Results of the 1997-2004 Kings County Volunteer Water Quality Monitoring Program*

Prepared for

Kings County Water Quality Monitoring Volunteers
and
Kings County Department of Community Development Services

By

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The Kings County Volunteer Water Quality Monitoring Program has now completed eight years of data collection. Ten lakes were monitored during 2004, nine of which are located in the Gaspereau River watershed and one of which (Tupper Lake) is located in the Cornwallis River watershed. This report provides a summary of the monitoring results to date.

Water Temperature Monitoring

During 2004, temperature data loggers were installed at the surface and bottom of Hardwood Lake, Lake George, Aylesford Lake and Black River Lake. As in previous years, Black River Lake exhibited the strongest water column stratification, Lake George was weakly stratified and Harwood and Aylesford Lakes did not exhibit any significant stratification (Figure 1). Temperature data for previous years is contained in Appendix I.

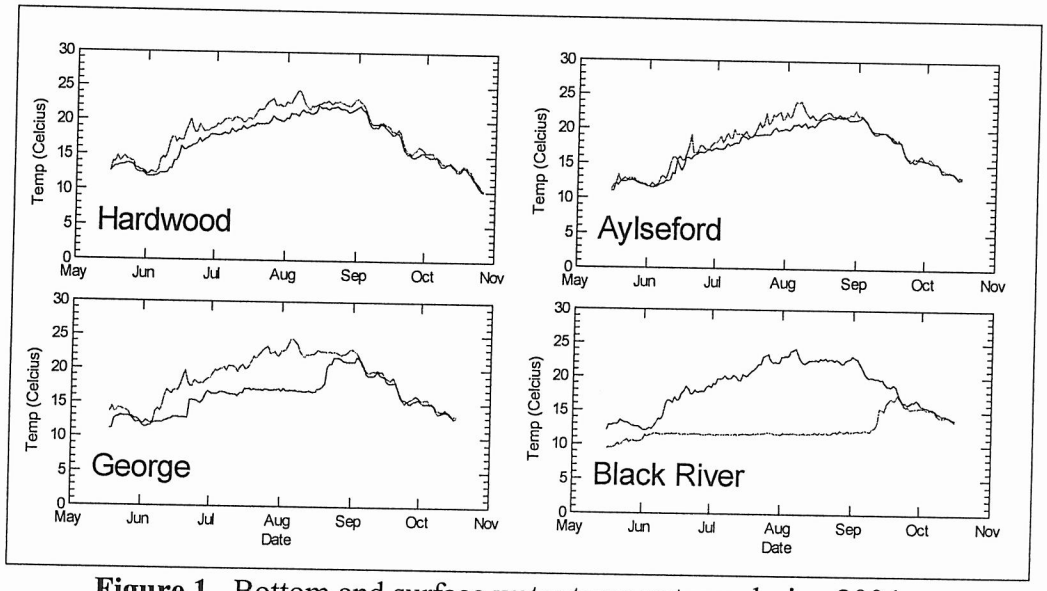


Figure 1. Bottom and surface water temperatures during 2004.

Trophic State Indicators

During 2004, the QE II Environmental Sciences Laboratory experienced problems with their analyses of total phosphorus. As a result, the values reported were incorrect and could not be used. Chlorophyll *a* and Secchi Disk depths during 2004 were comparable to values measured in previous years (Figure 2).

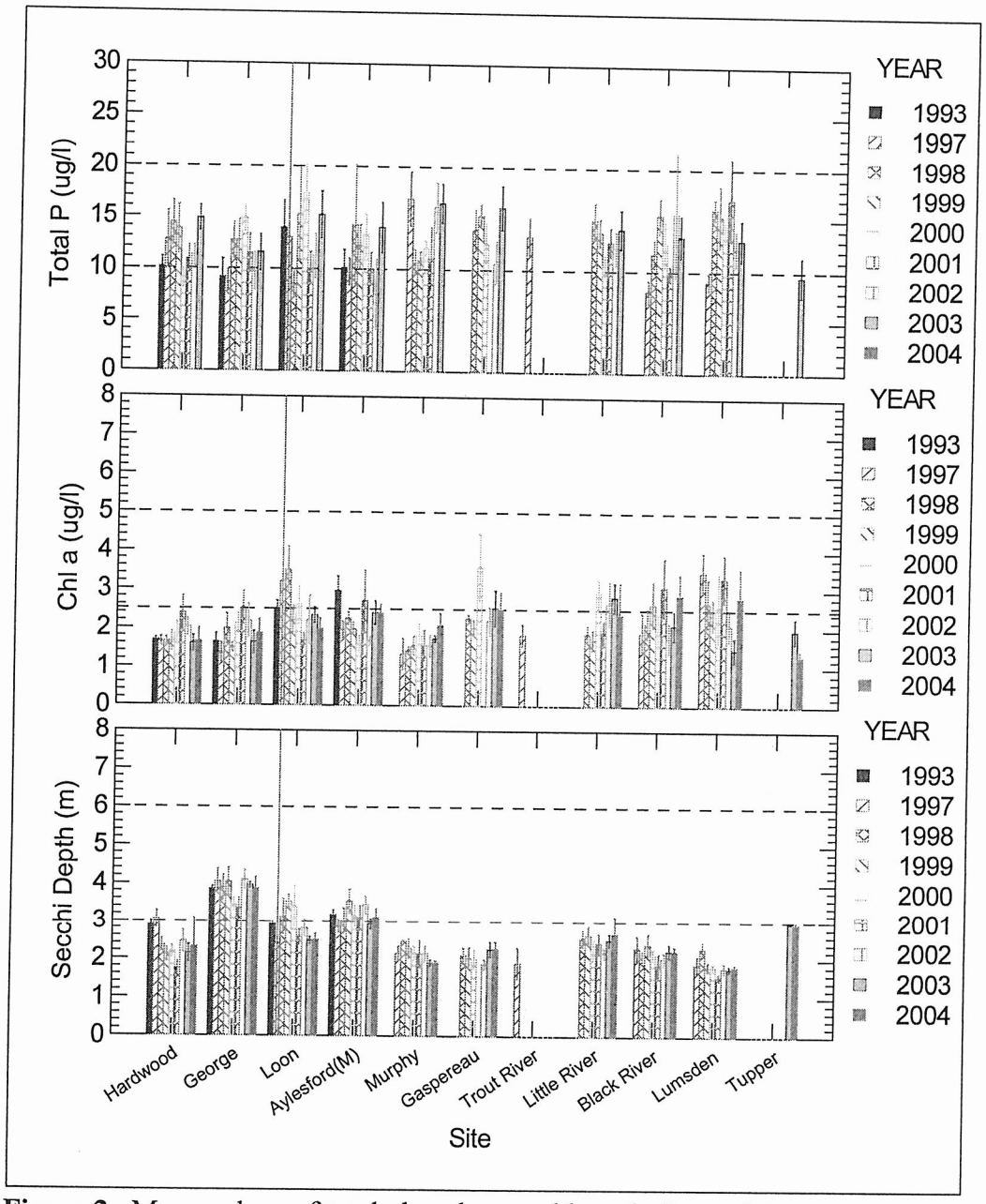


Figure 2. Mean values of total phosphorus, chlorophyll *a* and Secchi Disk depth at each site for each year (error bars are one standard error of the mean).

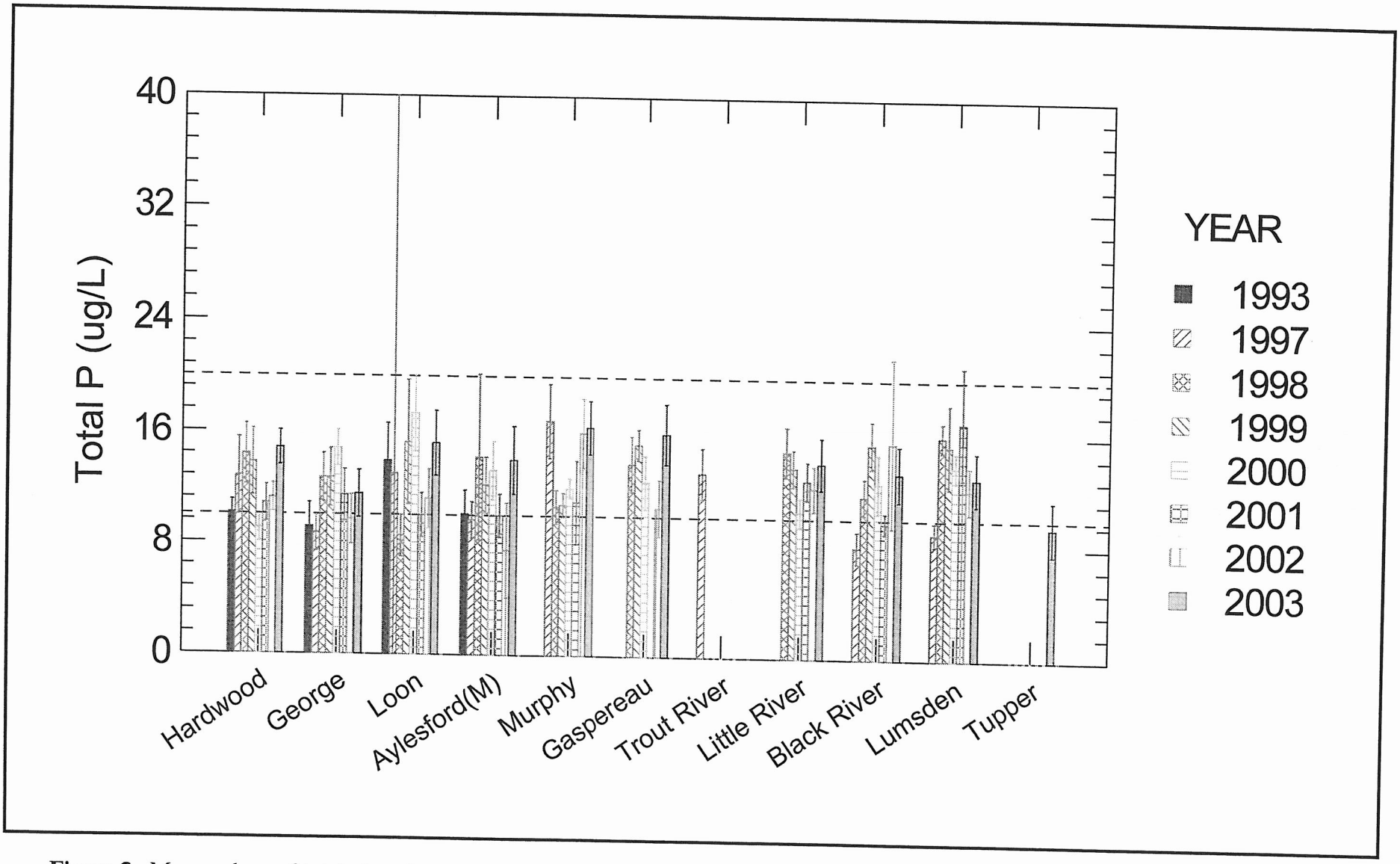


Figure 3. Mean values of total phosphorus concentration at each site for each year (error bars are one standard error of the mean).

