Canadian Data Report of

Fisheries and Aquatic Science No. 720



January 1989

# CARBON AND OXYGEN PRIMARY PRODUCTION IN BEDFORD BASIN FROM JULY TO DECEMBER 1986

by

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Cat. No. Fs 97-13/720E ISSN 0706-6465

Correct citation for this publication:

Irwin, B., J. Anning, C. Caverhill, R. Escribano, and T. Platt. 1989. Carbon and oxygen primary production in Bedford Basin from July to December 1986. Can. Data Rep. Fish. Aquat. Sci. No. 720: iv + 32 p.

## Abstract

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During the period July to December 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. 1989. Carbon and oxygen primary production in Bedford Basin from July to December 1986. Can. Data Rep. Fish. Aquat. Sci. No. 720: iv + 32 p.

Pendant la période du juillet au décembre 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.

# CONTENTS

## Introduction

This is the third 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, 1988a, 1988b; 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 10, and 15 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.

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 and surface light measurements made with Licor Li 192 SB underwater quantum sensors. Output was measured on a Licor Li 1000 data logger. Measurements were made at 1 m intervals from the surface to 15 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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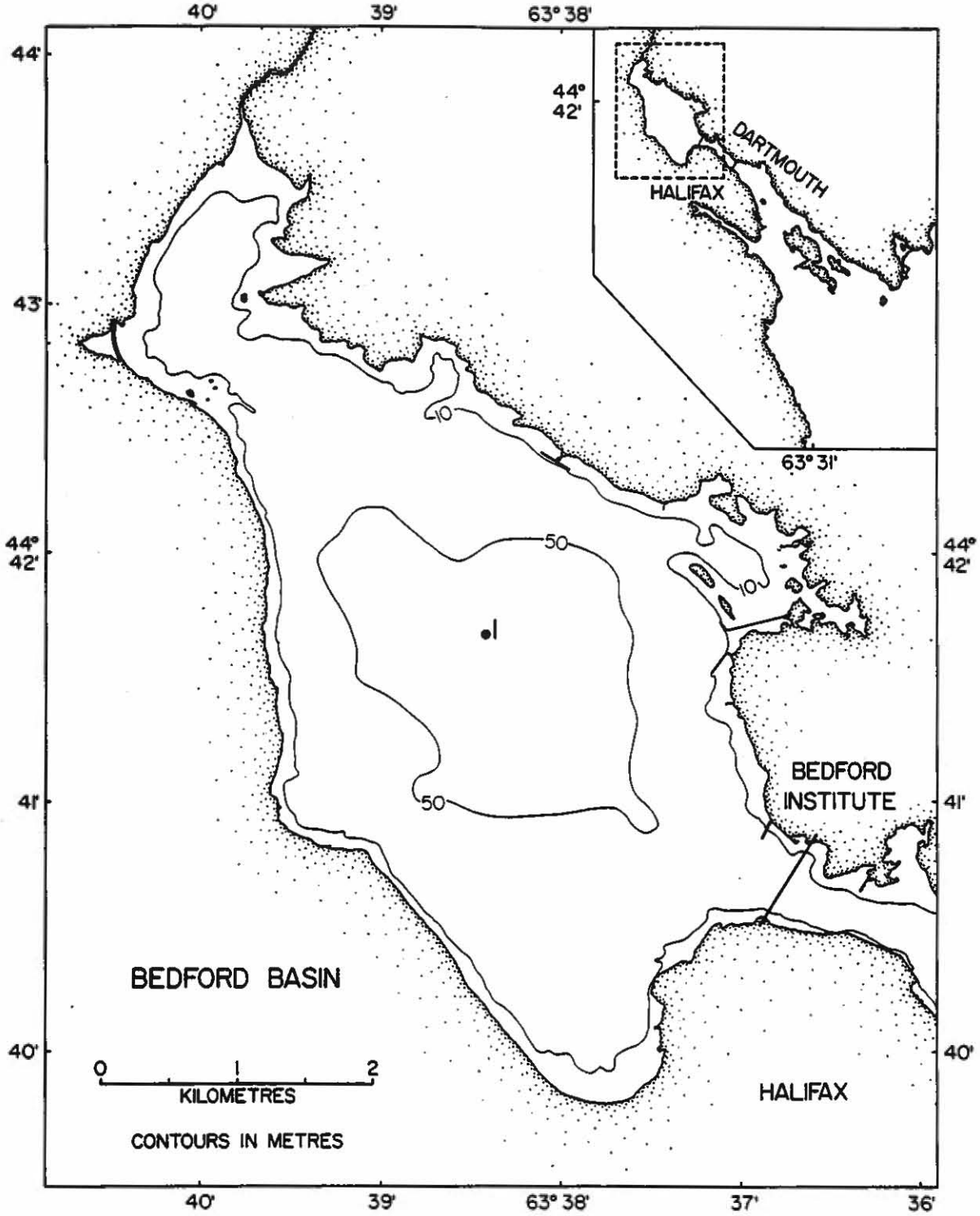
# LOCATION OF SAMPLING STATION


