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TEMPERATURE AND SALINITY MEASUREMENTS AT  
THE SALMONID DEMONSTRATION AND DEVELOPMENT FARM,  
L'ETANG INLET, N.B. DURING THE PERIOD 1986-1991

by

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### Abstract

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Daily temperature and salinity measurements, taken at the Salmonid Demonstration and Development Farm in the L'Etang Inlet of New Brunswick, are analyzed and summarized in graphical and tabular form.

### Résumé

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On analyse et résume ici sous forme de tableaux et de graphiques les mesures quotidiennes de température et de salinité prises à la Ferme de démonstration et de développement du saumon de l'Atlantique, située dans le bras Letang, au Nouveau-Brunswick.



## Introduction

The Atlantic Salmon Demonstration and Development Farm (SDDF), operated by the New Brunswick Salmon Growers Association, is a facility dedicated to research and development of salmon aquaculture. The farm, located in L'Etang Inlet, New Brunswick, initiated a program of daily measurements of temperature and salinity in May, 1986. Until April, 1989, the farm was located in Lime Kiln Bay at  $43^{\circ}03'36''\text{N}$ ,  $66^{\circ}49'27''\text{W}$ . At this time the farm was relocated at  $45^{\circ}03'16''\text{N}$ ,  $66^{\circ}49'05''\text{W}$ , approximately 700 m. to the south-south-east (Fig. 1). This report provides plots of the daily, weekly and monthly temperatures and salinities, as well as a table of monthly means for each month over the 1986-91 period.

## Methods and Measurement Schedule

Measurements were normally taken daily between 0800-1000 hours, local time. From January 1990, measurements were not taken on Sundays. Salinity measurements were discontinued in April, 1989. Measurements were made with a Yellow Springs Instrument (YSI) and generally read to the nearest  $0.1^{\circ}\text{C}$  and 0.1. Temperature accuracy is reported to be  $\pm 0.5^{\circ}\text{C}$  and salinity as  $\pm 2\%$  of scale.

## Data Presentation

Plots of daily, weekly and monthly temperatures and salinities are shown respectively in Figs. 2 to 9 and Figs. 11 to 16. Mean monthly temperatures and salinities for the period of record are shown respectively in Figs. 10 and 17. Table I provides a listing of monthly temperatures and salinities as well as the mean monthly values over the period of record.

The salinity data are of limited use, and caution is advised when using them. Unfortunately, erroneous results occur if the electrodes become fouled or dirty. Sometimes this can occur suddenly, but more often there is a gradual buildup which leads to a trend to lowered values. This was noted on a number of occasions

by the observer when a sudden increase in salinity occurred after cleaning the electrodes. Particularly good examples of this are seen in the 1987 daily salinity plot, where a gradual decline in measured salinity occurred followed by a sudden rise following probe cleaning (e.g. Fig. 12, July 22 and Sept. 12, 1987). Similarly, the downward trend during June and July 1986 (Fig. 11) was probably not real. Following cleaning of the probe on July 14, the measured salinity increased by 4.6.

Alaising is also present in the records, owing to the variations that occur over a semi-diurnal tidal cycle. Because sampling was taken only once per day and at about the same time each day, a 15-day spring-neap cycle will appear in the record. Variation in temperatures over a semi-diurnal tidal cycle, tends to be larger during the summer months, thus producing maximum biasing in the record at this time (e.g. see May-Sept. 1989, Fig 5).

#### **Acknowledgements**

We thank the New Brunswick Salmon Growers Association for making the data available, Leslie Mantin of Evans Computer Applications Ltd. for data compilation and K. Drinkwater and G. Harding.

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Multi-year monthly average (M) and annual mean (A) are also listed.

Table 2. Monthly water temperature anomalies for the period 1986-1991 relative to the means for the same period.



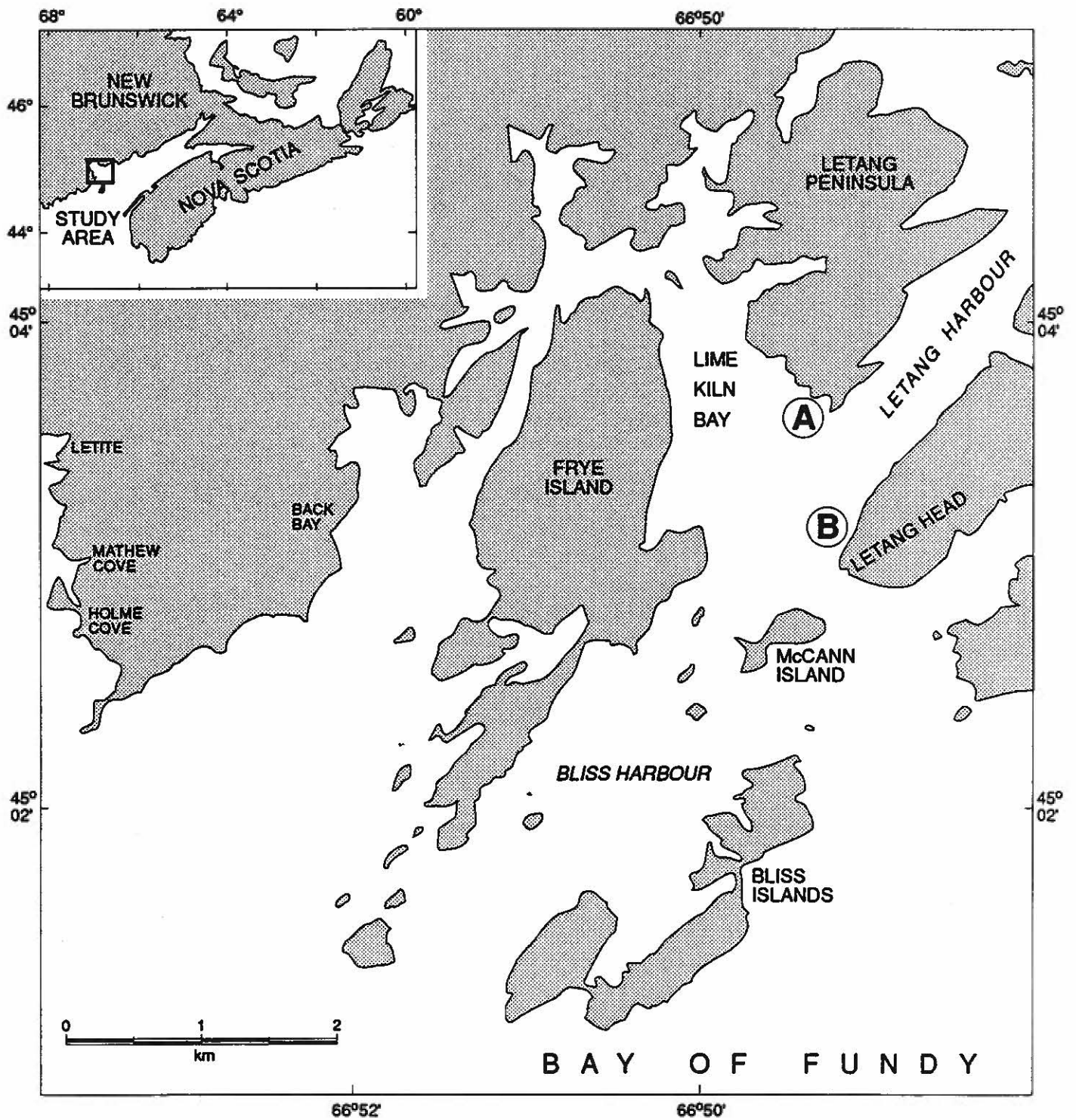


Figure 1. Map showing location of Salmonid Demonstration and Development Farm. (Located at site "A" prior to April, 1989 and at site "B" subsequently.)