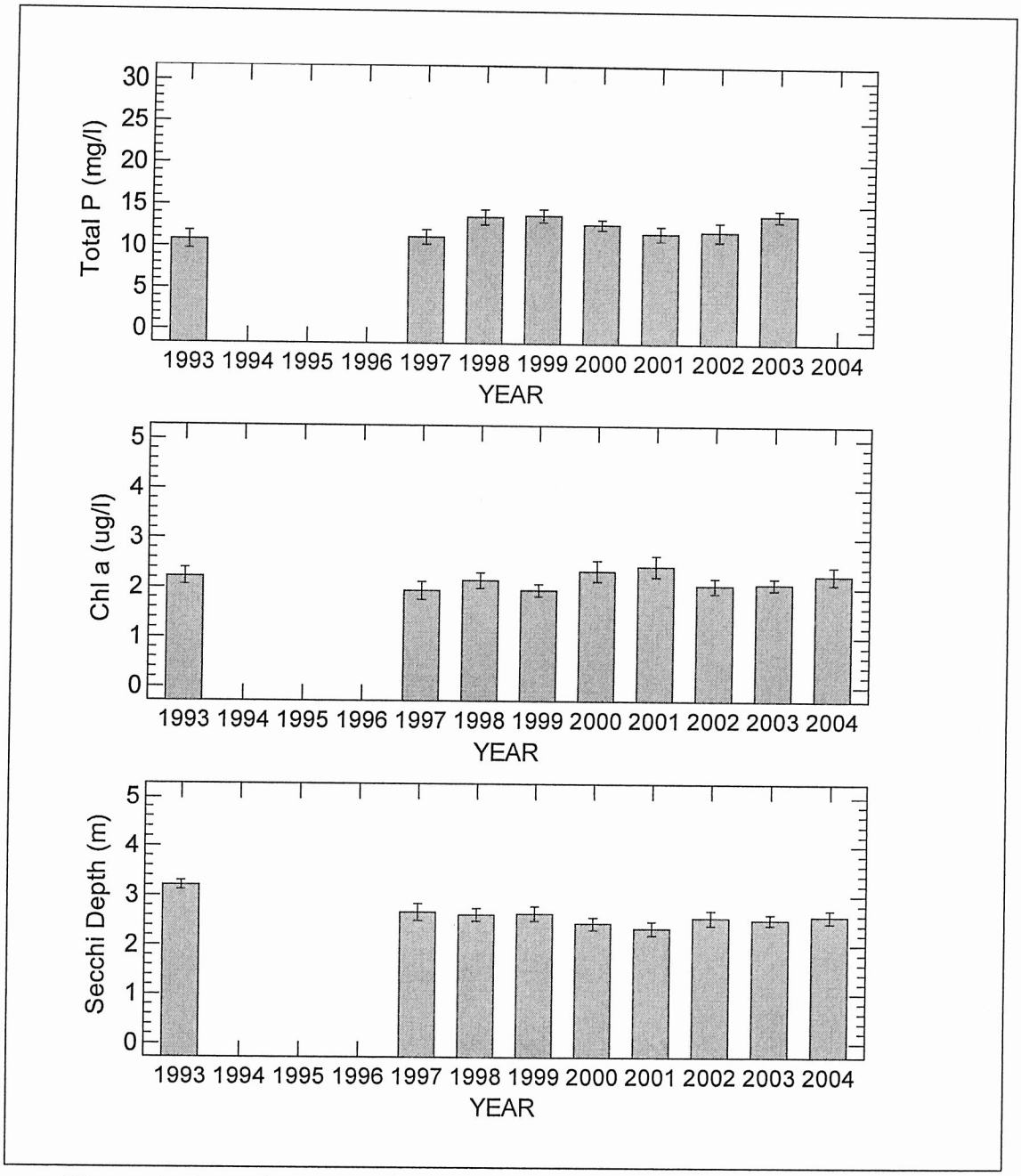


Figure 4. Annual mean total phosphorus, chlorophyll *a* and secchi depth for all lakes combined.

The values of Total Nitrogen, which exhibited an increasing trend in most lakes during 2002 and 2003, continued to increase in some of the lakes, but decreased in others (Figure 5).

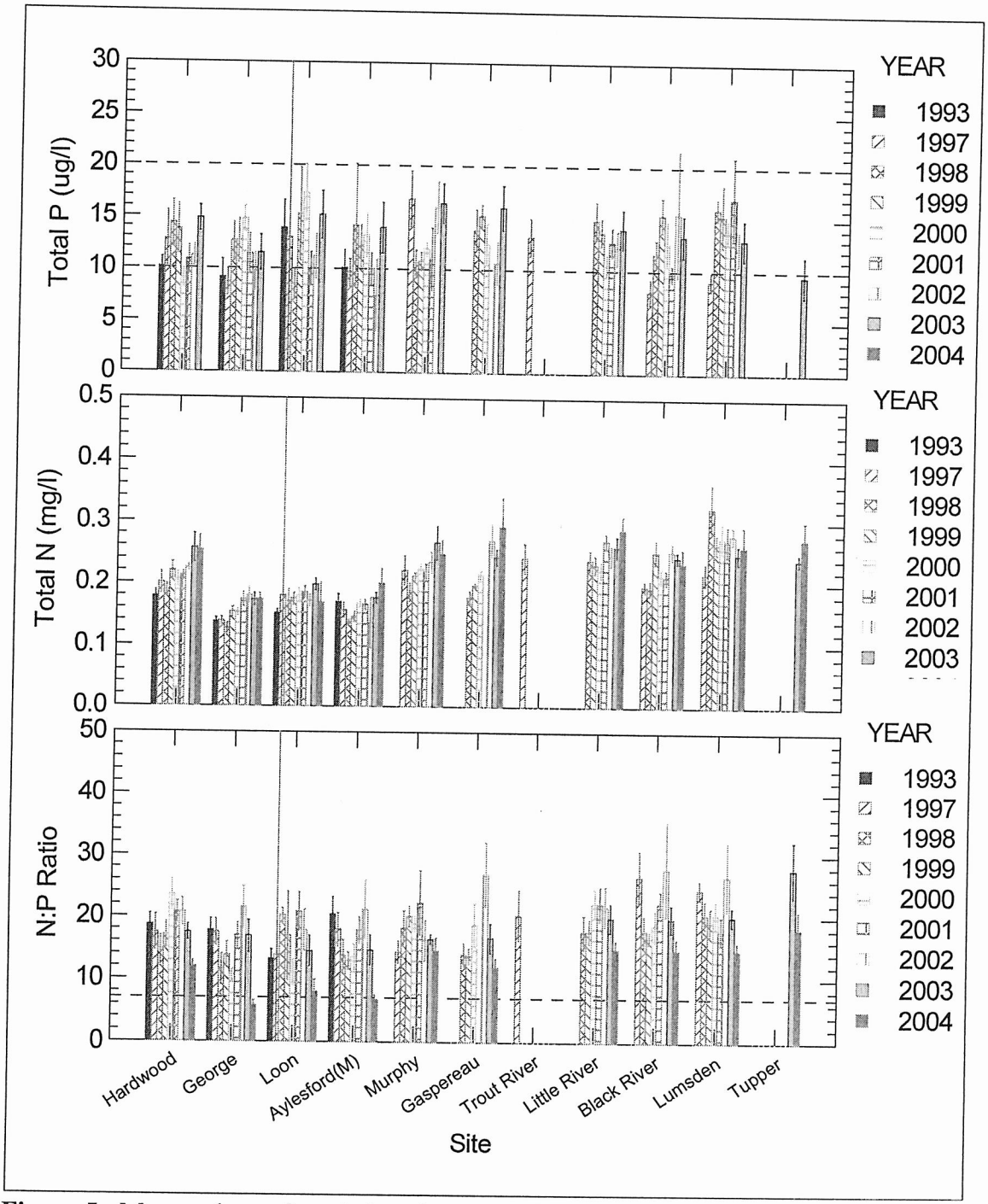


Figure 5. Mean values of total phosphorus, total nitrogen and N:P ratio at each site for each year (error bars are one standard error of the mean).

Alkalinity and pH

During 2002 and 2003, alkalinity (a measure of a lakes ability to resist changes in pH) appeared to exhibit a decrease in a number of the lakes, especially those having low conductivity (i.e., Loon, Gaspereau, Black River and Lumsden). The implication of decreasing alkalinity is that these lakes could experience the consequences of lake acidification. This trend does not appear to have continued into 2004 (Figure 6) and, in fact, most lakes appear to have gained some alkalinity (Figure 7).

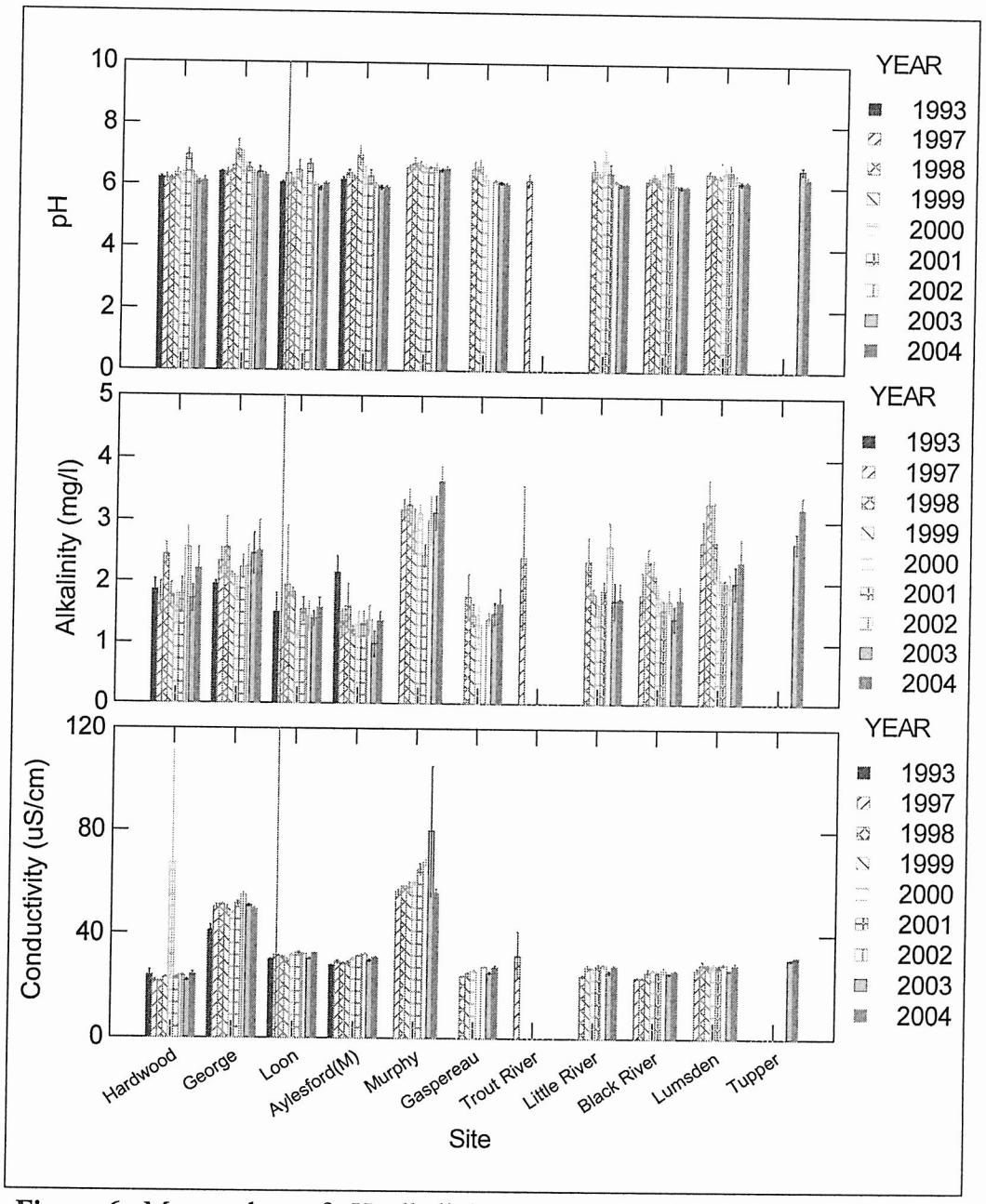


Figure 6. Mean values of pH, alkalinity and conductivity at each site for each year (error bars are one standard error of the mean).

