Canadian Data Report of

Fisheries and Aquatic Science No. 719

December 1988

CARBON AND OXYGEN PRIMARY PRODUCTION IN BEDFORD BASIN FROM JANUARY TO APRIL 1986

by

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Cat. No. Fs 97-13/719E ISSN 0706-6465

Correct citation for this publication:

Irwin, B., J. Anning, C. Caverhill, R. Escribano, and T. Platt. 1988. Carbon and oxygen primary production in Bedford Basin from January to April 1986. Can. Data Rep. Fish. Aquat. Sci. No. 719: iv + 34 p.

Abstract

Irwin, B., J. Anning, C. Caverhill, R. Escribano, and T. Platt. 1988. Carbon and oxygen primary production in Bedford Basin from January to April 1986. Can. Data Rep. Fish. Aquat. Sci. No. 719: iv + 34 p.

During the period January to April 1986, a series of primary productivity experiments were conducted in Bedford Basin. In this report we make available the raw data and also the fitted light saturation parameters.

Résumé

Irwin, B., J. Anning, C. Caverhill, R. Escribano, and T. Platt. 1988. Carbon and oxygen primary production in Bedford Basin from January to April 1986. Can. Data Rep. Fish. Aquat. Sci. No. 719: iv + 34 p.

Pendant la période du janvier au avril 1986, une série d'expériences ont été effectuée dans le bassin de Bedford. Dans ce rapport nous présentons les données brûtes sur ces expériences ainsi que les paramètres qui furent calculées pour representer les courbes de production primaire en fonction de la lumière.

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Introduction

This is the second in a series of data reports which will give the results of experiments designed to closely examine the relationship between carbon and oxygen estimates of phytoplankton primary production. In this report only *in situ* experiments were done.

All samples were collected at a single station in Bedford Basin at 44°31.3'N 63°38.3'W (Fig.1). Water depth at this location was 70 m. This particular site was chosen because there already exists a large body of biological, physical and chemical data on samples collected at this station (Cota and Harrison, 1983; Côté and Platt, 1984; Irwin and Platt, 1978a, 1978b; Irwin et al., 1975, 1983, 1987; Krauel, 1969; Platt and Irwin, 1971,1972; Platt et al., 1973; Taguchi and Platt, 1978a,1978b; Taguchi et al., 1975).

Sampling

All water samples were collected with 30 *l* Niskin bottles. Sampling depths were 1, 5 and 10 m. Water was carefully siphoned from the Niskin bottles into darkened plastic carboys from which sub samples were dispensed.

Primary Production

Primary productivity was measured using the ^{14}C method and the oxygen evolution method. The ^{14}C method was essentially as described in Strickland and Parsons (1972). For *in situ* studies, 40 µci of sodium bicarbonate ^{14}C was added to each of six light and four dark bottles from each depth. Light bottles were incubated *in situ* at their respective sampled depths. Dark bottles were incubated in a darkened temperature controlled tank. All bottles were recovered after 24 hours. 3 light and 2 dark bottles were filtered onto 2.5 cm Whatman GF/F filters. This was the whole fraction. The remaining 3 light and 2 darks were first filtered through a 3.0 µm Nuclepore to give the >3 µm fraction, and filtrate from this was then filtered through a Whatman GF/F to give

the <3 μm fraction. GF/F filters were then fumed over HC1 before counting in a scintillation counter.

The amount of material in the Dissolved Organic Carbon (DOC) pool was estimated by counting aliquots of filtrate from light and dark bottles from the whole fraction. Replicate five milliliter aliquots were acidified with 0.5 ml of 6N hydrochloric acid in 20 ml glass scintillation vials. Vials were agitated for one hour on a shaker in a fume hood and then the acid was neutralized with 0.5 ml of 6N sodium hydroxide. 10 ml of a water compatible cocktail (BDH #RO46967) was added to each vial and then counted in the usual way.