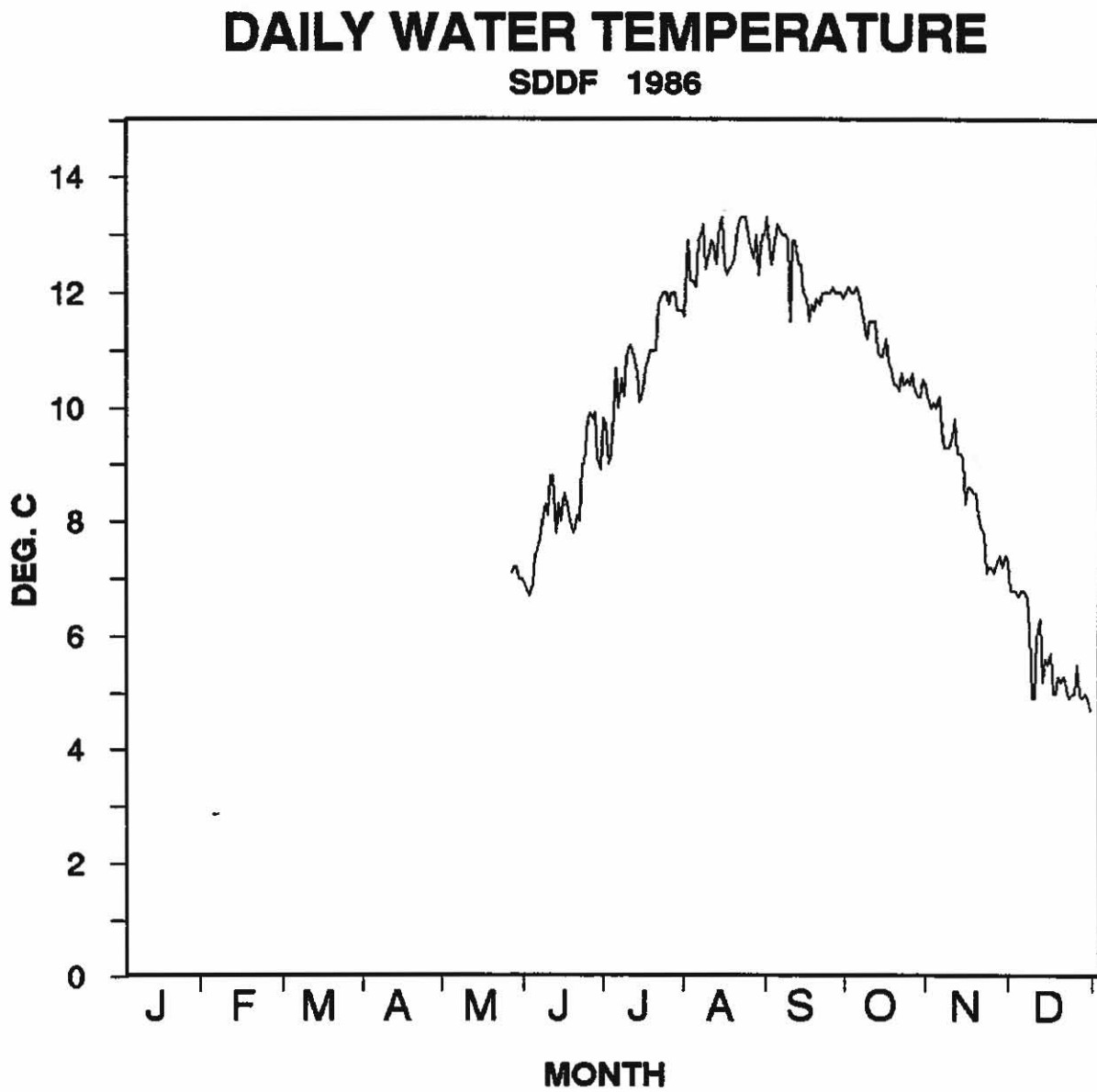


Figure 2. Daily Water Temperature 1986.

## DAILY WATER TEMPERATURE SDDF 1987

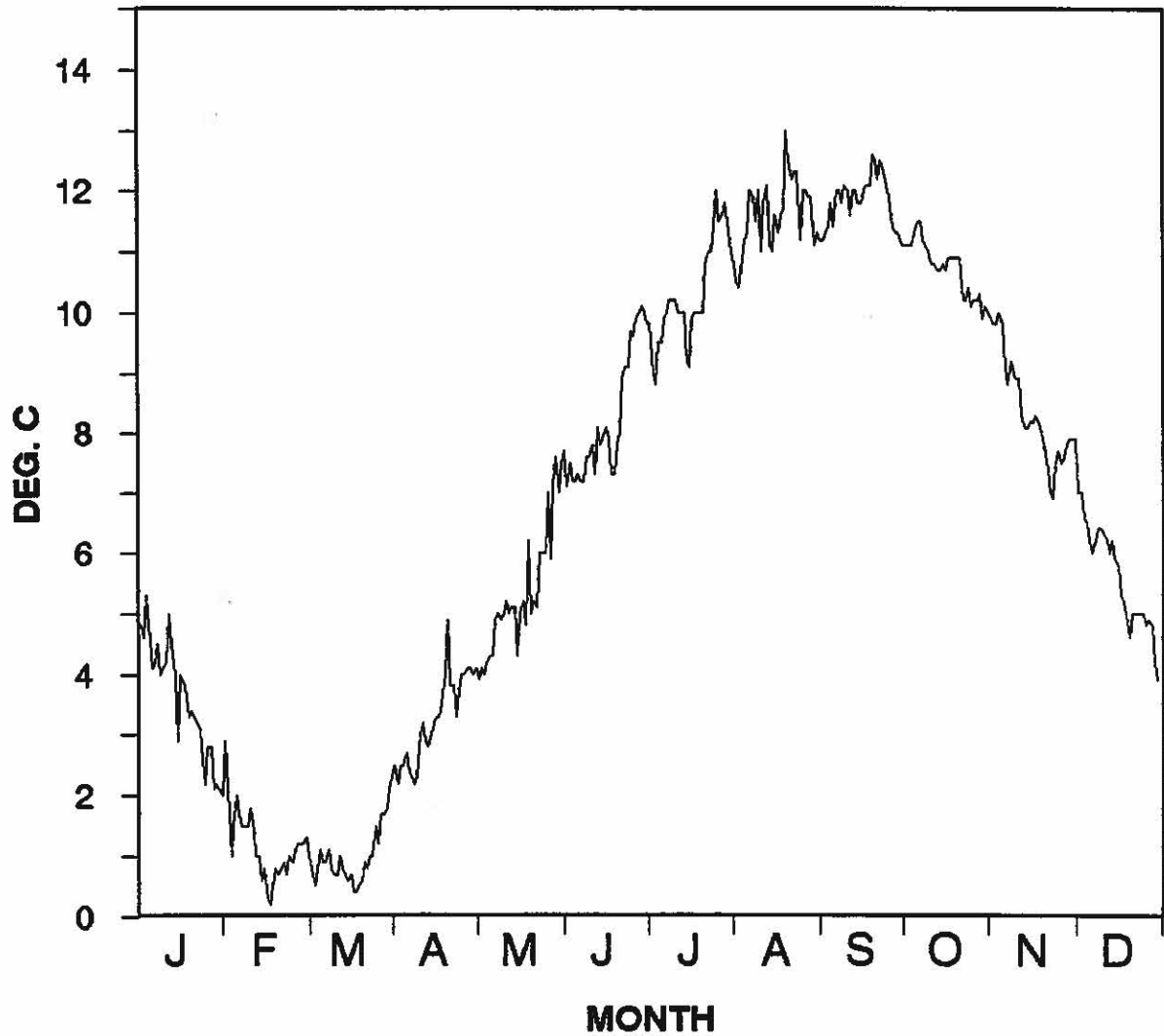


Figure 3. Daily Water Temperature 1987.