40'
39'
63° 38'
44'
43'
44°
42'
41'
40'
37'
36'
63° 31'
DARTMOUTH
HALIFAX
10
50
BEDFORD
INSTITUTE
BEDFORD BASIN
0
1
2
KILOMETRES
CONTOURS IN METRES
HALIFAX

# PROFILE DATA

# 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 02/07/1986 JULIAN DAY 183

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 11.9 | 9.83 | .48 | .40 | .38 | 66.0 |
| 5 | 10.4 | 9.79 | .39 | .44 | .40 | 12.0 |
| 10 | 8.3 | 9.37 | 1.06 | 1.17 | .60 | 2.2 |
| 15 | 7.0 | 9.20 | 1.44 | .95 | .72 | .7 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.65 | .85 | 1.47 | 697 | 326 | 86 | 46 |
| 5 | 3.03 | 1.59 | 1.30 | 757 | 303 | 110 | 60 |
| 10 | 2.55 | 1.38 | .96 | 690 | 223 | 112 | 47 |
| 15 | 1.83 | .89 | .64 | 508 | 251 | 85 | 55 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 5.90 | 3.91 | 1.76 | 8.10 | 7.09 | .48 |
| 5 | 1.97 | 1.16 | .43 | 6.88 | 5.05 | .15 |
| 10 | .21 | .24 | .52 | 6.16 | 4.74 | .01 |
| 15 | .04 | .10 | .03 | 5.98 | 4.55 | .01 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 30.4 | 11.2 | 19.2 | 8 | 1.93 |
| 5 | 9.8 | .1 | 9.7 | 7 | 1.87 |
| 10 | 7.4 | -1.7 | 9.2 | 5 | - |
| 15 | 1.2 | -3.4 | 4.6 | 20 | - |

# BEDFORD BASIN 1986

DATE 08/07/1986 JULIAN DAY 189

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 12.6 | 9.53 | .73 | .18 | .58 | 74.0 |
| 5 | 12.3 | 9.65 | .51 | .00 | .37 | 23.0 |
| 10 | 8.6 | 9.59 | 1.05 | .94 | .62 | 5.3 |
| 15 | 8.0 | 9.46 | .89 | 1.04 | .64 | 1.2 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.64 | .54 | 1.79 | 440 | 246 | 88 | 52 |
| 5 | 2.91 | .59 | 1.57 | 468 | 258 | 69 | 49 |
| 10 | 4.33 | 2.29 | 1.47 | 560 | 179 | 102 | 53 |
| 15 | 4.82 | 3.15 | .91 | 445 | 151 | 85 | 12 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 7.10 | 1.43 | 3.47 | 5.00 | 4.73 | .80 |
| 5 | 2.61 | .68 | 1.57 | 6.78 | 5.27 | .38 |
| 10 | 1.19 | .71 | .33 | 5.49 | 3.38 | .12 |
| 15 | .33 | .33 | .04 | 5.24 | 12.58 | .02 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 26.1 | 12.1 | 14.0 | 10 | 1.38 |
| 5 | 15.0 | -.2 | 15.2 | 13 | 2.16 |
| 10 | 10.9 | -2.6 | 13.6 | 9 | 3.43 |
| 15 | 4.5 | -6.6 | 11.1 | 6 | - |