The high precision Winkler technique of Williams and Jenkinson (1982) was used to measure oxygen. A total of 15 bottles were filled from each depth. Immediately after filling, five bottles were fixed and were used as T-O conditions. Four bottles were wrapped in aluminum foil and incubated in the darkened tank as dark bottles. The remaining six bottles were incubated *in situ* at their sampled depth. After 24 hours the light and dark bottles were fixed. All bottles were titrated within 24 hours after fixing.

Chlorophyll

Replicate 100 ml samples were filtered onto 25 mm Whatman GF/F filters or 25 mm 3.0 μm nuclepore filters. Chlorophyll was extracted for 24 hours with 85% acetone at 0°C in the dark. The fluorometric technique of Yentsch and Menzel (1963) as modified by Holm Hansen et al. (1965) was used to estimate chlorophyll concentration.

Organic Particulates

Samples for particulate organic carbon and particulate organic nitrogen were filtered onto 25 mm precombusted Whatman GF/F filters. Filters were analyzed by combustion in a Perkin Elmer model 21- CHN analyzer.

Nutrients

Samples for nitrate, silicate and inorganic phosphate were collected from all sampled depths. Vials were stored frozen at -20°C and later analyzed on a Technicon II autoanalyzer. Nitrate was measured using industrial method 158-71W, silicate with method 186-72W and inorganic phosphate with method 155-71W.

Samples for ammonia analysis were processed immediately after collection. The phenolhypochlorite method as described by Solorzano (1969) was used.

Light Measurements

Total incident radiation was measured with an Eppley 40 Junction black and white pyranometer (Model 8-48) mounted on the roof of the Bedford Institute of Oceanography some 2.5 kilometers south of the sampling station. The output from the pyranometer was integrated hourly and logged on a Licor Li 550 printing integrator.

Extinction coefficients were calculated using submarine light measurements made with a Licor Li 192 SB underwater quantum sensor. Output was measured on a Licor Li 185 B meter. Measurements were made at 1 m intervals from the surface to 10 m.

Acknowledgements

We wish to thank Mark Hodgson and Alastair Macdonald for their assistance in the analysis of samples and the preparation of this report.

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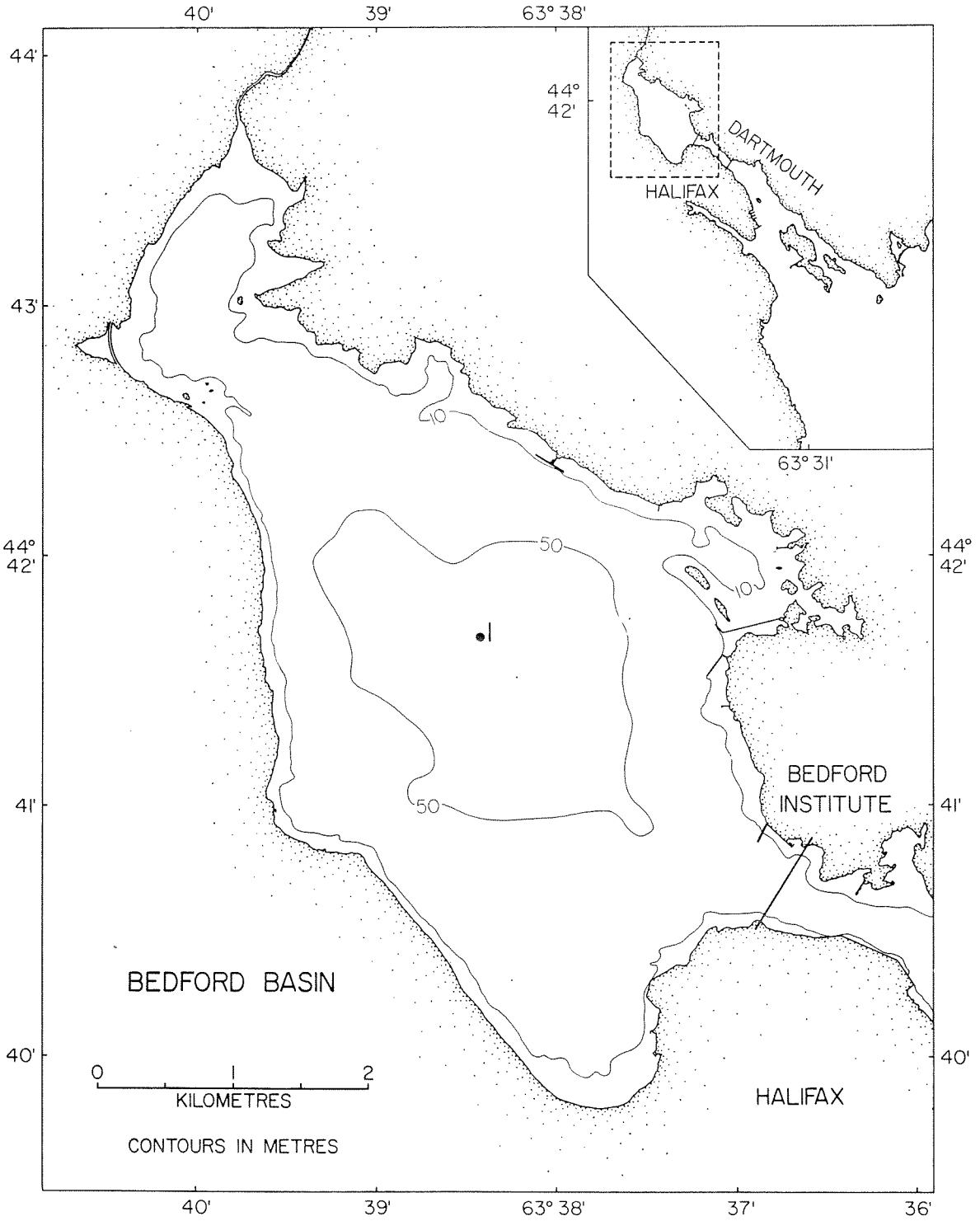

