

Weather and water quality data summary (1996), University Field Station (Delta Marsh)

L. Gordon Goldsborough

University Field Station (Delta Marsh), University of Manitoba,
Winnipeg, Manitoba R3T 2N2



The following is a summary of meteorological and water quality data collected at the Field Station during 1996. The complete data are available as *Microsoft Excel* spreadsheets on Macintosh or PC diskettes, and on the Station's page on the World Wide Web (Delta Marsh Home Page) at http://www.umanitoba.ca/faculties/science/delta_marsh. Wind velocity and direction data, pyrliometer traces, barometer traces, and hygothermograph traces are available on request.

Users are advised that the period represented by "daily" values differ between parameters: temperature, precipitation, and anemometer data are collected at 08:00 CST and represent the 24-hour period starting at 08:00 CST on the preceding day. This affects the interpretation of some parameters. For example, the maximum air temperature reported for 1 January ($X^{\circ}\text{C}$) may be the value for 31 December of the previous year if the maximum actually occurred prior to 24:00 or it may be the value for 1 January if the maximum occurred

between 00:00 and 08:00. Other daily data, including photosynthetically available radiation and hours of sunshine, are accurate for the reported calendar day, being cumulative between 00:00 and 24:00 CST. Monthly summary statistics (total, mean, median, minimum and maximum) are calculated for the period starting on the first day of the month, without consideration for the above.

Collection of weather data was made possible by instruments provided by the Atmospheric Environment Service of Environment Canada. Weather data were collected by Curt Code, Shirley Dinwoodie, Steve Ellis, Gordon Goldsborough, Mike Goodyear, Jeff Gowler, Doreen Greening, Michelle McDonald, Russ Mead, and Jodine Zirk.

Lake water samples were collected by Russ Mead at monthly intervals as part of an ongoing water quality monitoring program of Manitoba Environment. Station WQ666 is approximately 1 km offshore from the UFS.

Table 1. Summary of tables and figures for meteorological and water quality data collected at the University Field Station (Delta Marsh) between January and December, 1996.

Uncorrected daily photosynthetically available radiation ($\text{E}/\text{m}^2/\text{d}$)	Fig. 1
Daily total sunshine	Fig. 2
Daily air temperature ($^{\circ}\text{C}$)	Fig. 3
Daily precipitation (mm)	Fig. 4
Water quality at station WQ666 (Lake Manitoba)	Table 2

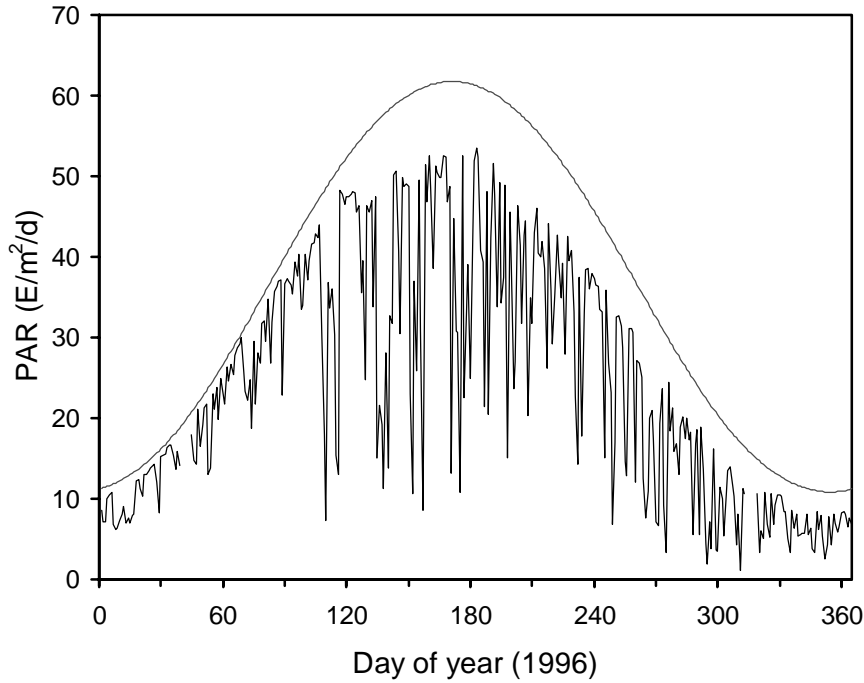


Figure 1. Uncorrected total daily photosynthetically available radiation (PAR - 400 to 700nm; E/m²/d) at the University Field Station (Delta Marsh) in 1996, as reported by PAR sensor Q6541 (installed 25 December 1995). The smooth curve represents the maximum daily (cloudless) PAR at the station, as calculated using the SIMSOL computer program (Fee, E. J. 1990. Computer programs for calculating *in situ* phytoplankton photosynthesis. Can. Tech. Rep. Fish. Aquat. Sci. No. 1740, v + 27pp.).