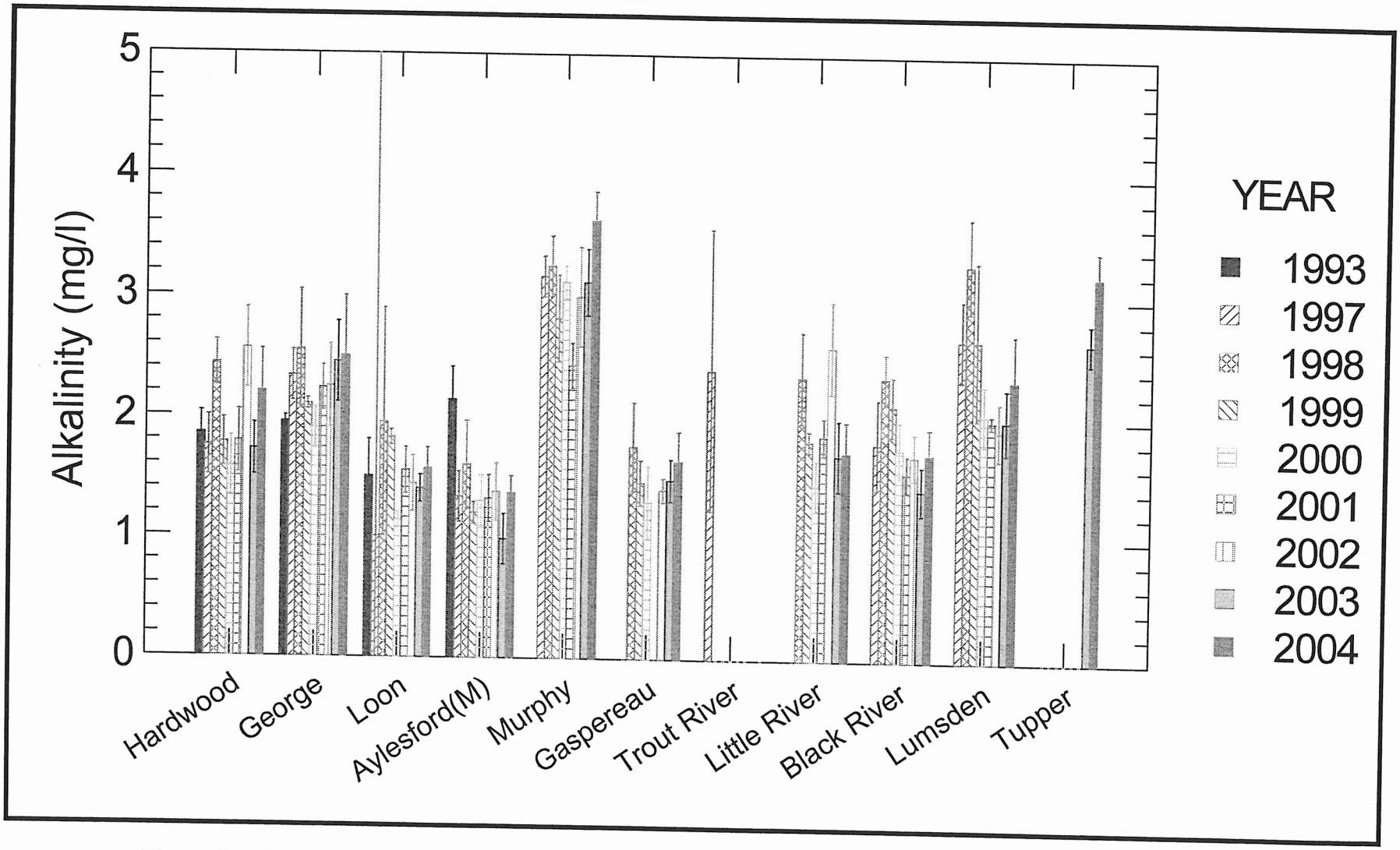


Figure 7. Mean values of alkalinity at each site for each year (error bars are one standard error of the mean).

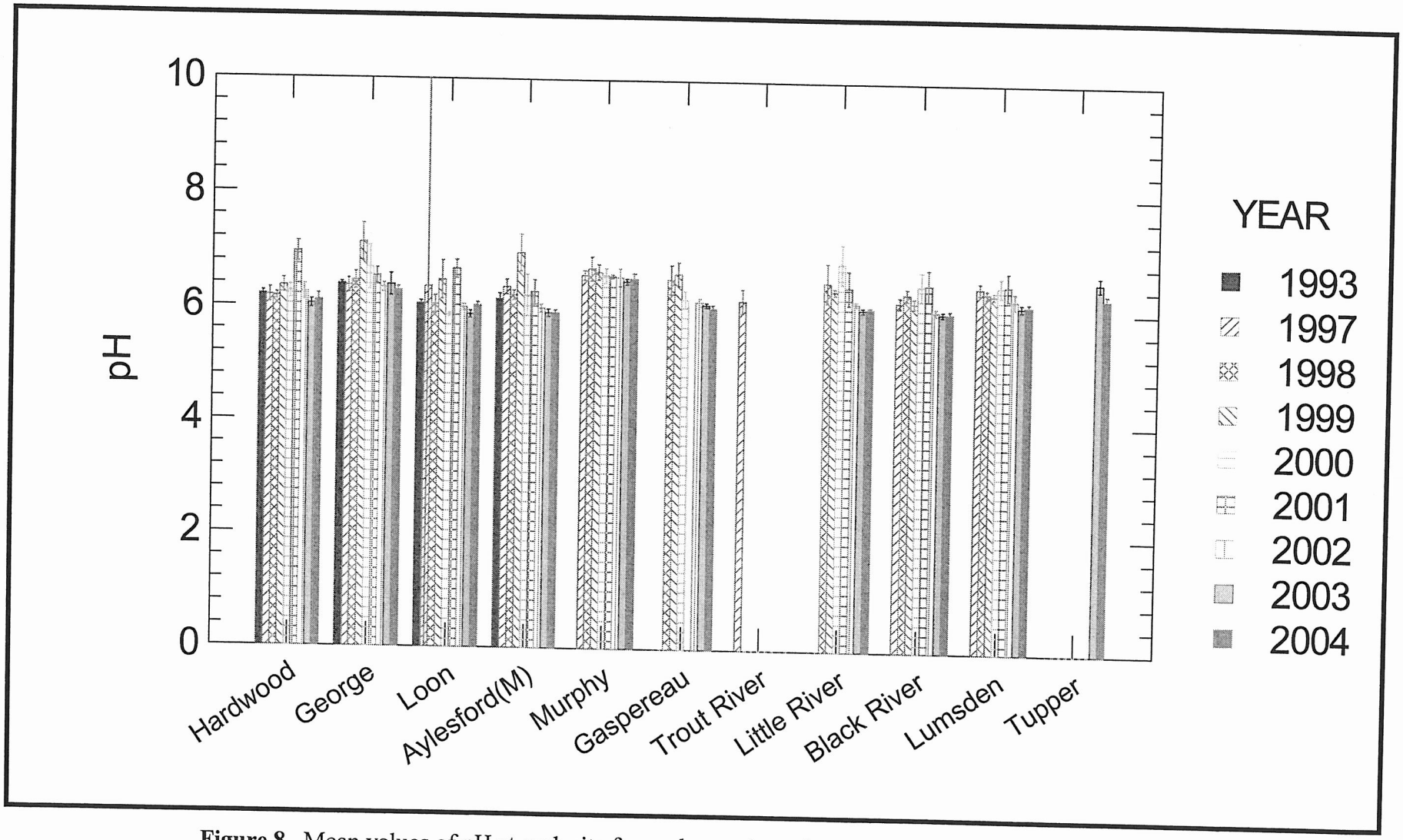


Figure 8. Mean values of pH at each site for each year (error bars are one standard error of the mean).

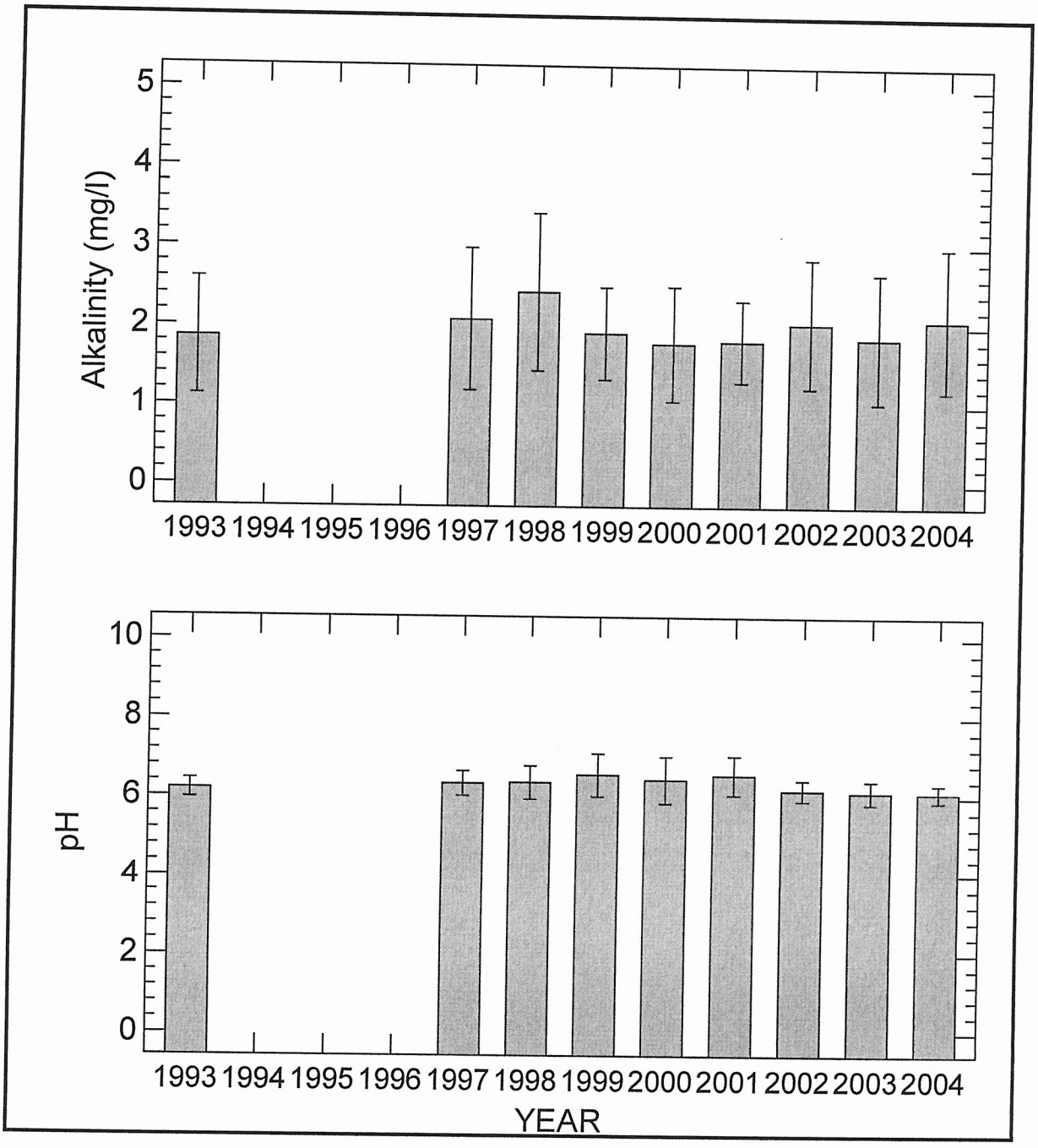


Figure 9. Annual mean alkalinity and pH of all lakes over time.