LOCATION OF SAMPLING STATION

IN SITU PROFILES, PARTICULATES AND INORGANIC NUTRIENTS

UNITS

Z	=	depth in meters
Temp	=	water temperature °C
0_2	=	oxygen concentration mg l^{-1}
NO_3	=	nitrate concentration mg at m^{-3}
SiO_3	=	silicate concentration mg at m^{-3}
PO_4	=	phosphate concentration mg at m^{-3}
% light	=	light penetration to depth Z m
Chl	=	chlorophyll concentration mg m^{-3}
POC	=	particulate organic carbon mg m^{-3}
PON	=	particulate organic nitrogen mg m^{-2}
PC	=	primary production mg C m^{-3} h^{-1}
C:N	=	carbon, nitrogen ratio
PDOC	=	dissolved organic carbon production mg C m^{-3} h^{-1}
PG	=	gross oxygen production mg O_2 m^{-3} h^{-1}
PN	=	net oxygen production mg O_2 m^{-3} h^{-1}
PR	=	oxygen respiration mg 0_2 m^{-3} h^{-1}
$\%\frac{PDOC}{PTOT}$	=	percent dissolved organic carbon production of total particulate and dissolved carbon production
PQ	=	photosynthetic quotient

BEDFORD BASIN 1986

DATE 07/01/1986 JULIAN DAY 7

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	1.00	10.30	7.24	9.38	1.13	68.00
5	1.00	10.34	5.83	7.25	.76	15.00
10	1.00	10.22	7.32	9.03	1.16	3.50

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	2.03	–	–	262	–	35	–
5	1.95	–	–	310	–	41	–
10	1.28	–	–	263	–	44	–

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.51	–	–	7.49	–	.09
5	.11	–	–	7.56	–	.02
10	.04	–	–	5.98	–	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	1.32	-3.38	4.71	15	.97
5	.44	-6.50	6.94	15	1.51
10	.00	-3.83	3.83	33	–

BEDFORD BASIN 1986

DATE 09/01/1986 JULIAN DAY 9

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.00	10.83	7.02	9.06	1.47	76.00
5	.50	10.72	7.28	8.14	1.21	26.00
10	.80	10.49	5.34	6.94	.84	6.90

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.34	.29	.47	182	157	21	21
5	2.38	.65	1.33	223	211	37	23
10	1.30	.32	.58	173	233	20	29