## DAILY WATER TEMPERATURE

SDDF 1988

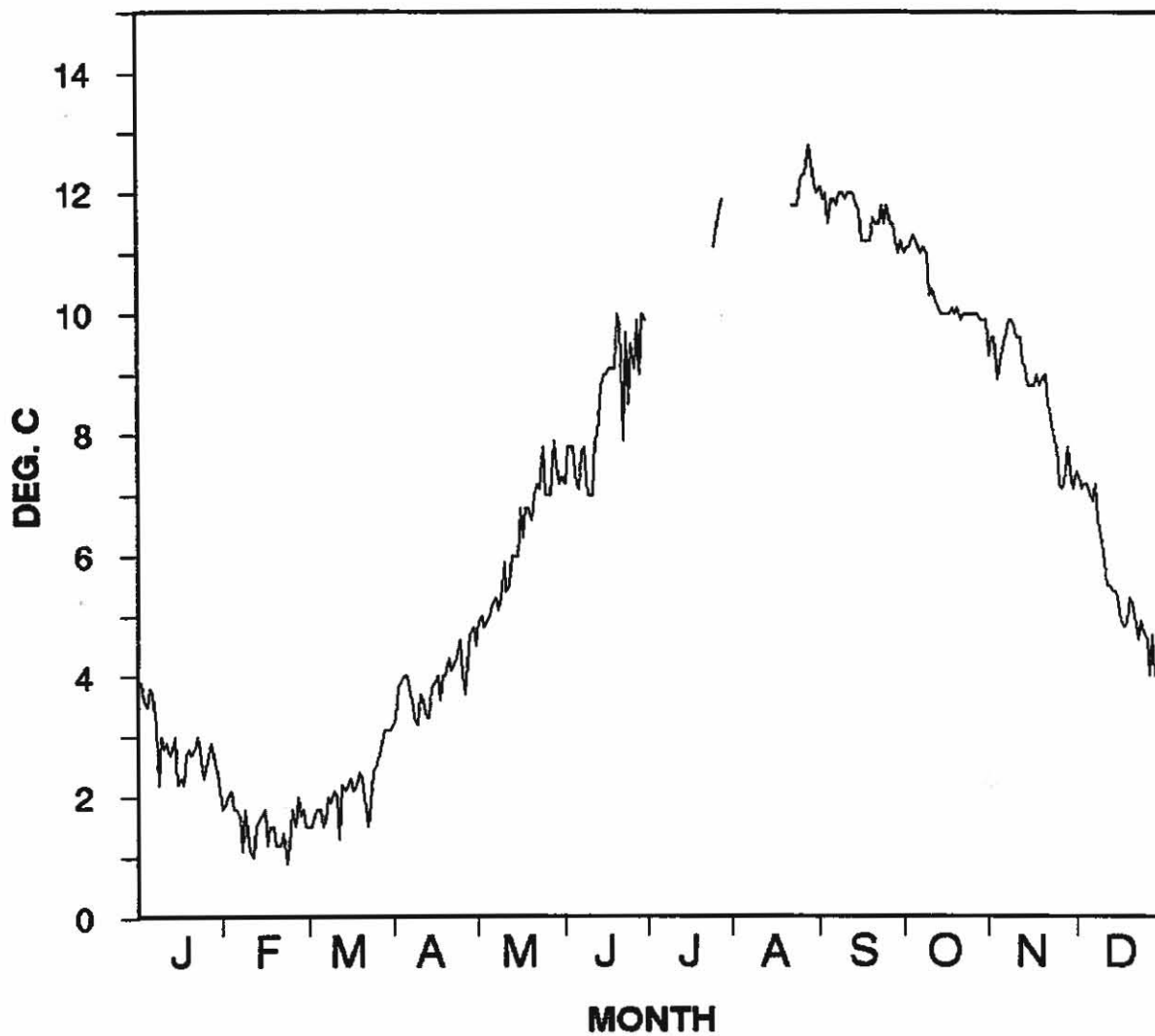


Figure 4. Daily Water Temperature 1988.

## DAILY WATER TEMPERATURE

SDDF 1989

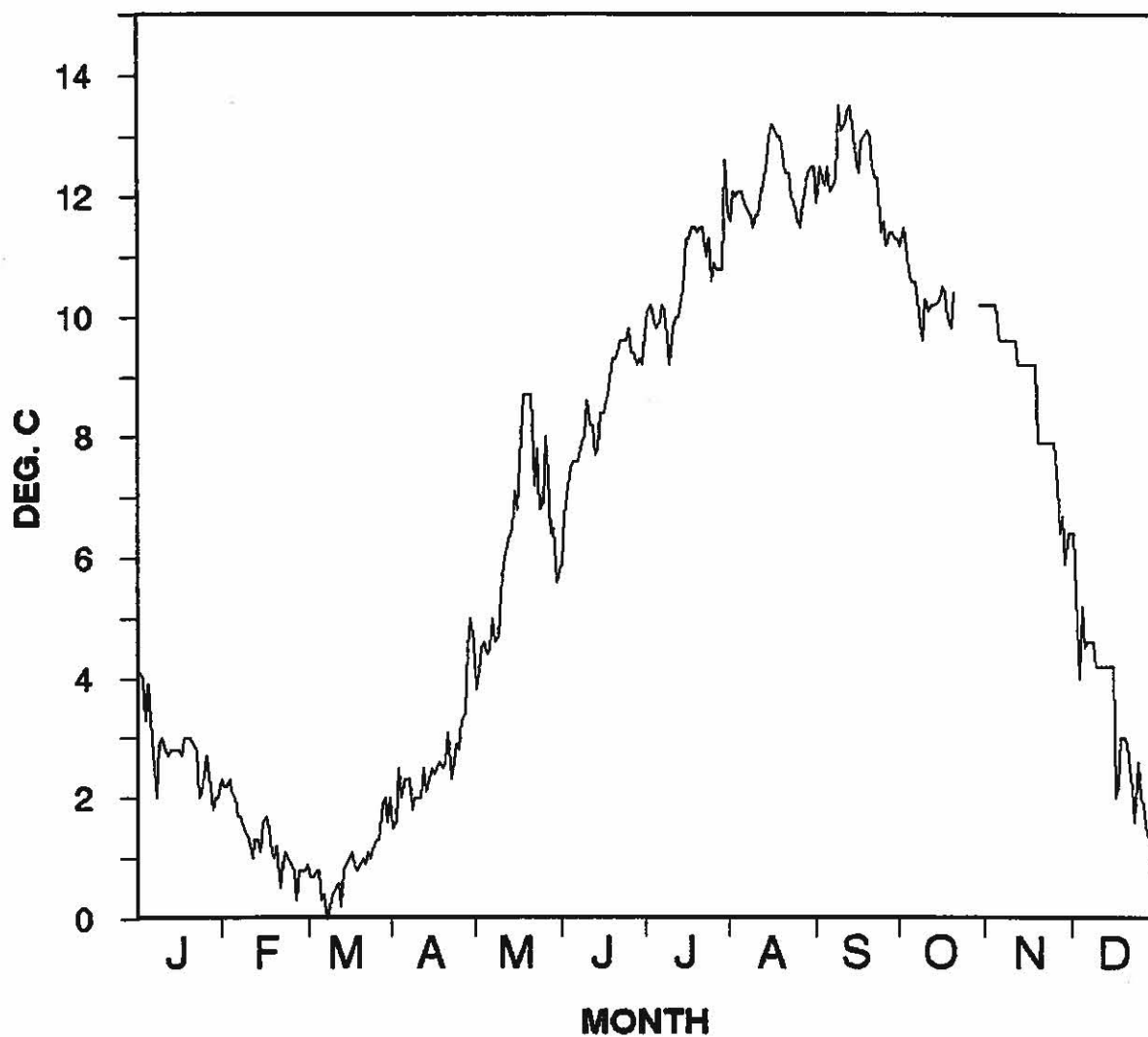


Figure 5. Daily Water Temperature 1989.

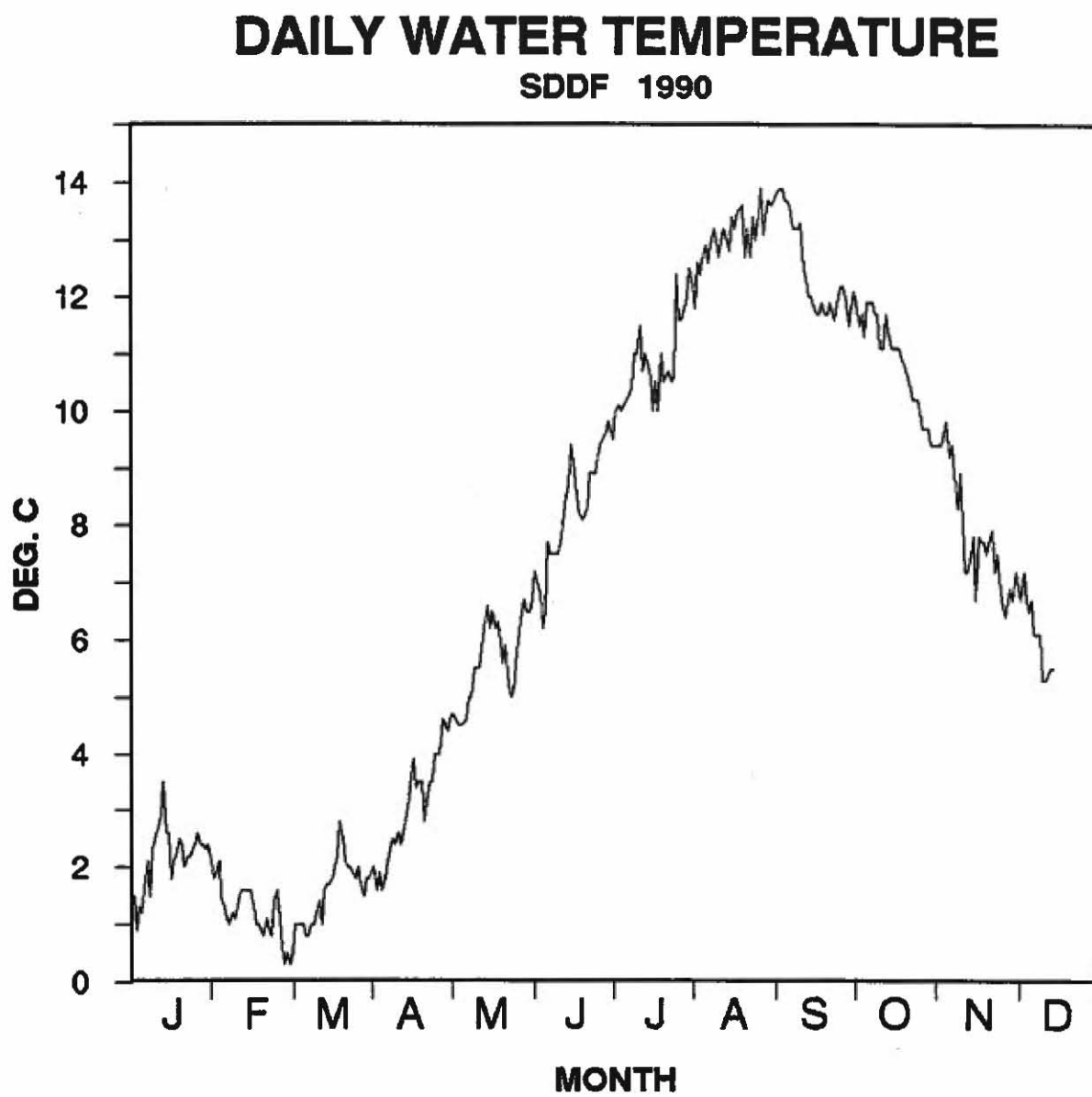


Figure 6. Daily Water Temperature 1990.