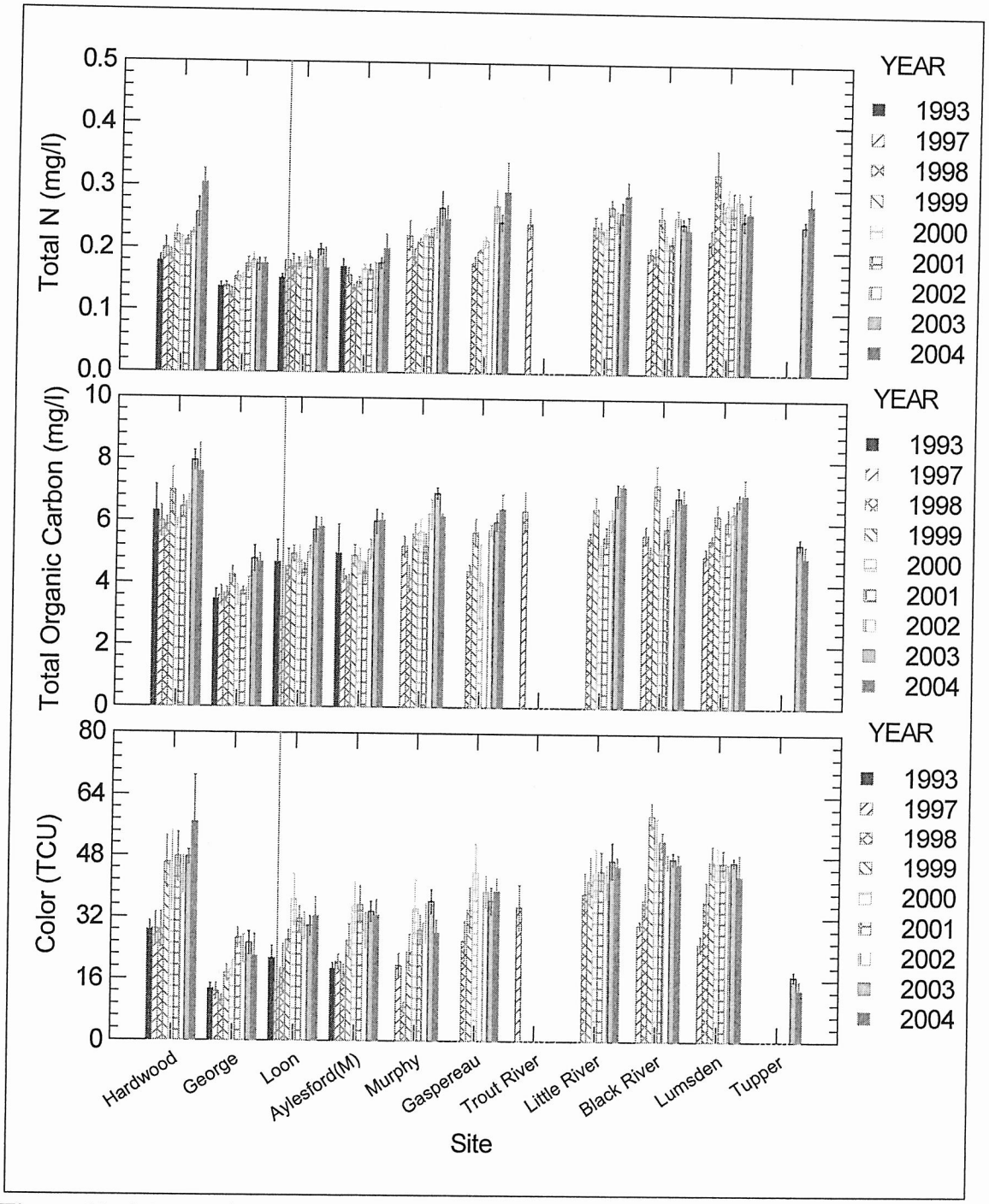


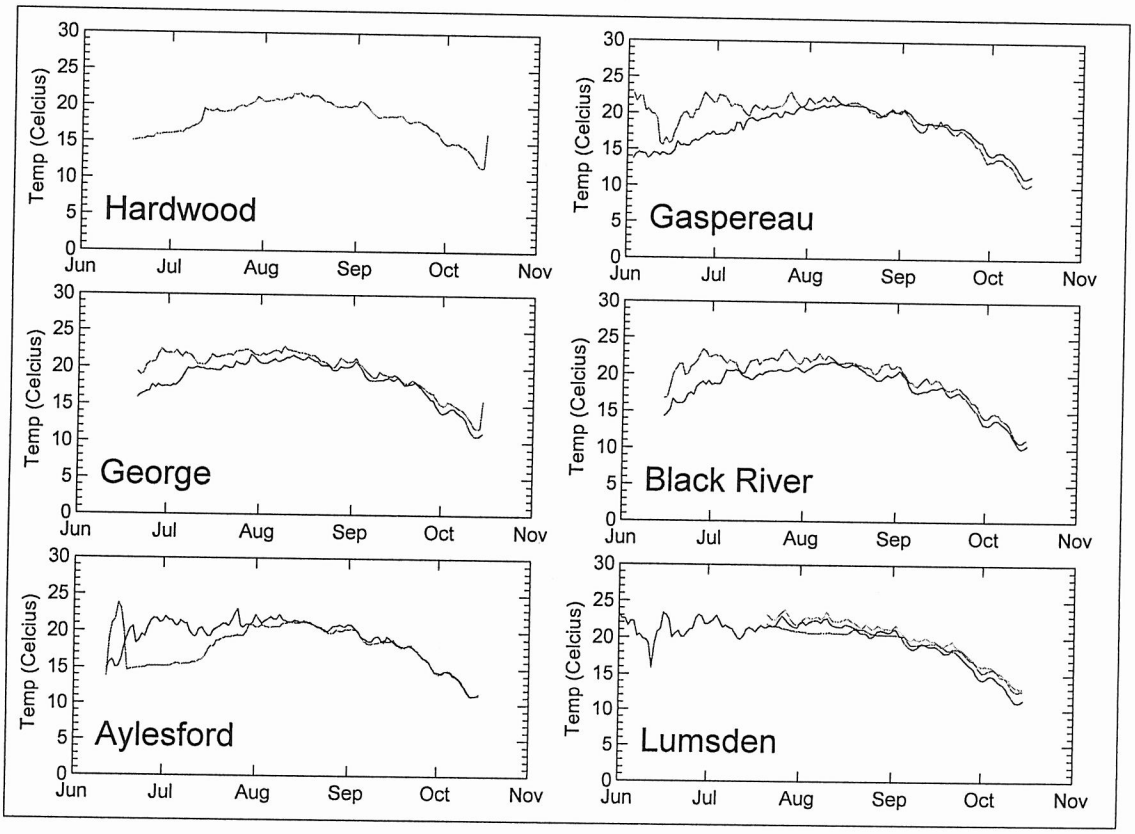
Figure 10. Mean values of total nitrogen, total organic carbon and color at each site for each year (error bars are one standard error of the mean).

