THE UNITED KINGDOM ACID WATERS MONITORING NETWORK

DATA REPORT FOR 2004 – 2005 (YEAR 17)

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Report to the Department for Environment, Food and Rural Affairs
(Contract EPG 1/3/160)

2005

Editors

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1. TABLE OF CONTENTS

Cover photographs: Sampling at Lochnagar, macrophyte surveying at Blue Lough and emptying a sediment trap at Loch Grannoch. All © Ewan Shilland.

2. INTRODUCTION

The UK Acid Waters Monitoring Network (UKAWMN) has been operating continuously since 1988. During the first ten years biological and chemical data were summarised in an annual series of printed reports From the year 2000 annual data reports have also been available from the UKAWMN web page. These are of a similar format to earlier annual reports but focus on graphical representations of time trends in raw data and diagnostic statistics (e.g. species richness and diversity indices). Detailed analysis of data is presented in two interpretative reports, Monteith (2005) and Monteith and Evans (2000) dealing with 15 and 10 years of accumulated results respectively. Both are also available on the UKAWMN web page. A full description of sampling methods and analytical procedures, together with site descriptions, is presented in Shilland *et al.* (2005).

3. THE MONITORING NETWORK

The UKAWMN, funded by the UK Department of the Environment, originally consisted of 10 stream sites and 10 lakes, situated in those parts of the country most susceptible to acidification (see map, page 14). In 1990, two additional sites, Blue Lough and Coneyglen Burn, were added to the Network with funding from the Department of Environment (Northern Ireland). In January 1991 site 18, the Nant y Gronwen, was withdrawn from the Network at the request of the landowner and was replaced by a nearby moorland stream, the Afon Gwy. Due to water abstraction and damming by a local fish farm at site 1, Coire nan Arr, a nearby replacement control site was chosen, site 23, named Loch Coire Fionnaraich. Since 2001 the entire network has been funded by the UK Department of the Environment Food and Rural Affairs (DEFRA).

All sites are monitored chemically and biologically according to methodologies described by Shilland *et al*. (2005). Water samples are collected monthly at stream sites and quarterly at lake sites. Epilithic diatoms and benthic invertebrates are sampled annually. Aquatic macrophytes are surveyed annually, between June and September, at stream sites and biannually at lake sites. Stream sites and the outflow streams of lake sites are electro-fished annually in the autumn.

In addition to the annual surveys, sediment cores were taken from all lake sites during the first five years of monitoring. These were radiometrically dated and analysed for diatoms, carbonaceous particles (derived from the combustion of fossil fuels) (Rose *et al.* 1995) and trace metals. Results of this work are presented in Patrick *et al.* (1995). Sediment traps installed in all lakes are emptied annually. The contents are analysed for diatom species composition, trace metals and the flux of carbonaceous particles, allowing direct comparisons to be made with the historical (sediment core) record.

Water chemistry and macroinvertebrate sampling was prevented at several sites in the spring of 2001 by foot-and-mouth related access restrictions. Sampling was resumed across the Network in June 2001.

All chemical, physical and biological data are stored in a database managed by the Centre for Ecology and Hydrology and ENSIS. Summary data are available to scientific and other interested organisations on request. Further information on the UKAWMN, including site descriptions and photographs, is available via the Internet at the address: http//www.ukawmn.ucl.ac.uk

4. DATA FORMAT

The chemical and biological data are presented in a series of sections, summarised below, on a site-by-site basis.

Section 1:	Time series graphs of key spot sampled chemical determinands for individual samples. Summary table for key chemical determinands including: the mean over the 1988-1993 baseline period; the mean for the current year (2004-2005), the standard deviation for the current year; the Seasonal Kendall (Hirsch *et al.*, 1982) slope estimate for the period 1988-2005; and, the Seasonal Kendall trend significance level (p) (we consider values of less the 0.05 as evidence for a significant temporal trend). The normal number of observations per year is 4 for lakes and 12 for streams.
Section 2:	Macroinvertebrates. Time series of macroinvertebrate taxon % abundance in annual aggregated samples (5 kick samples from lake littoral habitats or from riffle areas in streams), and annual total number of individual animals. Some species occurring at less than 1% relative abundance are omitted. Macroinvertebrate summary statistic time series: 1) total number of individuals; 2) number of individuals identified at Genus level only (excludes some ubiquitous groups such as the chironomids and oligochaetes); 3) total number of taxa; 4) Diversity Indices: a) Hill's N_1, the exponent of Shannon's Index and a measure of the number of abundant species in a sample (Hill, 1973). b) Hill's N_2, the reciprocal of Simpson's Index and a measure of the number of very abundant species in a sample (Hill, 1973). c) E_5, a measure of evenness based on the ratio $(N_2-1):(N_1-1)$. As a single species becomes more and more dominant, E_5 tends to zero.
Section 3:	Salmonids. Summary histogram of mean density of trout and salmon, if present, in three 50m reaches (number of individuals caught per $100m^2$ survey area) for each year of the monitoring period. (0+ = new recruits, >0+ = all fish over one year of age).
Section 4:	Epilithic diatoms. Time series of annual mean percentage frequency (from 3-4 replicate samples) of taxa occurring at greater than 2 % abundance in any one sample. Epilithic diatom summary statistic time series. Mean, maximum and minimum for:

	a) Hill's N_1 (see above) b) Hill's N_2 (see above) c) E_5 (see above) d) Diatom inferred pH (Di pH), based on the weighted average of species pH optima in the surface sediments of the 167 lake Surface Water Acidification Project dataset (Stevenson *et al*. 1991). pH reconstructions are intended only for application to sedimentary diatoms but directional trends in inferred pH of epilithic assemblages should provide an indication of the direction of a response to changing acidity.
Section 5:	Aquatic macrophytes. For lakes relative species abundance determined on a five point scale (comparable to the DAFOR scoring system, Palmer *et al*. 1992) following shoreline survey, shore transects and deep water grapnel trawls, as follows: 1. rare/infrequent 2. occasional but not abundant 3. widespread but not abundant 4. locally abundant 5. widespread and abundant For streams, total macrophyte cover estimated for 5m sections of a 50m survey stretch and each then partitioned into proportional species abundance to provide percentage cover for each species. Data analysed for this report are the mean species cover estimates for the 50m stretches.
Section 6:	For lake sites only. Histogram of diatom species composition from annually retrieved sediment traps. Species occurring at less than 1% abundance in all years are omitted.

After the site by site data a final section presents Mercury and Lead sediment trap concentrations for all the lake sites.

5. REFERENCES

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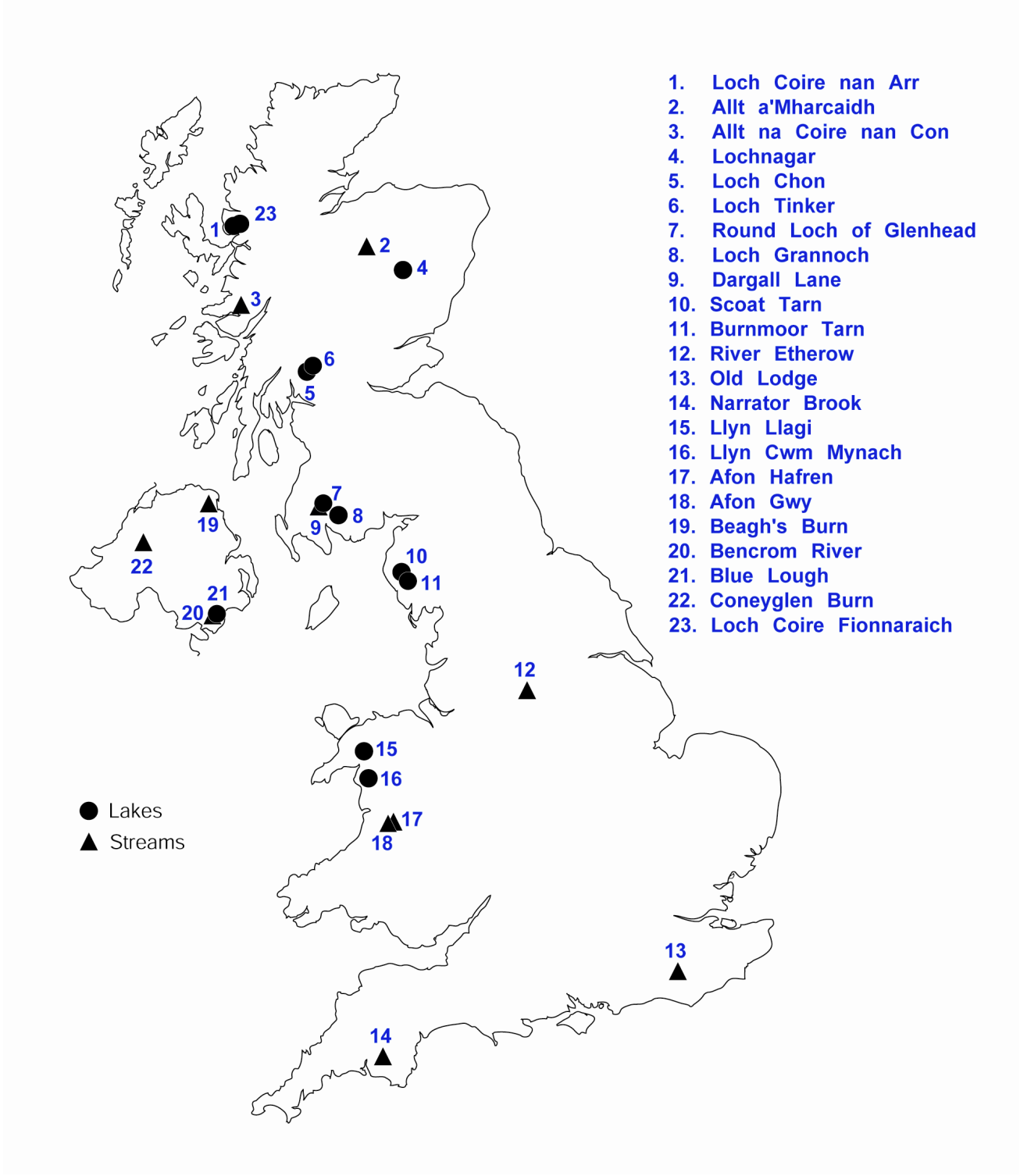
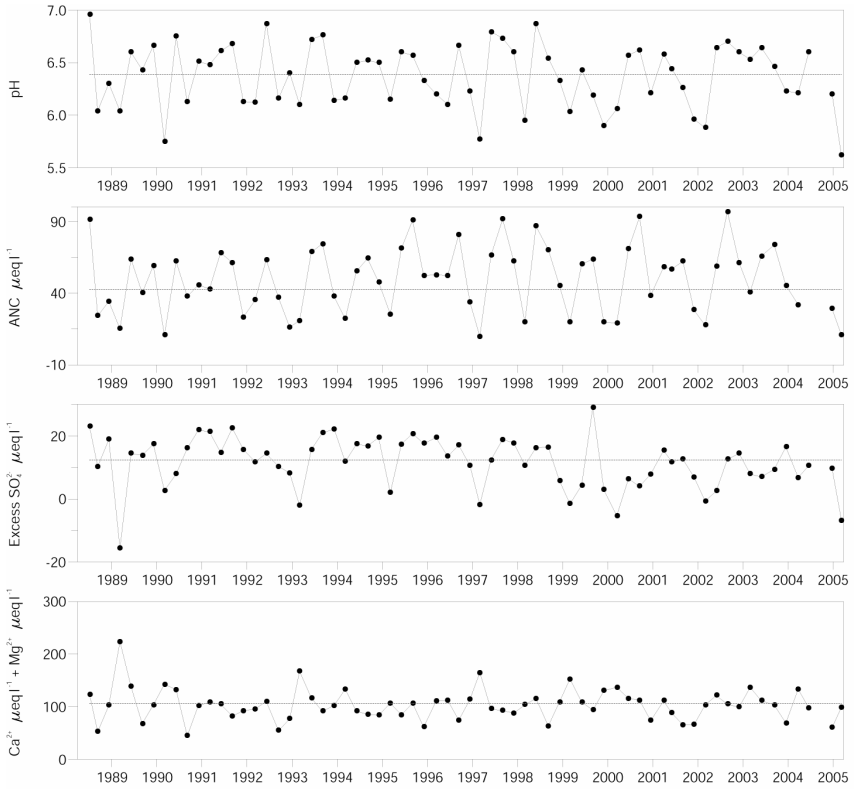
6. LOCATION OF UKAWMN SITES

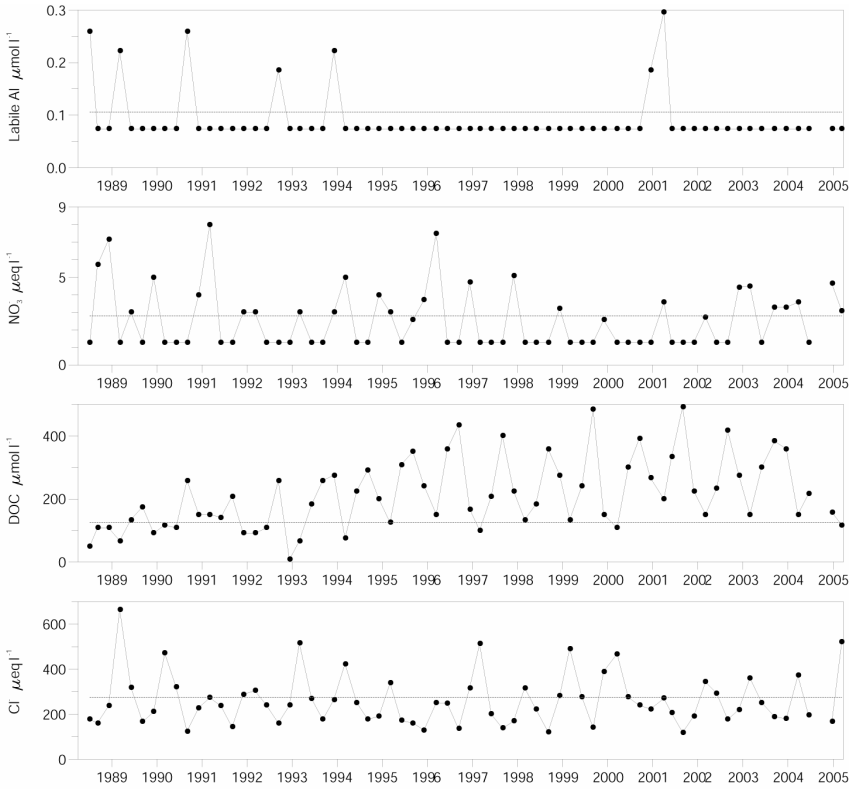


7 SITE DATA

7.1 Loch Coire nan Arr

7.1.1 Spot sampled chemistry data





Determinand statistics

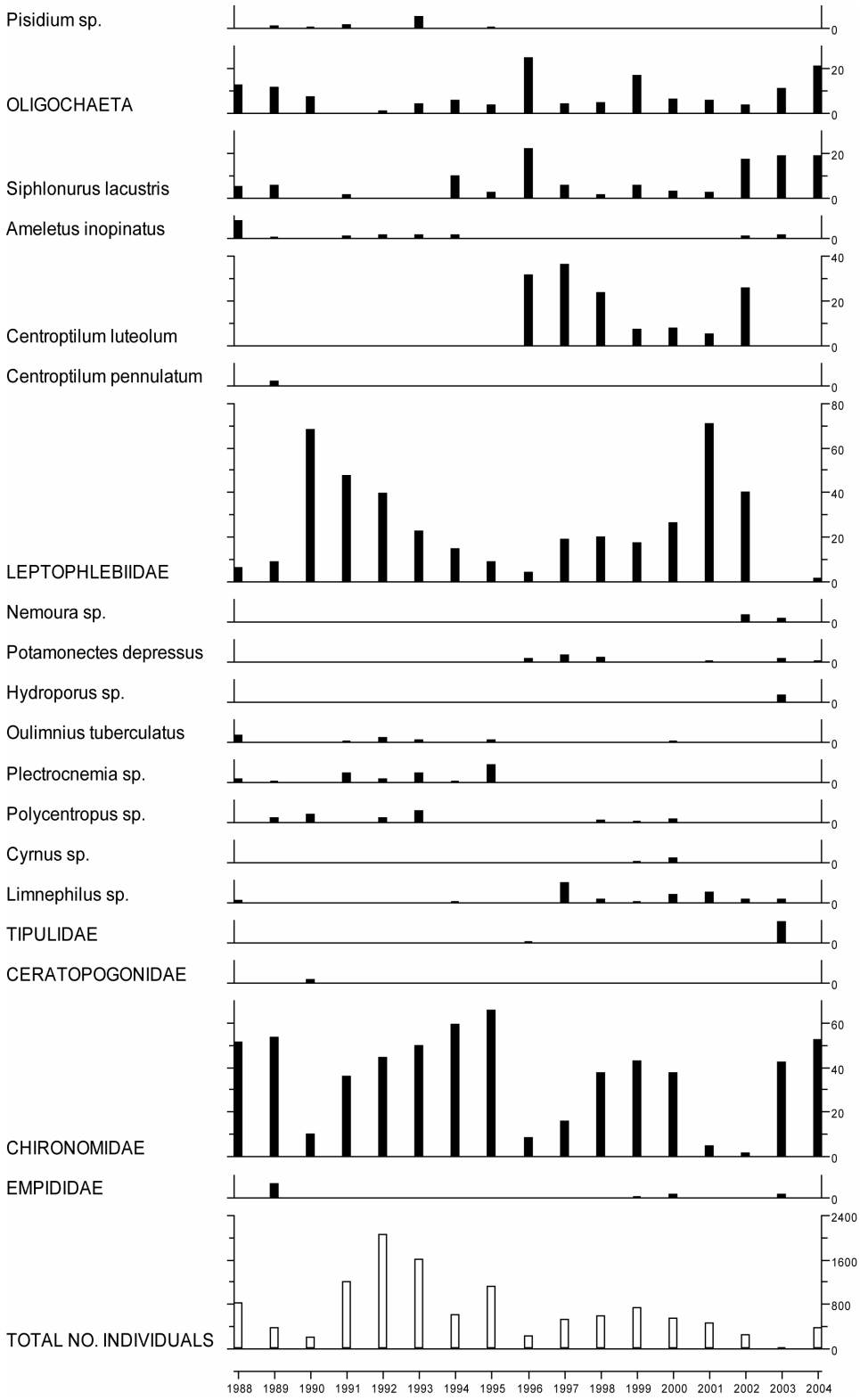
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	6.39	6.14	0.49	-0.01	0.43
ANC	42.66	20.08	13.00	0.41	0.34
Ca	42.53	33.83	10.25	0.00	0.40
Mg	63.67	51.67	14.24	0.00	0.49
Na	239.6	182.6	41.48	-0.04	0.15
K	9.51	6.24	0.39	**-0.01**	**0.05**
Sol.Al	0.46	0.37	0.10	0.00	0.70

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.11	0.07	0.00	0.00	0.41
Cl	273.9	294.8	196.6	-0.03	0.60
SO_4	41.15	35.42	11.02	**-0.03**	**0.01**
XSO_4	12.38	4.45	9.77	**-0.02**	**0.02**
NO_3	2.80	3.00	1.68	0.00	0.52
Si	33.21	32.14	14.50	0.00	0.36
DOC	124.6	163.9	50.23	**0.13**	**0.00**

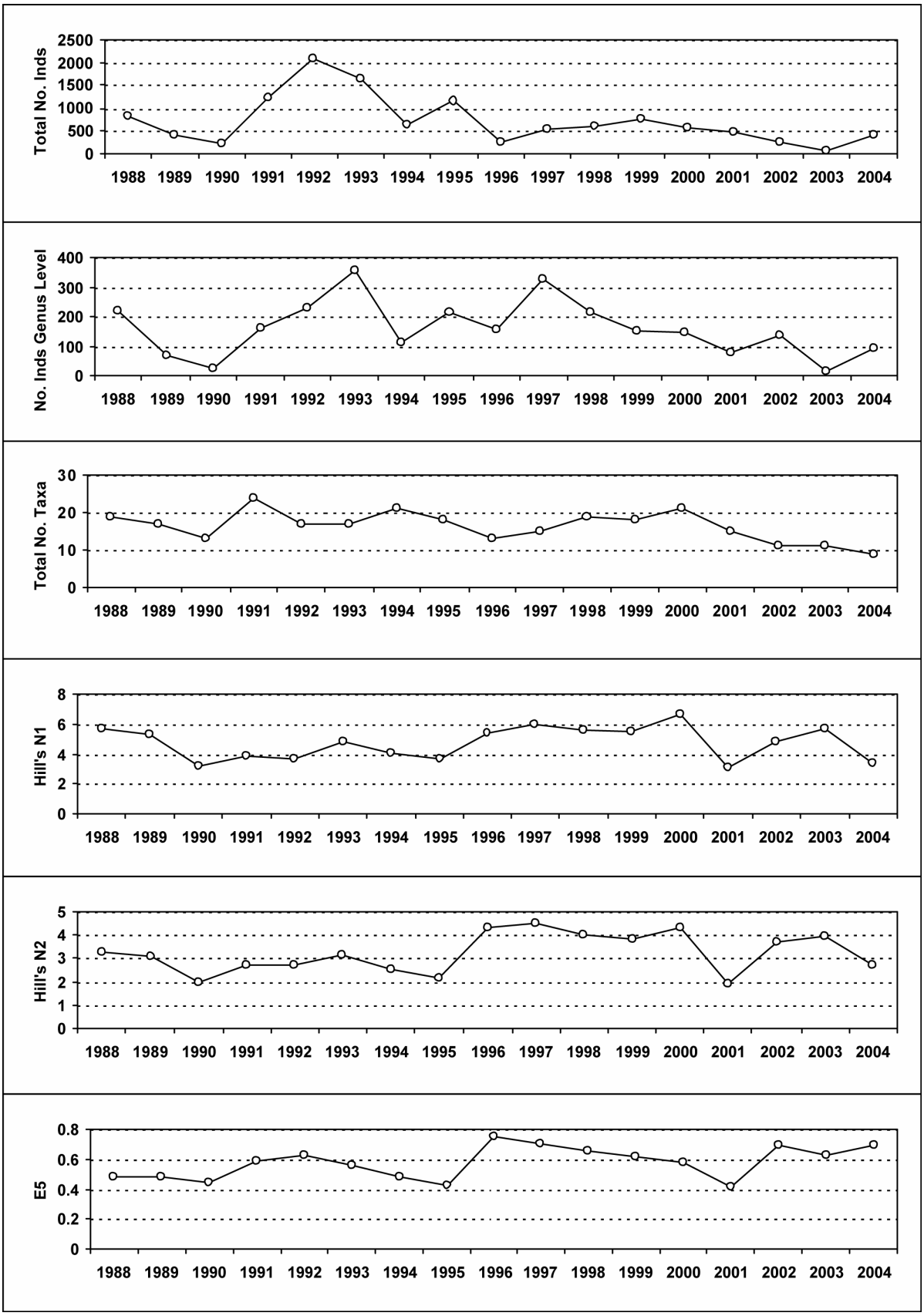
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol l^{-1}$)

7.1.2 Macroinvertebrate data

7.1.2.1 Percentage abundance summary, Loch Coire nan Arr

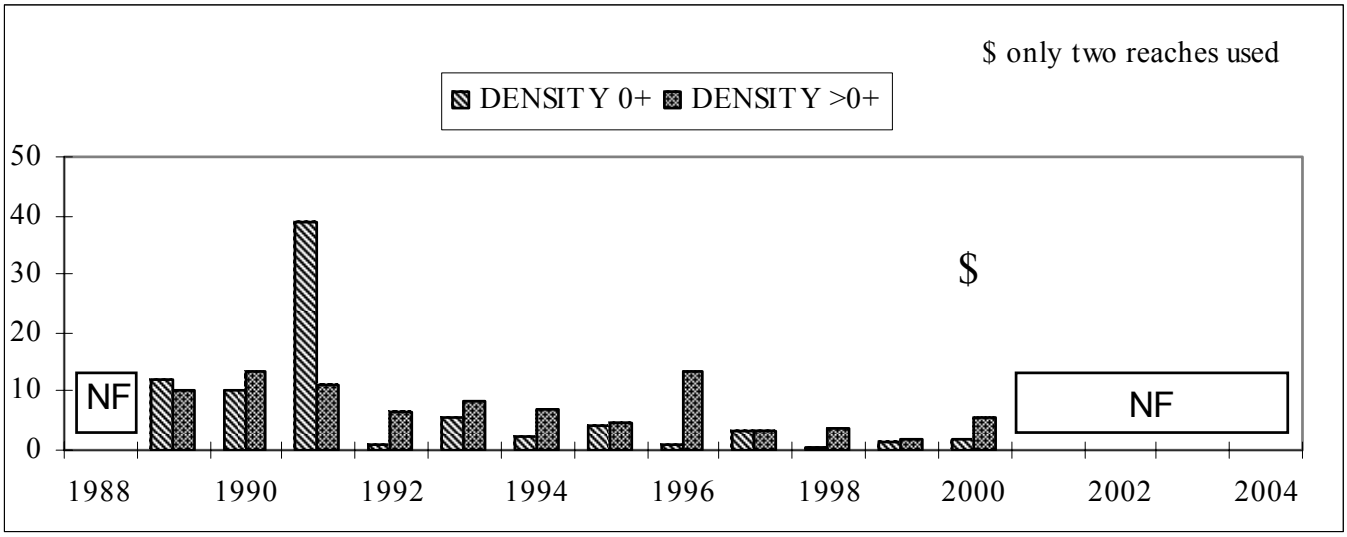


7.1.2.2 Summary statistics, Loch Coire nan Arr



7.1.3 Fish data (for outflow stream)

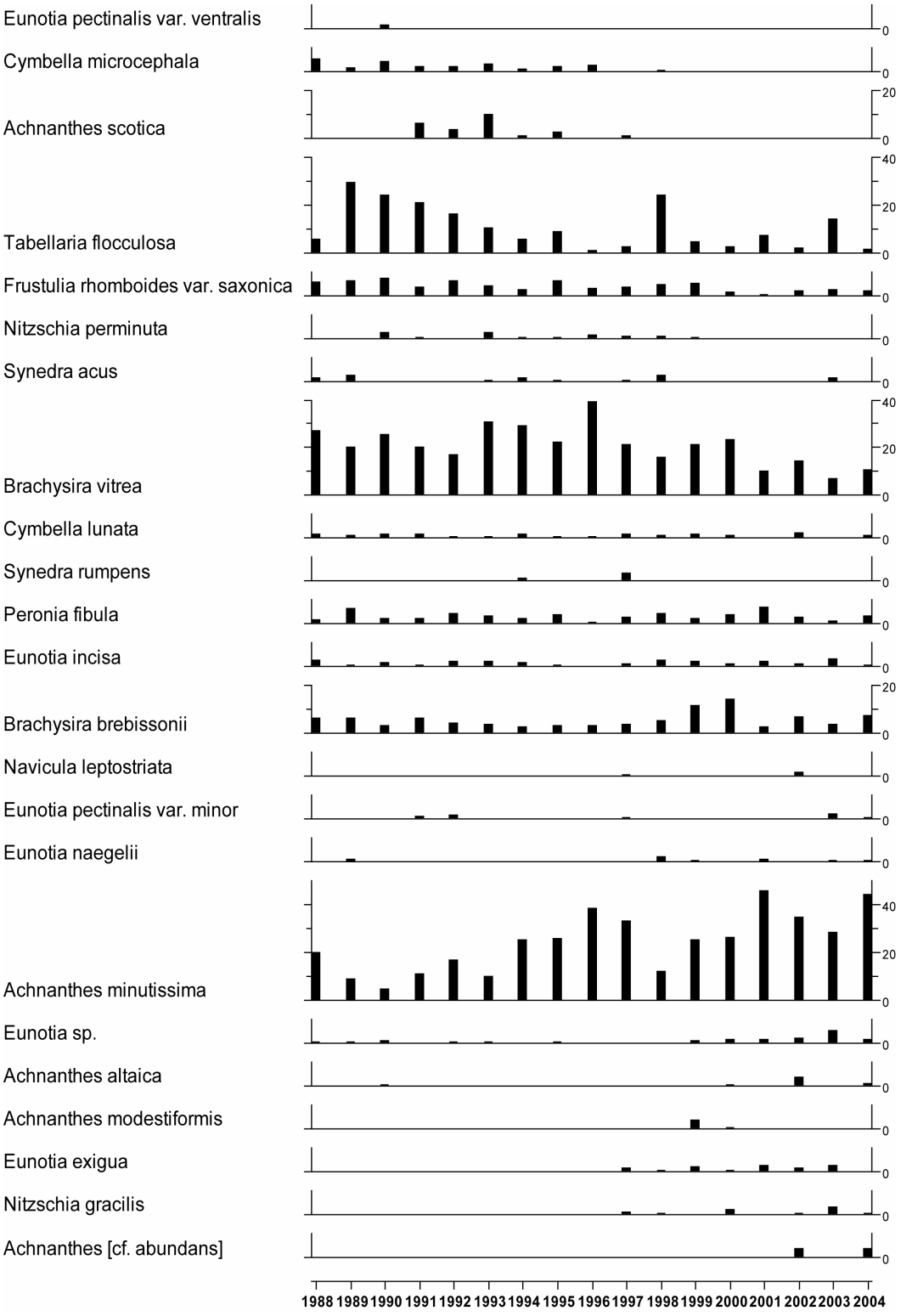
7.1.3.1 Summary of mean Trout density (numbers 100m^{-2}), Loch Coire nan Arr



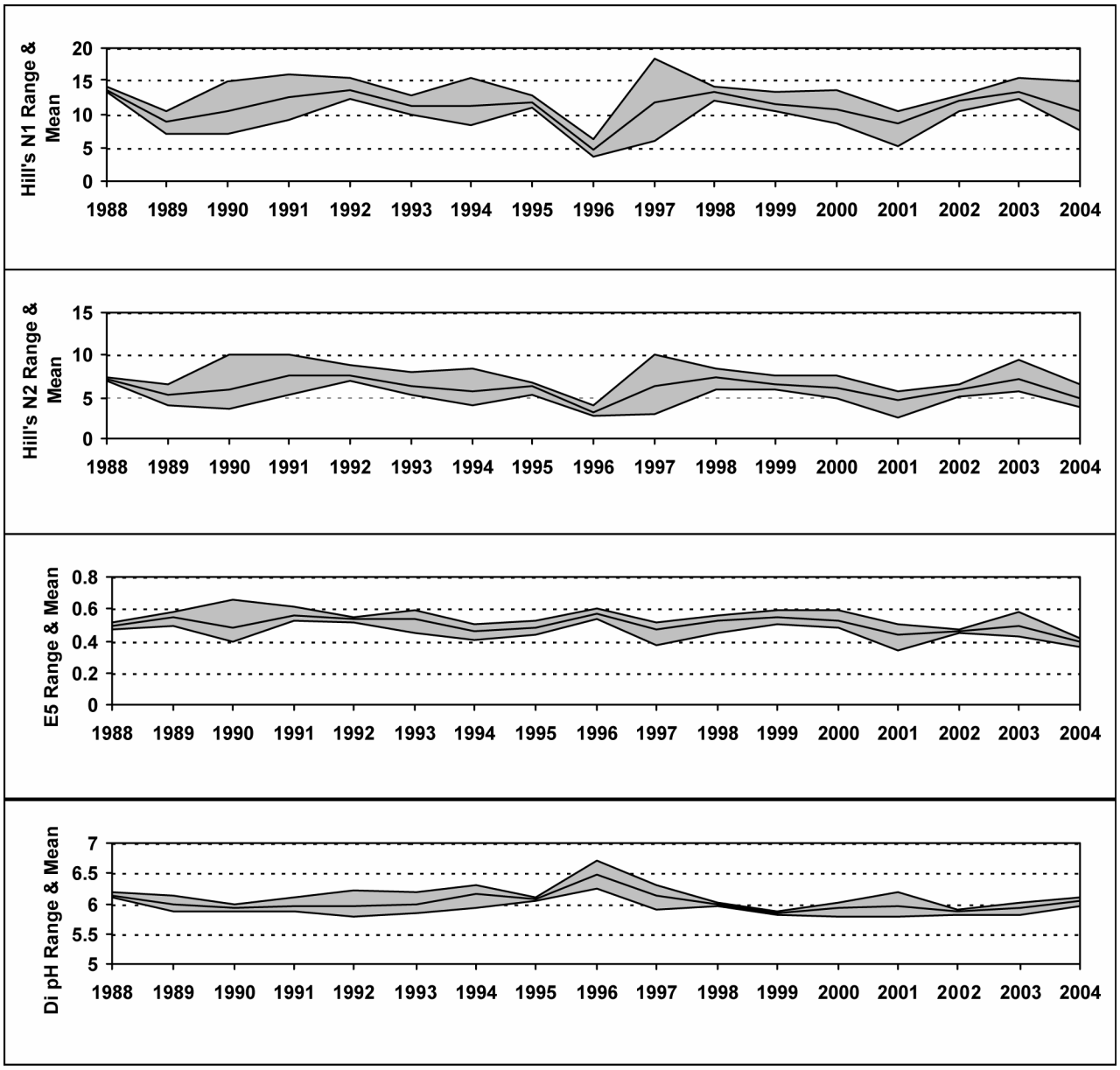
NF = Not fished

7.1.4 Epilithic diatom data

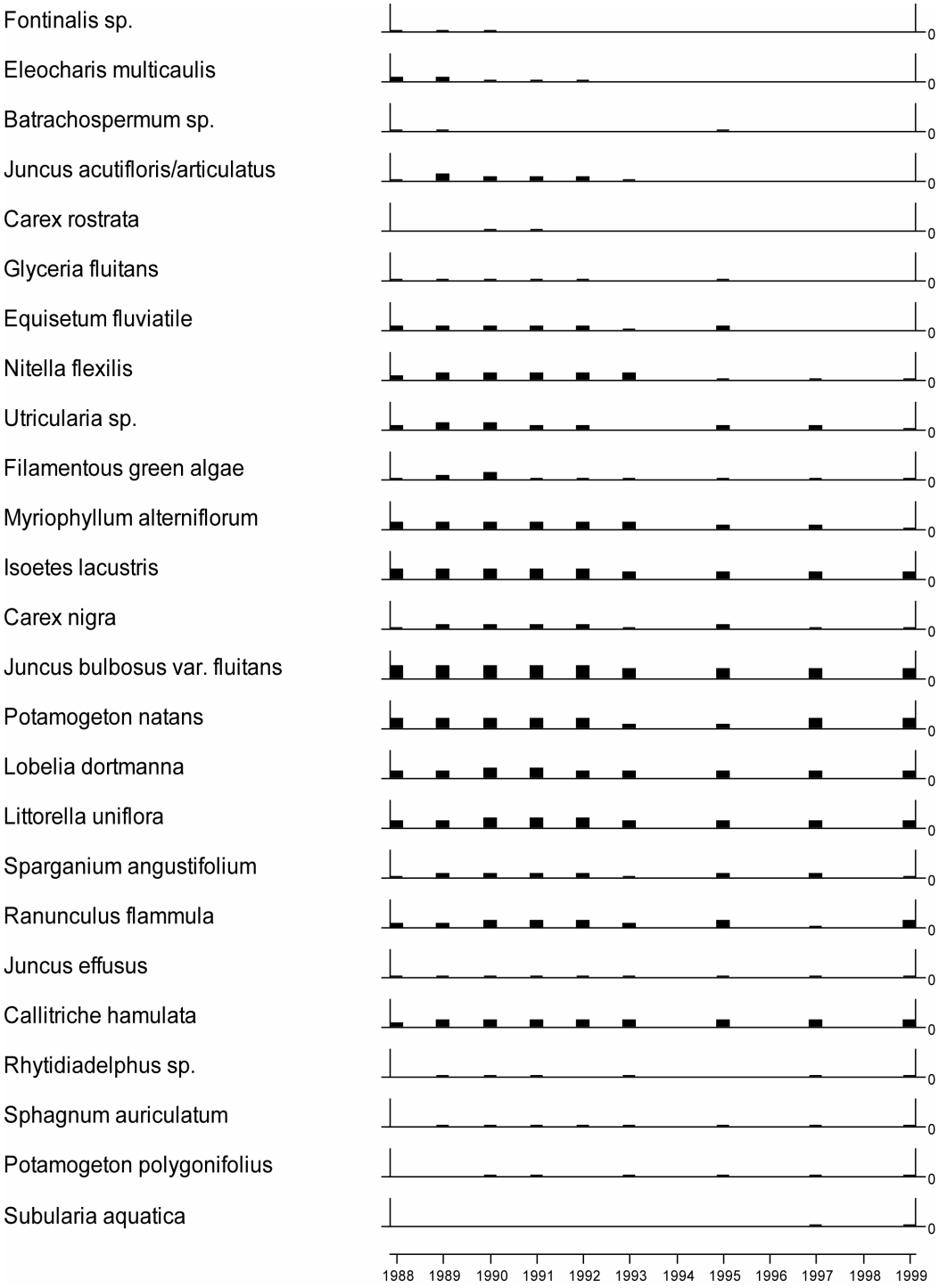
7.1.4.1 Percentage abundance summary, Loch Coire nan Arr



7.1.4.2 Summary statistics, Loch Coire nan Arr



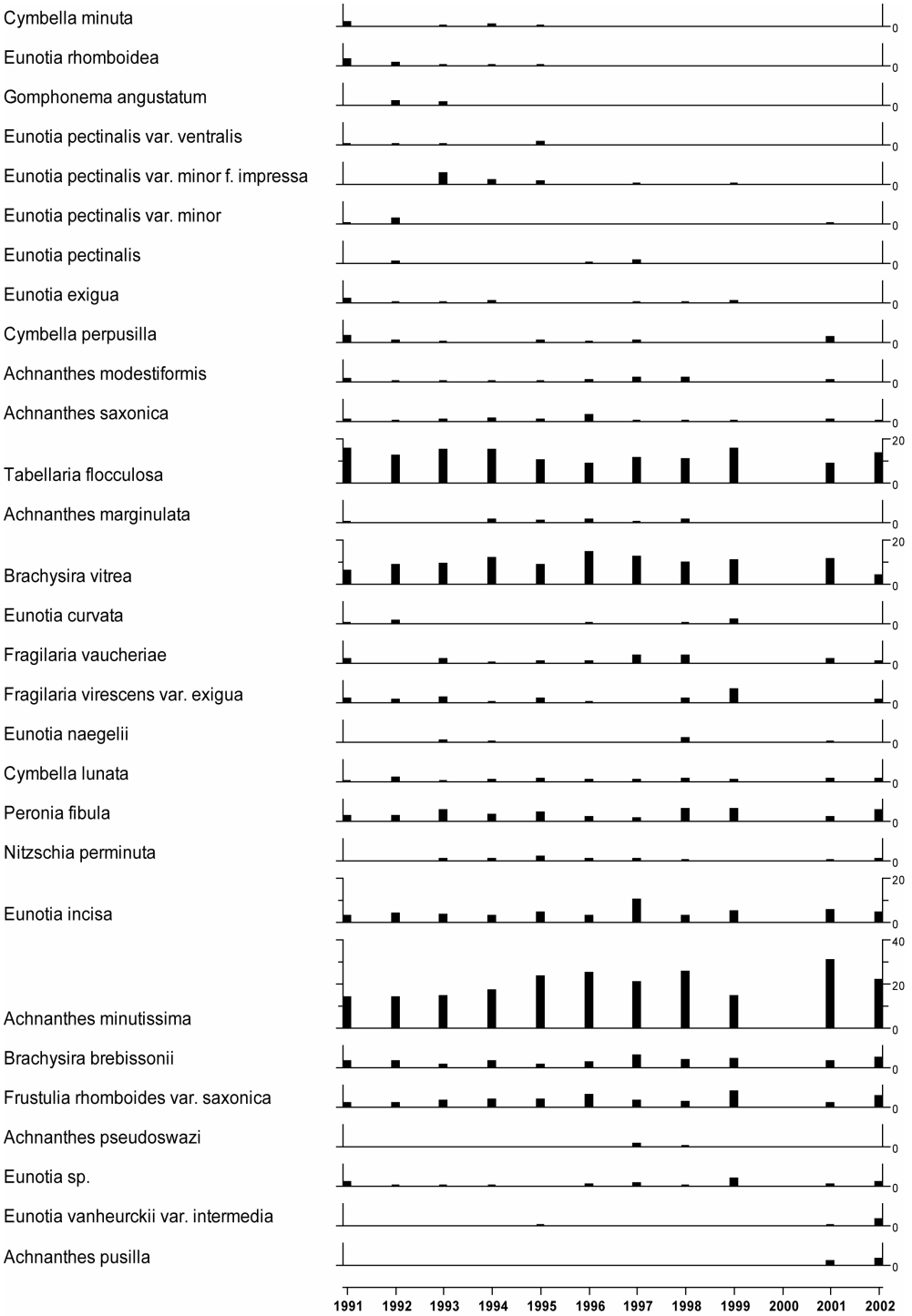
7.1.5 Aquatic macrophyte data, Loch Coire nan Arr



Aquatic macrophytes no longer surveyed after 1999.

7.1.6 Sediment trap data, Loch Coire nan Arr

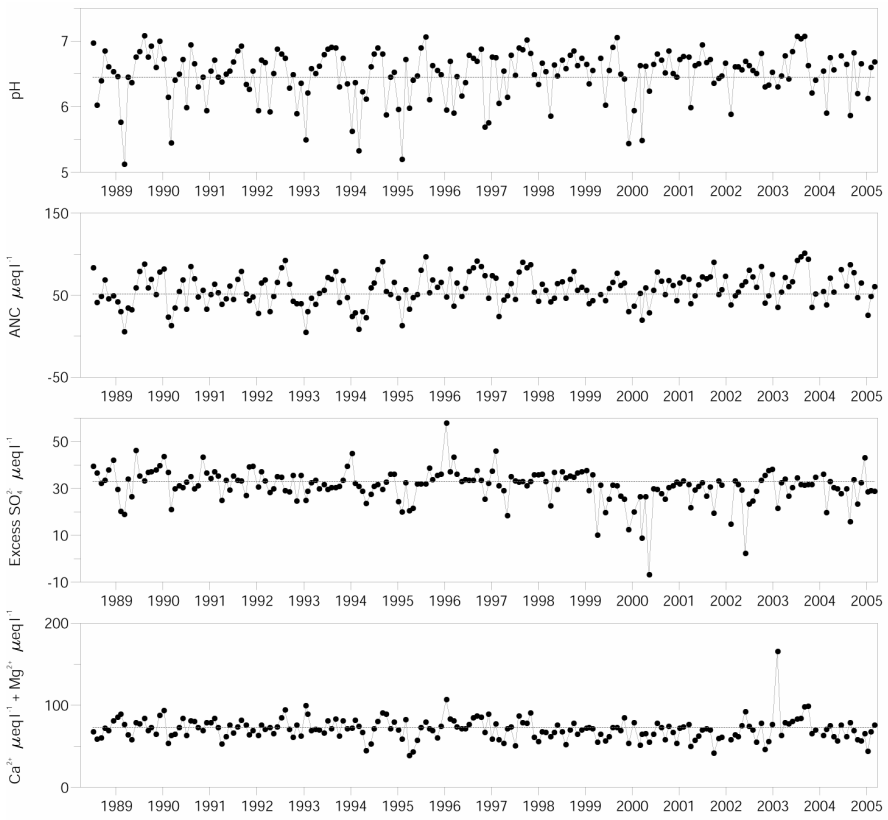
Relative percentage frequency of diatom taxa.

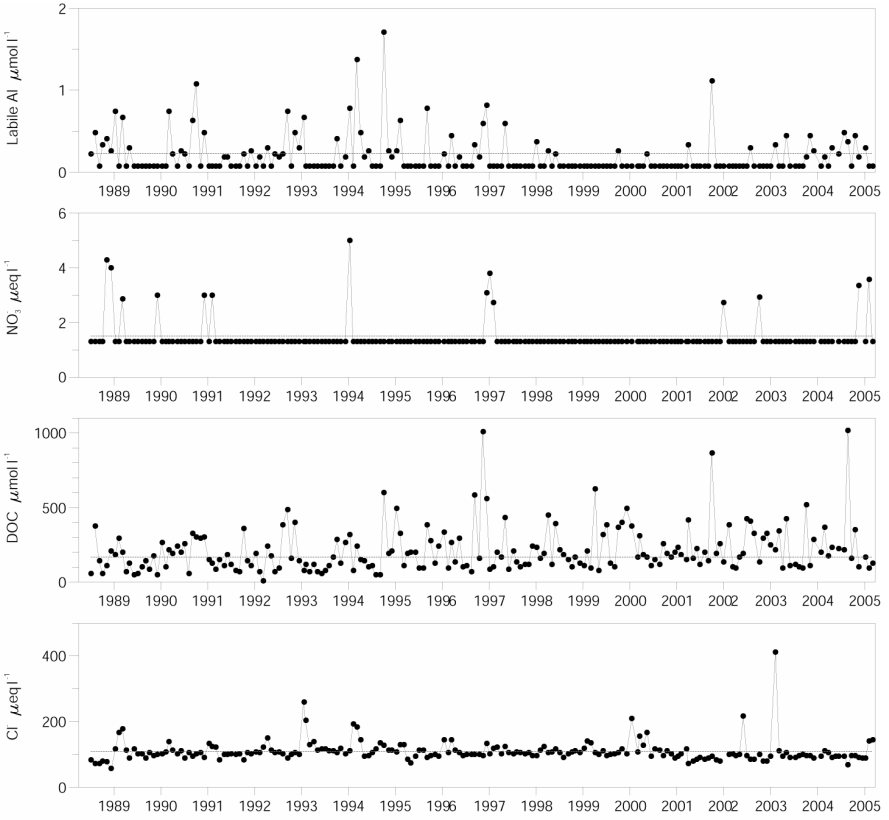


Sediment trap samples no longer collected after 2002.

7.2 Allt a'Mharcaidh

7.2.1 Spot sampled chemistry data





Determinand statistics

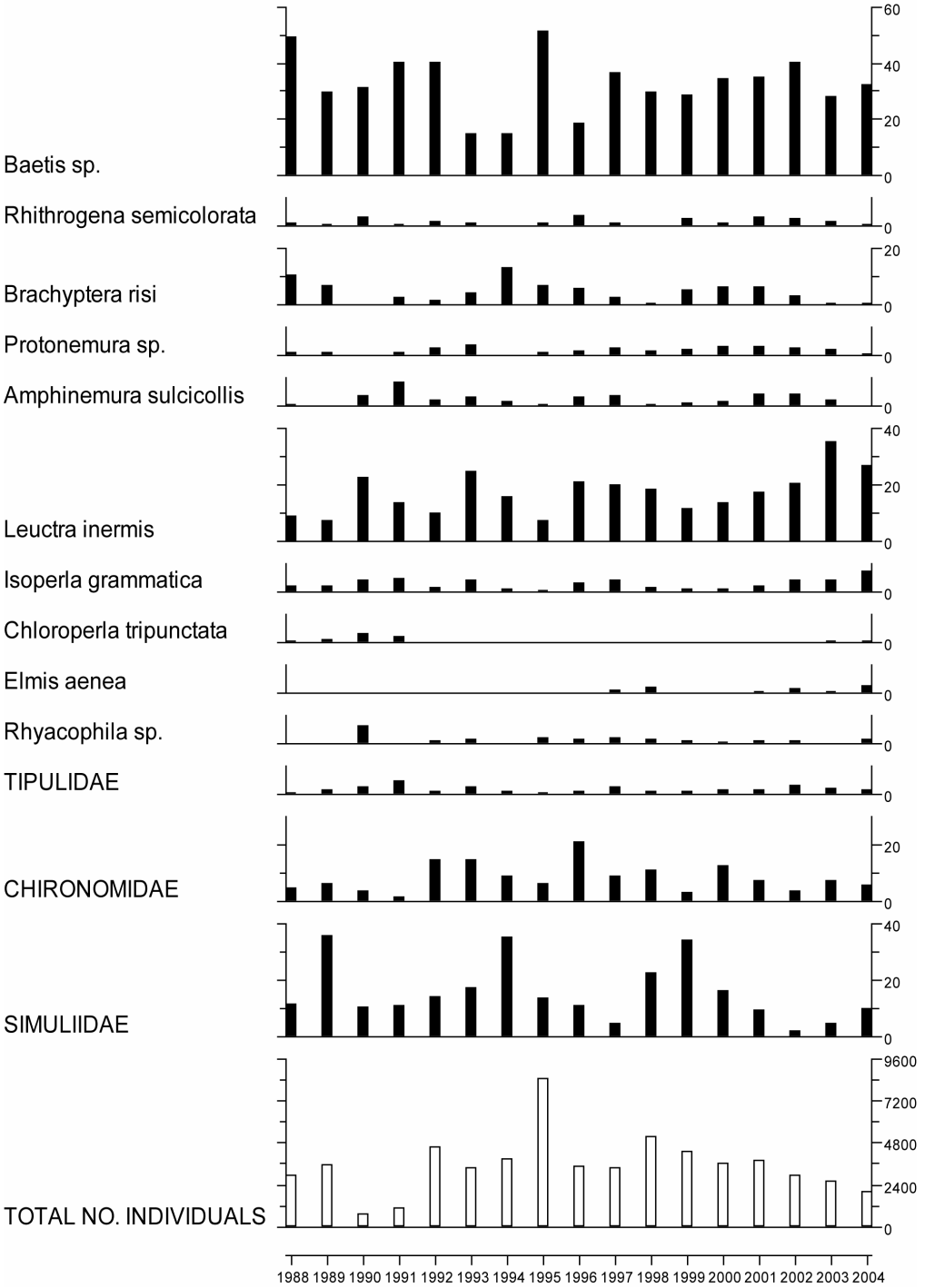
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	6.45	6.49	0.32	0.00	0.60
ANC	51.57	60.37	18.43	**0.84**	**0.01**
Ca	42.41	37.04	6.55	0.00	0.27
Mg	30.39	26.60	3.67	0.00	0.07
Na	132.6	114.1	10.99	-0.01	0.16
K	6.75	5.13	0.67	**0.00**	**0.01**
Sol.Al	1.31	1.61	1.90	-0.15	0.70

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.23	0.25	0.15	0.00	0.31
Cl	108.4	98.12	21.91	-0.02	0.17
SO_4	44.41	39.58	6.99	**-0.02**	**0.01**
XSO_4	33.02	29.28	6.30	**-0.01**	**0.01**
NO_3	1.50	1.72	0.92	0.00	0.32
Si	170.8	188.3	30.06	0.02	0.08
DOC	167.7	268.3	273.9	**0.06**	**0.01**

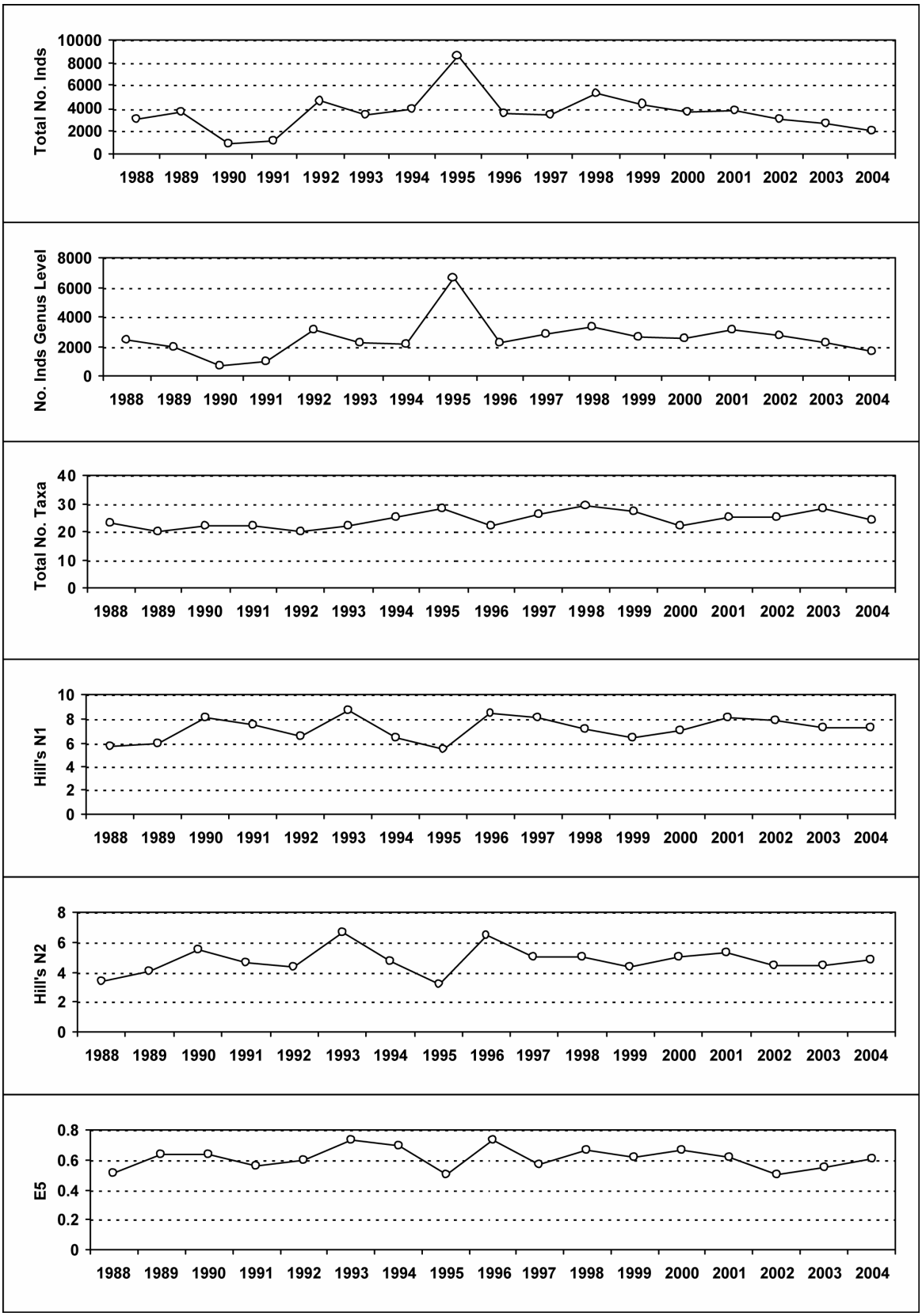
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.2.2 Macroinvertebrate data

7.2.2.1 Percentage abundance summary, Allt a'Mharcaidh

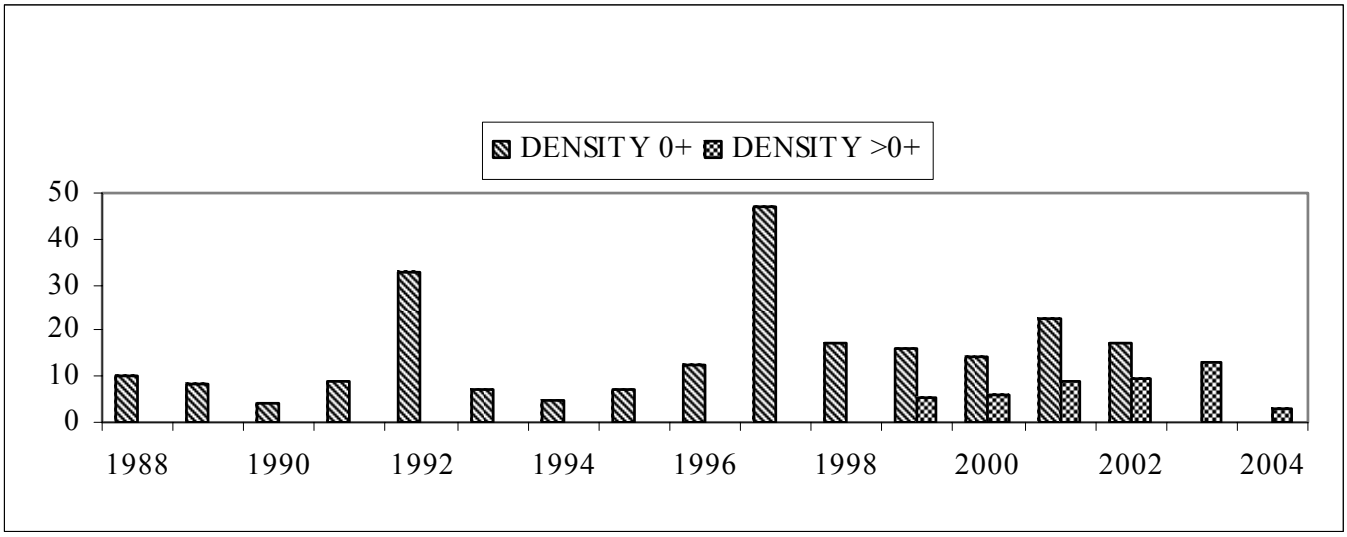


7.2.2.2 Summary statistics, Allt a'Mharcaidh

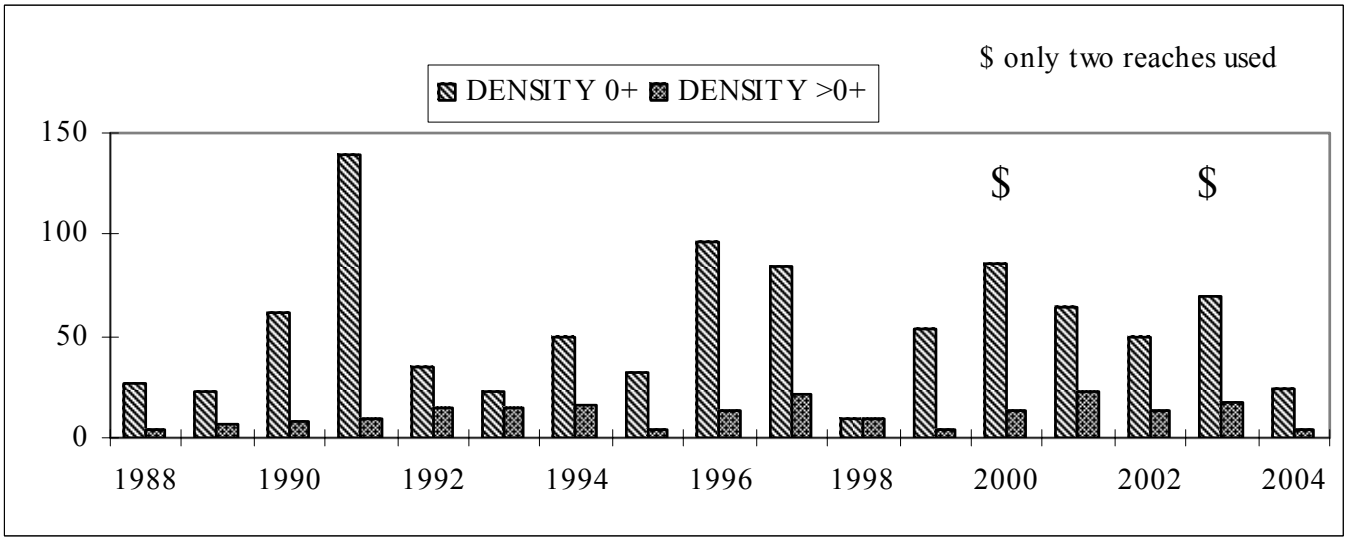


7.2.3 Fish data

7.2.3.1 Summary of mean Salmon density (total numbers 100m^{-2}), Allt a'Mharcaidh

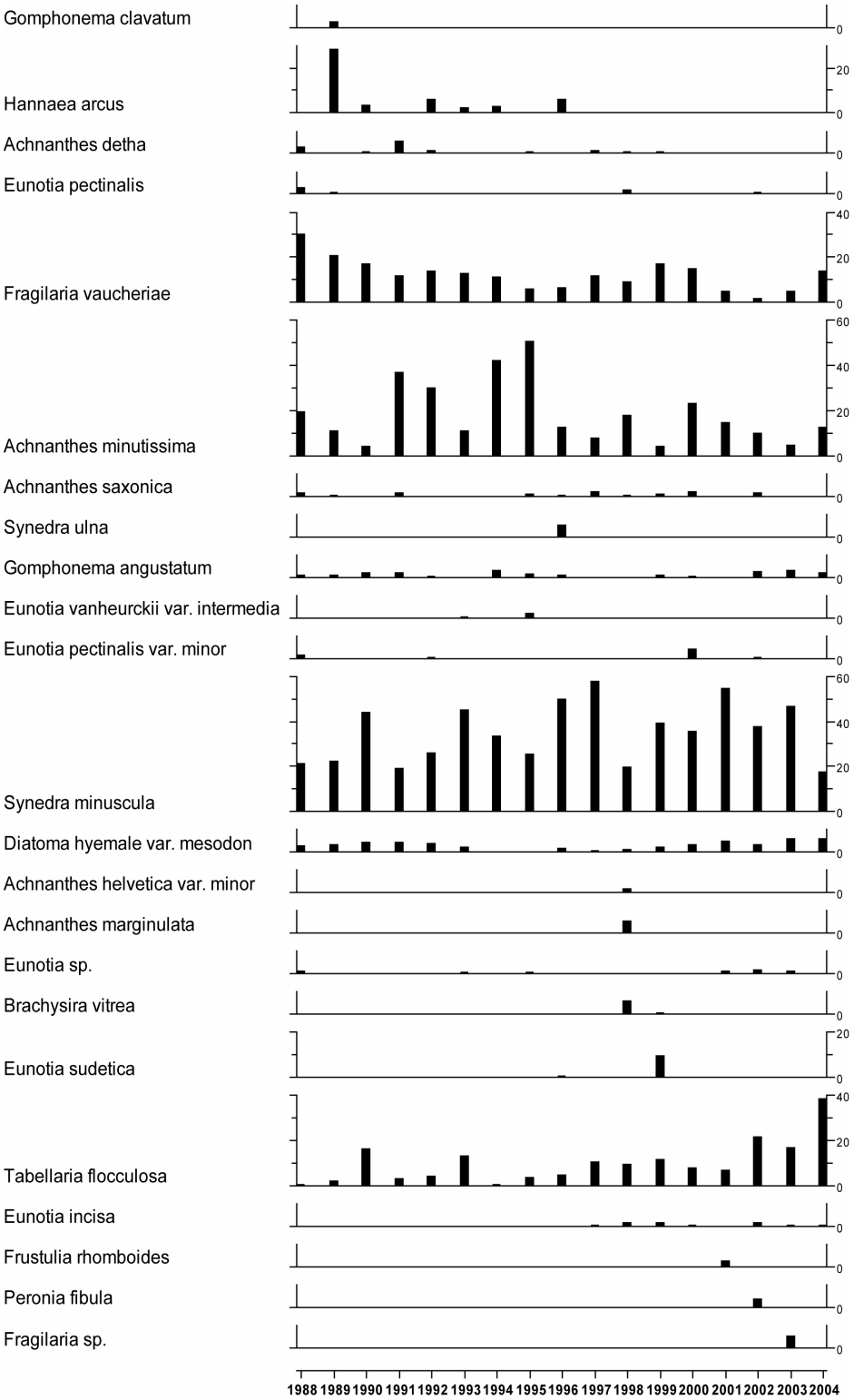


7.2.3.2 Summary of mean Trout density (numbers 100m^{-2}), Allt a'Mharcaidh

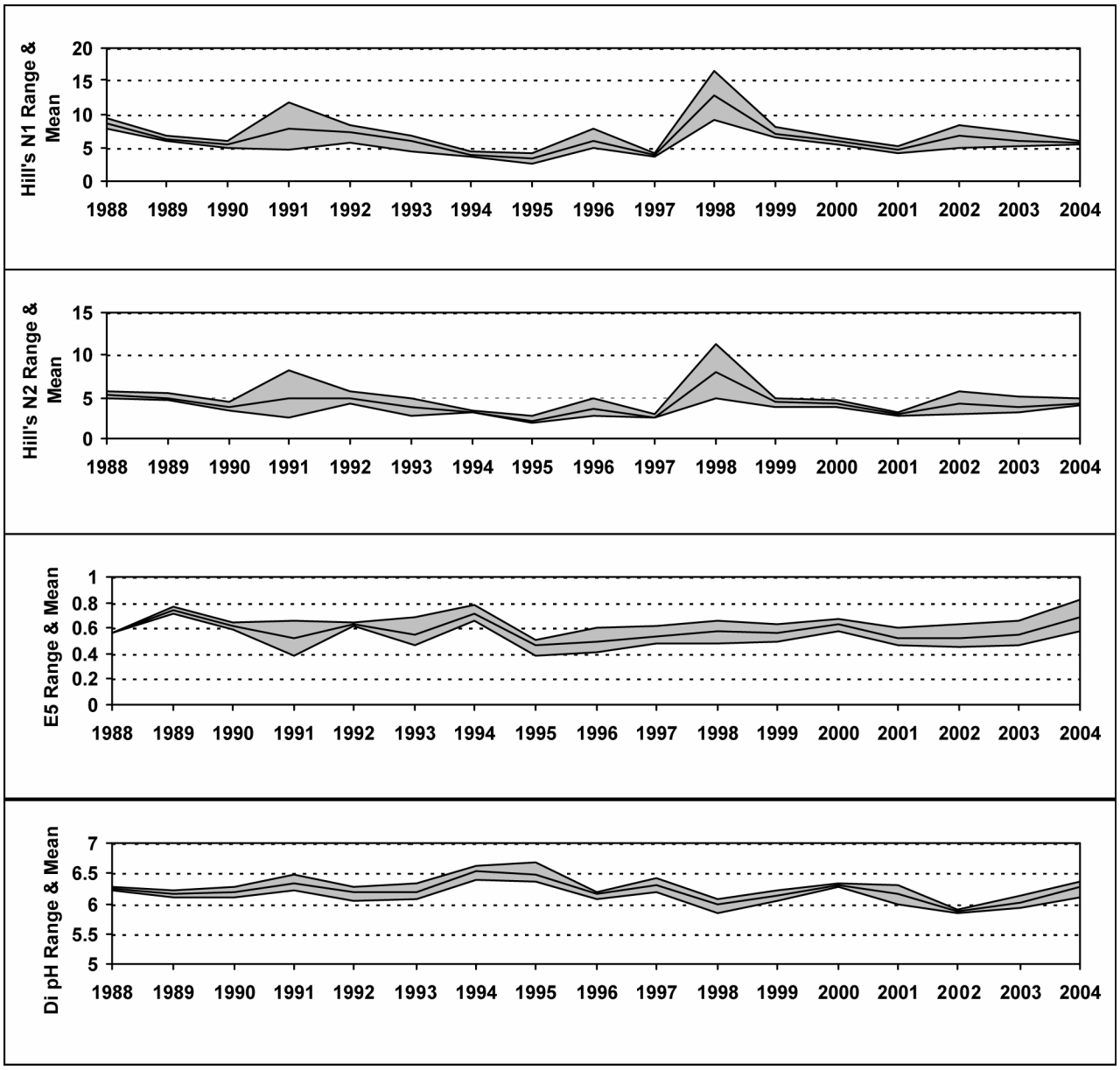


7.2.4 Epilithic diatom data

7.2.4.1 Percentage abundance summary, Allt a'Mharcaidh

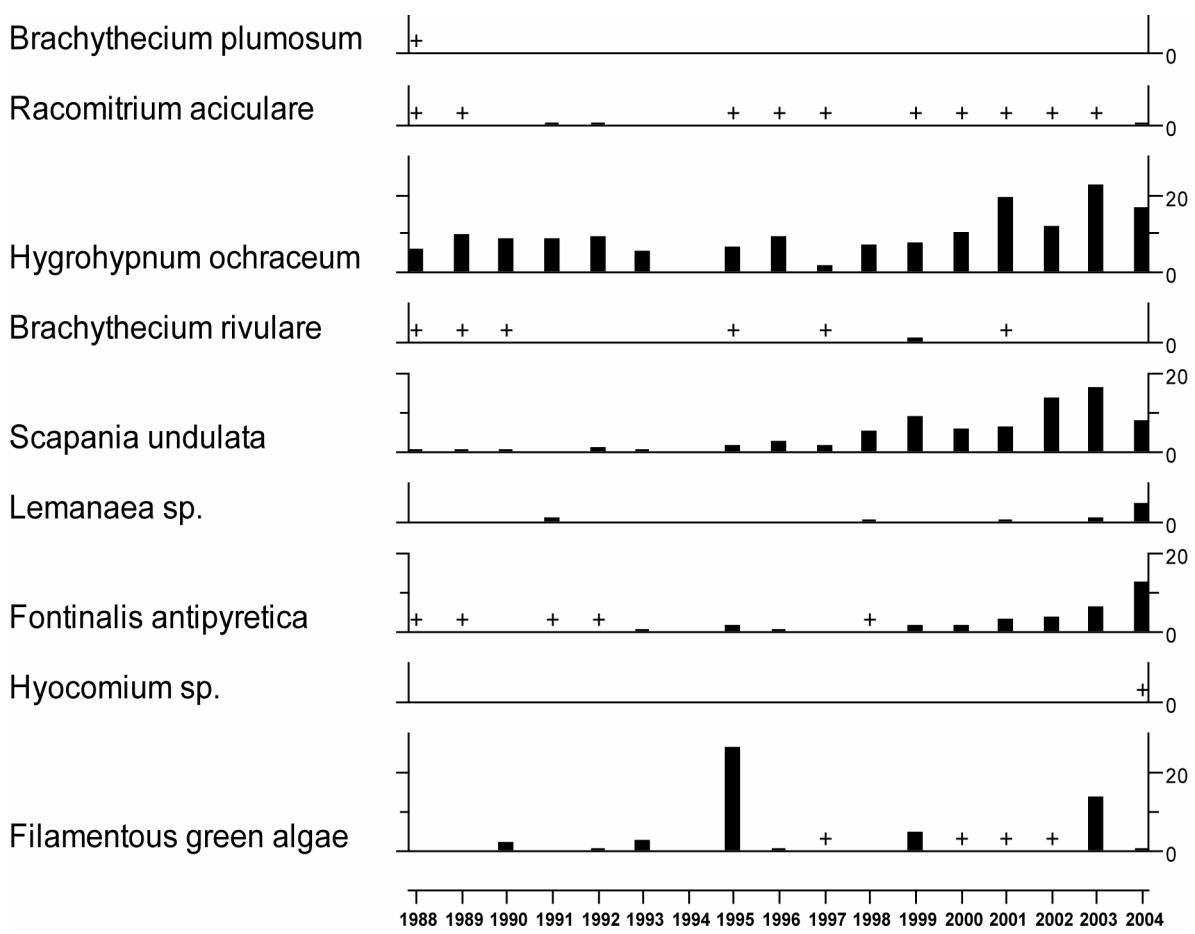


7.2.4.2 Summary statistics, Allt a'Mharcaidh



7.2.5 Aquatic macrophyte data, Allt a'Mharcaidh

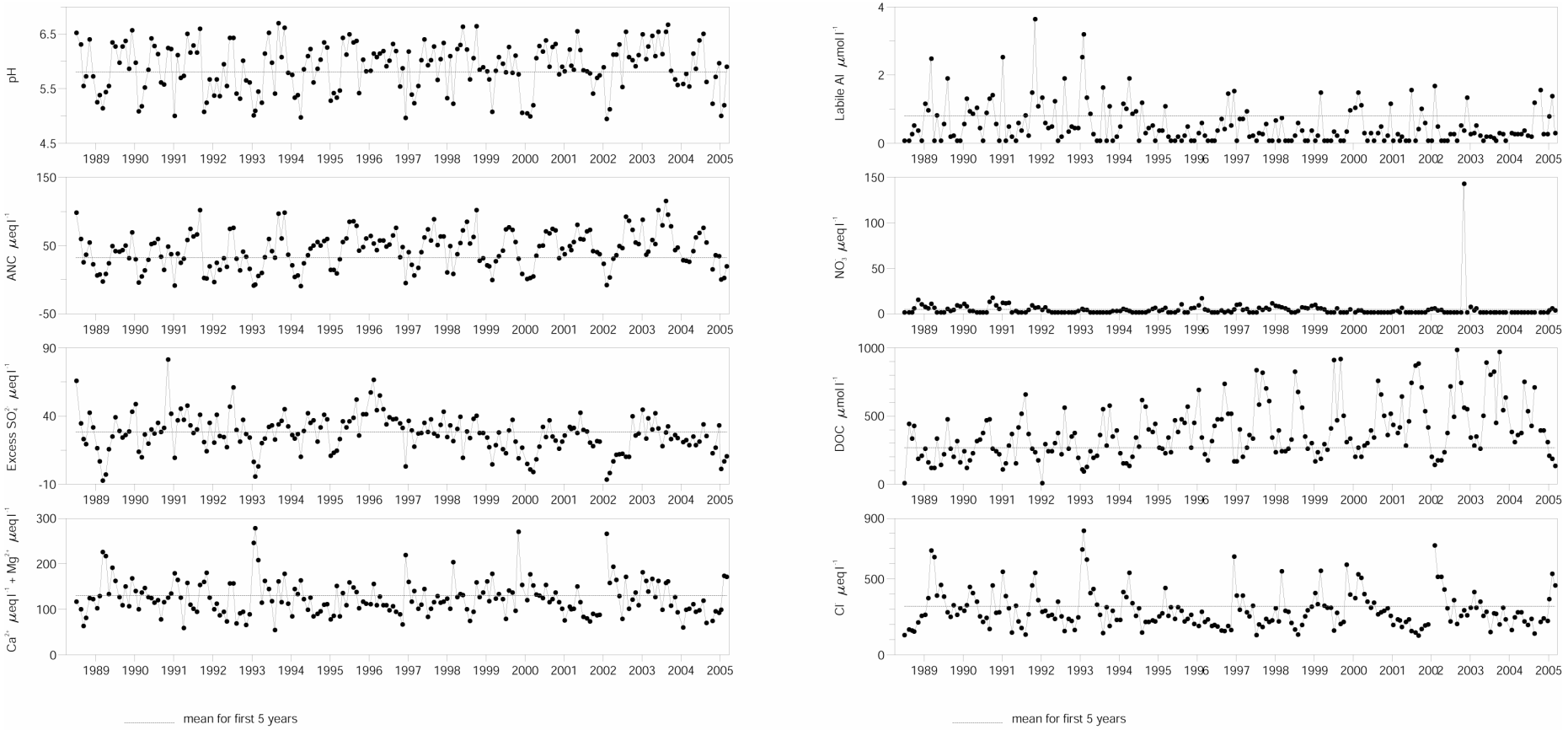
Percentage Species Cover



+ Represents <0.25% abundance

7.3 Allt na Coire nan Con

7.3.1 Spot sampled chemistry data



Determinand statistics

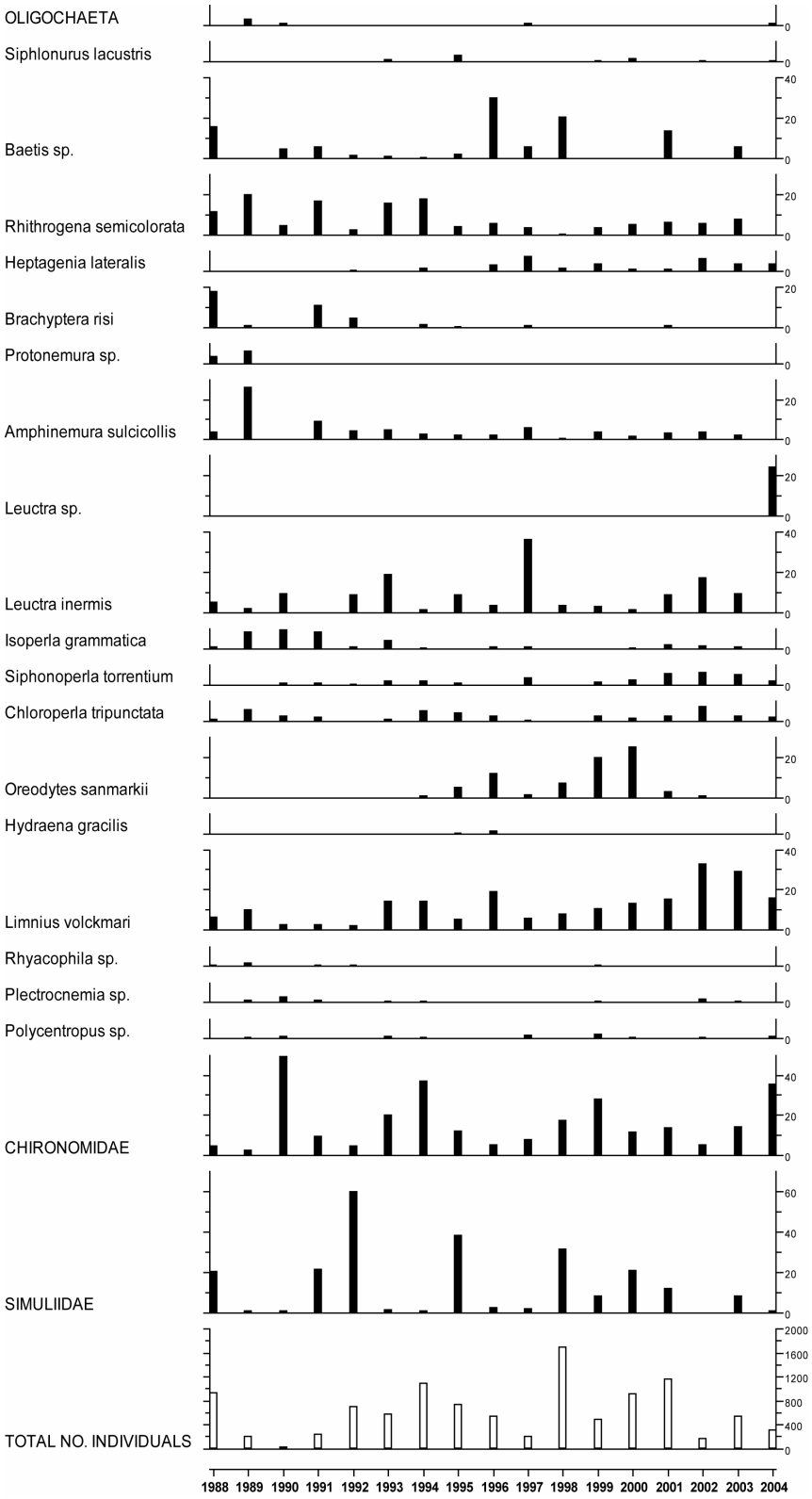
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.81	5.77	0.49	0.00	0.32
ANC	32.53	36.96	26.23	**1.31**	**0.01**
Ca	58.97	47.41	12.88	-0.01	0.49
Mg	70.89	60.98	22.85	0.00	0.62
Na	272.0	224.9	67.67	-0.04	0.38
K	9.14	6.11	1.93	**-0.01**	**0.01**
Sol.Al	2.40	2.55	1.07	0.24	0.62