## DAILY WATER TEMPERATURE

SDDF 1991

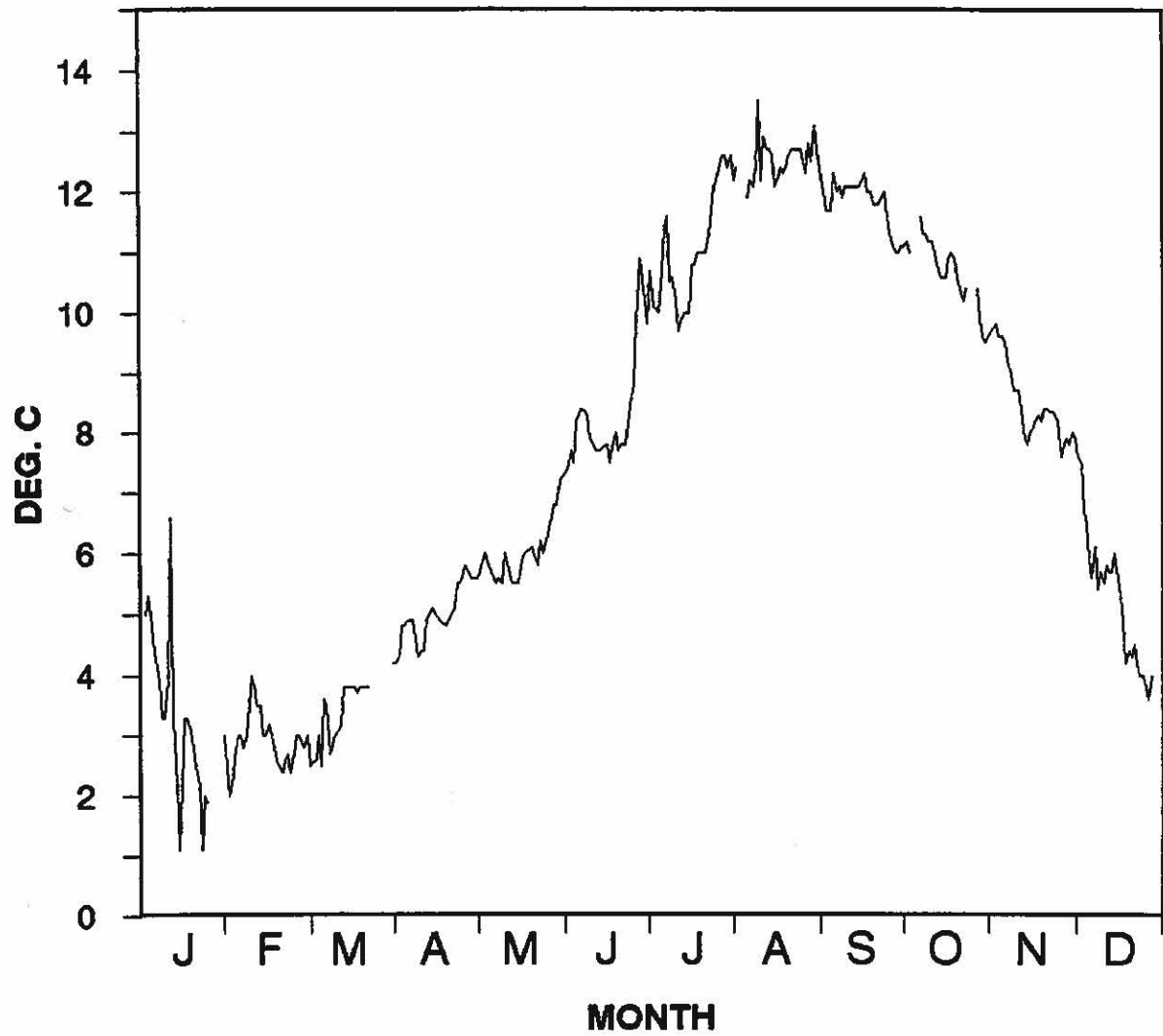


Figure 7. Daily Water Temperature 1991.

## WEEKLY WATER TEMPERATURE

SDDF 1986-1991

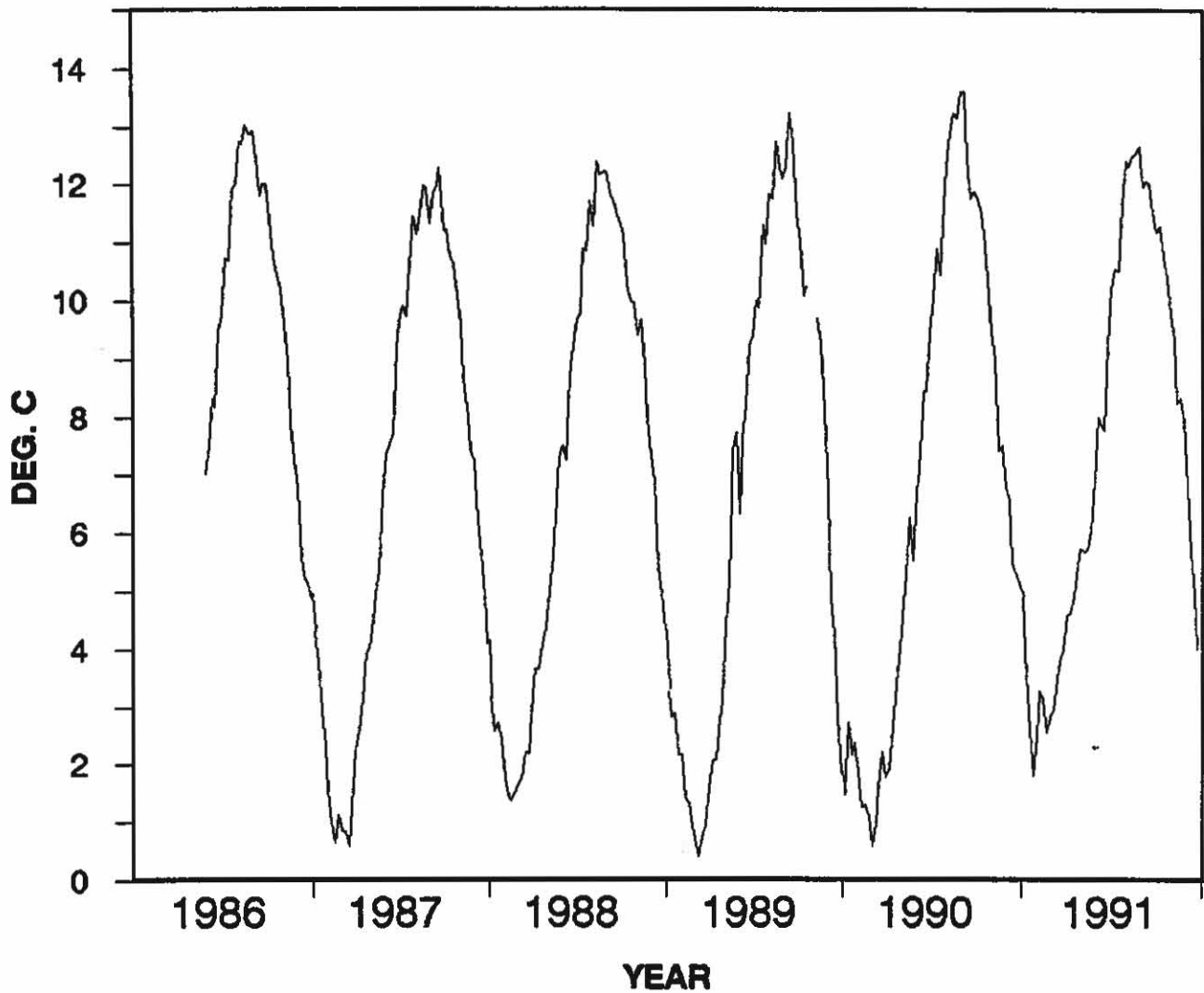


Figure 8. Weekly Water Temperature 1986-1991.



