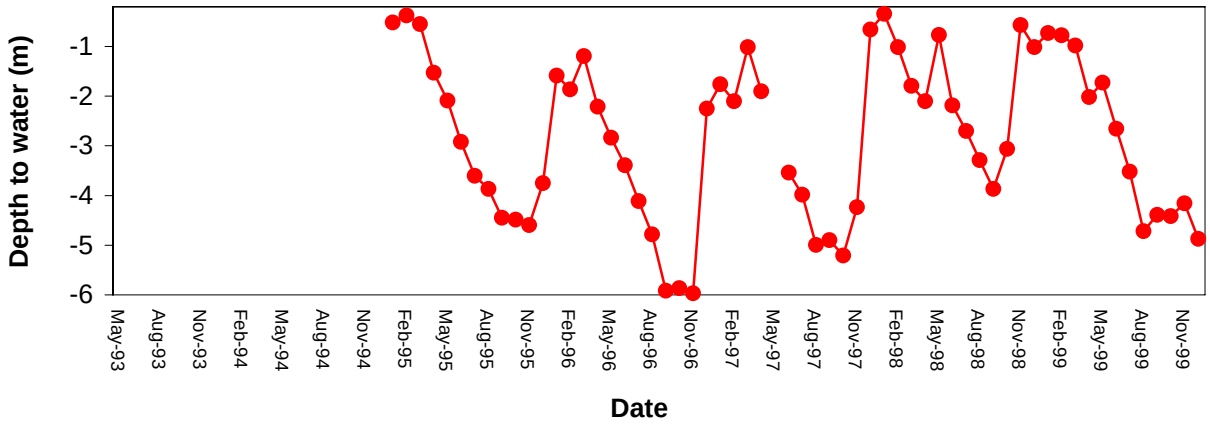
REFERENCES

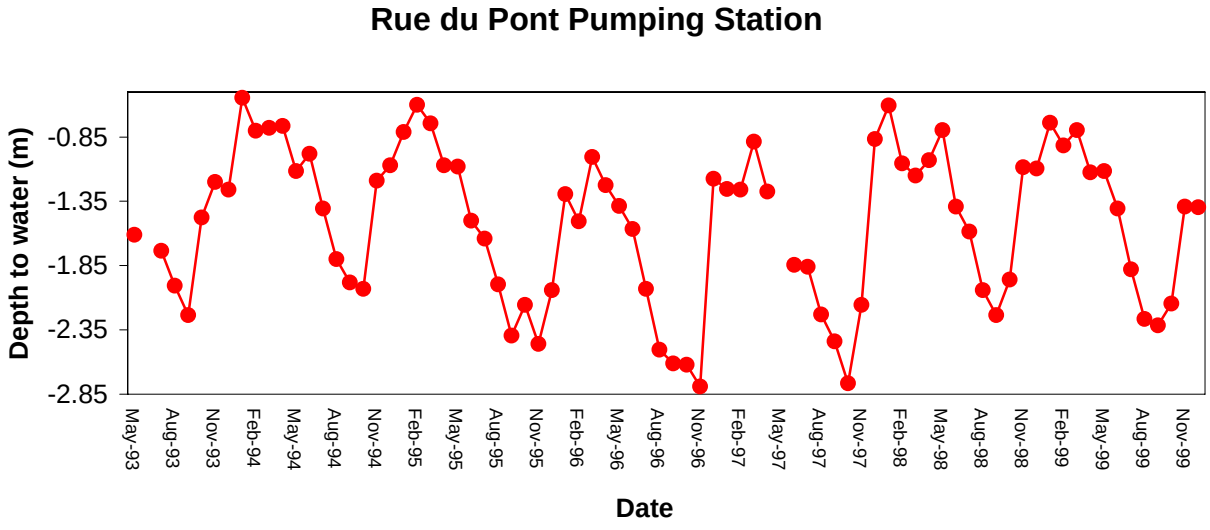
Cheney C S 2000. Report on the collection and collation of data from Fort Regent Cavern and Storm Water Sewer site investigation boreholes, St Helier, Jersey. British Geological Survey Technical Report WD/00/06C.

Robins N S and Smedley P L 1998. The Jersey groundwater study. *British Geological Survey Research Report* RR/98/5.