APPENDIX I

Temperature Data Previously Collected

---------- **Surface**

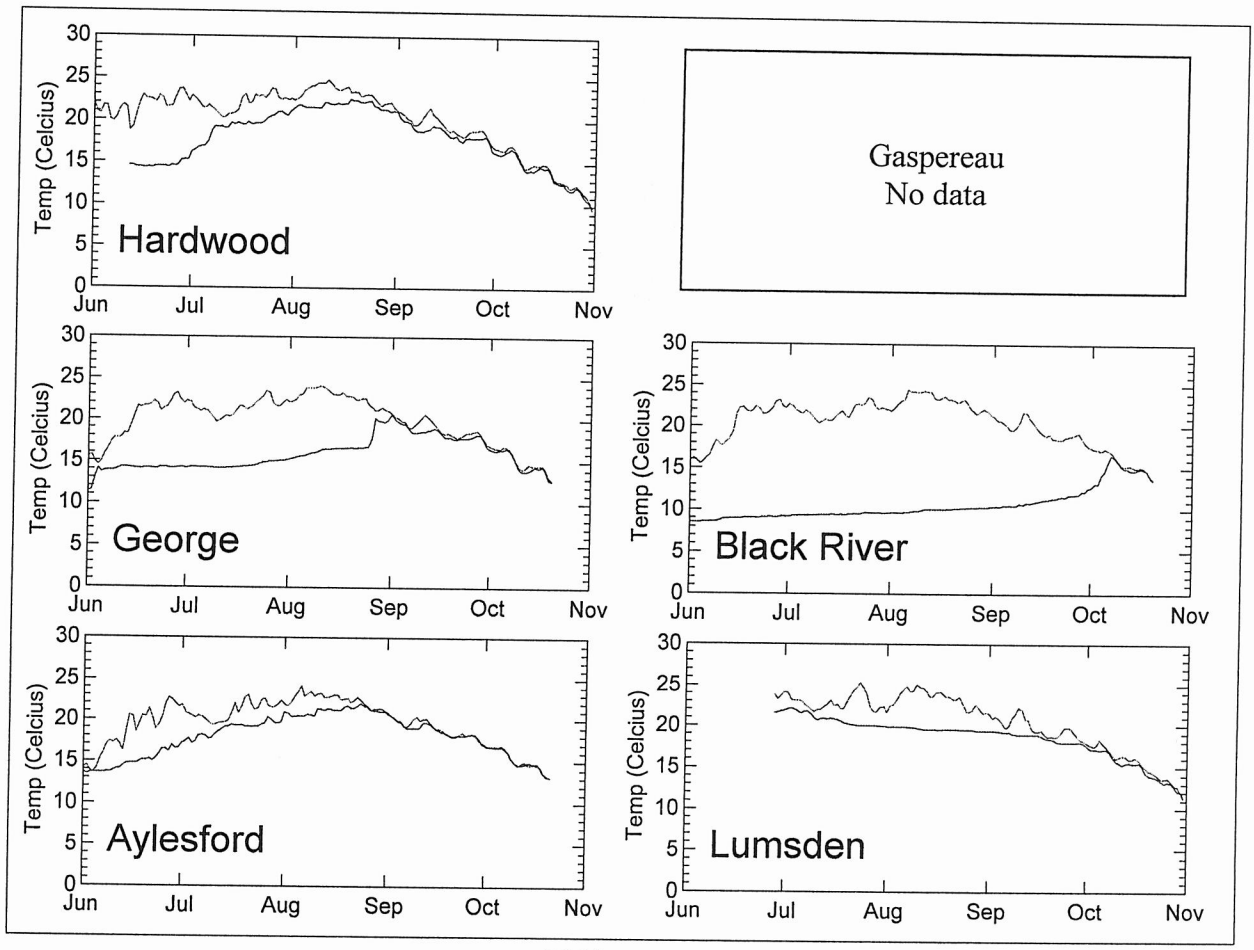
---------- **Bottom**



2000

---------- **Surface**

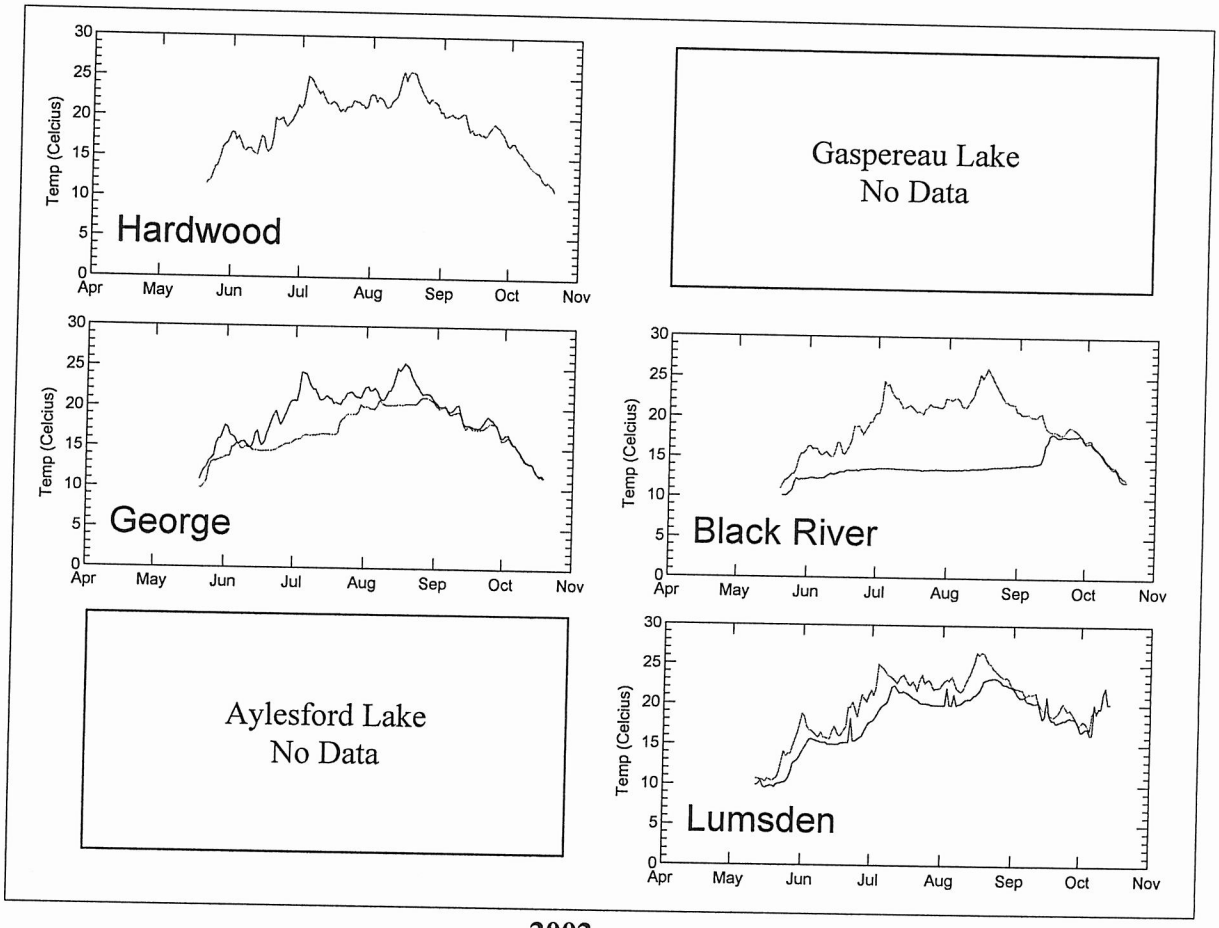
---------- **Bottom**



2001

---------- **Surface**

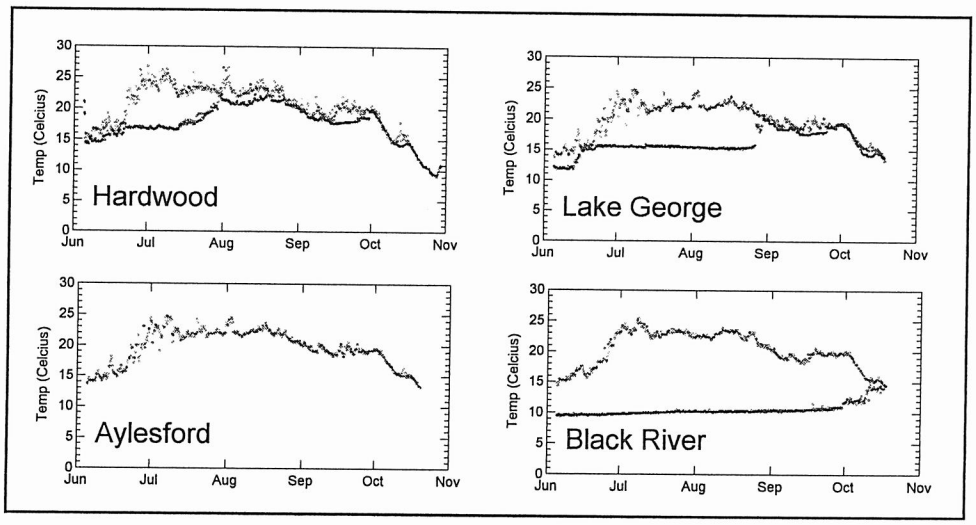
---------- **Bottom**



2002

---------- **Surface**

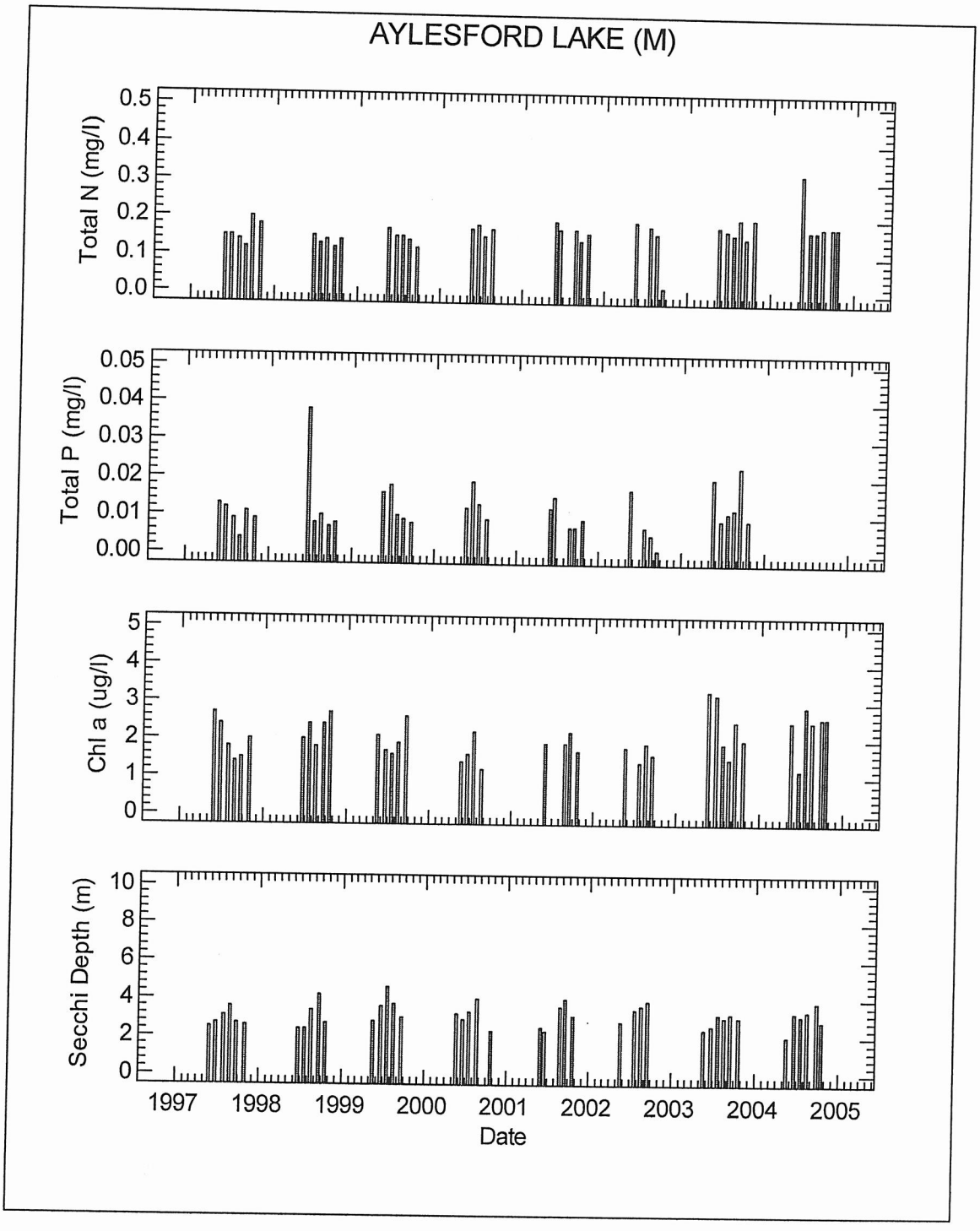
---------- **Bottom**