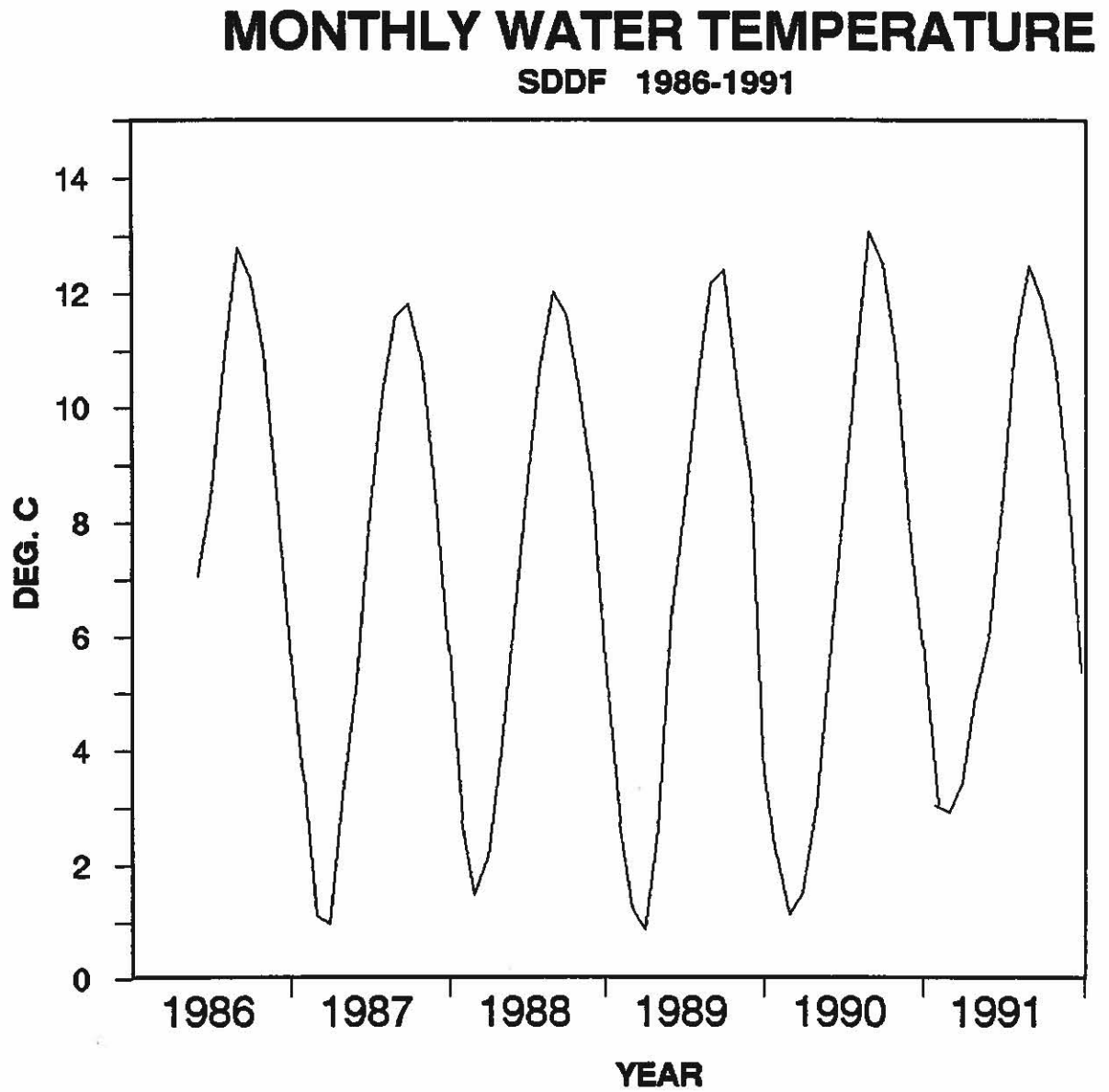


Figure 9. Monthly Water Temperature 1986-1991.

## MEAN MONTHLY TEMPERATURE

SDDF 1986-1991

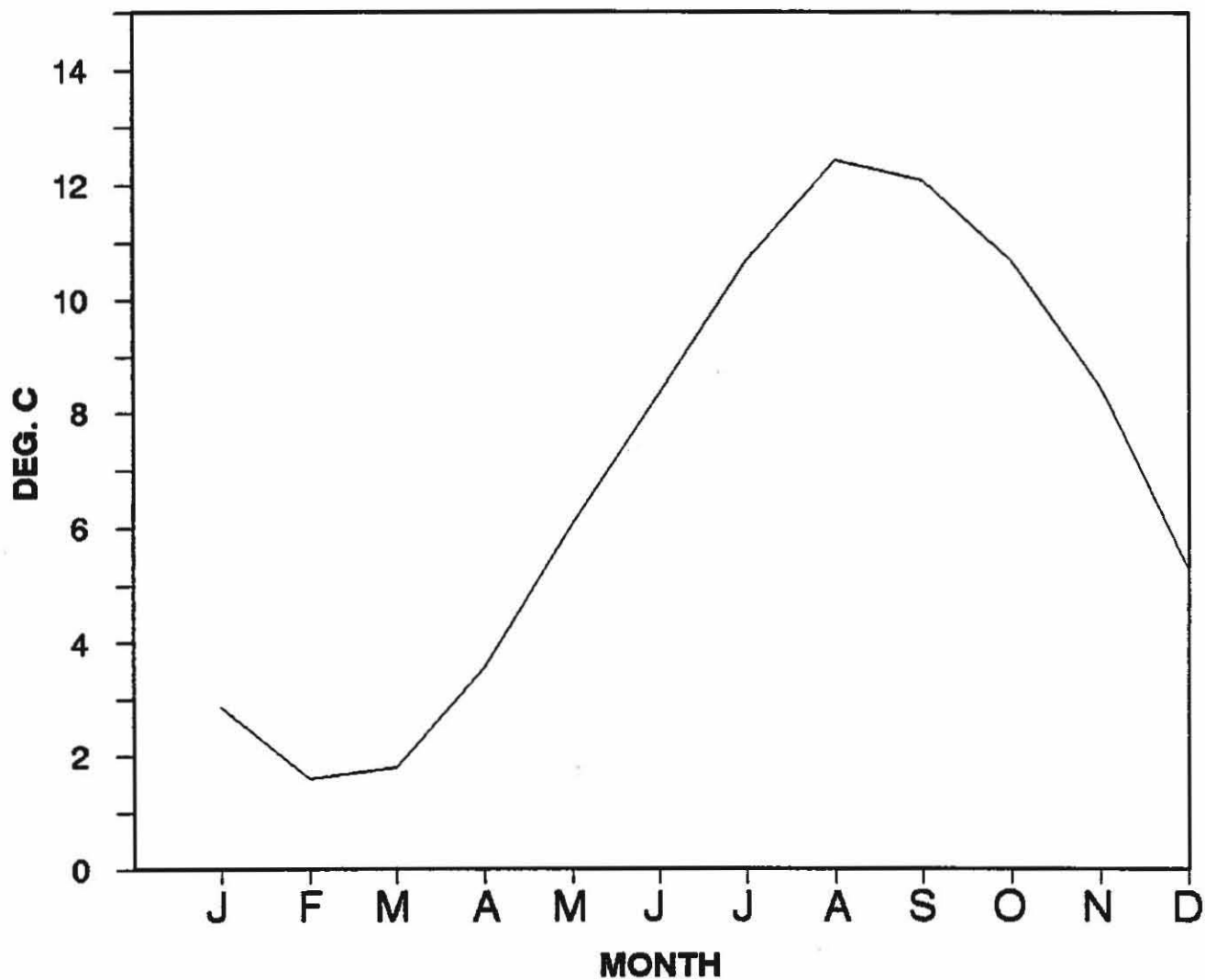
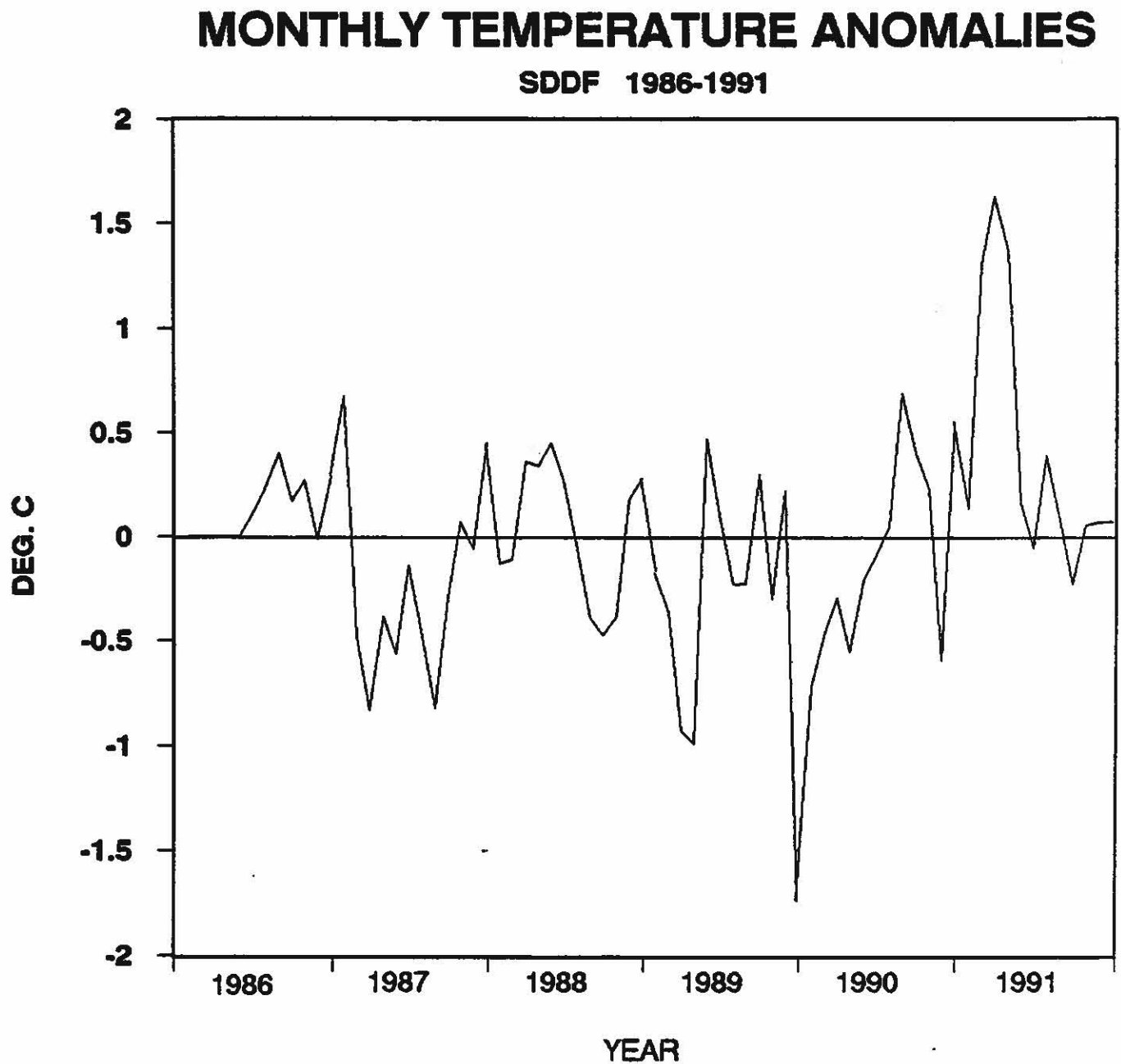