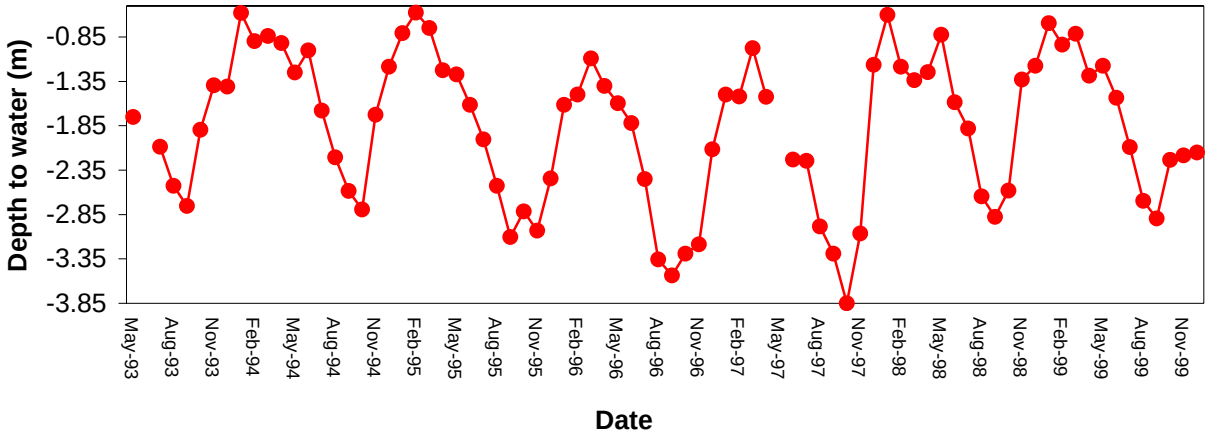
APPENDIX 1 Selected borehole hydrographs