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.80	0.61	0.52	-0.29	0.14
Cl	321.5	281.7	120.2	-0.07	0.51
SO_4	61.95	48.11	9.75	**-0.05**	**0.00**
XSO_4	28.19	18.52	10.39	-0.02	0.08
NO_3	4.91	2.07	1.44	**0.00**	**0.03**
Si	65.54	79.22	18.93	**0.02**	**0.02**
DOC	266.7	400.8	200.0	**0.19**	**0.00**

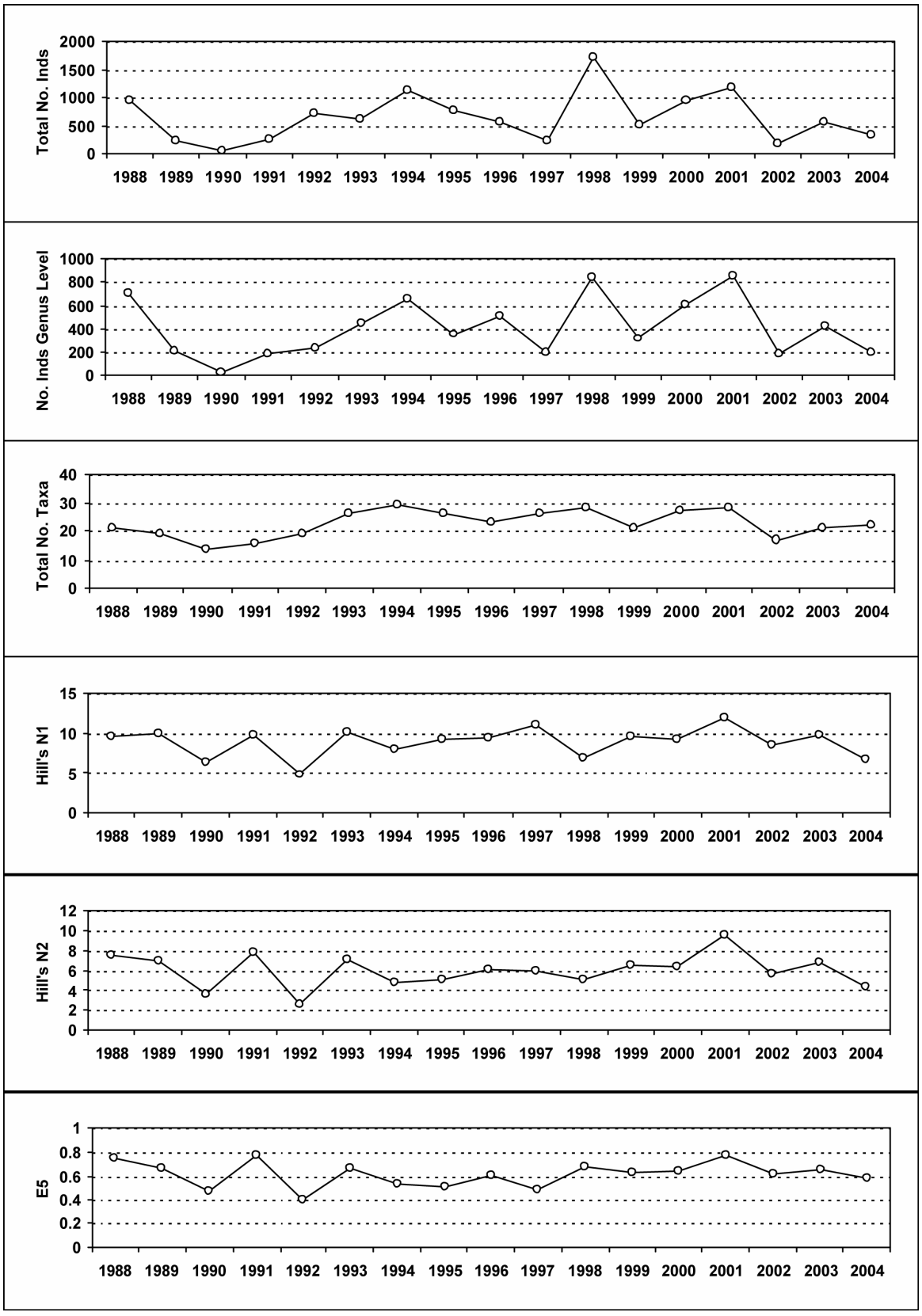
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.3.2 Macroinvertebrate data

7.3.2.1 Percentage abundance summary, Allt na Coire nan Con

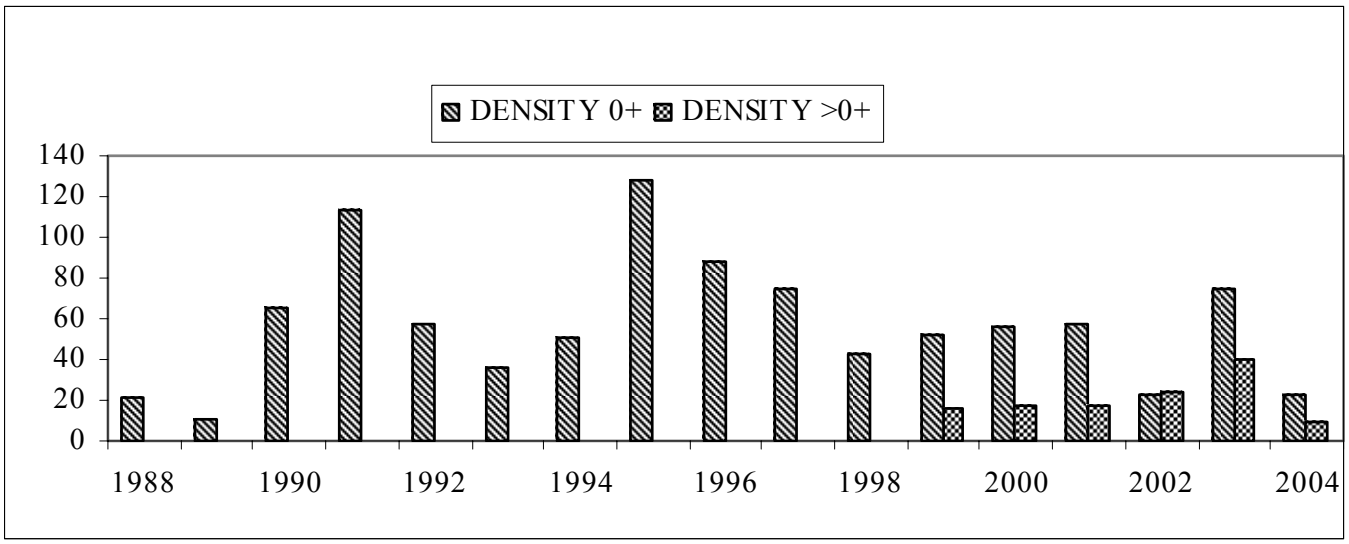


7.3.2.2 Summary statistics, Allt na Coire nan Con

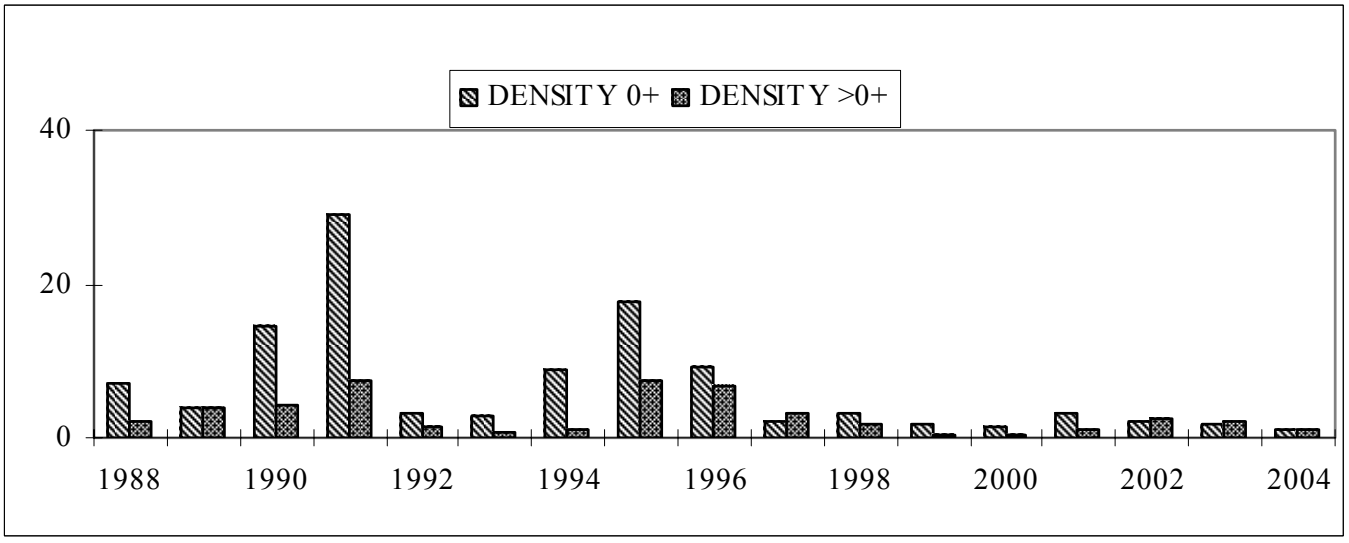


7.3.3 Fish data

7.3.3.1 Summary of mean Salmon density (total numbers 100m^{-2}), Allt na Coire nan Con

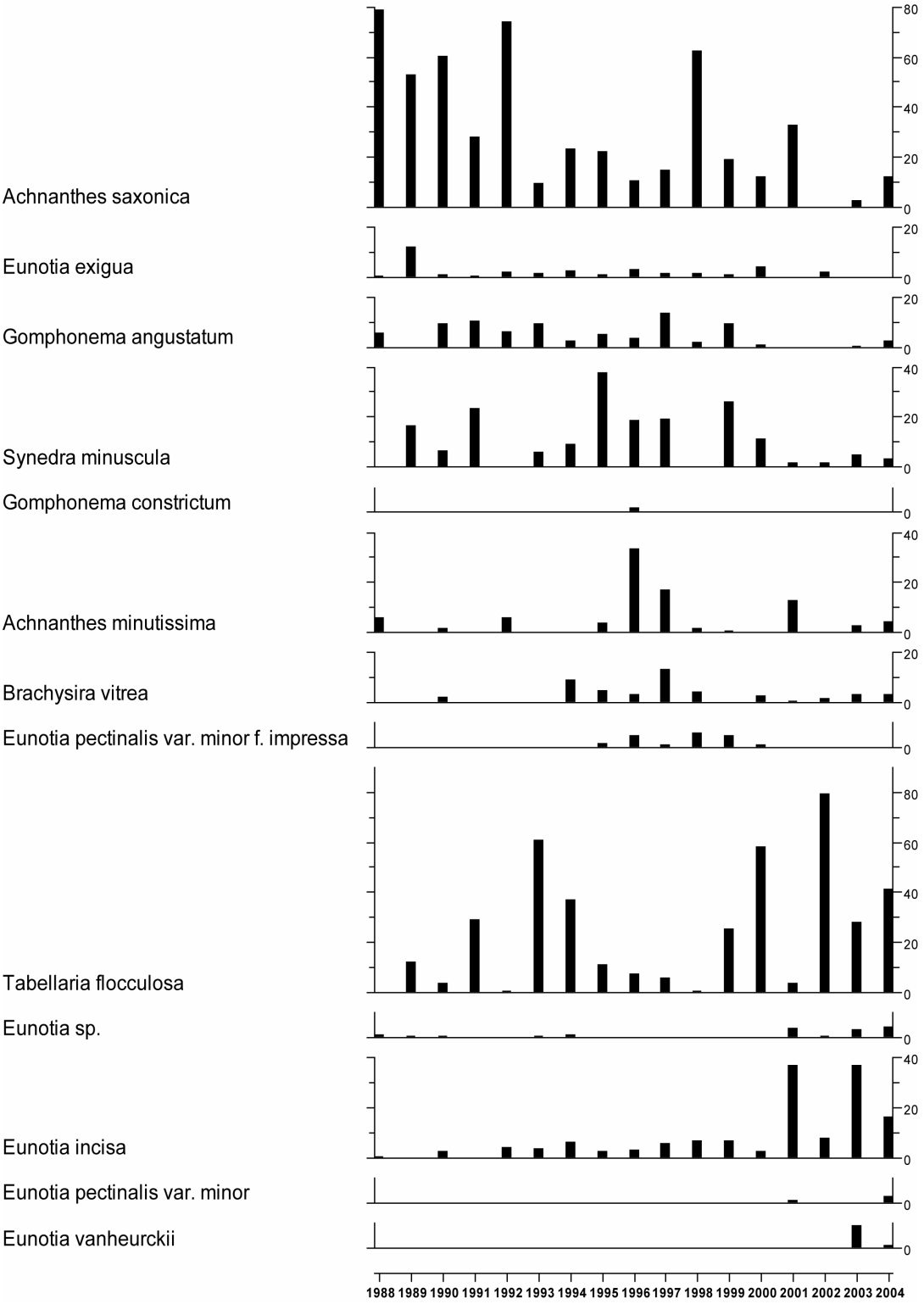


7.3.3.2 Summary of mean Trout density (numbers 100m^{-2}), Allt na Coire nan Con

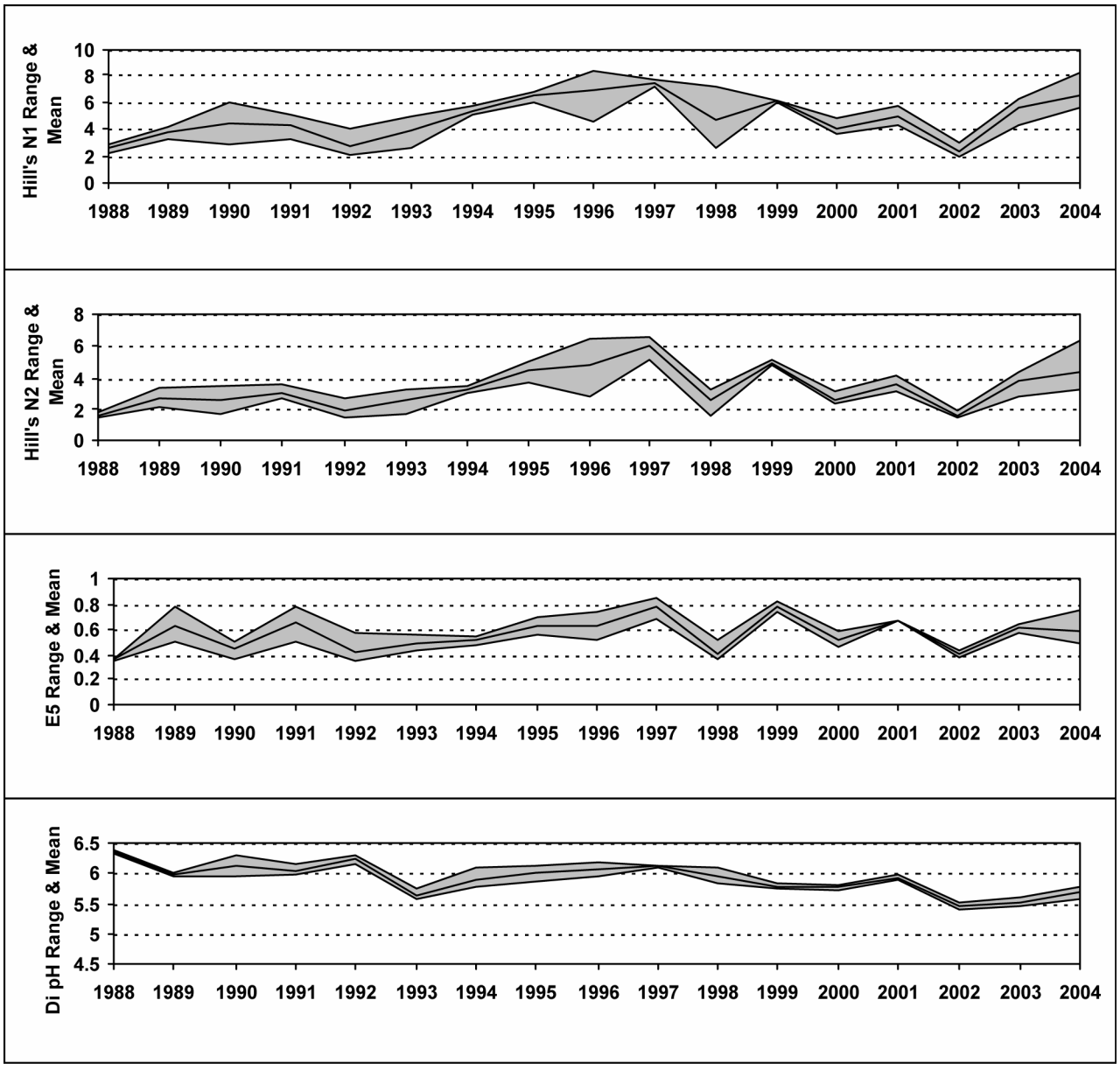


7.3.4 Epilithic diatom data

7.3.4.1 Percentage abundance summary, Allt na Coire nan Con

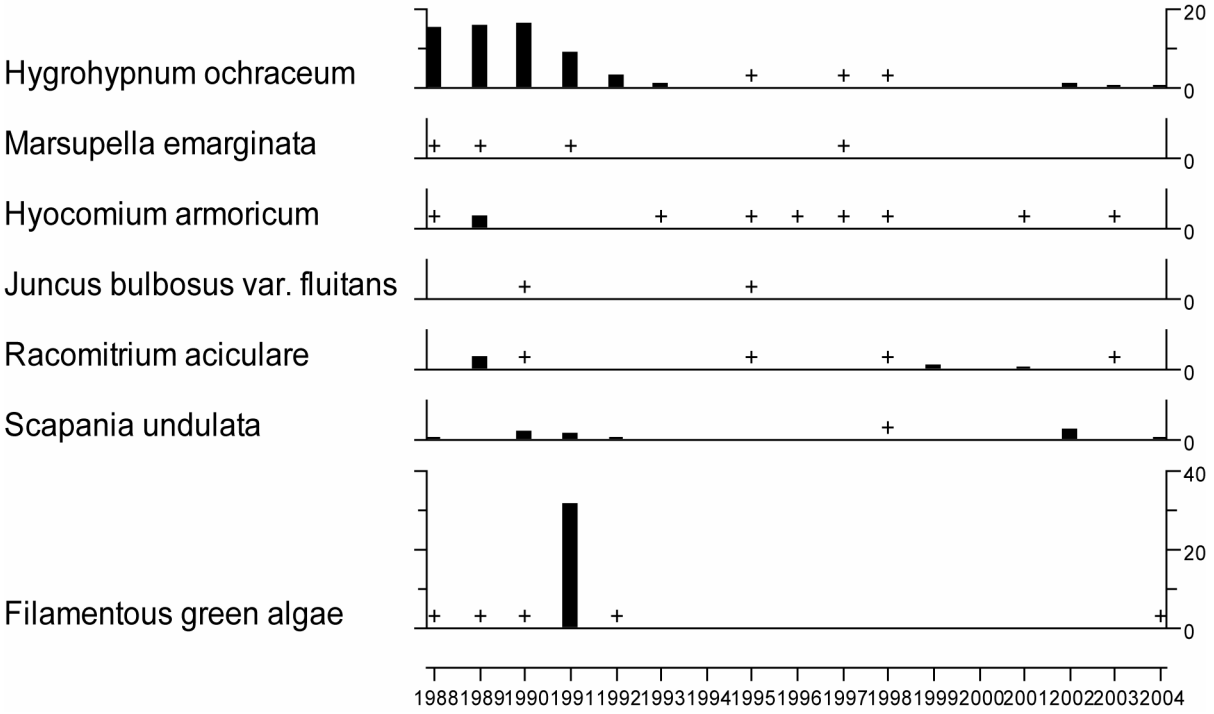


7.3.4.2 Summary statistics, Allt na Coire nan Con



7.3.5 Aquatic macrophyte data, Allt na Coire nan Con

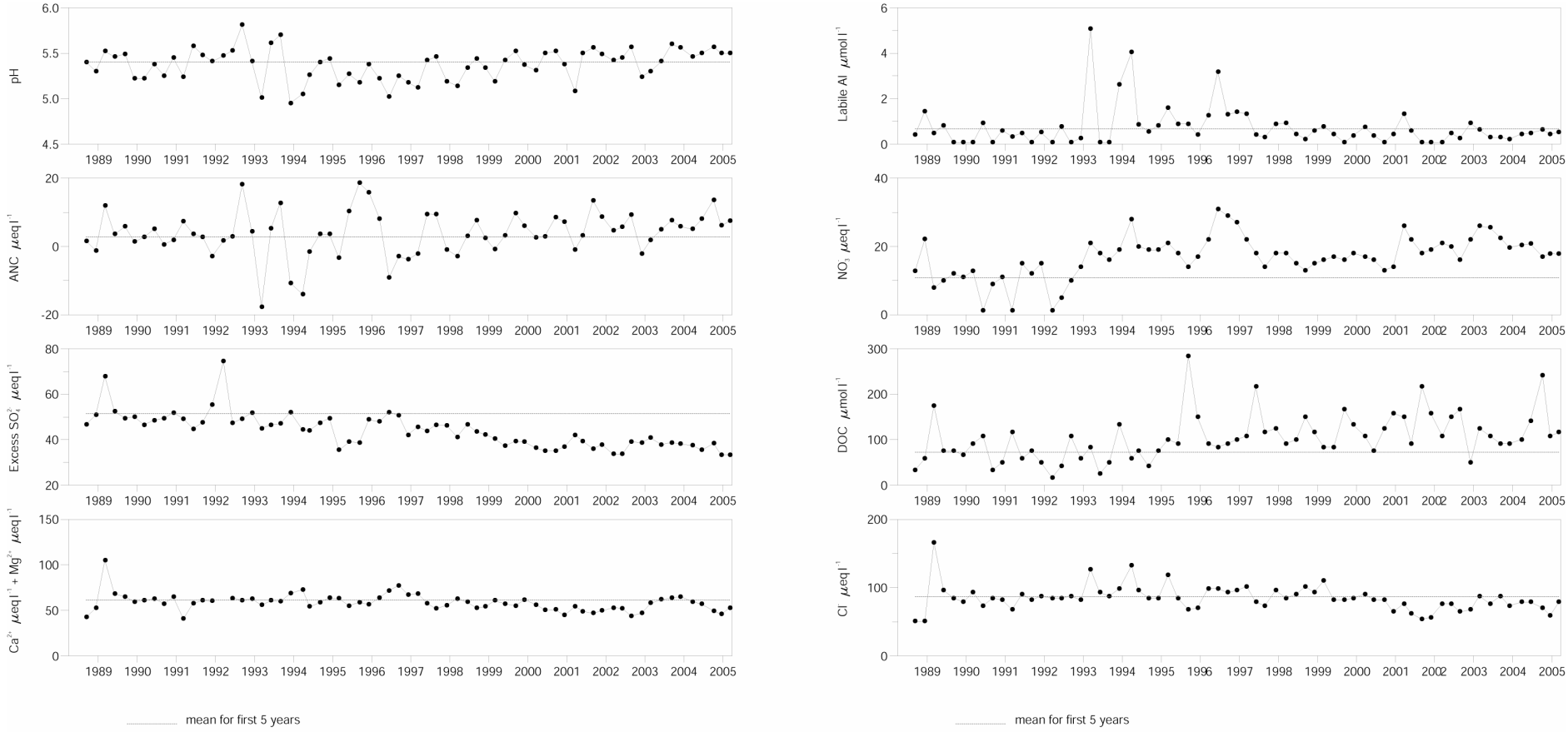
Percentage Species Cover



\+ Represents <0.25% abundance

7.4 Lochnagar

7.4.1 Spot sampled chemistry data



Determinand statistics

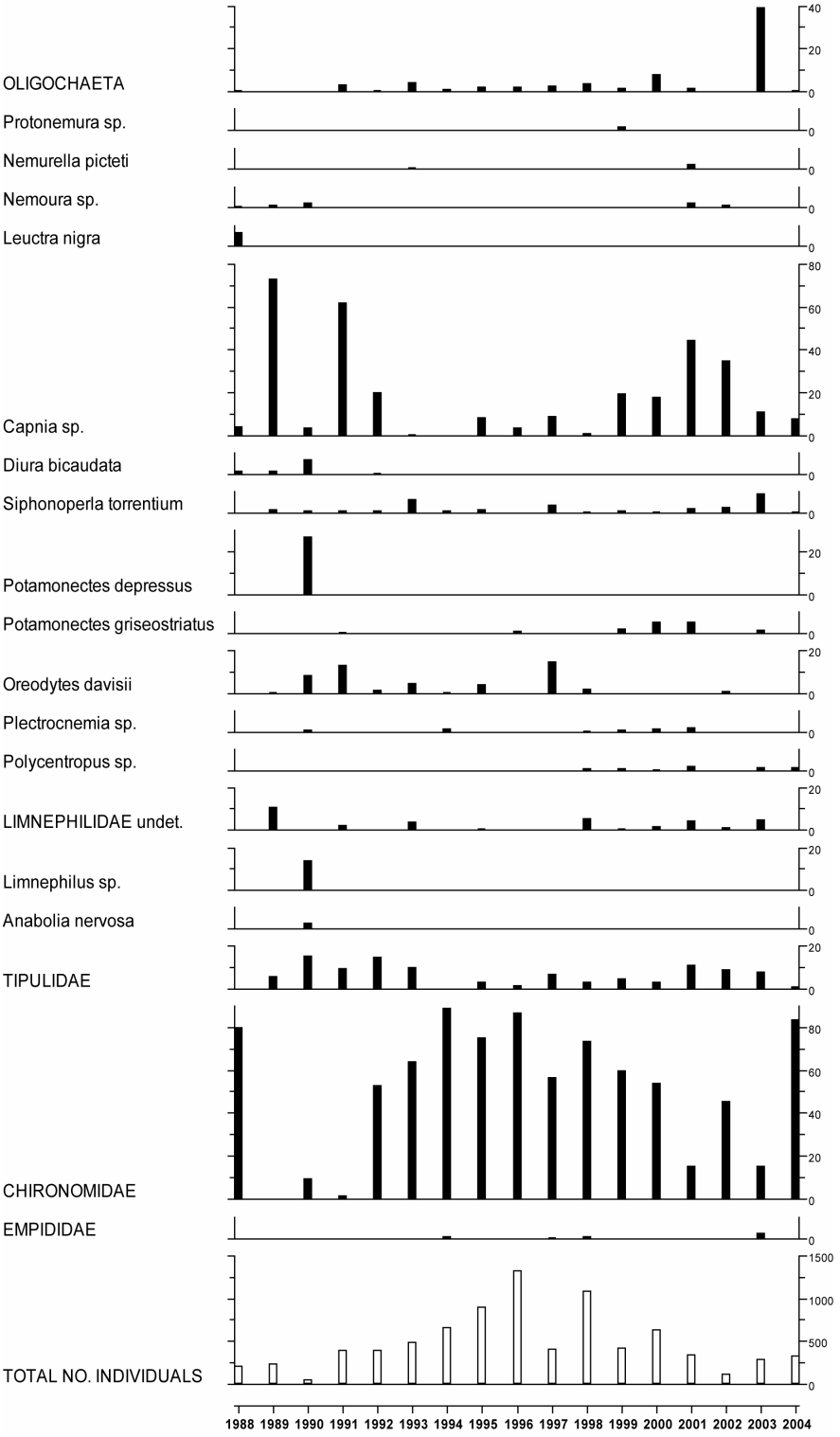
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.40	5.52	0.04	0.01	0.11
ANC	2.84	8.82	3.29	**0.33**	**0.02**
Ca	29.06	23.75	2.53	**-0.01**	**0.02**
Mg	30.57	27.50	2.45	**0.00**	**0.04**
Na	92.22	73.91	6.15	**-0.02**	**0.02**
K	7.54	4.10	0.21	**-0.01**	**0.00**
Sol.Al	1.19	0.94	0.22	-0.87	0.14

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.66	0.52	0.08	-0.32	0.39
Cl	86.88	71.83	9.34	-0.04	0.08
SO_4	60.64	42.71	2.69	**-0.06**	**0.00**
XSO_4	51.51	35.16	2.39	**-0.05**	**0.00**
NO_3	10.77	18.36	1.66	**0.01**	**0.04**
Si	74.21	76.43	3.35	0.00	0.81
DOC	72.37	152.1	61.38	**0.05**	**0.00**

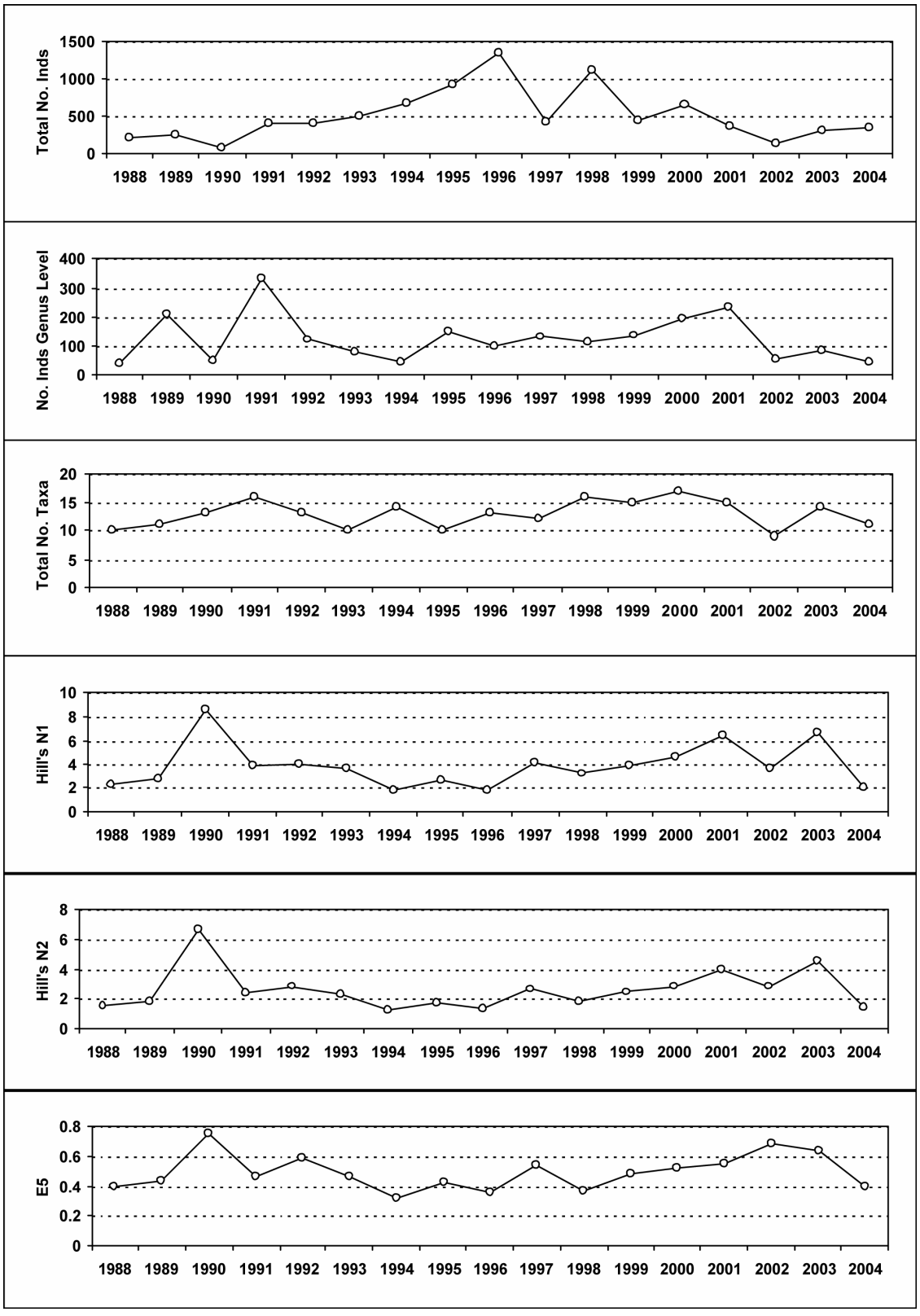
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units μeq l^{-1}, except Sol.Al, Sol.lab.Al and DOC (μmol l^{-1})

7.4.2 Macroinvertebrate data

7.4.2.1 Percentage abundance summary, Lochnagar

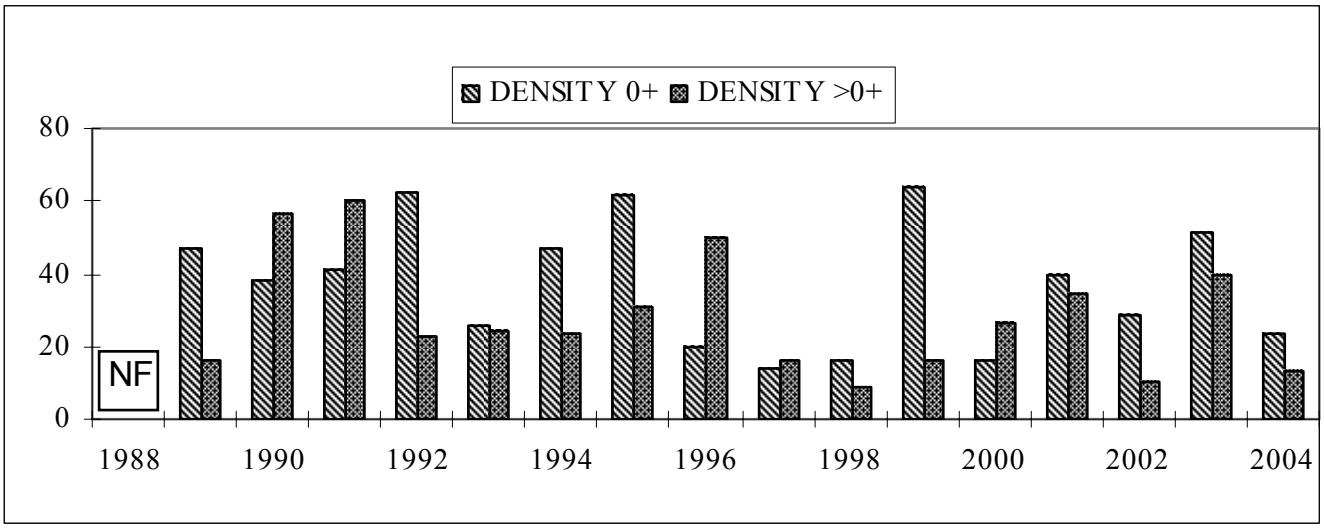


7.4.2.2 Summary statistics, Lochnagar



7.4.3 Fish data (for outflow stream)

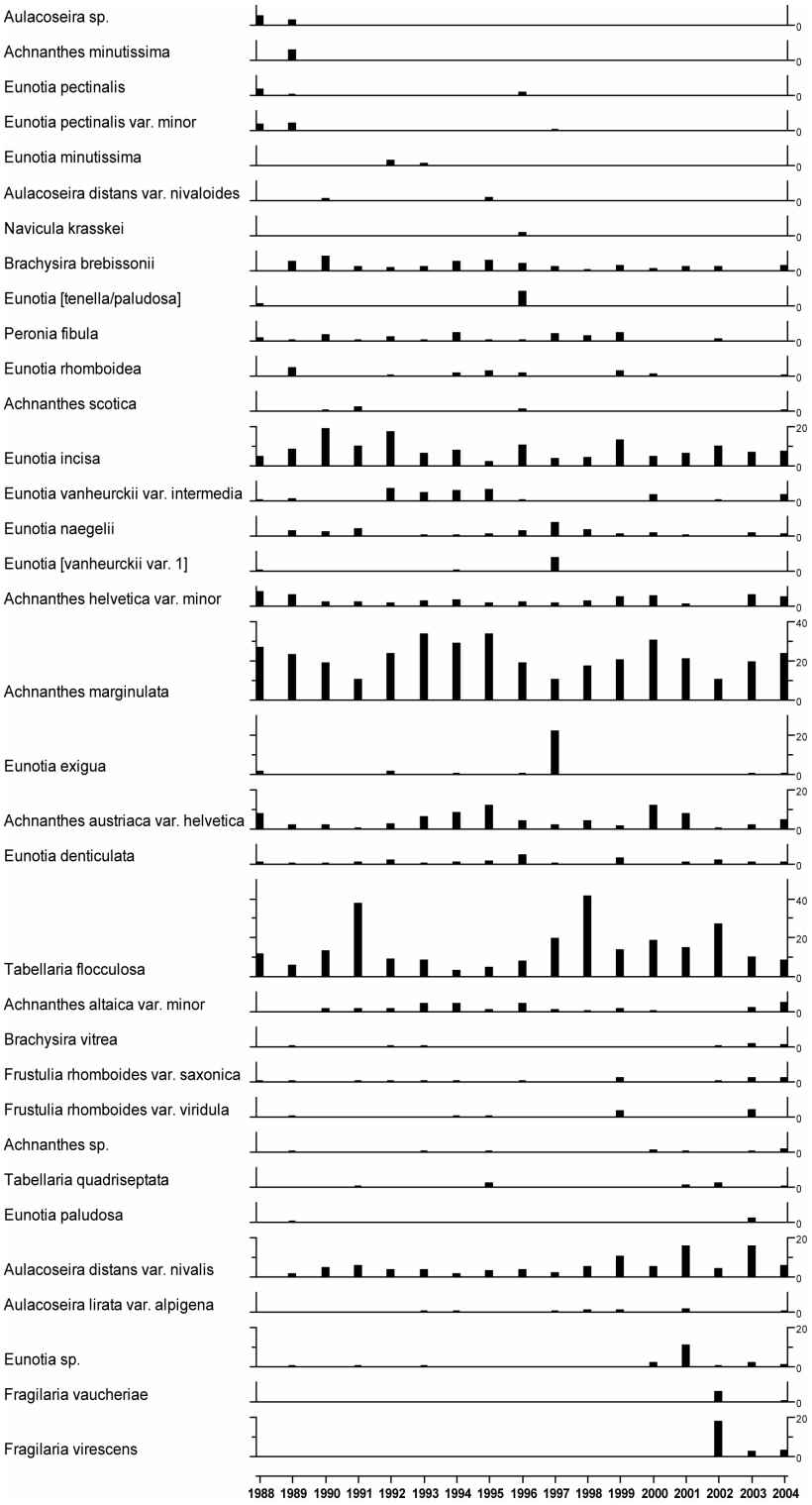
7.4.3.1 Summary of mean Trout density (numbers 100m^{-2}), Lochnagar



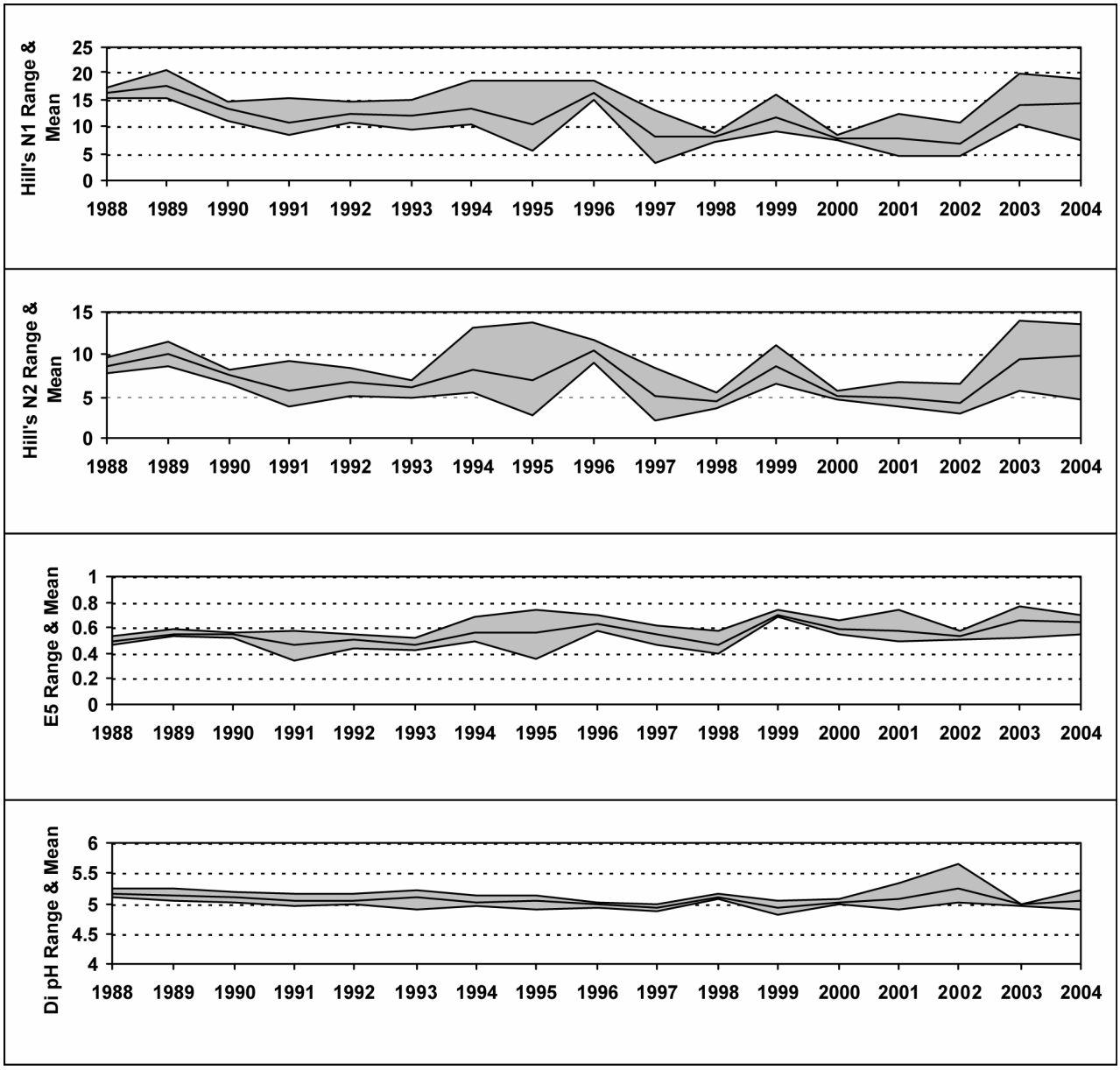
NF = Not fished

7.4.4 Epilithic diatom data

7.4.4.1 Percentage abundance summary, Lochnagar

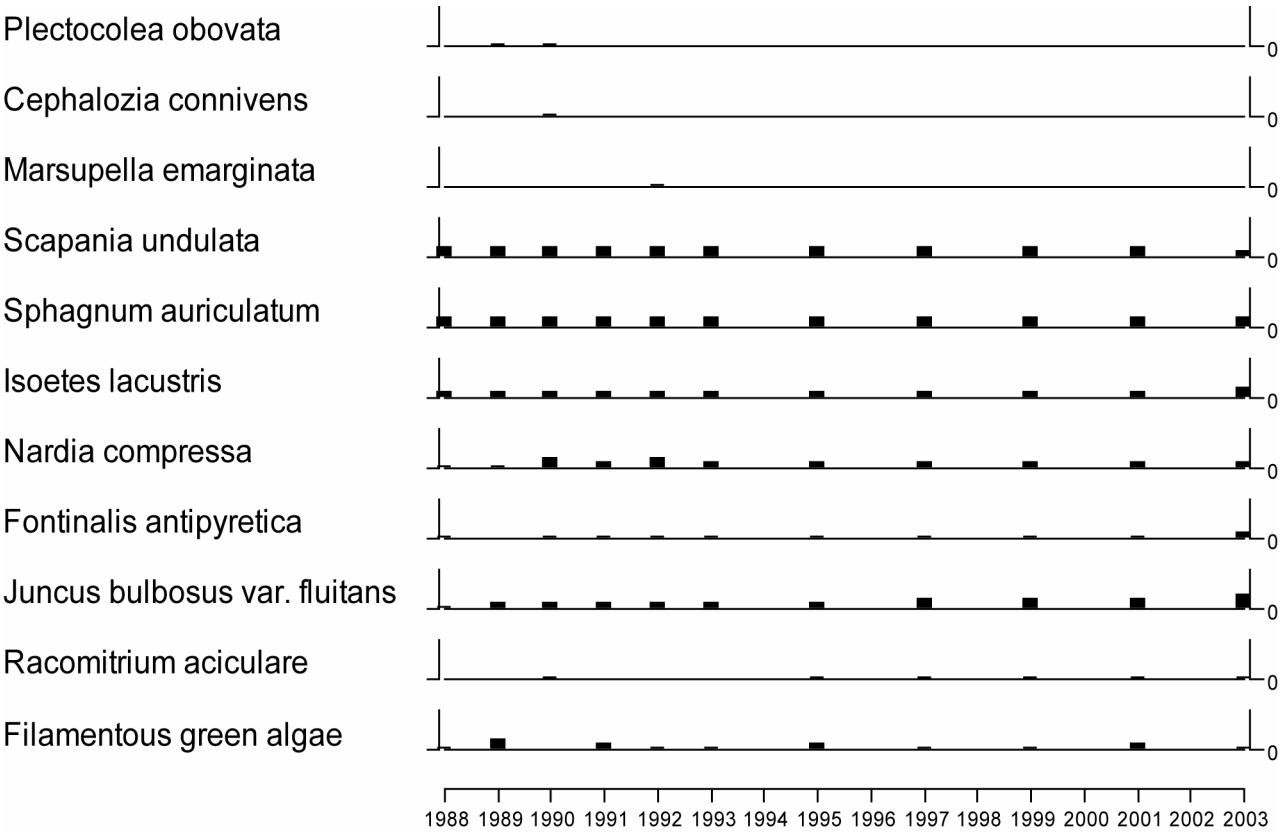


7.4.4.2 Summary statistics, Lochnagar



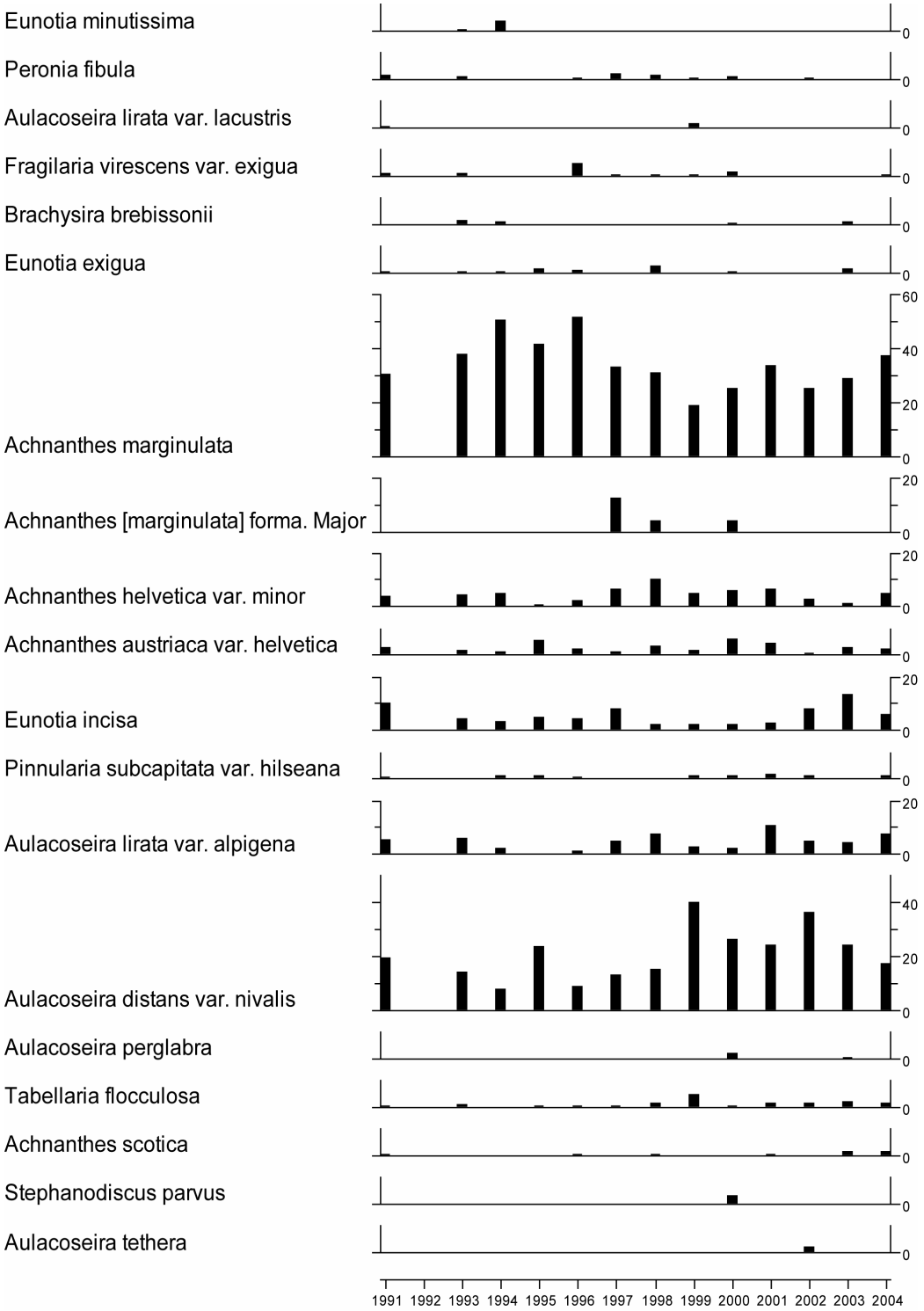
7.4.5 Aquatic macrophyte data, Lochnagar

Species Scores (1-5)



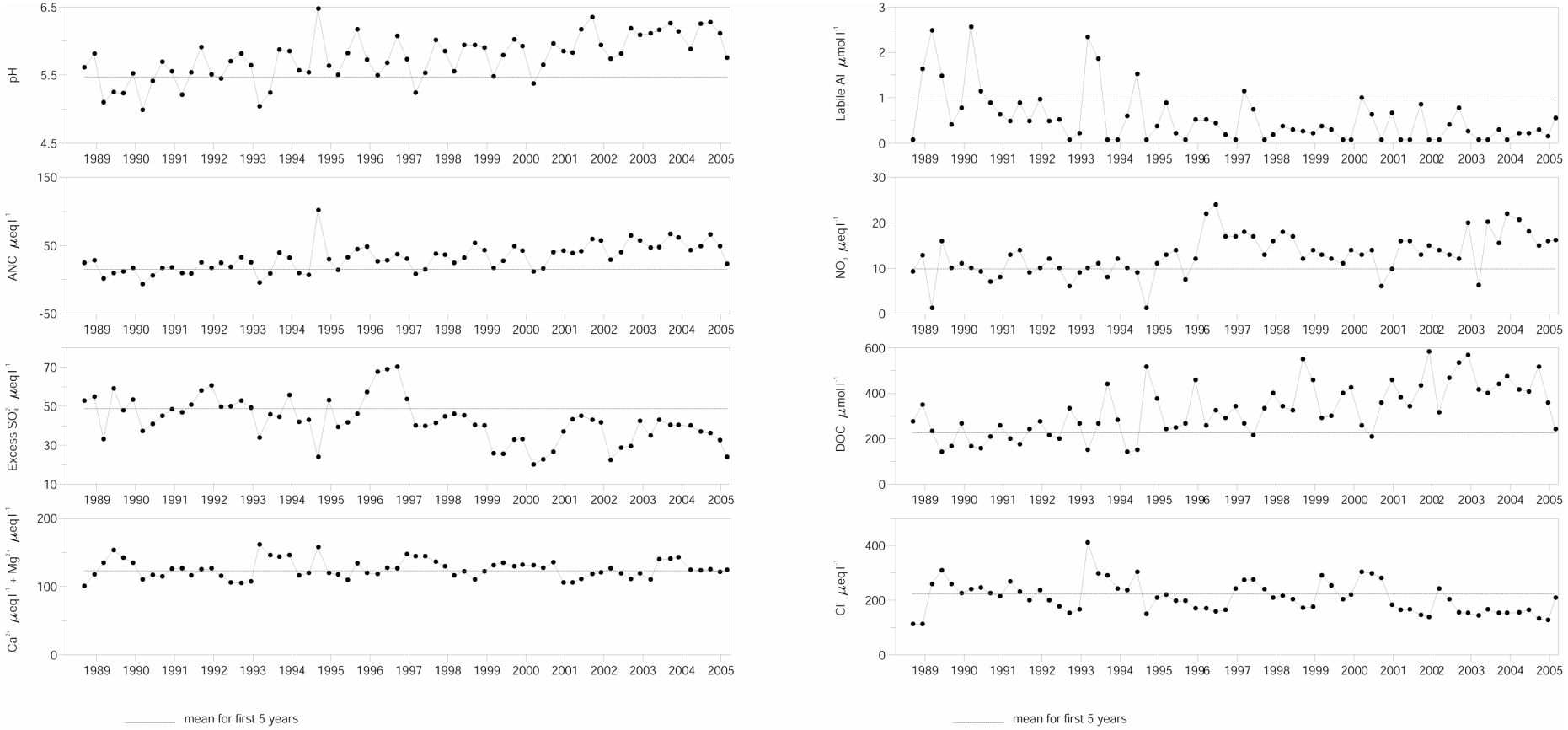
7.4.6 Sediment trap data, Lochnagar

Relative percentage frequency of diatom taxa



7.5 Loch Chon

7.5.1 Spot sampled chemistry data



Determinand statistics

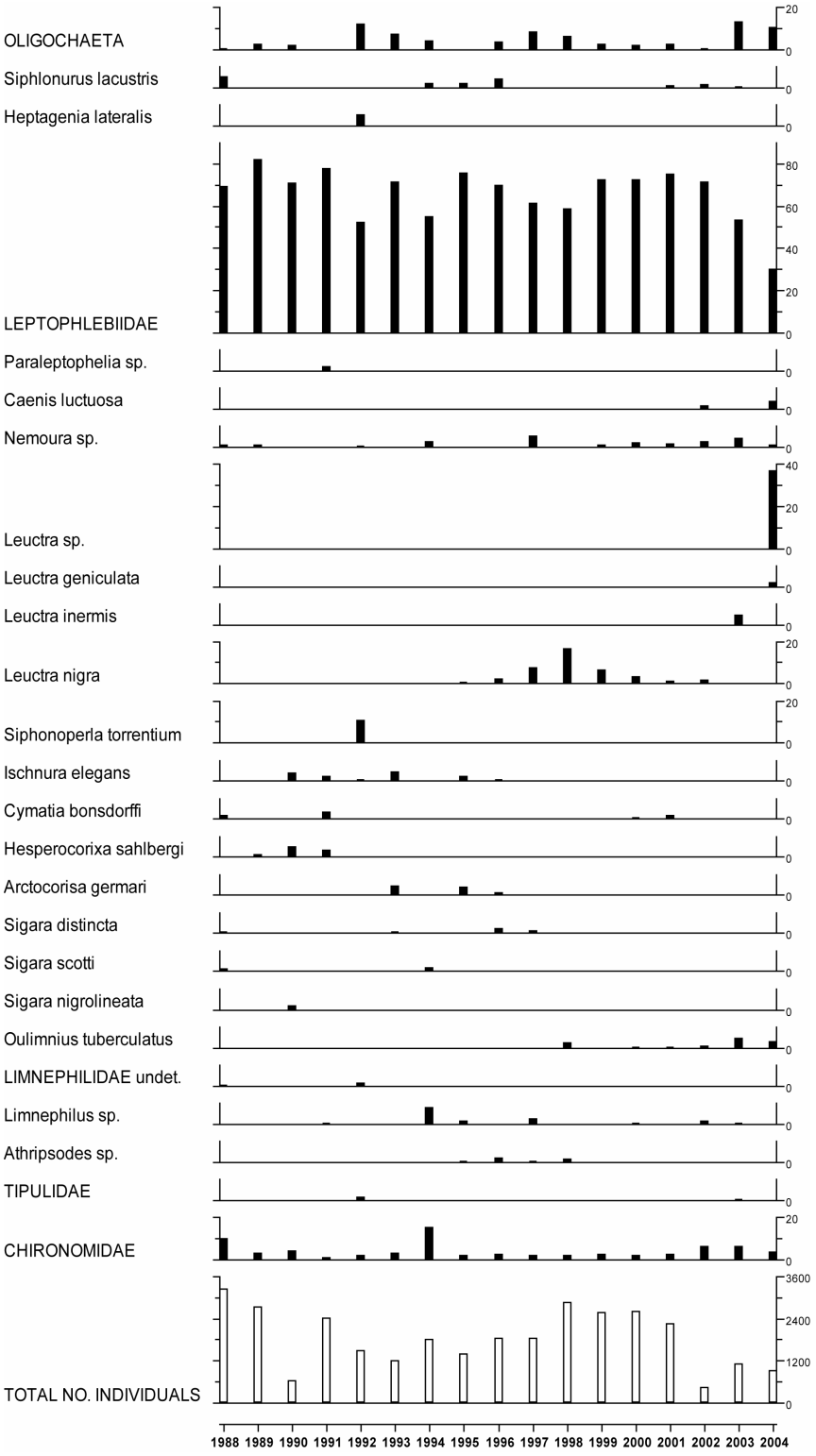
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.47	6.09	0.24	**0.04**	**0.00**
ANC	14.84	46.71	17.86	**2.73**	**0.00**
Ca	75.74	76.75	2.50	0.00	0.97
Mg	47.50	46.67	2.36	0.00	0.62
Na	186.3	127.2	15.63	**-0.08**	**0.03**
K	5.65	8.46	0.75	0.00	0.19
Sol.Al	2.43	2.01	0.43	**-1.00**	**0.00**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.97	0.31	0.18	**-1.11**	**0.00**
Cl	223.4	157.7	37.44	-0.17	0.07
SO_4	72.15	48.96	3.99	**-0.08**	**0.00**
XSO_4	48.69	32.39	5.96	**-0.05**	**0.01**
NO_3	9.88	16.30	1.31	**0.01**	**0.01**
Si	31.58	42.14	7.26	**0.20**	**0.05**
DOC	225.4	381.2	114.1	**0.00**	**0.00**

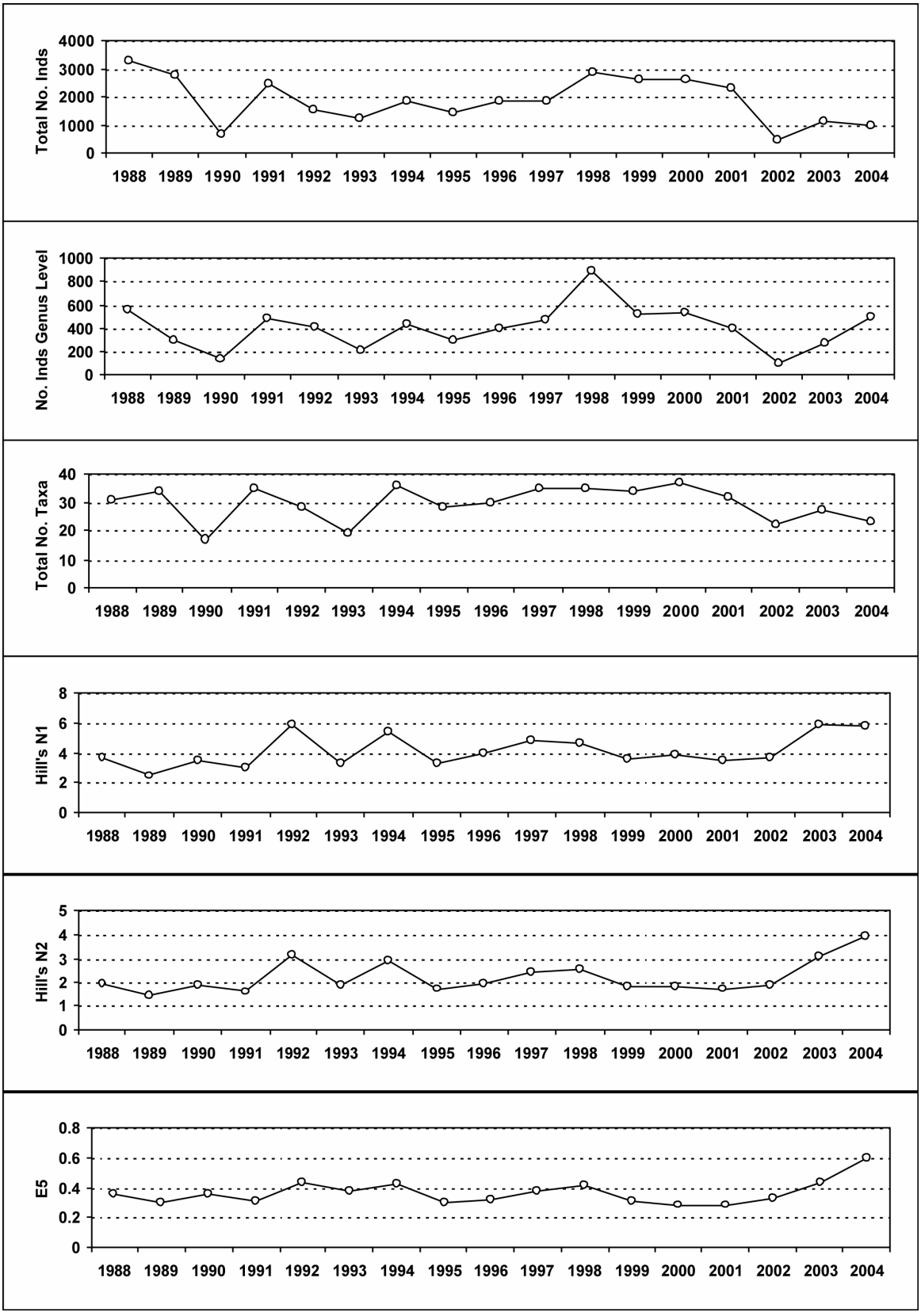
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.5.2 Macroinvertebrate data

7.5.2.1 Percentage abundance summary, Loch Chon

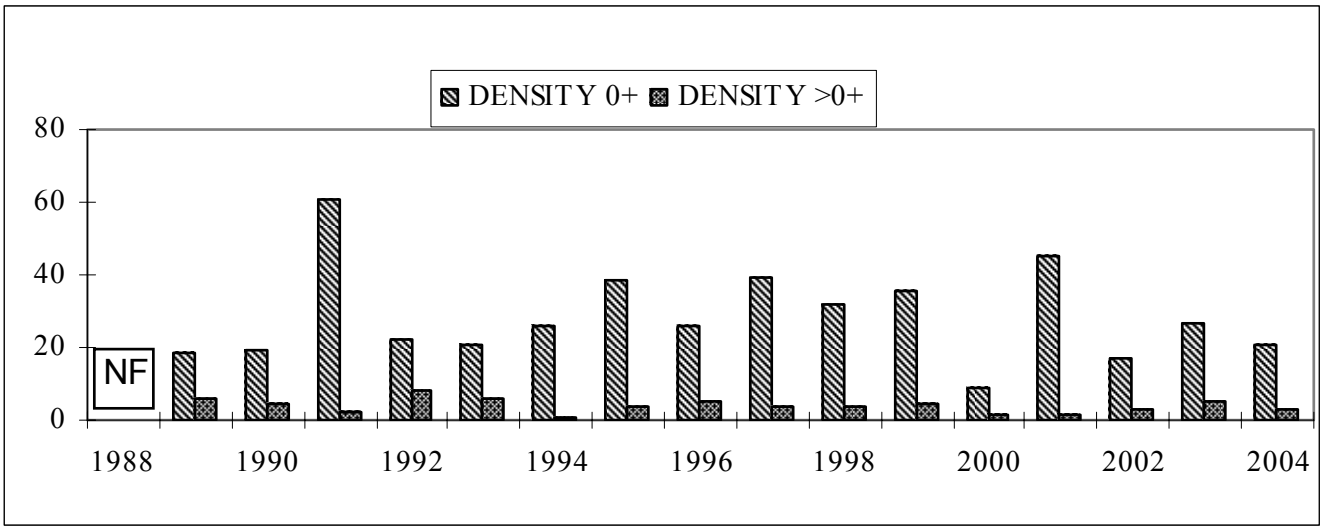


7.5.2.2 Summary statistics, Loch Chon



7.5.3 Fish data (for outflow stream)

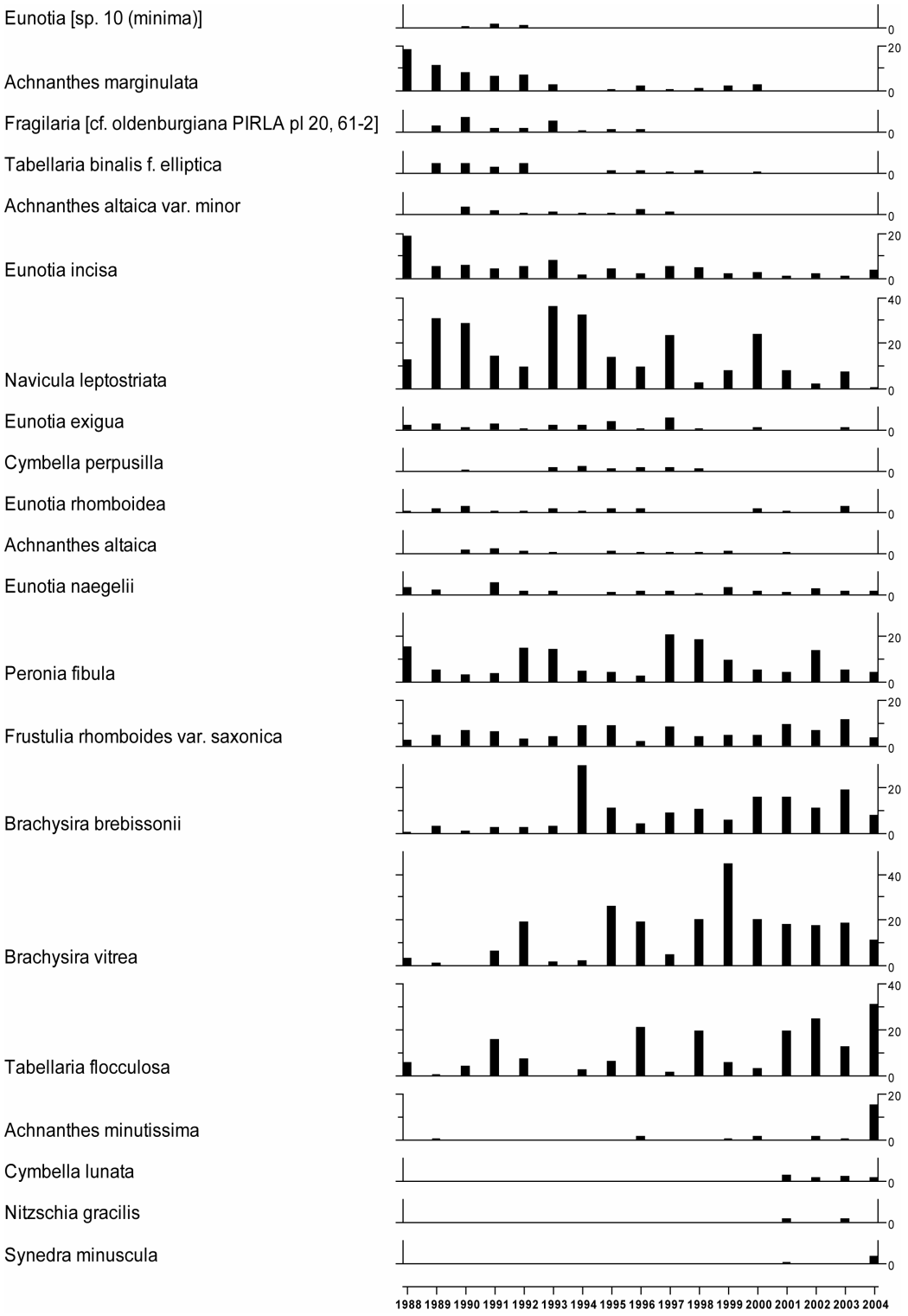
7.5.3.1 Summary of mean Trout density (numbers $100m^{-2}$), Loch Chon