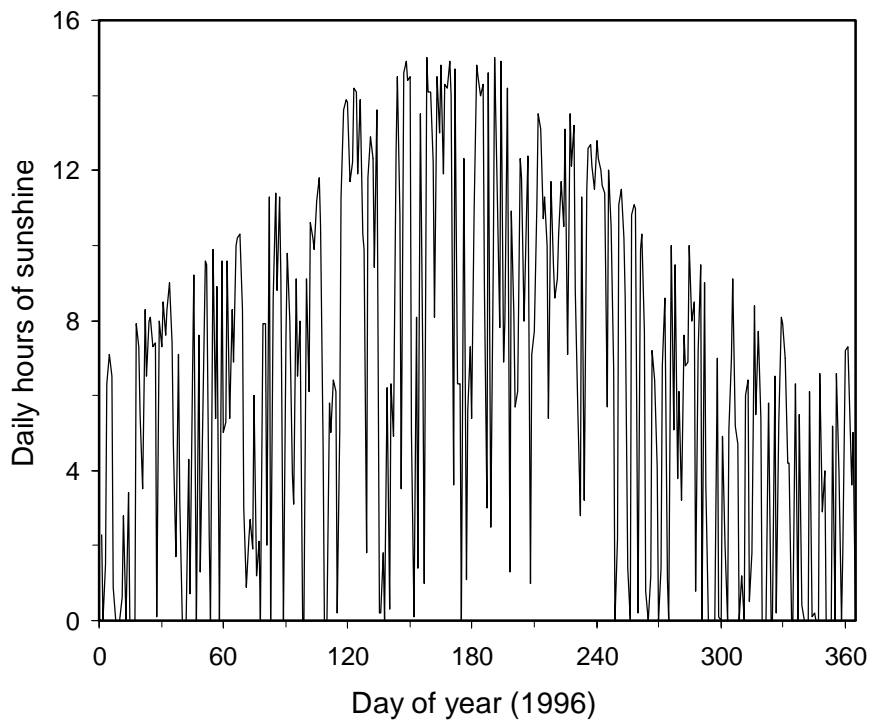


Figure 2. Daily hours of sunshine at the University Field Station (Delta Marsh) in 1996. The annual mean was 6.5 hours of sun per day. The range was 0 to 15.0 hours.

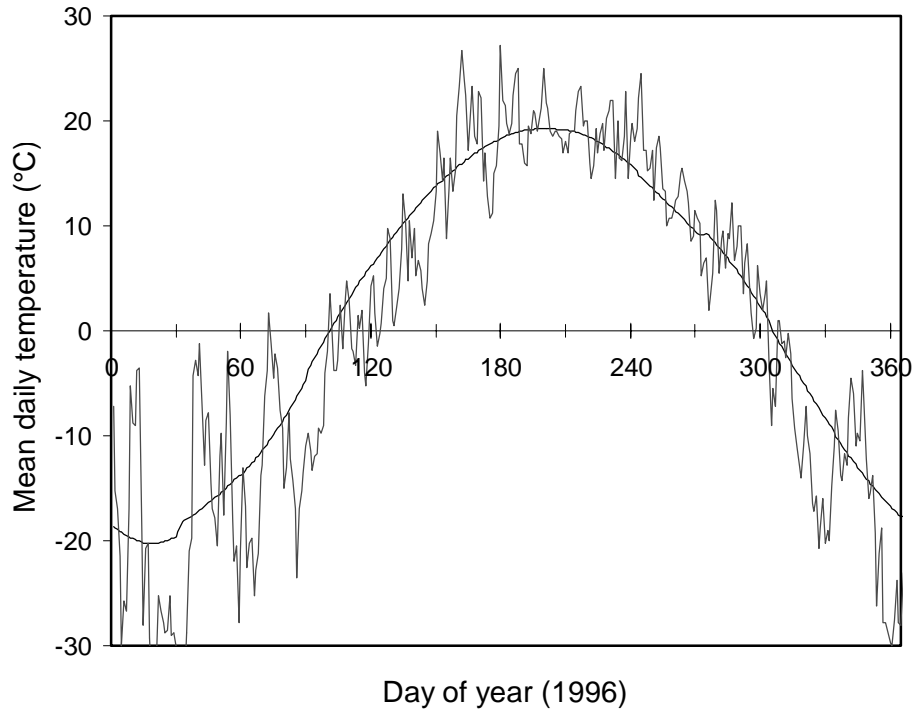


Figure 3. Daily mean air temperature (°C) at the University Field Station (Delta Marsh) in 1996. The smooth curve represents normal daily mean air temperature at the station, as calculated by R.McGinn (pers.comm. 1991). The annual mean daily temperature was 0.1°C. The minimum recorded temperature was -41.5°C and the maximum temperature was 34.5°C.