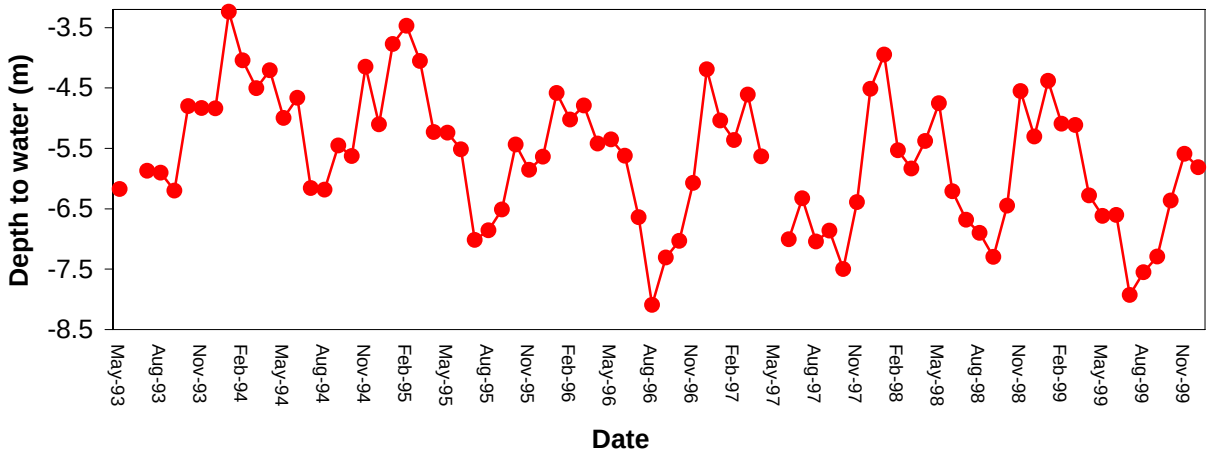




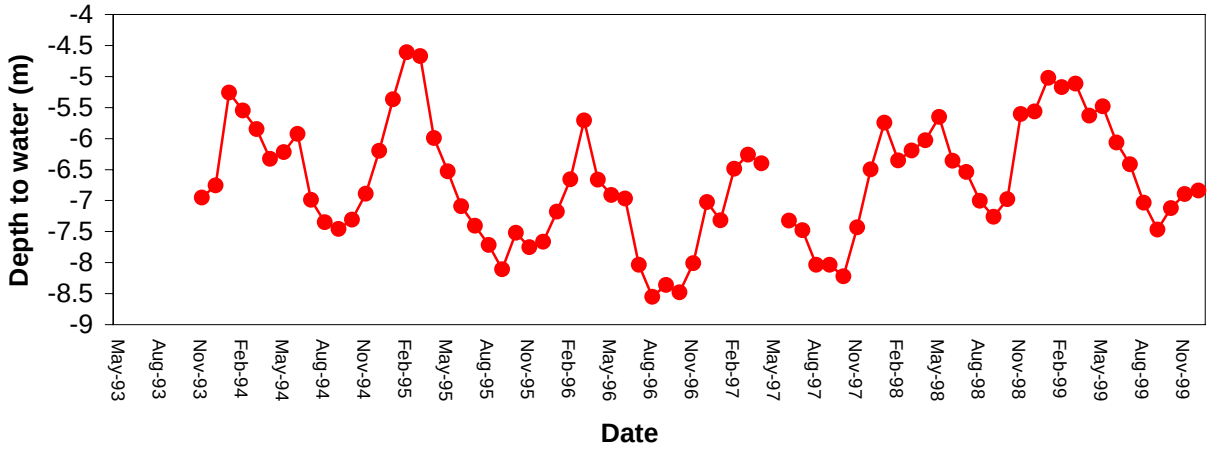
Sefton Farm



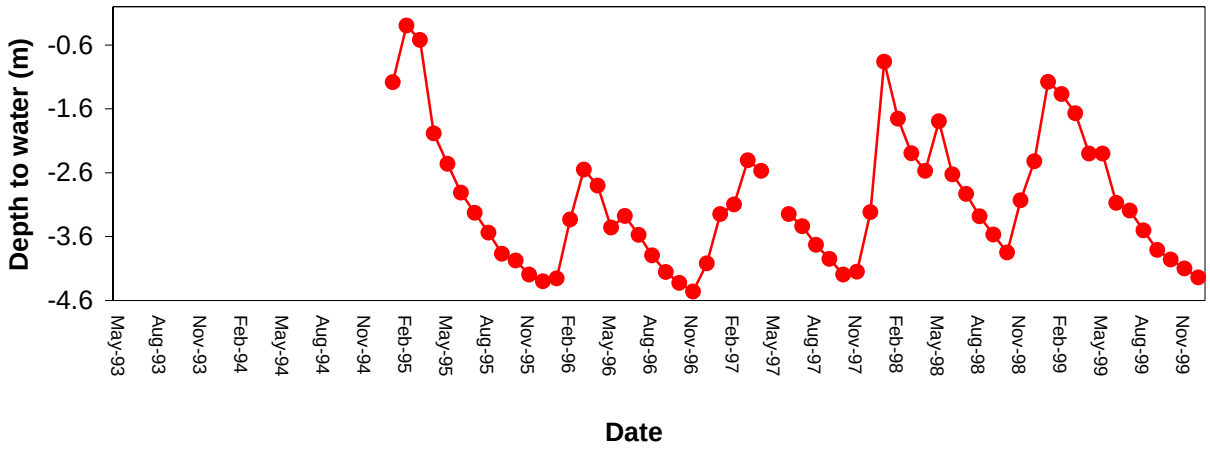
States Farm Well



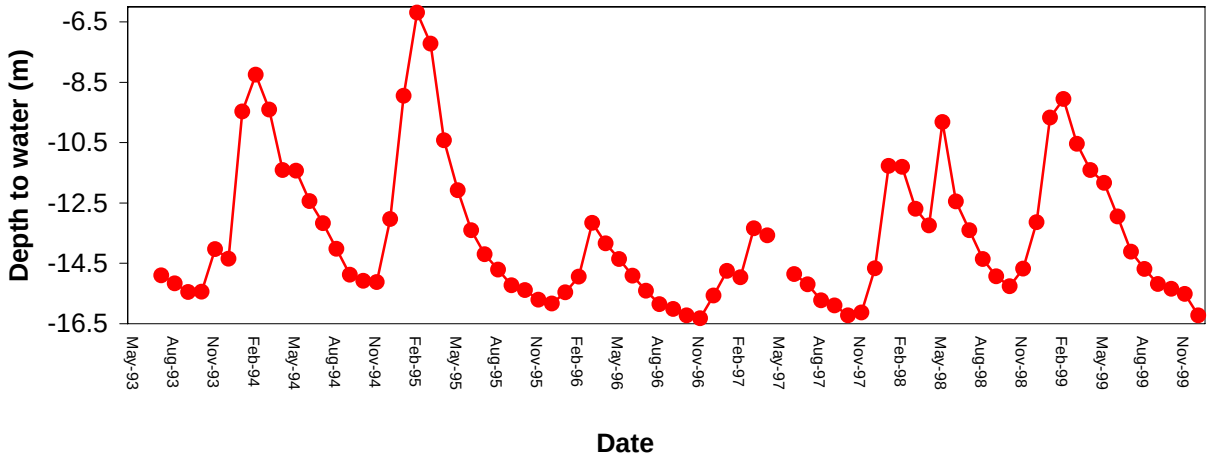
Trinity School



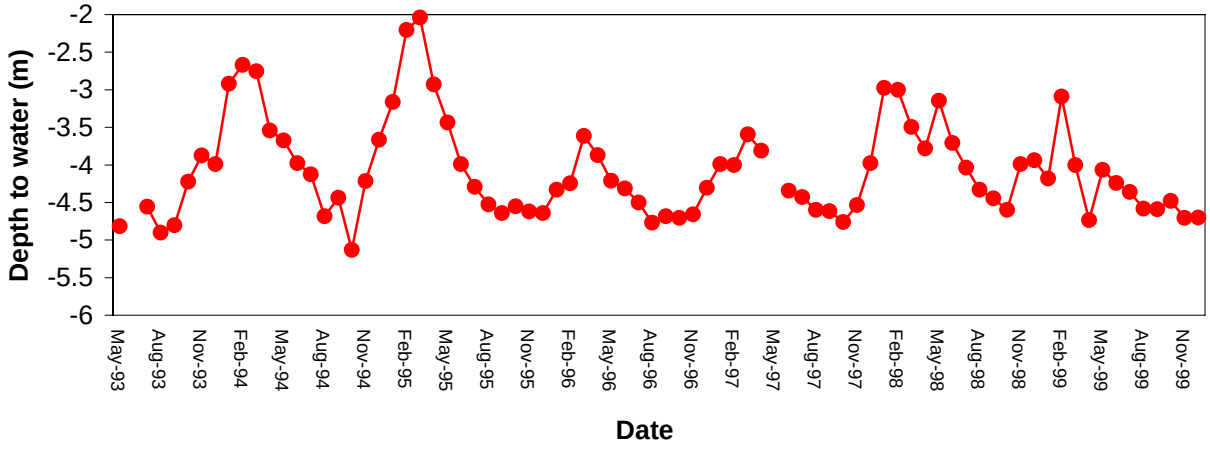
Bon Air Stables

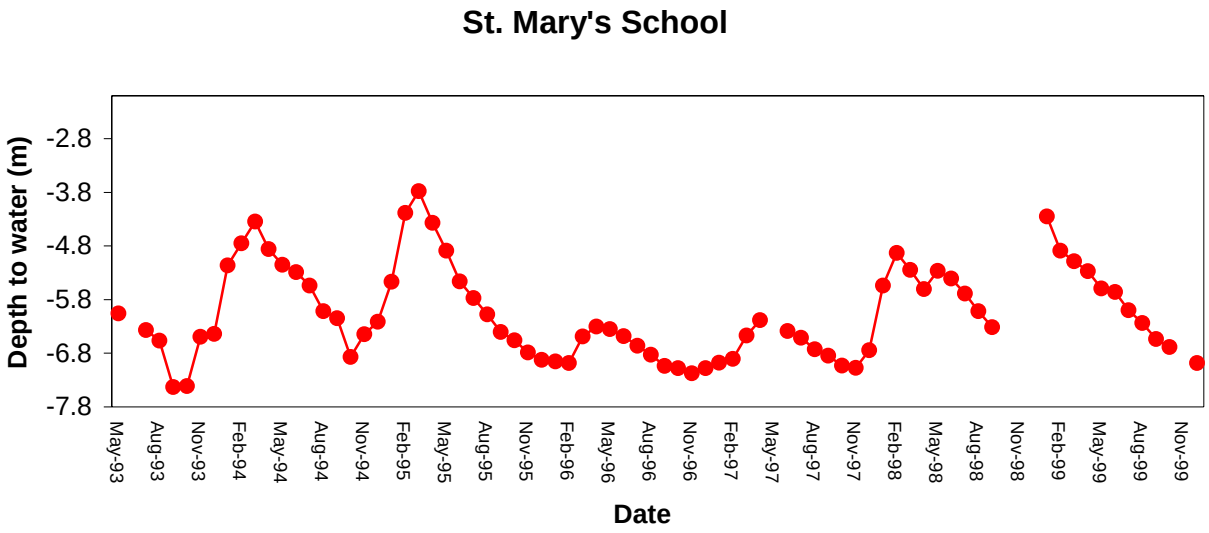


La Hougue Bie Well



St. George's Estate




St. Mary's School
Depth to water (m)
-2.8
-3.8
-4.8
-5.8
-6.8
-7.8
May-93
Aug-93
Nov-93
Feb-94
May-94
Aug-94
Nov-94
Feb-95
May-95
Aug-95
Nov-95
Feb-96
May-96
Aug-96
Nov-96
Feb-97
May-97
Aug-97
Nov-97
Feb-98
May-98
Aug-98
Nov-98
Feb-99
May-99
Aug-99
Nov-99
Date