# BEDFORD BASIN 1986

DATE 15/07/1986 JULIAN DAY 196

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 12.8 | 9.44 | .79 | .41 | .43 | 65.0 |
| 5 | 11.9 | 9.53 | .37 | .34 | .42 | 14.0 |
| 10 | 9.8 | 9.62 | .99 | 1.08 | .66 | 3.8 |
| 15 | 8.0 | 9.39 | .85 | .04 | .58 | 1.1 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.87 | .44 | 1.81 | 429 | 228 | 84 | 42 |
| 5 | 3.28 | .57 | 1.98 | 493 | 238 | 94 | 48 |
| 10 | 3.71 | 1.21 | 1.81 | 546 | 226 | 85 | 42 |
| 15 | 2.89 | .98 | 1.37 | 435 | 201 | 96 | 38 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 3.88 | 1.22 | 1.77 | 5.11 | 5.43 | .51 |
| 5 | 1.29 | .36 | .58 | 5.24 | 4.96 | .20 |
| 10 | .29 | .11 | .12 | 6.42 | 5.38 | .04 |
| 15 | .06 | .06 | .00 | 4.53 | 5.29 | .01 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 17.2 | 2.5 | 14.7 | 12 | 1.66 |
| 5 | 9.4 | -5.4 | 14.8 | 13 | 2.72 |
| 10 | 6.0 | -6.6 | 12.6 | 12 | - |
| 15 | 6.3 | -4.5 | 10.8 | 14 | - |

BEDFORD BASIN 1986

DATE 22/07/1986 JULIAN DAY 203

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | - | 9.49 | .65 | 2.62 | .60 | 69.0 |
| 5 | - | 9.48 | .70 | .51 | .49 | 13.0 |
| 10 | - | 9.33 | .59 | .00 | .56 | 1.4 |
| 15 | - | 9.07 | .69 | .00 | .45 | .5 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 3.34 | 1.68 | 1.53 | 403 | 263 | 57 | 47 |
| 5 | 6.49 | 2.57 | 3.53 | 677 | 310 | 117 | 68 |
| 10 | 8.41 | 2.78 | 4.08 | 668 | 338 | 117 | 43 |
| 15 | 5.07 | 1.81 | 2.21 | 511 | 262 | 65 | 43 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 5.28 | 3.01 | 2.20 | 7.07 | 5.60 | .55 |
| 5 | 4.82 | 1.86 | 2.37 | 5.79 | 4.56 | .50 |
| 10 | 1.78 | .87 | .88 | 5.71 | 7.85 | .20 |
| 15 | .48 | .28 | .24 | 7.86 | 5.84 | .03 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 23.7 | 12.4 | 11.3 | 9 | 1.68 |
| 5 | 20.5 | 5.6 | 14.9 | 9 | 1.59 |
| 10 | 6.9 | -10.6 | 17.5 | 10 | 1.45 |
| 15 | 2.6 | -6.7 | 9.4 | 6 | - |

# BEDFORD BASIN 1986

DATE 05/08/1986 JULIAN DAY 217

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 19.5 | 9.10 | .71 | 1.56 | .38 | 53.0 |
| 5 | 17.0 | 8.62 | .52 | 1.66 | .58 | 4.3 |
| 10 | 15.5 | 7.99 | .71 | .29 | .83 | 1.2 |
| 15 | 14.0 | 7.78 | .76 | .80 | .65 | .3 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 7.30 | 2.74 | 3.34 | 977 | 427 | 163 | 88 |
| 5 | 7.73 | 3.46 | 3.28 | 812 | 443 | 113 | 71 |
| 10 | 4.39 | 2.10 | 2.17 | 558 | 308 | 99 | 61 |
| 15 | 2.15 | .91 | .98 | 430 | 209 | 56 | 40 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 16.52 | 6.06 | 3.97 | 5.99 | 4.85 | 2.26 |
| 5 | 1.89 | 1.33 | .84 | 7.19 | 6.24 | .16 |
| 10 | .19 | .09 | .08 | 5.64 | 5.05 | .01 |
| 15 | .00 | .07 | .00 | 7.68 | 5.23 | .00 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 52.0 | 22.9 | 29.2 | 12 | 1.18 |
| 5 | 10.3 | -13.8 | 24.1 | 8 | 2.04 |
| 10 | 2.8 | -11.9 | 14.8 | 5 | - |
| 15 | 2.4 | -6.7 | 9.1 | 0 | - |