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.22	.13	.13	8.67	7.48	.04
5	.19	.09	.09	6.03	9.17	.05
10	.03	.02	.02	8.65	8.03	.01

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	.88	-1.19	2.07	15	1.49
5	.83	-3.34	4.18	21	1.63
10	.20	-.41	.61	25	2.50

BEDFORD BASIN 1986

DATE 13/01/1986 JULIAN DAY 13

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	1.00	10.90	5.84	8.81	.96	78.00
5	1.50	10.60	7.10	8.44	.87	30.00
10	2.00	9.93	7.02	9.03	1.06	9.00

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	.40	.18	.26	190	119	33	23
5	1.02	.28	.64	185	111	29	13
10	1.22	.26	.57	186	108	33	14

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.08	.04	.06	5.76	5.17	.01
5	.05	.02	.04	6.38	8.54	.00
10	.03	.01	.02	5.64	7.71	.00

Z	PG	PN	PR	PDOC % PTOT	PQ
1	.16	.39	-.23	11	.75
5	.15	-.50	.64	4	1.12
10	.17	-.10	.27	0	2.08

BEDFORD BASIN 1986

DATE 16/01/1986 JULIAN DAY 16

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.60	9.98	7.32	9.53	1.30	59.00
5	.60	9.84	7.69	10.87	1.06	11.00
10	.60	9.81	6.15	8.05	1.35	2.30

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.30	.40	.65	194	112	33	32
5	1.06	.33	.52	213	111	38	20
10	1.35	.43	.70	199	123	35	27

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.60	.27	.21	5.88	3.50	.07
5	.35	.12	.15	5.61	5.55	.10
10	.06	.03	.04	5.69	4.56	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	1.52	.56	.96	7	.95
5	1.28	.76	.52	22	1.37
10	.12	-2.93	3.06	33	.77

BEDFORD BASIN 1986

DATE 28/01/1986 JULIAN DAY 28

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	2.20	10.53	7.53	9.38	.99	74.00
5	2.20	10.57	7.51	11.09	.97	23.00
10	2.20	10.45	7.06	10.91	1.05	5.40

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	2.04	.38	1.19	248	155	38	30
5	1.62	.32	.76	253	133	57	18
10	2.54	.51	1.10	255	152	31	30

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.68	.33	.25	6.53	5.17	.10
5	.18	.10	.12	4.44	7.39	.04
10	.07	.01	.05	8.23	5.07	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	1.85	1.45	.40	13	1.02
5	.71	.54	.18	18	1.48
10	-2.37	-2.15	-.22	22	-

BEDFORD BASIN 1986

DATE 03/02/1986 JULIAN DAY 34

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	1.00	10.73	6.87	11.49	.83	74.00
5	1.00	10.62	5.91	8.71	.84	22.00
10	1.20	10.26	7.29	9.93	.89	4.90

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.59	.60	.68	267	134	48	18
5	1.47	.74	.65	254	147	45	22
10	2.27	.96	.82	255	172	40	37

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.41	.24	.15	5.56	7.44	.04
5	.29	.17	.10	5.64	6.68	.05
10	.09	.05	.05	6.38	4.65	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	1.99	.78	1.21	9	1.82
5	1.89	2.31	-.42	14	2.44
10	1.53	-2.33	3.86	18	-

BEDFORD BASIN 1986

DATE 10/02/1986 JULIAN DAY 41

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.00	10.84	6.60	9.54	.74	72.00
5	.00	10.88	7.23	10.52	.87	19.00
10	.00	10.81	7.62	10.81	.91	6.00

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	.63	.36	.27	167	103	38	9
5	.69	.30	.18	176	106	25	16
10	.52	.28	.22	194	125	29	26

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.30	.26	.23	4.39	11.44	.02
5	.23	.18	.04	7.04	6.63	.02
10	.10	.06	.02	6.69	4.81	.01