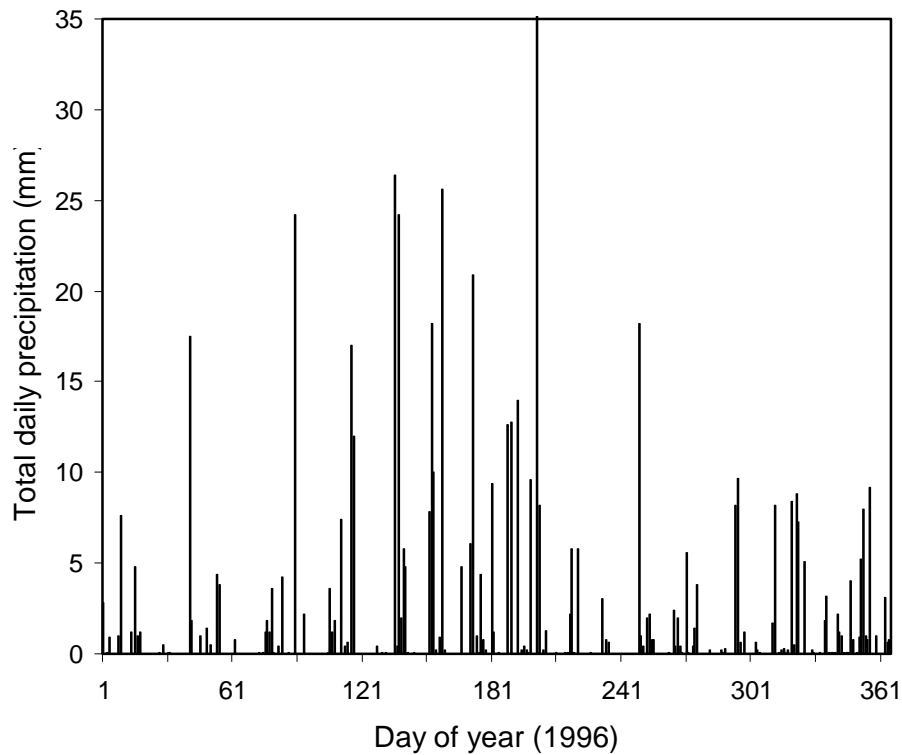


Figure 4. Daily total precipitation (water equivalents in mm) at the University Field Station (Delta Marsh) in 1996. The total annual precipitation was 584 mm, 67% of which fell as rain with the remainder as snow. The maximum amount of precipitation received in a single day was 43 mm (20 July).

Table 2. Water quality at sampling site WQ666 located 1 km offshore from the UFS in Lake Manitoba (1996). Analyses were performed by the Manitoba Department of Environment.