# BEDFORD BASIN 1986

DATE 19/08/1986 JULIAN DAY 231

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 19.0 | 8.67 | .64 | .43 | .59 | 69.0 |
| 5 | 17.0 | 8.34 | .32 | .97 | .58 | 15.0 |
| 10 | 16.0 | 7.76 | .56 | 1.67 | .72 | 3.0 |
| 15 | 14.0 | 7.34 | 1.25 | 1.80 | .87 | .8 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 8.33 | 2.72 | 4.39 | 1099 | 412 | 232 | 76 |
| 5 | 7.24 | 2.35 | 3.77 | 928 | 405 | 184 | 93 |
| 10 | 5.26 | 1.74 | 3.03 | 513 | 313 | 111 | 66 |
| 15 | 3.09 | .89 | 1.72 | 347 | 211 | 46 | 27 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 6.08 | 2.22 | 3.07 | 4.74 | 5.42 | .46 |
| 5 | .53 | .49 | .14 | 5.04 | 4.35 | .03 |
| 10 | .16 | .05 | .02 | 4.62 | 4.74 | .01 |
| 15 | .04 | .09 | .01 | 7.54 | 7.81 | .00 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 23.6 | -8.5 | 32.0 | 7 | 1.46 |
| 5 | 5.7 | -18.0 | 23.7 | 5 | - |
| 10 | 4.2 | -16.8 | 21.0 | 6 | - |
| 15 | 2.2 | -8.1 | 10.3 | 0 | - |

BEDFORD BASIN 1986

DATE 26/08/1986 JULIAN DAY 238

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 8.23 | .69 | .17 | .54 | 58.0 |
| 5 | 16.5 | 8.12 | .75 | .05 | .75 | 6.3 |
| 10 | 16.0 | 7.55 | 1.14 | 1.07 | 1.00 | .8 |
| 15 | 15.0 | 7.18 | 1.07 | 1.54 | .87 | .2 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 6.99 | 3.65 | 2.91 | 676 | 325 | 142 | 61 |
| 5 | 6.68 | 3.40 | 2.64 | 621 | 281 | 141 | 39 |
| 10 | 4.64 | 2.23 | 2.36 | 471 | 206 | 87 | 24 |
| 15 | 2.66 | 1.23 | 1.19 | 325 | 141 | 60 | 12 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 15.37 | 7.56 | 3.46 | 4.76 | 5.33 | - |
| 5 | 3.86 | 2.02 | 2.06 | 4.40 | 7.21 | .32 |
| 10 | .44 | .27 | .20 | 5.41 | 8.58 | .05 |
| 15 | .10 | .13 | .14 | 5.42 | 11.75 | .04 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 47.1 | 27.5 | 19.6 | - | 1.15 |
| 5 | 19.2 | -10.7 | 29.9 | 8 | 1.87 |
| 10 | 2.4 | -11.9 | 14.3 | 10 | - |
| 15 | 1.5 | -6.6 | 8.1 | 29 | - |

BEDFORD BASIN 1986

DATE 02/09/1986 JULIAN DAY 245

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 8.90 | .47 | .68 | .60 | 65.0 |
| 5 | 15.0 | 8.39 | .58 | .69 | .62 | 12.0 |
| 10 | 12.5 | 7.76 | .51 | 3.21 | .71 | 2.7 |
| 15 | 11.0 | 7.71 | .87 | .75 | .57 | .9 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 3.46 | 1.44 | 1.89 | 573 | 291 | 111 | 53 |
| 5 | 5.01 | 1.57 | 2.85 | 557 | 251 | 110 | 56 |
| 10 | 3.65 | .69 | 2.06 | 365 | 209 | 70 | 42 |
| 15 | 2.02 | .36 | 1.32 | 246 | 147 | 45 | 27 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 6.58 | 2.47 | 2.77 | 5.16 | 5.49 | 1.03 |
| 5 | 2.85 | 1.08 | 1.30 | 5.06 | 4.48 | .34 |
| 10 | .53 | .21 | .33 | 5.21 | 4.98 | .19 |
| 15 | .17 | .10 | .09 | 5.47 | 5.44 | .01 |

| Z | PG | PN | PR | % PDOC/PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 25.2 | 3.1 | 22.1 | 14 | 1.44 |
| 5 | 15.0 | -3.5 | 18.5 | 11 | 1.98 |
| 10 | 5.9 | -3.1 | 9.0 | 26 | - |
| 15 | 4.2 | -1.8 | 6.0 | 6 | - |