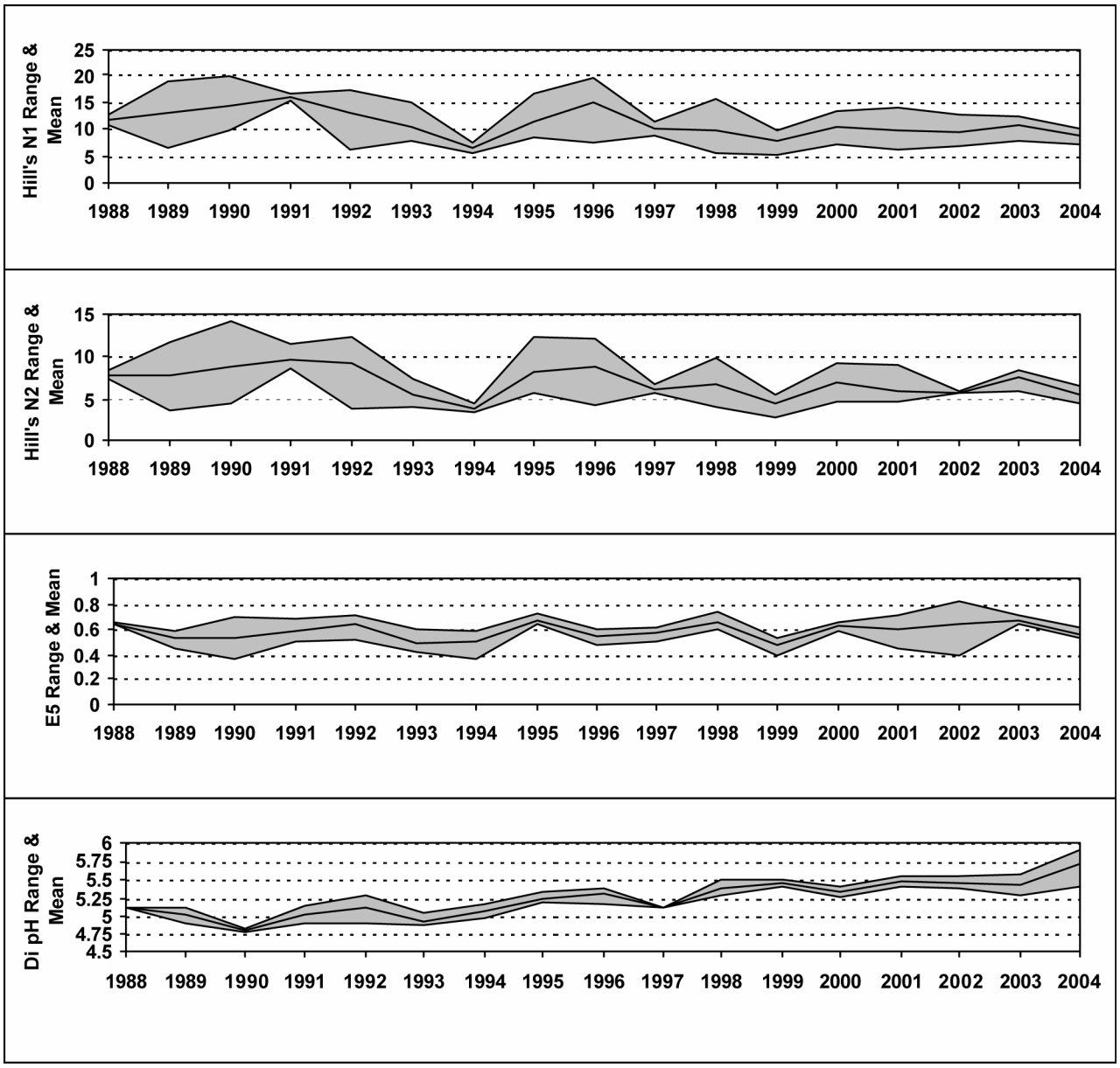
NF = Not fished

7.5.4 Epilithic diatom data

7.5.4.1 Percentage abundance summary, Loch Chon

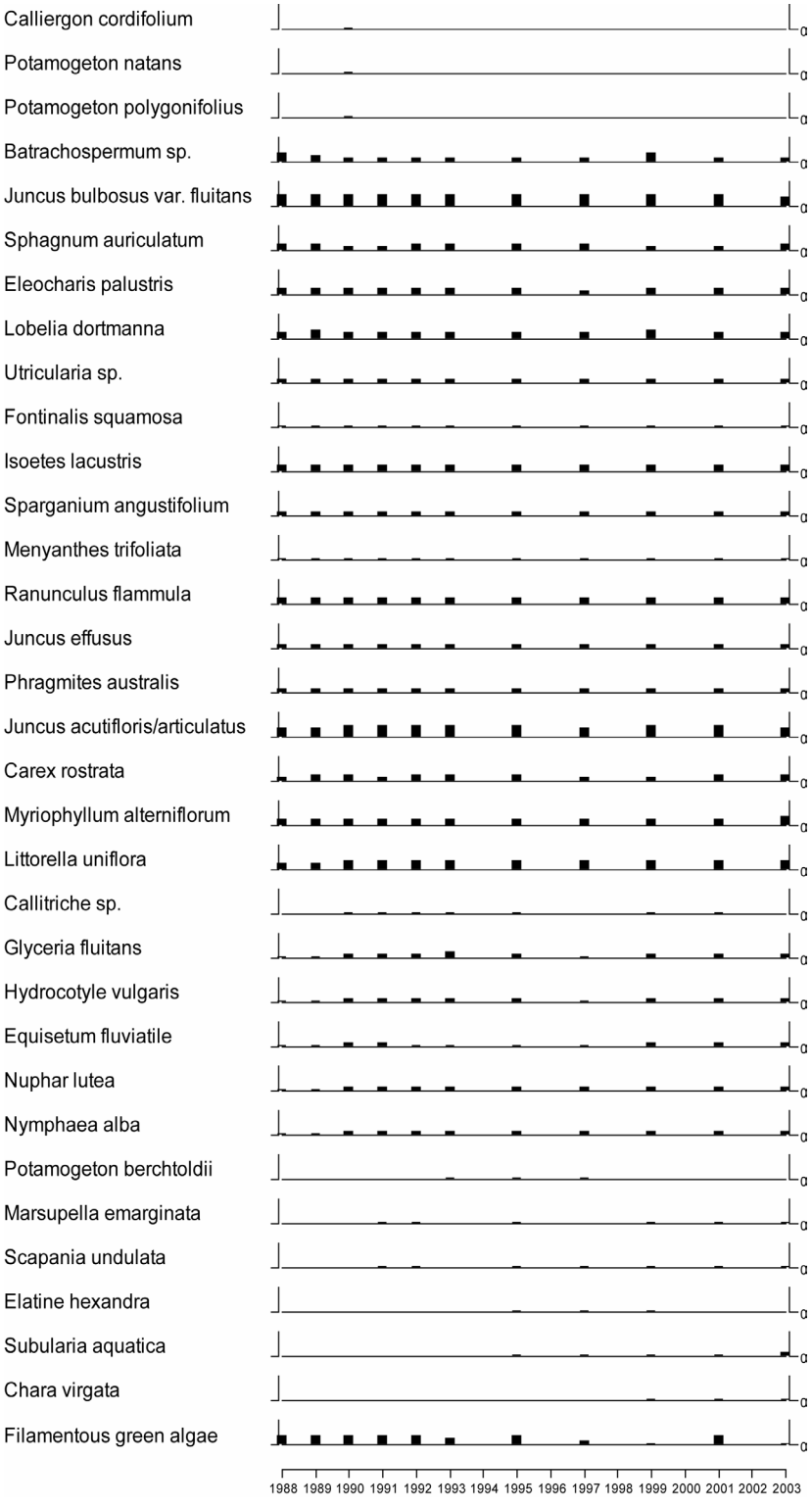


7.5.4.2 Summary statistics, Loch Chon



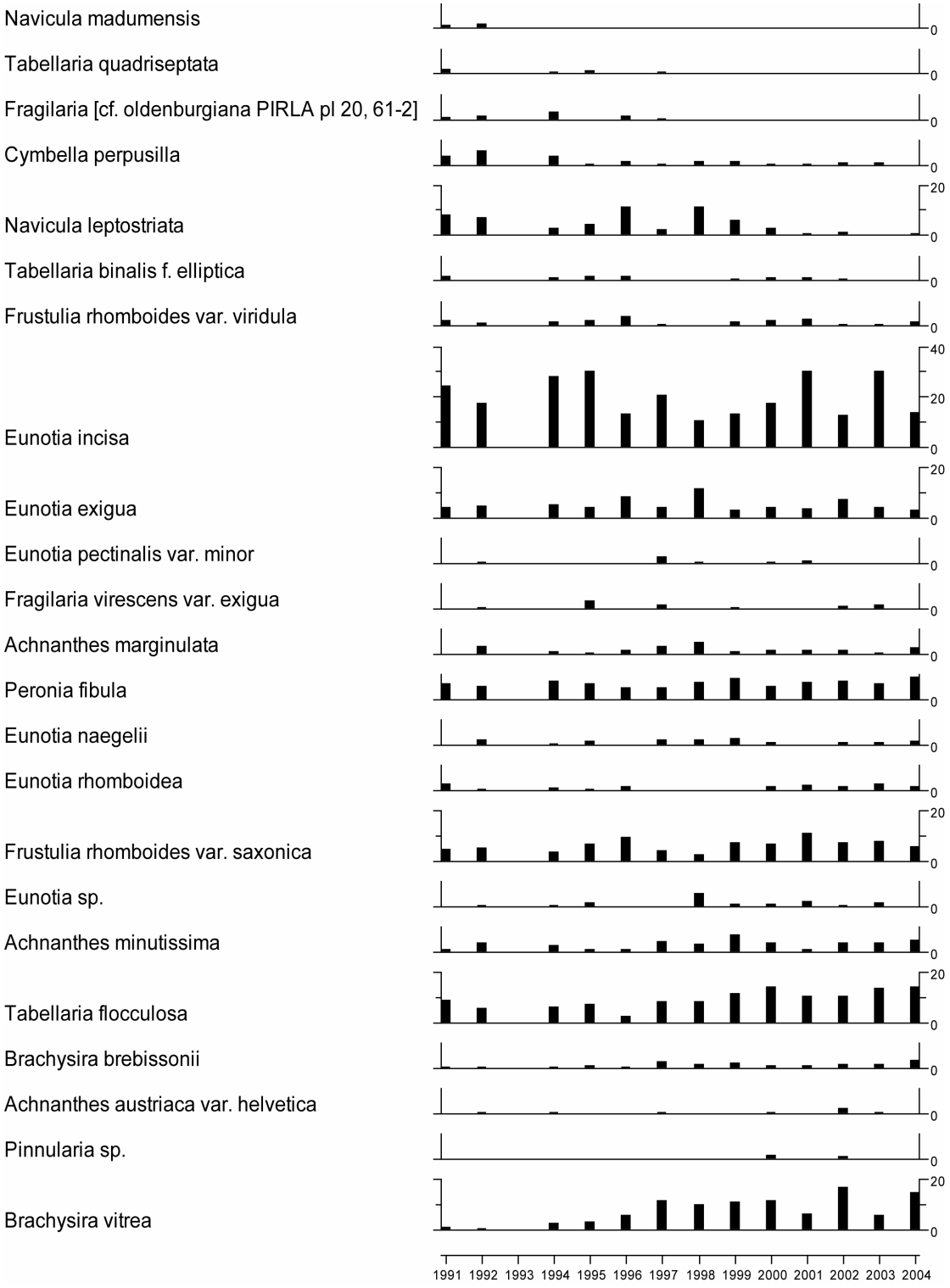
7.5.5 Aquatic macrophyte data, Loch Chon

Species Scores (1-5)



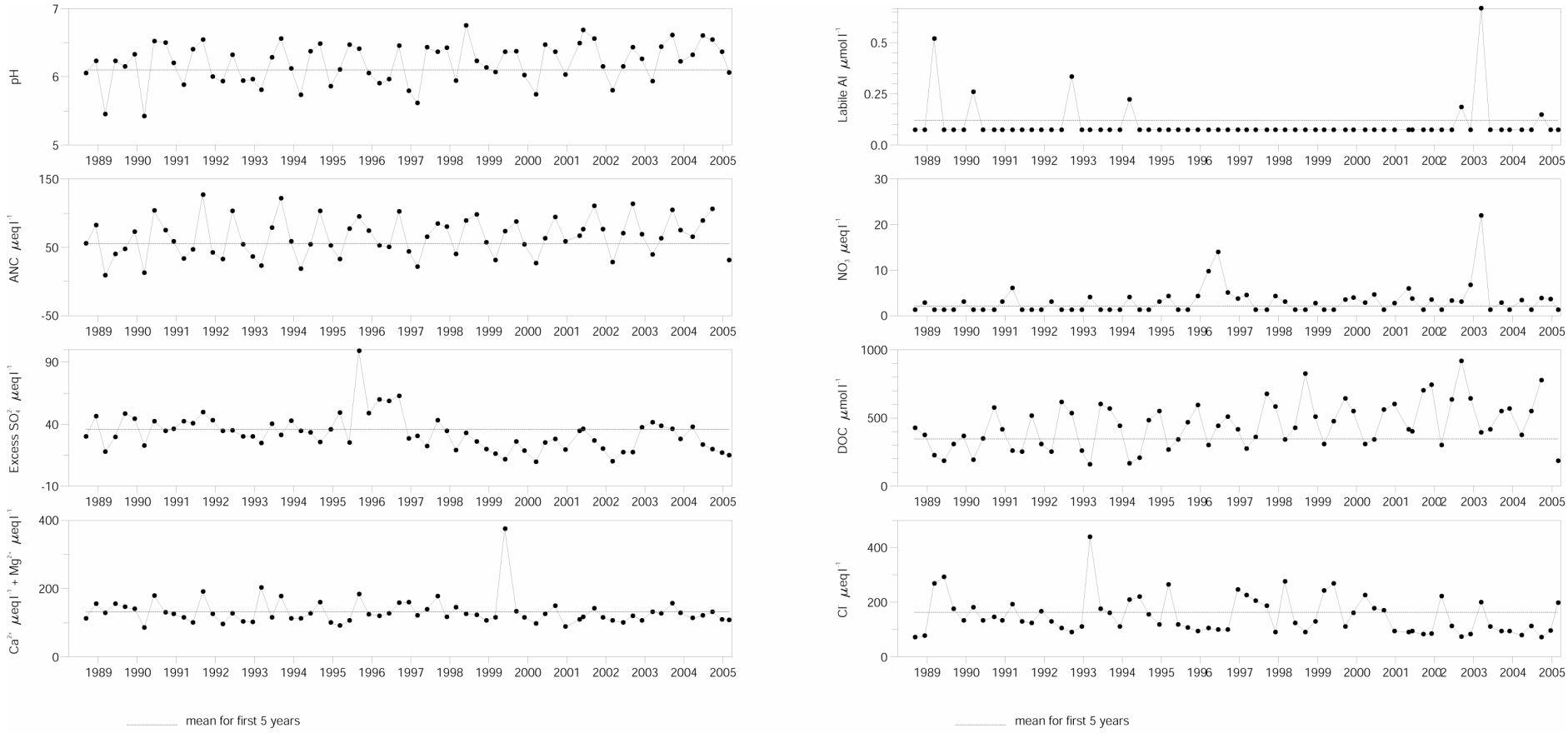
7.5.6 Sediment trap data, Loch Chon

Relative percentage frequency of diatom taxa



7.6 Loch Tinker

7.6.1 Spot sampled chemistry data



Determinand statistics

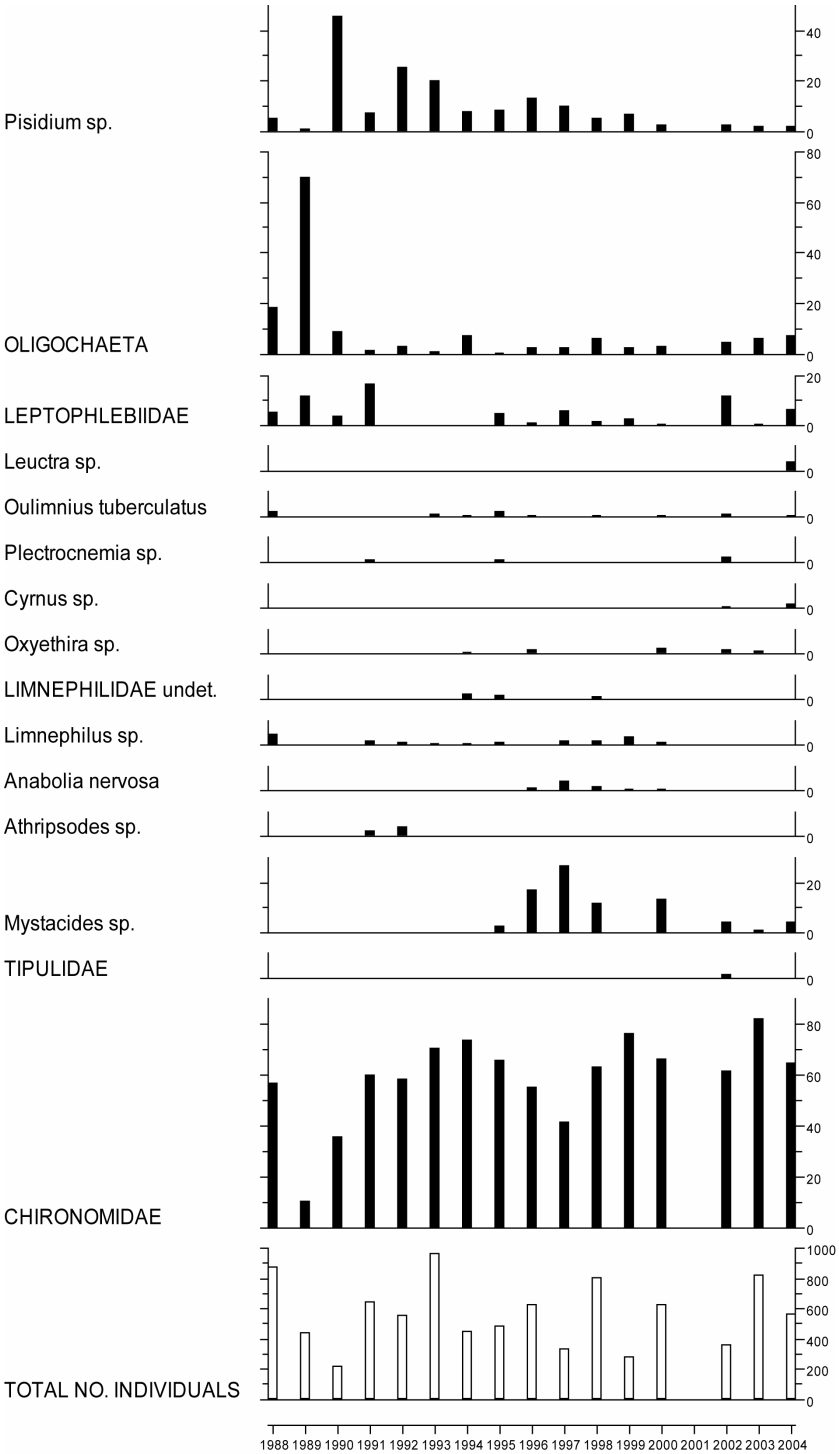
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	6.10	6.39	0.24	**0.02**	**0.02**
ANC	55.51	75.20	39.43	**1.33**	**0.03**
Ca	86.00	78.50	10.21	-0.01	0.48
Mg	46.45	38.75	3.08	-0.01	0.10
Na	140.0	93.48	25.72	**-0.07**	**0.02**
K	7.22	5.64	1.17	0.00	0.13
Sol.Al	0.72	0.57	0.25	-0.15	0.38

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.12	0.09	0.04	0.00	0.86
Cl	162.6	119.0	54.93	-0.10	0.06
SO_4	52.96	31.25	4.81	**-0.07**	**0.01**
XSO_4	35.88	18.75	3.81	**-0.05**	**0.01**
NO_3	2.03	2.50	1.41	**0.00**	**0.05**
Si	24.06	33.39	7.03	0.00	0.85
DOC	345.6	502.8	298.6	**0.18**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

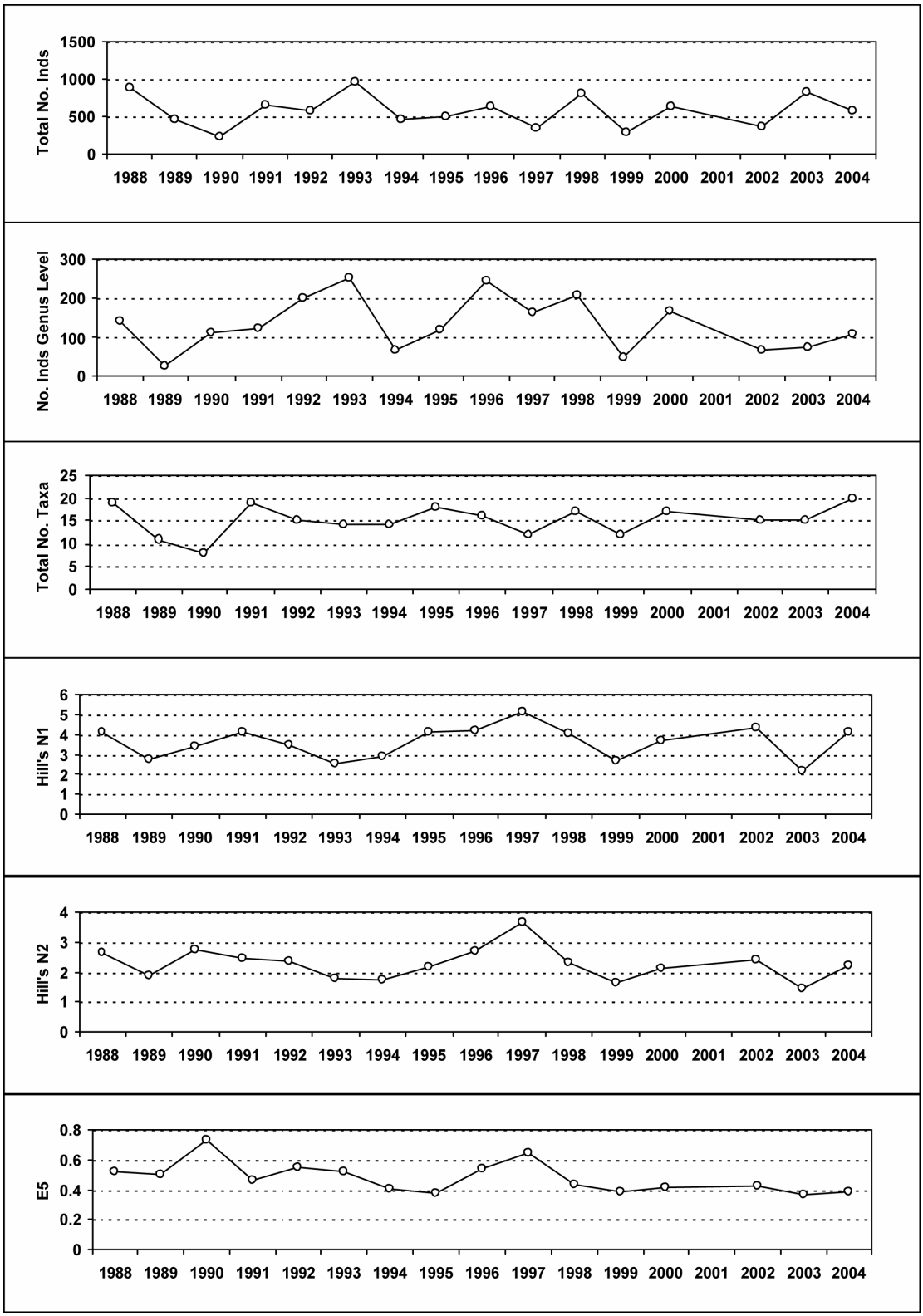
7.6.2 Macroinvertebrate data

7.6.2.1 Percentage abundance summary, Loch Tinker



No sampling in 2001 due to Foot and Mouth restrictions.

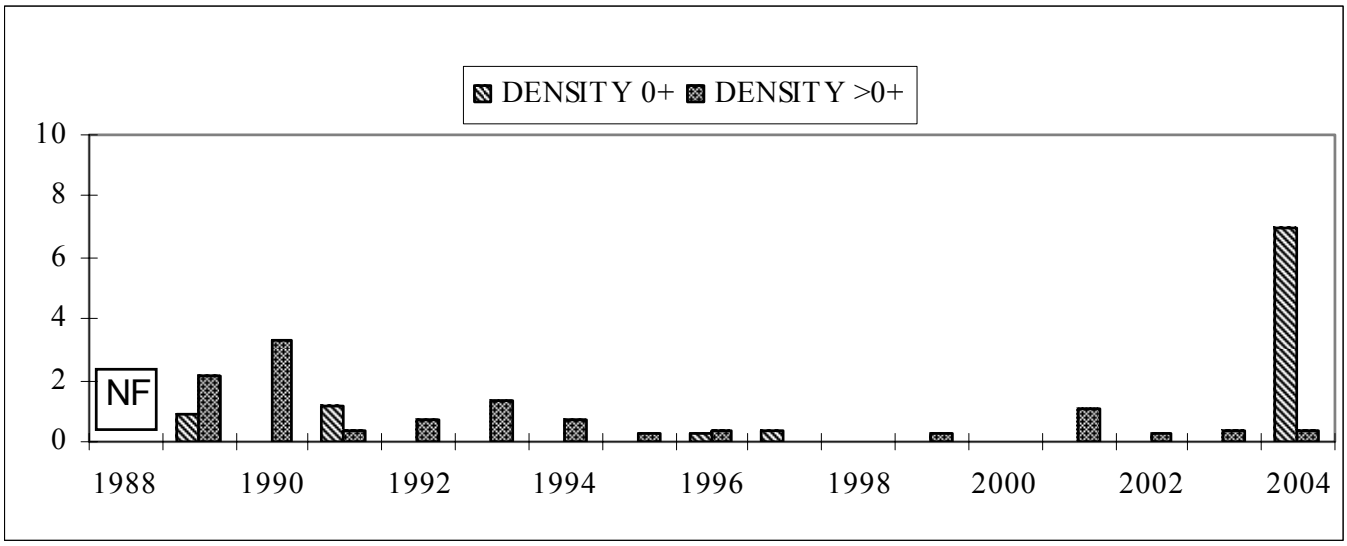
7.6.2.2 Summary statistics, Loch Tinker



No sampling in 2001 due to Foot and Mouth restrictions.

7.6.3 Fish data (for outflow stream)

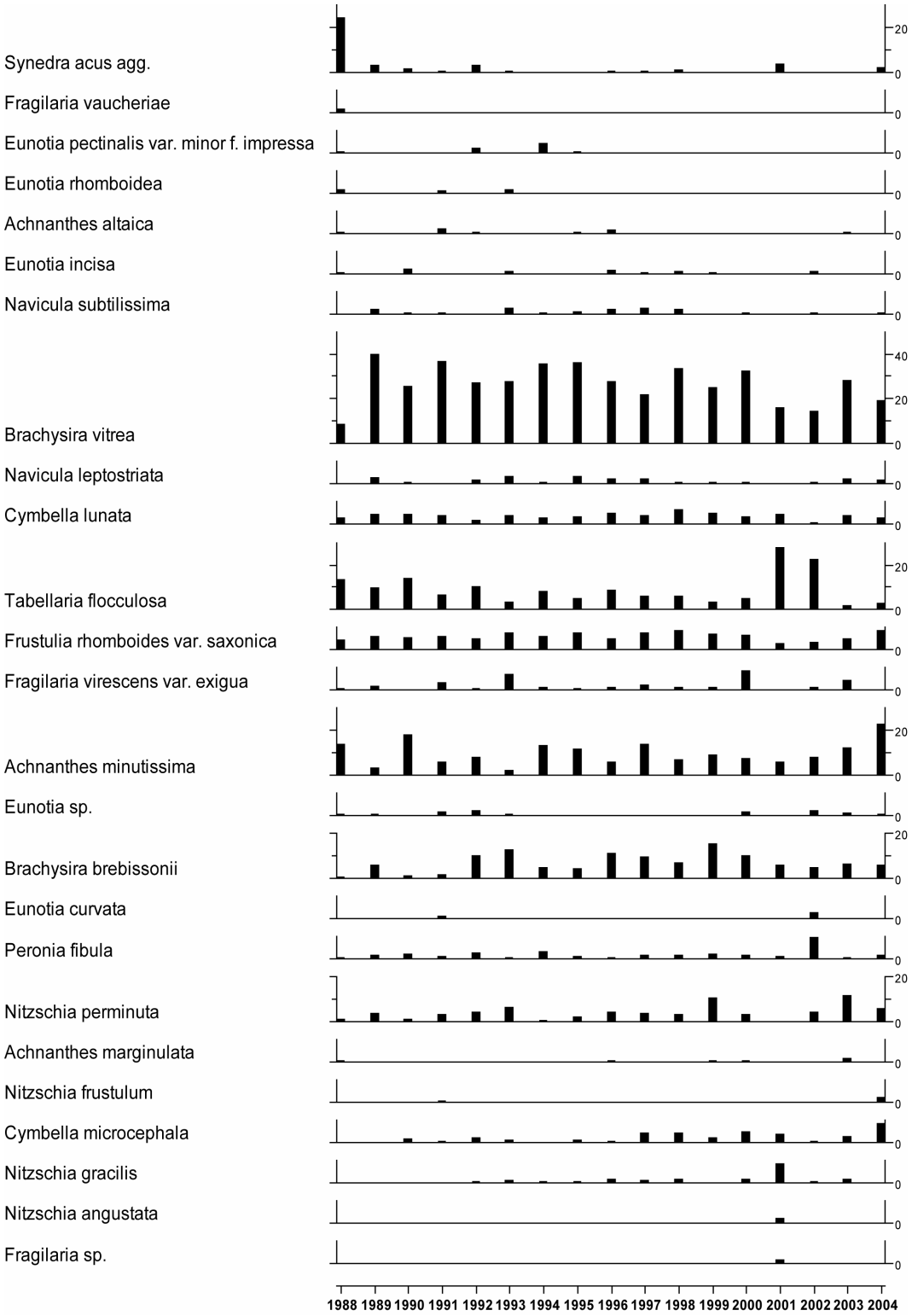
7.6.3.1 Summary of mean Trout density (numbers 100m^{-2}), Loch Tinker



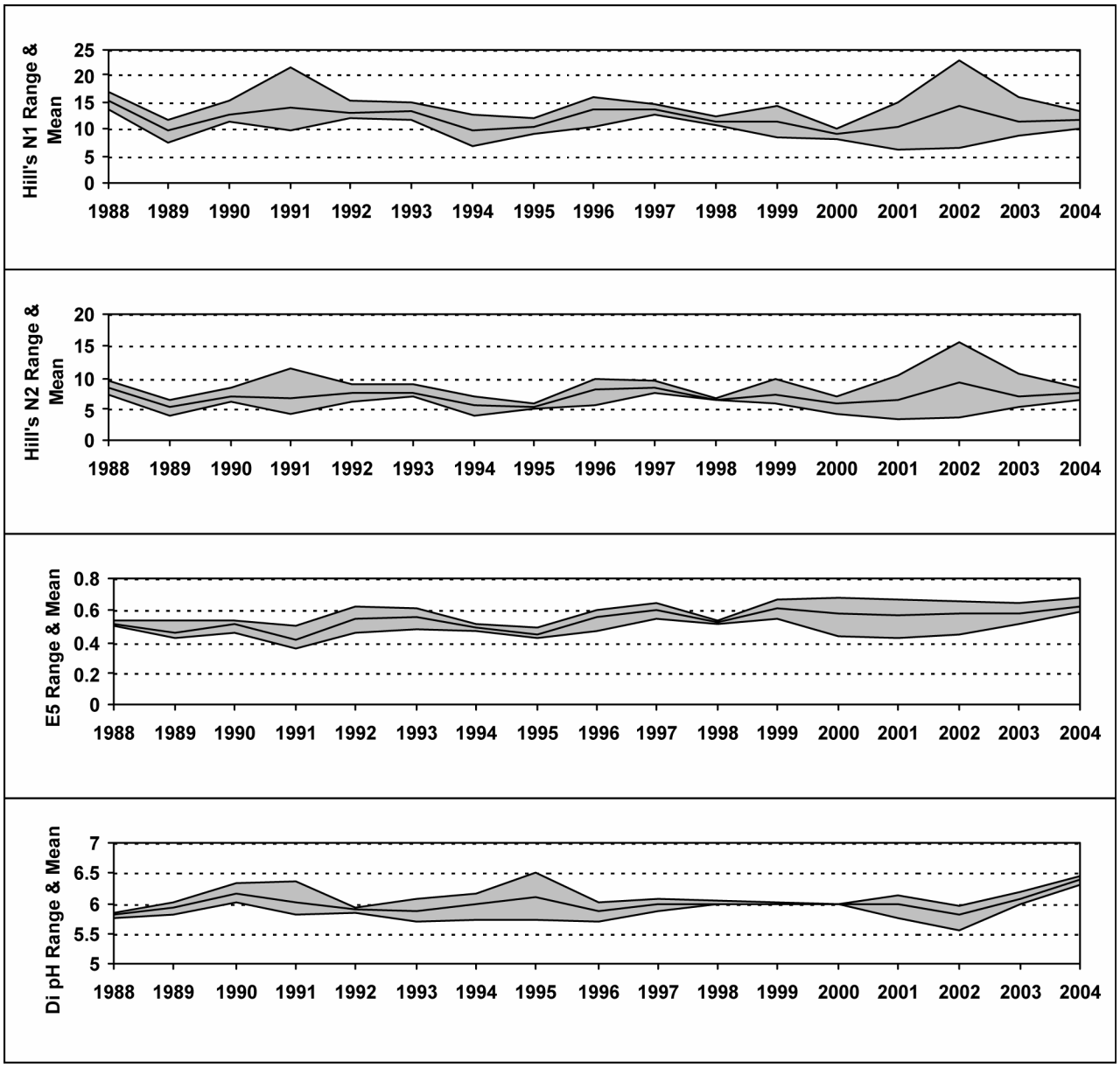
NF = Not fished

7.6.4 Epilithic diatom data

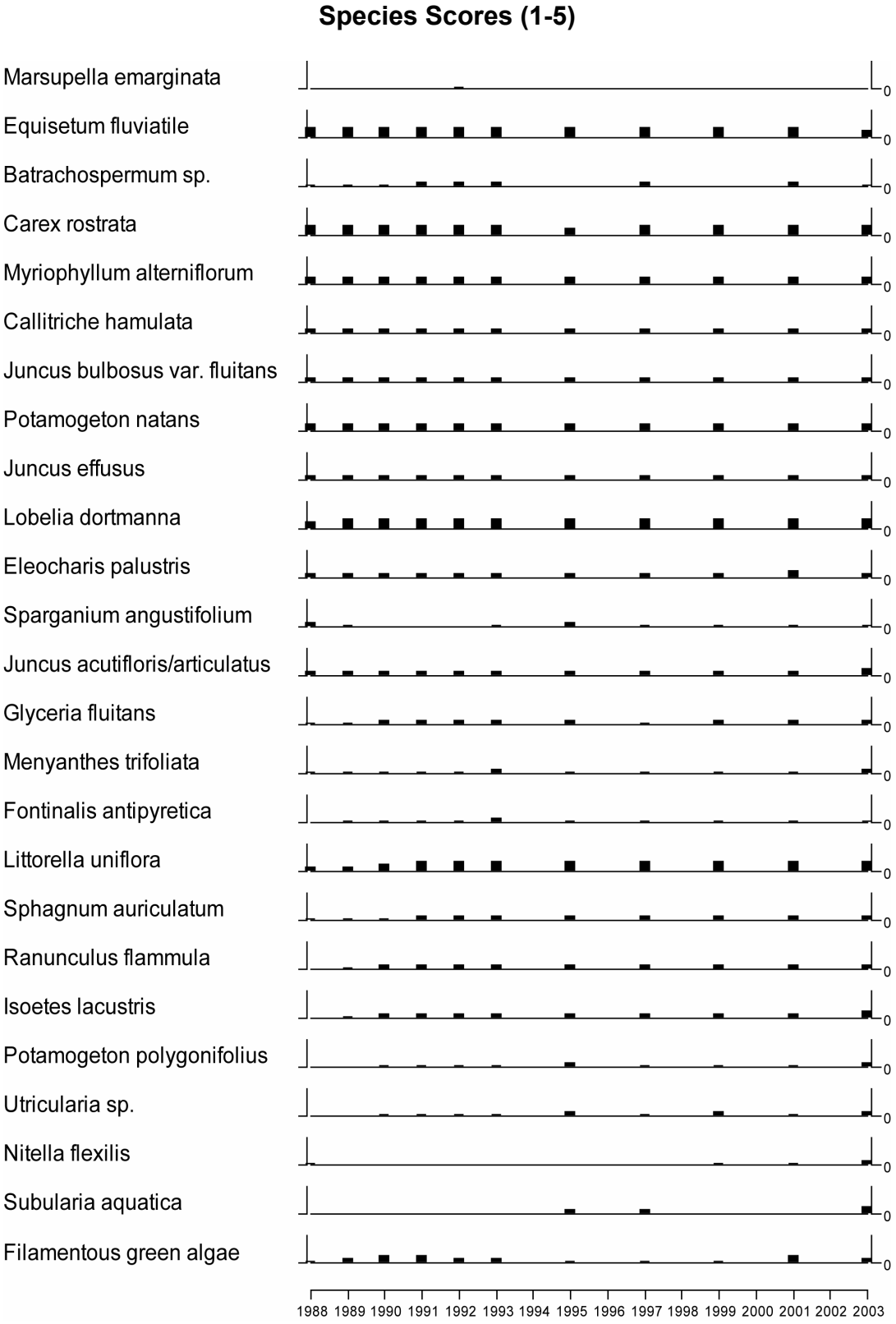
7.6.4.1 Percentage abundance summary, Loch Tinker



7.6.4.2 Summary statistics, Loch Tinker

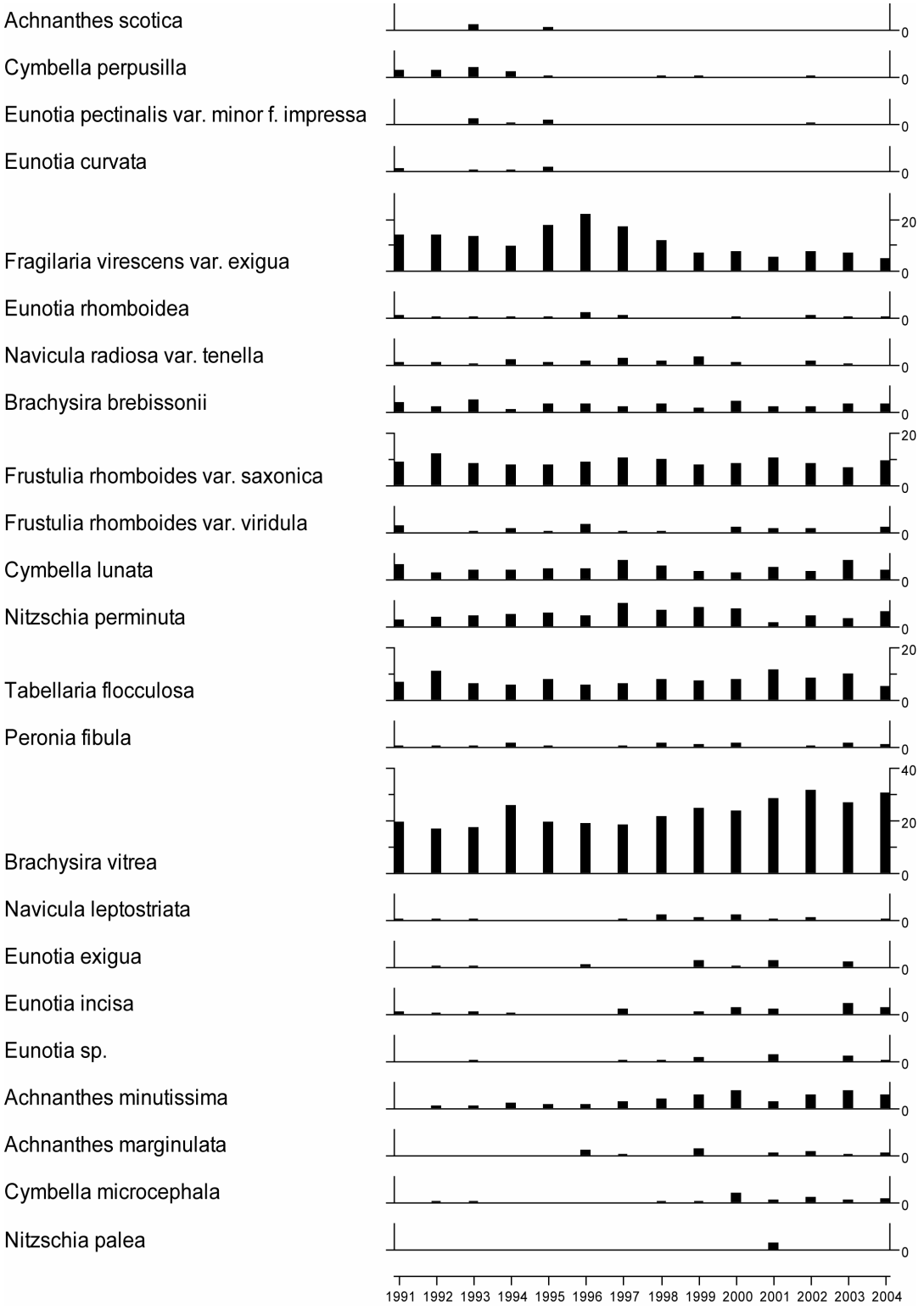


7.6.5 Aquatic macrophyte data, Loch Tinker



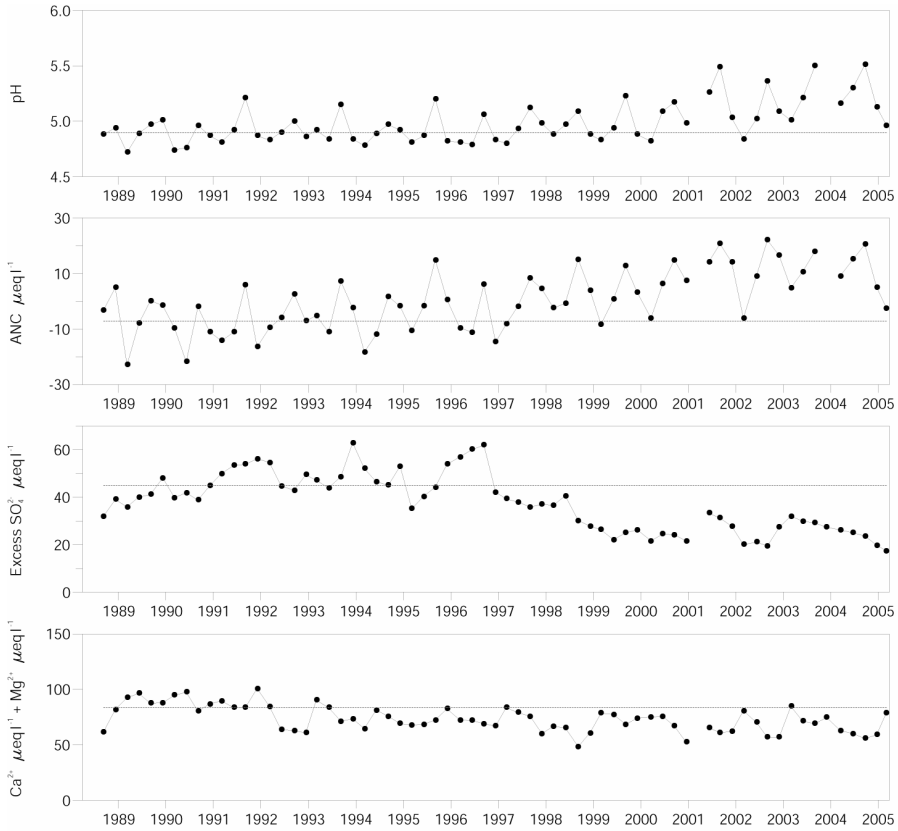
7.6.6 Sediment trap data, Loch Tinker

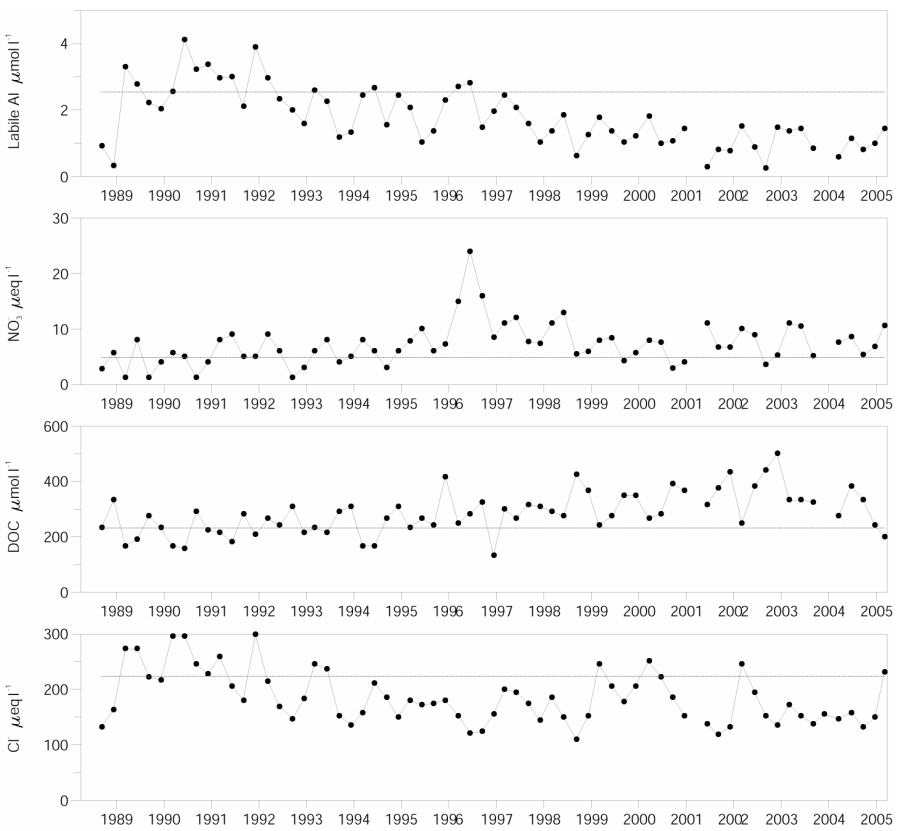
Relative percentage frequency of diatom taxa



7.7 Round Loch of Glenhead

7.7.1 Spot sampled chemistry data





Determinand statistics

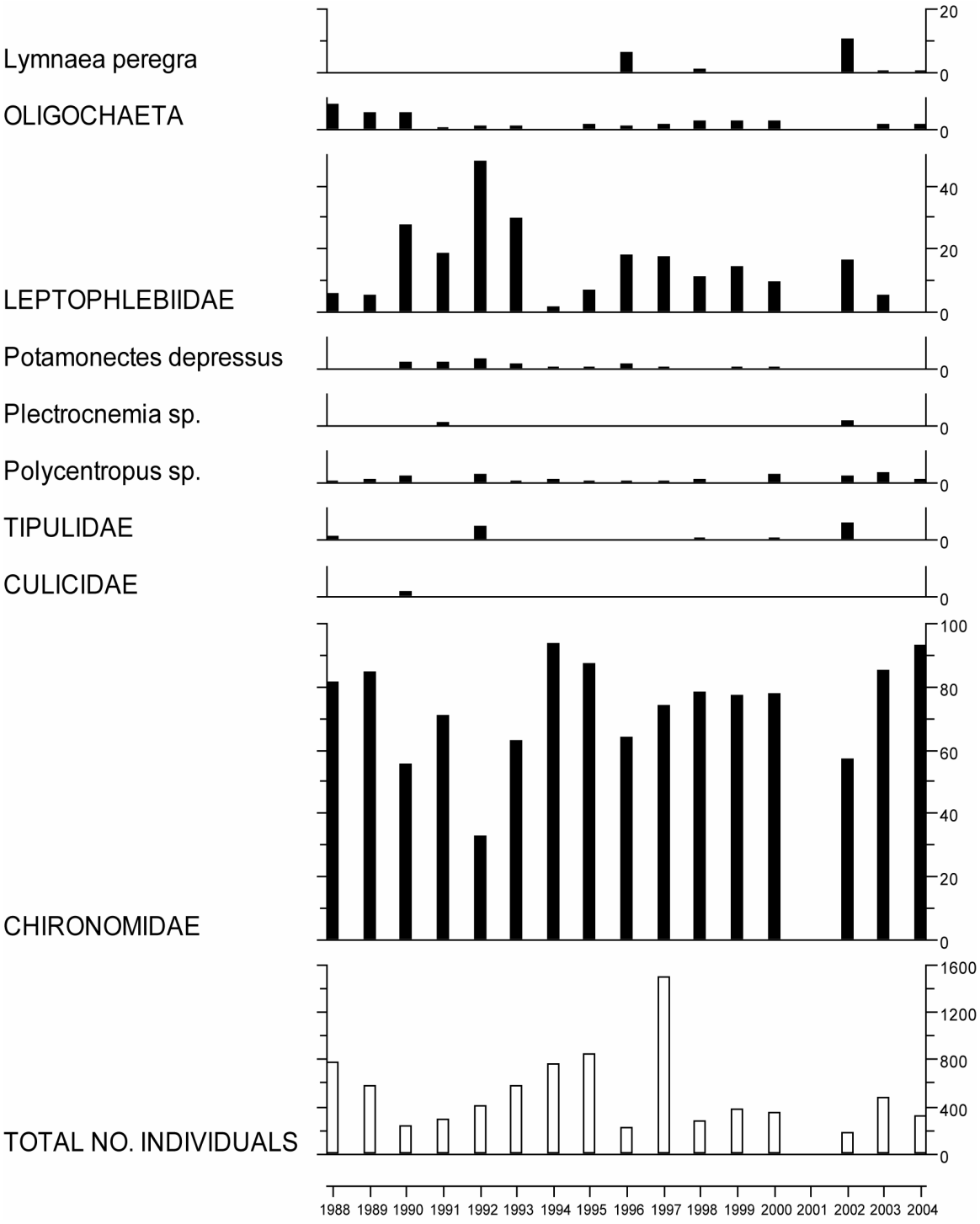
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	4.90	5.22	0.24	**0.02**	**0.00**
ANC	-7.13	9.58	10.33	**1.53**	**0.00**
Ca	34.92	26.38	2.75	**-0.01**	**0.01**
Mg	48.55	37.08	7.71	**-0.01**	**0.01**
Na	193.8	132.6	25.23	**-0.08**	**0.00**
K	9.00	6.86	1.31	**0.00**	**0.05**
Sol.Al	3.65	2.63	0.34	**-2.00**	**0.00**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	2.54	1.10	0.27	**-3.25**	**0.00**
Cl	223.6	167.6	43.55	**-0.14**	**0.02**
SO_4	68.42	39.06	3.12	**-0.11**	**0.00**
XSO_4	44.94	21.46	3.52	**-0.08**	**0.00**
NO_3	4.81	7.84	2.29	0.00	0.07
Si	26.32	24.46	15.49	0.00	0.26
DOC	233.3	289.6	83.71	**0.12**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

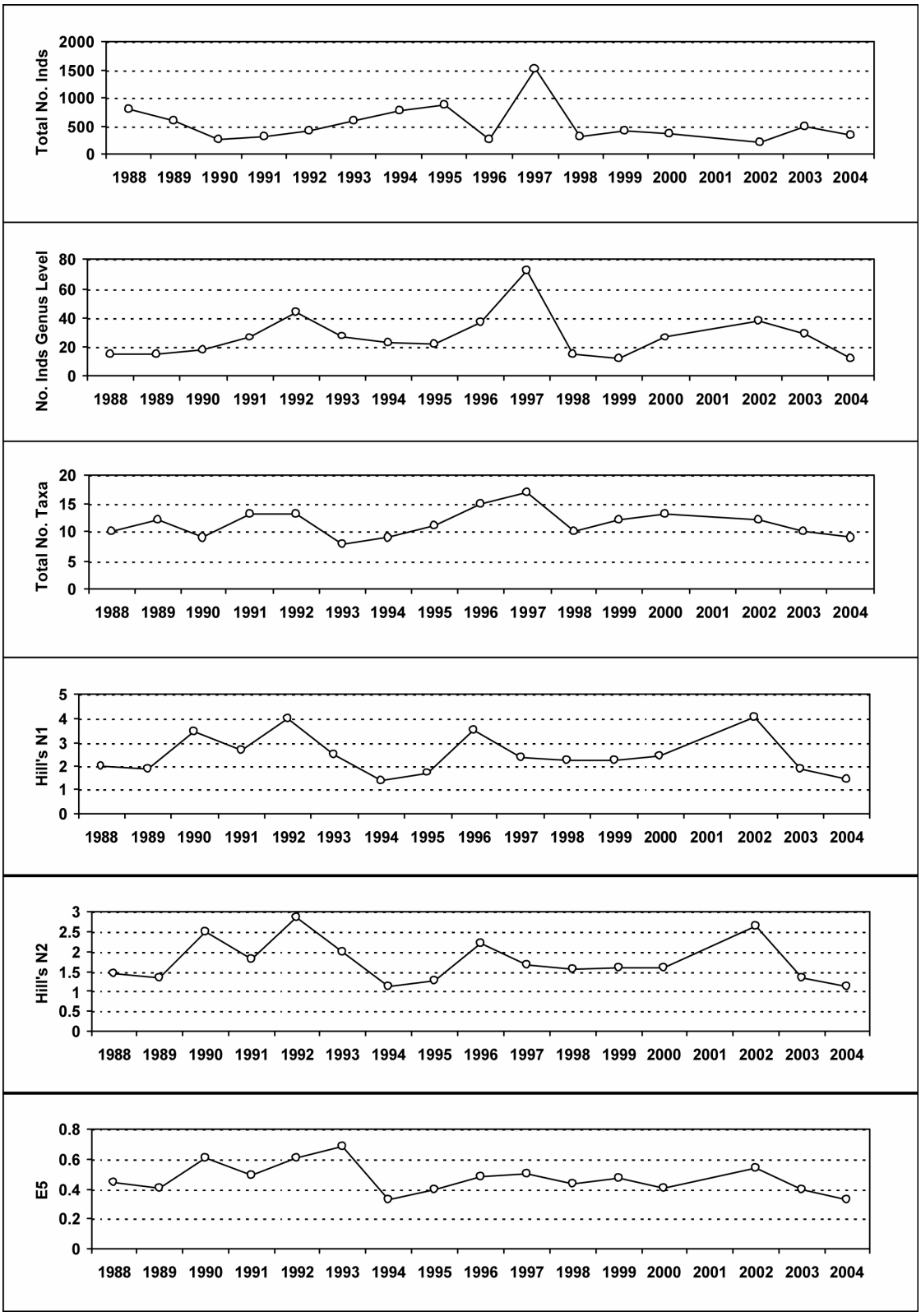
7.7.2 Macroinvertebrate data

7.7.2.1 Percentage abundance summary, Round Loch of Glenhead



No sampling in 2001 due to Foot and Mouth restrictions.

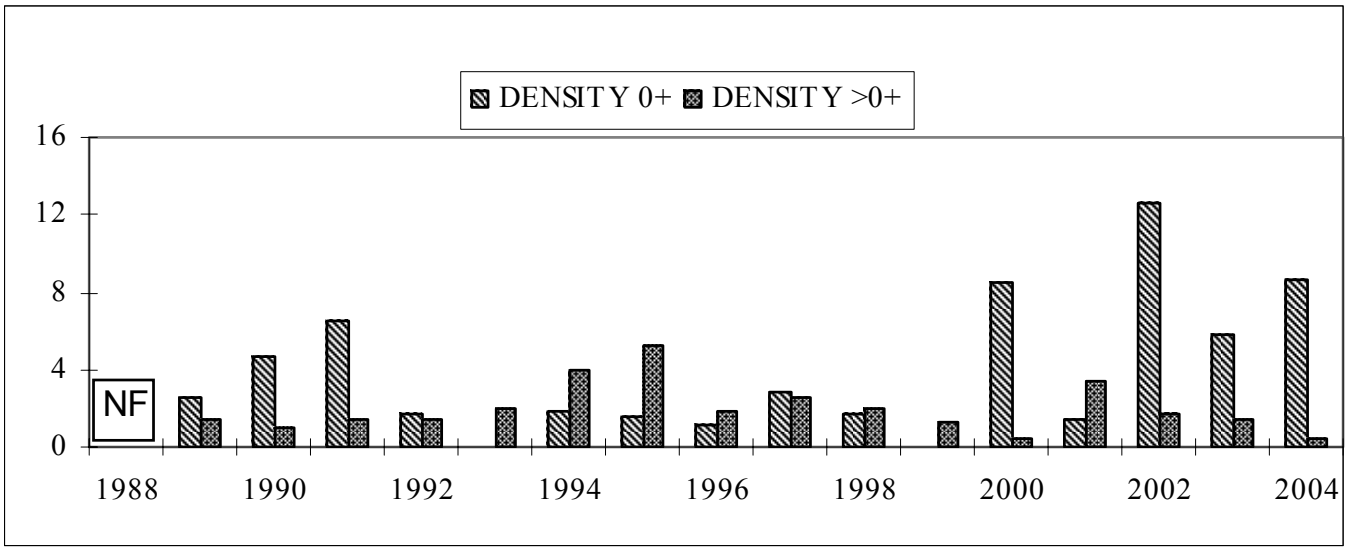
7.7.2.2 Summary statistics, Round Loch of Glenhead



No sampling in 2001 due to Foot and Mouth restrictions.

7.7.3 Fish data (for outflow stream)

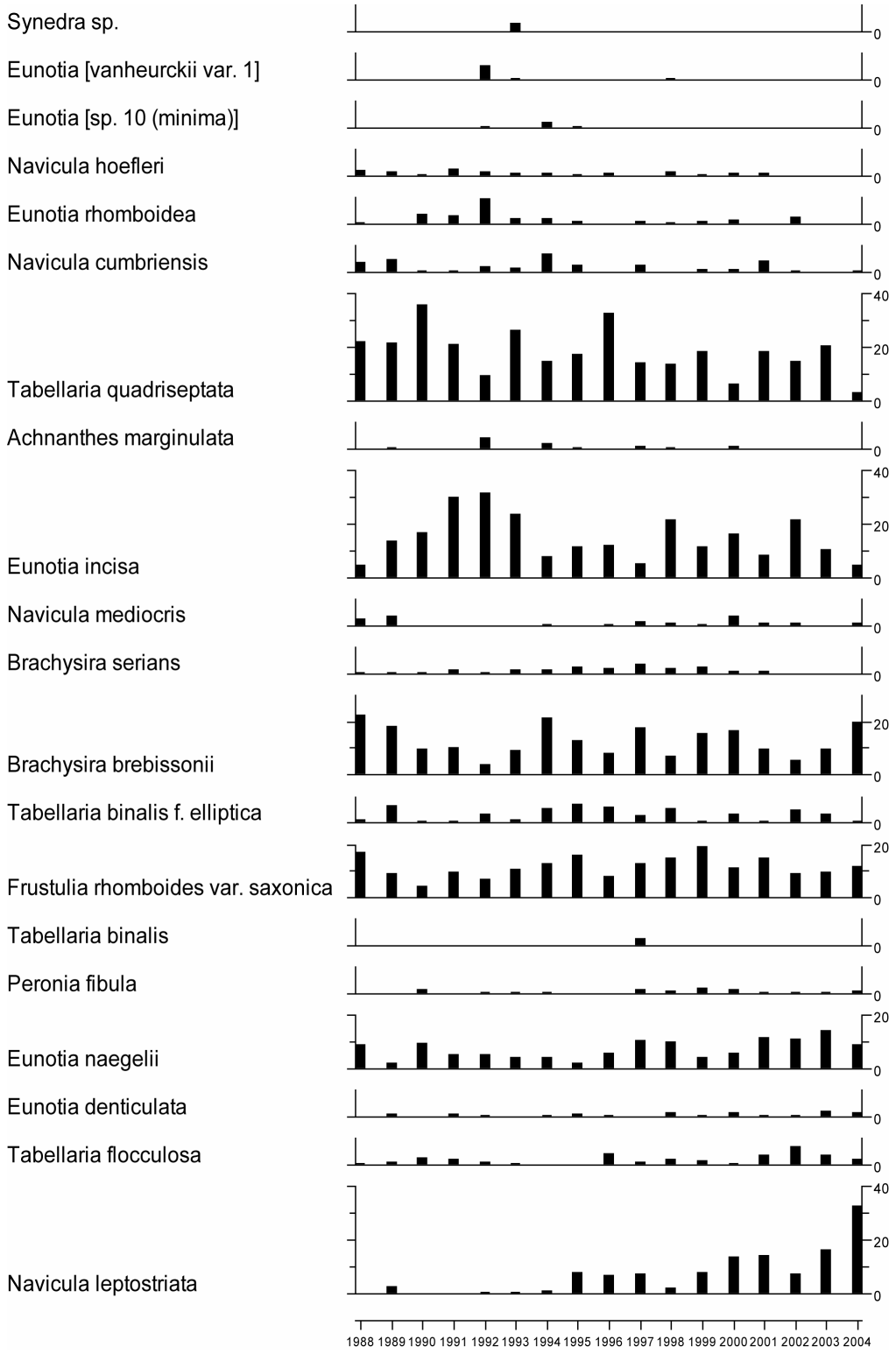
7.7.3.1 Summary of mean Trout density (numbers 100m^{-2}), Round Loch of Glenhead



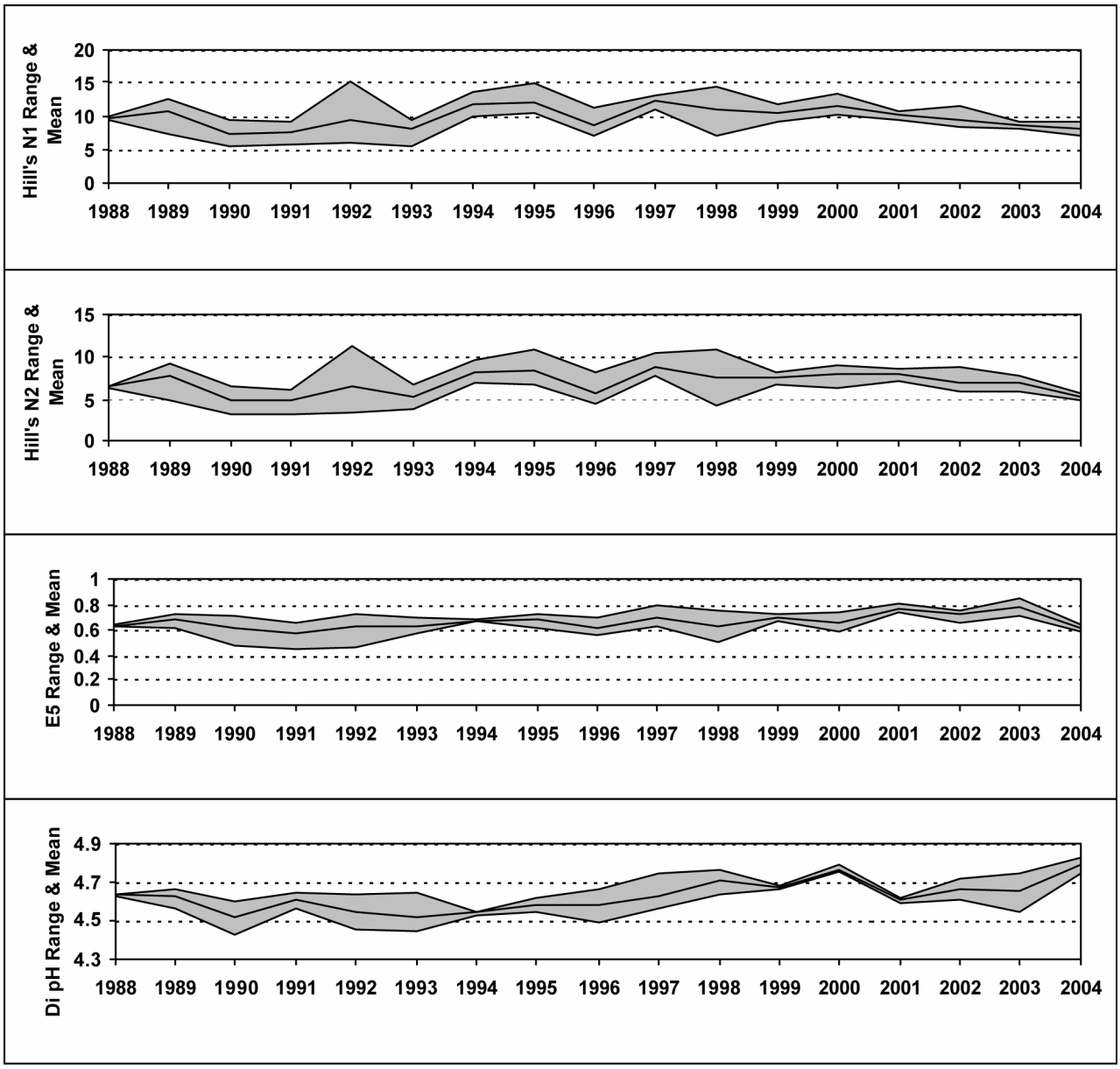
NF = Not fished

7.7.4 Epilithic diatom data

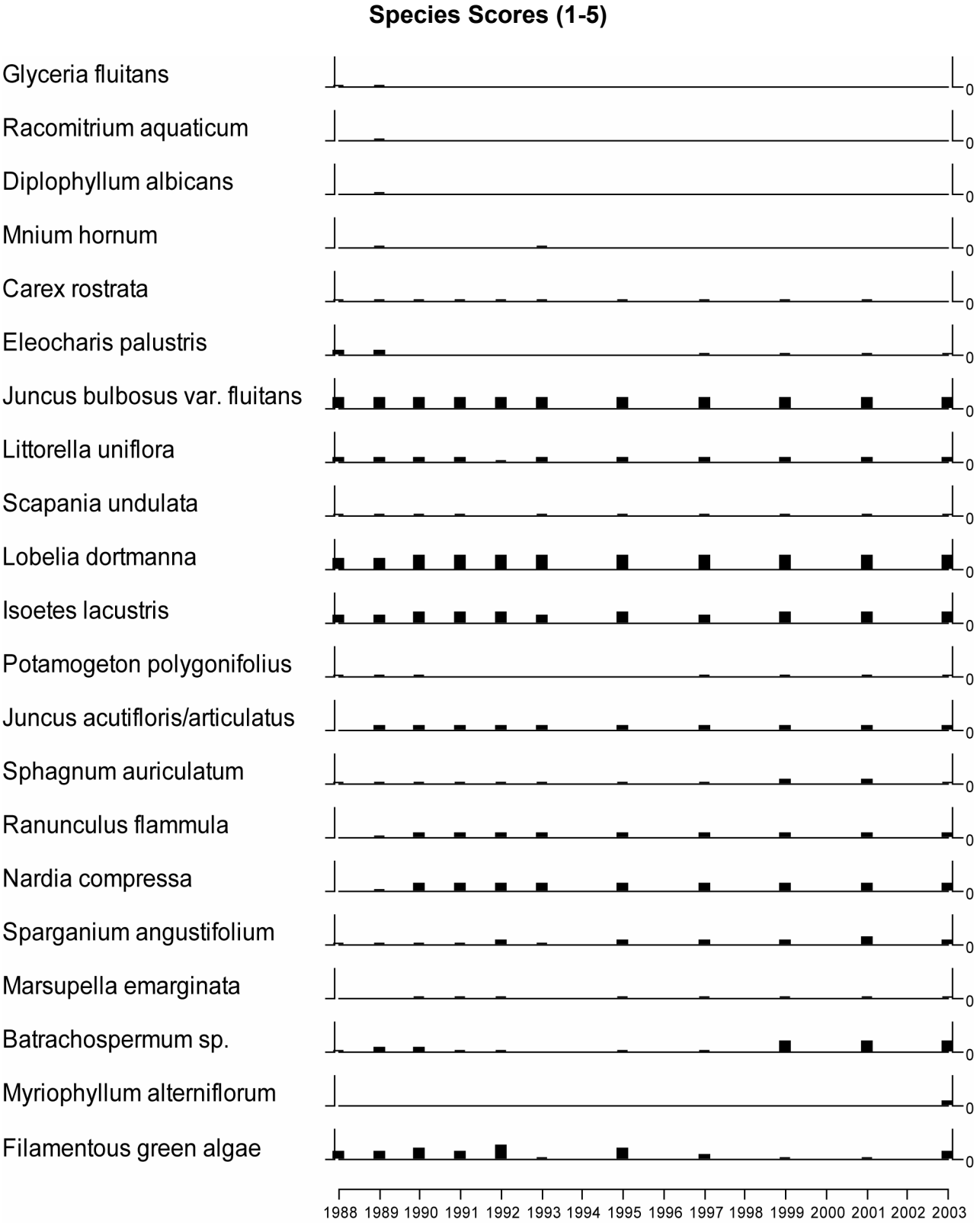
7.7.4.1 Percentage abundance summary, Round Loch of Glenhead