Figure 10. Mean Monthly Water Temperature for the period 1986-1991.



**Figure 11. Monthly Water Temperature Anomalies for the period 1986-1991 relative to the means for the same period.**

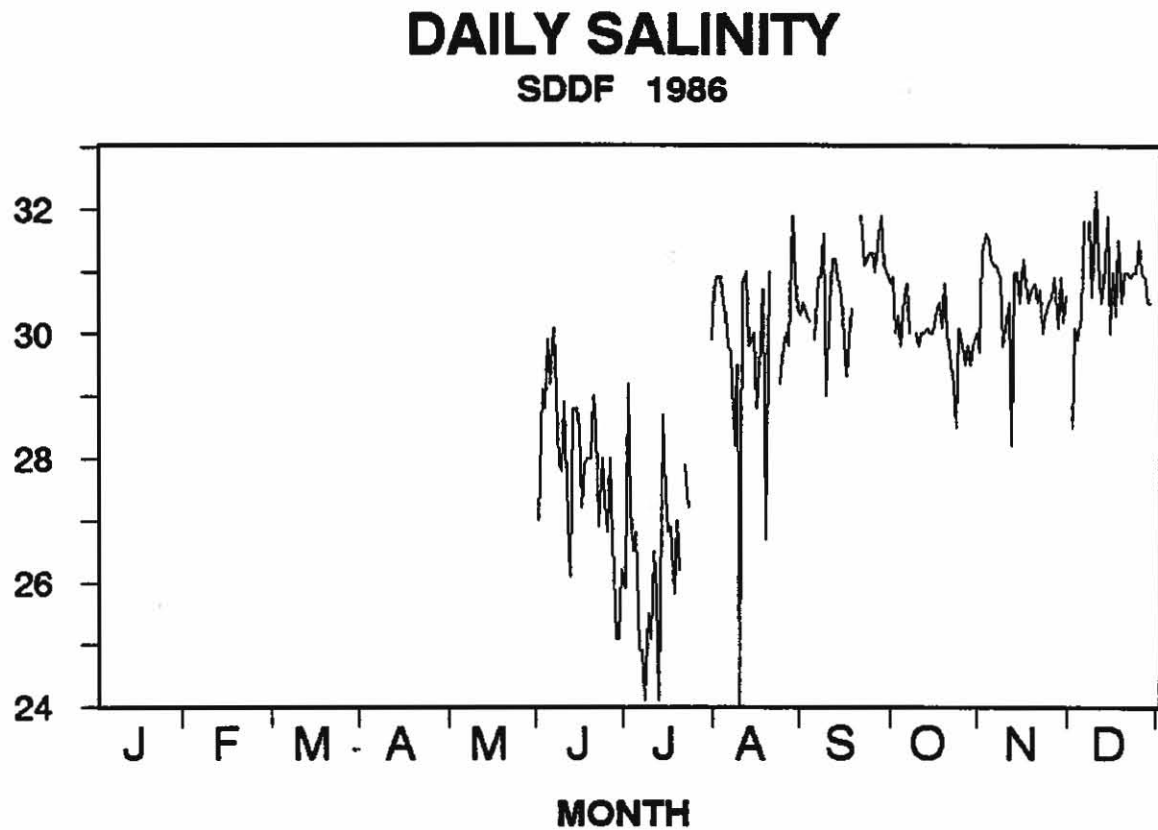


Figure 12. Daily Salinity 1986.

## DAILY SALINITY

SDDF 1987

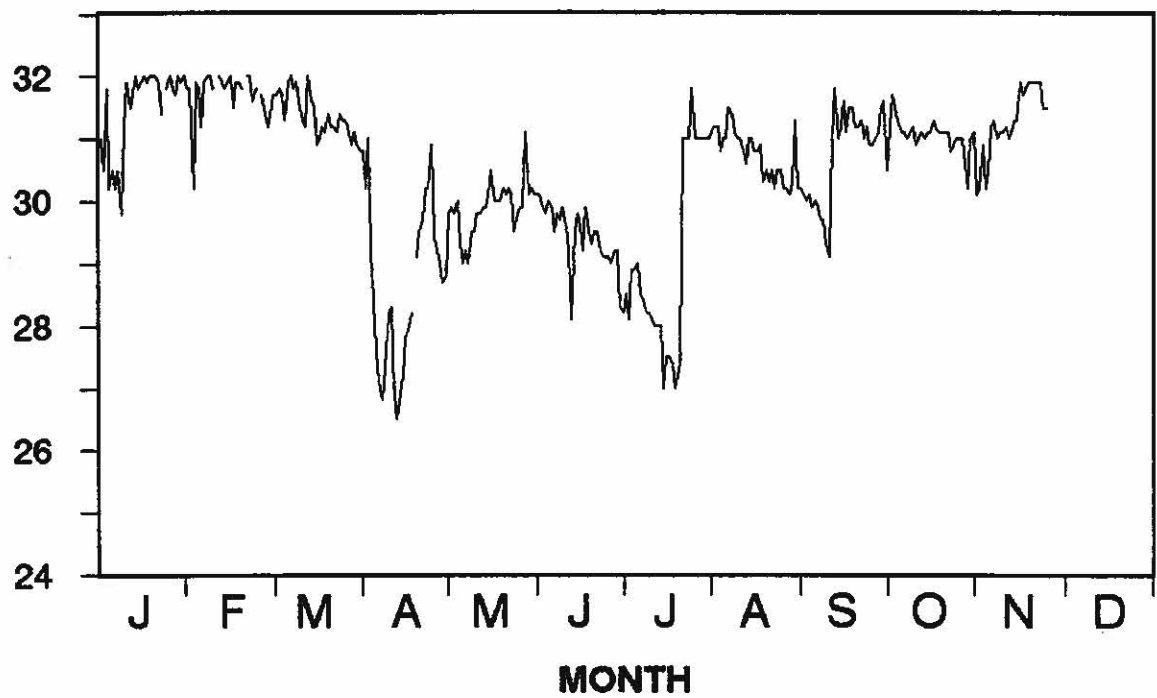


Figure 13. Daily Salinity 1987.

## DAILY SALINITY

SDDF 1988

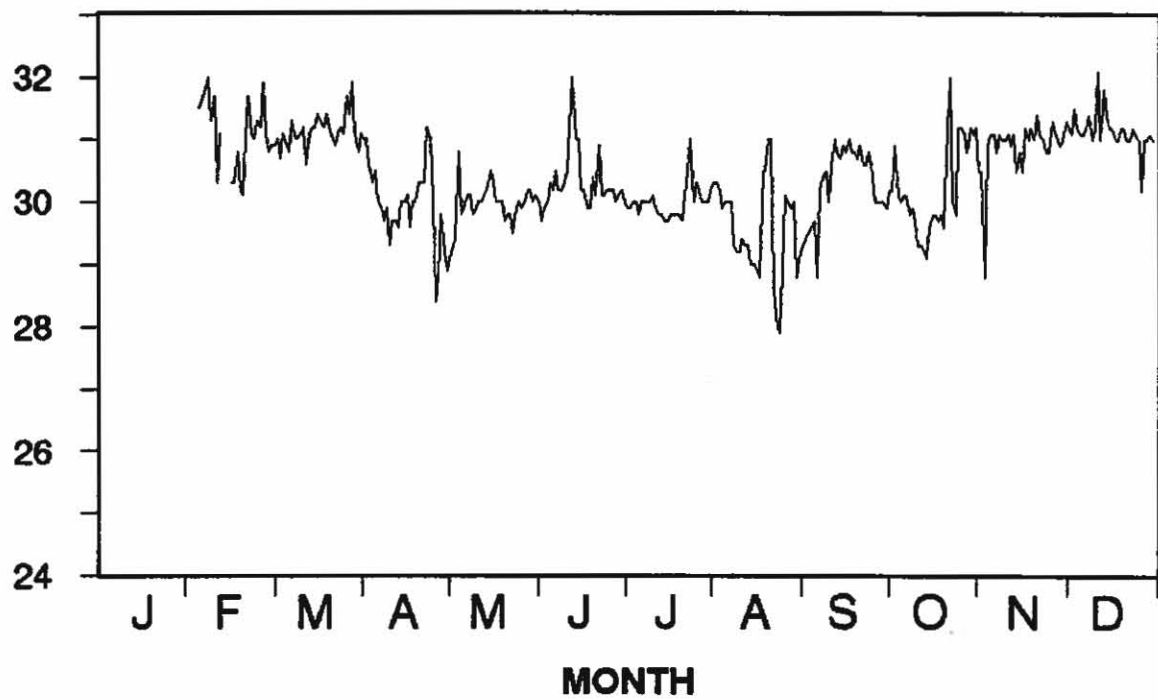


Figure 14. Daily Salinity 1988.