# BEDFORD BASIN 1986

DATE 09/09/1986 JULIAN DAY 252

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 14.0 | 8.70 | .50 | .57 | .52 | 67.0 |
| 5 | 13.5 | 8.73 | .47 | 2.18 | .90 | 14.0 |
| 10 | 13.0 | 8.27 | .55 | 1.28 | .79 | 2.7 |
| 15 | 10.5 | 8.00 | .86 | .32 | .53 | .7 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 3.15 | 2.10 | .89 | 512 | 242 | 103 | 50 |
| 5 | 3.53 | 2.04 | 1.74 | 510 | 280 | 100 | 64 |
| 10 | 2.89 | 1.28 | 1.36 | 486 | 253 | 94 | 57 |
| 15 | 1.32 | .61 | .59 | 328 | 167 | 62 | 33 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 8.95 | 8.17 | 1.36 | 4.97 | 4.84 | .62 |
| 5 | 3.23 | 1.88 | .71 | 5.10 | 4.38 | .27 |
| 10 | .55 | .24 | .16 | 5.17 | 4.44 | .04 |
| 15 | .08 | .06 | .04 | 5.29 | 4.15 | .03 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 36.5 | 25.7 | 10.8 | 6 | 1.53 |
| 5 | 11.8 | 1.8 | 9.9 | 8 | 1.37 |
| 10 | 4.1 | -7.4 | 11.4 | 7 | - |
| 15 | 1.1 | -9.9 | 11.0 | 27 | - |

BEDFORD BASIN 1986

DATE 23/09/1986 JULIAN DAY 266

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 11.5 | 10.35 | .71 | .00 | .53 | 67.0 |
| 5 | 11.0 | 10.04 | .46 | .38 | .47 | 14.0 |
| 10 | 10.2 | 9.26 | .92 | .20 | .64 | 3.3 |
| 15 | 9.5 | 8.77 | 1.65 | .83 | .84 | 1.1 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 5.88 | 4.26 | 1.12 | 631 | 263 | 108 | 48 |
| 5 | 6.52 | 4.13 | .99 | 758 | 247 | 128 | 46 |
| 10 | 6.40 | 4.46 | .73 | 692 | 190 | 108 | 34 |
| 15 | 4.39 | 3.04 | .46 | 498 | 159 | 83 | 27 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 3.14 | 2.54 | .84 | 5.84 | 5.48 | .19 |
| 5 | .91 | .52 | .13 | 5.92 | 5.37 | .05 |
| 10 | .22 | .24 | .05 | 6.41 | 5.59 | .05 |
| 15 | .17 | .14 | .02 | 6.00 | 5.89 | .01 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 19.9 | 4.4 | 15.5 | 6 | 2.38 |
| 5 | 4.8 | -10.1 | 14.9 | 5 | 1.99 |
| 10 | 3.6 | -5.8 | 9.4 | 19 | - |
| 15 | 5.0 | -8.3 | 13.2 | 6 | - |

# BEDFORD BASIN 1986

DATE 30/09/1986 JULIAN DAY 273

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 12.0 | 9.36 | .74 | .90 | .52 | 71.0 |
| 5 | 12.0 | 9.35 | .29 | .14 | .41 | 18.0 |
| 10 | 11.5 | 9.43 | .52 | .71 | .66 | 4.0 |
| 15 | 11.0 | 8.77 | .85 | 1.02 | .76 | 1.1 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 7.04 | 5.68 | 1.14 | 986 | 269 | 159 | 32 |
| 5 | 6.07 | 4.33 | 1.01 | 975 | 241 | 165 | 56 |
| 10 | 6.98 | 5.56 | .95 | 993 | 247 | 160 | 48 |
| 15 | 3.94 | 3.04 | .54 | 566 | 167 | 101 | 39 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 1.99 | 1.18 | .41 | 6.20 | 8.41 | .12 |
| 5 | .26 | .22 | .06 | 5.91 | 4.30 | .00 |
| 10 | .11 | .12 | .02 | 6.21 | 5.15 | .00 |
| 15 | .02 | .08 | .01 | 5.60 | 4.28 | .00 |

| Z | PG | PN | PR | % PDOC/PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 10.5 | -2.4 | 12.8 | 6 | 1.98 |
| 5 | 4.9 | -9.7 | 14.6 | 0 | - |
| 10 | 4.5 | -10.7 | 15.2 | 0 | - |
| 15 | 4.2 | -7.4 | 11.5 | 0 | - |