7.7.4.2 Summary statistics, Round Loch of Glenhead

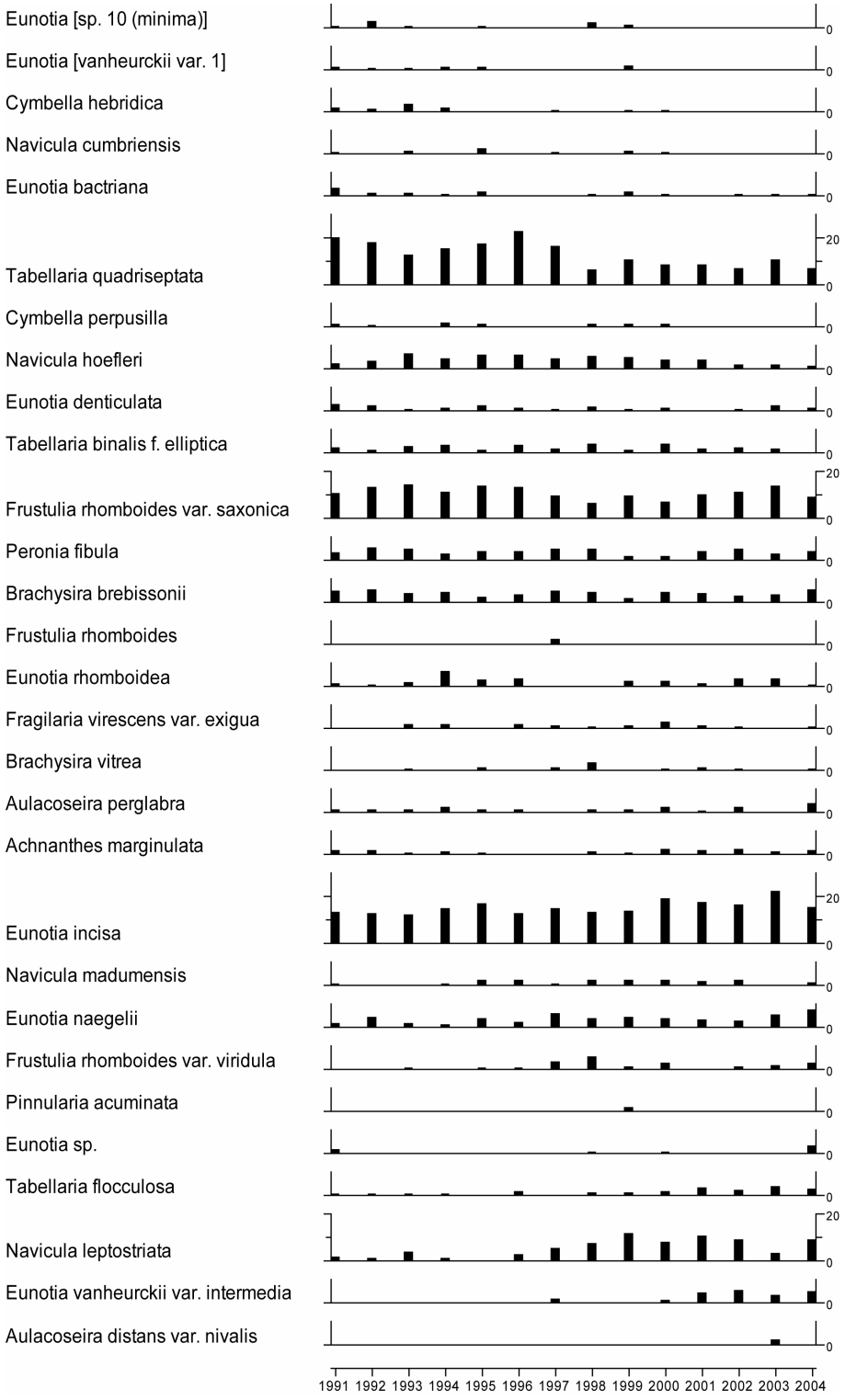


7.7.5 Aquatic macrophyte data, Round Loch of Glenhead



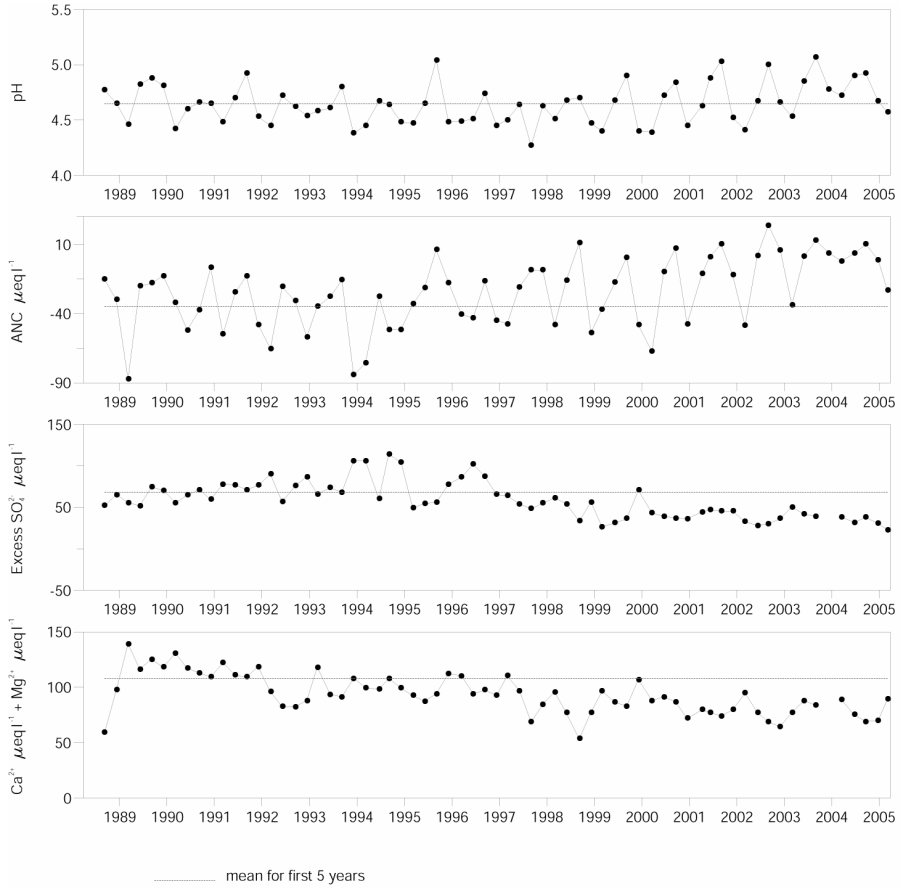
7.7.6 Sediment trap data, Round Loch of Glenhead

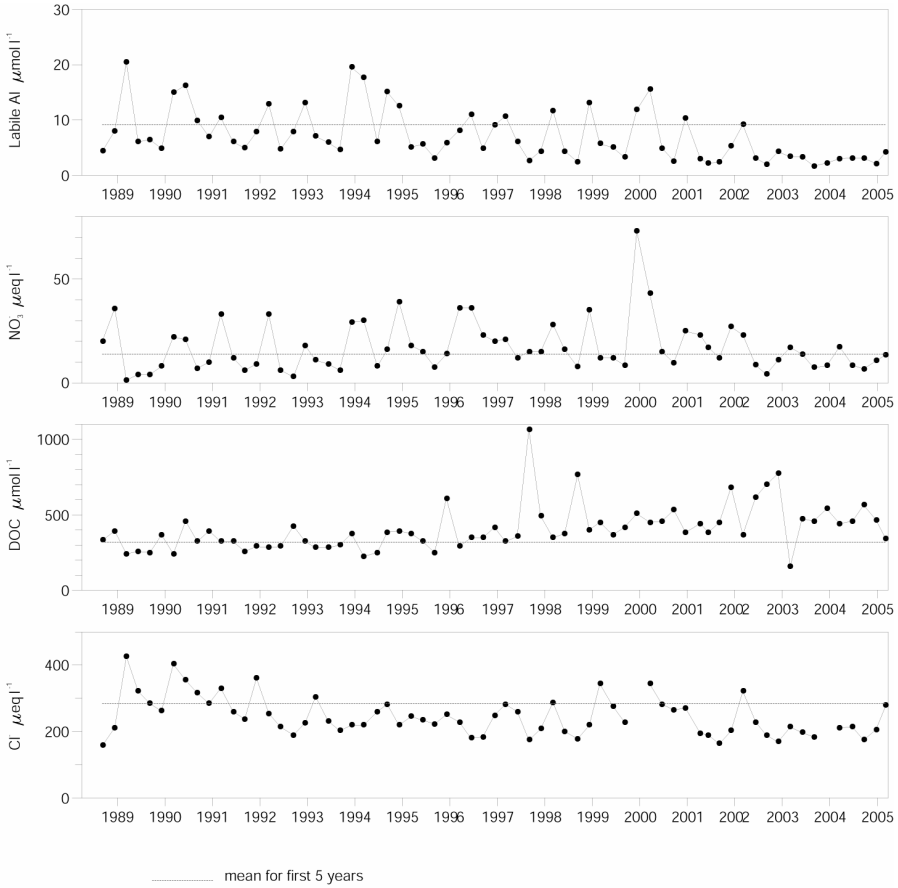
Relative percentage frequency of diatom taxa



7.8 Loch Grannoch

7.8.1 Spot sampled chemistry data





Determinand statistics

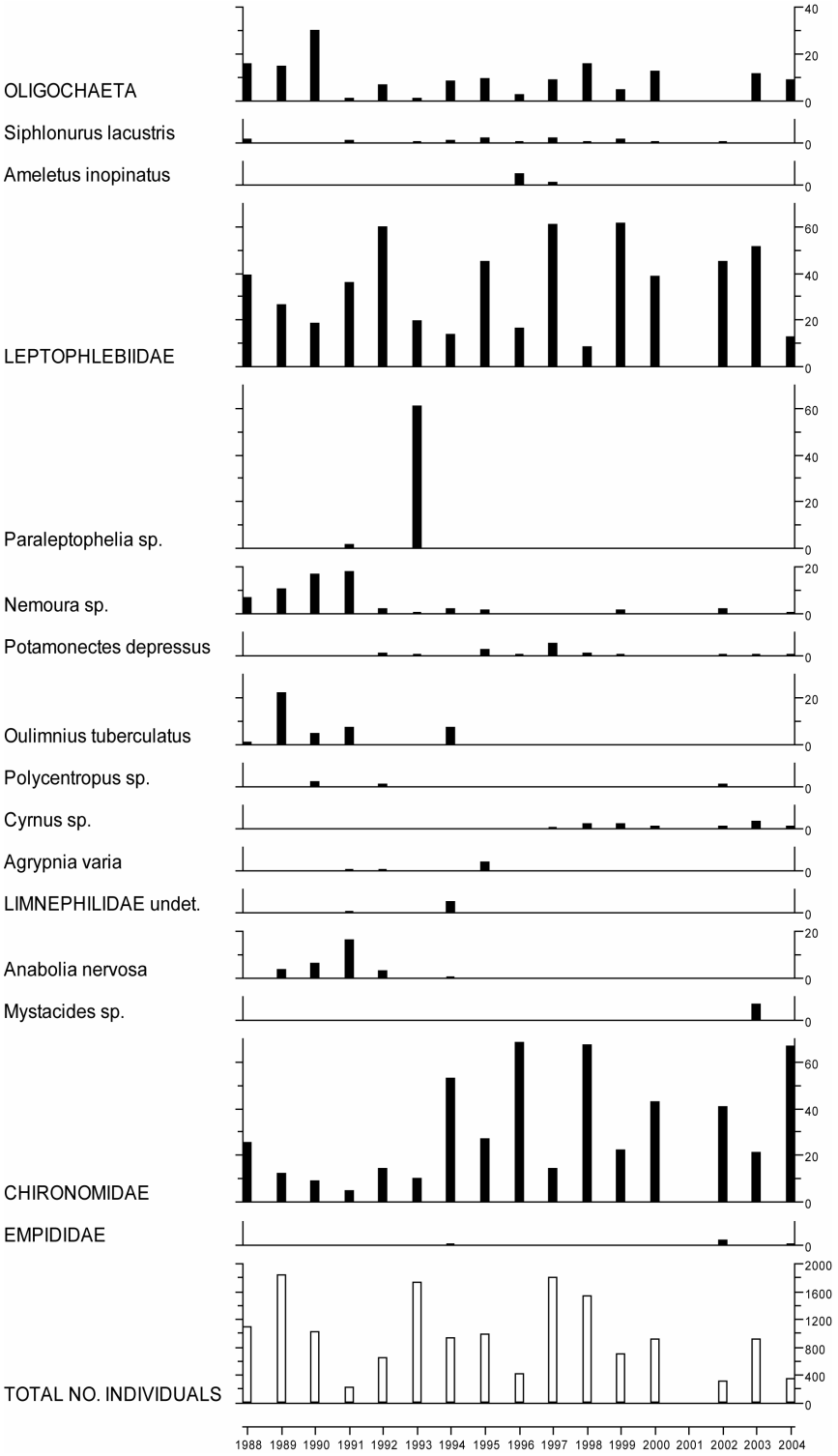
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	4.65	4.76	0.17	0.01	0.07
ANC	-34.68	-2.61	14.50	**2.46**	**0.00**
Ca	51.47	33.50	2.83	**-0.03**	**0.00**
Mg	56.54	42.29	6.50	**-0.01**	**0.00**
Na	239.1	167.4	19.61	**-0.10**	**0.01**
K	4.73	4.42	0.49	0.00	0.32
Sol.Al	11.72	6.17	0.49	**-6.71**	**0.01**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	9.12	3.12	0.88	**-9.50**	**0.00**
Cl	283.8	218.3	43.79	**-0.16**	**0.03**
SO_4	98.14	53.65	1.99	**-0.16**	**0.00**
XSO_4	68.34	30.72	6.21	**-0.13**	**0.00**
NO_3	13.89	9.84	2.96	0.00	0.88
Si	59.02	47.68	22.47	**-0.02**	**0.02**
DOC	319.3	458.3	92.04	**0.16**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

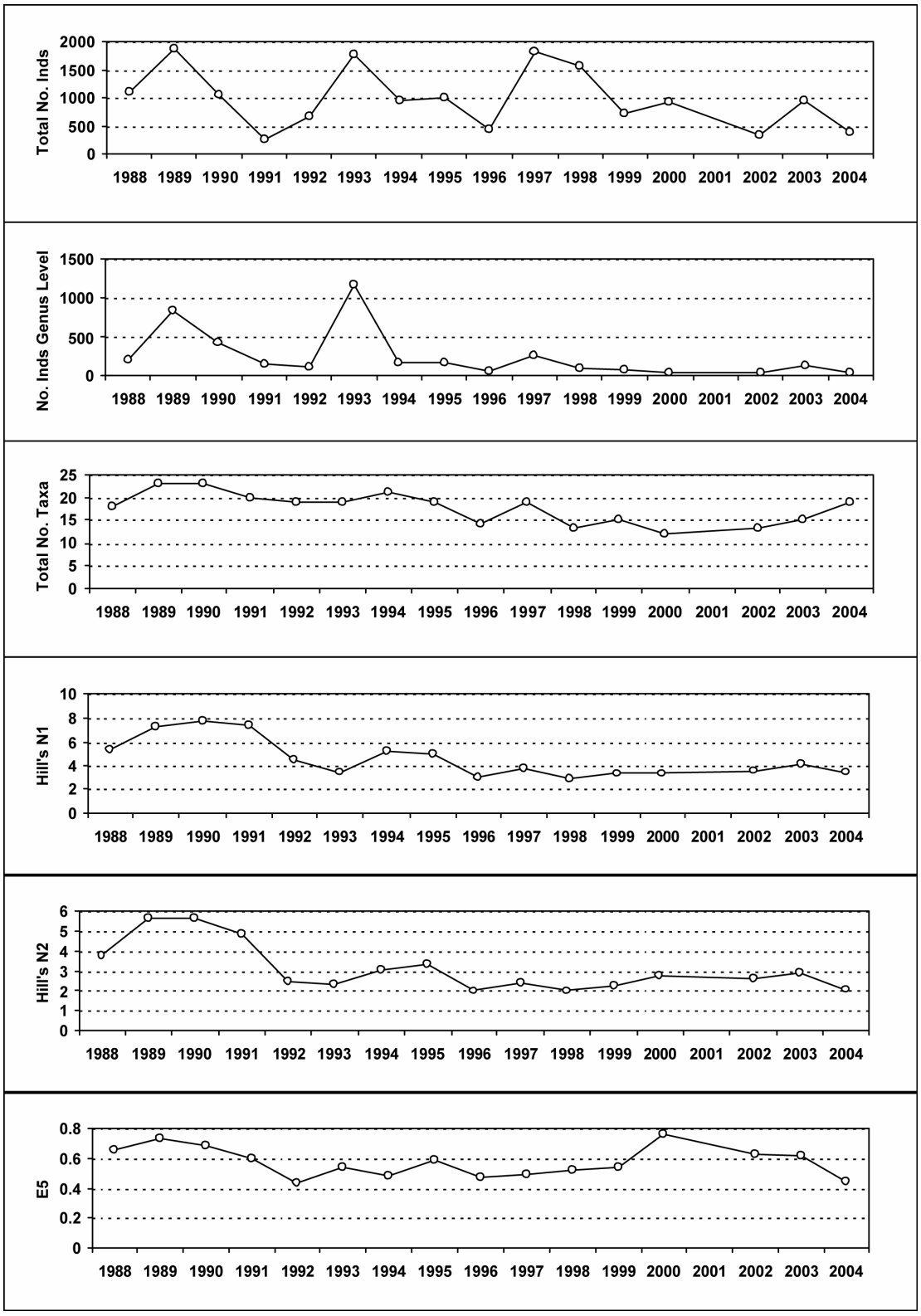
7.8.2 Macroinvertebrate data

7.8.2.1 Percentage abundance summary, Loch Grannoch



No sampling in 2001 due to Foot and Mouth restrictions.

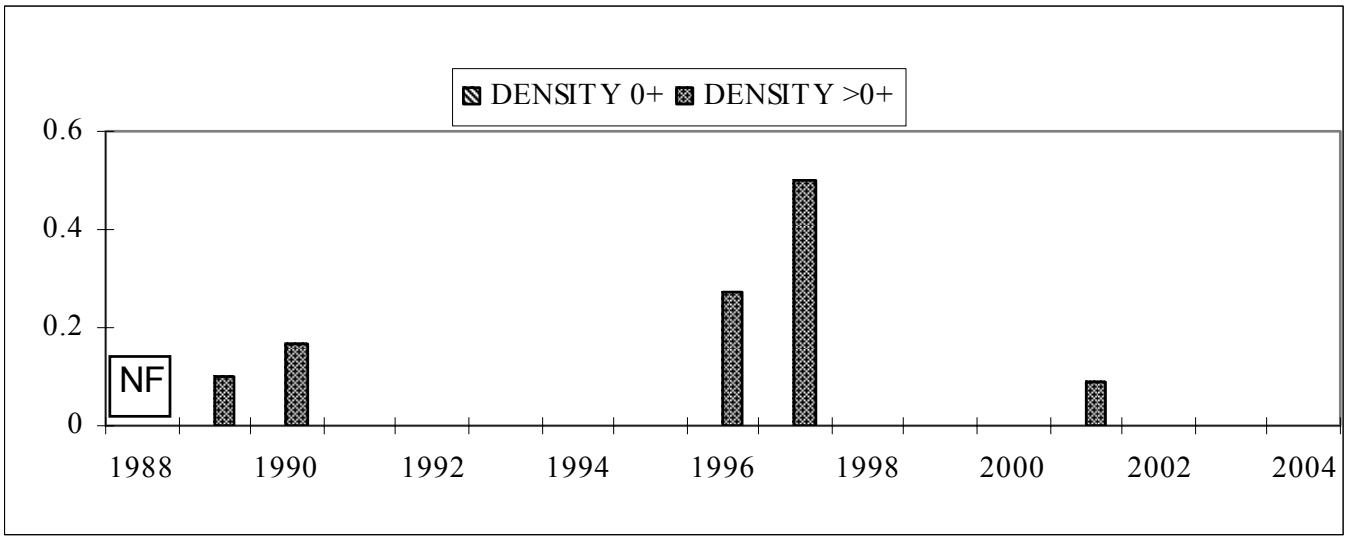
7.8.2.2 Summary statistics, Loch Grannoch



No sampling in 2001 due to Foot and Mouth restrictions.

7.8.3 Fish data (for outflow stream)

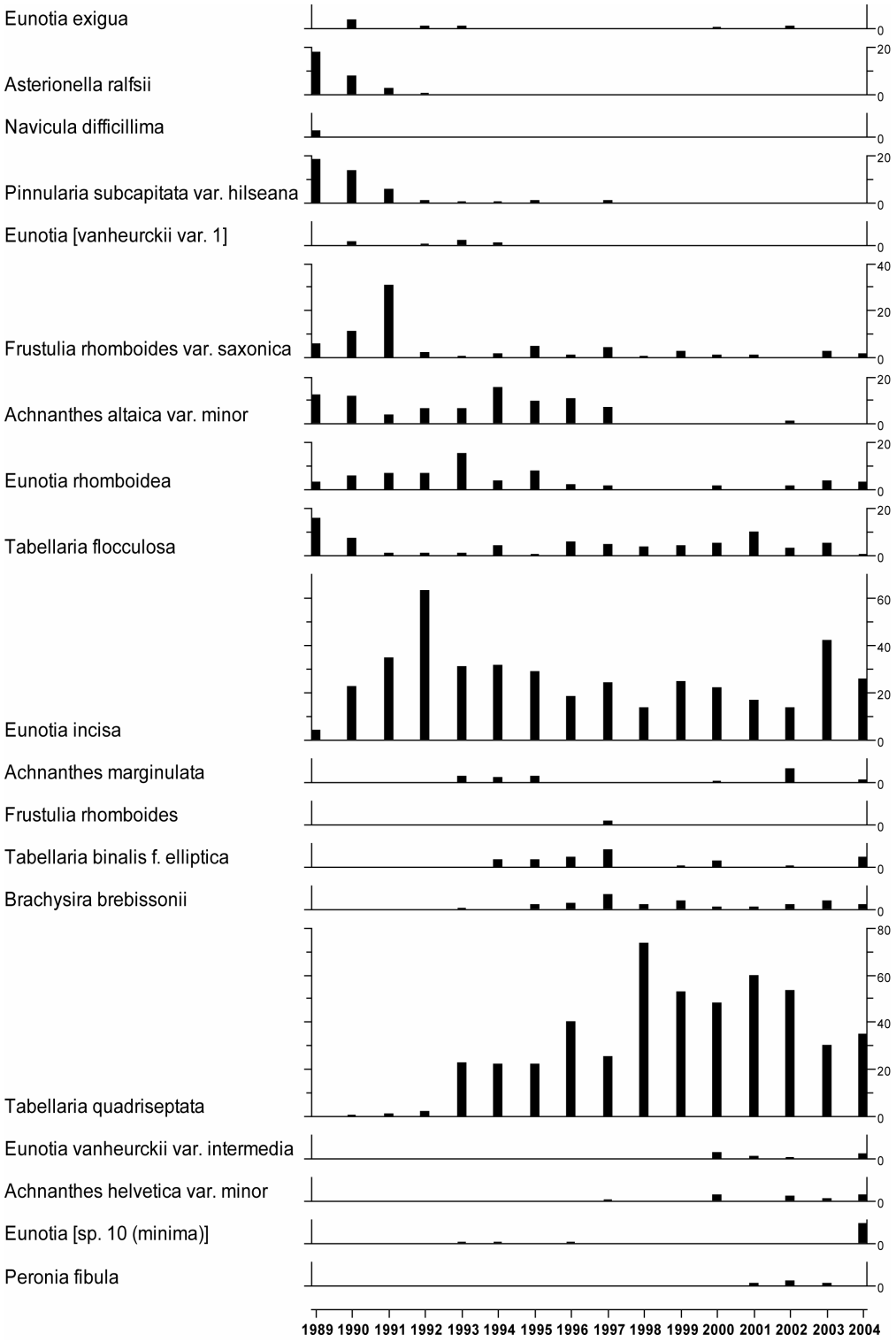
7.8.3.1 Summary of mean Trout density (numbers 100m^{-2}), Loch Grannoch



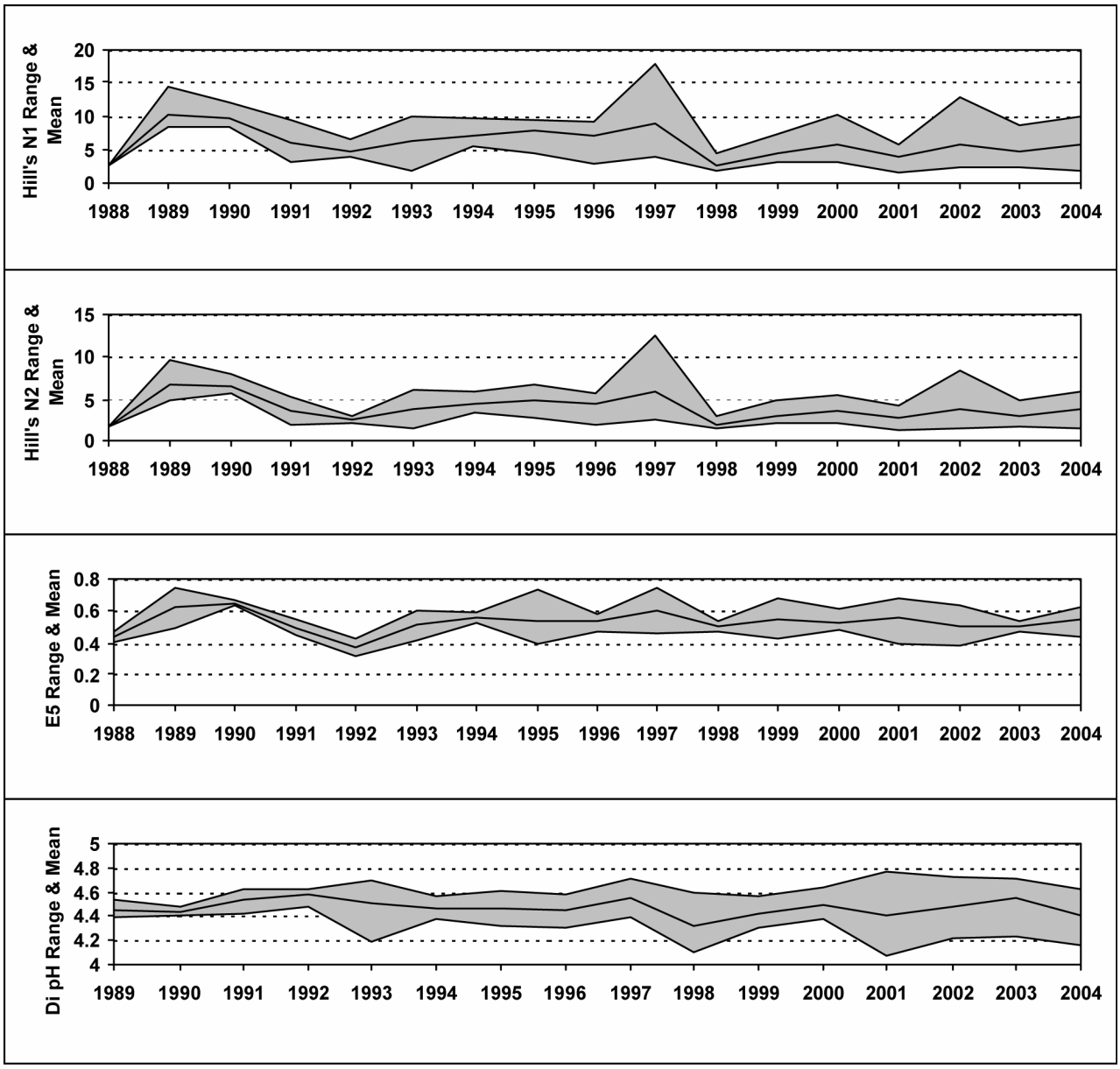
NF = Not fished

7.8.4 Epilithic diatom data

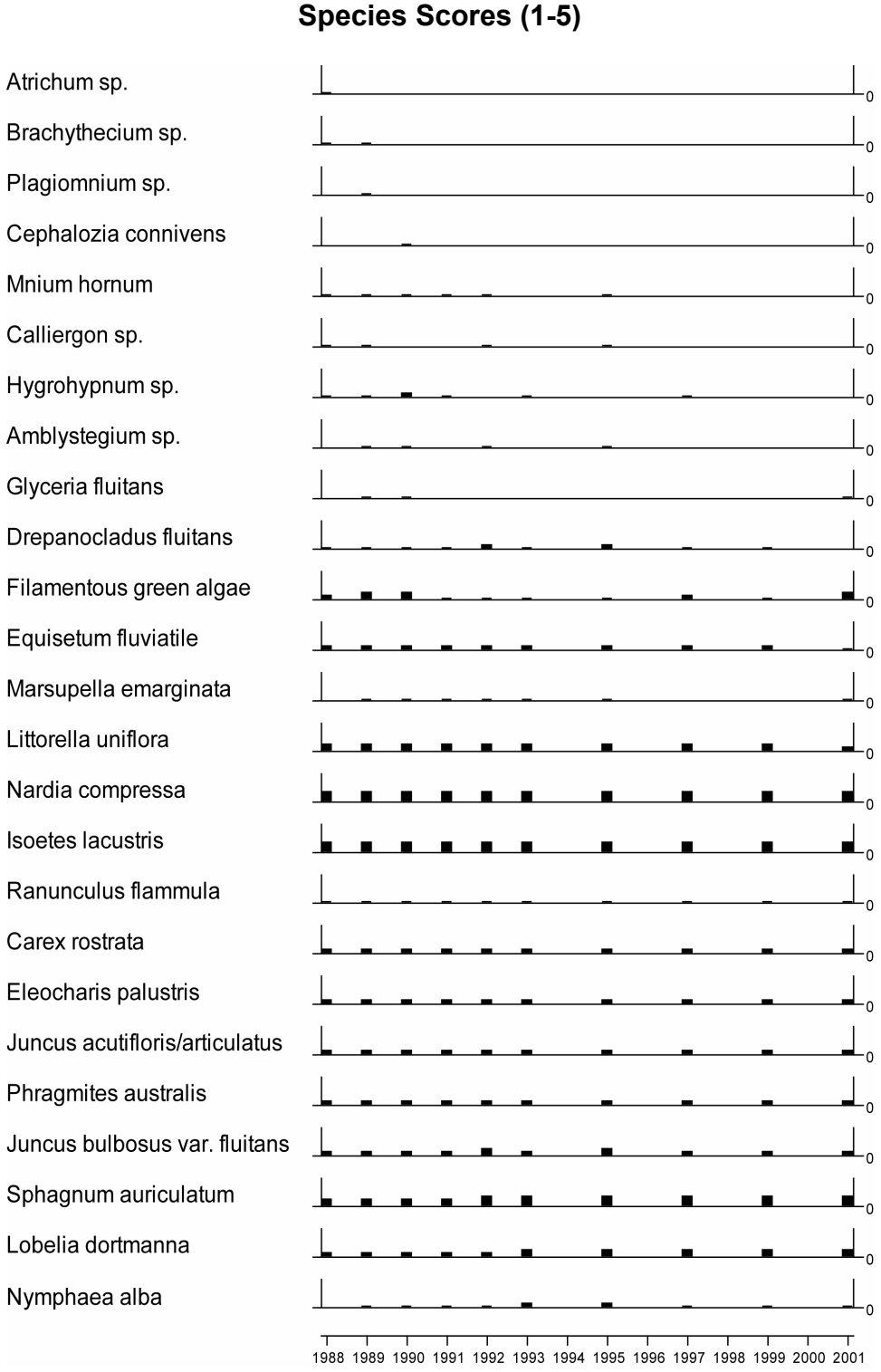
7.8.4.1 Percentage abundance summary, Loch Grannoch



7.8.4.2 Summary statistics, Loch Grannoch



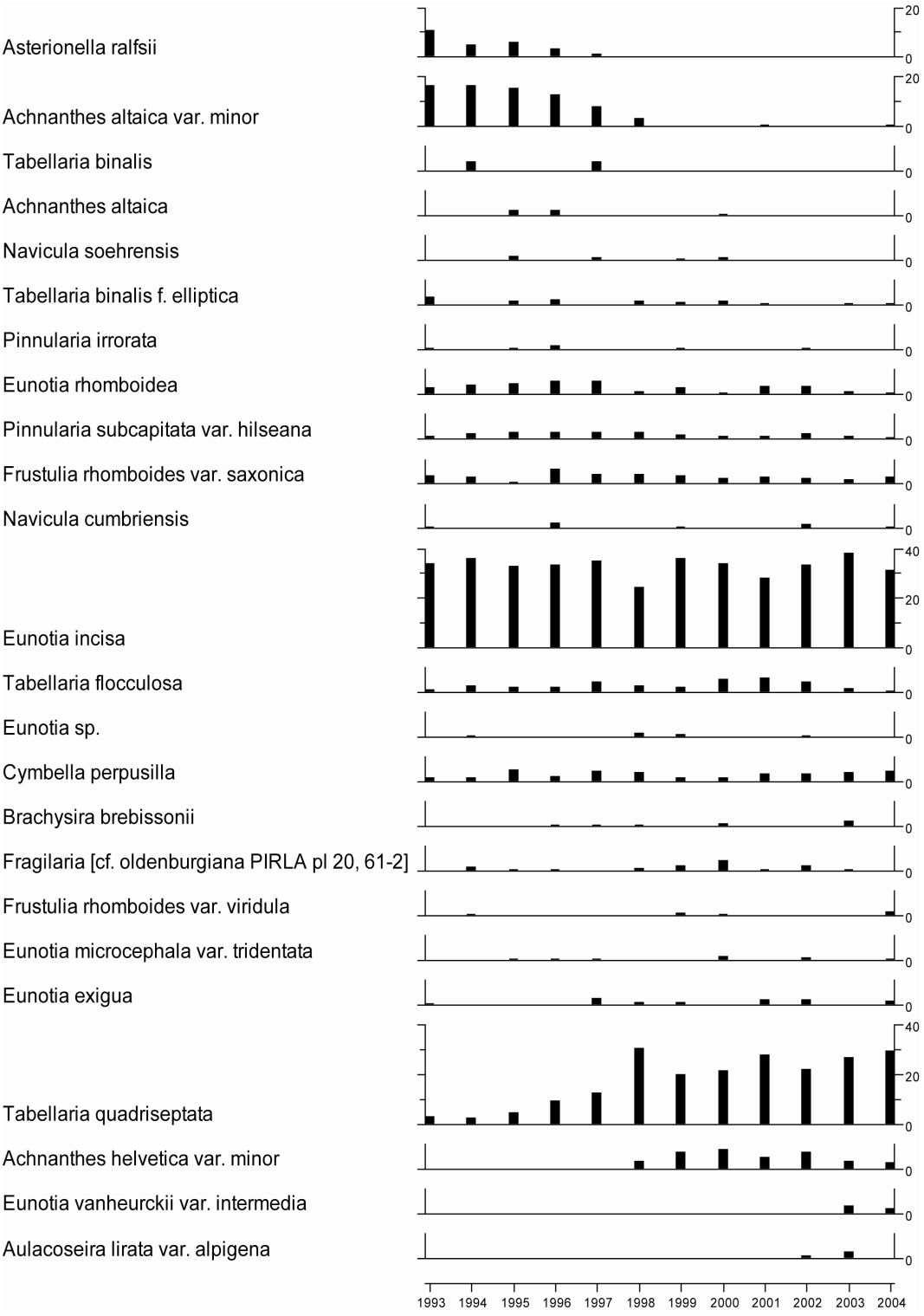
7.8.5 Aquatic macrophyte data, Loch Grannoch



No aquatic macrophyte survey in 2003.

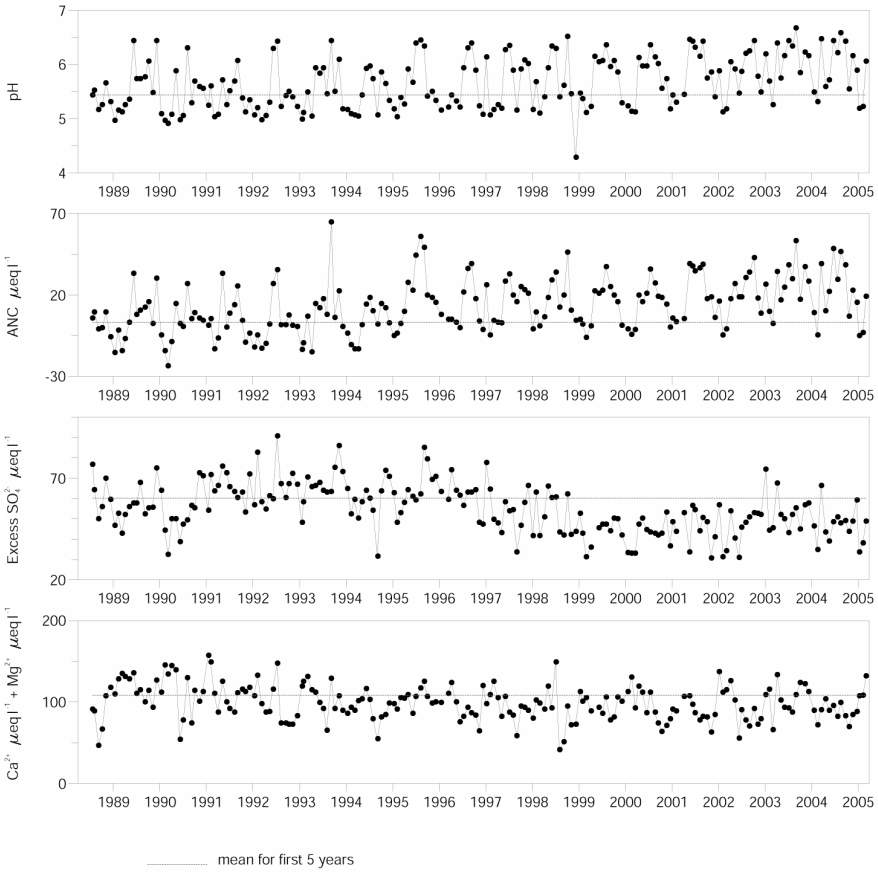
7.8.6 Sediment trap data, Loch Grannoch

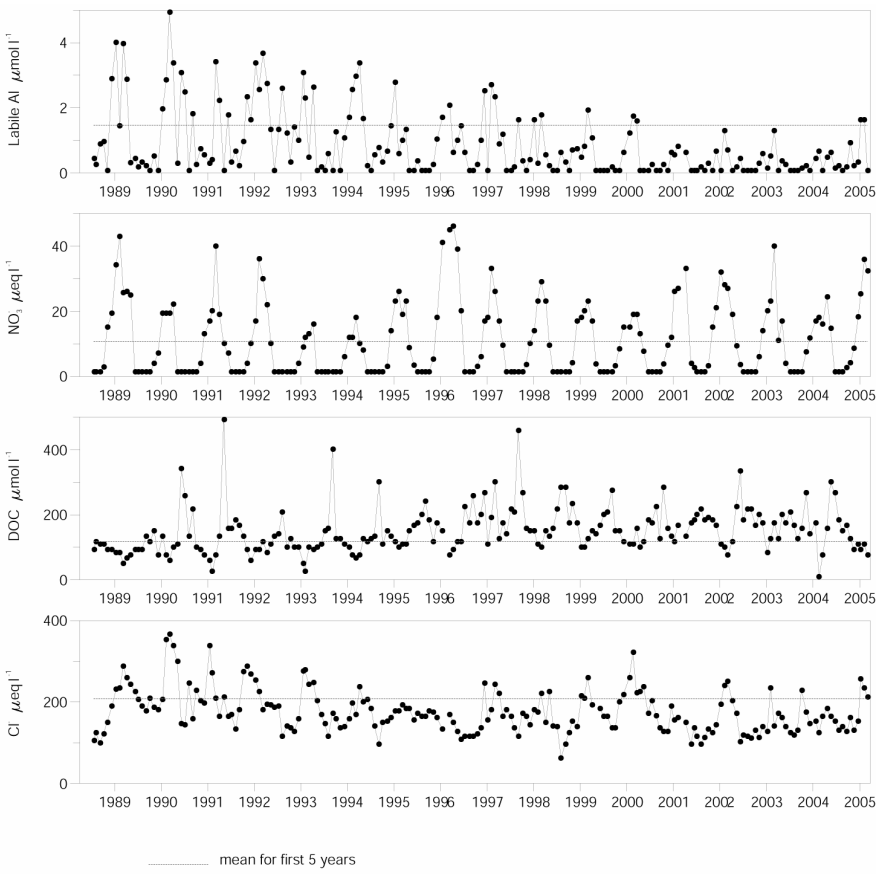
Relative percentage frequency of diatom taxa



7.9 Dargall Lane

7.9.1 Spot sampled chemistry data





Determinand statistics

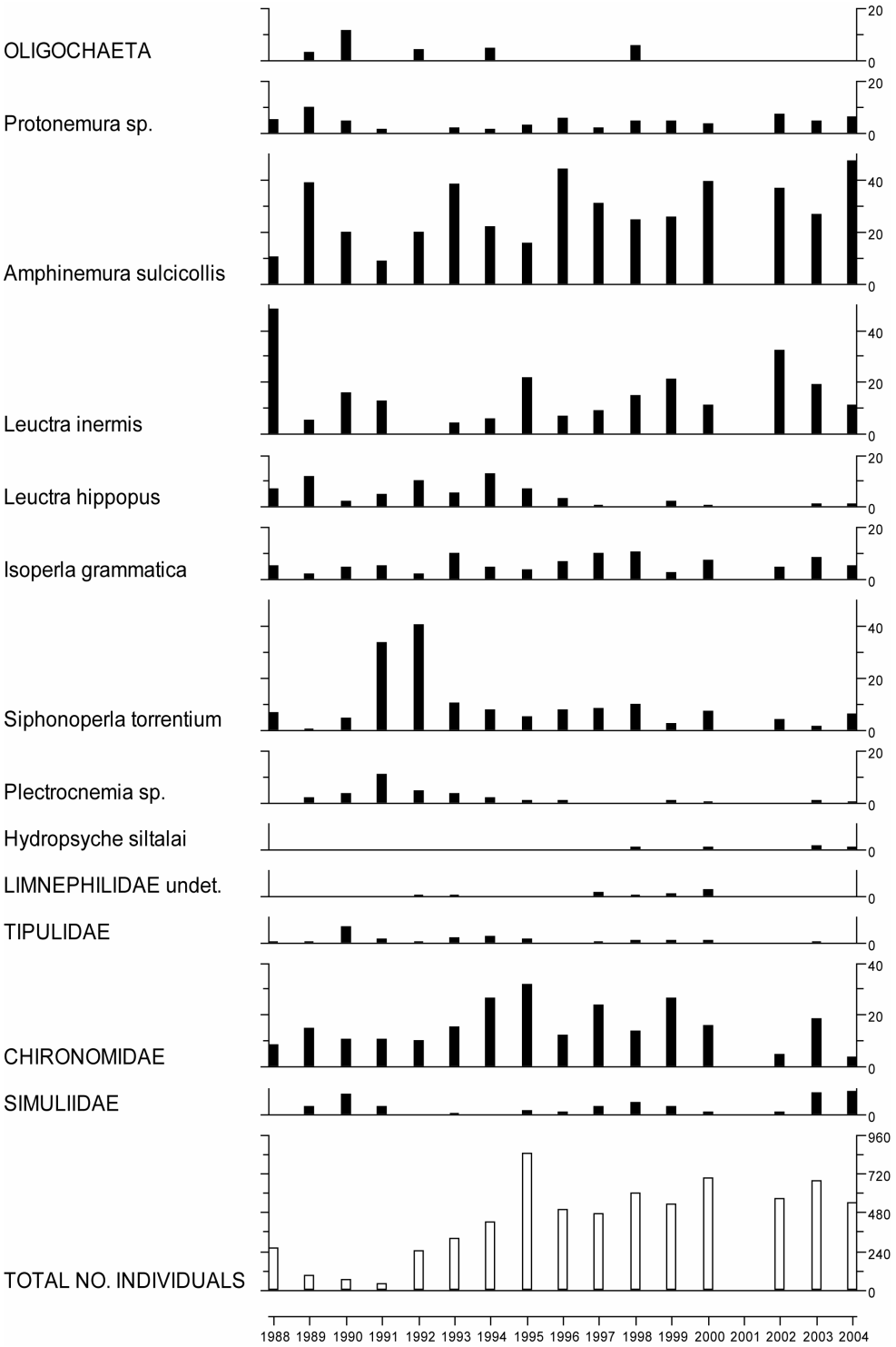
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.44	5.92	0.47	**0.03**	**0.00**
ANC	3.39	20.95	17.59	**1.38**	**0.00**
Ca	51.58	45.50	7.81	**-0.01**	**0.05**
Mg	56.62	49.44	9.56	**-0.01**	**0.03**
Na	182.2	139.5	21.66	**-0.07**	**0.00**
K	9.06	8.21	2.83	**0.00**	**0.04**
Sol.Al	2.06	1.14	0.75	**-1.50**	**0.00**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	1.48	0.55	0.56	**-1.33**	**0.00**
Cl	207.9	169.7	42.99	**-0.11**	**0.03**
SO_4	82.02	63.72	4.90	**-0.07**	**0.00**
XSO_4	60.18	45.89	6.83	**-0.05**	**0.01**
NO_3	10.70	14.18	12.84	0.00	0.17
Si	70.68	76.01	18.67	0.00	0.63
DOC	117.8	152.1	70.09	**0.05**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

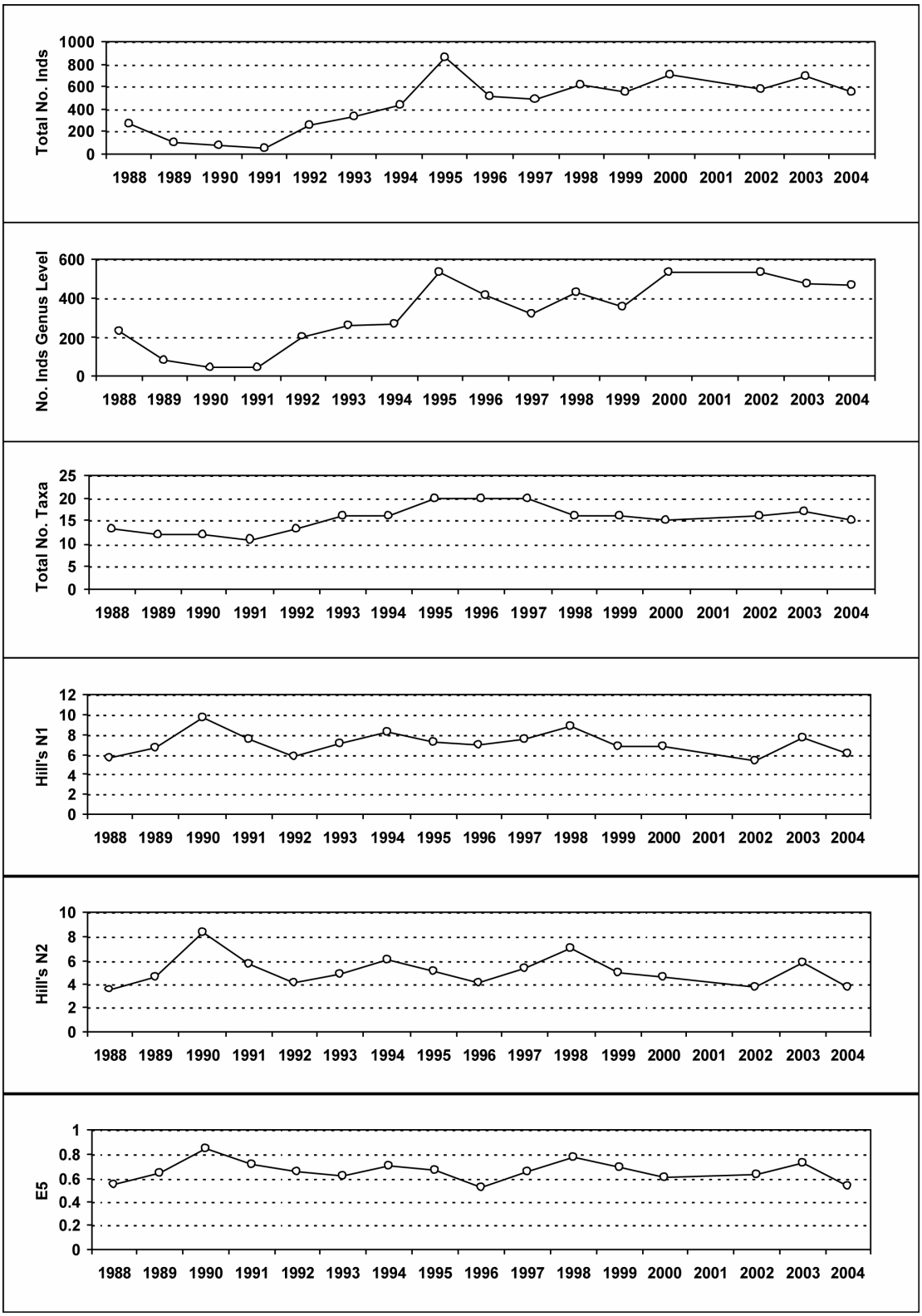
7.9.2 Macroinvertebrate data

7.9.2.1 Percentage abundance summary, Dargall Lane



No sampling in 2001 due to Foot and Mouth restrictions.

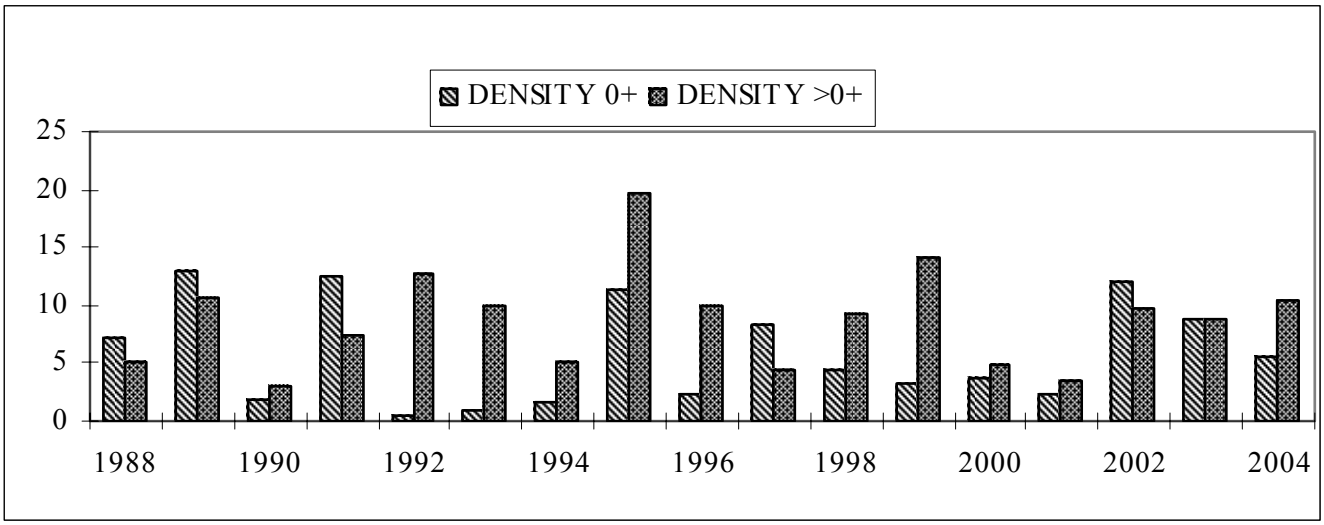
7.9.2.2 Summary statistics, Dargall Lane



No sampling in 2001 due to Foot and Mouth restrictions.

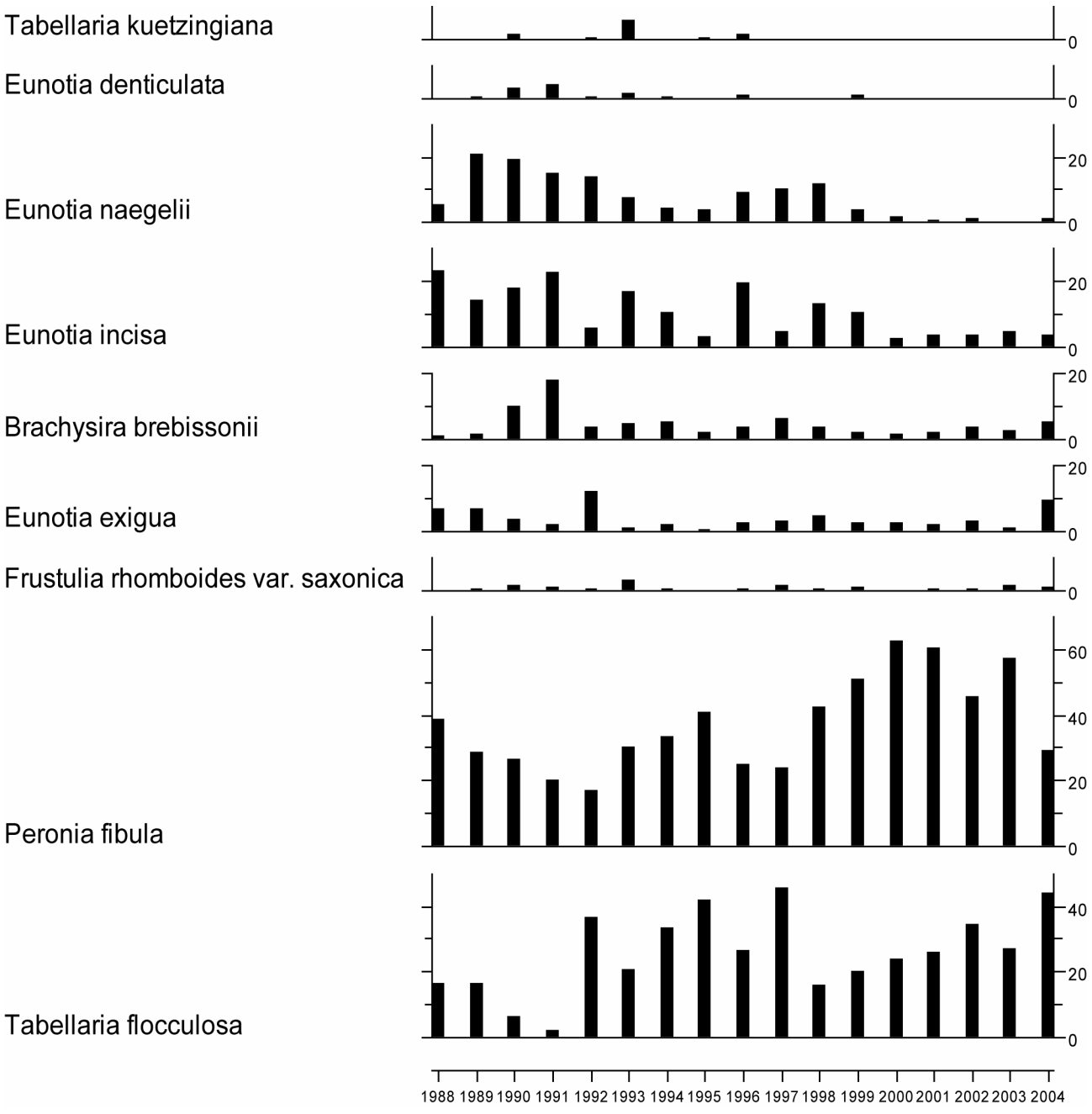
7.9.3 Fish data

7.9.3.1 Summary of mean Trout density (numbers $100m^{-2}$), Dargall Lane

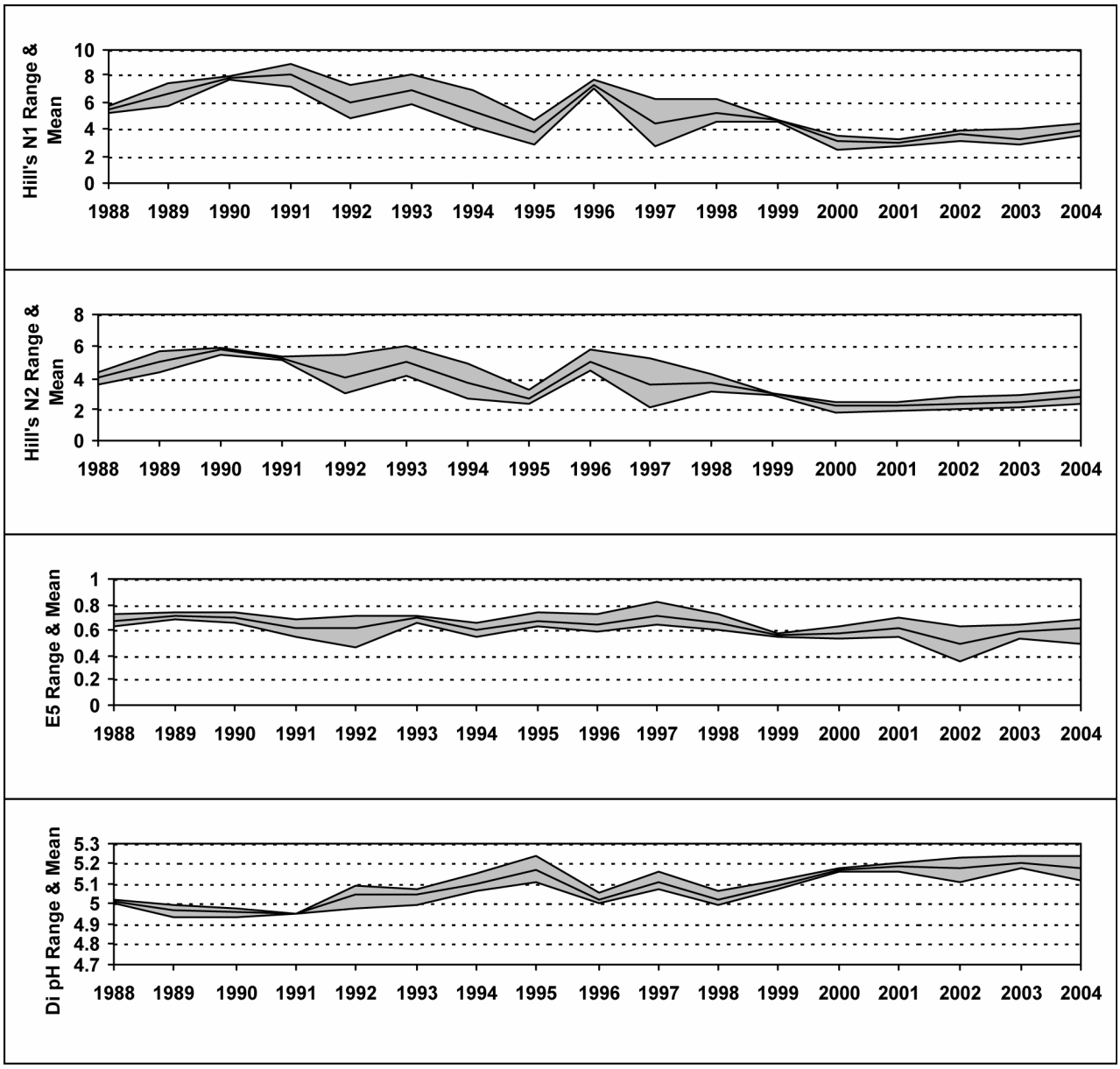


7.9.4 Epilithic diatom data

7.9.4.1 Percentage abundance summary, Dargall Lane

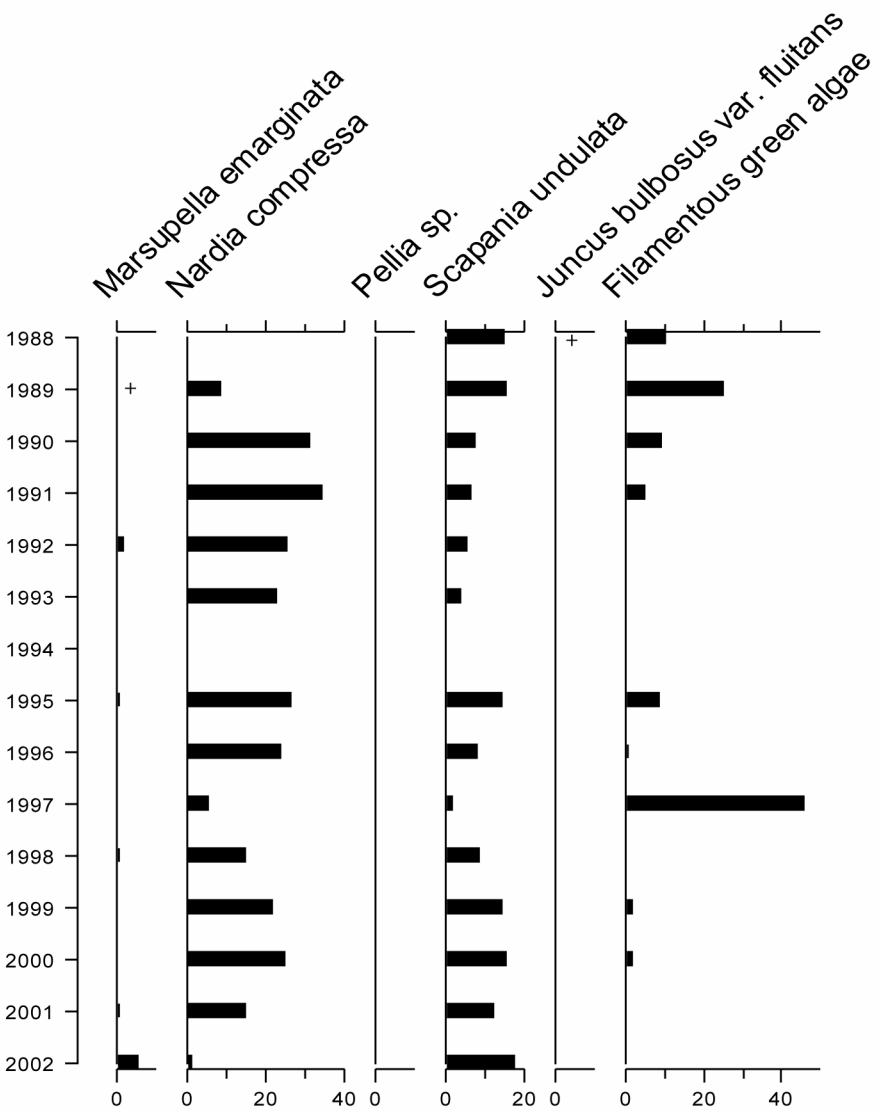


7.9.4.2 Summary statistics, Dargall Lane



7.9.5 Aquatic macrophyte data, Dargall Lane

Percentage Species Cover

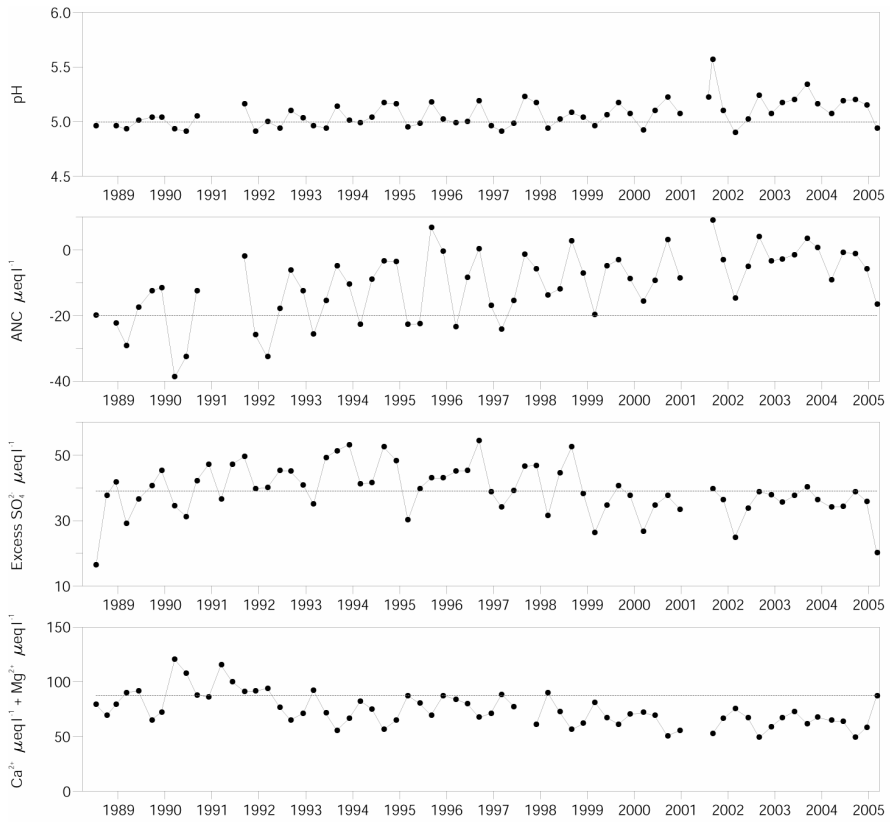


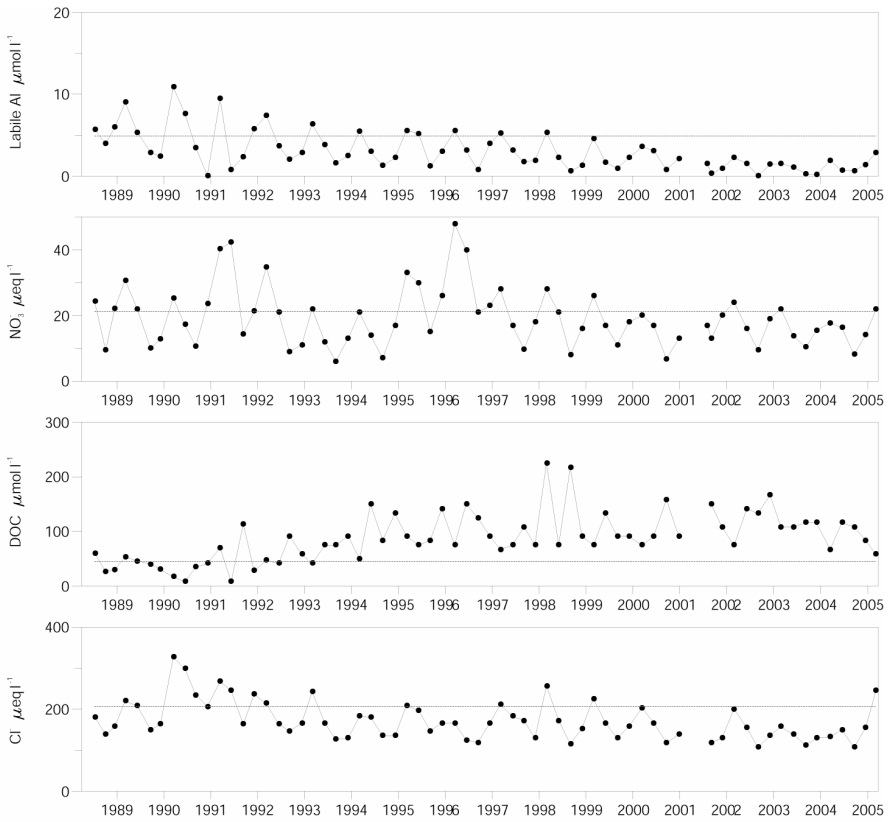
+ Represents <0.1% abundance

2003 and 2004 data pending.

7.10 Scoat Tarn

7.10.1 Spot sampled chemistry data





Determinand statistics

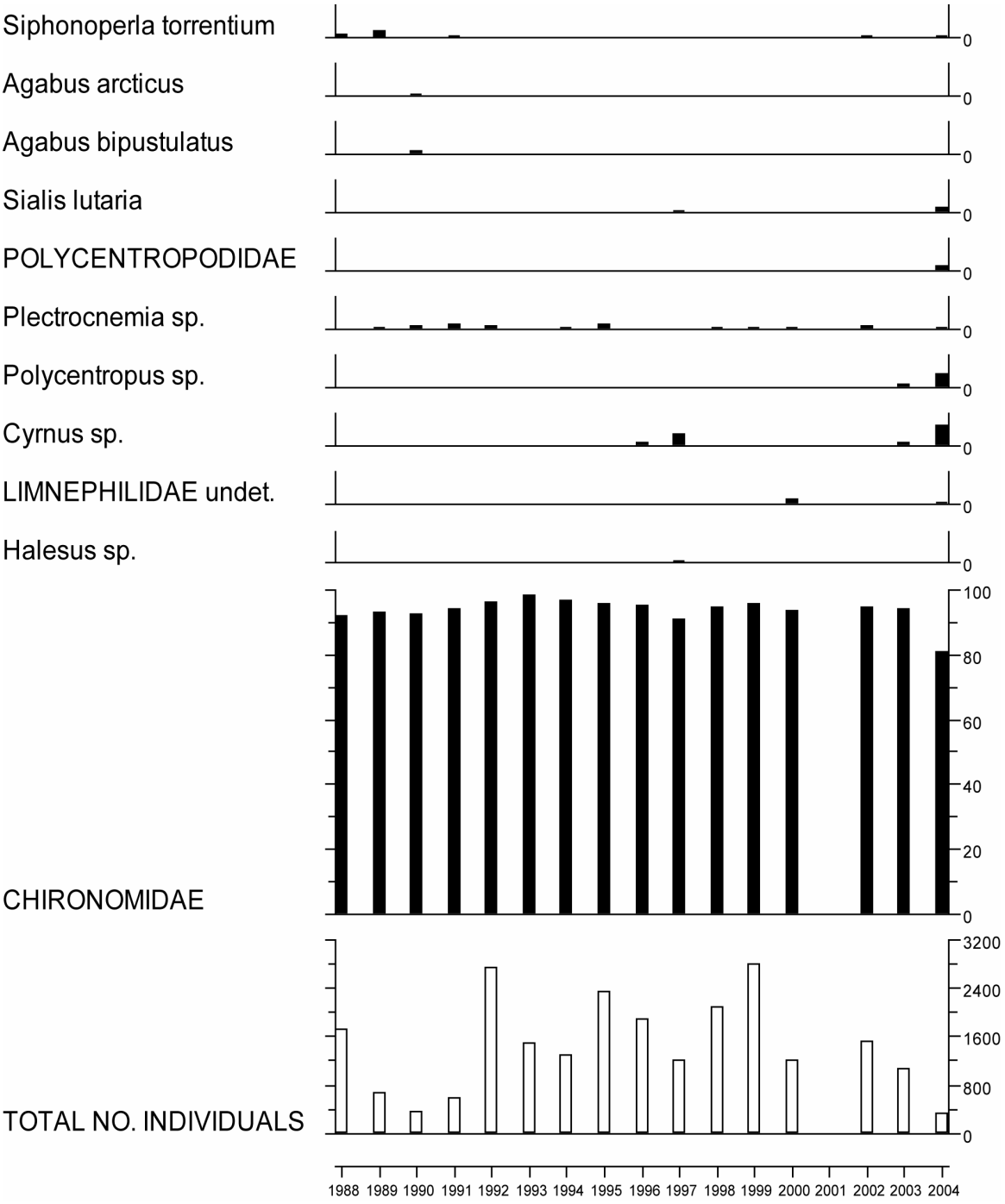
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.00	5.12	0.12	**0.01**	**0.00**
ANC	-19.95	-6.05	7.33	**1.18**	**0.00**
Ca	35.75	24.38	5.27	**-0.02**	**0.00**
Mg	51.50	40.21	11.08	**-0.01**	**0.00**
Na	178.3	128.3	34.33	**-0.07**	**0.00**
K	8.27	5.32	1.50	**-0.01**	**0.00**
Sol.Al	5.36	1.62	1.02	**-7.54**	**0.00**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	4.91	1.42	1.04	**-7.48**	**0.00**
Cl	206.3	164.1	58.07	**-0.11**	**0.00**
SO_4	60.73	49.48	2.62	**-0.05**	**0.00**
XSO_4	39.06	32.24	8.30	**-0.02**	**0.03**
NO_3	21.21	15.12	5.71	0.00	0.10
Si	42.50	50.89	7.92	0.00	0.51
DOC	44.50	91.67	26.35	**0.06**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

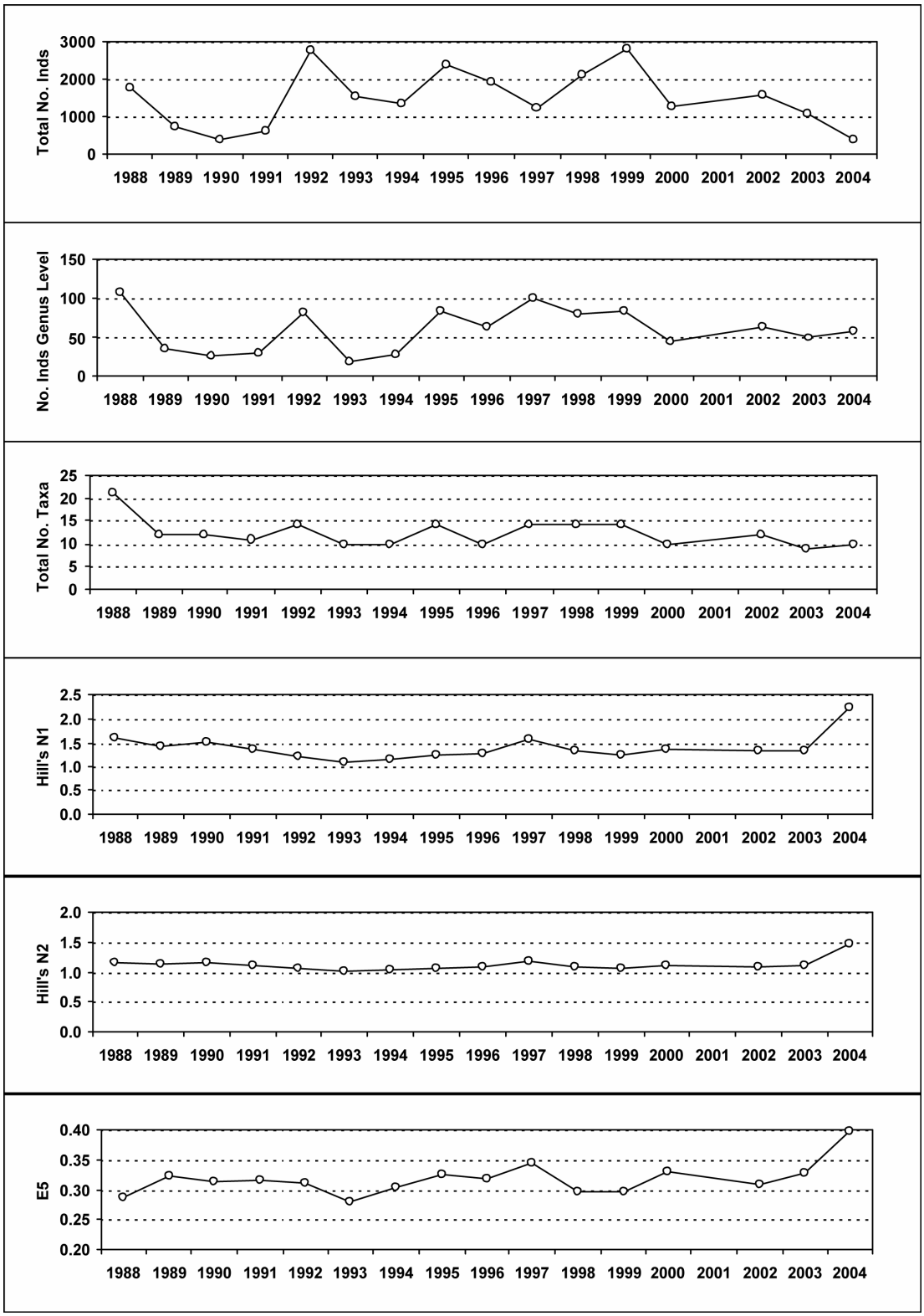
7.10.2 Macroinvertebrate data

7.10.2.1 Percentage abundance summary, Scoat Tarn



No sampling in 2001 due to Foot and Mouth restrictions.