Z	PG	PN	PR	PDOC % PTOT	PQ
1	1.04	.35	.69	6	1.30
5	1.02	-.25	1.28	8	1.67
10	-.30	-1.14	.84	9	-

BEDFORD BASIN 1986

DATE 13/02/1986 JULIAN DAY 44

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.20	10.83	7.14	10.84	.98	76.00
5	.20	10.78	5.40	8.58	.74	25.00
10	.20	10.69	4.62	6.78	.41	6.10

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.90	.89	.35	216	119	34	22
5	2.39	1.13	.60	272	172	45	33
10	2.51	1.28	.77	253	185	44	28

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.76	.48	.12	6.35	5.41	.04
5	.87	.41	.21	6.04	5.21	.09
10	.30	.13	.11	5.75	6.61	.07

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	2.99	1.53	1.46	5	1.48
5	4.54	.25	4.29	9	1.96
10	.14	-1.05	1.18	19	-

BEDFORD BASIN 1986

DATE 17/02/1986 JULIAN DAY 48

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	-.50	10.76	7.16	10.71	.30	72.00
5	.00	10.77	7.38	10.94	.51	19.00
10	.00	10.55	7.41	10.74	.77	6.70

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.01	.96	.43	157	103	26	12
5	1.18	1.06	.21	184	108	34	15
10	2.68	1.76	.83	292	154	52	23

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	.58	.52	.05	6.04	8.58	.02
5	.56	.38	.05	5.41	7.20	.04
10	.29	.19	.09	5.62	6.70	.03

Z	PG	PN	PR	PDOC % PTOT	PQ
1	1.99	.38	1.60	3	1.29
5	2.33	.84	1.01	7	1.56
10	.88	-1.16	2.03	9	1.13

BEDFORD BASIN 1986

DATE 20/02/1986 JULIAN DAY 51

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.50	10.95	6.65	10.91	1.10	73.00
5	.50	11.18	6.36	10.74	1.01	21.00
10	.80	10.47	6.68	10.11	1.00	4.50

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	2.05	1.83	.18	185	108	31	20
5	3.50	2.48	.58	262	151	49	33
10	3.41	2.36	1.16	300	180	48	36

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	1.22	1.14	.06	5.97	5.40	.03
5	1.29	.95	.15	5.35	4.58	.06
10	.45	.40	.10	6.25	5.00	.06

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	5.24	2.64	2.61	2	1.61
5	5.42	3.89	1.53	4	1.58
10	2.13	-1.21	3.34	12	1.78

BEDFORD BASIN 1986

DATE 24/02/1986 JULIAN DAY 55

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.30	11.02	6.57	8.03	1.12	74.00
5	.30	11.13	6.39	8.02	.98	25.00
10	.00	10.86	4.58	6.32	.64	9.30

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	4.88	4.41	.41	277	107	50	11
5	5.29	4.88	.43	313	144	55	19
10	6.50	5.80	.63	298	137	53	24

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	3.10	2.95	.15	5.54	9.73	.06
5	1.84	1.58	.13	5.69	7.58	.06
10	.45	.42	.05	5.62	5.71	.02

Z	PG	PN	PR	PDOC % PTOT	PQ
1	10.94	5.22	5.71	2	1.32
5	5.49	1.18	4.35	3	1.12
10	1.77	-2.10	3.87	4	1.47

BEDFORD BASIN 1986

DATE 27/02/1986 JULIAN DAY 58

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.20	11.00	6.79	7.60	.96	70.00
5	.20	10.98	7.68	-	.95	16.00
10	.20	10.94	8.83	5.90	.76	3.50

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	8.06	5.73	.81	511	176	91	37
5	7.53	6.53	.95	395	167	76	37
10	6.82	5.47	.75	372	148	71	27

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	4.59	5.00	.29	5.62	4.76	.12
5	3.69	2.55	.17	5.20	4.51	.12
10	.87	.83	.07	5.24	5.48	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	20.03	16.74	3.29	2	1.64
5	13.01	12.11	.90	3	1.32
10	3.23	-2.40	5.63	2	1.39

BEDFORD BASIN 1986

DATE 03/03/1986 JULIAN DAY 62

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.30	11.90	3.57	5.27	.77	60.00
5	.30	11.84	4.26	6.13	.91	7.70
10	.30	11.77	2.93	5.08	.76	.60