BEDFORD BASIN 1986

DATE 07/10/1986 JULIAN DAY 280

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 11.0 | 8.87 | .97 | .61 | .62 | 61.0 |
| 5 | 11.0 | 8.93 | 1.11 | .62 | .60 | 8.7 |
| 10 | 11.0 | 8.78 | .66 | .26 | .56 | 1.2 |
| 15 | 10.5 | 8.34 | 1.10 | 1.08 | .71 | .3 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 8.59 | 6.20 | 2.13 | 996 | 321 | 161 | 61 |
| 5 | 9.30 | 5.56 | 2.33 | 1017 | 311 | 171 | 67 |
| 10 | 7.62 | 4.80 | 1.74 | 900 | 269 | 157 | 36 |
| 15 | 4.59 | 2.77 | .99 | 611 | 194 | 106 | 35 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 8.22 | 4.88 | 1.37 | 6.19 | 5.26 | .50 |
| 5 | 2.24 | 1.23 | .56 | 5.95 | 4.64 | .19 |
| 10 | .28 | .17 | .06 | 5.73 | 7.47 | .05 |
| 15 | .08 | .08 | .02 | 5.76 | 5.54 | .06 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 28.6 | 15.6 | 13.1 | 6 | 1.31 |
| 5 | 9.6 | -3.8 | 13.4 | 8 | 1.60 |
| 10 | 2.7 | -10.0 | 12.8 | 15 | - |
| 15 | 2.8 | -8.7 | 11.6 | 43 | - |

# BEDFORD BASIN 1986

DATE 14/10/1986 JULIAN DAY 287

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 11.0 | 9.76 | .02 | .25 | .93 | 64.0 |
| 5 | 11.5 | 9.82 | .03 | .24 | .87 | 14.0 |
| 10 | 10.7 | 9.23 | .71 | .85 | 1.08 | 4.0 |
| 15 | 11.0 | 8.57 | 1.22 | 1.63 | 1.23 | 1.3 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 8.79 | 5.94 | 1.10 | 1199 | 210 | 177 | 40 |
| 5 | 8.66 | 5.94 | 1.03 | 1102 | 235 | 167 | 37 |
| 10 | 7.75 | 5.62 | .86 | 907 | 217 | 148 | 38 |
| 15 | 5.56 | 3.94 | .55 | 660 | 148 | 107 | 22 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 2.54 | 2.06 | .68 | 6.77 | 5.25 | .16 |
| 5 | .53 | .49 | .18 | 6.60 | 6.35 | .06 |
| 10 | .13 | .08 | .02 | 6.13 | 5.71 | .01 |
| 15 | .06 | .08 | .00 | 6.17 | 6.73 | .00 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 11.5 | -4.6 | 16.0 | 6 | 1.69 |
| 5 | 2.4 | -13.5 | 16.0 | 10 | 1.50 |
| 10 | 4.3 | -14.0 | 18.3 | 7 | - |
| 15 | 3.2 | -8.6 | 11.8 | 0 | - |

BEDFORD BASIN 1986

DATE 21/10/1986 JULIAN DAY 294

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 9.5 | 8.75 | .90 | .69 | .62 | 66.0 |
| 5 | 9.7 | 8.62 | 1.14 | 1.69 | .79 | 17.0 |
| 10 | 9.7 | 8.38 | 2.09 | 2.82 | 1.21 | 4.8 |
| 15 | 9.5 | 7.97 | 1.61 | 3.99 | .97 | 1.5 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.42 | .81 | 1.41 | 454 | 245 | 81 | 47 |
| 5 | 2.93 | .79 | 1.61 | 465 | 239 | 81 | 45 |
| 10 | 2.24 | .60 | 1.08 | 433 | 211 | 79 | 45 |
| 15 | 1.39 | .41 | .67 | 364 | 203 | 62 | 35 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 1.79 | .58 | 1.10 | 5.60 | 5.21 | .18 |
| 5 | .70 | .20 | .54 | 5.74 | 5.31 | .10 |
| 10 | .18 | .05 | .14 | 5.48 | 4.69 | .01 |
| 15 | .06 | .04 | .00 | 5.87 | 5.80 | .01 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 8.2 | 2.4 | 5.8 | 9 | 1.73 |
| 5 | 3.4 | -3.0 | 6.4 | 12 | 1.59 |
| 10 | 1.4 | -5.7 | 7.1 | 5 | - |
| 15 | .9 | -5.7 | 6.6 | 14 | - |