## DAILY SALINITY

SDDF 1989

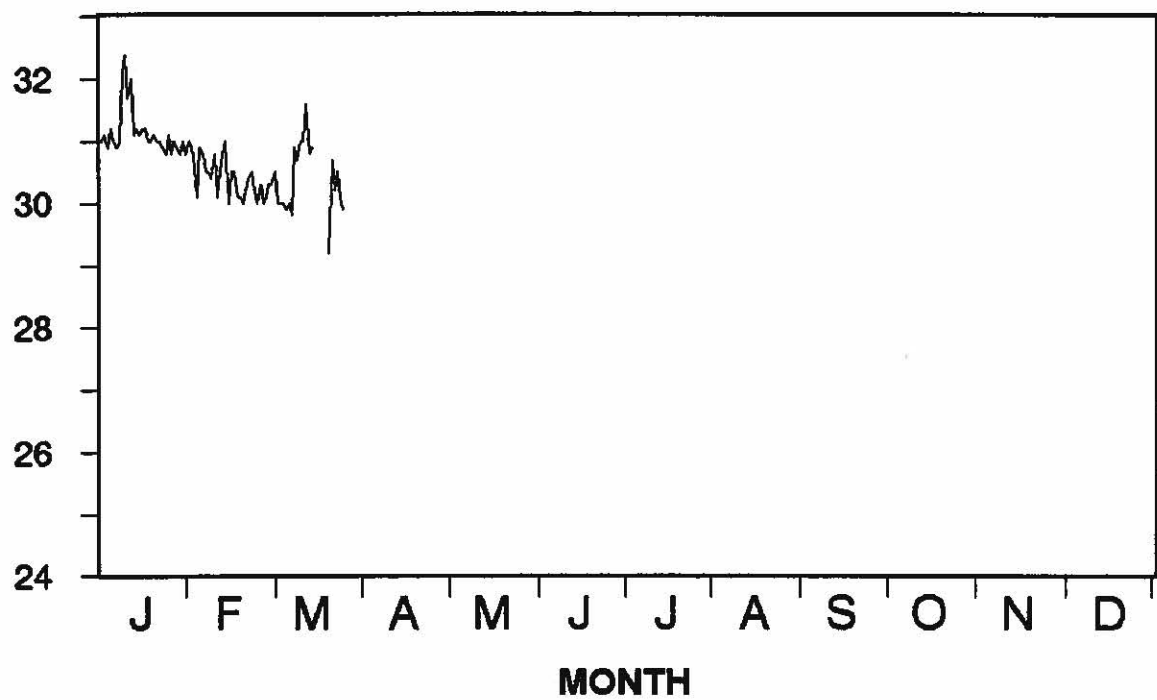


Figure 15. Daily Salinity 1989.

# WEEKLY SALINITY

SDDF 1986-1989

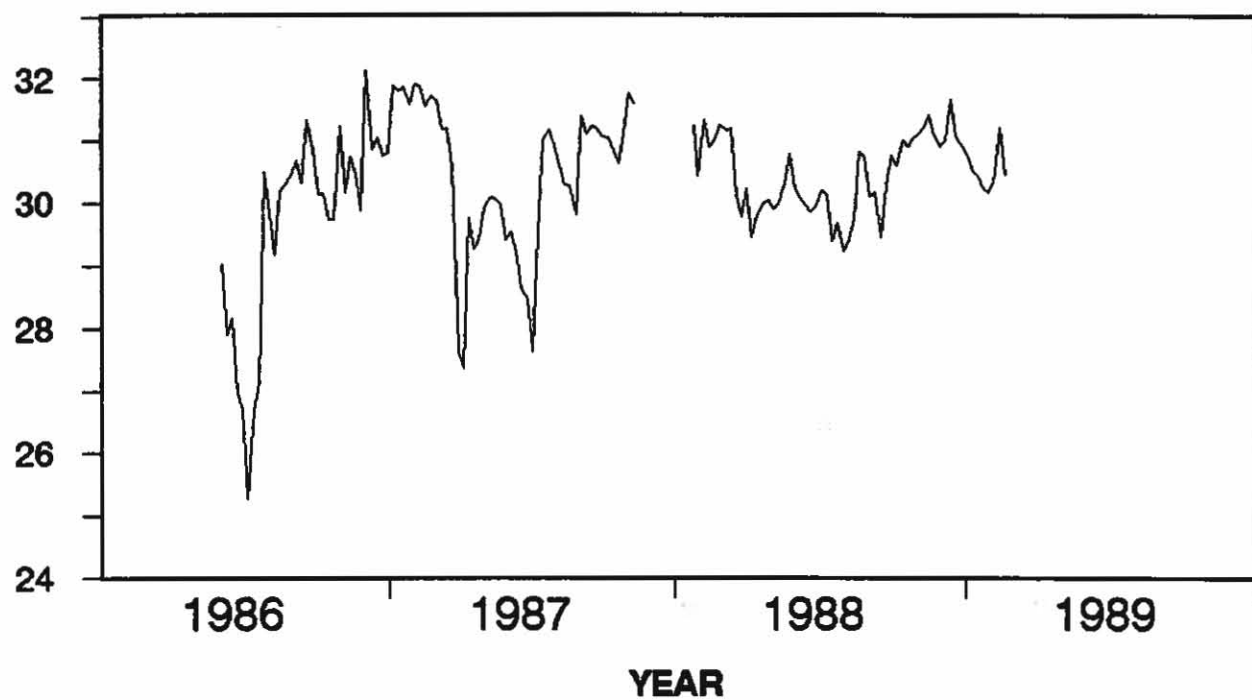


Figure 16. Weekly Salinity 1986-1989.



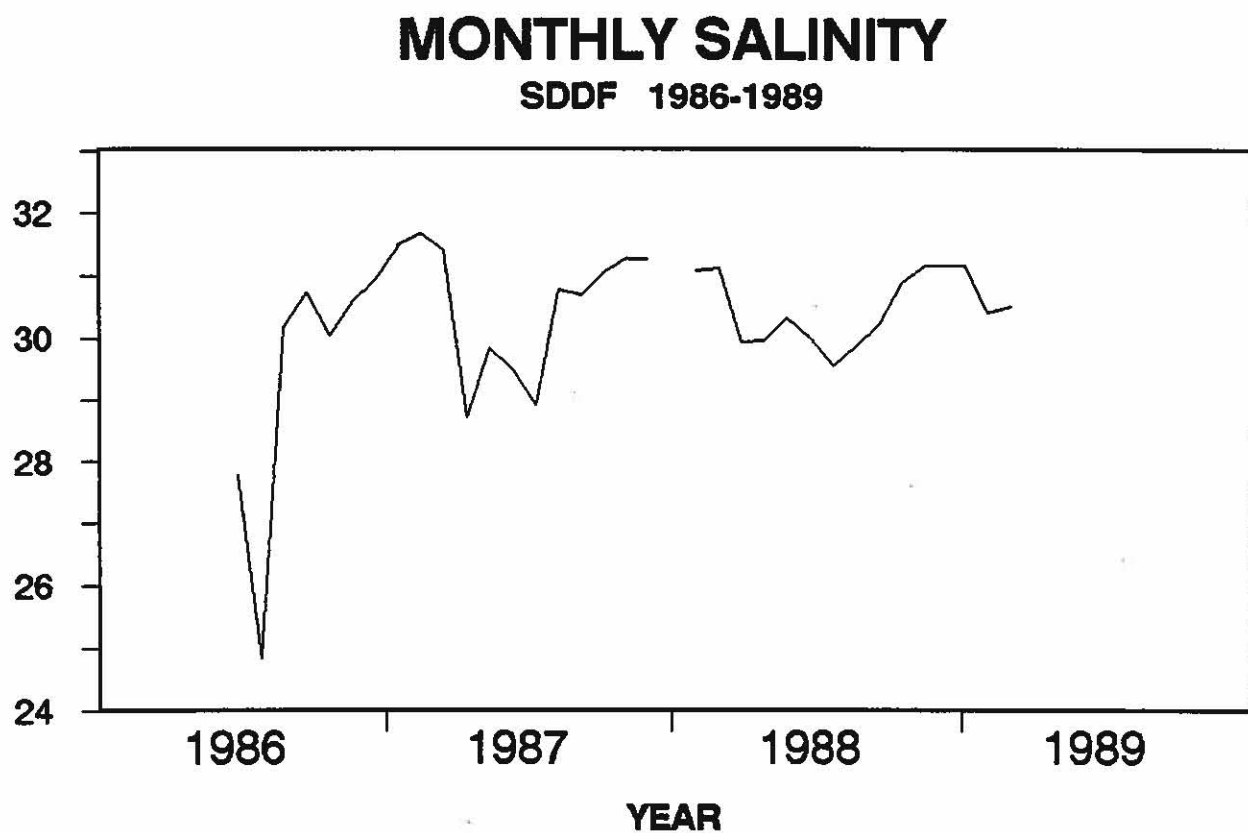


Figure 17. Monthly Salinity 1986-1989.