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	19.49	22.97	.26	526	122	98	23
5	23.21	23.21	.55	558	122	104	20
10	19.49	20.07	.64	561	134	104	20

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	13.60	12.57	.26	5.37	5.30	.13
5	5.55	5.28	.14	5.37	6.10	.08
10	1.07	.74	.05	5.39	6.70	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	36.46	29.24	7.22	1	1.01
5	15.58	12.38	3.20	1	1.05
10	2.97	-1.19	4.17	2	1.04

BEDFORD BASIN 1986

DATE 06/03/1986 JULIAN DAY 65

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.70	12.23	1.53	1.78	.54	58.00
5	.70	12.12	1.60	1.57	.63	6.80
10	.70	11.70	2.98	3.03	.55	1.20

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	33.33	31.36	1.74	962	181	216	37
5	33.33	31.36	1.47	947	183	198	39
10	32.02	24.13	1.12	766	164	177	34

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	18.49	17.08	.38	4.45	4.89	.41
5	5.96	5.92	.12	4.78	4.69	.14
10	.40	.35	.01	4.32	4.82	.01

Z	PG	PN	PR	PDOC % PTOT	PQ
1	80.01	73.00	7.00	2	1.62
5	18.53	10.89	7.64	2	1.17
10	2.15	.97	1.18	2	2.01

BEDFORD BASIN 1986

DATE 10/03/1986 JULIAN DAY 69

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	-.30	12.58	1.02	.03	.42	65.00
5	-.30	12.60	1.13	.30	.62	12.00
10	-.30	12.57	.78	.26	.44	1.40

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	35.94	33.33	.86	***	167	187	50
5	33.98	32.67	.78	***	180	191	34
10	35.29	33.33	.79	***	199	184	43

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	18.72	18.32	.40	5.50	3.34	.33
5	3.09	3.38	.11	5.77	5.29	.10
10	.38	.20	.01	5.77	4.63	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	57.70	51.50	6.23	2	1.16
5	10.79	.56	10.24	3	1.31
10	1.80	-8.17	9.97	5	1.77

BEDFORD BASIN 1986

DATE 13/03/1986 JULIAN DAY 72

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	.50	13.09	1.52	.05	.20	58.00
5	.50	13.14	.39	.10	.57	6.40
10	.50	12.98	1.81	.27	.56	.40

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	30.06	32.02	.31	974	114	141	27
5	31.37	30.71	.93	***	153	170	44
10	32.02	32.02	.96	***	164	173	34

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	14.61	14.27	.20	6.91	4.22	.18
5	5.33	5.89	.13	6.65	3.48	.10
10	.41	.39	.03	6.42	4.82	.01

Z	PG	PN	PR	PDOC % PTOT	PQ
1	49.67	44.41	5.26	1	1.27
5	17.46	10.72	6.74	2	1.23
10	2.45	-2.99	5.44	2	2.24

BEDFORD BASIN 1986

DATE 17/03/1986 JULIAN DAY 76

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	1.00	13.23	1.92	2.47	.13	72.00
5	.60	13.55	1.07	1.84	.50	19.00
10	.60	13.09	1.01	.93	.30	3.60

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	9.06	7.94	.15	576	190	85	29
5	17.64	15.20	.63	669	189	104	43
10	21.81	19.73	1.05	814	207	134	44

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	8.15	6.68	.08	6.78	6.55	.07
5	2.75	2.29	.06	6.43	4.39	.10
10	.57	.40	.04	6.07	4.70	.08

Z	PG	PN	PR	PDOC % PTOT	PQ
1	21.87	19.27	2.60	1	1.01
5	719.00	-2.85	10.04	4	.98
10	2.71	-1.09	3.80	13	1.79

BEDFORD BASIN 1986

DATE 24/03/1986 JULIAN DAY 83

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	1.80	13.91	1.05	3.81	.16	55.00
5	1.30	13.80	.64	.96	.15	5.10
10	1.10	13.14	.46	.64	.17	.90