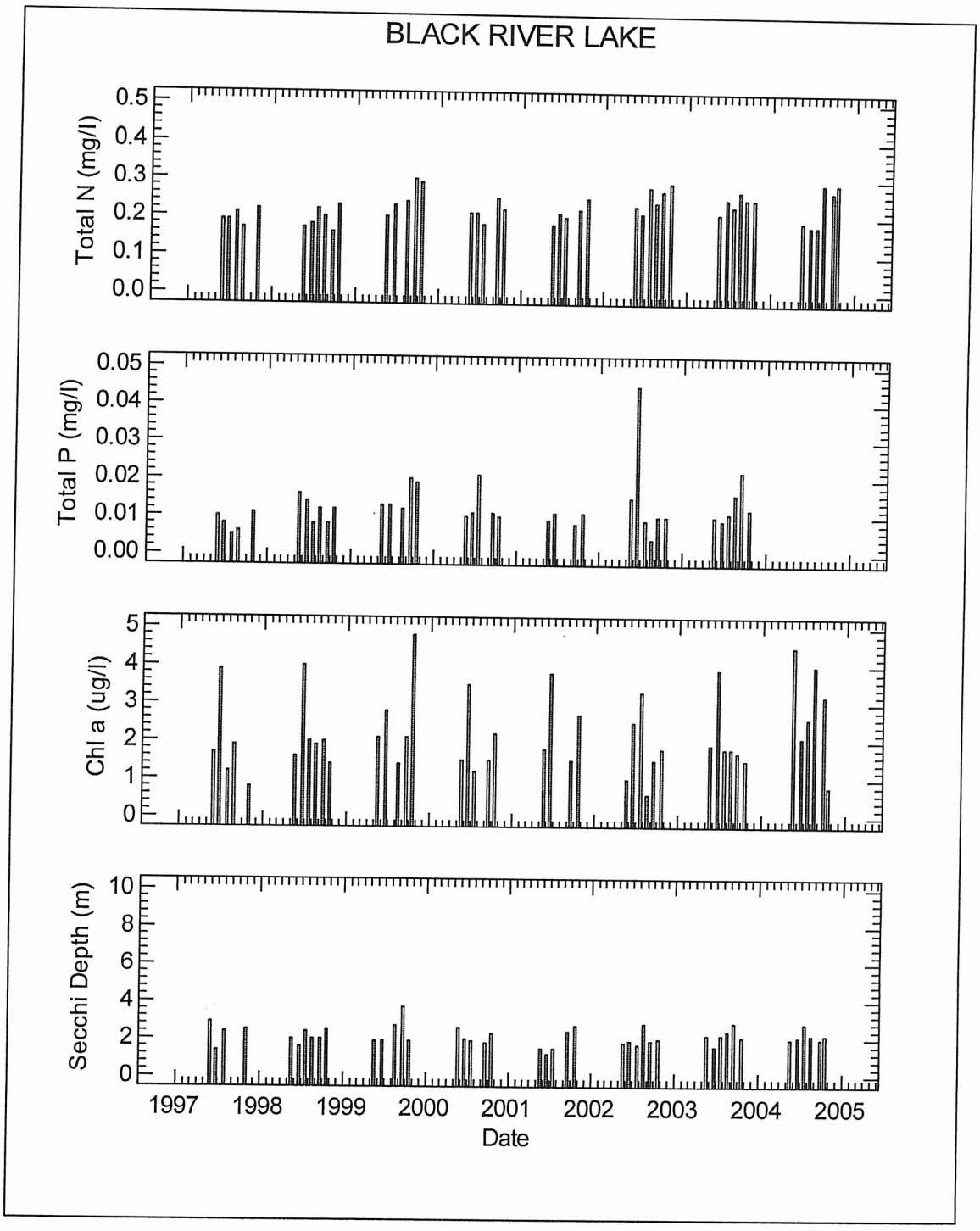


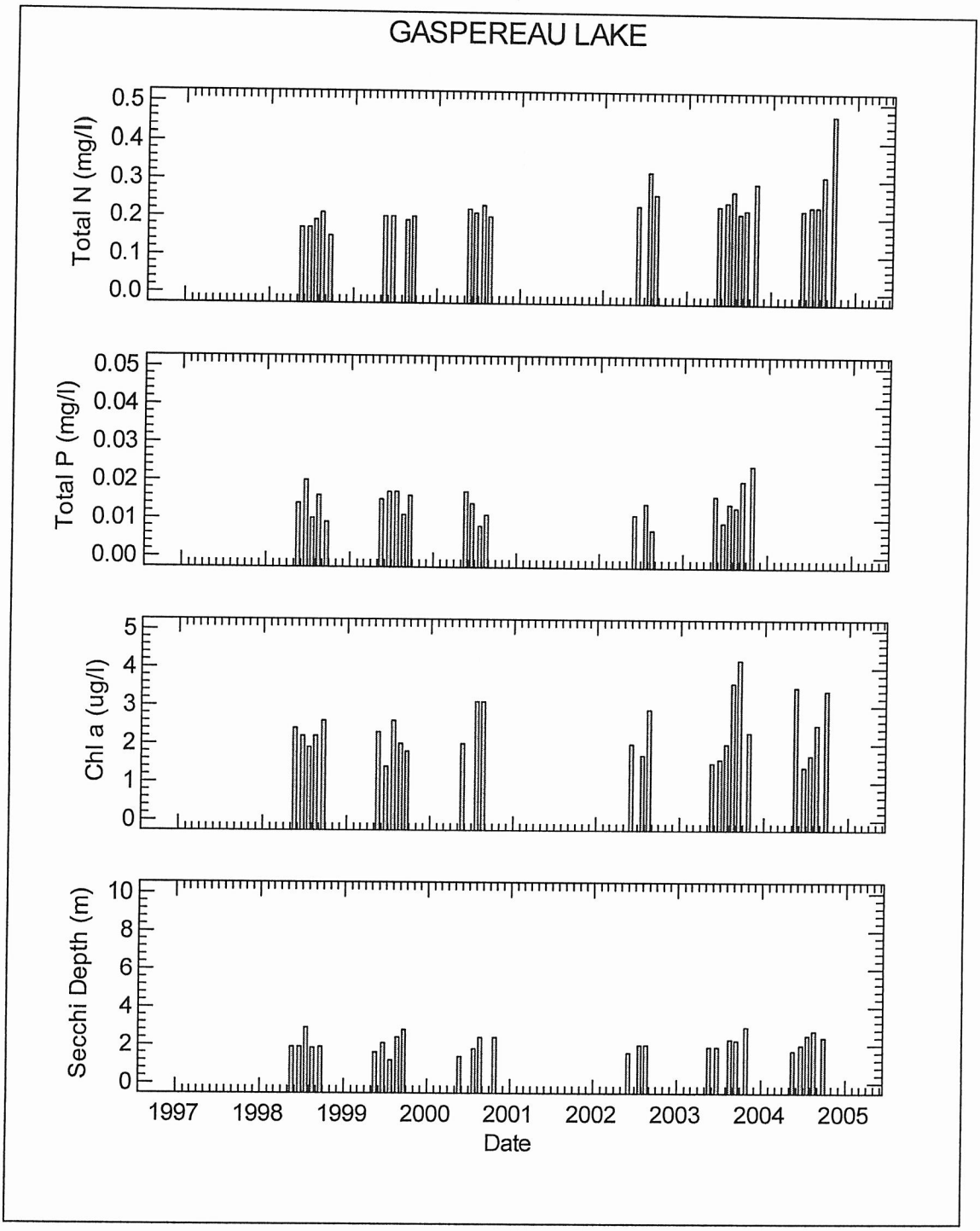
2003

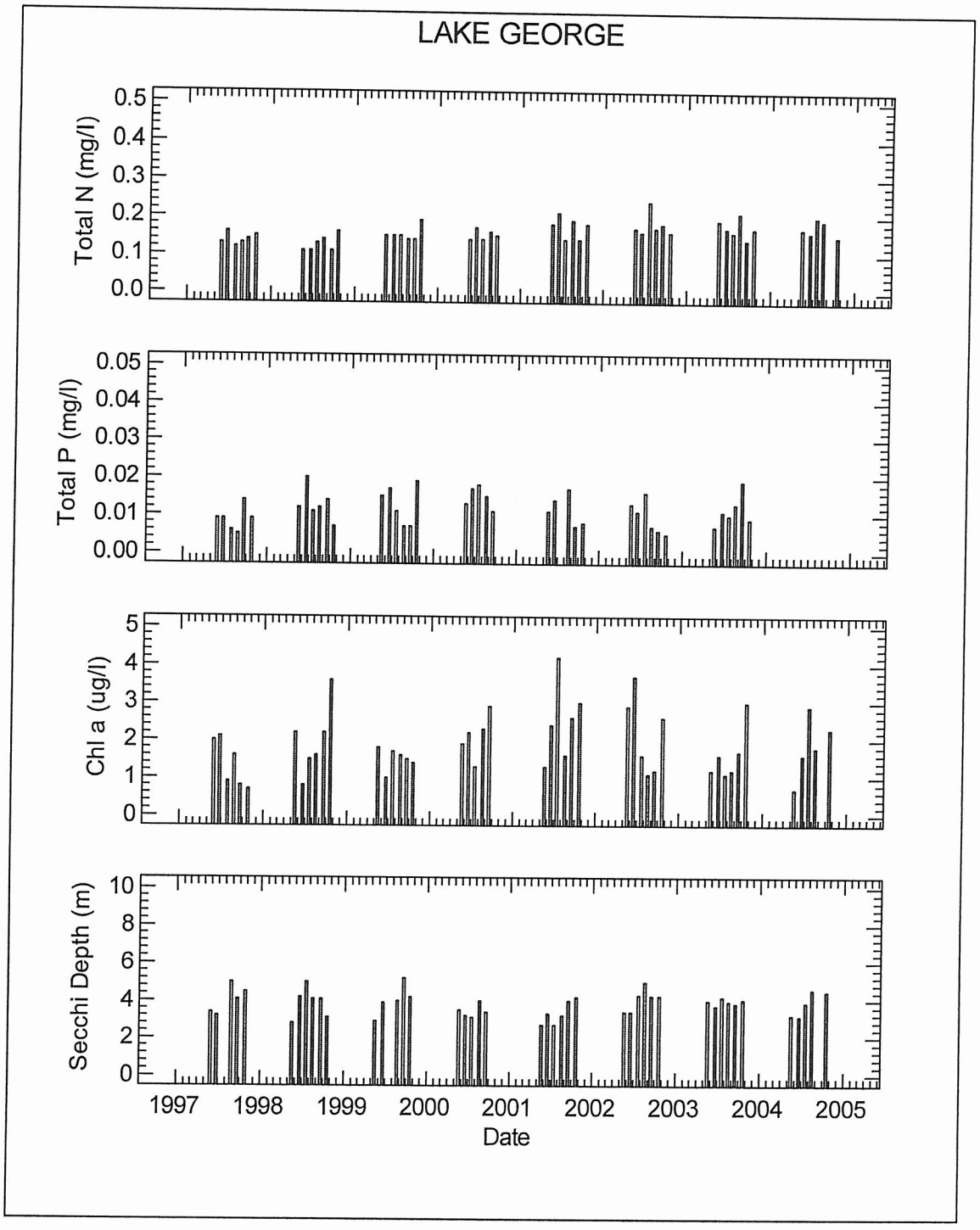
APPENDIX II

Time Series Data for All Lakes


AYLESFORD LAKE (M)
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
Date


BLACK RIVER LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
Date


GASPEREAU LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
Date