Date	30-Jan	28-Feb	19-Mar	16-Apr	13-May	17-Jun	15-Jul	20-Aug	24-Sep	28-Oct	19-Nov	10-Dec
Water depth (m)		3.6	3.5		3.4	3.8		3.4	2.7	3.1	3.3	3.5
Secchi depth (m)		1.0	1.0		0.5	0.6		0.4	0.5	0.3	0.4	0.6
Coliform - fecal (CFU/100 mL)	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Alkalinity - total (mg/L)	274	280	287	10.9	135	178	211	199	203	210	220	262
Alkalinity - bicarb (mg/L)	307	342	350	13.3	130	179	205	197	201	234	256	283
Alkalinity - carb (mg/L)	<18	<18	<18	<0.60	<18	18.3	26.1	22.3	23.0	<18.0	<18.0	18.4
Alkalinity - hydrox (mg/L)	<10.2	<10.2	<10.2	<0.34	<10.2	<10.2	<10.2	<10.2	<10.2	<10.2	<10.2	<10.2
pH	8.36	8.17	8.04	7.46	8.64	8.66	8.82	8.85	8.74	8.45	8.34	8.35
Conductivity (µS/cm)	2130	2180	2180	39	698	1120	1360	1270	1410	1410	1560	1600
Color - true (units)	5	15	10	10	20	5	5	15	10	15	15	10
Oxygen - dissolved (mg/L)	11.5	8.5	7.3	11.2	13.2	7.8	8.4	8.8	9.4	10.7	12.3	3.9
Solids - dissolved (mg/L)	1300	1300	1300	32	410	610	860	770	800	820	910	940
Solids - suspended (mg/L)	<5	<5	<5	<5	8	18	11	19	23	51	32	42
Solids - total (mg/L)	1300	1300	1300	32	420	630	870	790	820	870	940	980
Turbidity (NTU)	6.0	4.1	3.0	3.9	0.2	15.0	8.6	16.0	19.0	45.0	32.0	41.0
Ammonia (mg/L)	0.068	0.002	<0.020	0.334	0.020	<0.020	<0.020	0.031	0.021	0.023	0.042	0.053
Chloride - soluble (mg/L)	414			<10		187	264	238		263		
Chlorophyll-a (µg/L)	<1.0	<1.0	<1.0	<1.0	37.0	5.2	6.5	22.0	10.0	14.0	2.5	7.5
Nitrate+nitrite-N - soluble (mg/L)	0.32	0.18	0.29	0.27	0.07	0.01	<0.01	0.01	<0.01	<0.01	0.03	0.03
Phosphorus - total (mg/L)	0.023	0.023	0.024	0.014	0.160	0.048	0.040	0.083	0.082	0.080	0.046	0.151
Phosphorus - total diss (mg/L)		0.017			0.122	0.007	0.029	0.049	0.058	0.072	0.028	0.122
Phosphorus - total part (mg/L)		0.006			0.038	0.041	0.011	0.034	0.024	0.008	0.018	0.029
Sulphate - soluble (mg/L)	218			<10			165	152				
Carbon - total (mg/L)	82.5	79.8	82.6	1.9	42.5	49.8	59.3	53.5	60.2	61.2	64.9	67.4
Carbon - inorganic (mg/L)	64.5	68.5	68.7	1.9	32.3	40.0	47.4	44.4	46.4	49.4	52.5	54.4
Carbon - organic (mg/L)	18.0	11.3	13.9	<1.0	10.2	9.8	11.9	9.1	13.8	11.8	12.4	13.0
Carbon - dissolved (mg/L)		79.8			41.6	49.5	58.3	53.4	59.4	59.2		
Carbon - particulate (mg/L)		<1.0			<1.0	<1.0	1.0	<1.0	<1.0	2.0		
Carbon - inorganic dissolved (mg/L)		66.2			31.9	39.7	47.7	43.4	45.9	48.3		
Carbon - inorganic particulate (mg/L)		2.3			<1.0	<1.0	<1.0	1.0	<1.0	1.1		
Carbon - organic dissolved (mg/L)		13.6			9.7	9.8	10.6	10.0	13.5	10.9		
Carbon - organic particulate (mg/L)		<1.0			<1.0	<1.0	1.3	<1.0	<1.0	<1.0		
Nitrogen - TKN (mg/L)	1.10	1.02	1.12	0.54	0.94	0.84	1.11	1.17	1.26	1.07	0.99	1.12
Nitrogen - dissolved Kjeldahl (mg/L)		0.95			0.86	0.73	0.77	0.82	0.85	0.72		
Nitrogen - particulate Kjeldahl (mg/L)		<0.20			<0.20	<0.20	0.34	0.35	0.41	0.35		
Aluminum - extractable (mg/L)	0.444			0.126			0.095					
Arsenic - total (mg/L)	0.003			0.001			0.003					
Boron - extractable (mg/L)	0.22			<0.05			0.14					
Cadmium - extractable (mg/L)	<0.001			<0.001			<0.001					
Calcium - extractable (mg/L)	48.1			2.69			42.3	37.3		46.6		
Chromium - hexavalent (mg/L)	<0.02			<0.02			<0.02					
Copper - extractable (mg/L)	<0.01			<0.01			<0.01					
Hardness as CaCO3 (mg/L)	405			10.8			297					
Iron - extractable (mg/L)	0.05			0.06			0.01	0.04		0.19		
Lead - extractable (mg/L)	<0.0020			<0.0020			<0.0020					
Magnesium - extractable (mg/L)	69.3			0.98			46.4	43.7		51.2		
Manganese - extractable (mg/L)	0.005			0.01			<0.005	0.014		0.032		
Nickel - extractable (mg/L)	<0.005			<0.005			<0.005					
Potassium - extractable (mg/L)	20.8			<1.0			14.5	14.0		15.7		
Sodium - extractable (mg/L)	282			1.74			172	164		187		
Zinc - extractable (mg/L)	<0.01			<0.01			<0.01					