# BEDFORD BASIN 1986

DATE 28/10/1986 JULIAN DAY 301

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 9.0 | 8.70 | 2.55 | 5.18 | 1.19 | 60.0 |
| 5 | 9.5 | 8.58 | 2.40 | 3.85 | 1.28 | 14.0 |
| 10 | 9.5 | 8.21 | 2.19 | 3.33 | 1.16 | 4.3 |
| 15 | 10.0 | 7.82 | 2.60 | 3.85 | 1.26 | 1.4 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.68 | .61 | 1.87 | 423 | 181 | 67 | 41 |
| 5 | 3.10 | .64 | 2.20 | 341 | 222 | 71 | 37 |
| 10 | 2.53 | .61 | 1.74 | 363 | 159 | 69 | 36 |
| 15 | 1.52 | .42 | .88 | 285 | 131 | 54 | 37 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 1.05 | .38 | .74 | 6.31 | 4.41 | .12 |
| 5 | .46 | .09 | .26 | 4.80 | 6.00 | .08 |
| 10 | .12 | .10 | .07 | 5.26 | 4.42 | .02 |
| 15 | .03 | .03 | .01 | 5.28 | 3.54 | .03 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 4.8 | .3 | 4.5 | 10 | 1.72 |
| 5 | 2.3 | -3.2 | 5.5 | 15 | 1.73 |
| 10 | 1.8 | -2.0 | 3.8 | 14 | - |
| 15 | .4 | -3.3 | 3.8 | 50 | - |

# BEDFORD BASIN 1986

DATE 12/11/1986 JULIAN DAY 316

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 7.5 | 9.48 | 2.87 | 6.08 | 1.29 | 67.0 |
| 5 | 8.0 | 9.33 | 2.51 | 4.97 | 1.25 | 18.0 |
| 10 | 8.0 | 9.19 | 3.09 | 6.30 | 1.14 | 5.9 |
| 15 | 8.0 | 8.69 | 4.12 | 7.42 | 1.11 | 2.2 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 2.62 | .80 | 2.11 | 294 | 199 | 53 | 38 |
| 5 | 8.27 | 2.07 | 3.88 | 493 | 294 | 86 | 65 |
| 10 | 5.28 | 1.76 | 2.68 | 394 | 239 | 71 | 52 |
| 15 | 2.79 | 1.01 | 1.00 | 304 | 147 | 50 | 28 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | 1.09 | .42 | .47 | 5.55 | 5.24 | .20 |
| 5 | .64 | .17 | .43 | 5.73 | 4.52 | .22 |
| 10 | .15 | .10 | .07 | 5.55 | 4.60 | .07 |
| 15 | .03 | .02 | .01 | 6.08 | 5.25 | .02 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 6.3 | .0 | 6.3 | 16 | 2.17 |
| 5 | 3.5 | -3.4 | 6.9 | 26 | 2.05 |
| 10 | 1.4 | -5.5 | 6.9 | 32 | - |
| 15 | 3.3 | -1.2 | 4.5 | 40 | - |