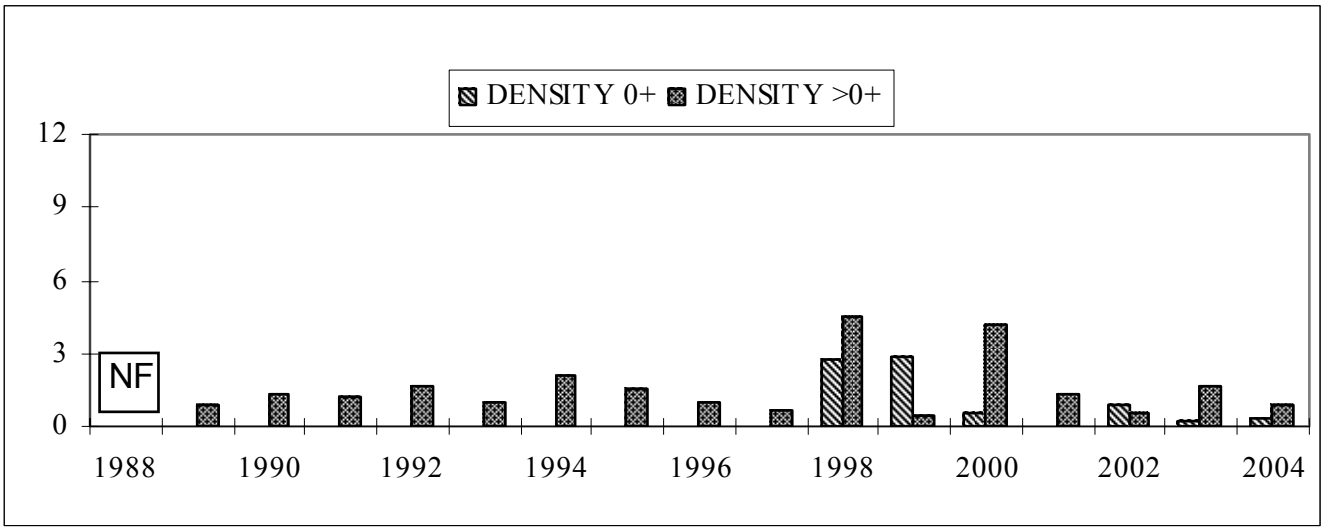
7.10.2.2 Summary statistics, Scoat Tarn



No sampling in 2001 due to Foot and Mouth restrictions.

7.10.3 Fish data (for outflow stream)

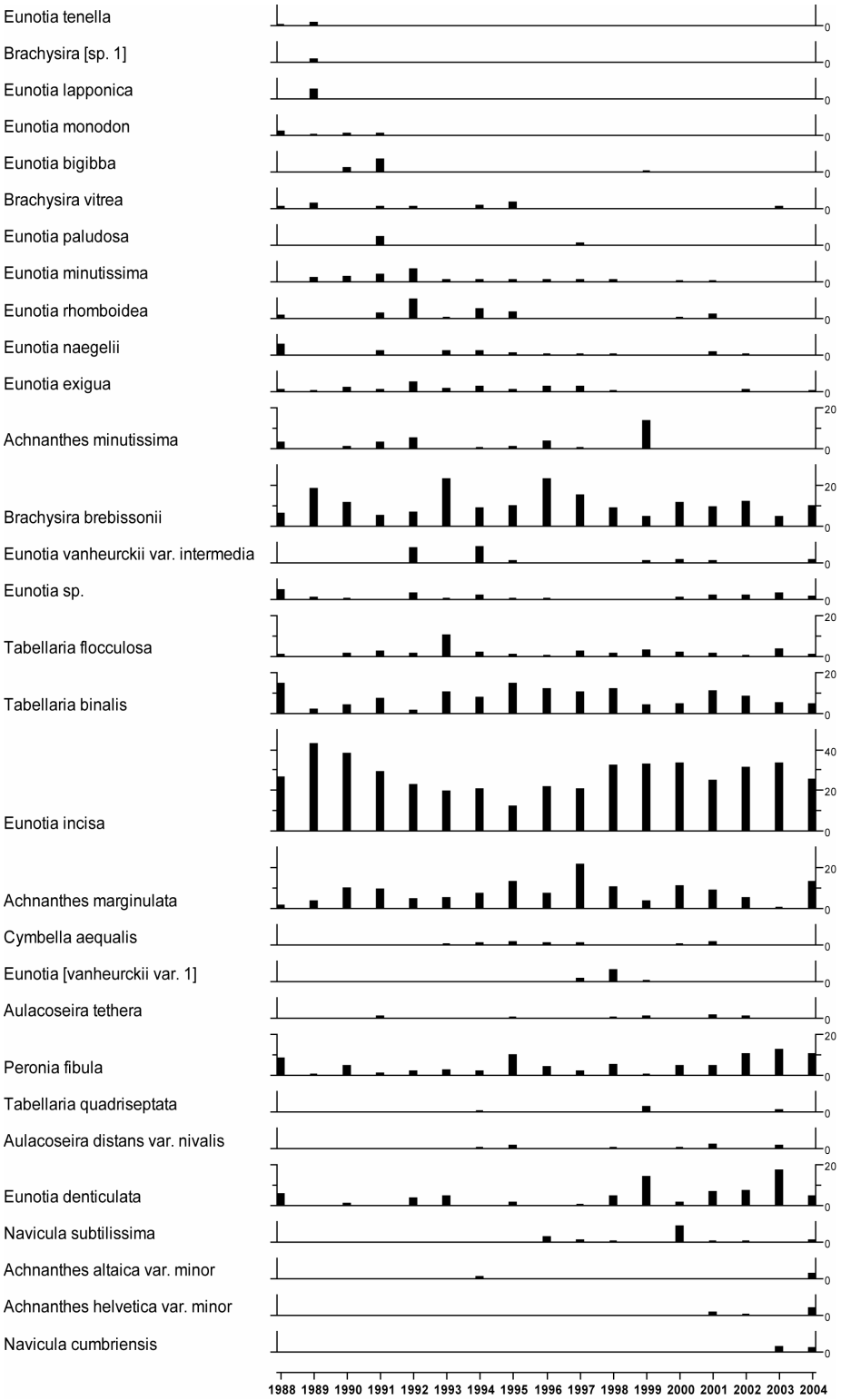
7.10.3.1 Summary of mean Trout density (numbers 100m^{-2}), Scoat Tarn



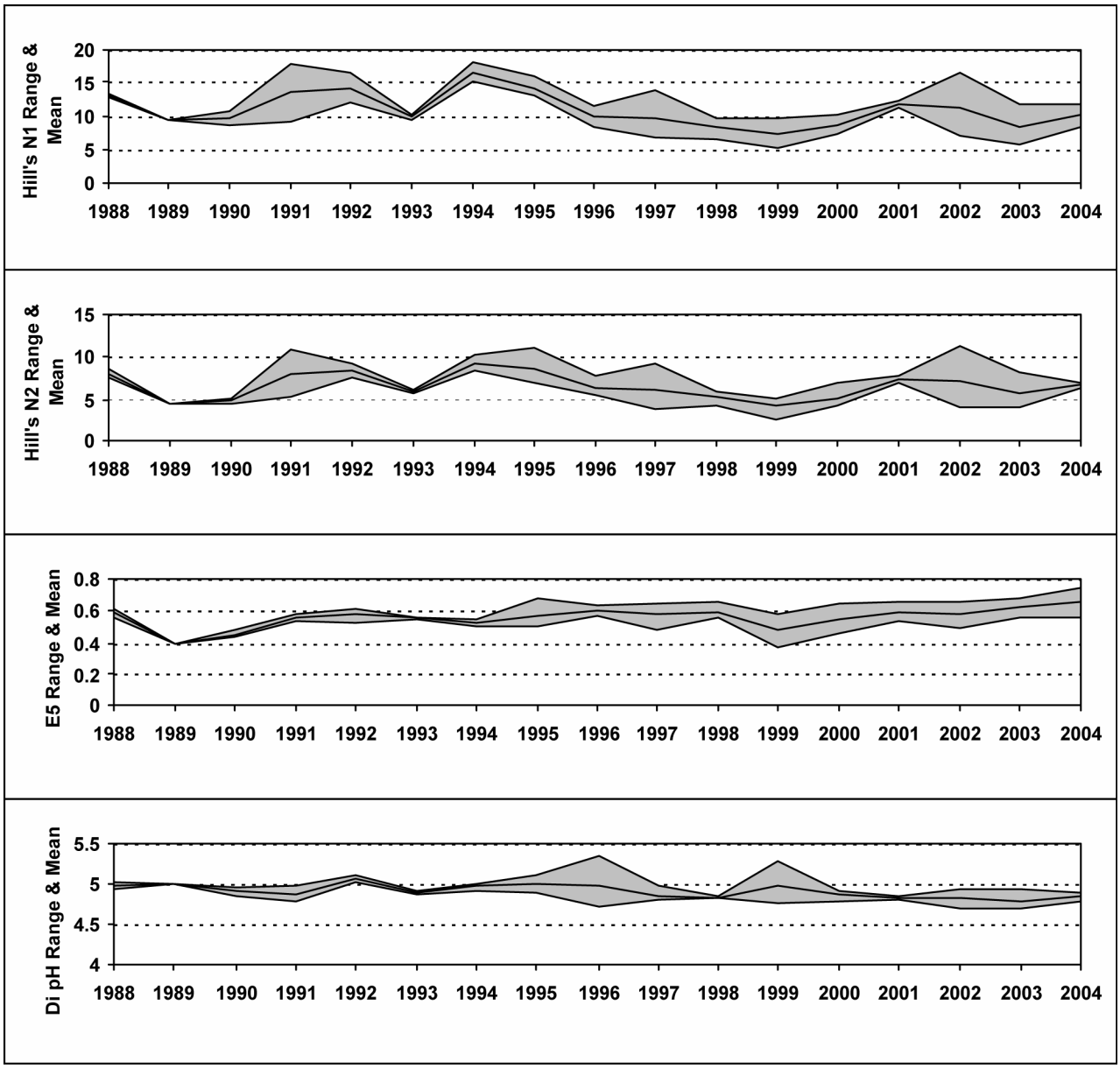
NF = Not fished

7.10.4 Epilithic diatom data

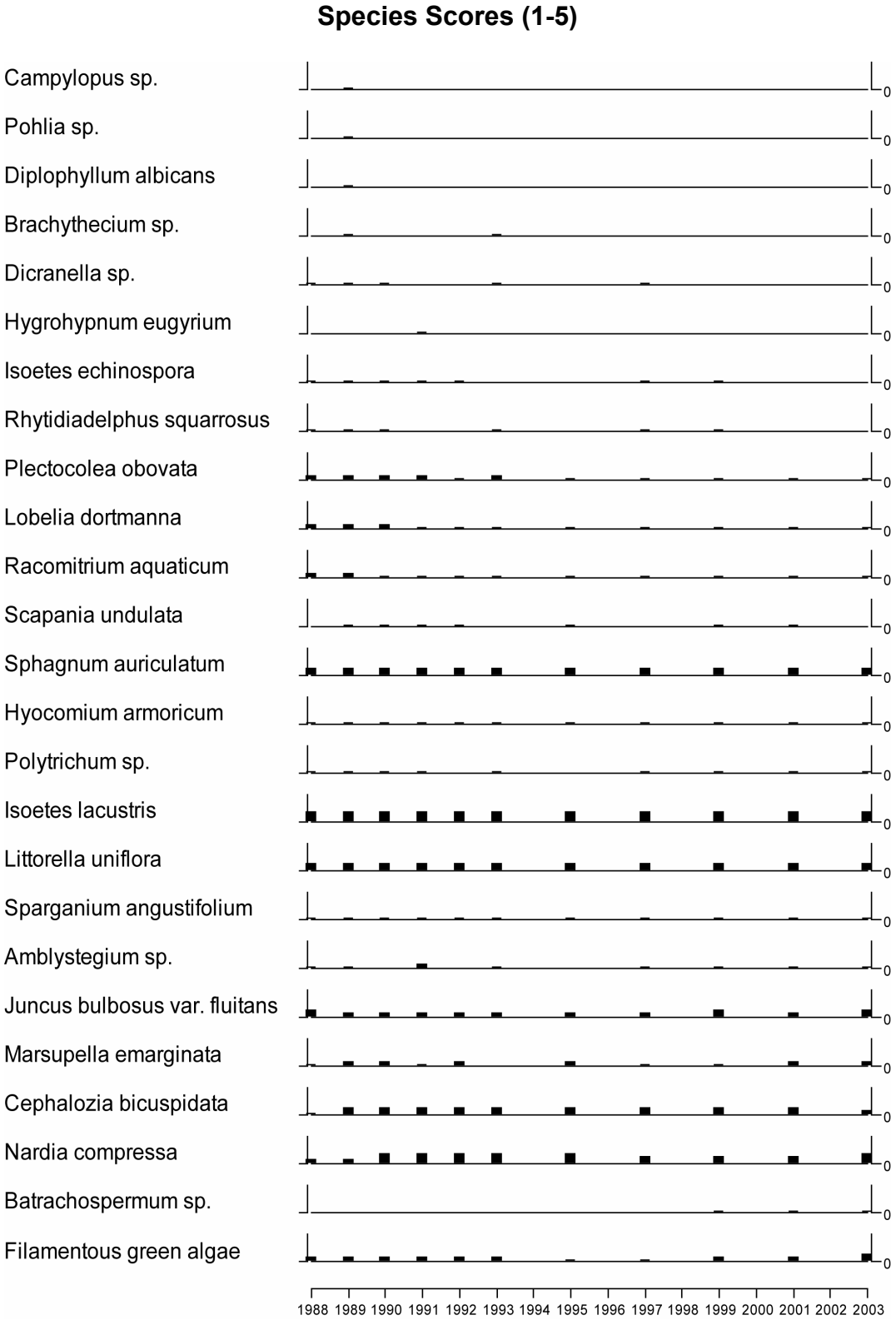
7.10.4.1 Percentage abundance summary, Scoat Tarn



7.10.4.2 Summary statistics, Scoat Tarn

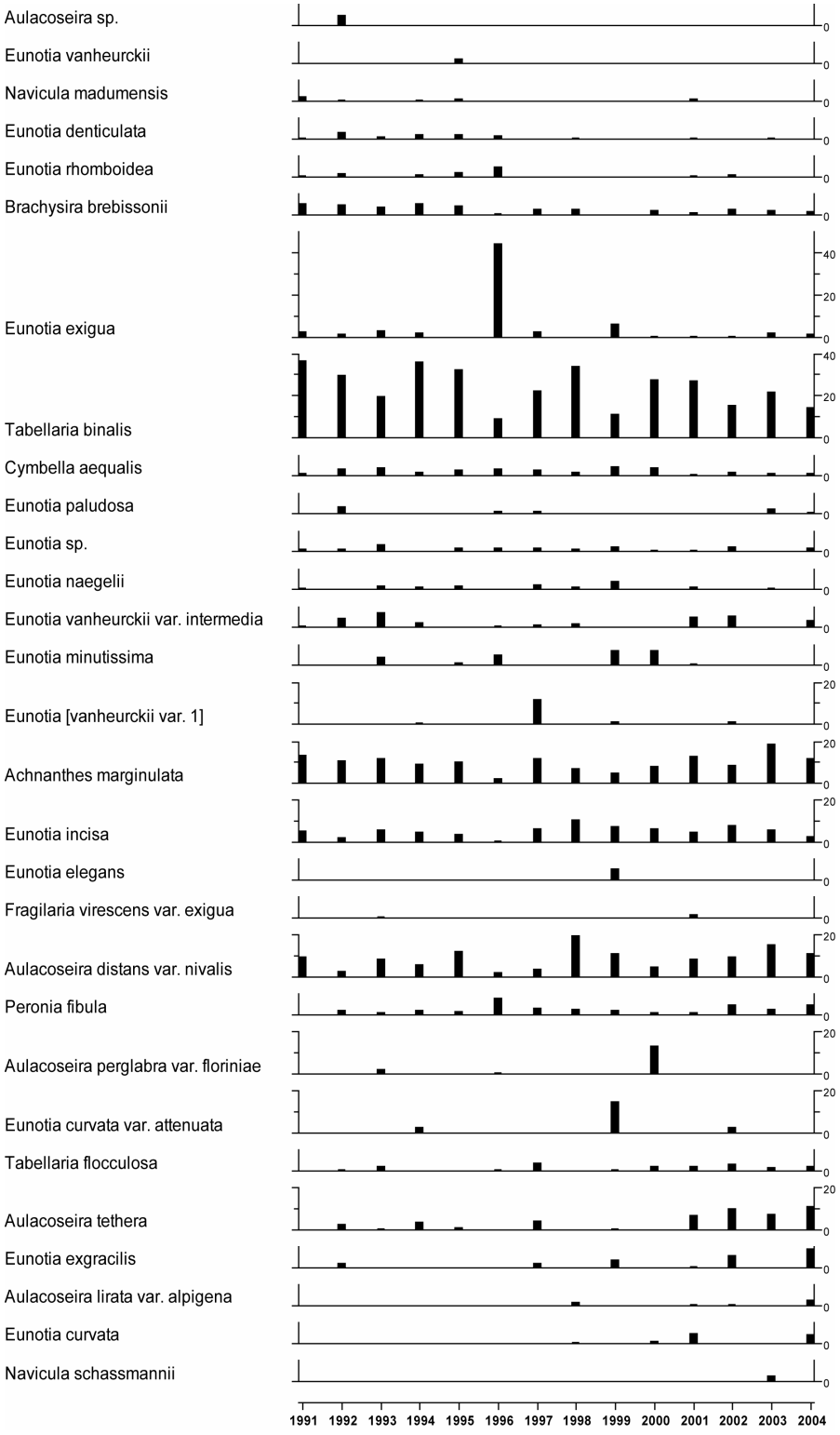


7.10.5 Aquatic macrophyte data, Scoat Tarn



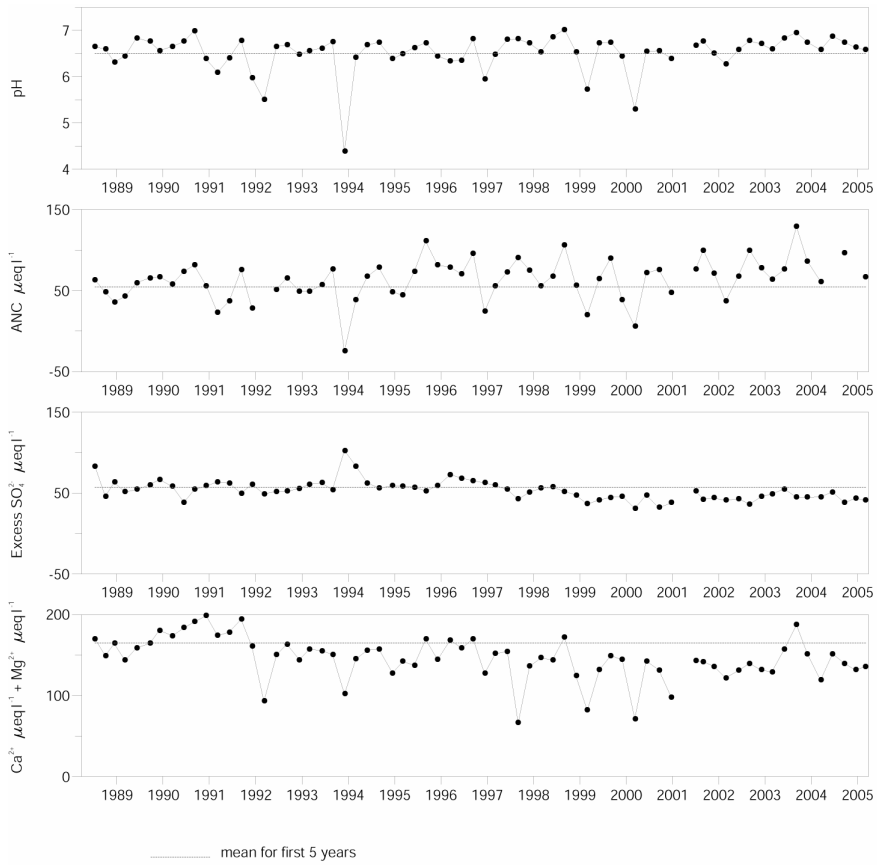
7.10.6 Sediment trap data, Scoat Tarn

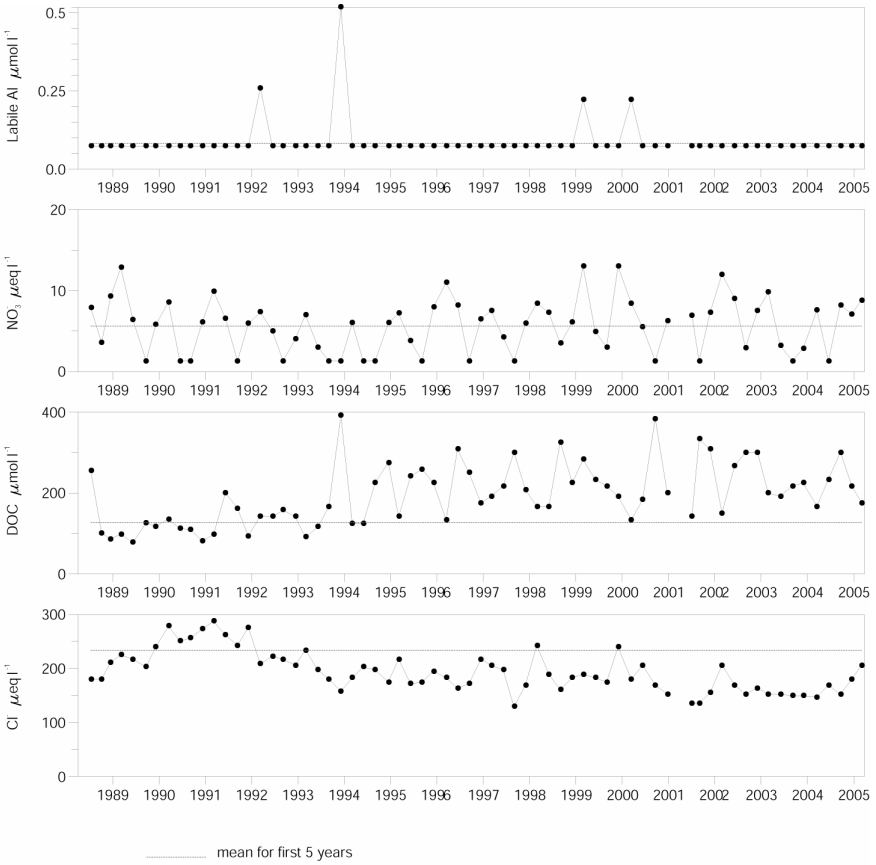
Relative percentage frequency of diatom taxa



7.11 Burnmoor Tarn

7.11.1 Spot sampled chemistry data





Determinand statistics

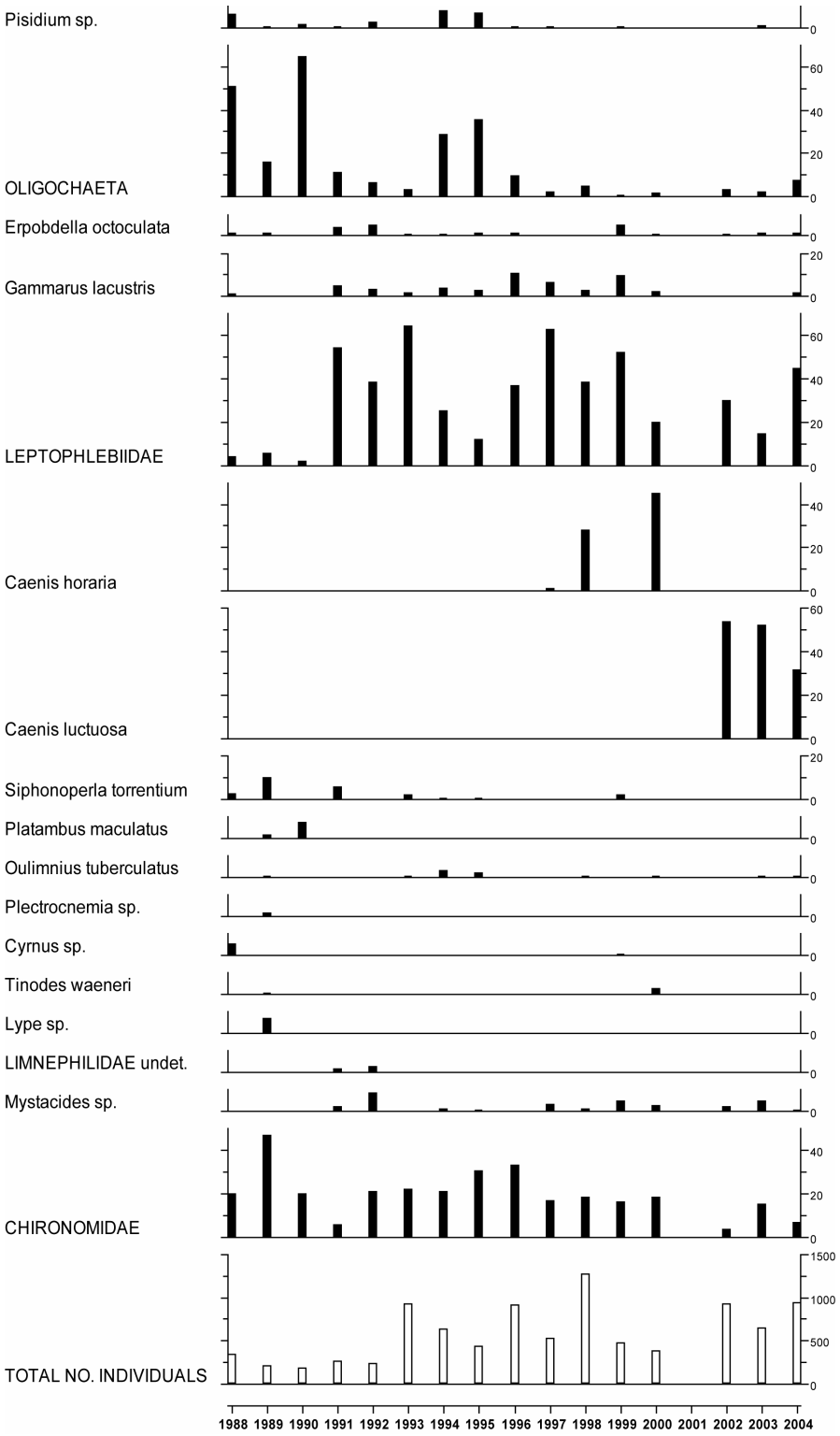
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	6.50	6.70	0.13	0.01	0.17
ANC	54.11	81.53	21.41	**1.60**	**0.01**
Ca	95.97	80.62	6.38	**-0.03**	**0.02**
Mg	68.50	58.75	2.85	**-0.01**	**0.00**
Na	208.5	152.2	11.77	**-0.10**	**0.00**
K	9.24	7.31	0.61	**-0.01**	**0.00**
Sol.Al	0.28	0.17	0.19	0.00	0.63

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.08	0.07	0.00	0.00	0.36
Cl	233.5	176.8	22.46	**-0.17**	**0.00**
SO_4	81.46	61.98	5.98	**-0.09**	**0.00**
XSO_4	56.93	43.41	5.51	**-0.06**	**0.00**
NO_3	5.63	6.34	3.44	0.00	0.41
Si	53.21	69.29	16.34	0.00	0.54
DOC	126.5	231.2	51.99	**0.10**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

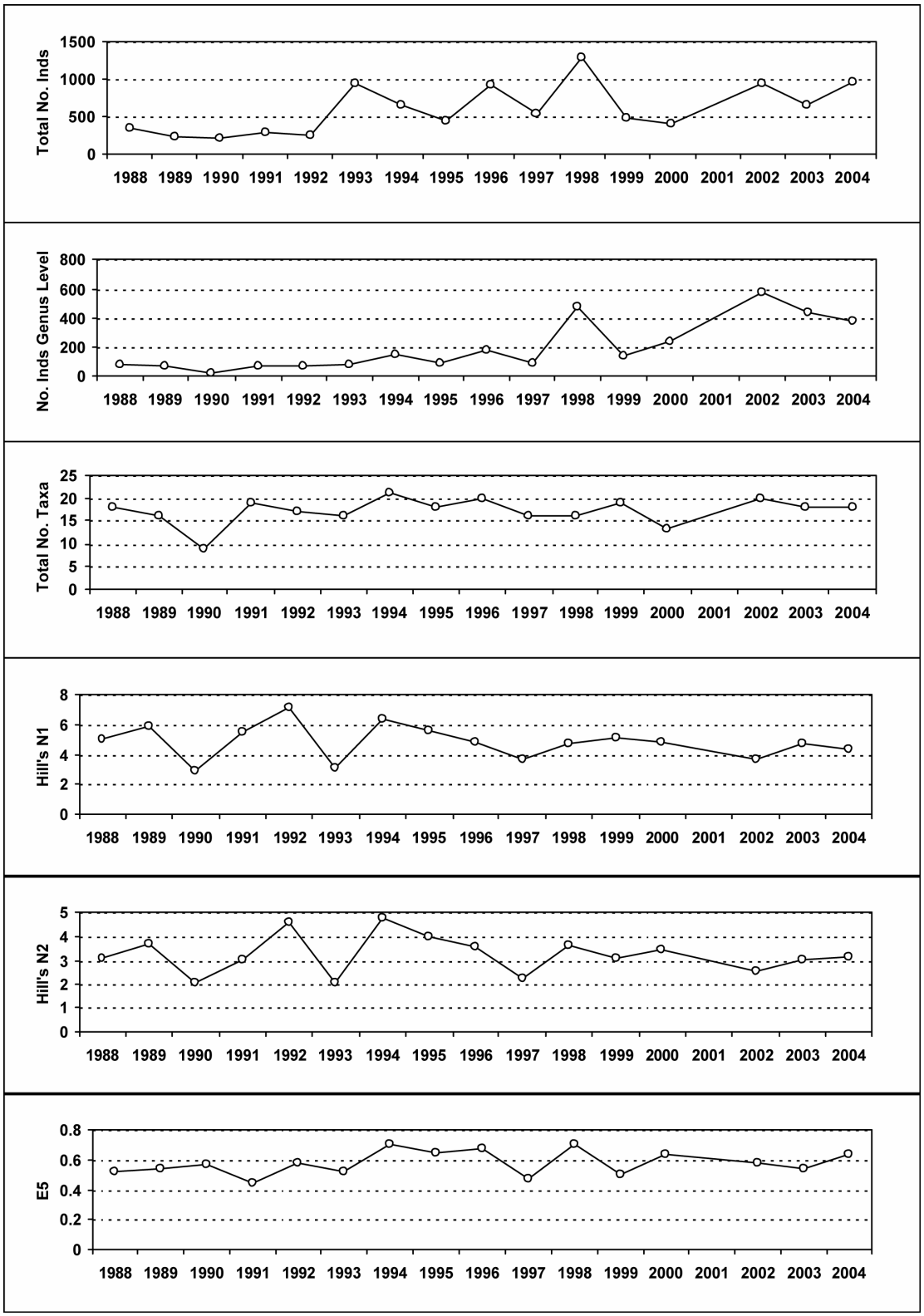
7.11.2 Macroinvertebrate data

7.11.2.1 Percentage abundance summary, Burnmoor Tarn



No sampling in 2001 due to Foot and Mouth restrictions.

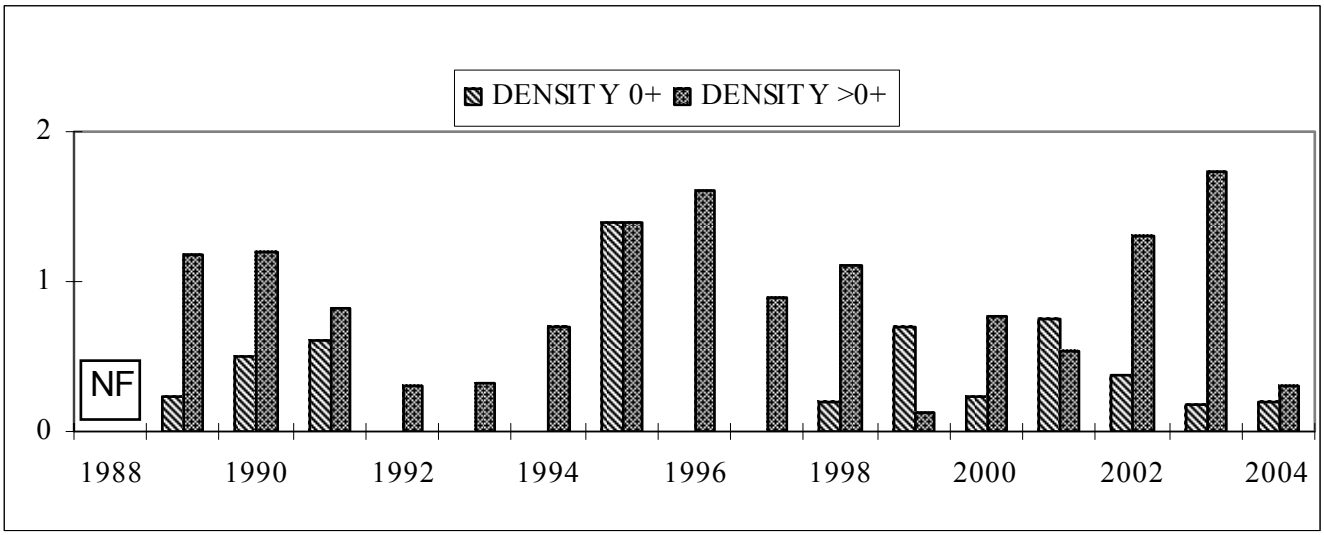
7.11.2.2 Summary statistics, Burnmoor Tarn



No sampling in 2001 due to Foot and Mouth restrictions.

7.11.3 Fish data (for outflow stream)

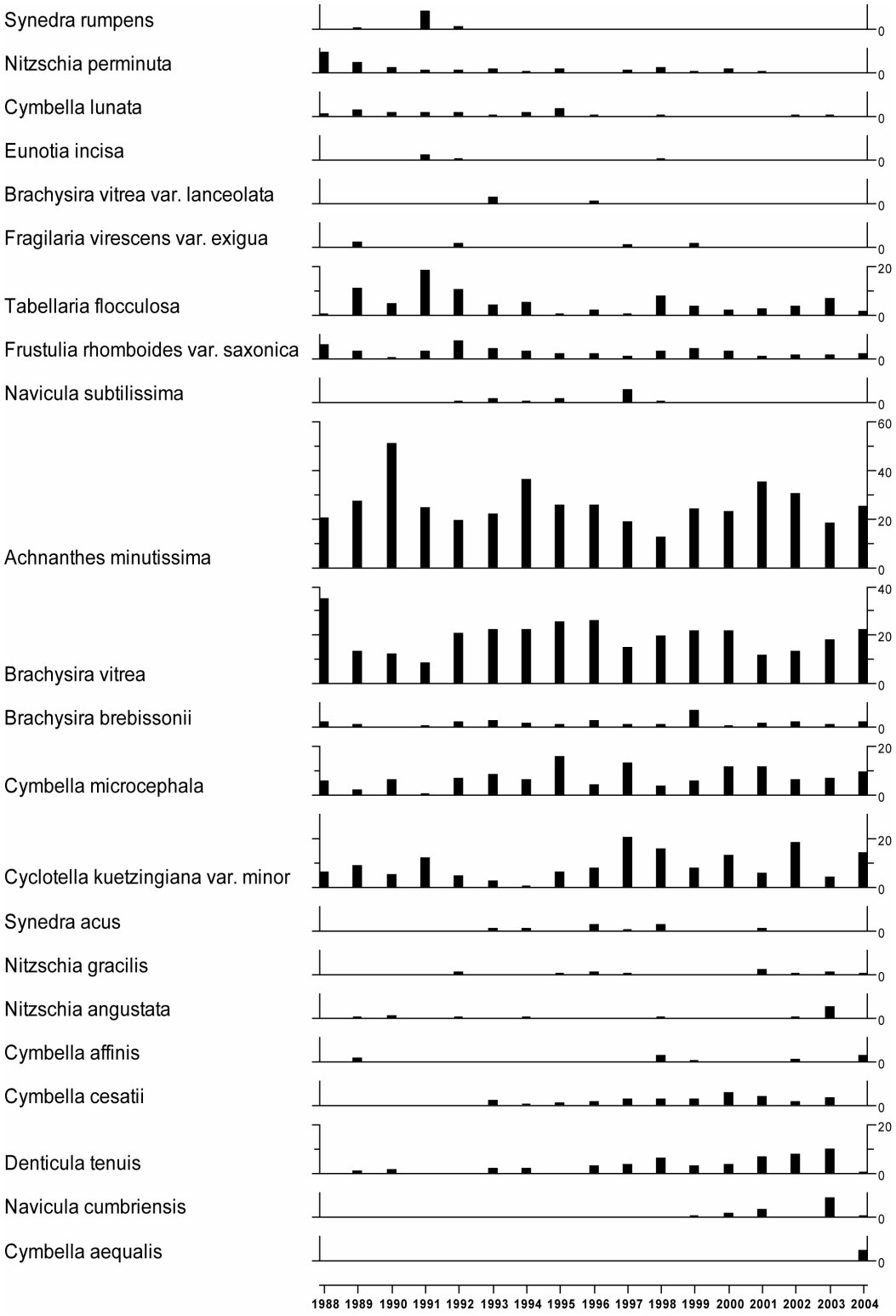
7.11.3.1 Summary of mean Trout density (numbers 100m^{-2}), Burnmoor Tarn



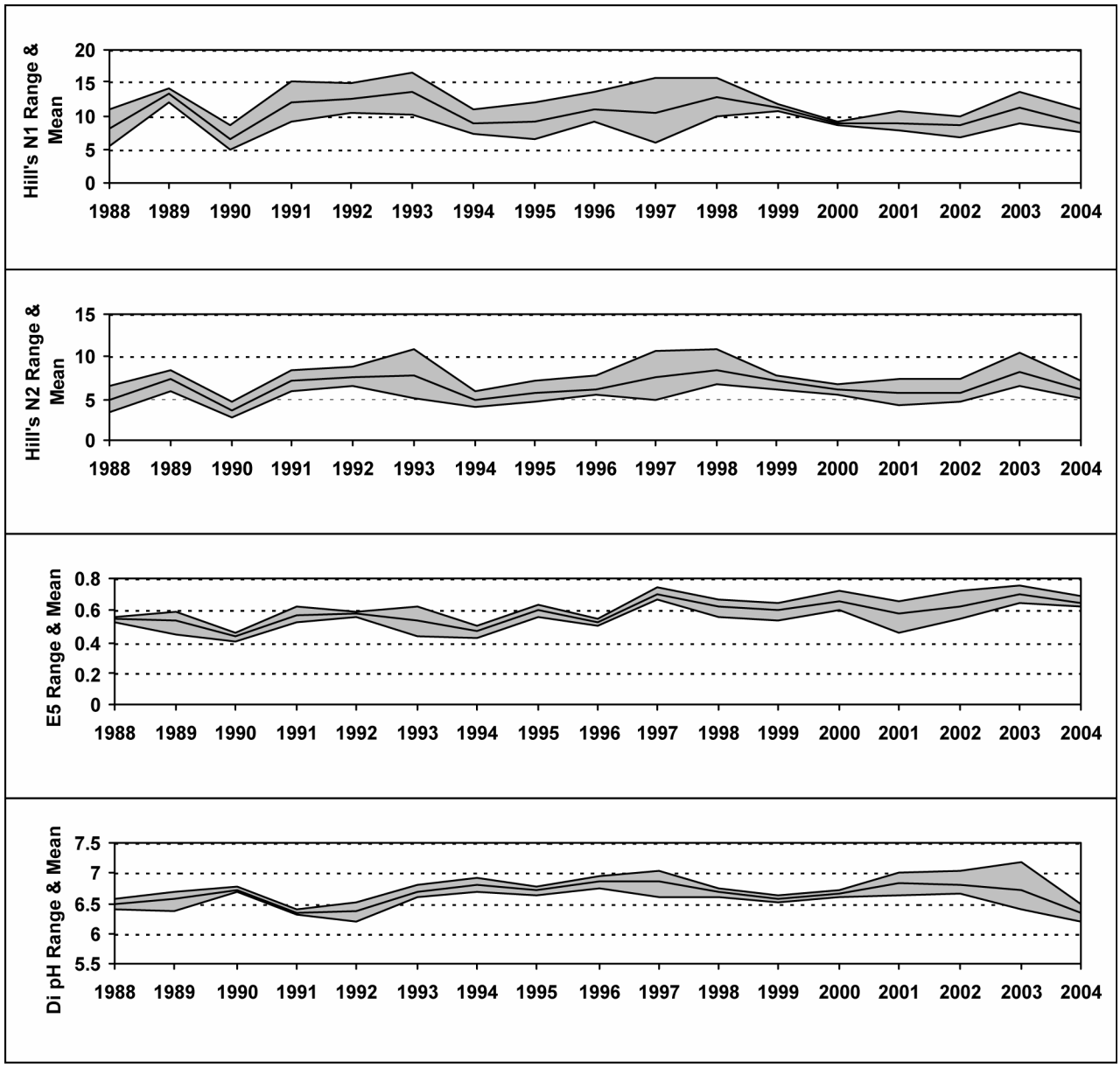
NF = Not fished

7.11.4 Epilithic diatom data

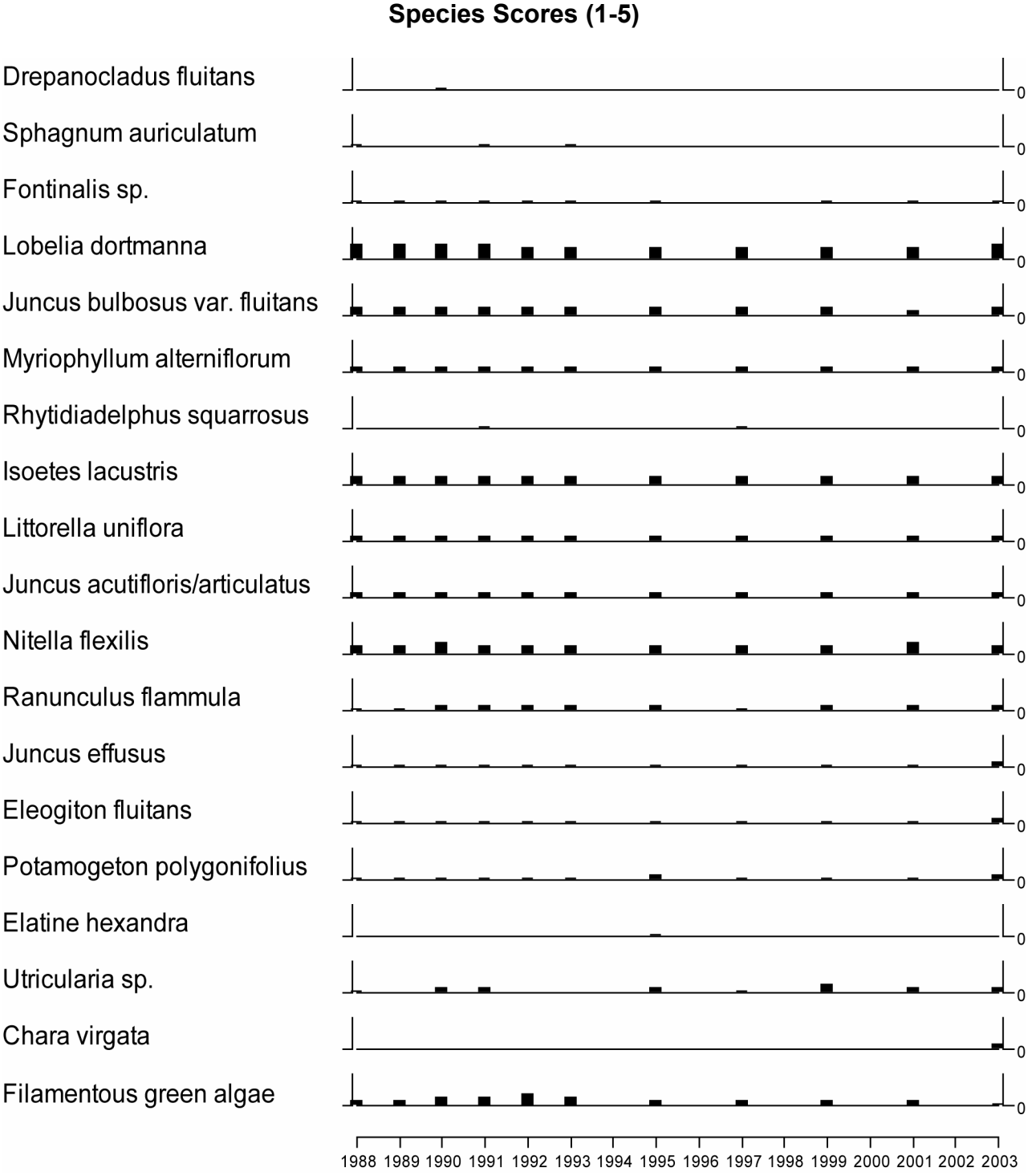
7.11.4.1 Percentage abundance summary, Burnmoor Tarn



7.11.4.2 Summary statistics, Burnmoor Tarn

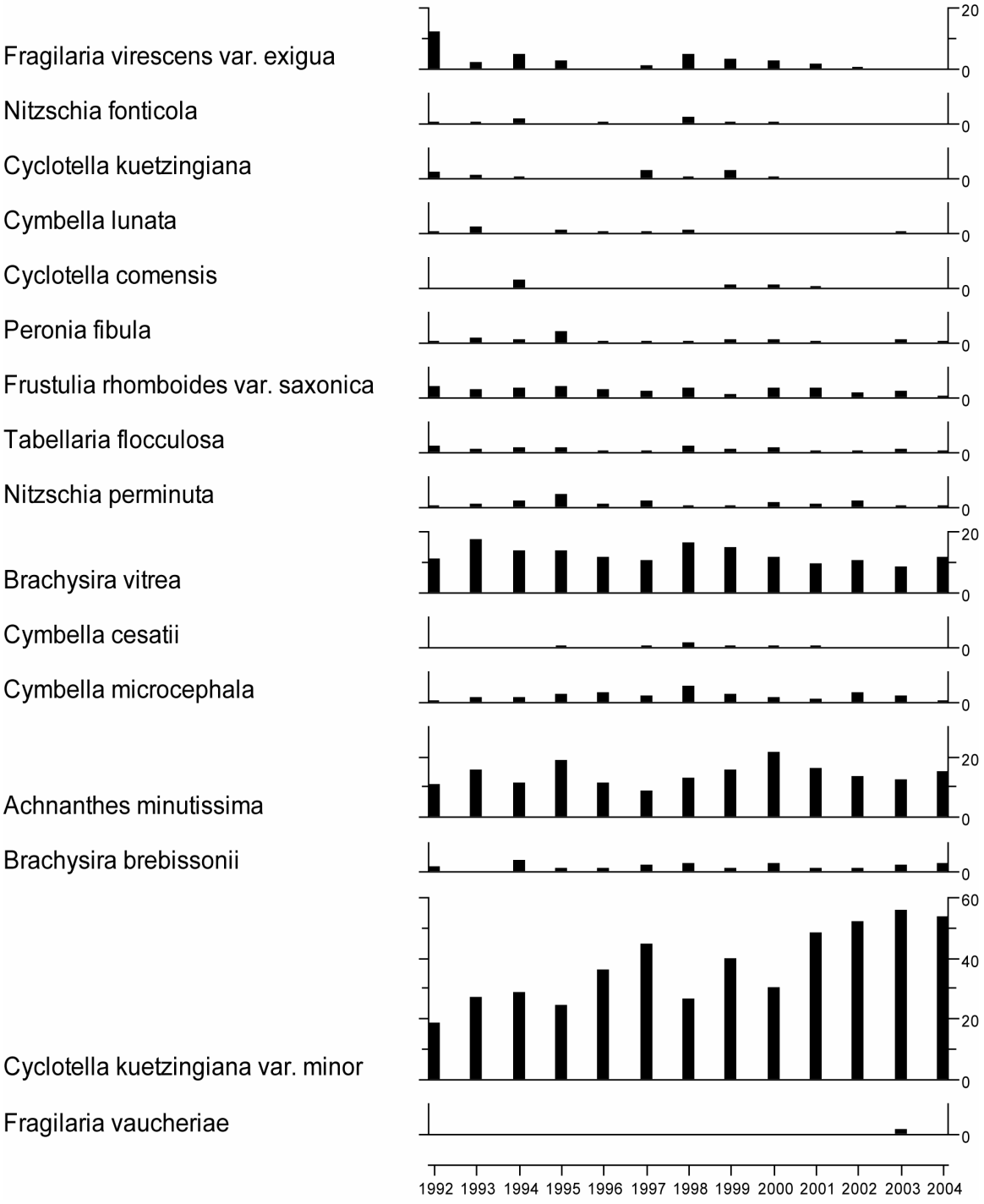


7.11.5 Aquatic macrophyte data, Burnmoor Tarn



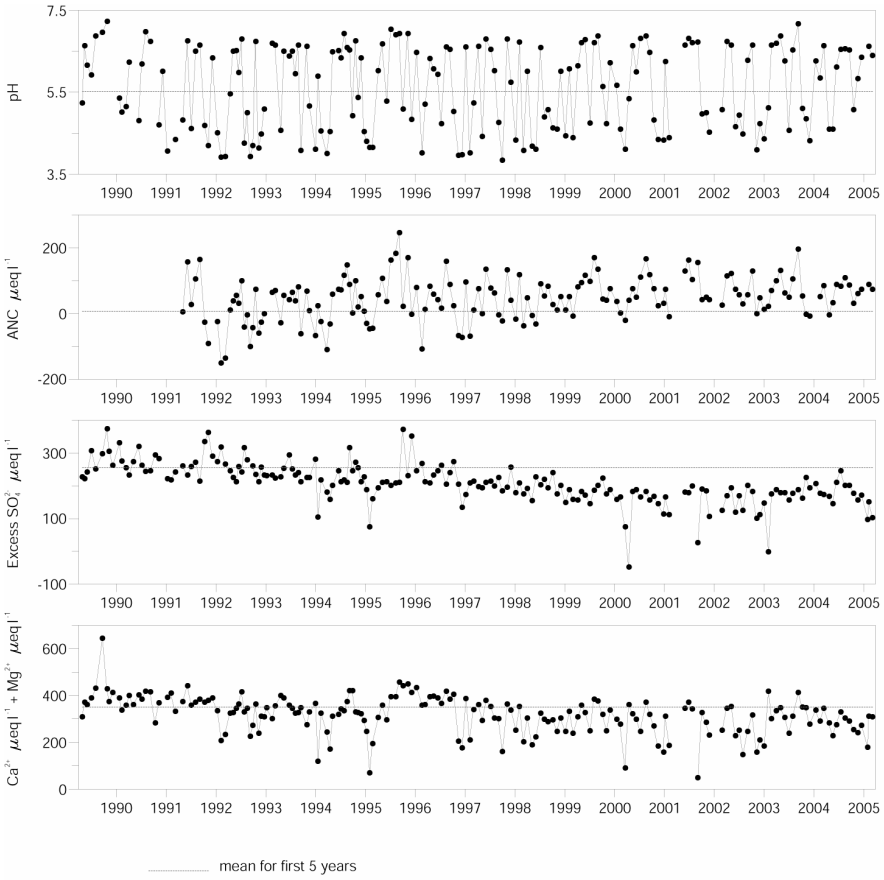
7.11.6 Sediment trap data, Burnmoor Tarn

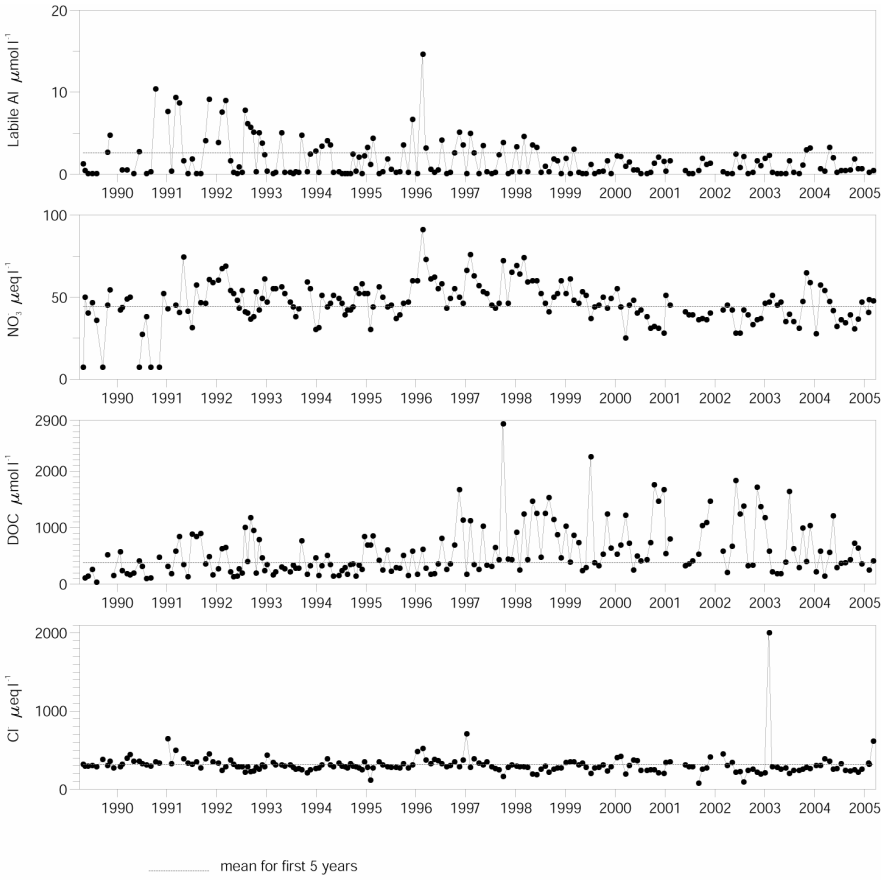
Relative percentage frequency of diatom taxa



7.12 River Etherow

7.12.1 Spot sampled chemistry data





Determinand statistics

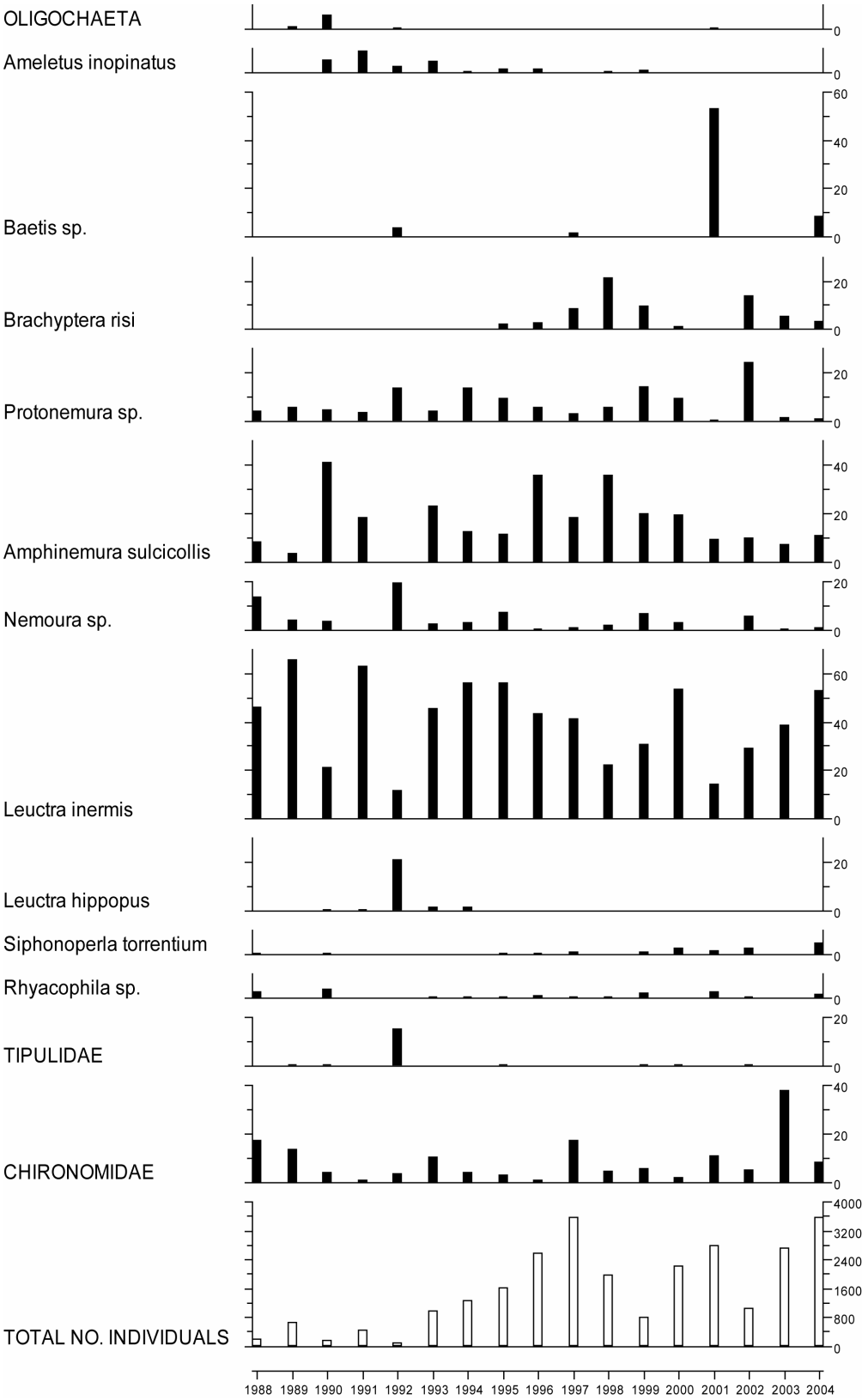
	mean 4/1989-3/1994	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1989-3/2005	p* 4/1989-3/2005
pH	5.53	5.92	0.79	0.02	0.11
ANC	7.12	65.69	33.23	**5.64**	**0.00**
Ca	178.3	138.5	21.80	**-0.05**	**0.00**
Mg	172.1	133.4	21.15	**-0.04**	**0.00**
Na	300.5	272.5	84.74	-0.04	0.09
K	19.83	17.67	3.92	**-0.01**	**0.02**
Sol.Al	5.24	3.80	2.55	-1.34	0.32

	mean 4/1989-3/1994	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1989-3/2005	p* 4/1989-3/2005
Sol.lab.Al	2.64	0.96	0.97	**-0.85**	**0.02**
Cl	316.4	302.8	106.8	**-0.10**	**0.03**
SO_4	288.7	200.2	38.55	**-0.37**	**0.00**
XSO_4	255.4	168.4	42.91	**-0.36**	**0.00**
NO_3	44.47	40.01	6.36	-0.01	0.28
Si	234.0	244.3	56.46	0.00	0.75
DOC	377.3	506.1	274.4	**0.26**	**0.01**

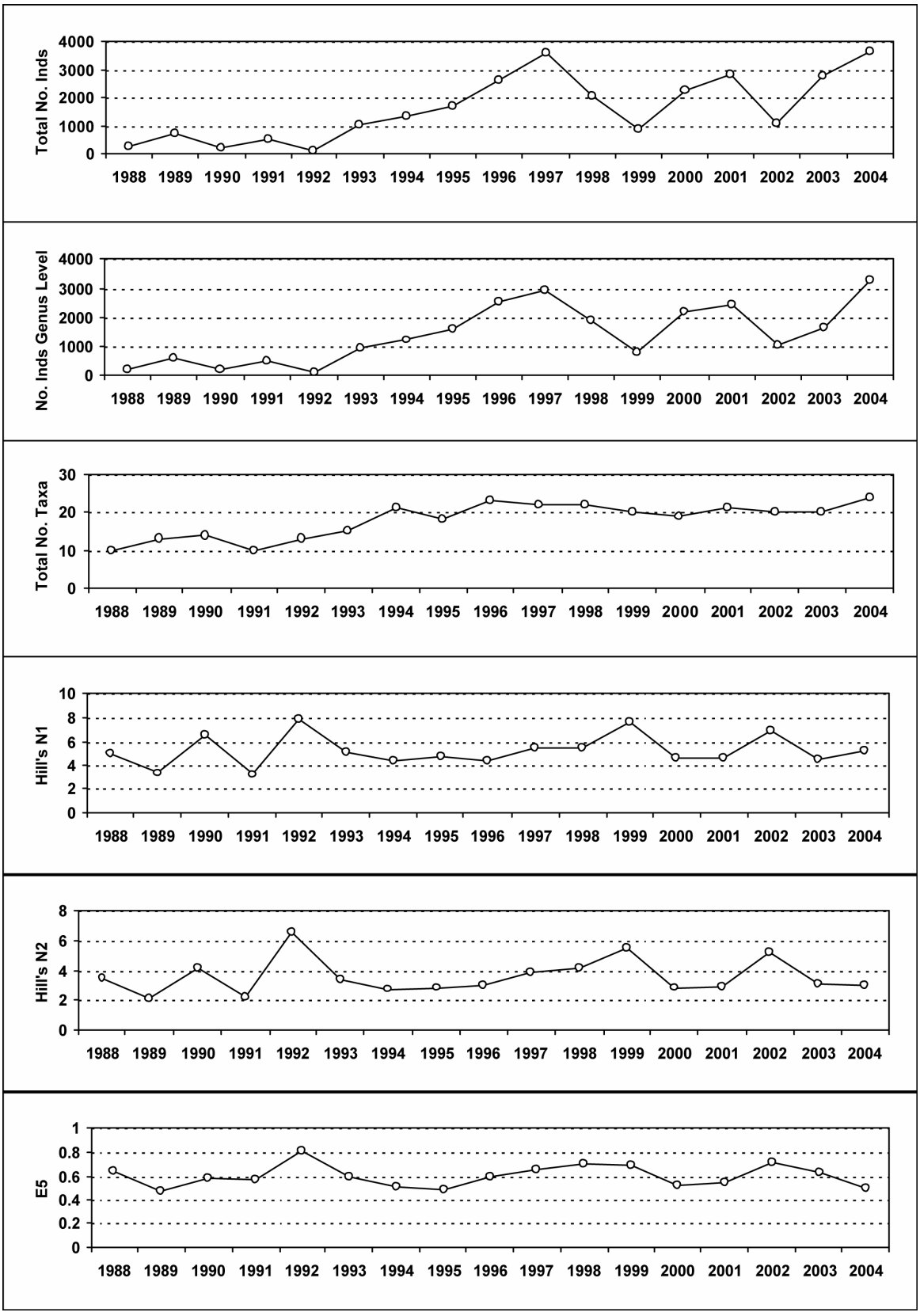
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units μeq l^{-1}, except Sol.Al, Sol.lab.Al and DOC (μmol l^{-1})

7.12.2 Macroinvertebrate data

7.12.2.1 Percentage abundance summary, River Etherow



7.12.2.2 Summary statistics, River Etherow

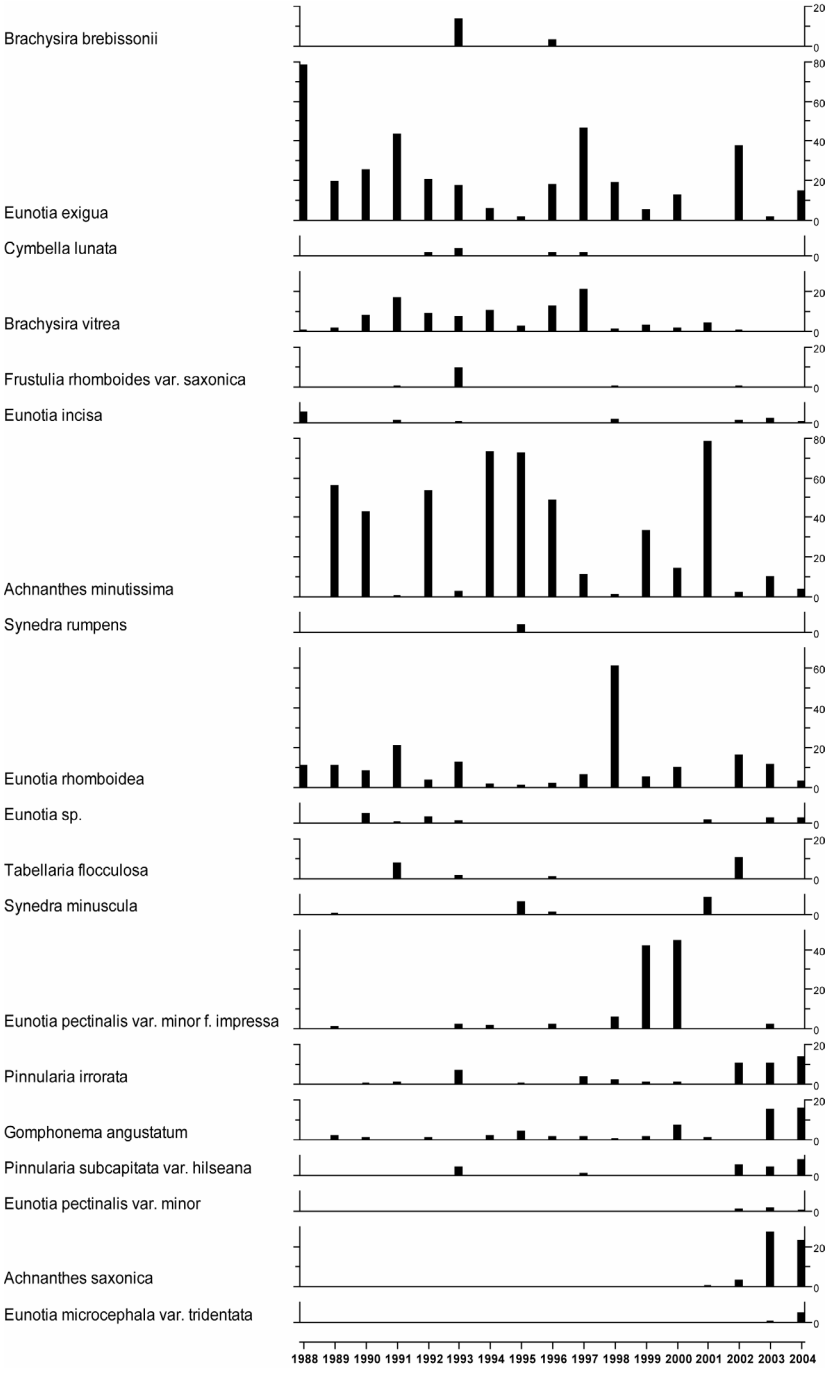


7.12.3 Fish data

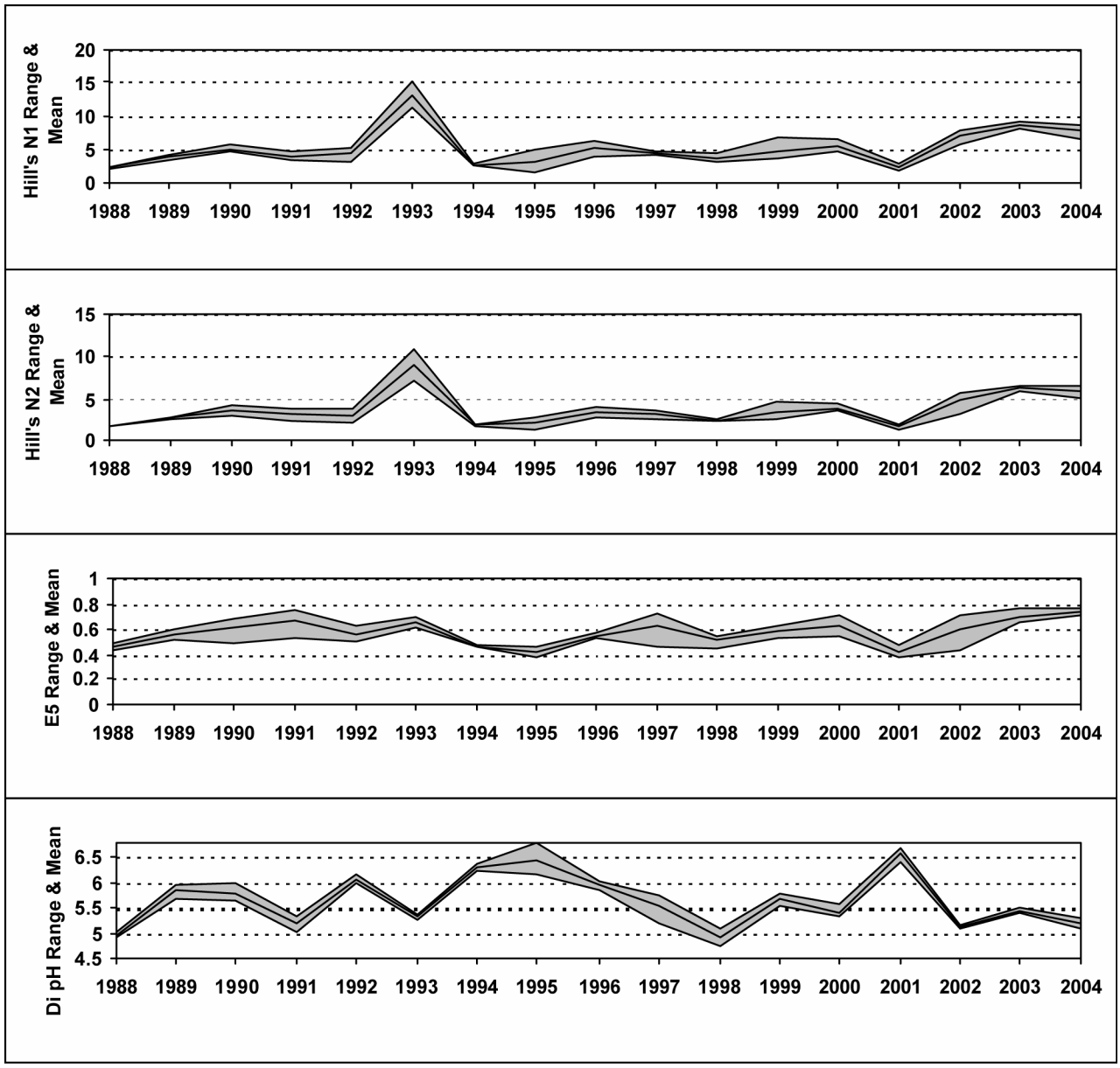
No fish are present in this reach of the river.