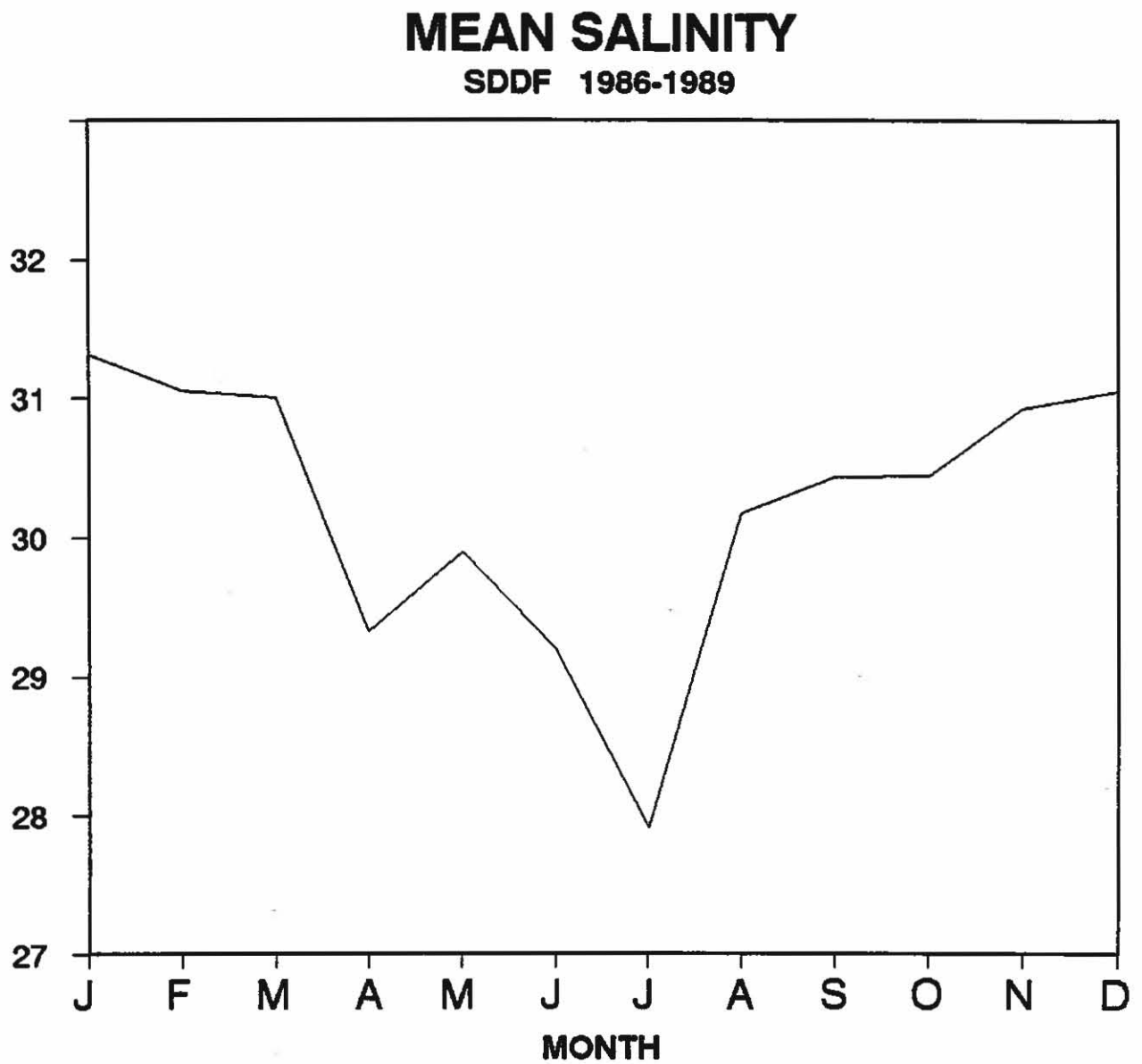


Figure 18. Mean Monthly Salinity for the period 1986-1989.

Table 1. Monthly mean water temperatures and salinities. Multi-year monthly average (M) and annual mean (A) are also listed.

| Temperature (°C) |     |     |     |     |     |     |      |      |      |      |     |     |     |
|------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|-----|-----|
| Year\Month       | Jan | Feb | Mar | Apr | May | Jun | Jul  | Aug  | Sep  | Oct  | Nov | Dec | A   |
| 1986             |     |     |     |     |     | 8.4 | 10.9 | 12.8 | 12.3 | 11.0 | 8.5 | 5.6 |     |
| 1987             | 3.6 | 1.1 | 1.0 | 3.2 | 5.2 | 8.2 | 10.2 | 11.6 | 11.8 | 10.8 | 8.4 | 5.8 | 6.7 |
| 1988             | 2.8 | 1.5 | 2.2 | 3.9 | 6.2 | 8.6 | 10.6 | 12.0 | 11.6 | 10.3 | 8.7 | 5.6 | 7.0 |
| 1989             | 2.7 | 1.2 | 0.9 | 2.6 | 6.3 | 8.4 | 10.5 | 12.2 | 12.4 | 10.4 | 8.7 | 3.6 | 6.6 |
| 1990             | 2.2 | 1.1 | 1.5 | 3.0 | 5.6 | 8.2 | 10.8 | 13.1 | 12.5 | 10.9 | 7.9 | 5.8 | 6.9 |
| 1991             | 3.0 | 2.9 | 3.4 | 5.0 | 6.0 | 8.2 | 11.1 | 12.5 | 11.9 | 10.8 | 8.6 | 5.4 | 7.4 |
| M                | 2.9 | 1.6 | 1.8 | 3.6 | 5.8 | 8.3 | 10.7 | 12.4 | 12.1 | 10.7 | 8.5 | 5.3 | 7.0 |

| Salinity (p.s.u.) |      |      |      |      |      |      |      |      |      |      |      |      |  |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Year\Month        | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |  |
| 1986              |      |      |      |      |      | 27.8 | 24.8 | 30.2 | 30.8 | 30.0 | 30.6 | 31.0 |  |
| 1987              | 31.5 | 31.7 | 31.4 | 28.7 | 29.8 | 29.5 | 28.9 | 30.8 | 30.7 | 31.1 | 31.3 |      |  |
| 1988              |      | 31.1 | 31.1 | 29.9 | 30.0 | 30.3 | 30.0 | 29.6 | 29.9 | 30.2 | 30.9 | 31.2 |  |
| 1989              | 31.1 | 30.4 | 30.5 |      |      |      |      |      |      |      |      |      |  |
| M                 | 31.3 | 31.0 | 31.0 | 29.3 | 29.9 | 29.2 | 27.9 | 30.2 | 30.4 | 30.4 | 30.9 | 31.1 |  |

Table 2. Monthly water temperature anomalies for the period 1986-1991 relative to the means for the same period.

| Monthly Temperature Anomalies |     |     |     |      |     |     |     |     |     |     |     |      |
|-------------------------------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|
| Year/Month                    | Jan | Feb | Mar | Apr  | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec  |
| 1986                          |     |     |     |      |     | .1  | .2  | .4  | .2  | .3  | .0  | .3   |
| 1987                          | .7  | -.5 | 0.8 | -.4  | -.6 | -.1 | -.5 | -.8 | -.3 | .1  | -.1 | .5   |
| 1988                          | -.1 | -.1 | .4  | .3   | .5  | .3  | -.1 | -.4 | -.5 | -.4 | .2  | .3   |
| 1989                          | -.2 | -.4 | -.9 | -1.0 | .5  | .1  | -.2 | -.2 | .3  | -.3 | .2  | -1.7 |
| 1990                          | -.7 | -.5 | -.3 | -.6  | -.2 | -.1 | .1  | .7  | .4  | .2  | -.6 | .6   |
| 1991                          | .1  | 1.3 | 1.6 | 1.4  | .2  | -.1 | .4  | .1  | -.2 | .1  | .1  | .1   |