LAKE GEORGE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
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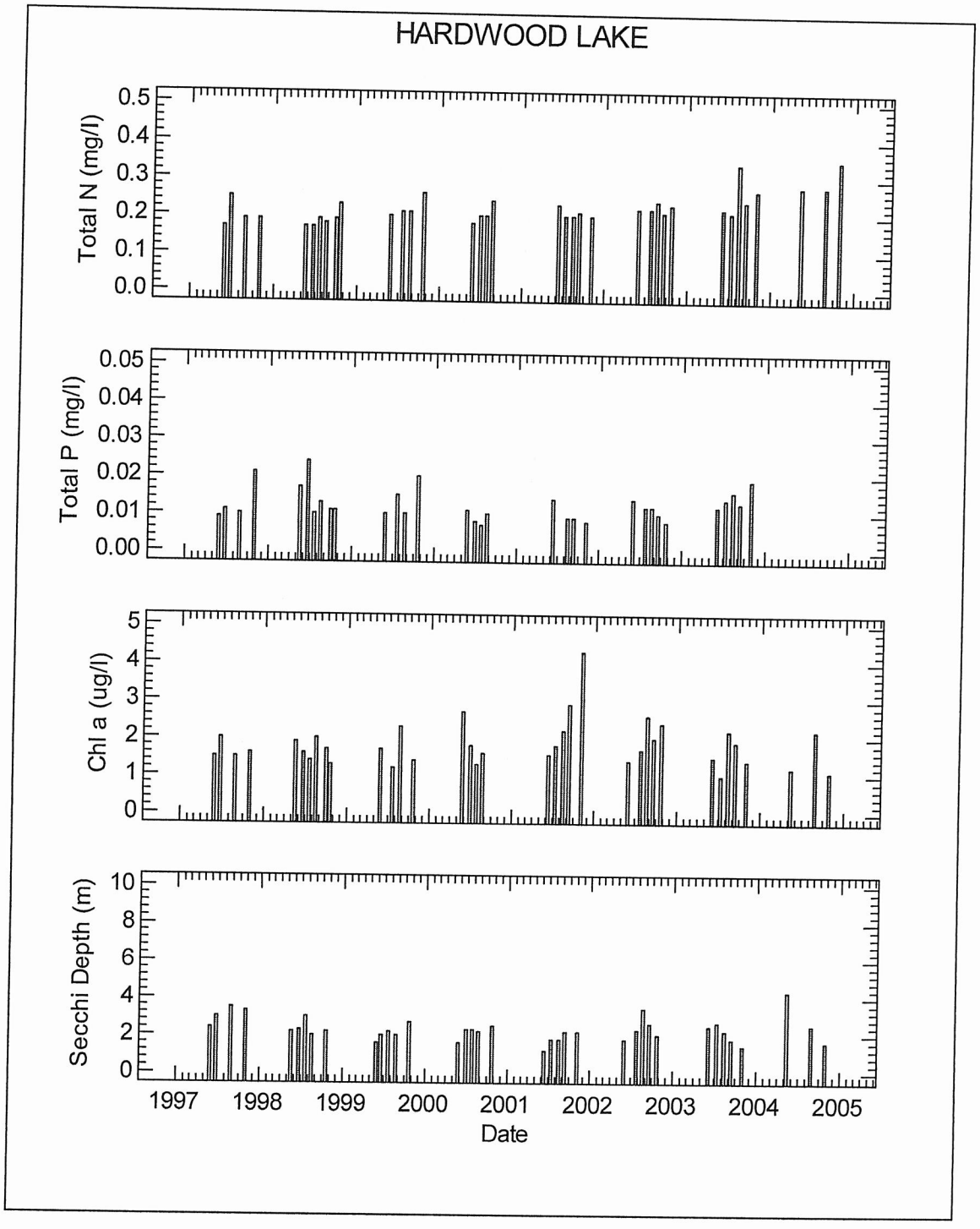
2004
2005
Date


HARDWOOD LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
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1997
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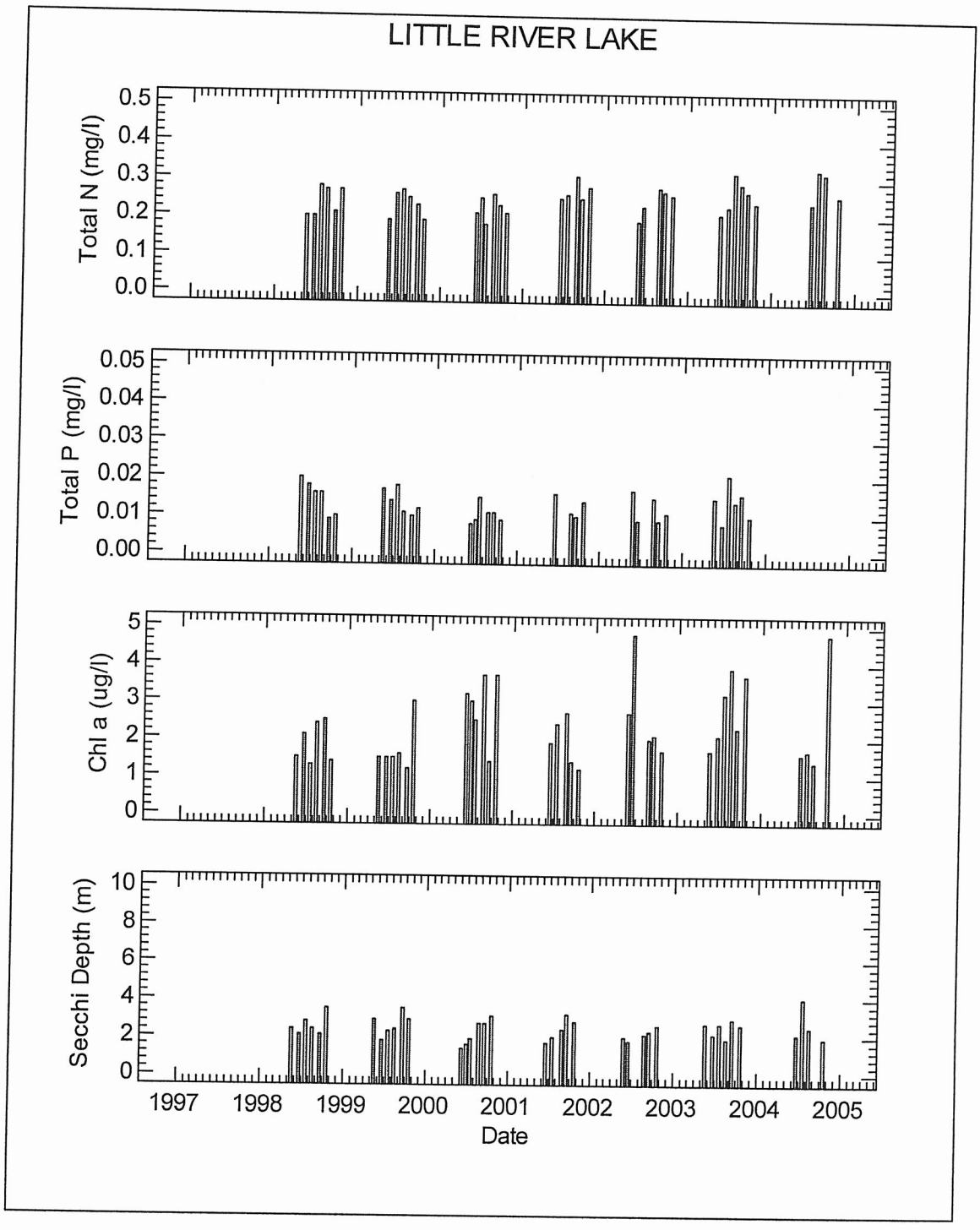
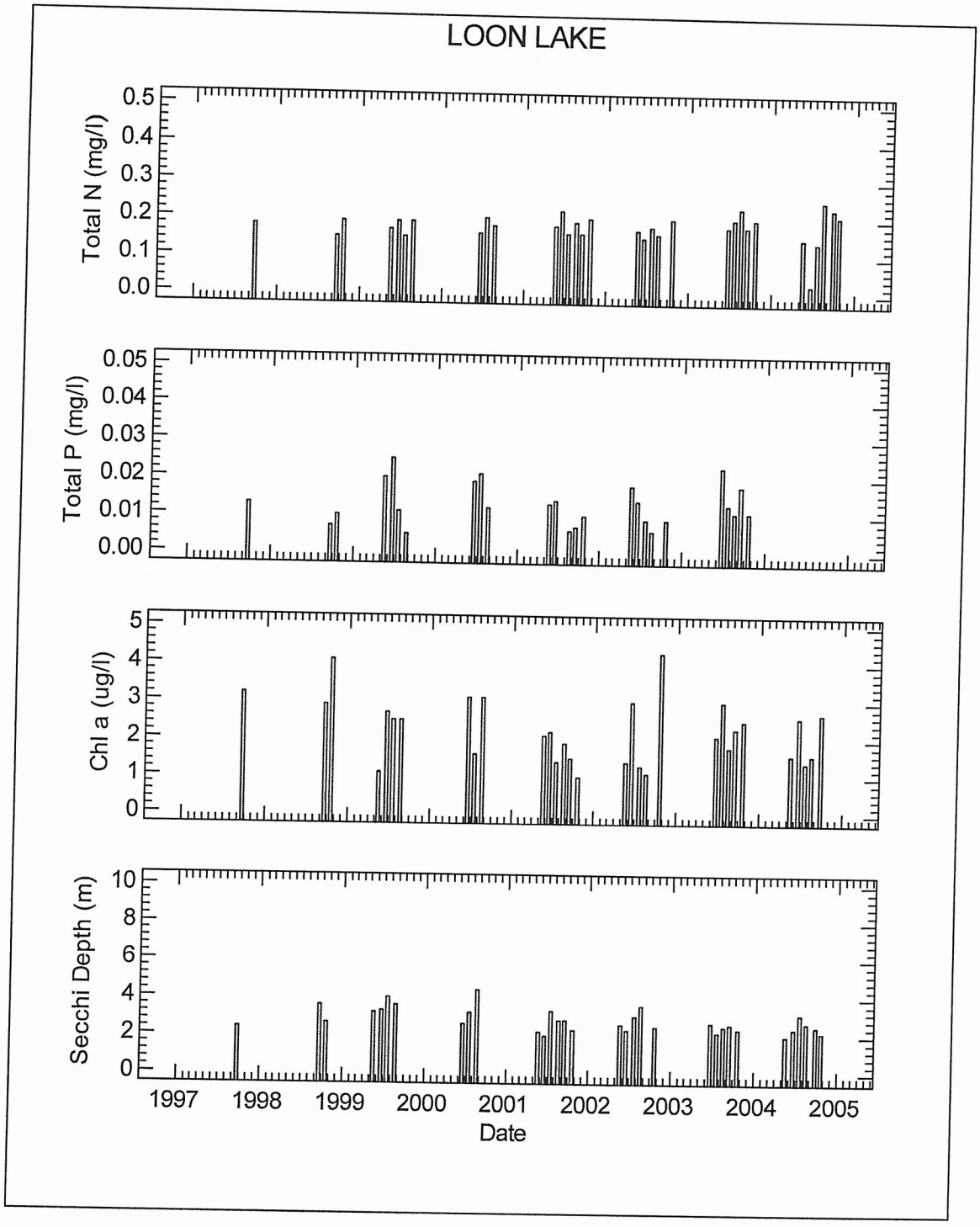
2005
Date