7.12.4 Epilithic diatom data

7.12.4.1 Percentage abundance summary, River Etherow

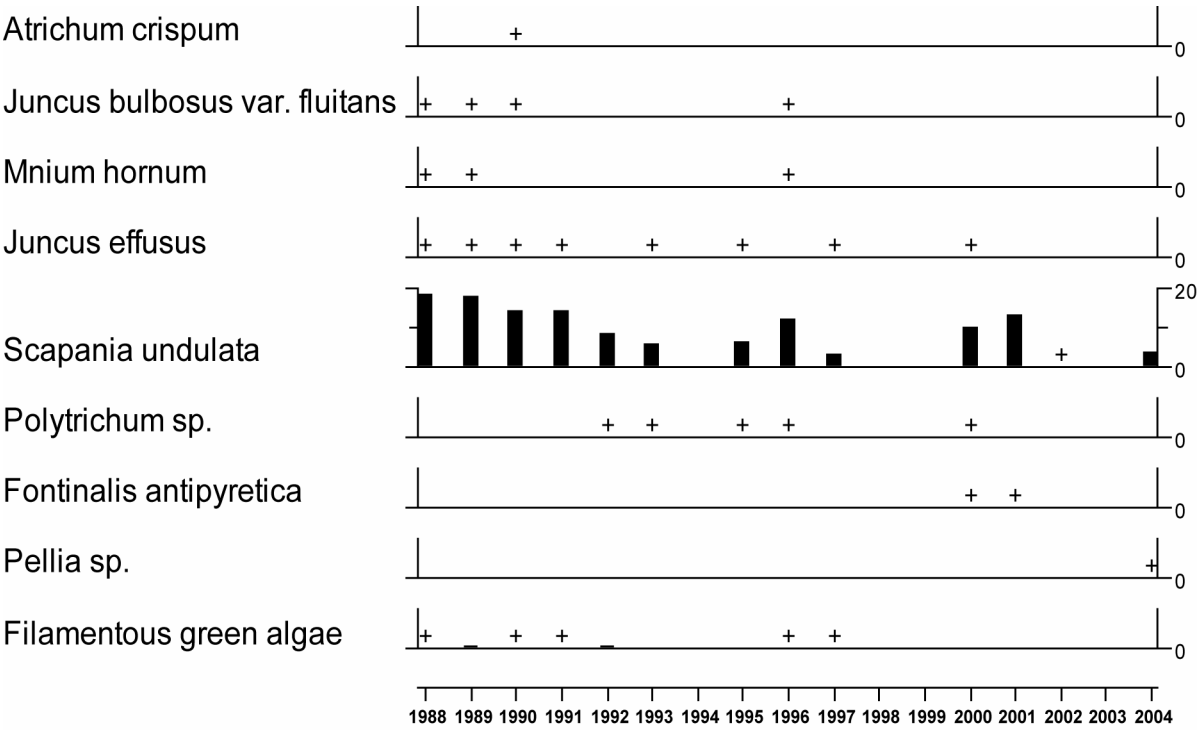


7.12.4.2 Summary statistics, River Etherow



7.12.5 Aquatic macrophyte data, River Etherow

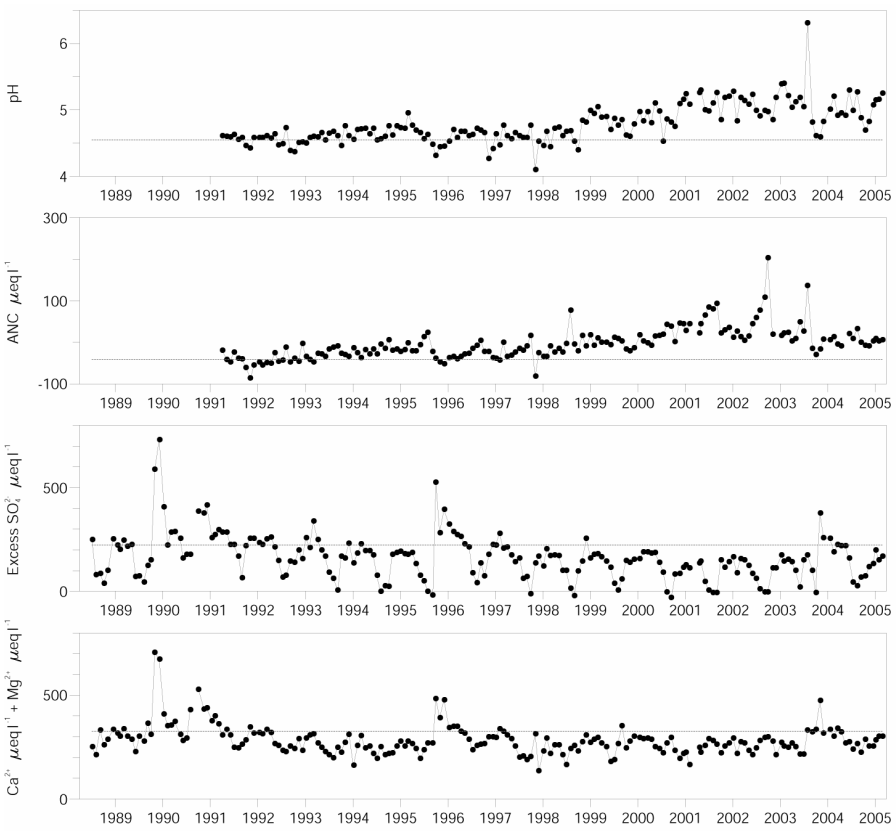
Percentage Species Cover

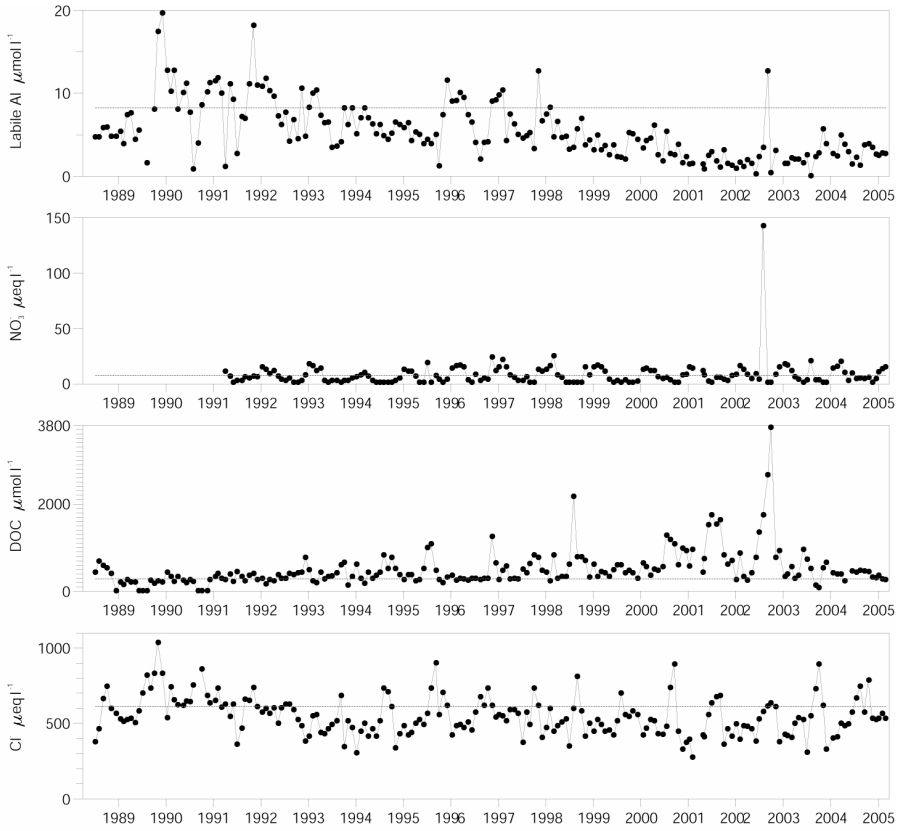


+ Represents <0.25% abundance

7.13 Old Lodge

7.13.1 Spot sampled chemistry data





Determinand statistics

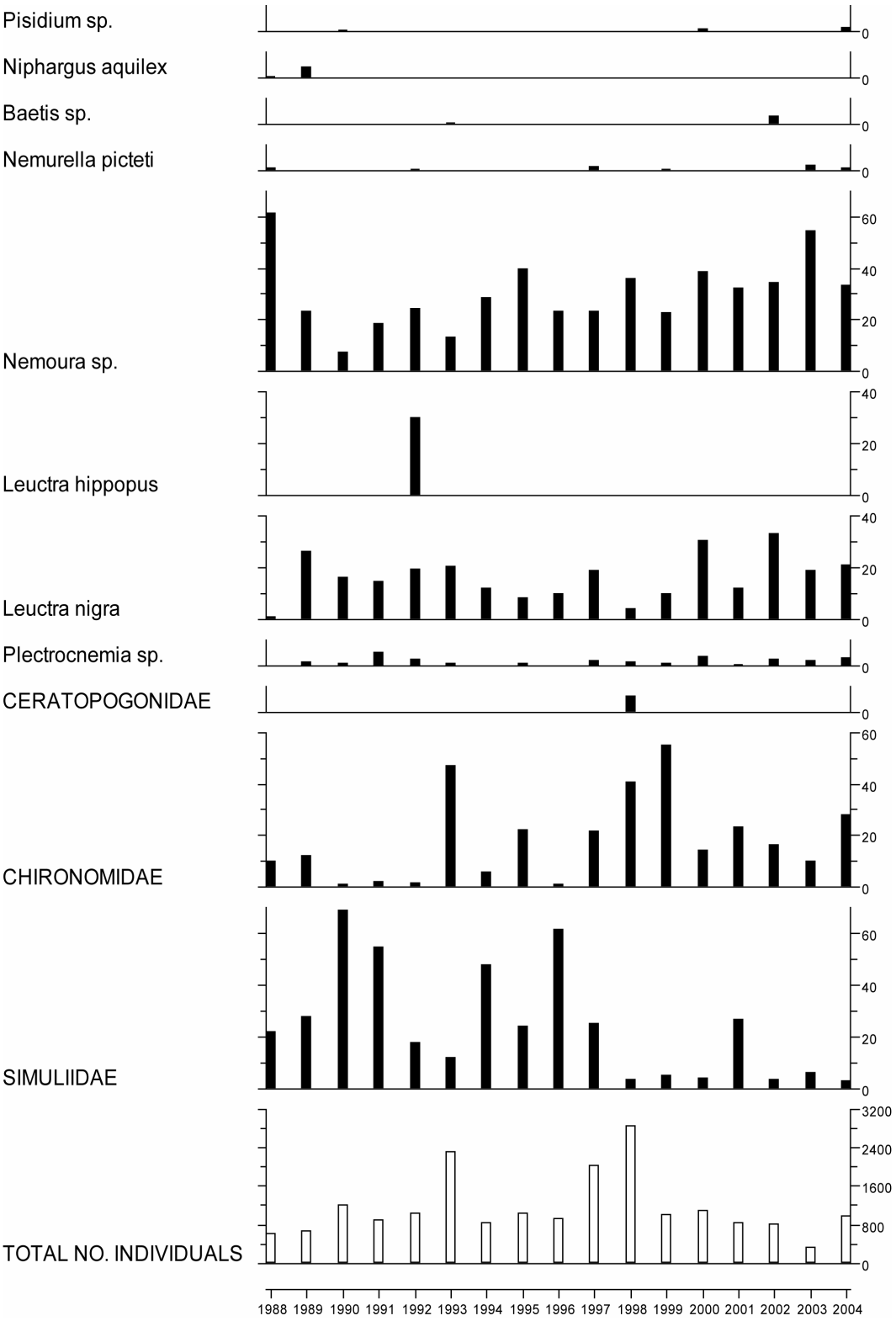
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	4.55	5.04	0.19	**0.04**	**0.00**
ANC	-41.74	5.15	12.60	**5.32**	**0.00**
Ca	167.6	141.7	17.50	-0.02	0.09
Mg	158.2	130.9	12.94	**-0.02**	**0.05**
Na	490.8	415.9	45.61	**-0.10**	**0.01**
K	22.18	19.64	6.70	0.00	0.45
Sol.Al	9.97	4.22	0.91	**-10.20**	**0.00**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	8.26	2.80	0.87	**-11.60**	**0.00**
Cl	614.2	584.3	96.80	**-0.24**	**0.02**
SO_4	289.2	193.2	58.50	**-0.34**	**0.00**
XSO_4	224.7	131.9	66.43	**-0.33**	**0.00**
NO_3	7.39	7.35	4.40	0.00	0.44
Si	133.5	138.7	35.74	0.00	0.95
DOC	288.8	369.7	91.76	**0.25**	**0.00**

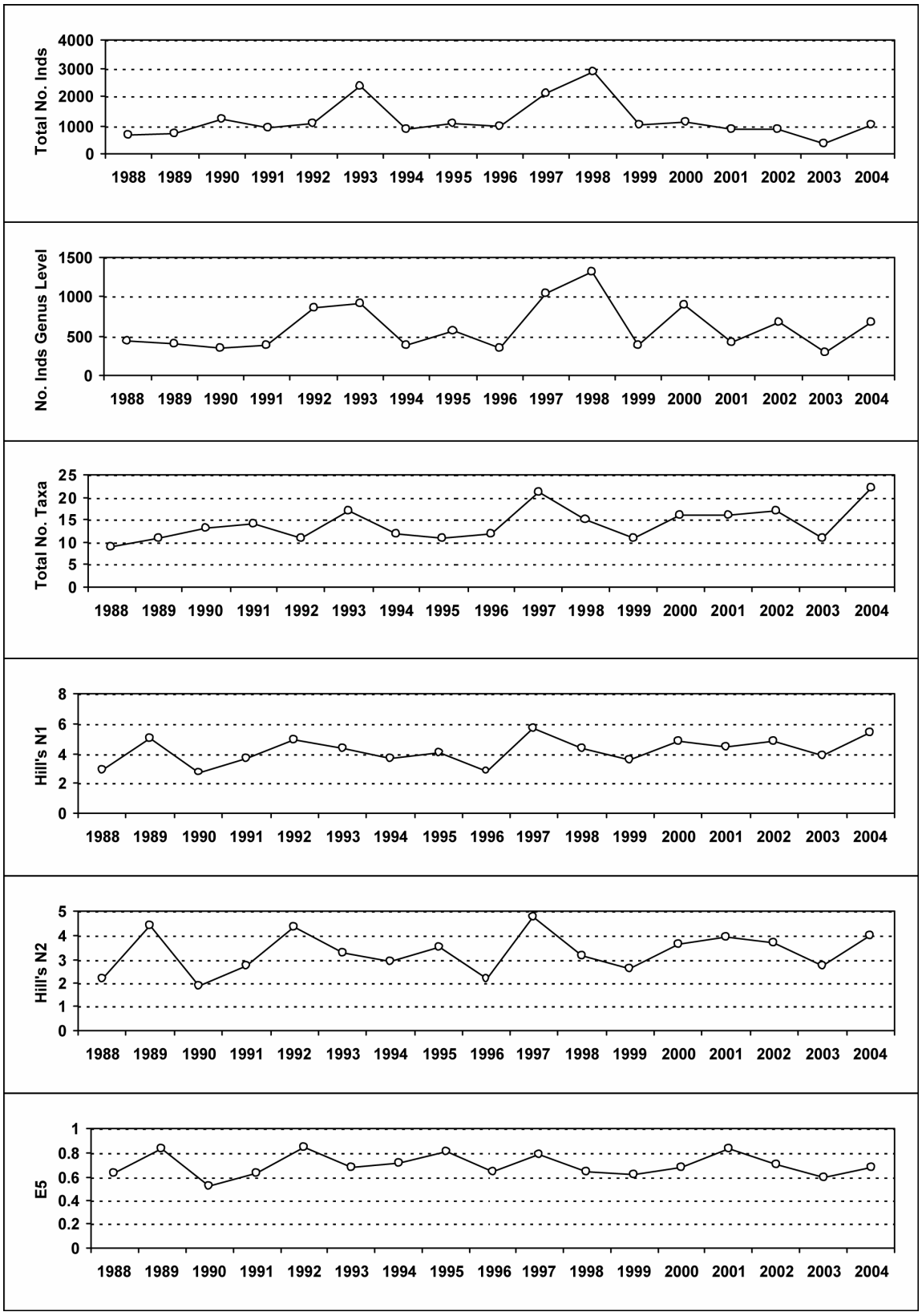
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.13.2 Macroinvertebrate data

7.13.2.1 Percentage abundance summary, Old Lodge

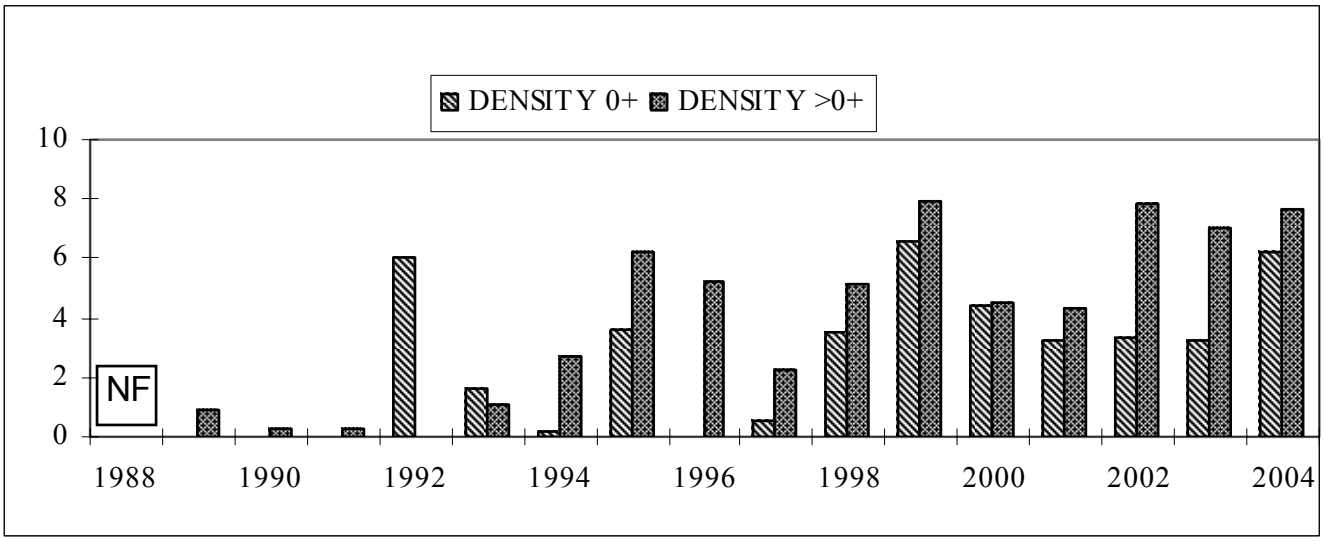


7.13.2.2 Summary statistics, Old Lodge



7.13.3 Fish data

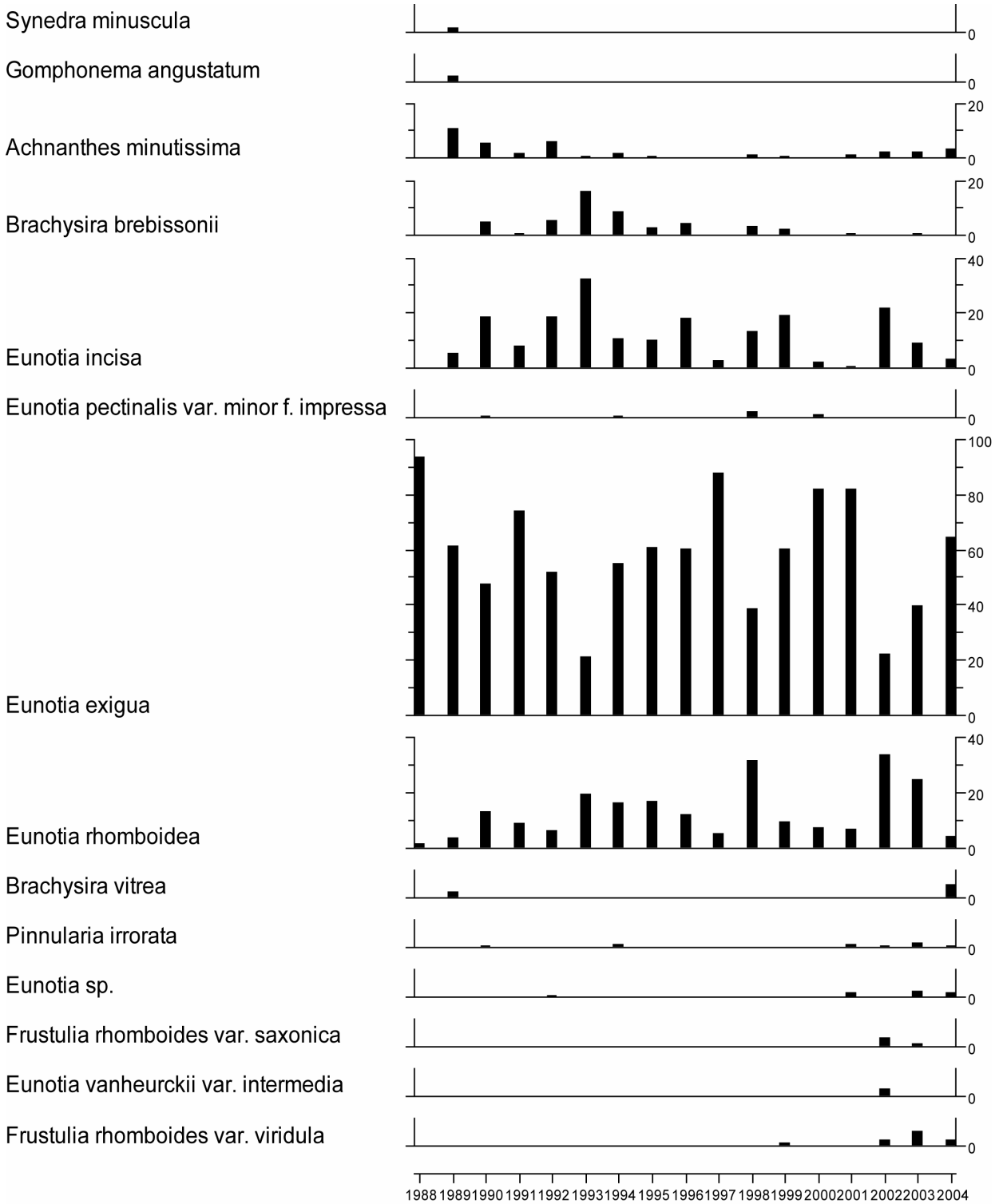
7.13.3.1 Summary of mean Trout density (numbers $100m^{-2}$), Old Lodge



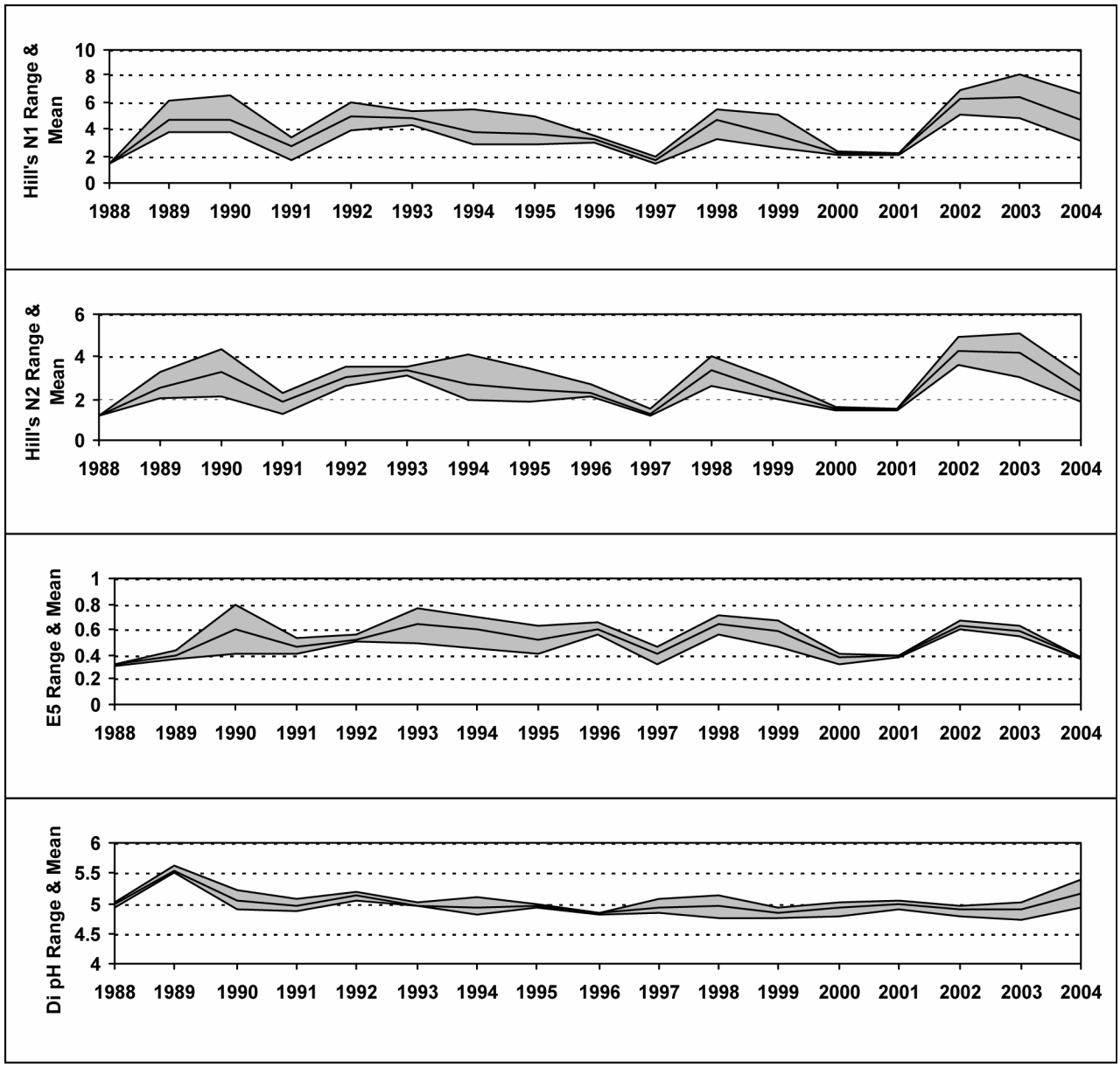
NF = Not fished

7.13.4 Epilithic diatom data

7.13.4.1 Percentage abundance summary, Old Lodge

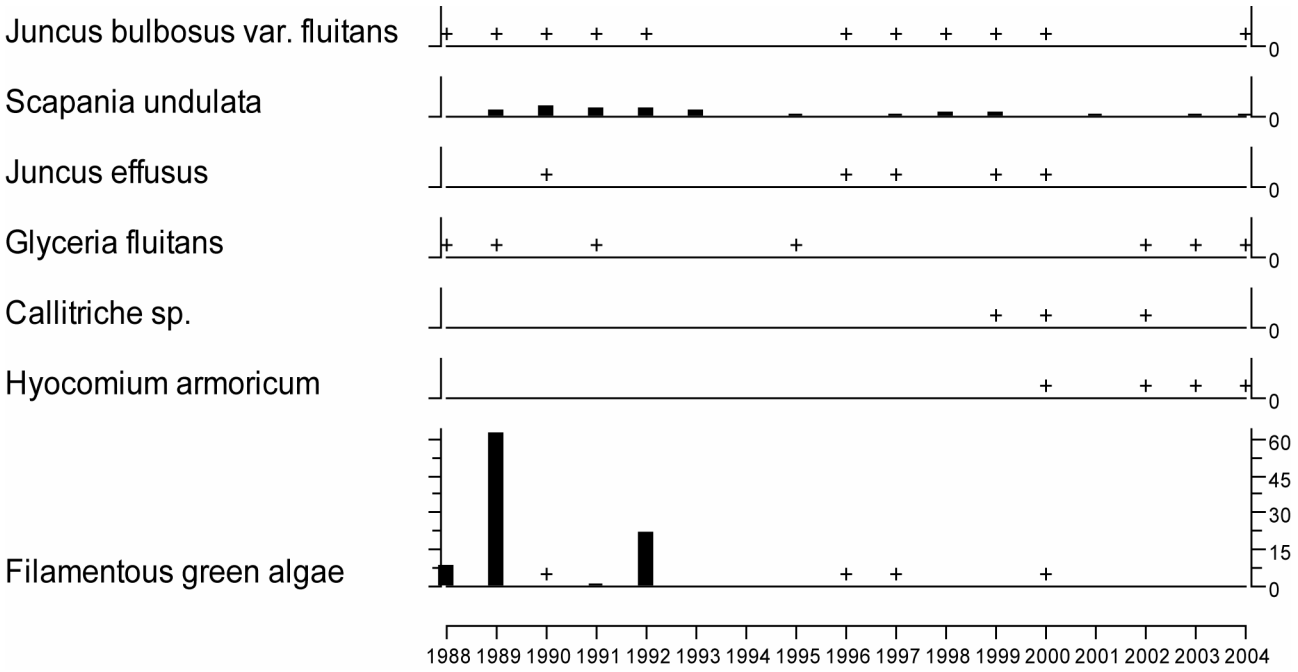


7.13.4.2 Summary statistics, Old Lodge



7.13.5 Aquatic macrophyte data, Old Lodge

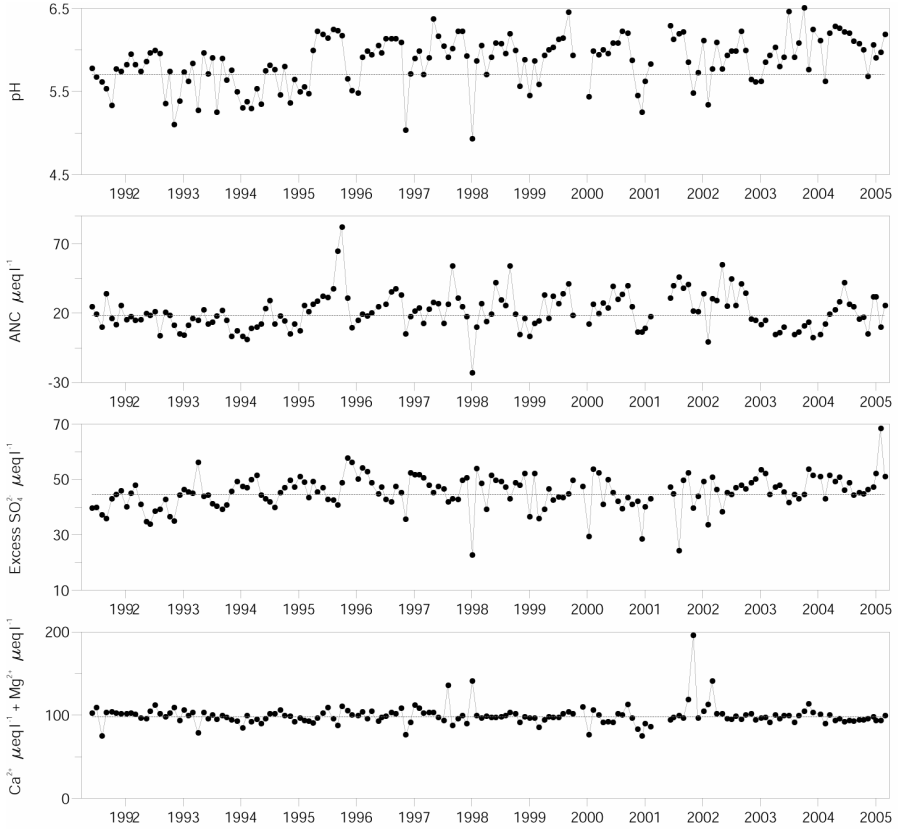
Percentage Species Cover

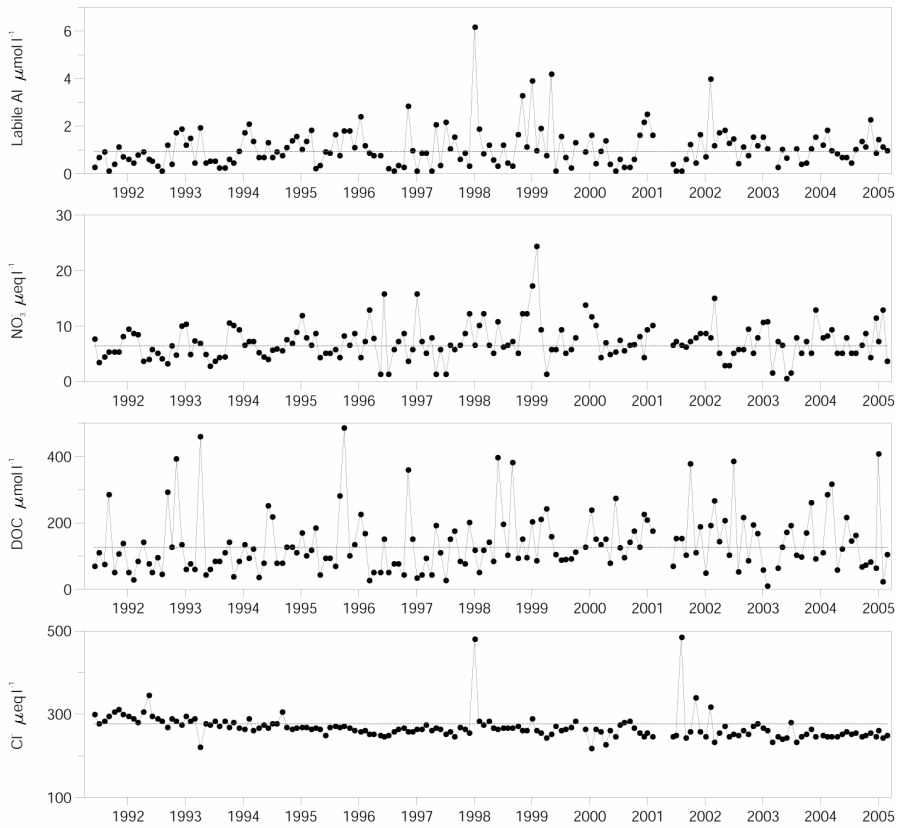


+ Represents <0.1% abundance

7.14 Narrator Brook

7.14.1 Spot sampled chemistry data





Determinand statistics

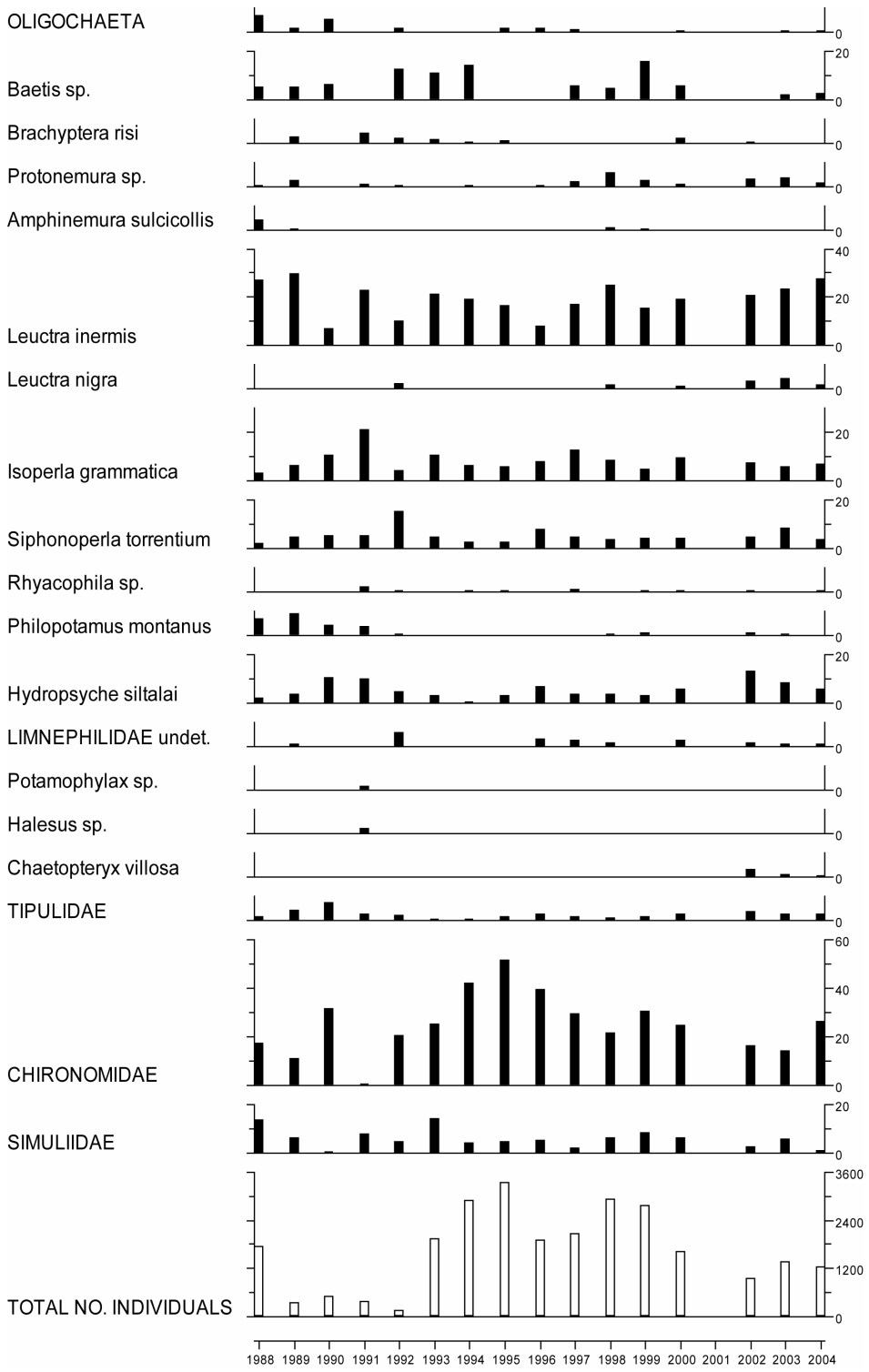
	mean 4/1991-3/1996	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1991-3/2005	p* 4/1991-3/2005
pH	5.71	6.08	0.17	**0.03**	**0.01**
ANC	18.50	23.18	10.16	0.54	0.30
Ca	33.77	31.25	0.94	0.00	0.06
Mg	64.52	63.06	1.56	0.00	0.09
Na	254.5	219.2	7.52	**-0.05**	**0.00**
K	19.52	18.18	1.53	0.00	0.39
Sol.Al	2.09	2.04	0.54	**1.13**	**0.01**

	mean 4/1991-3/1996	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1991-3/2005	p* 4/1991-3/2005
Sol.lab.Al	0.93	1.05	0.47	0.40	0.12
Cl	275.7	249.8	5.14	**-0.10**	**0.00**
SO_4	73.59	75.69	6.30	0.00	0.21
XSO_4	44.63	49.47	6.48	**0.02**	**0.01**
NO_3	6.42	6.85	2.90	0.00	0.09
Si	151.3	171.9	14.50	**0.02**	**0.02**
DOC	125.3	126.0	103.1	**0.05**	**0.02**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

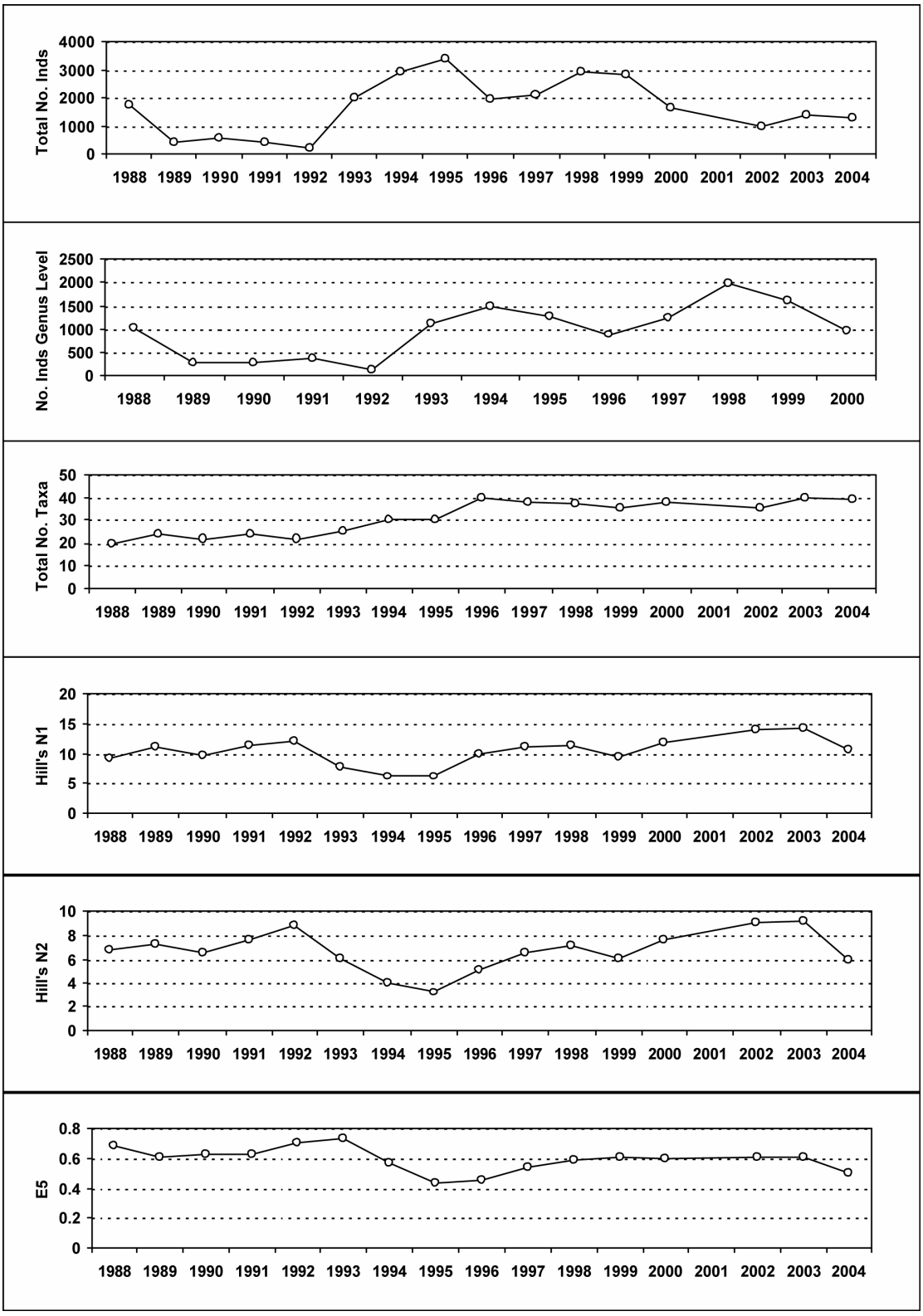
7.14.2 Macroinvertebrate data

7.14.2.1 Percentage abundance summary, Narrator Brook



No sampling in 2001 due to Foot and Mouth restrictions.

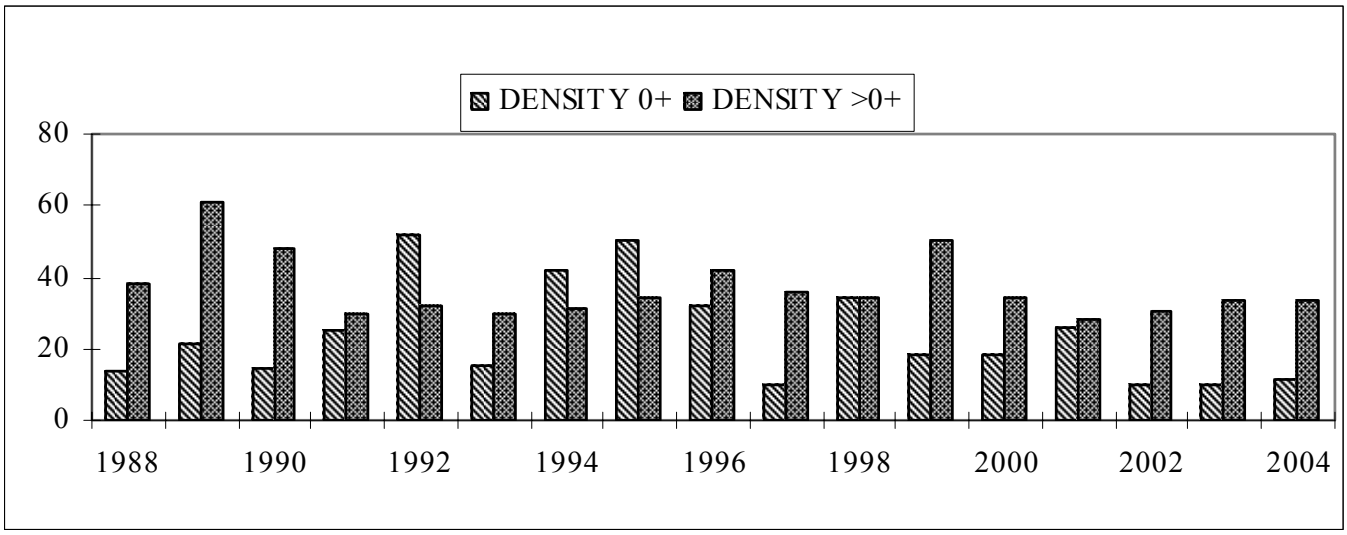
7.14.2.2 Summary statistics, Narrator Brook



No sampling in 2001 due to Foot and Mouth restrictions.

7.14.3 Fish data

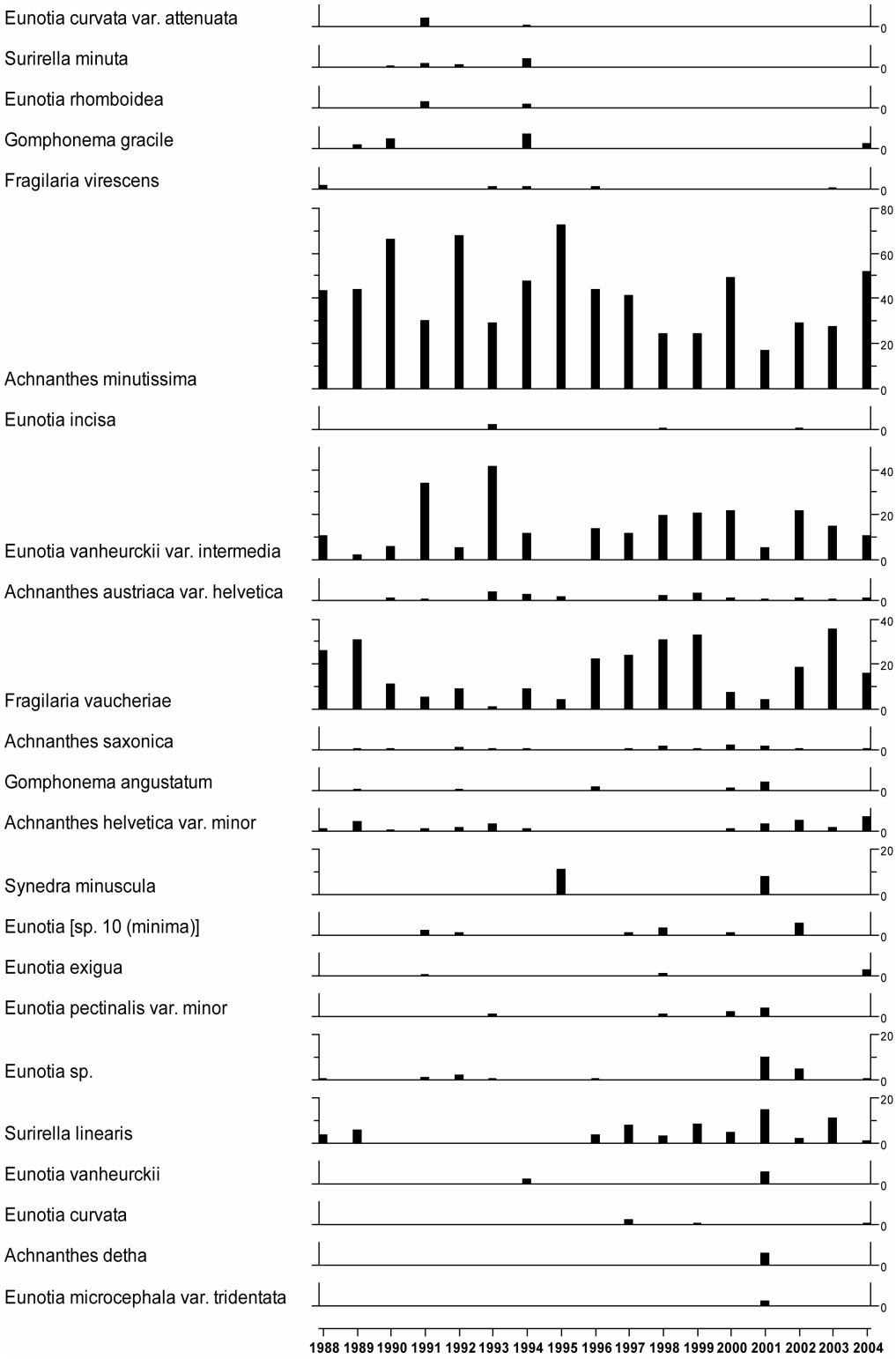
7.14.3.1 Summary of mean Trout density (numbers 100m^{-2}), Narrator Brook



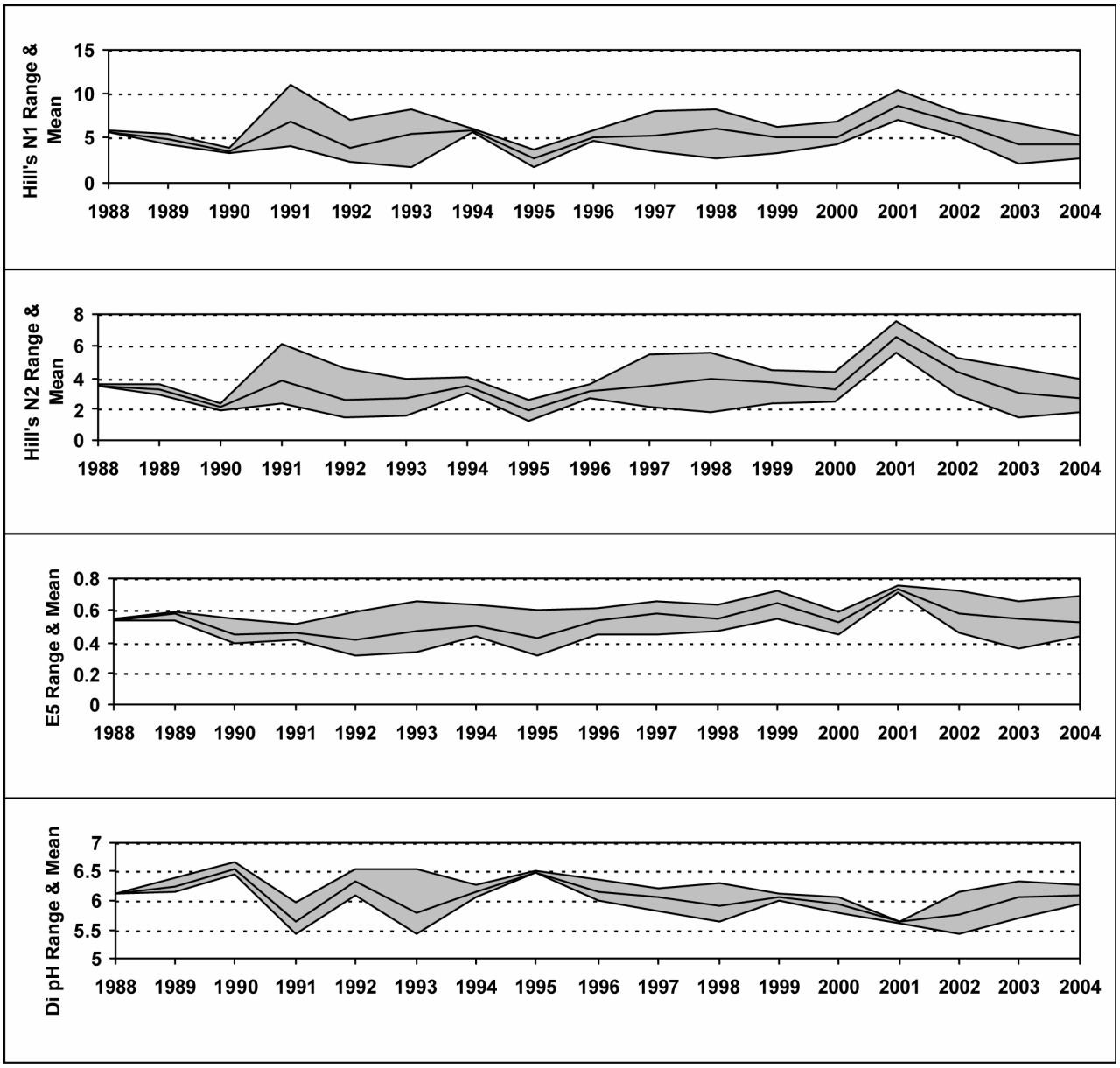
NF = Not fished

7.14.4 Epilithic diatom data

7.14.4.1 Percentage abundance summary, Narrator Brook

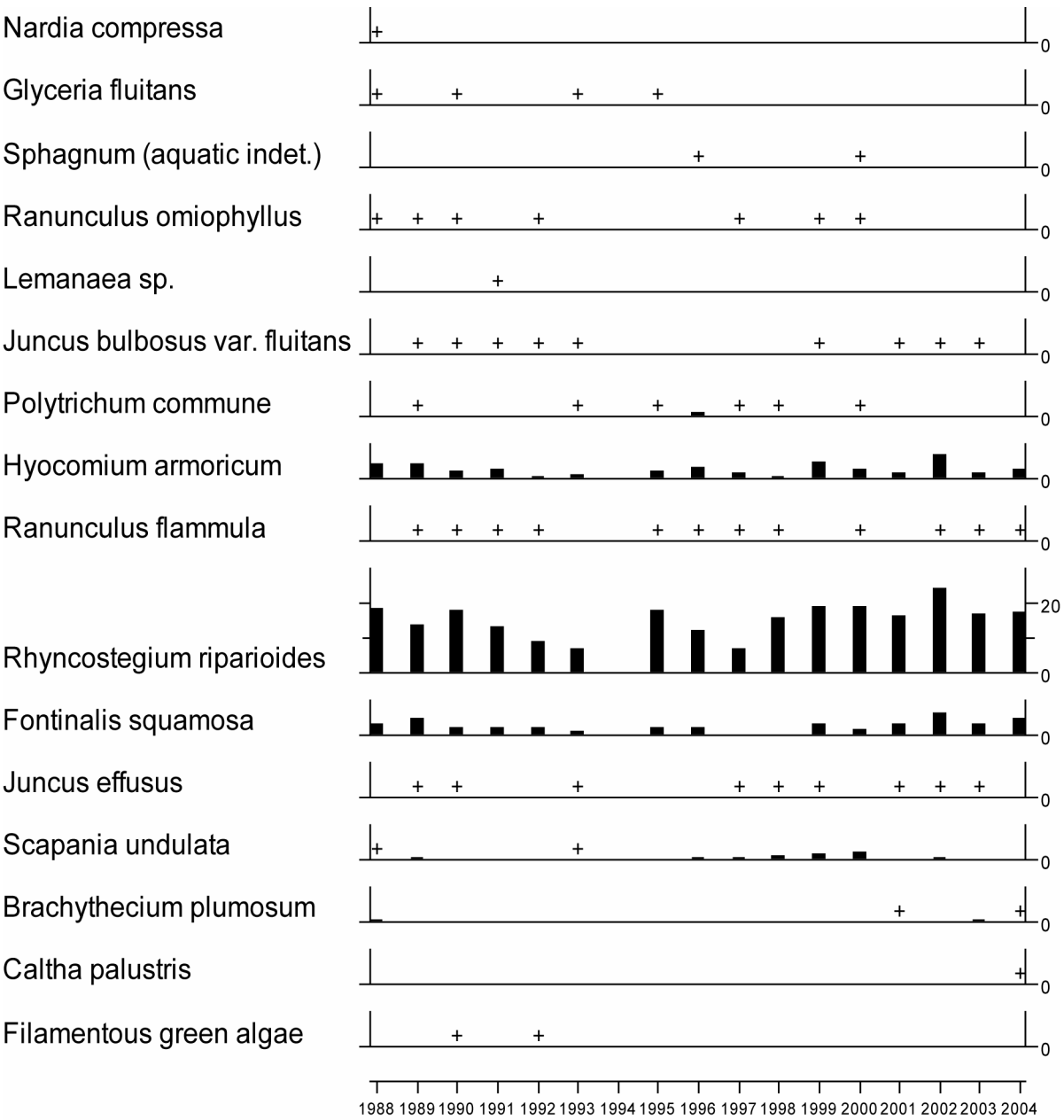


7.14.4.2 Summary statistics, Narrator Brook



7.14.5 Aquatic macrophyte data, Narrator Brook

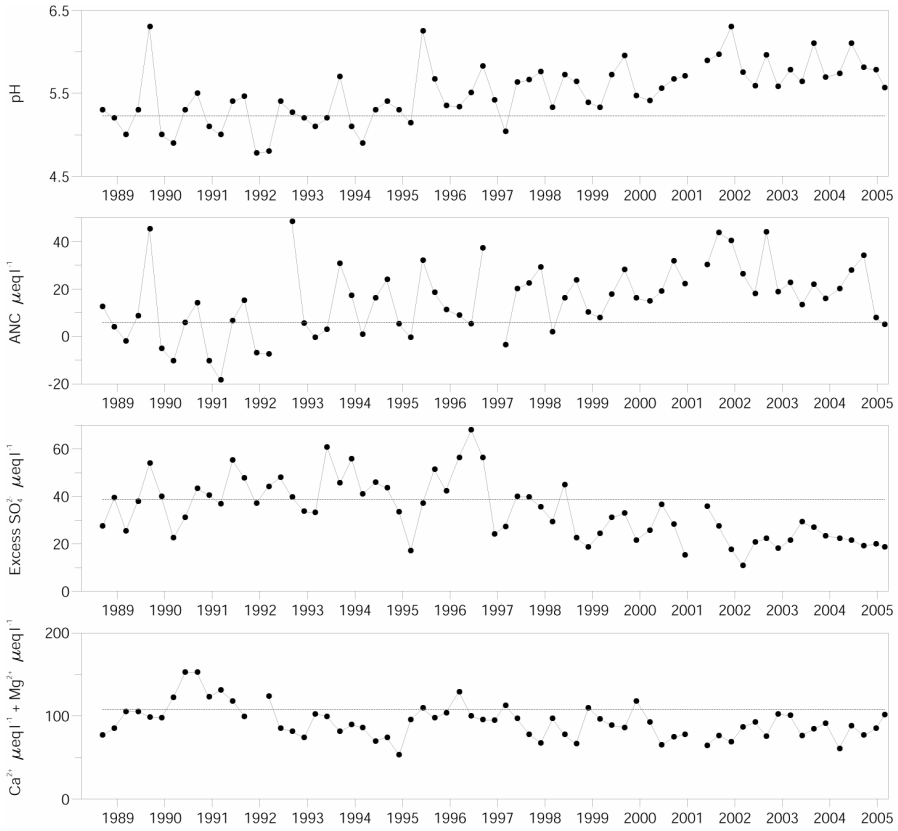
Percentage Species Cover

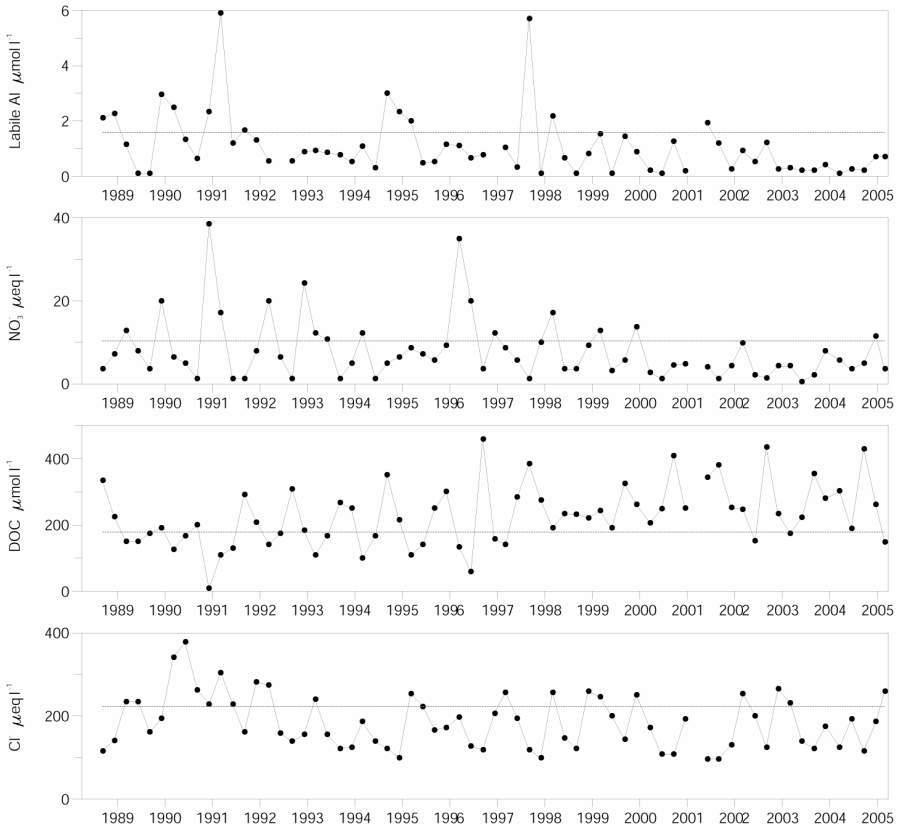


\+ Represents <0.25% abundance

7.15 Llyn Llagi

7.15.1 Spot sampled chemistry data





Determinand statistics

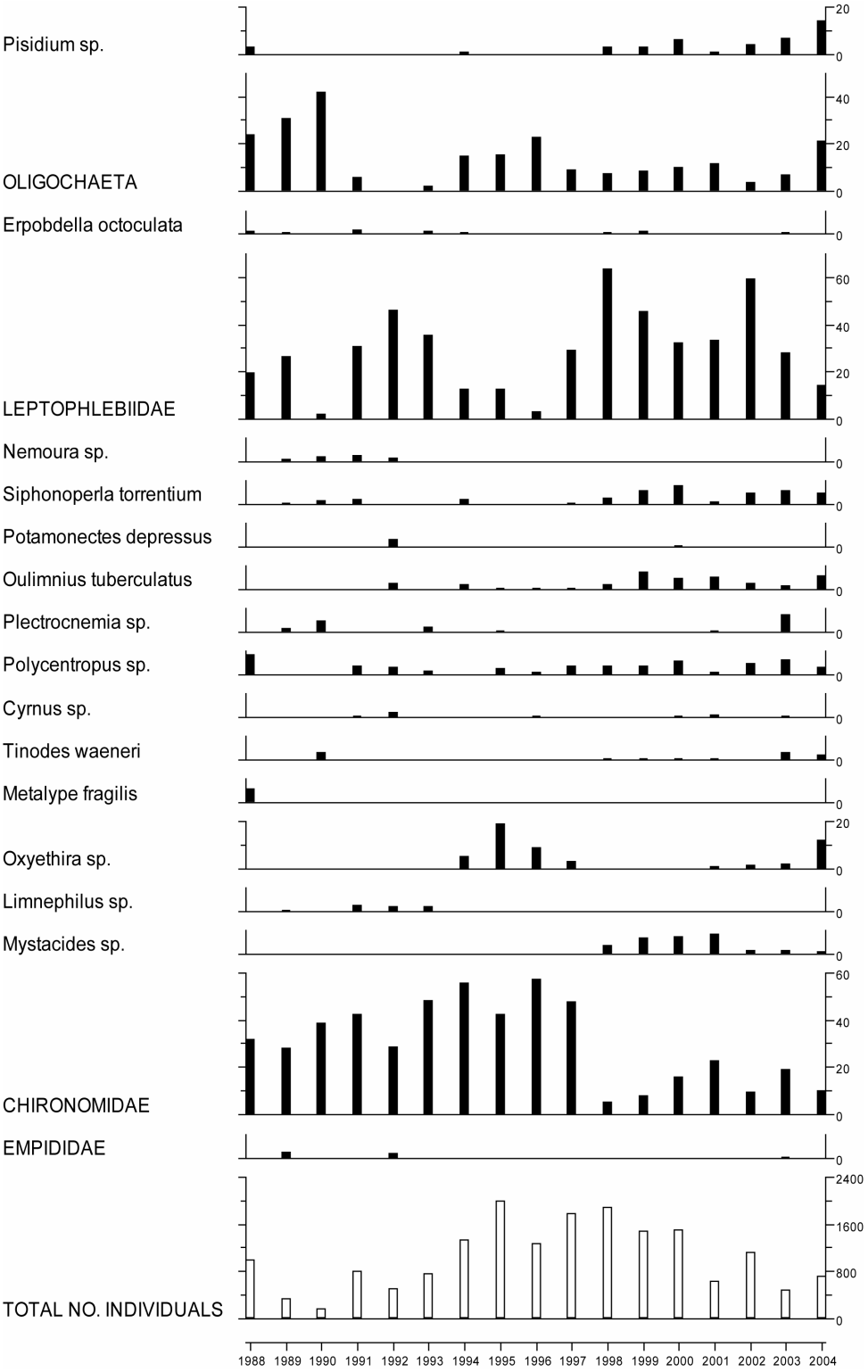
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.23	5.82	0.22	**0.05**	**0.00**
ANC	5.86	18.68	14.49	**1.41**	**0.00**
Ca	57.06	45.25	3.23	**-0.02**	**0.02**
Mg	50.53	42.50	7.30	-0.01	0.08
Na	187.4	142.4	37.63	-0.05	0.06
K	3.60	3.08	1.47	0.00	0.14
Sol.Al	2.81	2.02	0.88	-0.50	0.20

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	1.58	0.47	0.27	**-1.70**	**0.01**
Cl	222.4	188.0	58.70	-0.10	0.11
SO_4	62.17	39.58	6.13	**-0.10**	**0.00**
XSO_4	38.82	19.84	1.28	**-0.07**	**0.00**
NO_3	10.42	5.89	3.75	0.00	0.08
Si	34.96	12.32	7.88	0.00	0.12
DOC	177.9	256.7	124.1	**0.08**	**0.00**

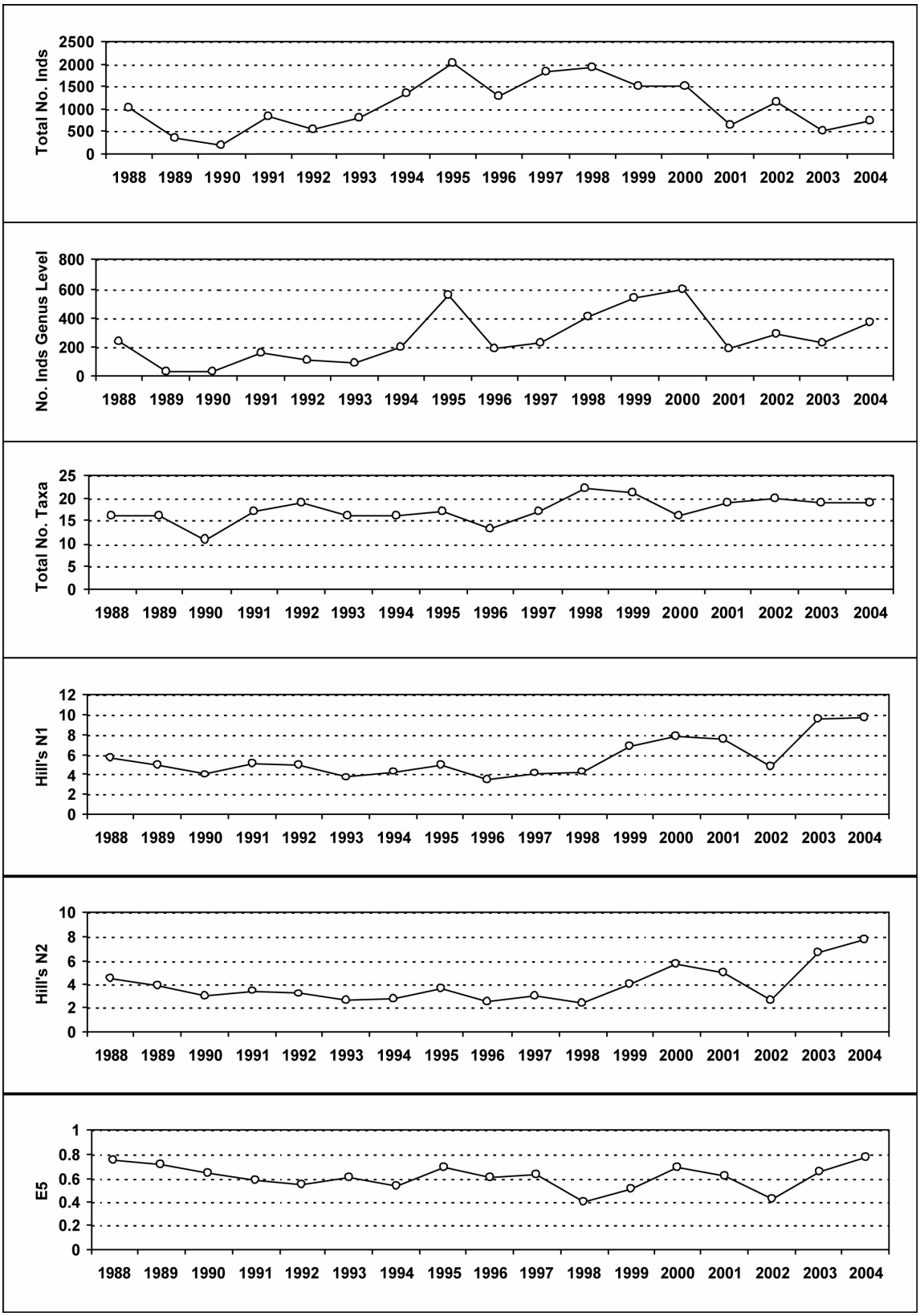
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol l^{-1}$)

7.15.2 Macroinvertebrate data

7.15.2.1 Percentage abundance summary, Llyn Llagi

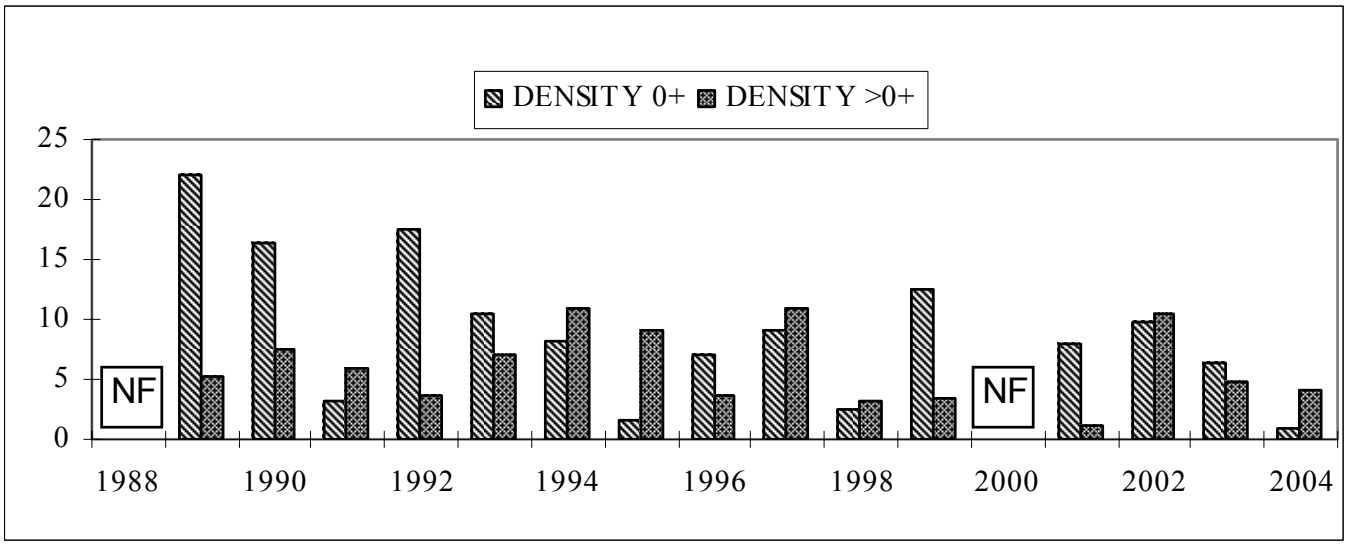


7.15.2.2 Summary statistics, Llyn Llagi



7.15.3 Fish data (for outflow stream)

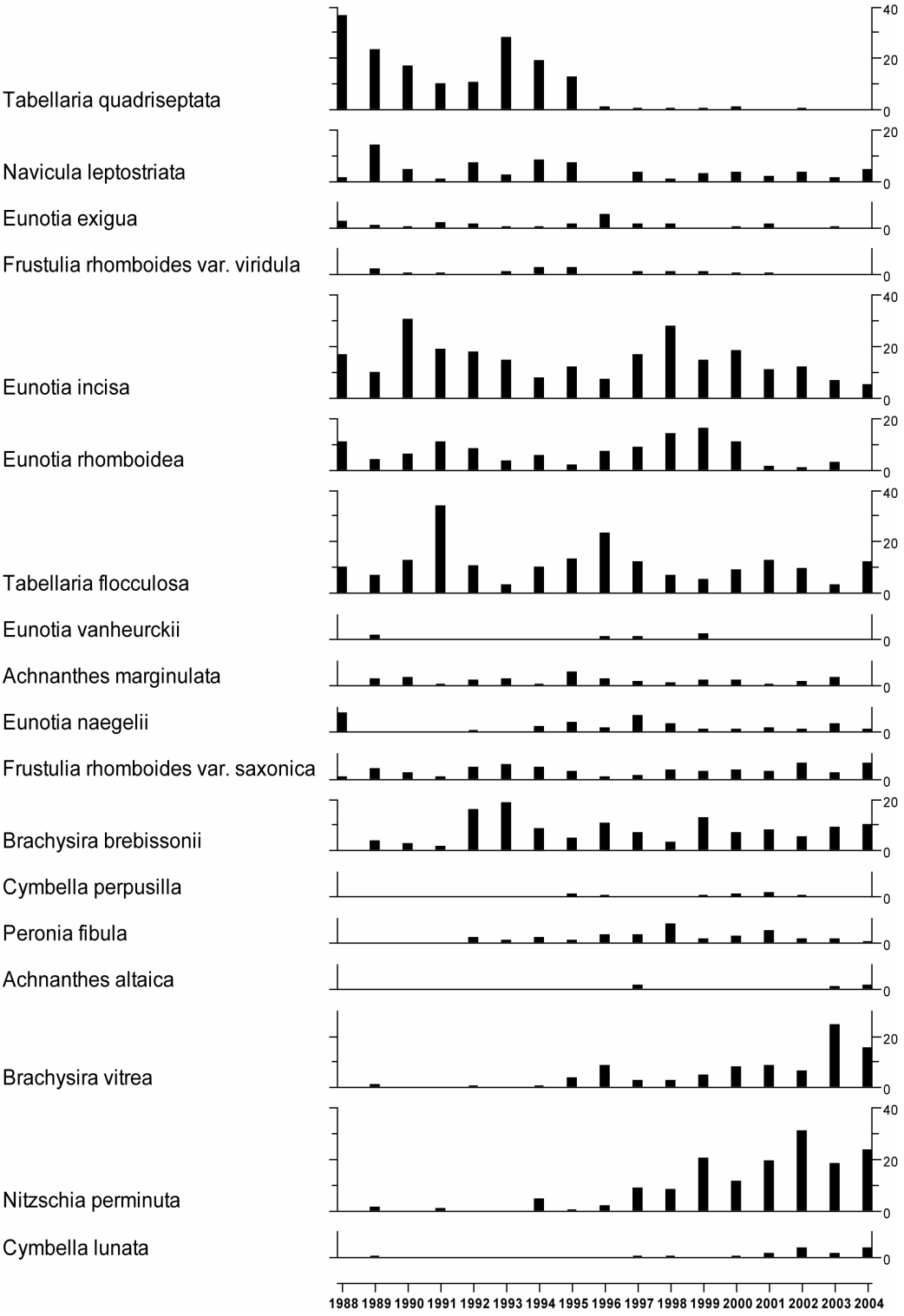
7.15.3.1 Summary of mean Trout density (numbers 100m^{-2}), Llyn Llagi