APPENDIX 2 Analytical chemistry data

LOCATION	SITE	DATE	pH	Temp (°C)	SEC (µS/cm)	HCO_3 (mg/l)
A5 ST OUEN'S BAY	J04	10/11/99	7.69	11.7	506	159.8
APPLEBARN	J49	19/11/99	6.22	12.3	705	37.8
ATLANTIC HOTEL	J09	08/11/99	6.32	14.1	483	113.5
AVIEMORE	J123	17/11/99	6.49	12.1	647	46.4
BELLOZANNE B/H	J165	10/11/99	7.85	14.8	977	180.6
BESCO LAUNDRY	J23	08/11/99	7.60	14.5	941	192.8
BON AIR STABLES	J44	11/11/99	6.27	13.4	484	92.7
BROUGHTON FARM	J121	09/11/99	5.86	13.1	777	47.6
CHAISE AU DIABLE	J91	10/11/99	7.14	13.2	616	142.7
CHATEAU LE CHAIRE	J109	12/11/99	6.35	13.5	538	50.0
CORONATION PARK (C)	J45c	No Sample				
FIRST TOWER PARK	J36	15/11/99	7.16	13.2	970	163.5
GERANIUM FARM	J16	08/11/99	5.80	13.0	945	26.8
GREYSTONES	J01	18/11/99	5.71	11.5	1030	31.7
GREYWINGS	J47	18/11/99	5.69	13.3	1007	22.8
GROUVILLE SPRING	J100	15/11/99	6.55	12.7	1009	114.7
HIGHFIELD HOTEL	J60	11/11/99	5.35	12.9	597	5.9
HOMEFIELDS FARM	J107	12/11/99	6.37	12.3	1462	85.4
HOUGUE BIE NURSERY	J81	12/11/99	6.14	10.8	597	17.3
L'AUBERGE DU NORD	J48	16/11/99	5.52	13.2	519	8.3
LA CACHETTE	J118	18/11/99	7.76	13.0	689	131.8
LA CHENEE	J86	Pump still broken				
LA HAUTEUR	J115	09/11/99	6.52	13.2	908	64.7
LA MAISON DU PUITS	J129	09/11/99	6.93	12.9	975	85.4
LA MARE VINEYARD	J67	16/11/99	5.64	12.4		11.8
LA MOYE GOLF CLUB (4)	J128a	19/11/99	7.20	12.4	745	251.3
LA MOYE GOLF CLUB (5)	J128b	19/11/99	7.37	12.3	475	186.7
LA VILLAISE	J112	09/11/99	6.93	13.0	1109	72.0
LE COIE HOTEL	J101	12/11/99	7.41	12.9	784	137.9
LES BOURGEONS	J25	17/11/99	7.23	12.4	710	72.0
LES MAUVES	J02	18/11/99	6.03	12.8	770	30.5
MANOR FARM	J79	17/11/99	6.04	12.5	615	25.5
MEADOW SPRINGS	J76	No Sample				
NORTHLYNN FARM	J119	16/11/99	5.98	12.9	538	23.2
OAKBANK	J80	17/11/99	5.22	12.4	653	<12.2
PARADE PARK	J37	15/11/99	7.24	13.6	864	298.9
PRIORY INN	J20	16/11/99	5.67	13.5	691	21.1
PSd - SHREDDING SITE	J124	19/11/99	6.94	13.3	483	42.7
QUENNEVAIS CAMPSITE	J19	08/11/99	7.06	12.7	569	69.5

LOCATION	SITE	DATE	pH	Temp (^{o}C)	SEC (µS/cm)	HCO_3 (mg/l)
RONEZ QUARRY	J58	16/11/99	6.92	12.3	906	96.4
ST. HELIER NURSERY	J30	15/11/99	6.16	12.3	502	35.4
ST. PETER NURSERY	J15	08/11/99	7.73	11.5	688	69.5
STATES FARM B/H B	J65B	11/11/99	5.71	12.7	398	19.8
STATES FARM WELL	J66	11/11/99	6.1	13.6	614	34.2
STONEWALL FARM	J31	17/11/99	6.55	13.1	810	133.0
SURVILLE CEMETERY	J125	15/11/99	6.06	12.3	523	52.5
TESSON MILL	J84	10/11/99	7.46	12.9	807	136.6
VAL BACHELIER FARM	J127	09/11/99	5.84	12.8	1094	19.2
VAL DE LA MARE	J05	10/11/99	7.01	12.8	779	234.2
VAL DE LA MARE FARM	J13	18/11/99	6.41	12.7	1022	68.3
WESTWAYS	J117b	18/11/99	6.83	12.4	773	89.1