LITTLE RIVER LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
Date


LOON LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
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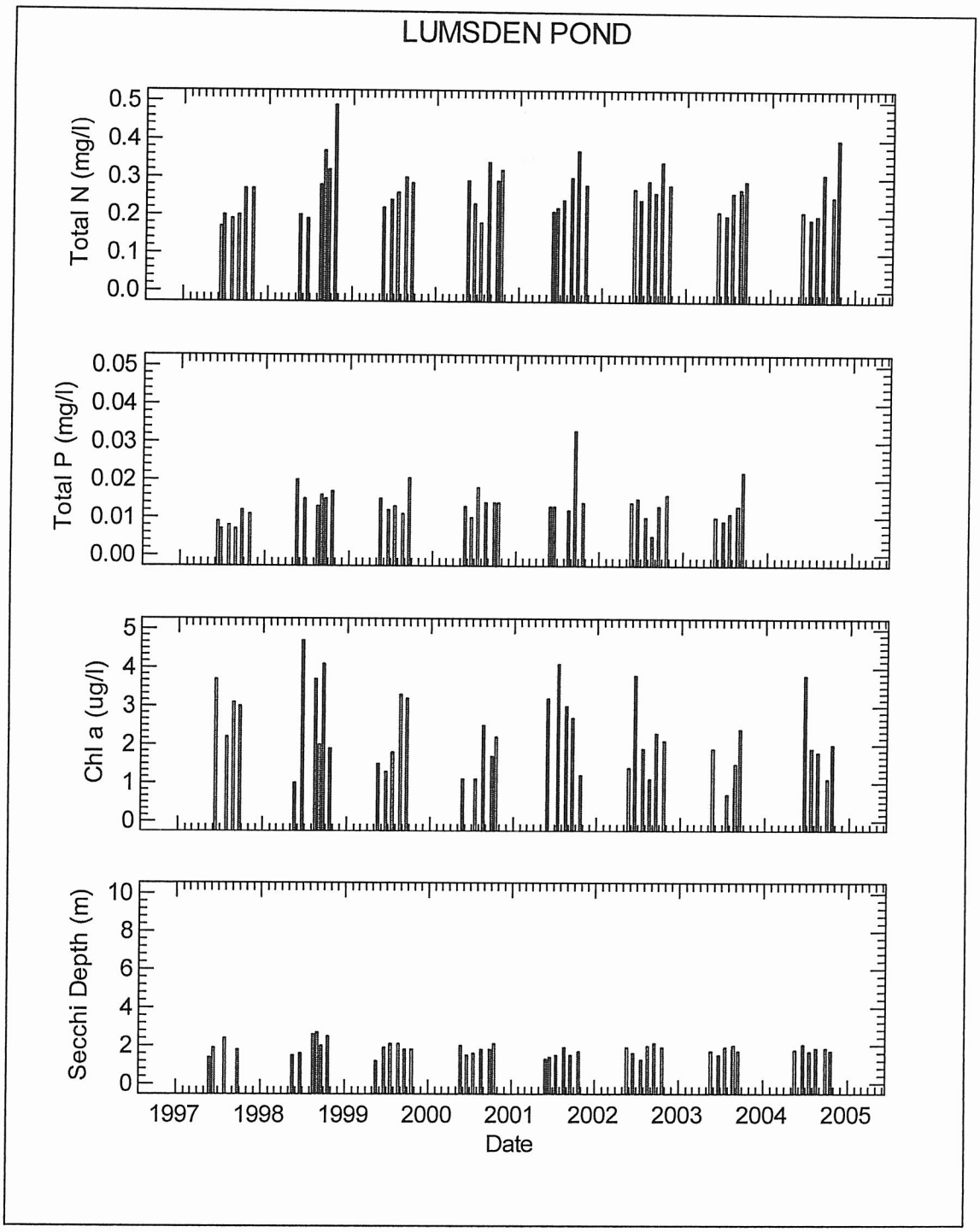
2003
2004
2005
Date


LUMSDEN POND
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
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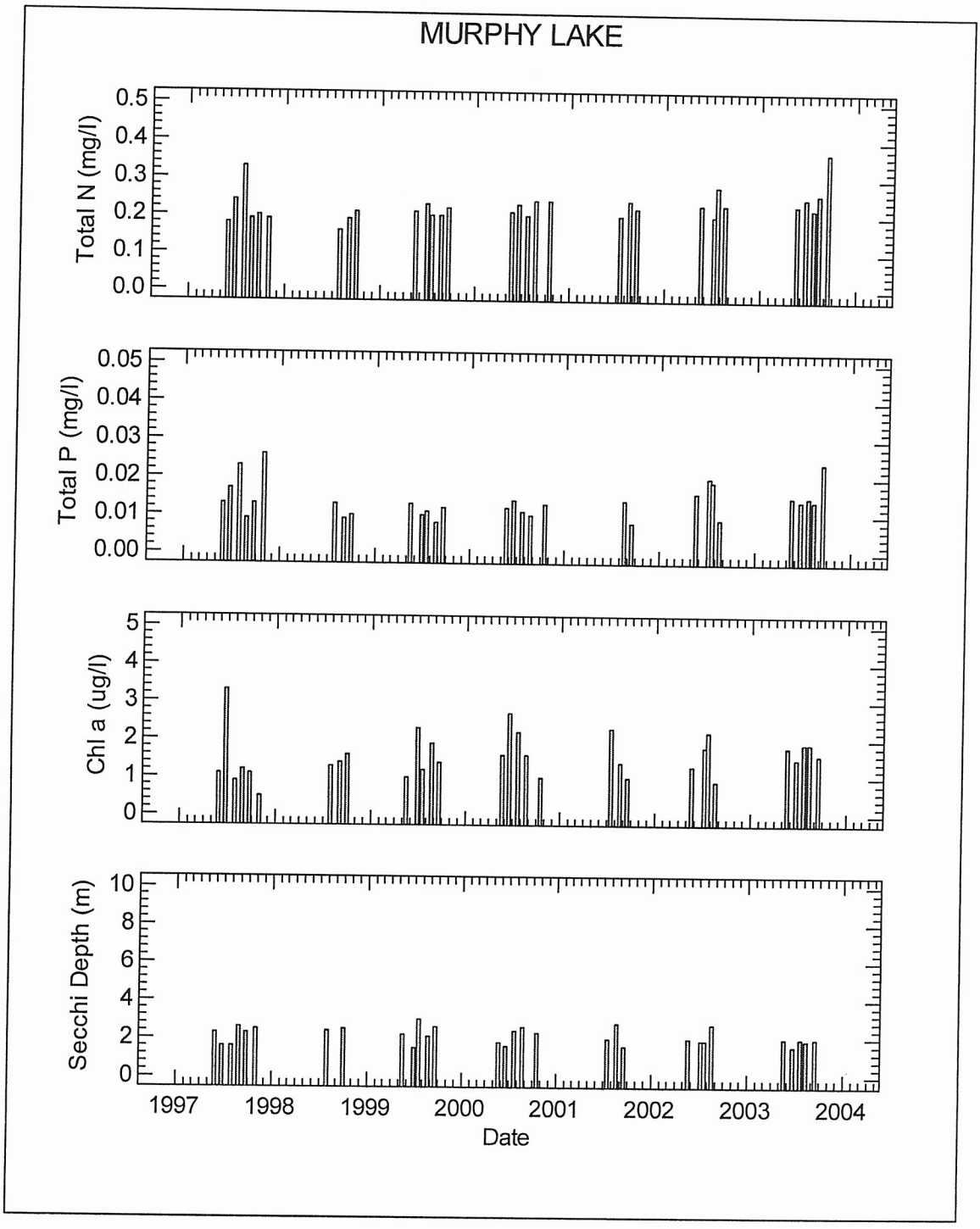
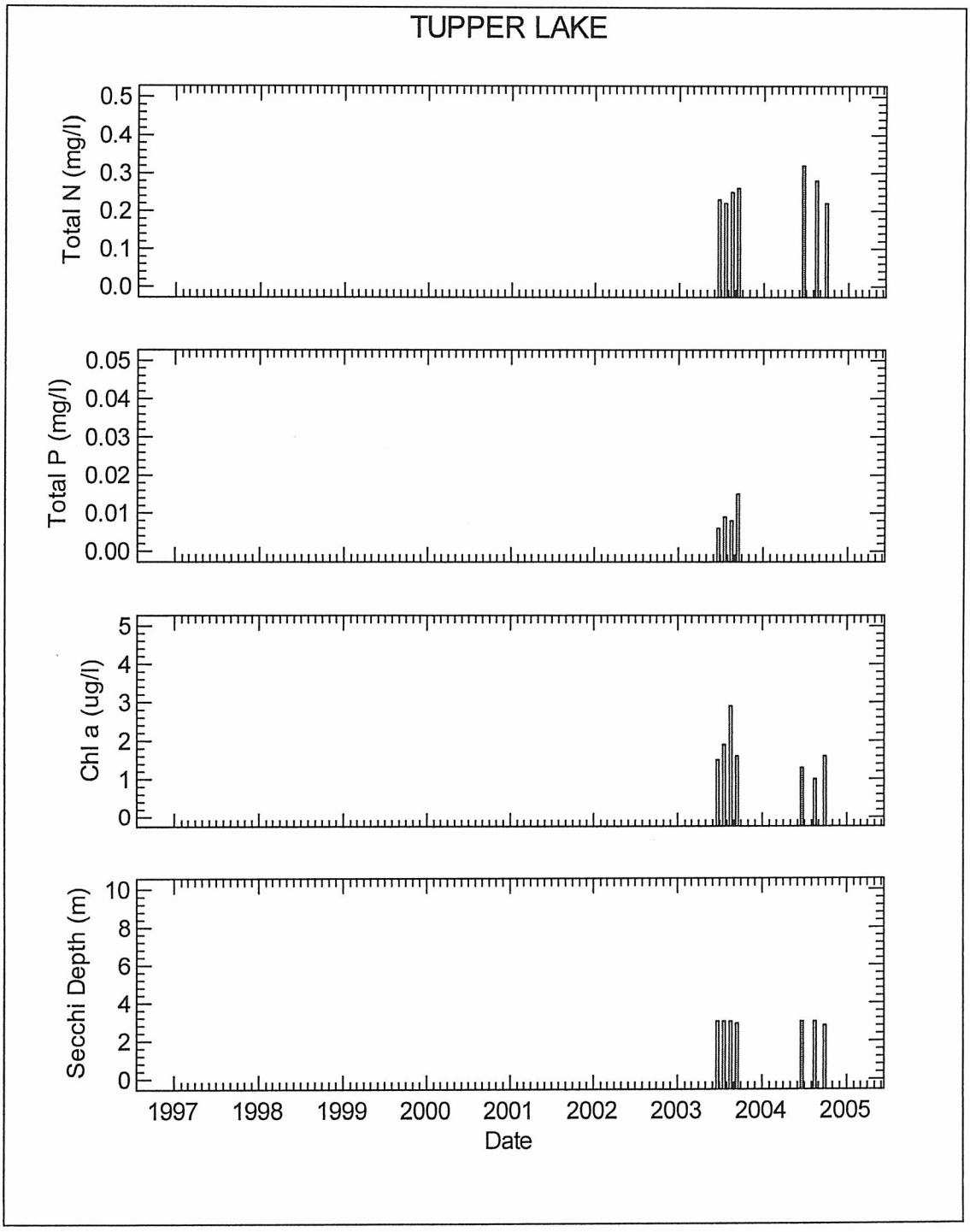
2003
2004
2005
Date


MURPHY LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
Date


TUPPER LAKE
Total N (mg/l)
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
Chl a (ug/l)
5
4
3
2
1
0
Secchi Depth (m)
10
8
6
4
2
0
1997
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2004
2005
Date