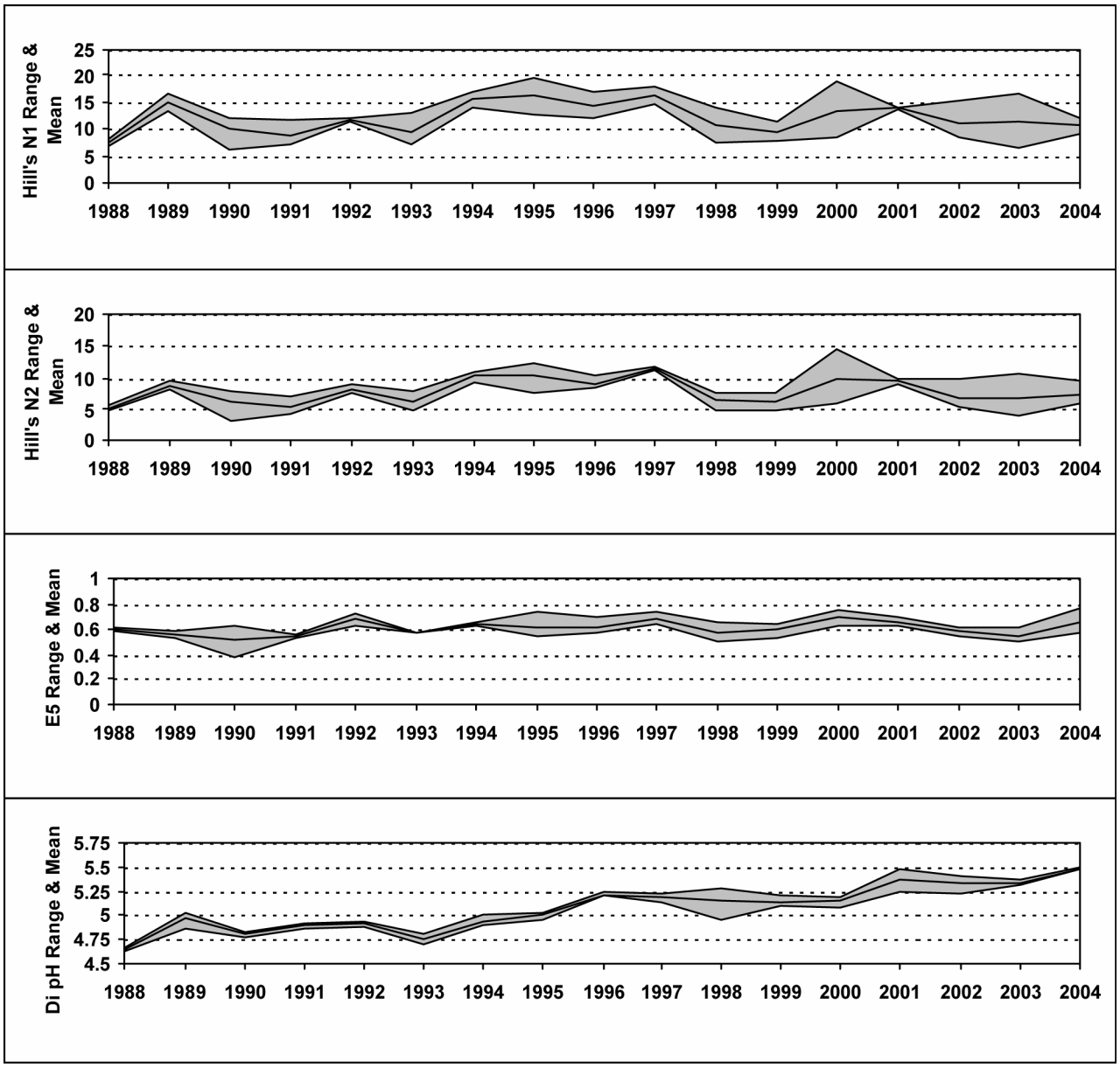
NF = Not fished

7.15.4 Epilithic diatom data

7.15.4.1 Percentage abundance summary, Llyn Llagi



7.15.4.2 Summary statistics, Llyn Llagi



7.15.5 Aquatic macrophyte data, Llyn Llagi

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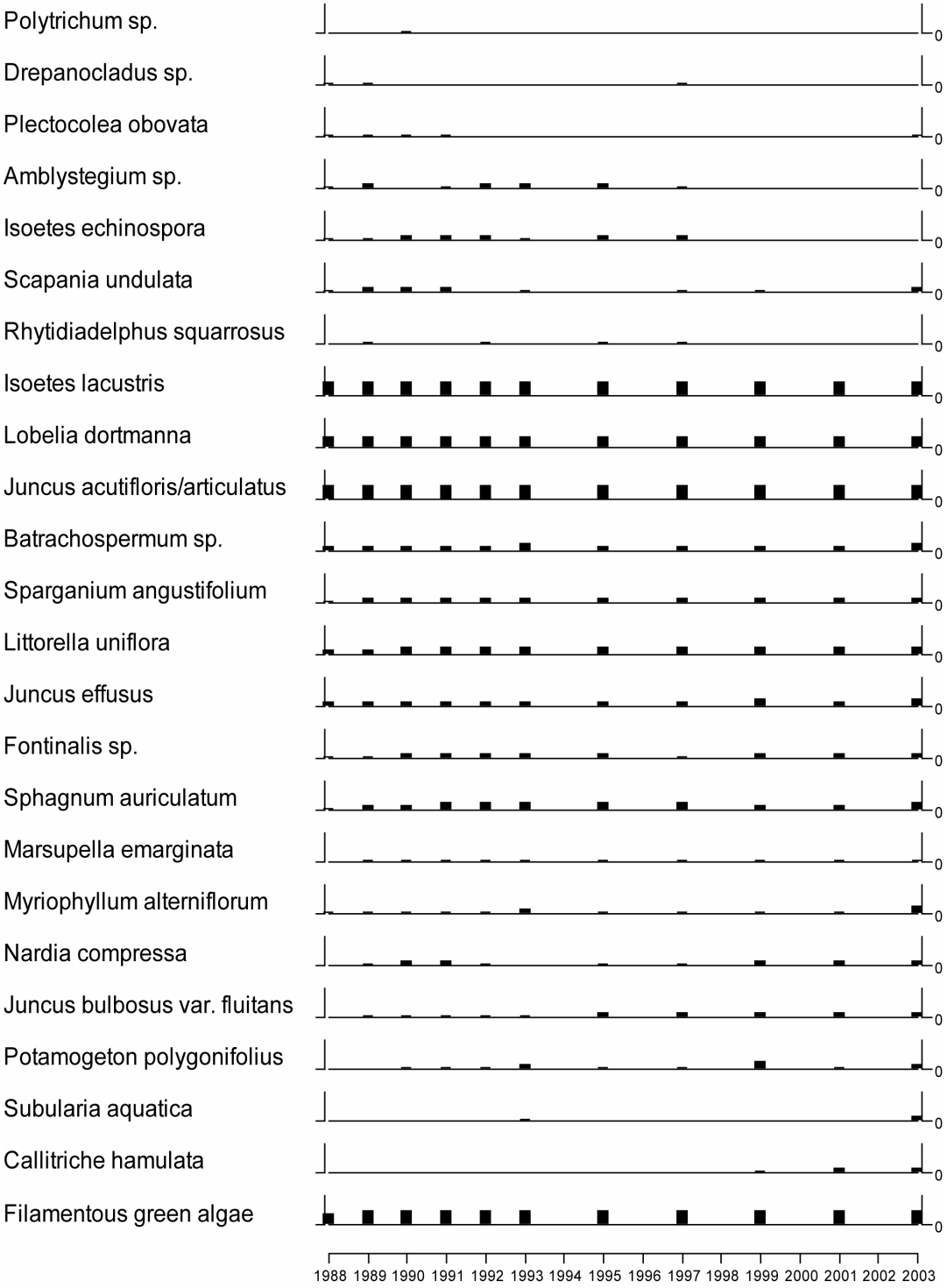
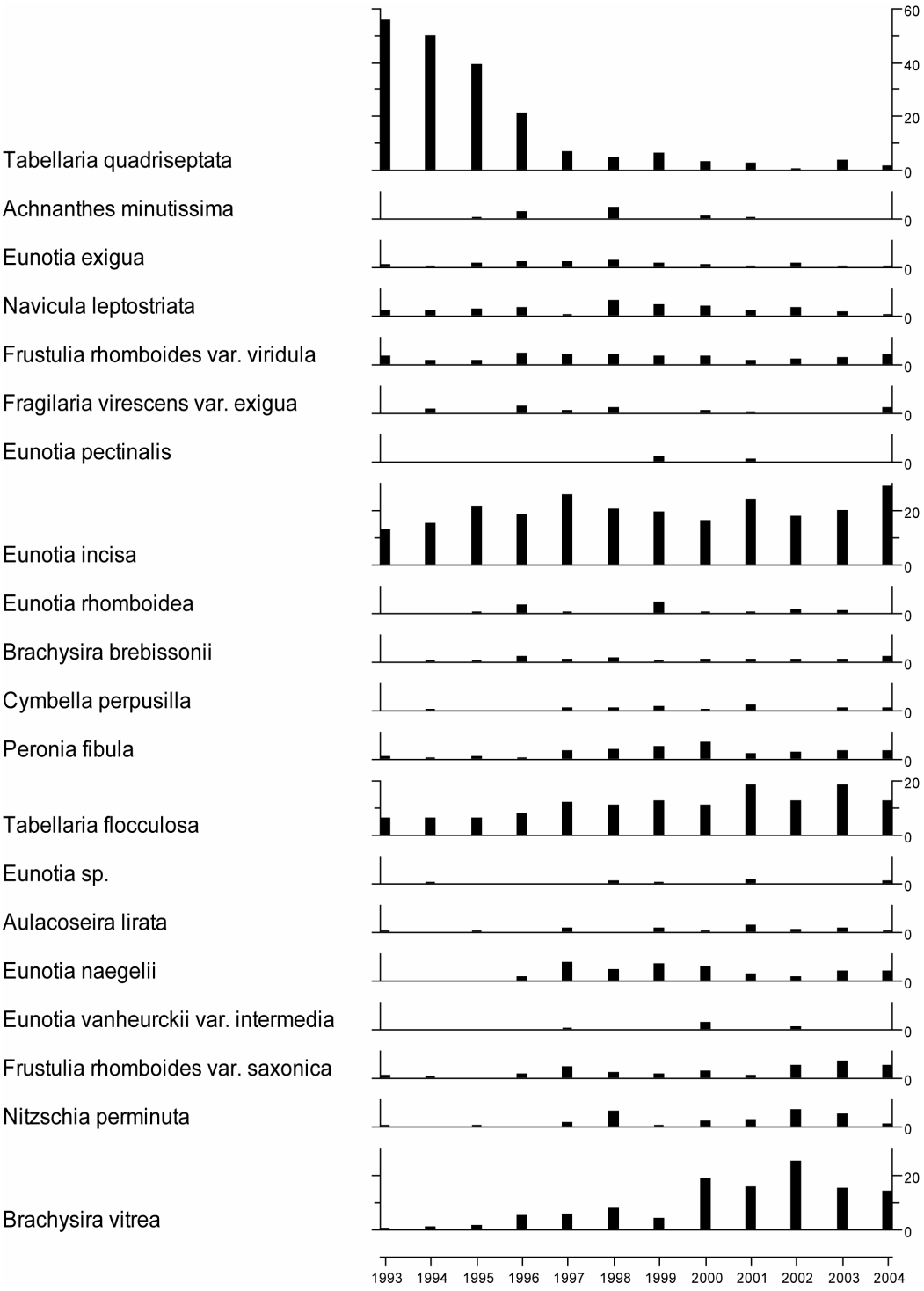
Species Scores (1-5)



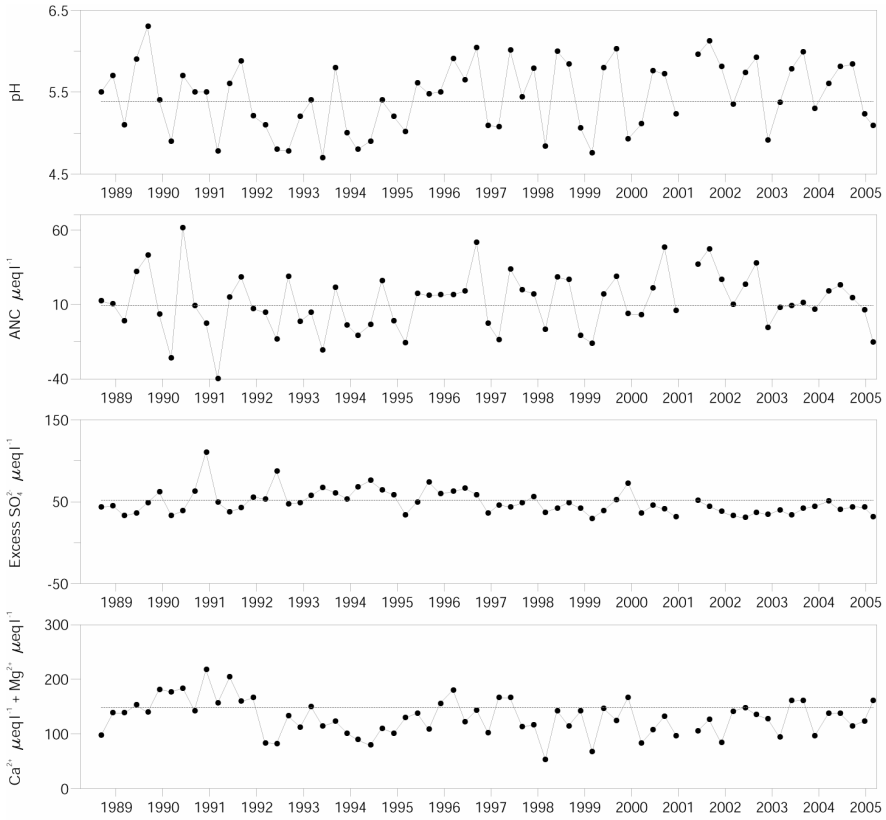
7.15.6 Sediment trap data, Llyn Llagi

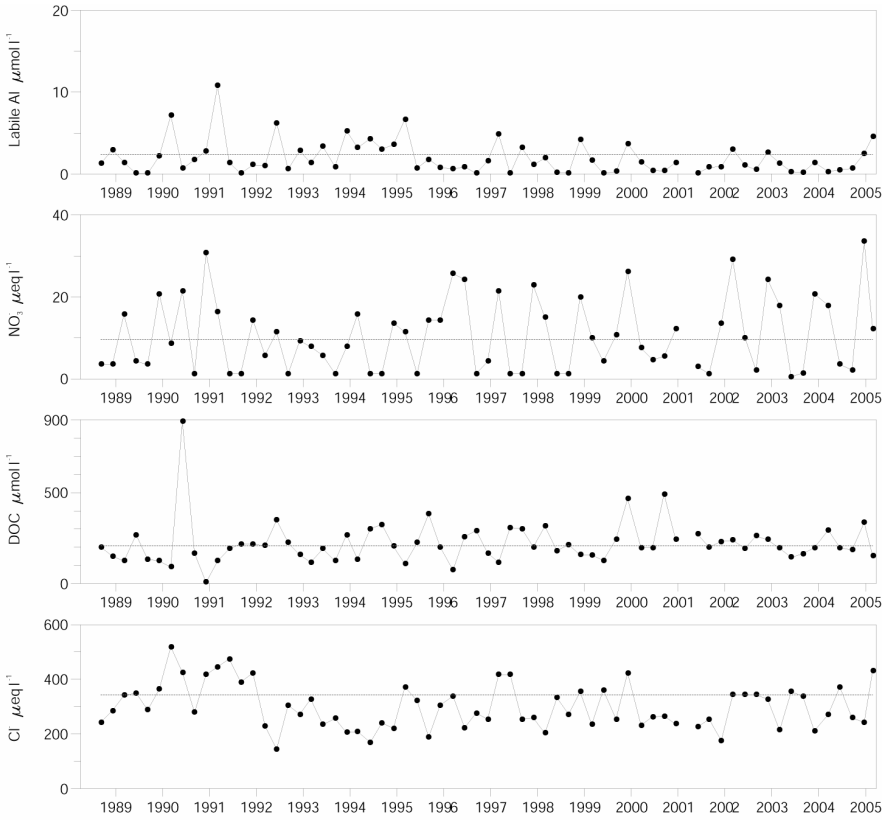
Relative percentage frequency of diatom taxa



7.16 Llyn Cwm Mynach

7.16.1 Spot sampled chemistry data





Determinand statistics

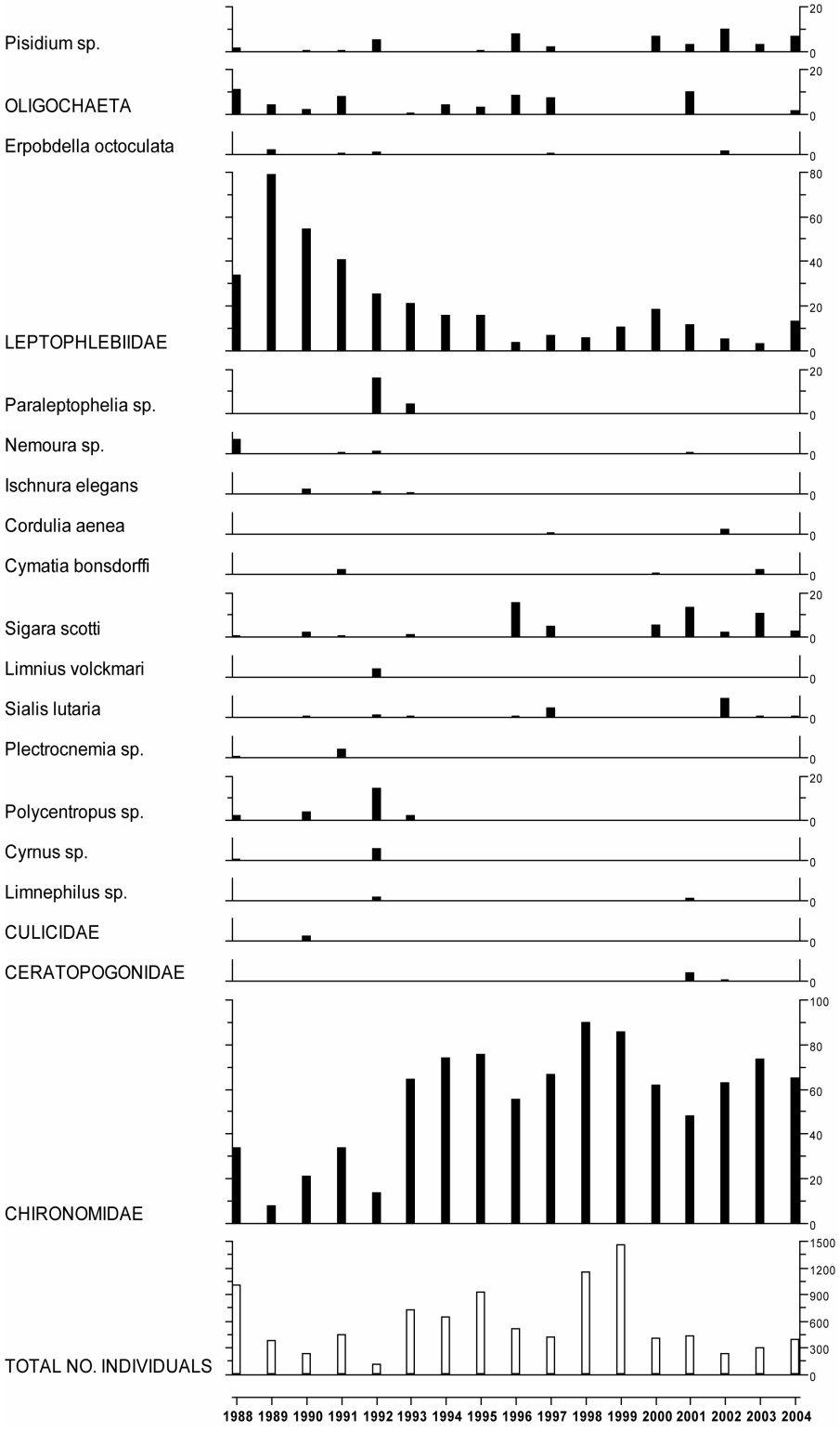
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.38	5.49	0.39	0.01	0.22
ANC	9.18	7.06	16.40	0.54	0.14
Ca	79.13	68.75	5.14	-0.01	0.29
Mg	68.86	65.21	15.77	0.00	0.54
Na	294.5	252.2	43.91	-0.04	0.30
K	3.41	4.68	1.73	**0.00**	**0.00**
Sol.Al	3.94	4.31	2.49	1.25	0.20

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	2.42	2.08	1.90	-1.05	0.23
Cl	342.6	326.1	90.56	-0.05	0.54
SO_4	88.16	73.96	4.96	**-0.06**	**0.01**
XSO_4	52.17	39.72	5.50	**-0.04**	**0.05**
NO_3	9.59	12.86	14.50	0.00	0.23
Si	56.77	30.18	31.72	**-0.01**	**0.01**
DOC	208.8	217.3	81.30	0.04	0.09

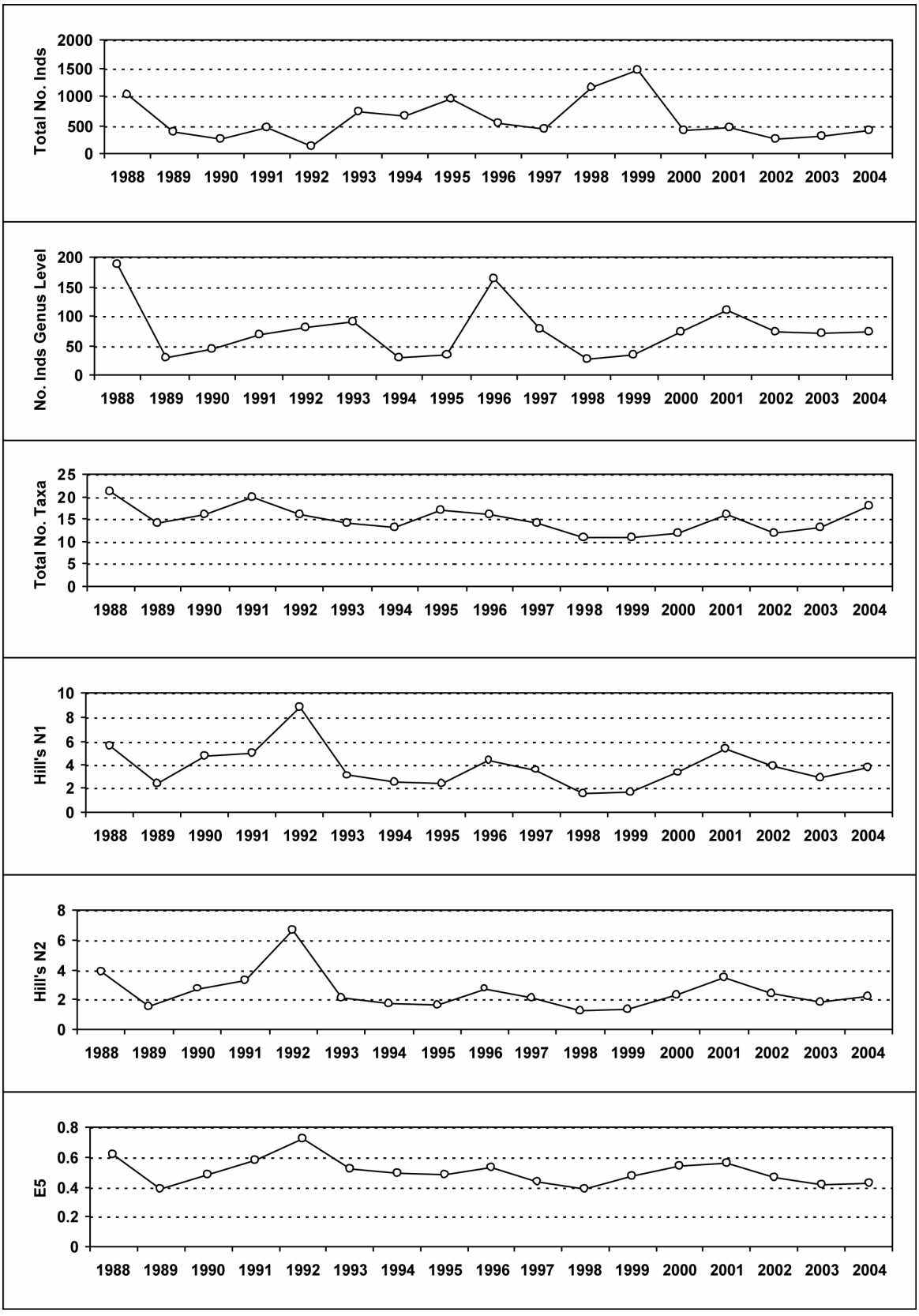
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.16.2 Macroinvertebrate data

7.16.2.1 Percentage abundance summary, Llyn Cwm Mynach

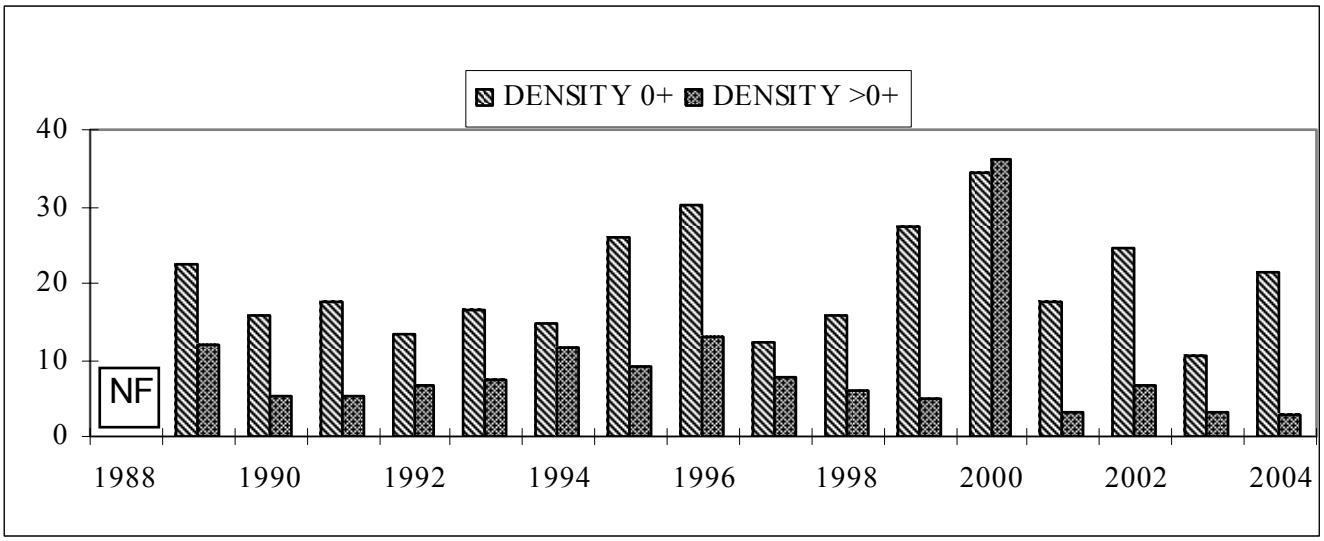


7.16.2.2 Summary statistics, Llyn Cwm Mynach



7.16.3 Fish data (for outflow stream)

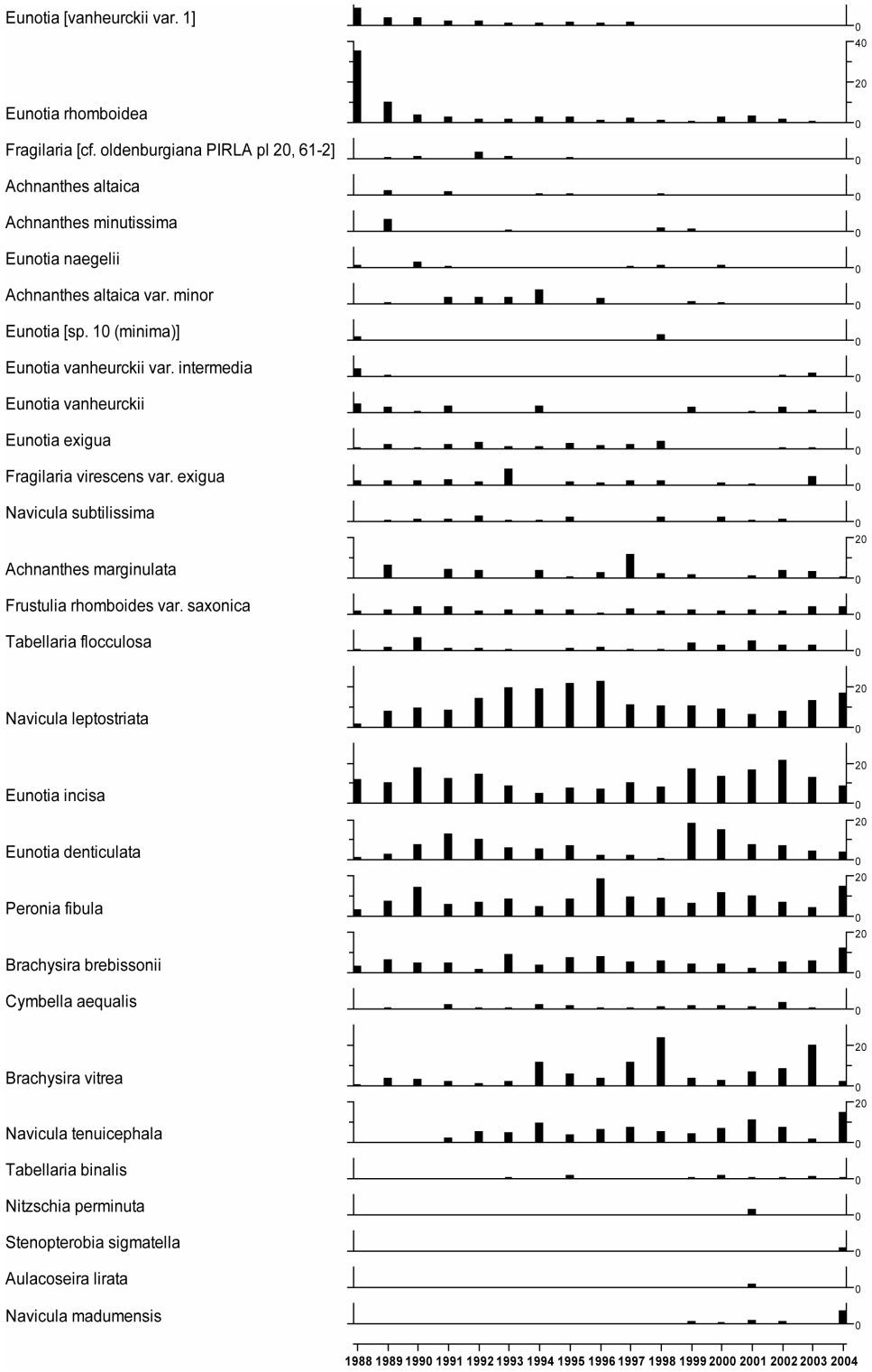
7.16.3.1 Summary of mean Trout density (numbers 100m^{-2}), Llyn Cwm Mynach



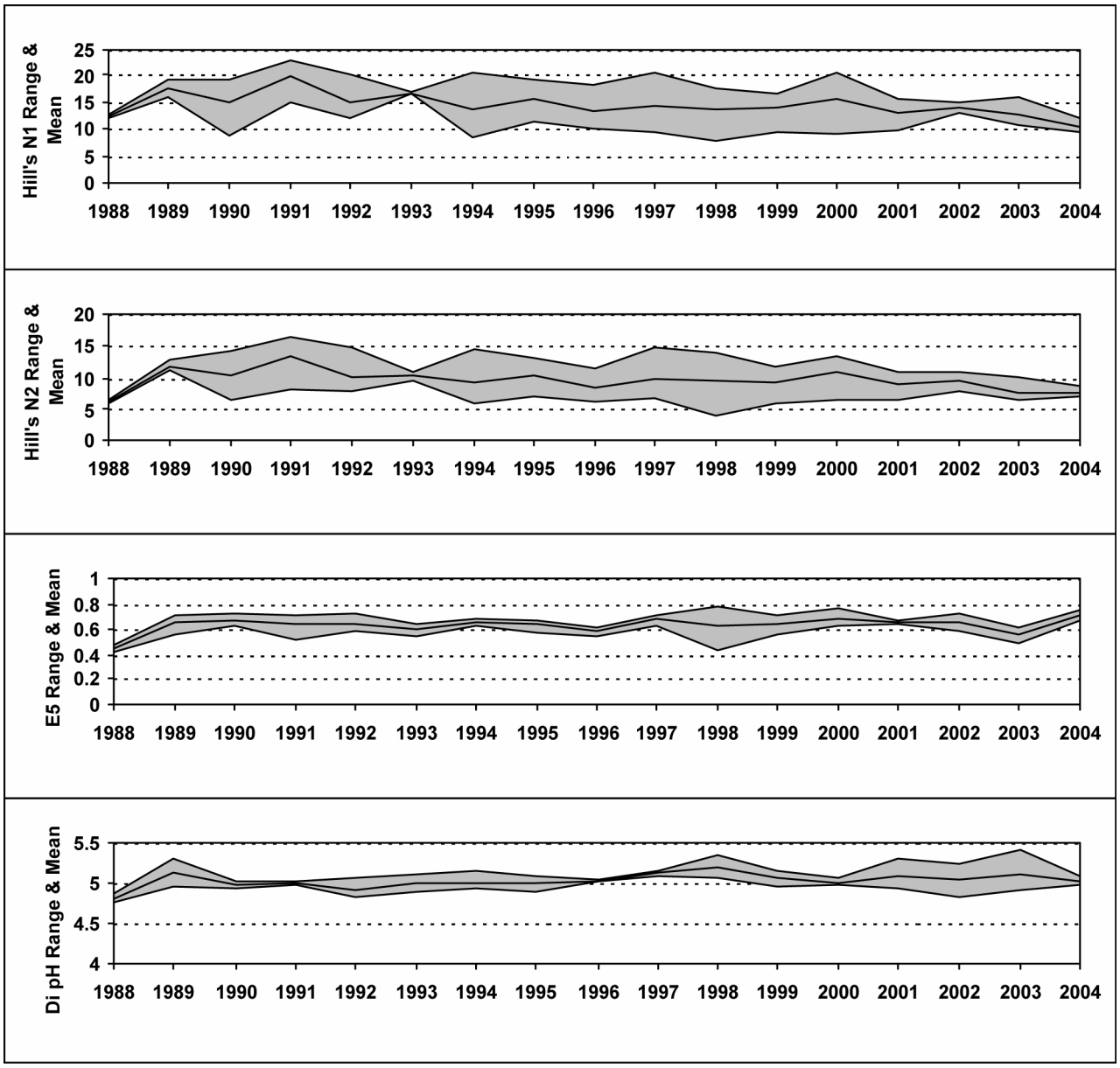
NF = Not fished

7.16.4 Epilithic diatom data

7.16.4.1 Percentage abundance summary, Llyn Cwm Mynach

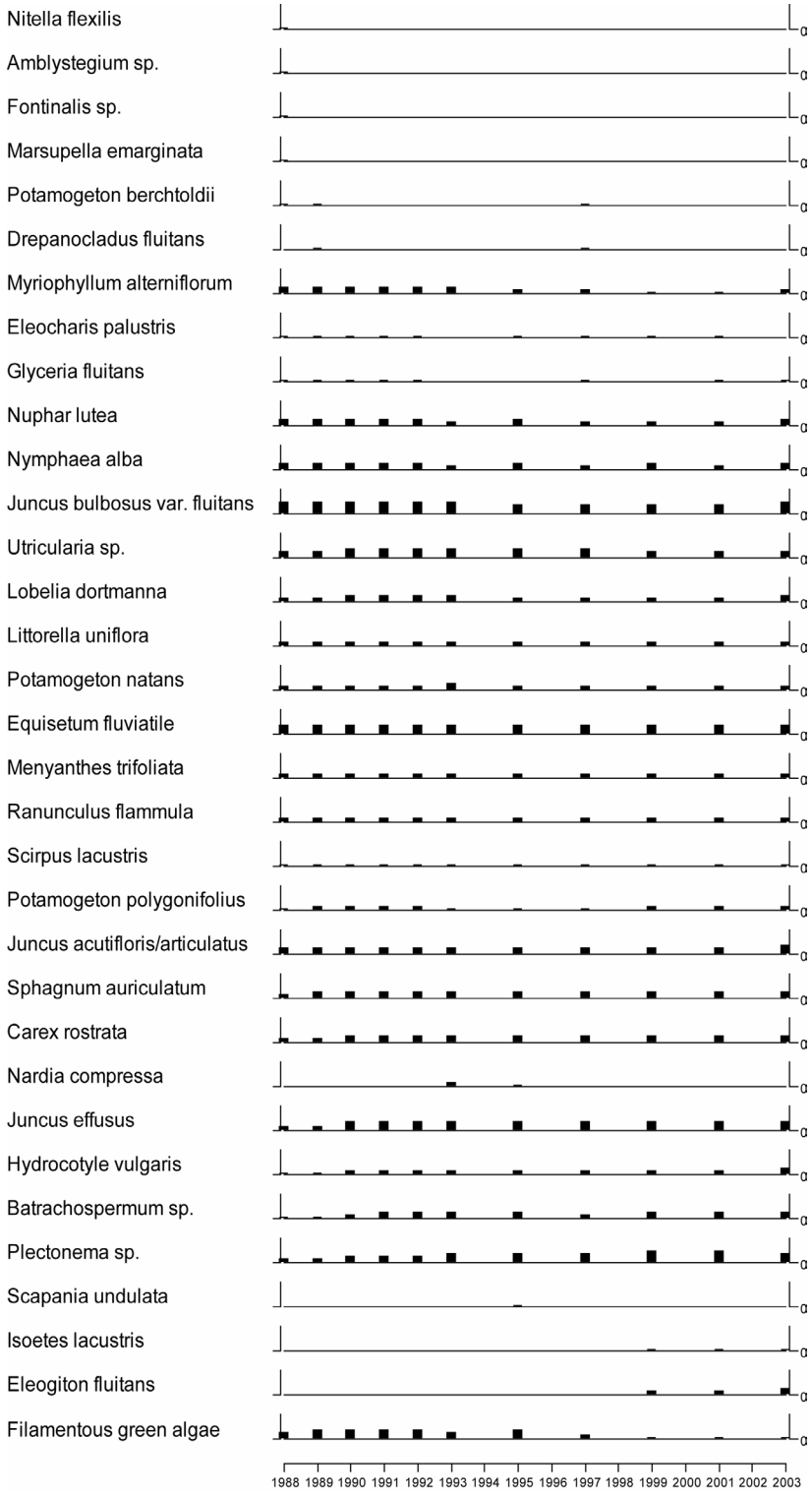


7.16.4.2 Summary statistics, Llyn Cwm Mynach



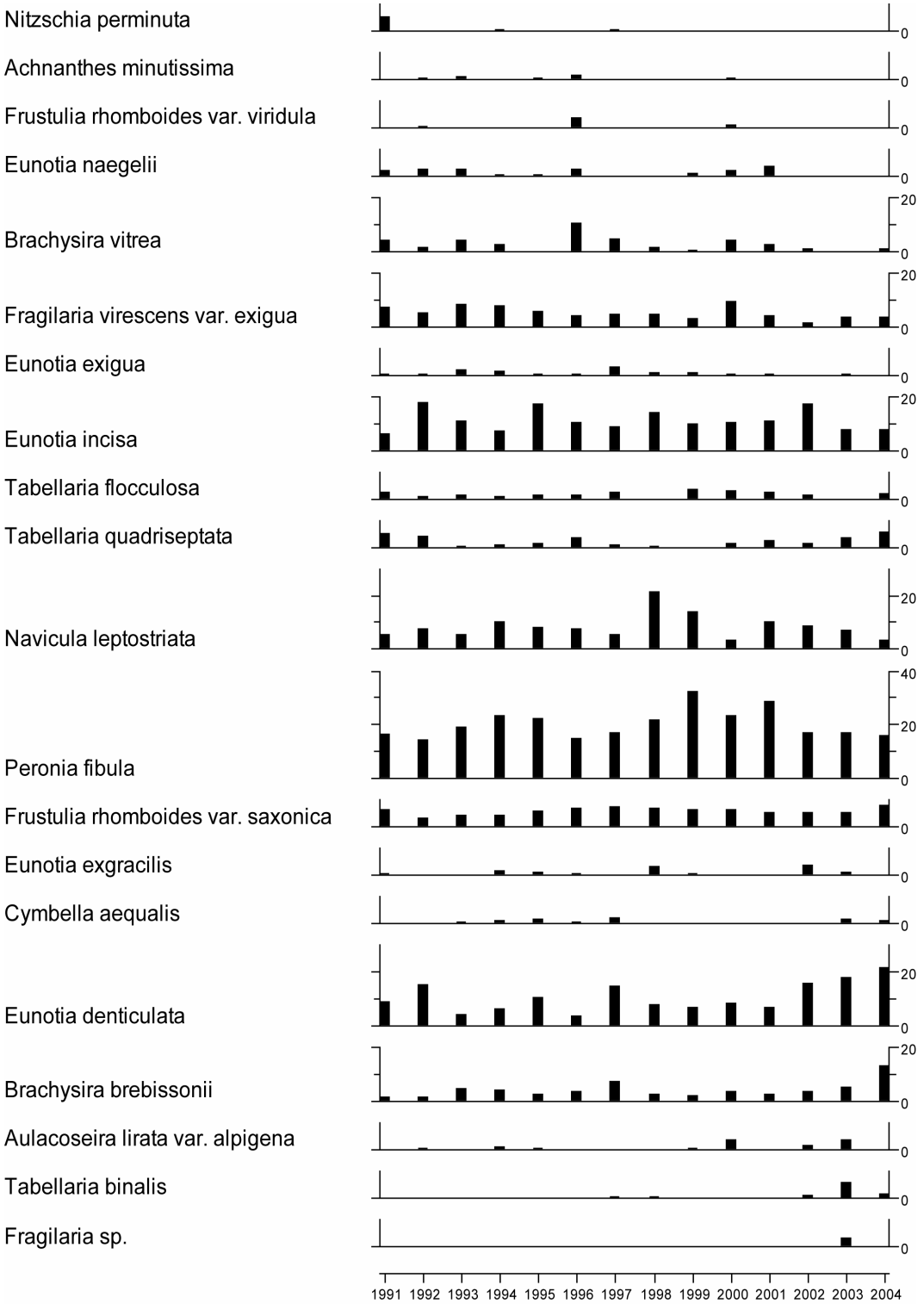
7.16.5 Aquatic macrophyte data, Llyn Cwm Mynach

Species Scores (1-5)



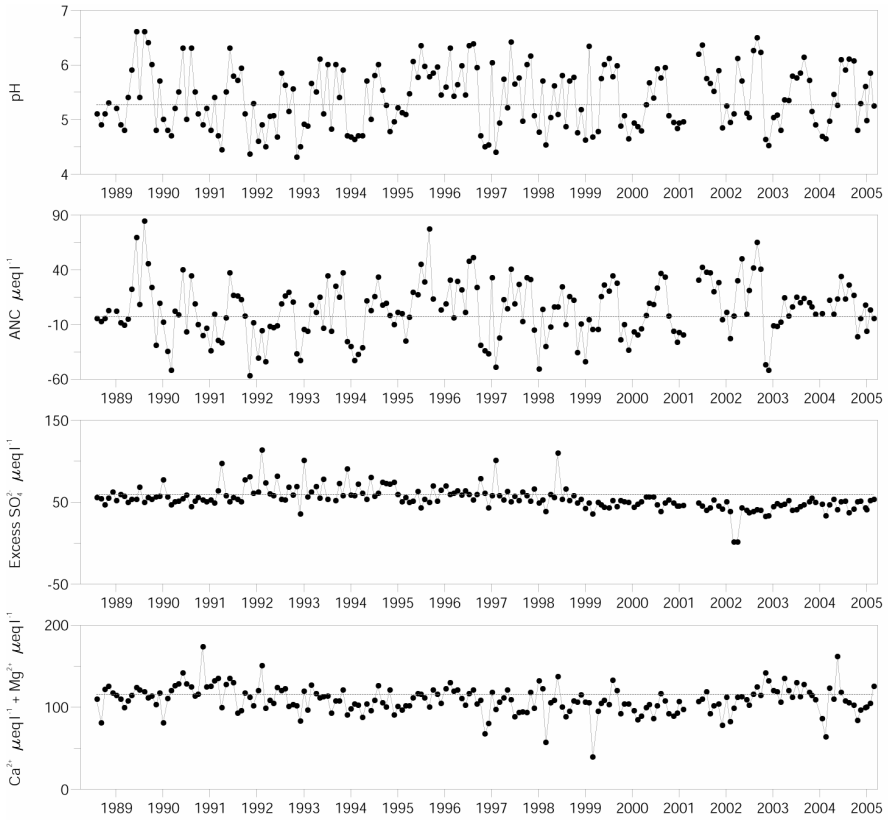
7.16.6 Sediment trap data, Llyn Cwm Mynach

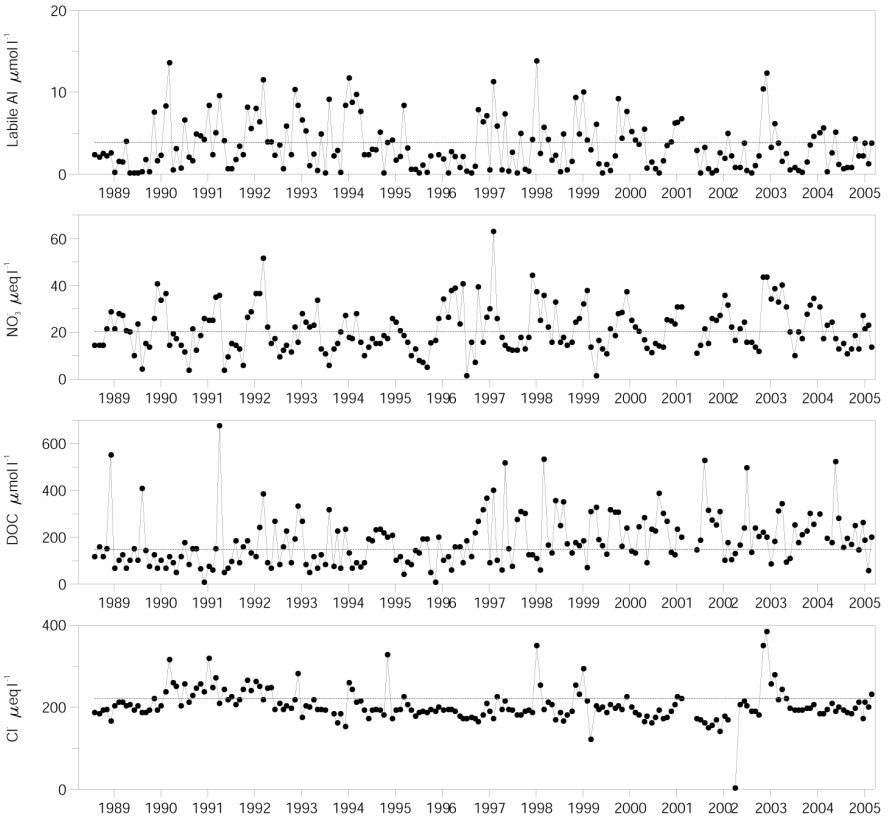
Relative percentage frequency of diatom taxa



7.17 Afon Hafren

7.17.1 Spot sampled chemistry data





Determinand statistics

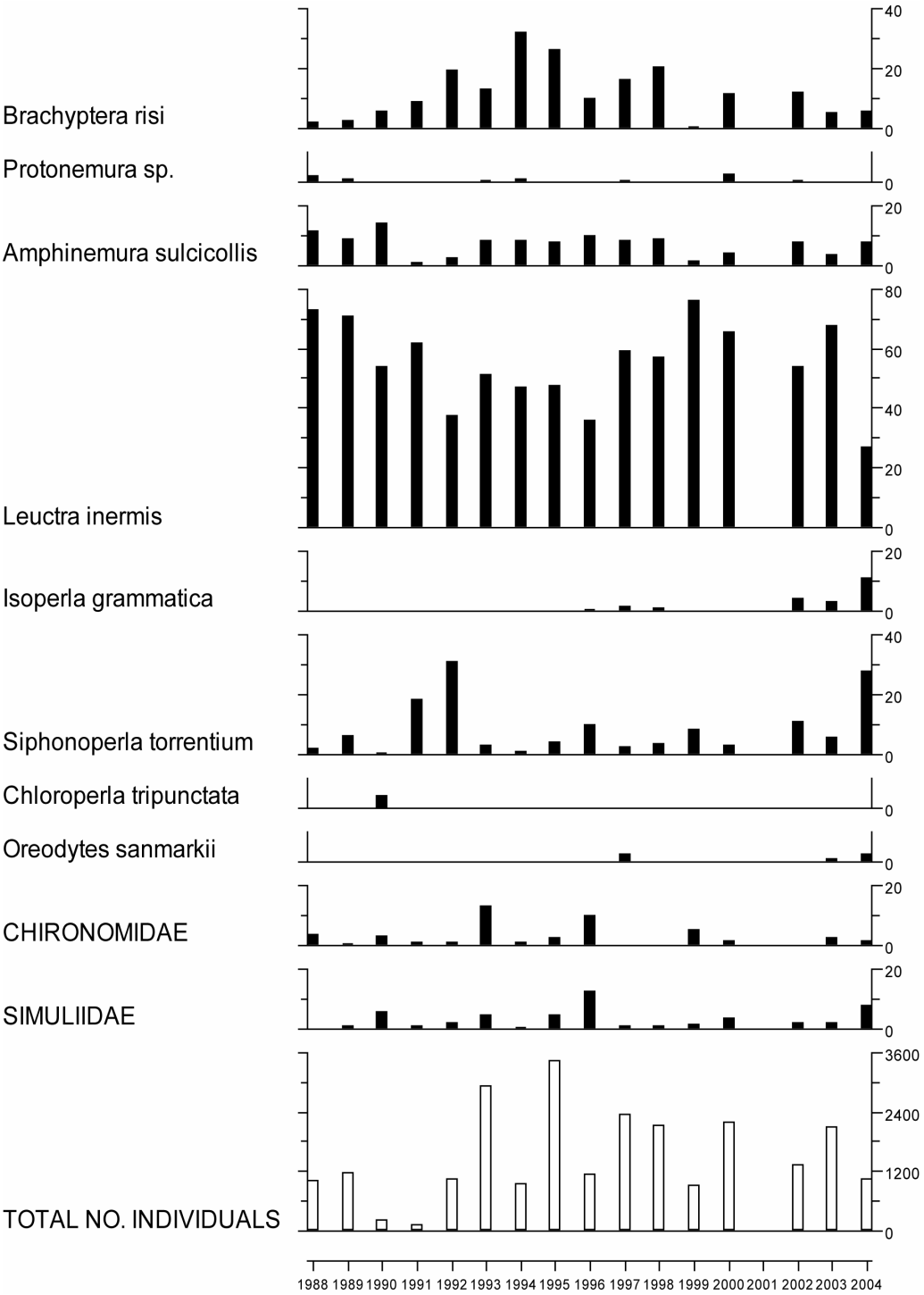
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.27	5.55	0.45	0.01	0.28
ANC	-2.57	5.34	16.21	0.78	0.15
Ca	48.08	43.38	11.80	**-0.01**	**0.02**
Mg	67.32	65.97	8.01	0.00	0.37
Na	201.0	180.4	36.64	**-0.02**	**0.05**
K	3.20	3.80	1.93	**0.00**	**0.00**
Sol.Al	6.38	5.54	3.09	1.00	0.72

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	3.83	2.38	1.54	-1.00	0.37
Cl	221.8	198.4	15.77	-0.05	0.13
SO_4	82.70	67.53	7.02	**-0.06**	**0.00**
XSO_4	59.41	46.70	5.93	**-0.05**	**0.00**
NO_3	20.45	17.44	5.37	0.00	0.28
Si	113.8	97.50	25.04	**-0.02**	**0.02**
DOC	149.3	216.2	112.8	**0.09**	**0.00**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

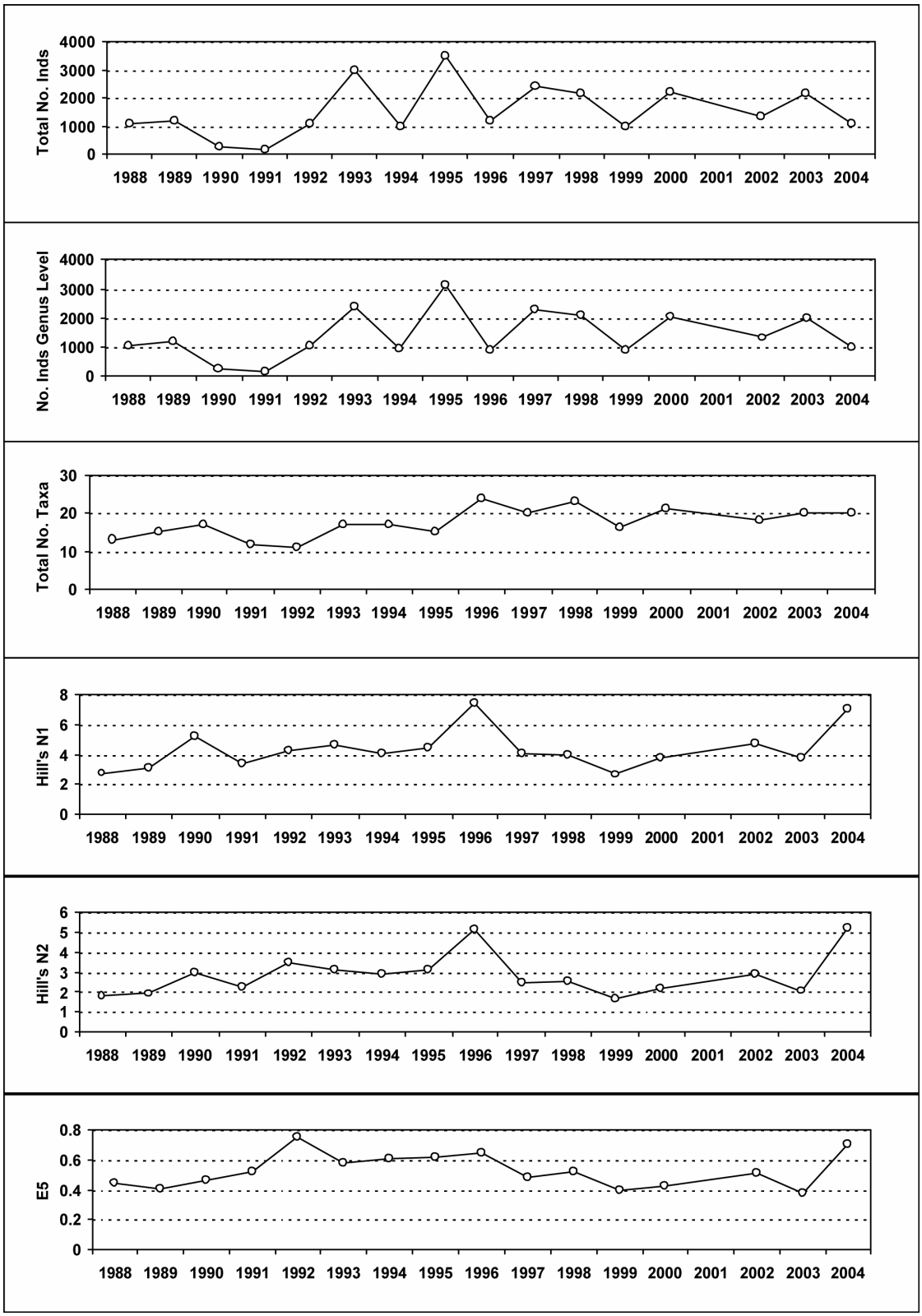
7.17.2 Macroinvertebrate data

7.17.2.1 Percentage abundance summary, Afon Hafren



No sampling in 2001 due to Foot and Mouth restrictions.

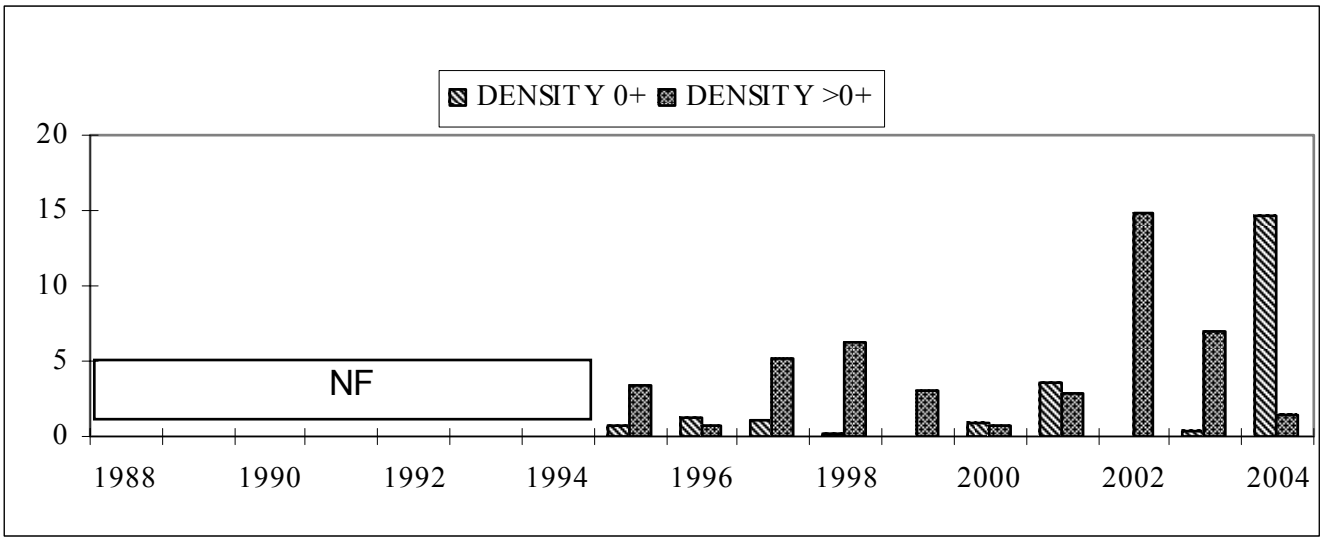
7.17.2.2 Summary statistics, Afon Hafren



No sampling in 2001 due to Foot and Mouth restrictions.

7.17.3 Fish data

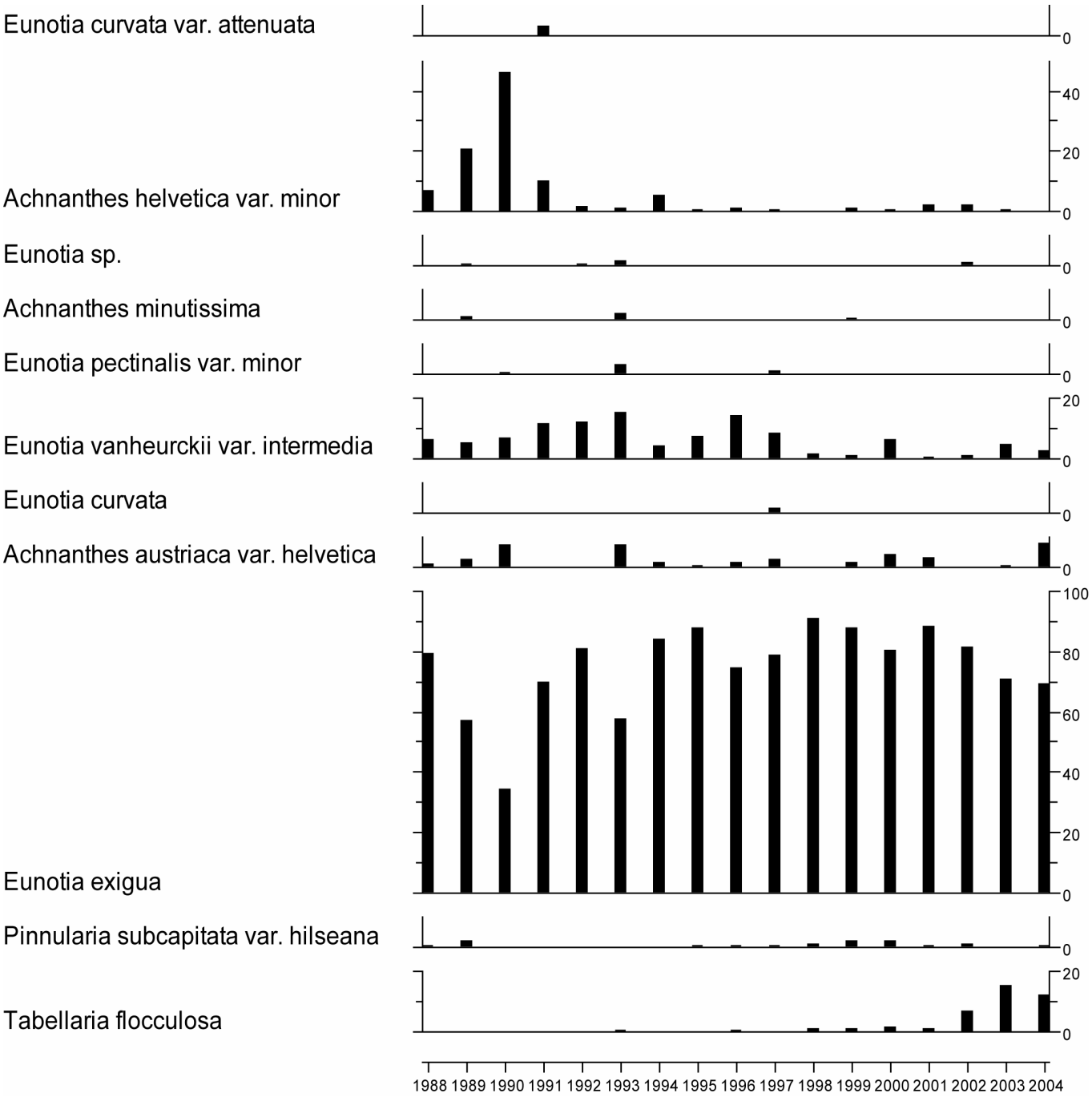
7.17.3.1 Summary of mean Trout density (numbers 100m^{-2}), Afon Hafren



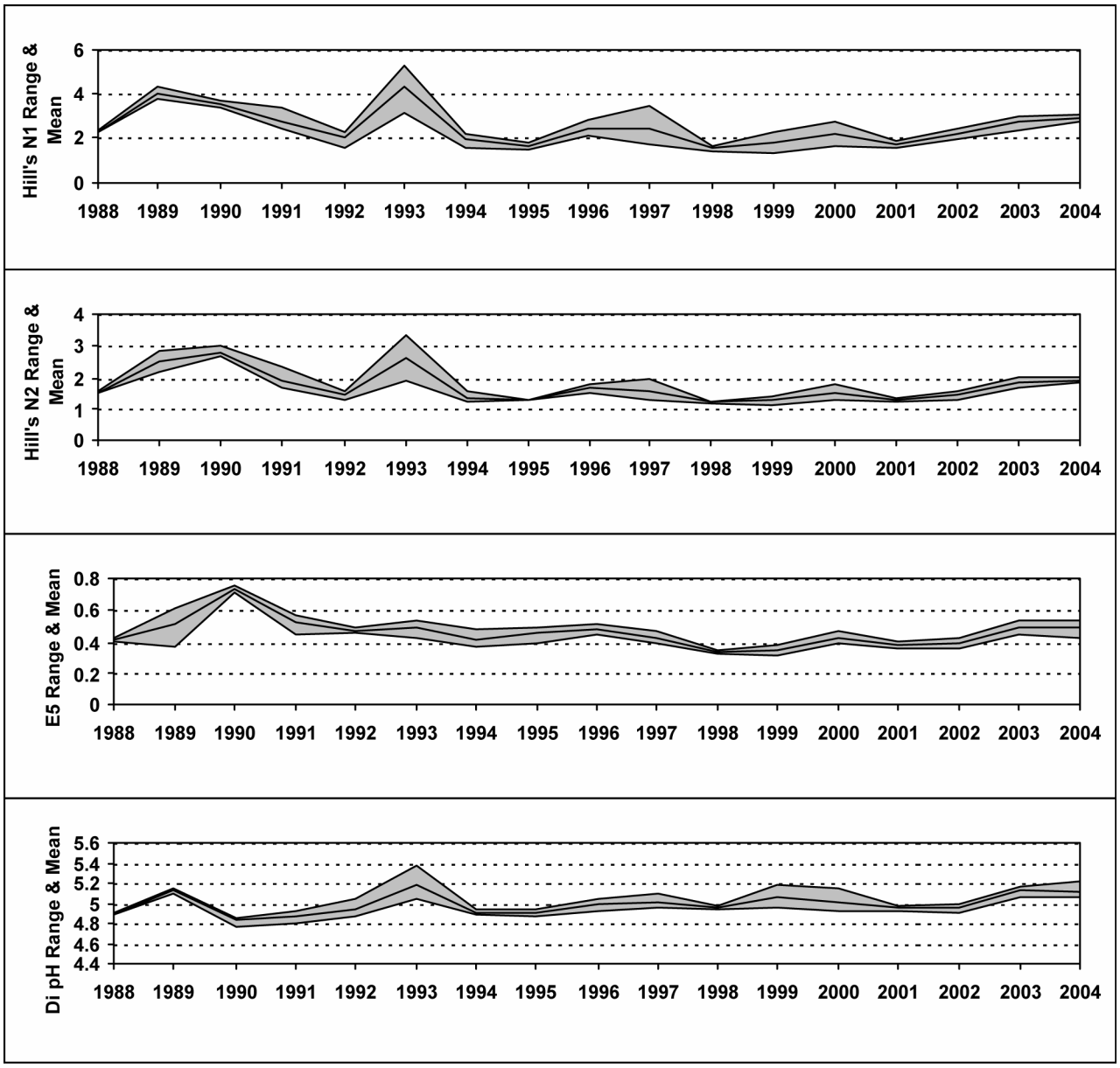
NF = Not fished

7.17.4 Epilithic diatom data

7.17.4.1 Percentage abundance summary, Afon Hafren

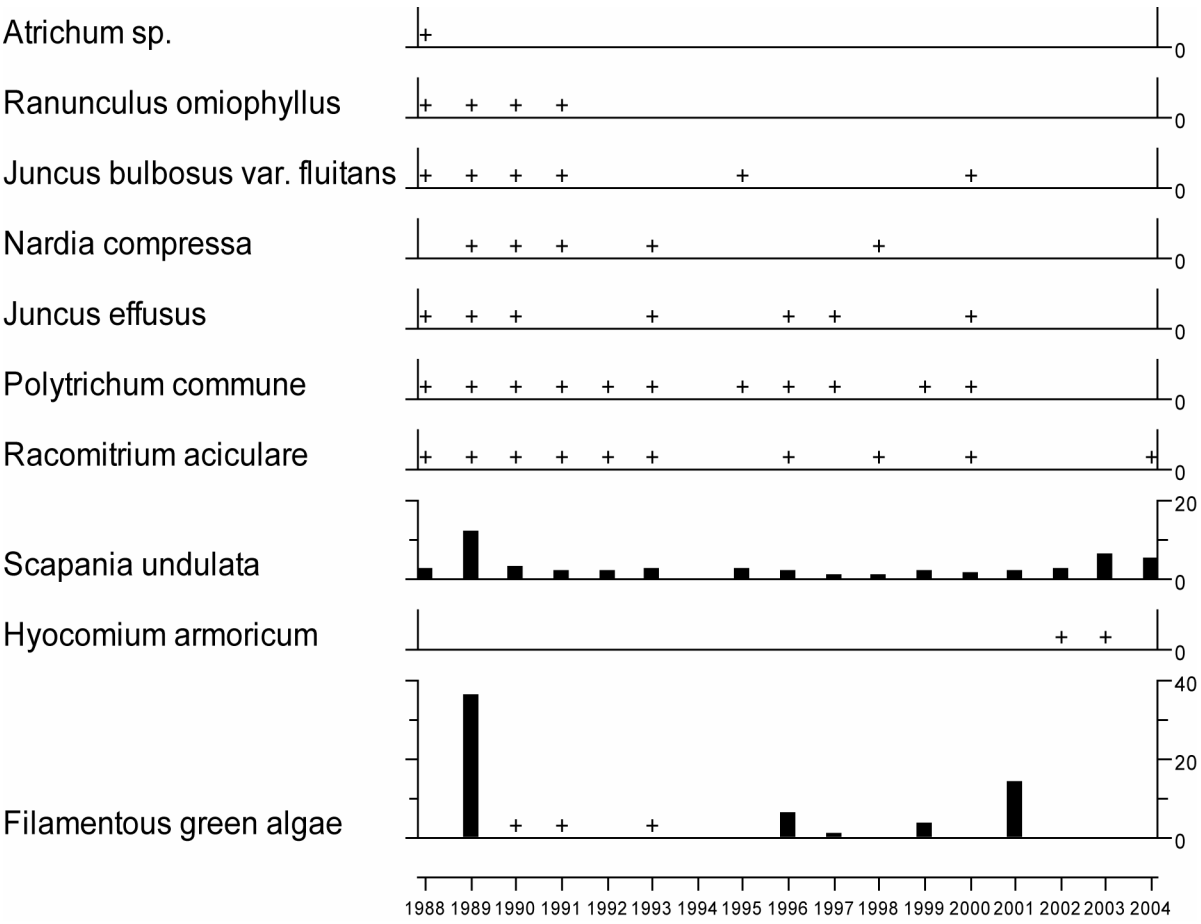


7.17.4.2 Summary statistics, Afon Hafren



7.17.5 Aquatic macrophyte data, Afon Hafren

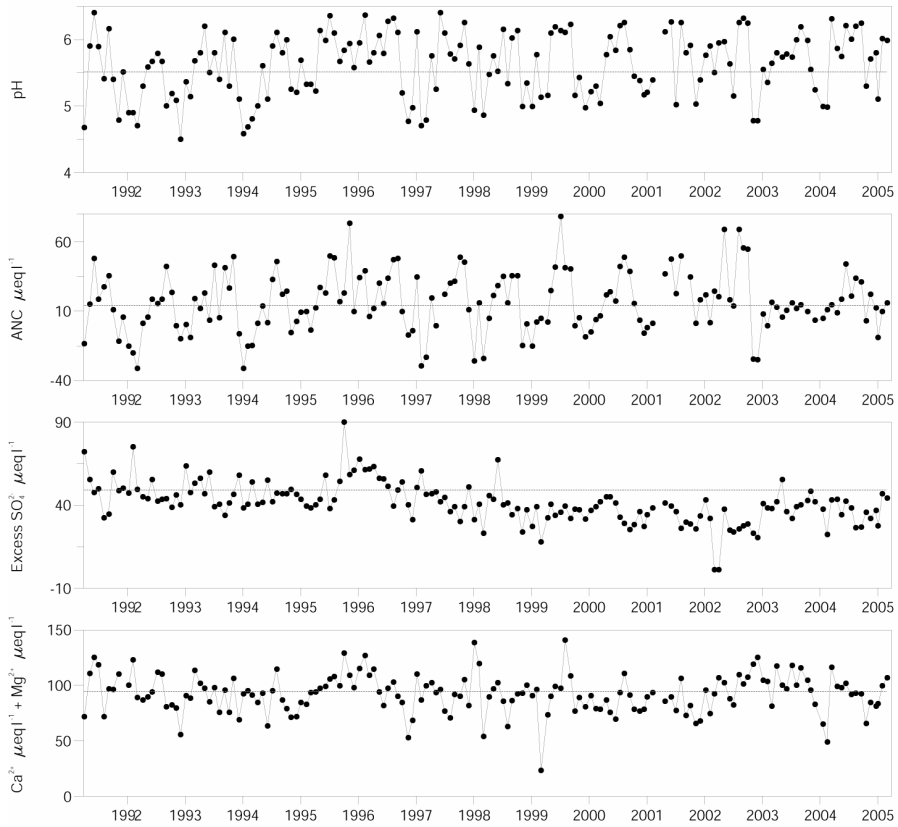
Percentage Species Cover

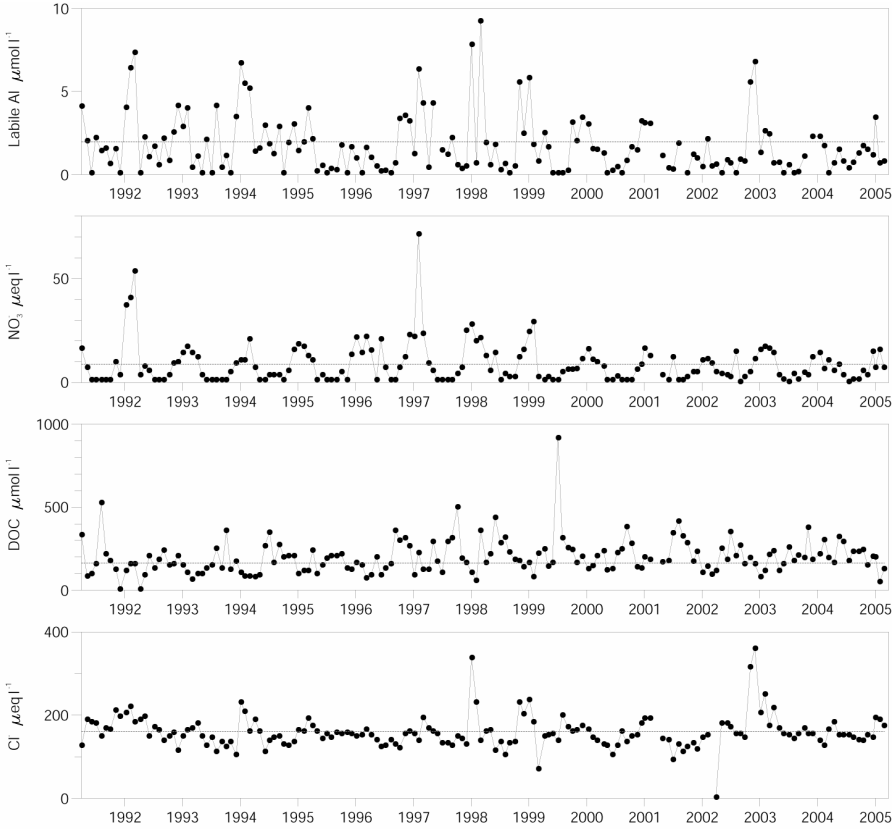


+ Represents <0.25% abundance

7.18 Afon Gwy

7.18.1 Spot sampled chemistry data





Determinand statistics

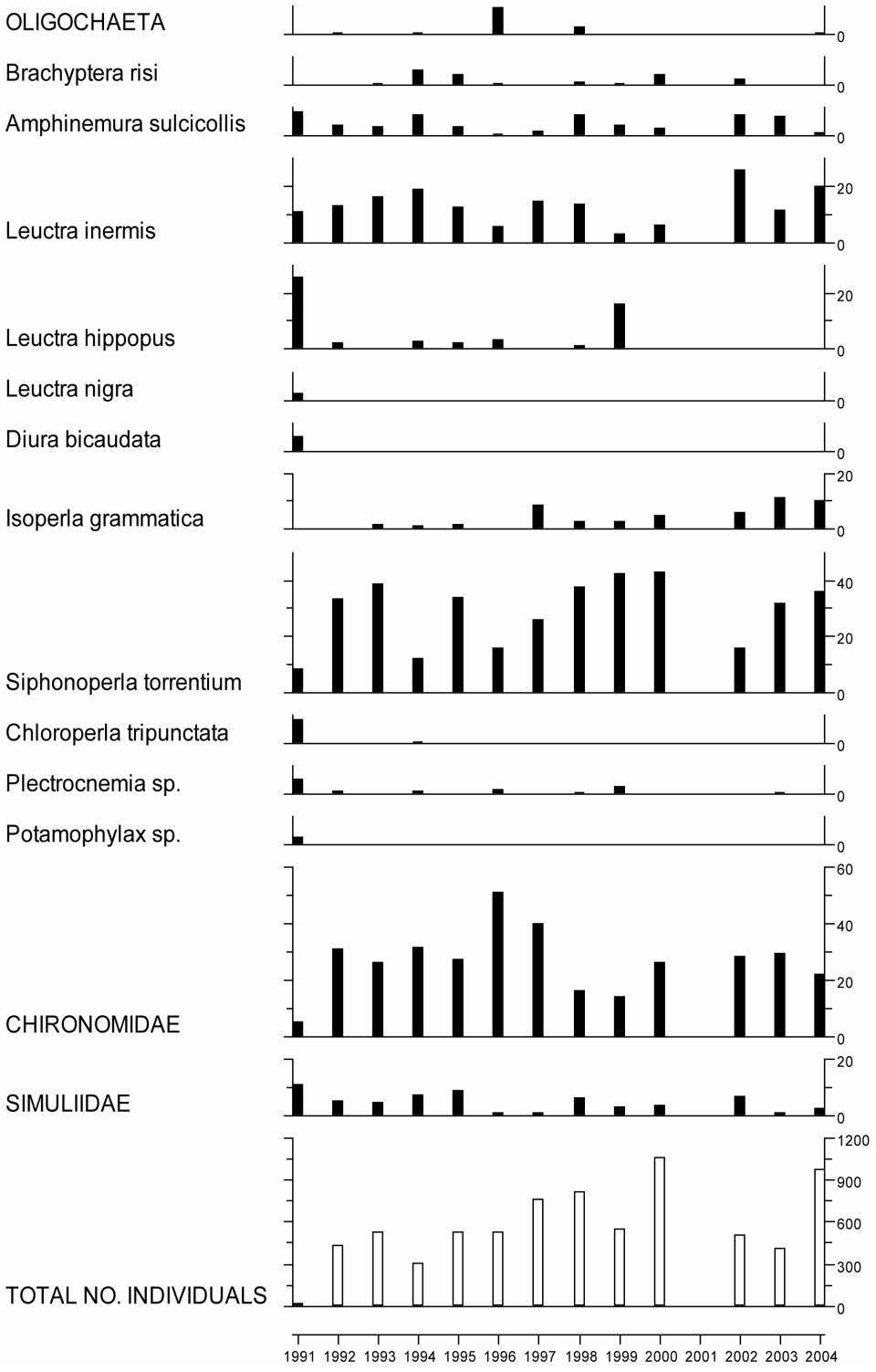
	mean 4/1991-3/1996	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1991-3/2005	p* 4/1991-3/2005
pH	5.51	5.84	0.35	**0.03**	**0.02**
ANC	14.00	17.45	14.36	0.71	0.11
Ca	40.57	37.46	5.89	-0.01	0.29
Mg	54.08	53.75	6.26	0.00	0.71
Na	147.5	138.4	15.38	0.00	0.68
K	3.24	2.34	1.40	0.00	0.13
Sol.Al	3.93	3.44	1.31	-1.00	0.40

	mean 4/1991-3/1996	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1991-3/2005	p* 4/1991-3/2005
Sol.lab.Al	1.98	1.24	0.81	**-1.46**	**0.05**
Cl	159.7	160.1	19.58	-0.02	0.54
SO_4	65.90	52.95	8.12	**-0.07**	**0.00**
XSO_4	49.13	36.14	7.09	**-0.07**	**0.00**
NO_3	8.87	6.29	4.93	0.00	0.41
Si	69.88	64.82	16.18	0.00	0.51
DOC	163.5	200.0	73.25	**0.05**	**0.02**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