# BEDFORD BASIN 1986

DATE 25/11/1986 JULIAN DAY 329

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 5.5 | 9.94 | 3.38 | 7.05 | 1.32 | 62.0 |
| 5 | 6.0 | 9.81 | 3.19 | 6.53 | 1.54 | 9.3 |
| 10 | 6.0 | 9.38 | 4.36 | 8.37 | 1.54 | 2.1 |
| 15 | 6.5 | 9.07 | 3.60 | 6.88 | 1.43 | .6 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | 3.75 | .96 | 1.63 | 420 | 248 | 70 | 52 |
| 5 | 3.75 | 1.06 | 1.61 | 411 | 234 | 70 | 31 |
| 10 | 3.08 | 1.06 | 1.35 | 391 | 222 | 74 | 34 |
| 15 | 2.40 | .72 | .99 | 328 | 207 | 50 | 40 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | .96 | .51 | .44 | 6.00 | 4.77 | .06 |
| 5 | .27 | .12 | .14 | 5.87 | 7.55 | .02 |
| 10 | .06 | .04 | .02 | 5.28 | 6.53 | .01 |
| 15 | .04 | .11 | .00 | 6.56 | 5.18 | .01 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 6.9 | 3.0 | 3.9 | 6 | 2.70 |
| 5 | 1.2 | -3.5 | 4.8 | 7 | 1.67 |
| 10 | .7 | -3.1 | 3.9 | 14 | - |
| 15 | -.5 | -3.7 | 3.2 | 20 | - |

# BEDFORD BASIN 1986

DATE 10/12/1986 JULIAN DAY 344

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 4.0 | 9.95 | 3.94 | 13.09 | 1.15 | 69.0 |
| 5 | 4.5 | 9.68 | 3.72 | 11.32 | 1.07 | 21.0 |
| 10 | 5.0 | 9.31 | 3.51 | 9.94 | 1.04 | 6.5 |
| 15 | 5.5 | 8.90 | 3.64 | 9.52 | 1.07 | 2.5 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | .62 | .27 | .26 | 325 | 171 | 39 | 23 |
| 5 | .99 | .32 | .35 | 271 | 161 | 41 | 22 |
| 10 | 1.10 | .32 | .74 | 262 | 176 | 39 | 27 |
| 15 | .75 | .27 | .54 | 275 | 116 | 39 | 19 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | .17 | .10 | .10 | 8.33 | 7.43 | .07 |
| 5 | .10 | .07 | .05 | 6.61 | 7.32 | .01 |
| 10 | .04 | .02 | .02 | 6.72 | 6.52 | .02 |
| 15 | .02 | .02 | .00 | 7.05 | 6.11 | .01 |

| Z | PG | PN | PR | % PDOC/PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 2.0 | .0 | 2.0 | 29 | - |
| 5 | 1.4 | -.5 | 1.9 | 9 | - |
| 10 | .4 | -1.5 | 1.9 | 33 | - |
| 15 | .0 | -1.9 | 1.9 | 20 | - |

# BEDFORD BASIN 1986

DATE 22/12/1986 JULIAN DAY 356

| Z | TEMP | O2 | NO3 | SIO3 | PO4 | % LIGHT |
|---|---|---|---|---|---|---|
| 1 | 2.0 | 9.92 | 3.46 | 4.18 | .71 | 48.0 |
| 5 | 2.5 | 10.03 | 4.57 | 5.80 | .87 | 3.9 |
| 10 | 2.5 | 9.77 | 3.59 | 5.04 | .82 | .9 |
| 15 | 3.0 | 9.34 | 3.04 | 4.29 | .69 | .3 |

| | CHL | | | POC | | PON | |
|---|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | W | <3 |
| 1 | .97 | .21 | .62 | 239 | 117 | 40 | 25 |
| 5 | 1.01 | .24 | .62 | 205 | 112 | 43 | 23 |
| 10 | .97 | .23 | .62 | 177 | 98 | 35 | 18 |
| 15 | .81 | .18 | .44 | 157 | 87 | 32 | 22 |

| | PC | | | C:N | | |
|---|---|---|---|---|---|---|
| Z | W | >3 | <3 | W | <3 | PDOC |
| 1 | .46 | .06 | .06 | 5.98 | 4.68 | .05 |
| 5 | .20 | .11 | .04 | 4.77 | 4.87 | .02 |
| 10 | .25 | .07 | .02 | 5.06 | 5.44 | .02 |
| 15 | .25 | .01 | .02 | 4.91 | 3.95 | .00 |

| Z | PG | PN | PR | PDOC % PTOT | PQ |
|---|---|---|---|---|---|
| 1 | 2.6 | -1.7 | 4.3 | 10 | - |
| 5 | 2.2 | -3.3 | 5.6 | 9 | - |
| 10 | -.4 | -4.0 | 3.6 | 7 | - |
| 15 | .0 | -3.1 | 3.1 | 2 | - |