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	13.34	11.02	1.17	916	236	137	50
5	16.24	14.97	.93	980	200	132	45
10	15.55	13.46	1.25	865	217	144	43

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	12.11	9.63	.73	6.69	4.72	.29
5	4.22	3.48	.22	7.42	4.44	.11
10	.48	.48	.07	6.01	5.05	.02

Z	PG	PN	PR	% PDOC/PTOT	PQ
1	29.55	28.33	1.21	2	.92
5	11.47	10.01	1.46	3	1.02
10	2.33	-.84	3.16	4	1.82

BEDFORD BASIN 1986

DATE 01/04/1986 JULIAN DAY 91

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	3.20	12.59	1.27	1.73	.09	62.00
5	2.00	12.58	1.06	.99	.14	9.30
10	1.80	12.31	.47	.51	.10	1.30

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	6.15	4.70	.49	674	182	104	37
5	7.38	5.78	.71	629	197	99	41
10	9.15	8.14	1.36	800	197	132	43

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	9.38	8.57	.40	6.48	4.92	.35
5	3.56	3.67	.29	6.35	4.80	.15
10	.64	.47	.09	6.06	5.58	.00

Z	PG	PN	PR	PDOC % PTOT	PQ
1	24.59	16.07	8.52	3	.98
5	9.32	2.76	6.56	4	.98
10	2.18	-7.05	9.23	0	1.28

BEDFORD BASIN 1986

DATE 07/04/1986 JULIAN DAY 97

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	2.50	11.96	.89	.74	.13	73.00
5	2.20	11.96	.48	1.00	.33	20.00
10	1.50	11.89	.49	.65	.37	4.10

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	3.52	2.42	.86	473	181	77	37
5	3.36	2.23	.88	515	199	92	38
10	6.03	4.48	.98	627	201	103	39

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	2.88	1.36	.26	6.14	4.89	.13
5	.85	.77	.12	5.60	5.24	.05
10	.21	.21	.03	6.09	5.15	.01

Z	PG	PN	PR	PDOC % PTOT	PQ
1	9.78	6.99	2.79	4	1.27
5	1.88	-1.22	3.10	5	.83
10	.59	-2.38	2.99	5	1.05

BEDFORD BASIN 1986

DATE 14/04/1986 JULIAN DAY 104

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	4.80	11.67	2.31	9.39	.12	52.00
5	4.80	11.69	2.07	6.01	.24	6.10
10	2.30	11.35	2.28	4.35	.29	1.00

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	3.21	1.10	1.34	551	246	85	37
5	3.37	1.45	1.51	567	257	95	37
10	6.12	3.62	2.09	519	260	93	42

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	4.65	1.97	1.49	6.48	6.65	.74
5	.91	.53	.35	5.97	6.95	.11
10	.21	.16	.06	5.58	6.19	.05

Z	PG	PN	PR	PDOC % PTOT	PQ
1	7.71	5.28	2.43	14	.62
5	1.36	-2.94	4.30	11	.51
10	.33	-1.78	2.11	19	.59

BEDFORD BASIN 1986

DATE 21/04/1986 JULIAN DAY 111

Z	TEMP	O2	NO3	SIO3	PO4	% LIGHT
1	3.80	11.13	1.66	2.97	.33	74.00
5	3.60	11.26	1.84	3.94	.38	22.00
10	2.90	11.07	2.09	2.06	.38	4.80

	CHL			POC		PON	
Z	W	>3	<3	W	<3	W	<3
1	1.28	.54	.67	443	202	78	41
5	3.59	1.90	1.48	527	241	92	73
10	4.58	2.37	1.78	485	233	96	60

	PC			C:N		
Z	W	>3	<3	W	<3	PDOC
1	1.05	.65	.29	5.68	4.93	.12
5	.89	.65	.34	5.73	2.30	.09
10	.26	.10	.06	5.05	3.88	.04

Z	PG	PN	PR	PDOC % PTOT	PQ
1	3.31	-1.73	5.04	10	1.18
5	3.76	-3.10	6.86	9	1.58
10	1.15	-3.82	4.97	13	1.66