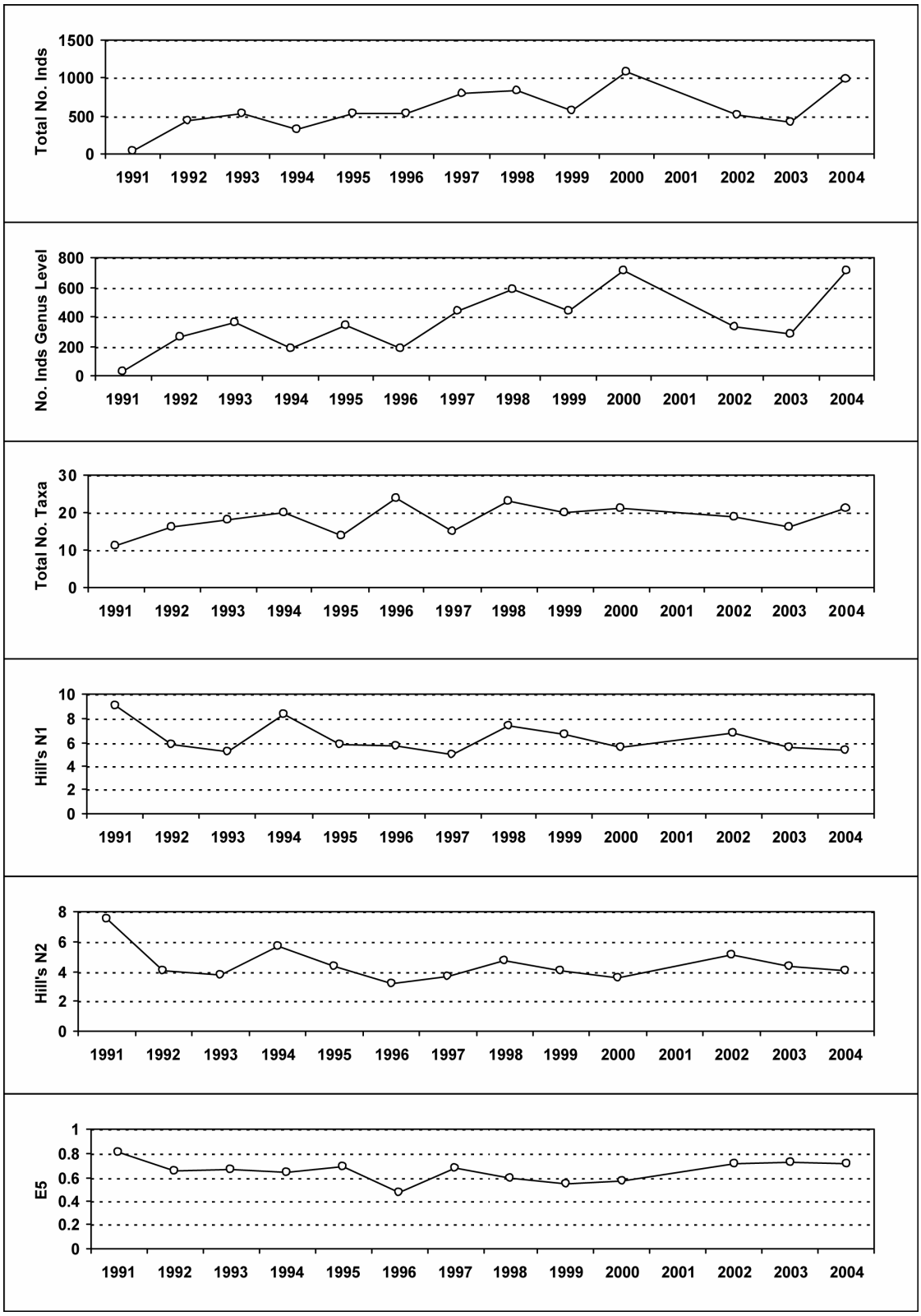
7.18.2 Macroinvertebrate data

7.18.2.1 Percentage abundance summary, Afon Gwy



No sampling in 2001 due to Foot and Mouth restrictions.

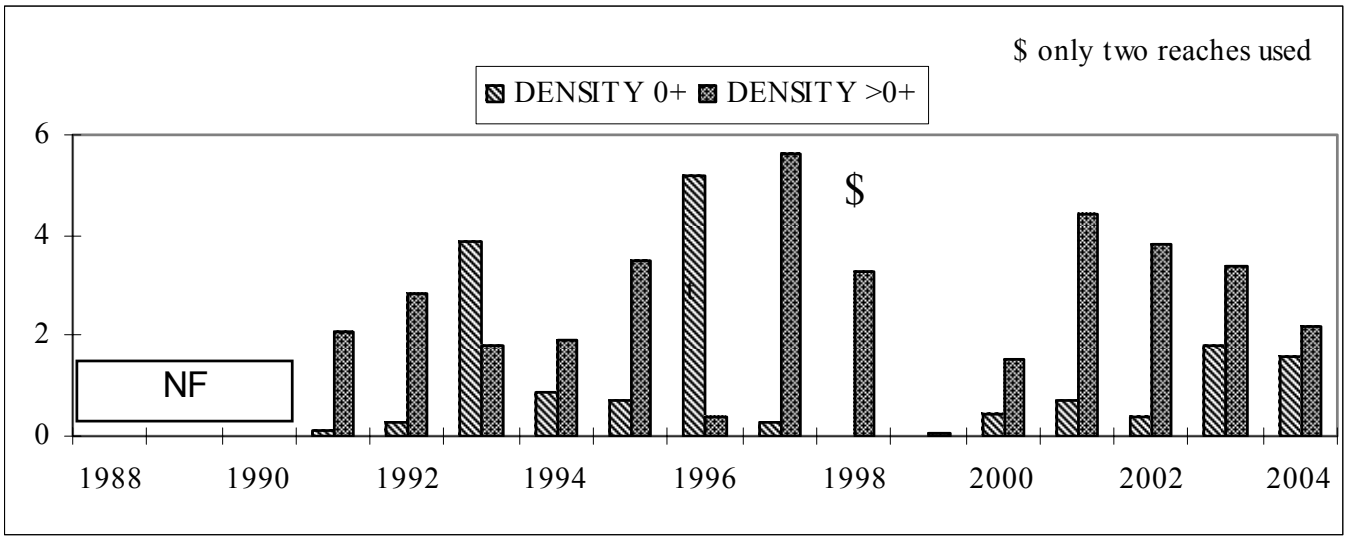
7.18.2.2 Summary statistics, Afon Gwy



No sampling in 2001 due to Foot and Mouth restrictions.

7.18.3 Fish data

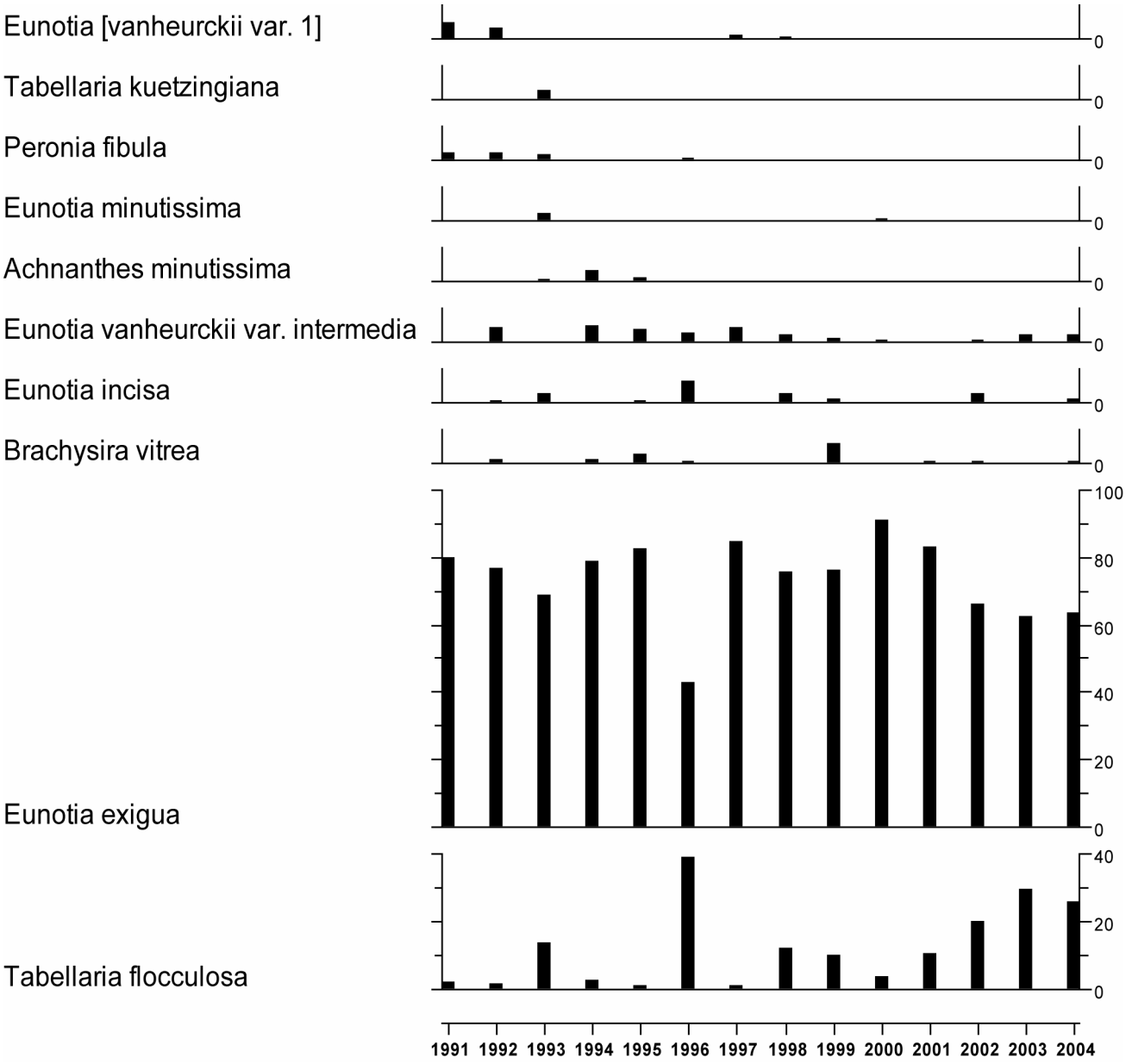
7.18.3.1 Summary of mean Trout density (numbers 100m^{-2}), Afon Gwy



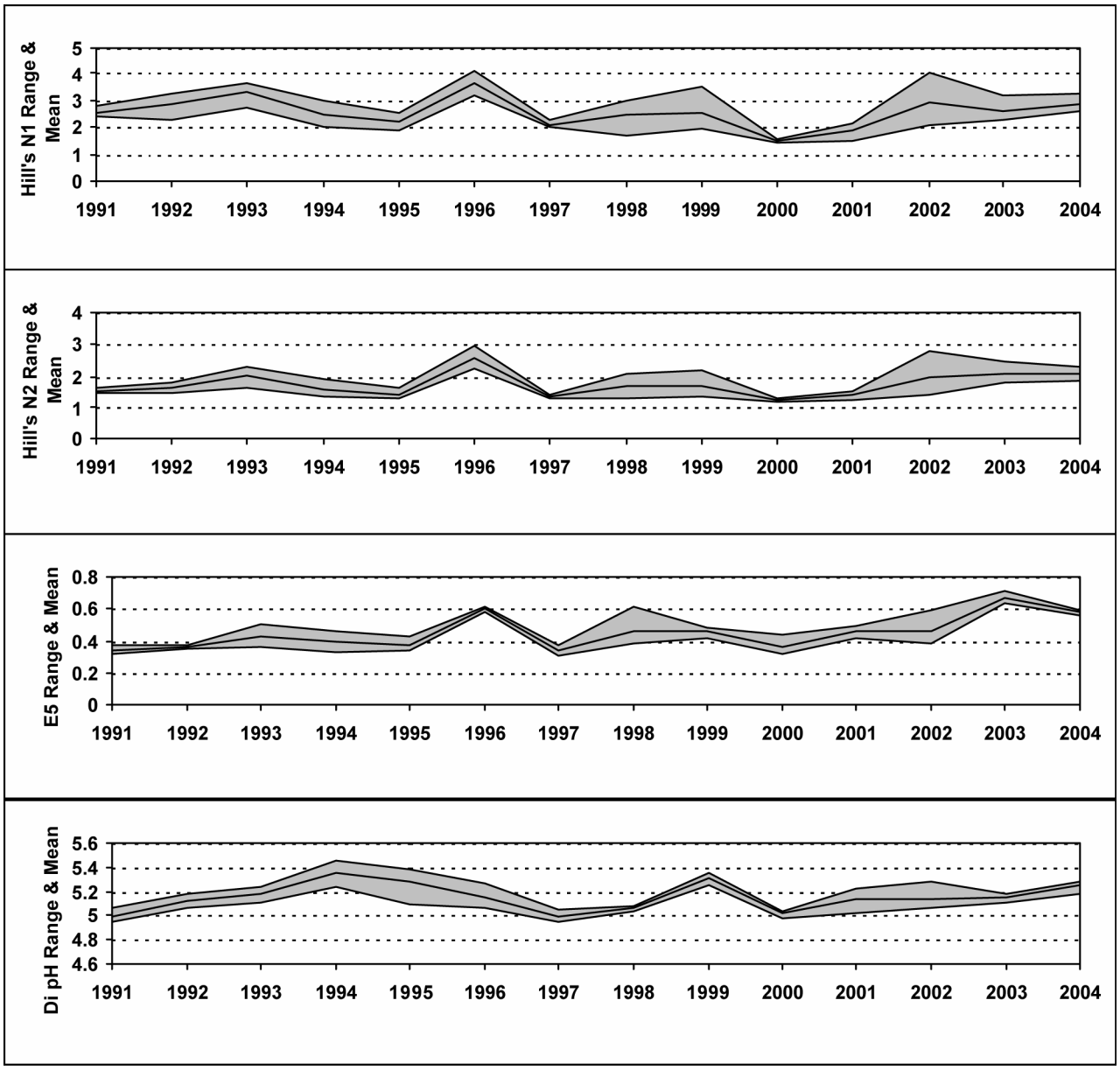
NF = Not fished

7.18.4 Epilithic diatom data

7.18.4.1 Percentage abundance summary, Afon Gwy

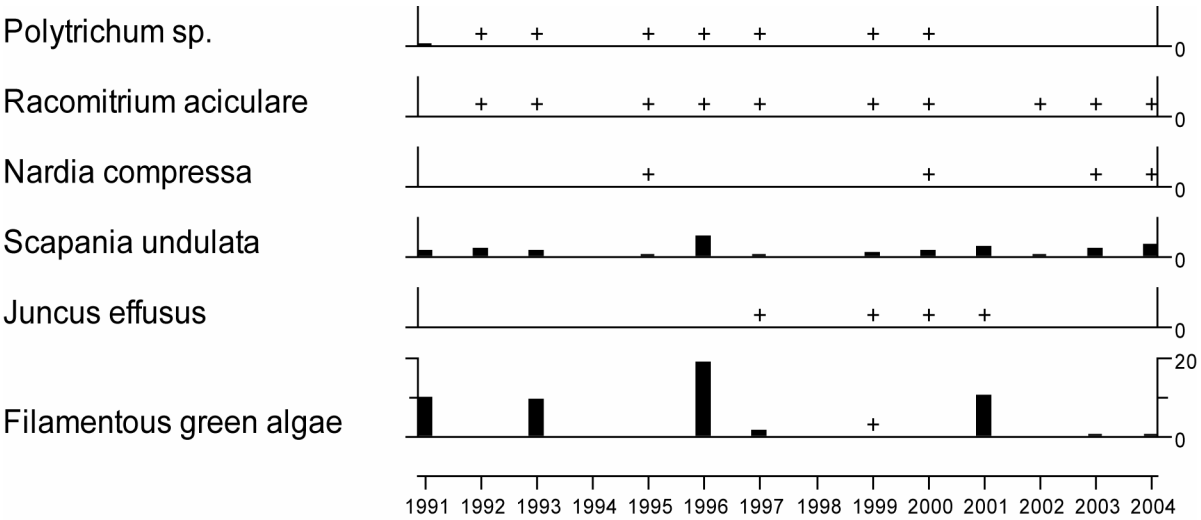


7.18.4.2 Summary statistics, Afon Gwy



7.18.5 Aquatic macrophyte data, Afon Gwy

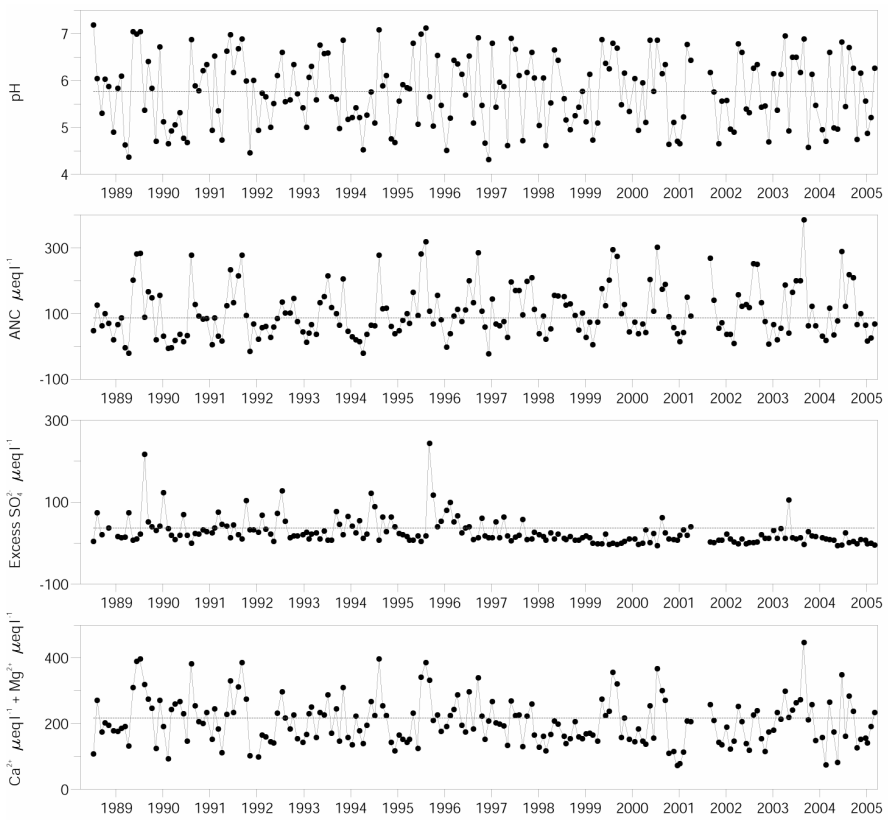
Percentage Species Cover

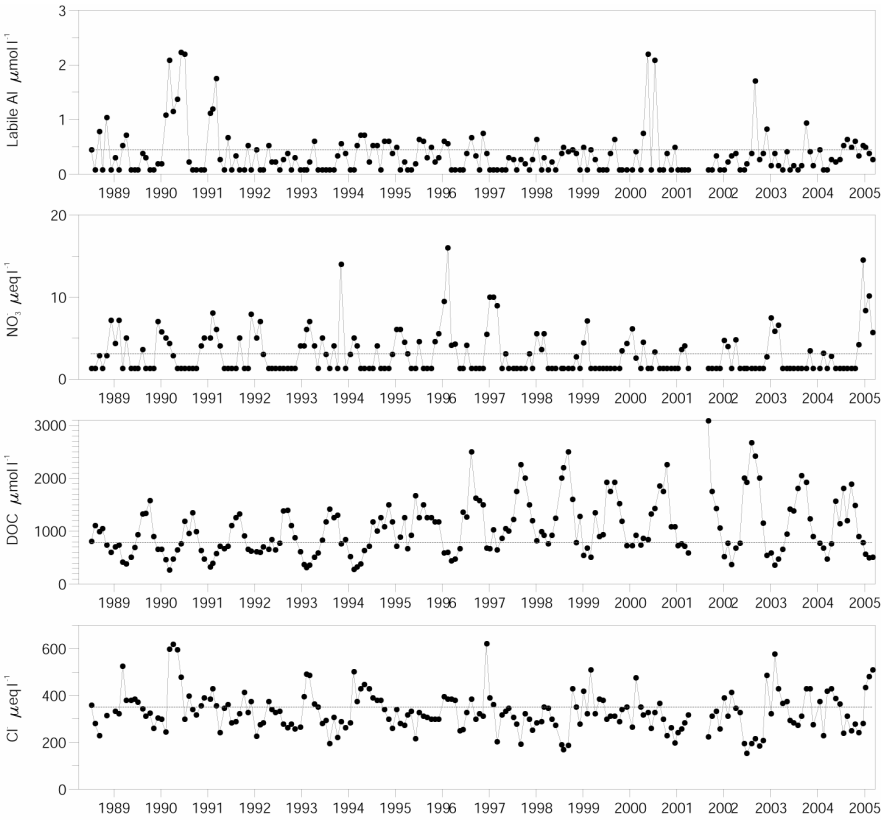


\+ Represents <0.25% abundance

7.19 Beaghs Burn

7.19.1 Spot sampled chemistry data





Determinand statistics

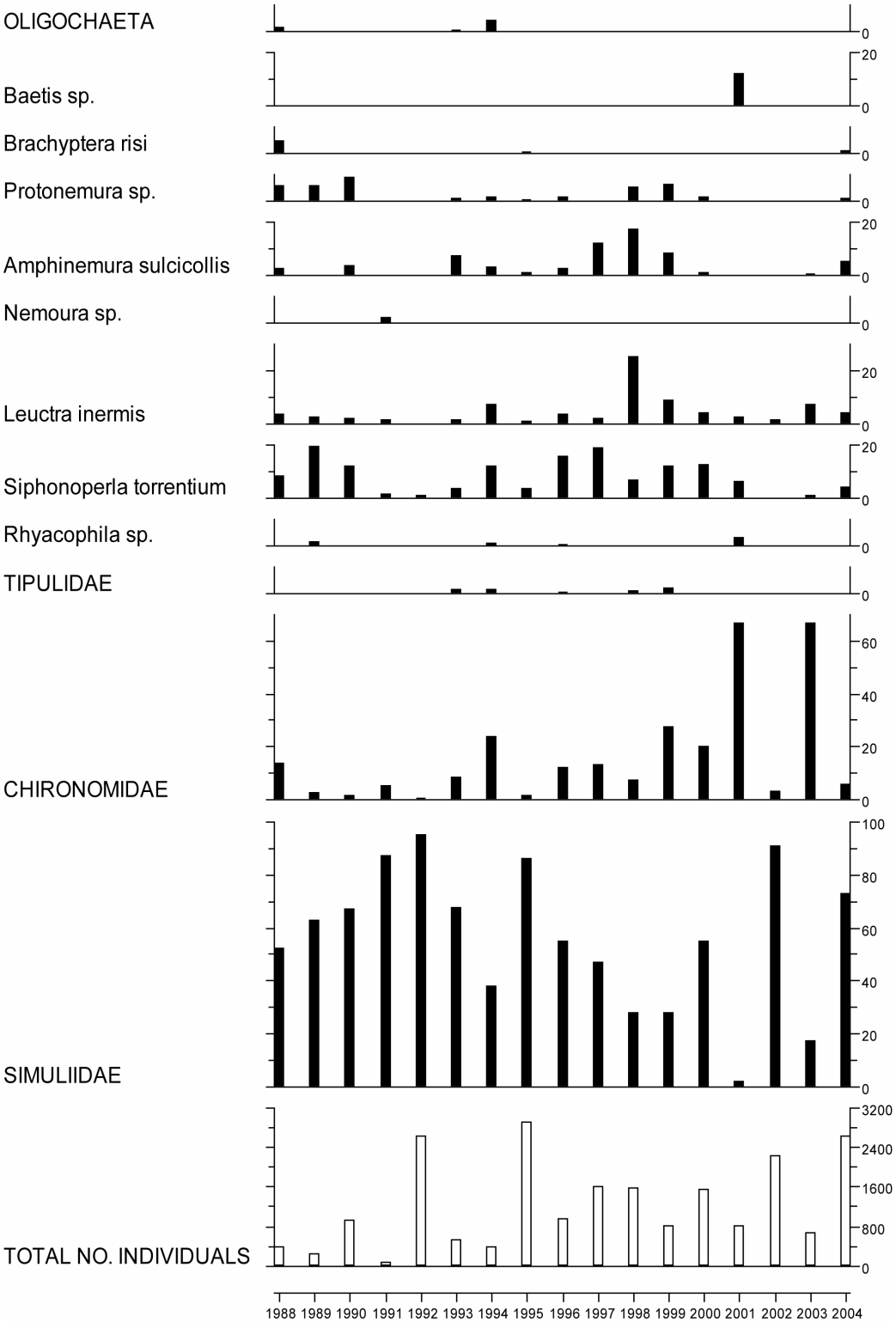
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.76	5.66	0.74	0.00	0.79
ANC	86.98	106.9	86.51	1.87	0.08
Ca	103.2	91.54	44.47	-0.02	0.29
Mg	113.9	98.26	30.79	-0.01	0.15
Na	306.7	260.9	62.04	-0.06	0.07
K	11.31	10.30	3.89	0.00	0.75
Sol.Al	2.14	1.60	0.54	**-1.00**	**0.05**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	0.44	0.41	0.14	0.00	0.79
Cl	350.5	348.8	97.00	-0.07	0.19
SO_4	73.68	39.06	9.02	**-0.10**	**0.00**
XSO_4	37.39	2.43	8.73	**-0.08**	**0.00**
NO_3	3.11	4.44	4.40	0.00	0.15
Si	68.92	64.88	33.36	0.00	0.56
DOC	783.8	1088.2	502.1	**0.37**	**0.00**

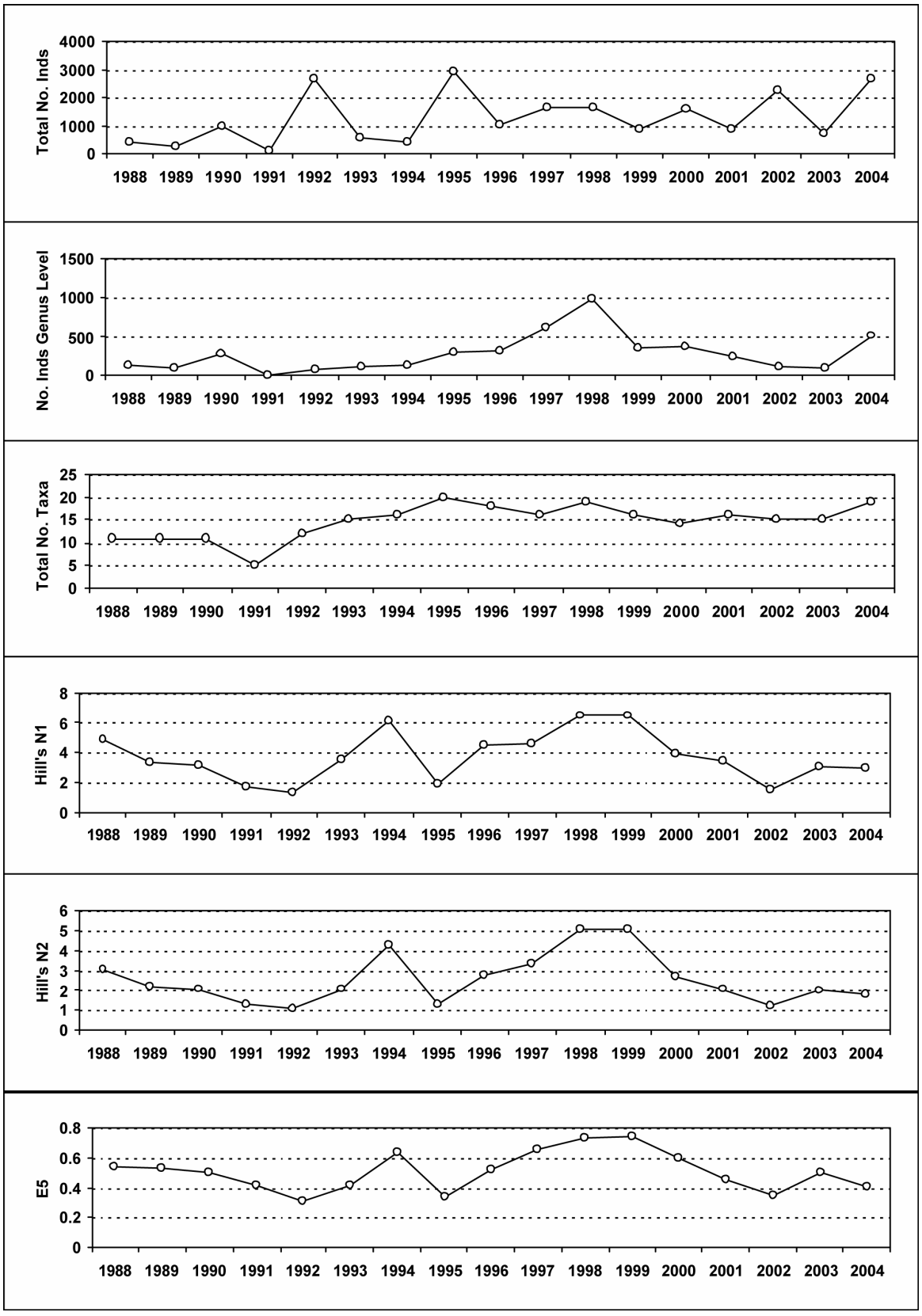
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.19.2 Macroinvertebrate data

7.19.2.1 Percentage abundance summary, Beaghs Burn

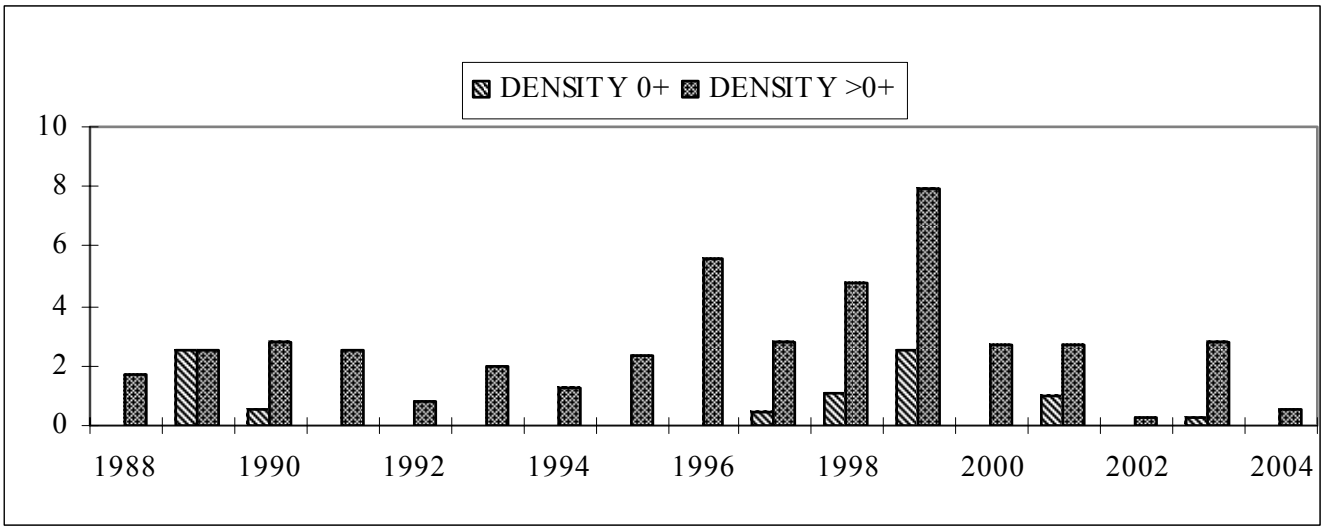


7.19.2.2 Summary statistics, Beaghs Burn



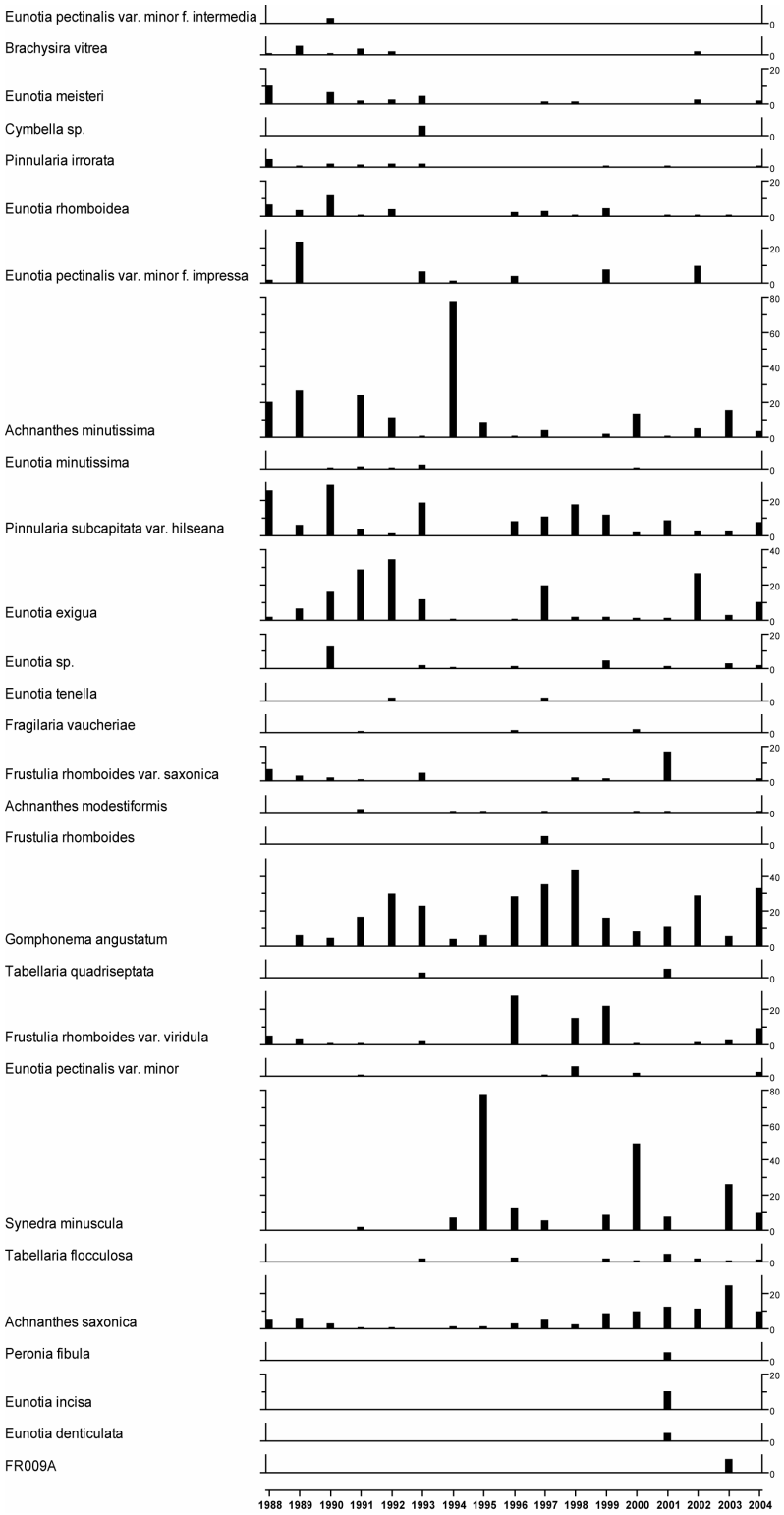
7.19.3 Fish data

7.19.3.1 Summary of mean Trout density (numbers 100m^{-2}), Beaghs Burn

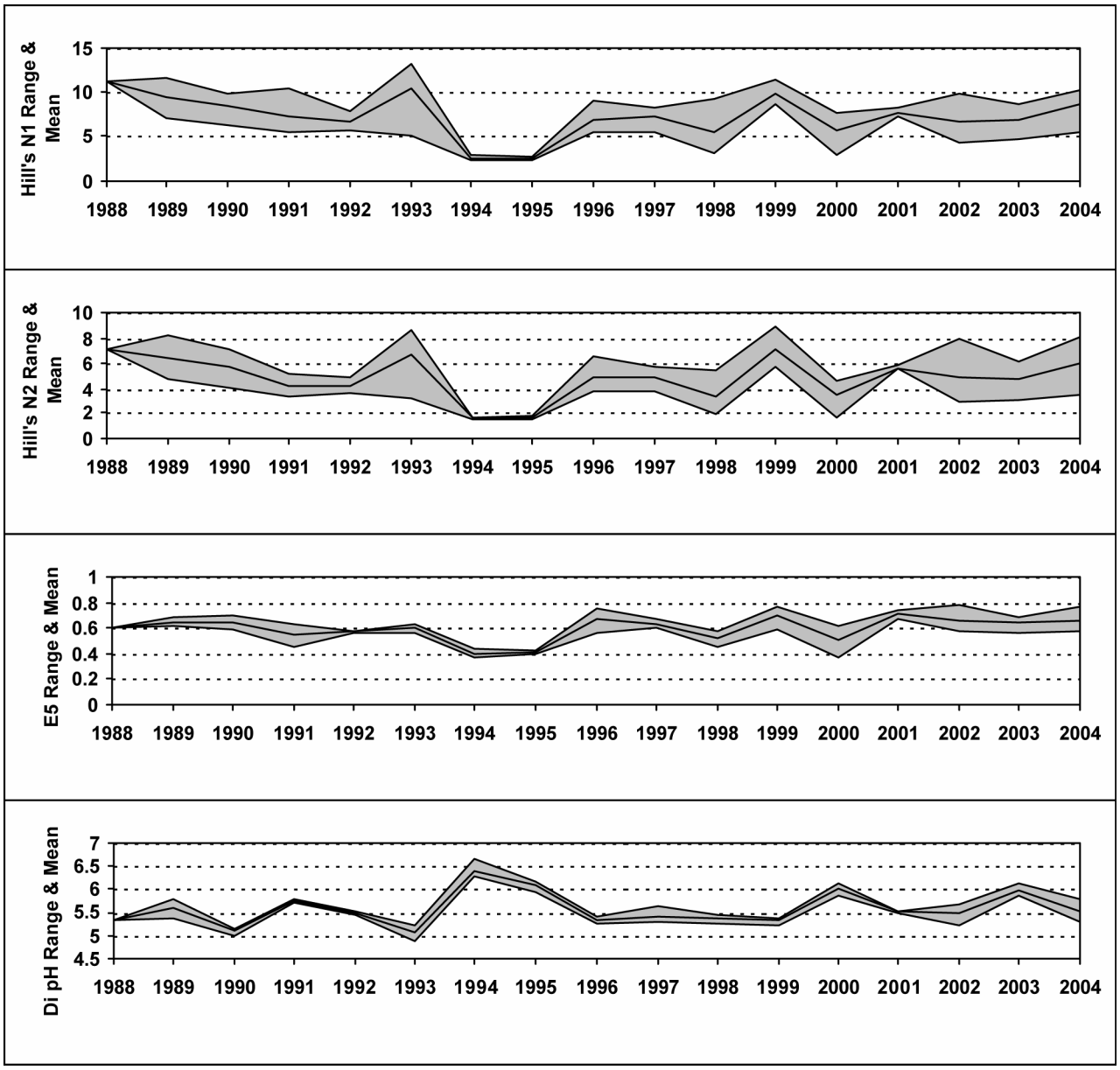


7.19.4 Epilithic diatom data

7.19.4.1 Percentage abundance summary, Beaghs Burn

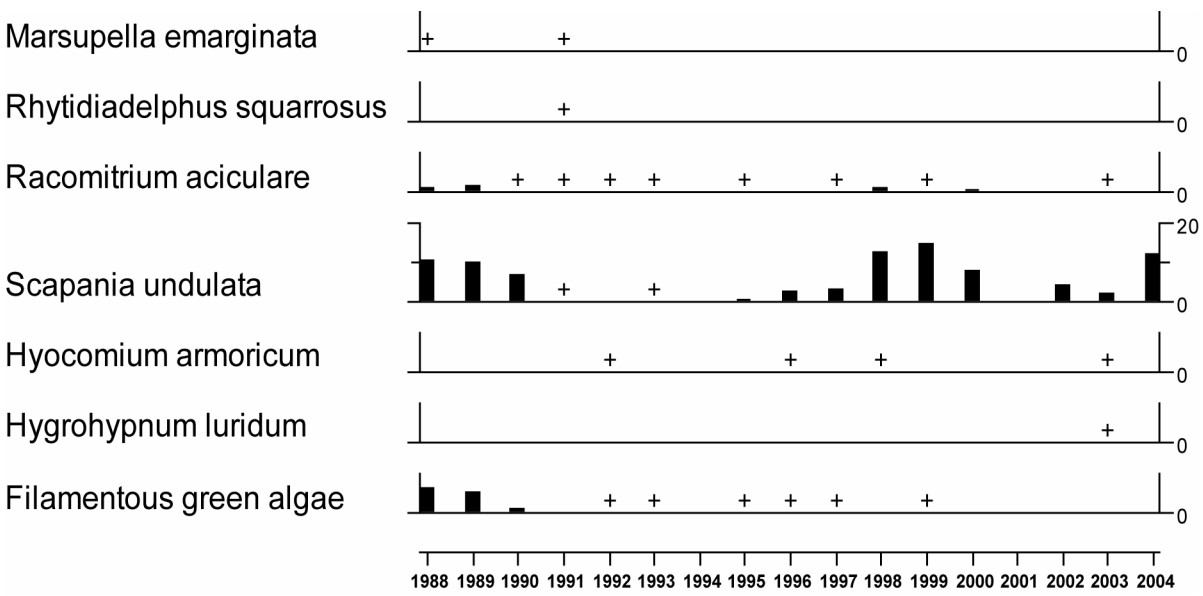


7.19.4.2 Summary statistics, Beaghs Burn



7.19.5 Aquatic macrophyte data, Beaghs Burn

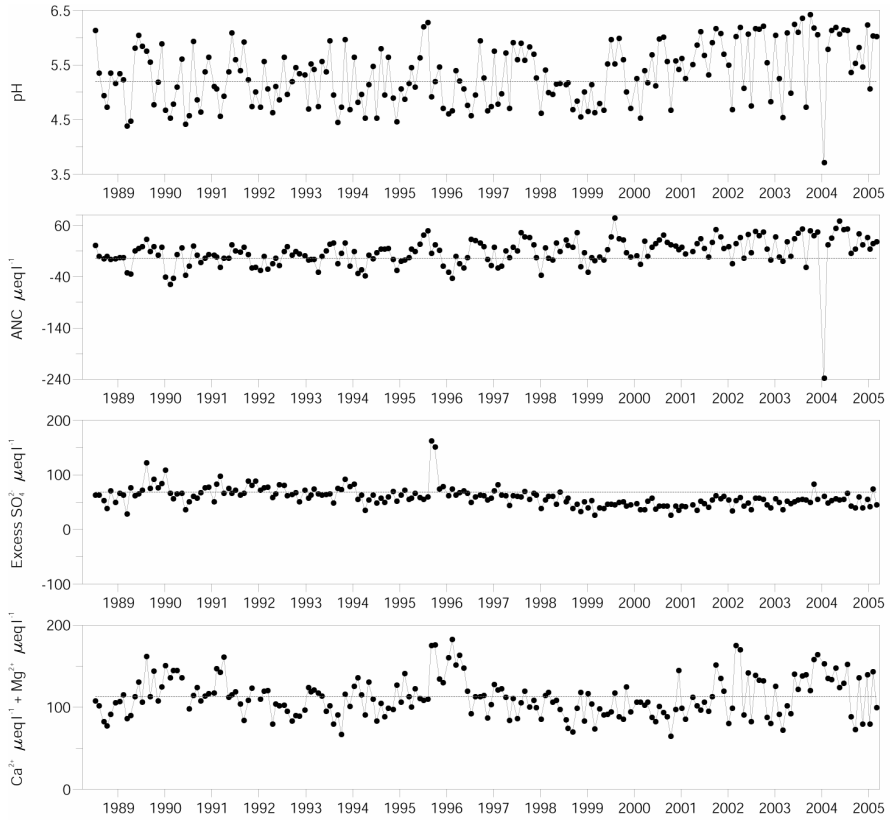
Percentage Species Cover

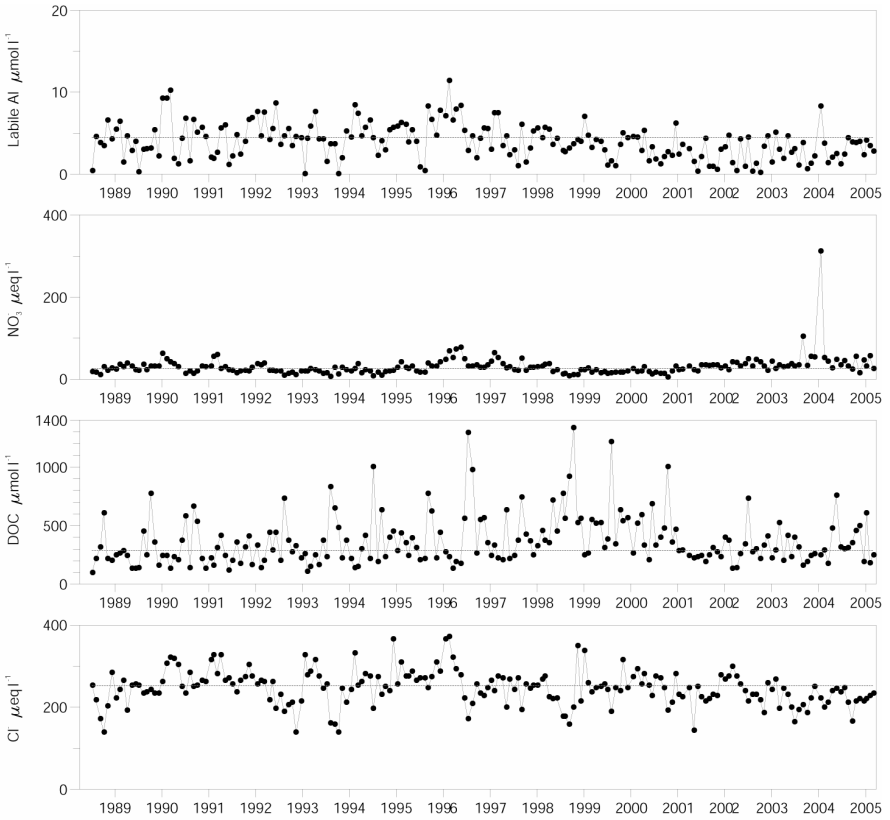


+ Represents <0.25% abundance

7.20 Bencrom River

7.20.1 Spot sampled chemistry data





Determinand statistics

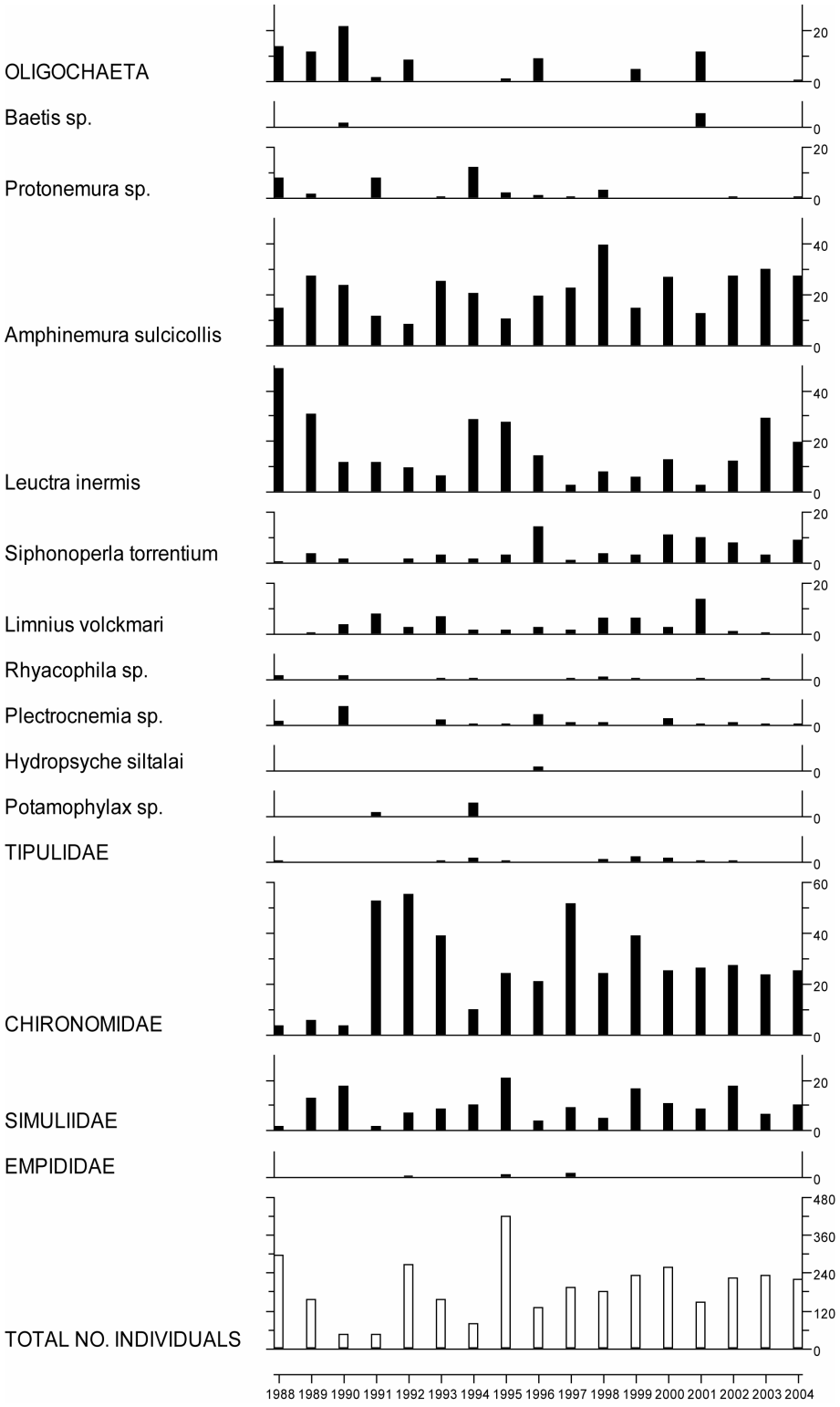
	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
pH	5.20	5.83	0.39	**0.04**	**0.01**
ANC	-3.90	34.25	19.64	**2.51**	**0.00**
Ca	52.21	61.42	22.24	0.00	0.80
Mg	62.05	54.03	7.99	-0.01	0.06
Na	259.7	223.6	27.71	**-0.05**	**0.04**
K	11.66	12.07	2.23	0.00	0.28
Sol.Al	7.40	4.97	2.13	**-6.12**	**0.01**

	mean 4/1988-3/1993	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1988-3/2005	p* 4/1988-3/2005
Sol.lab.Al	4.43	3.10	0.99	**-4.00**	**0.01**
Cl	252.3	223.0	21.85	**-0.08**	**0.05**
SO_4	94.96	75.35	12.37	**-0.09**	**0.00**
XSO_4	68.45	51.93	11.04	**-0.07**	**0.00**
NO_3	26.86	36.73	12.98	0.00	0.45
Si	214.7	211.0	45.34	0.00	0.75
DOC	287.7	391.7	173.4	0.06	0.09

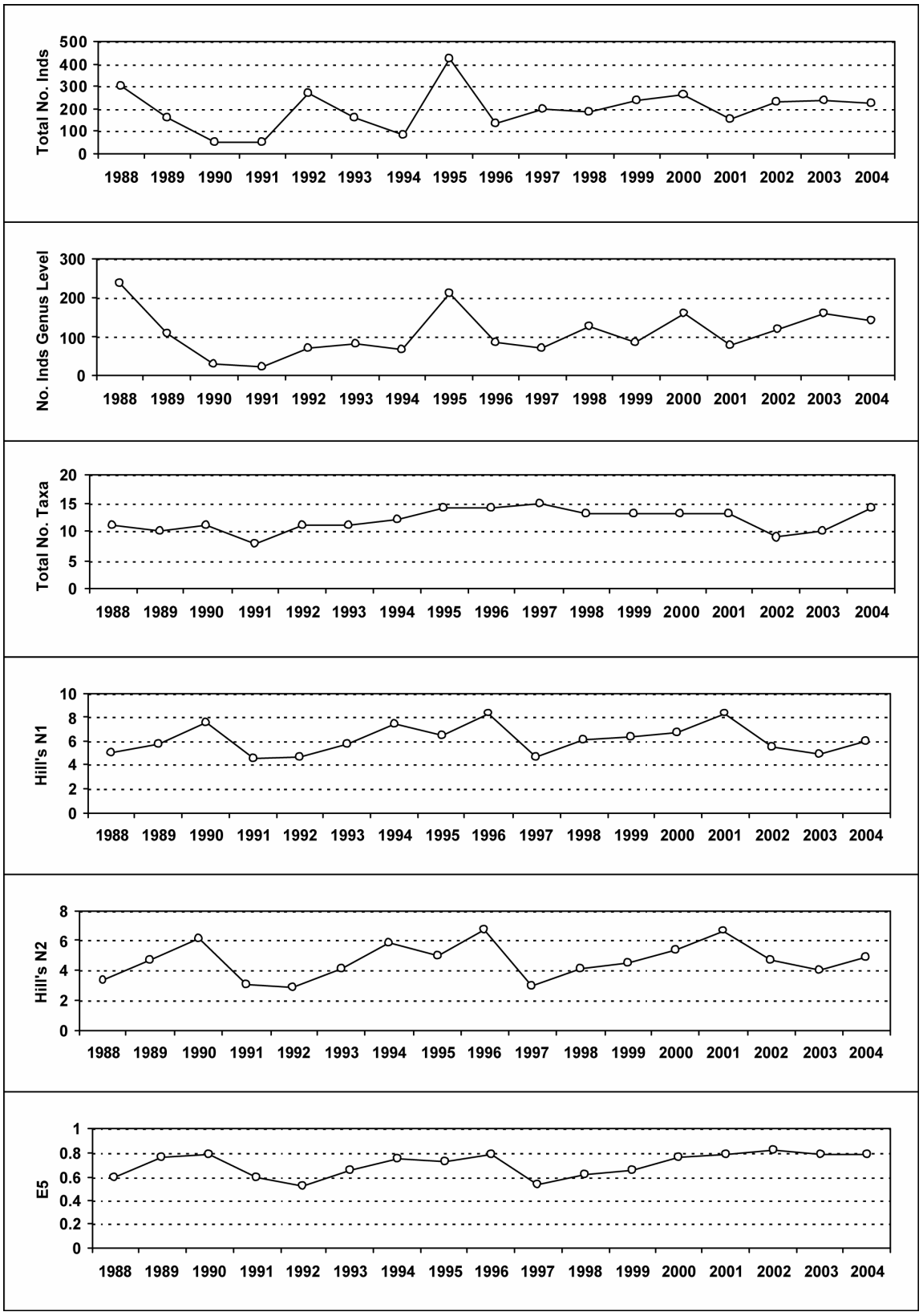
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.20.2 Macroinvertebrate data

7.20.2.1 Percentage abundance summary, Bencrom River

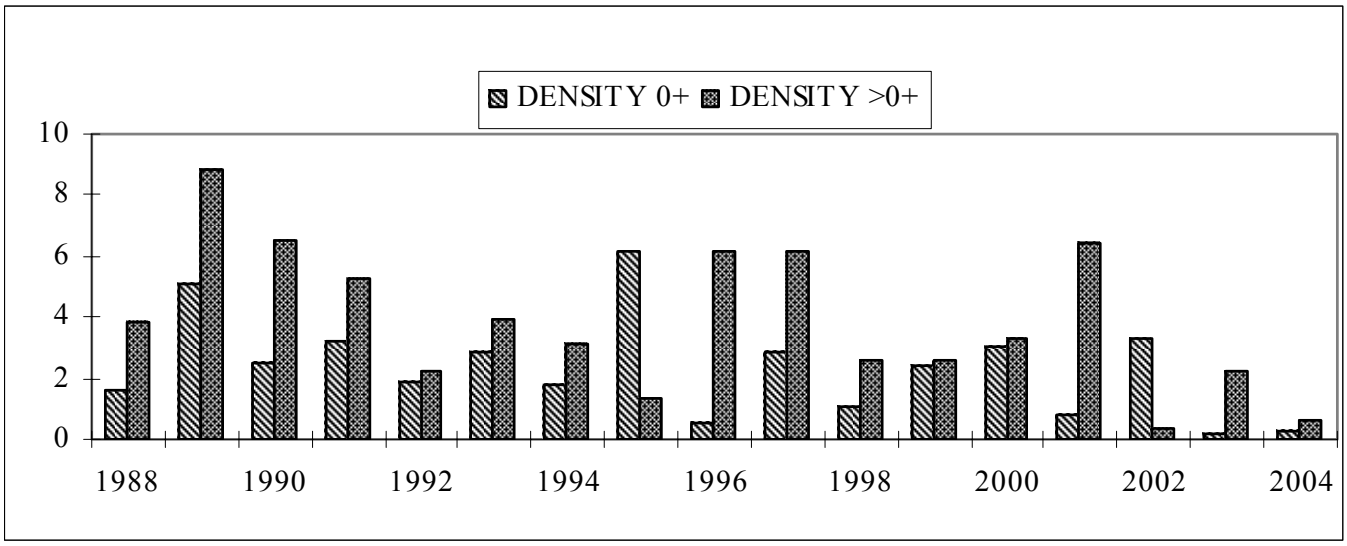


7.20.2.2 Summary statistics, Bencrom River



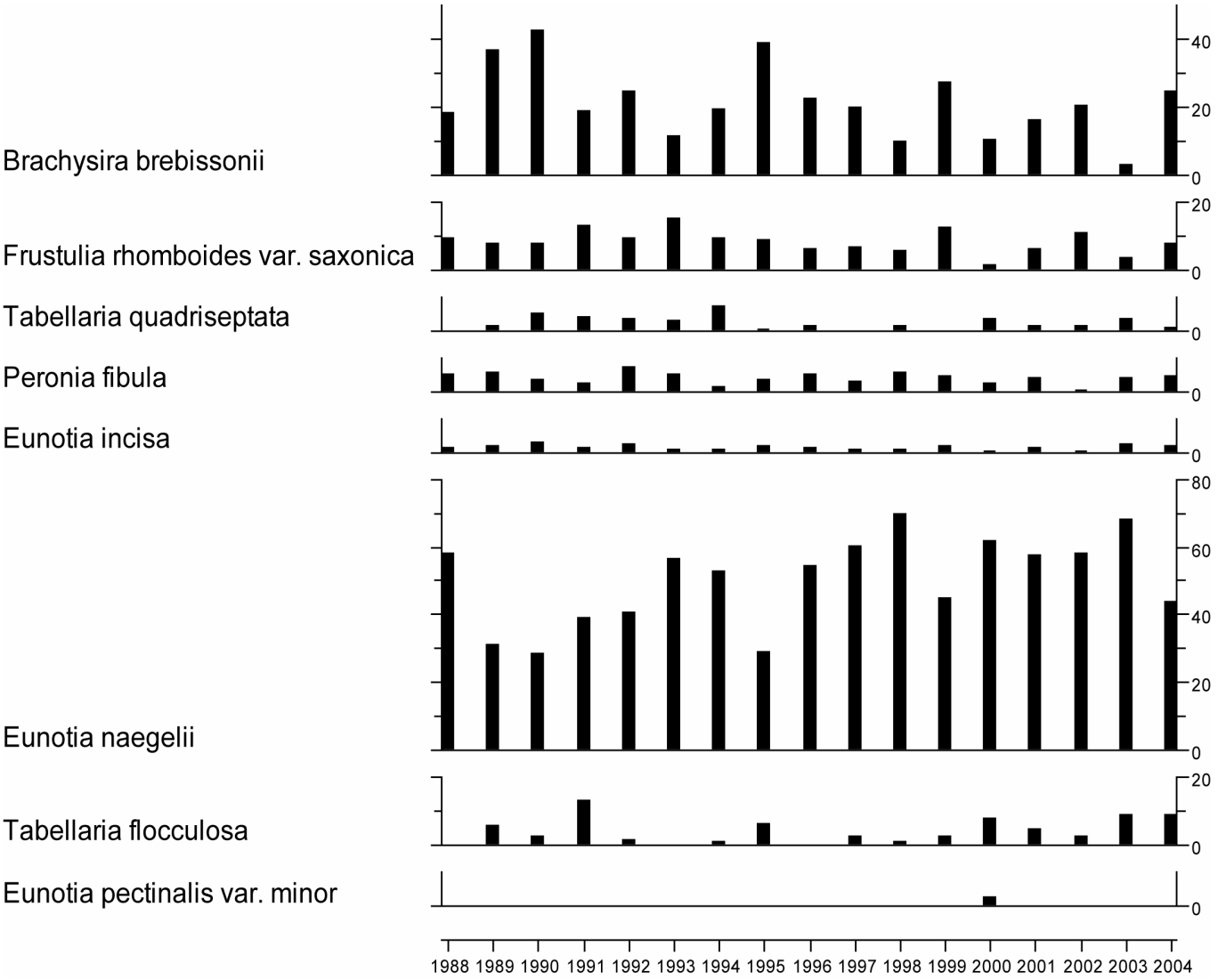
7.20.3 Fish data

7.20.3.1 Summary of mean Trout density (numbers 100m^{-2}), Bencrom River

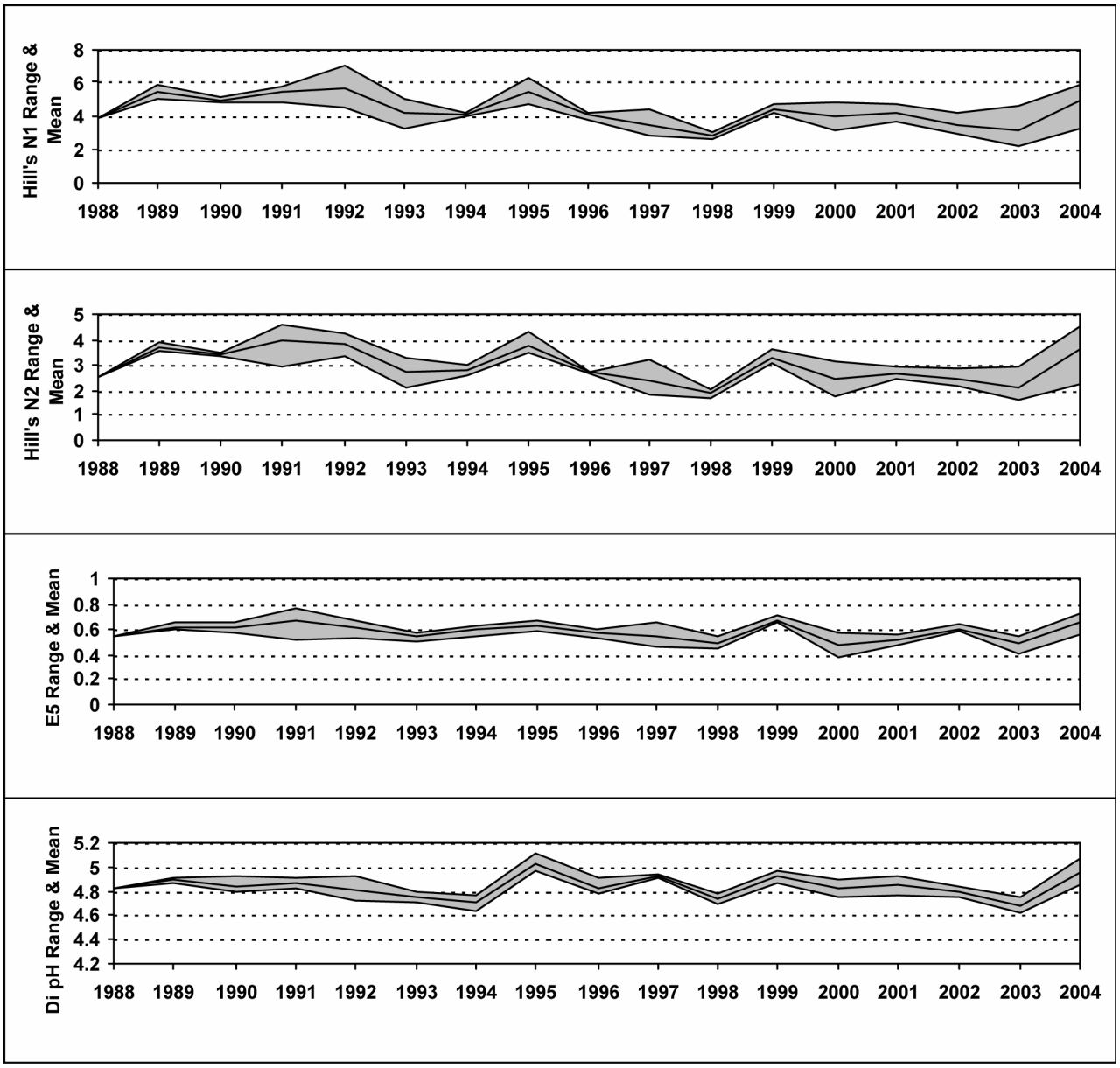


7.20.4 Epilithic diatom data

7.20.4.1 Percentage abundance summary, Bencrom River

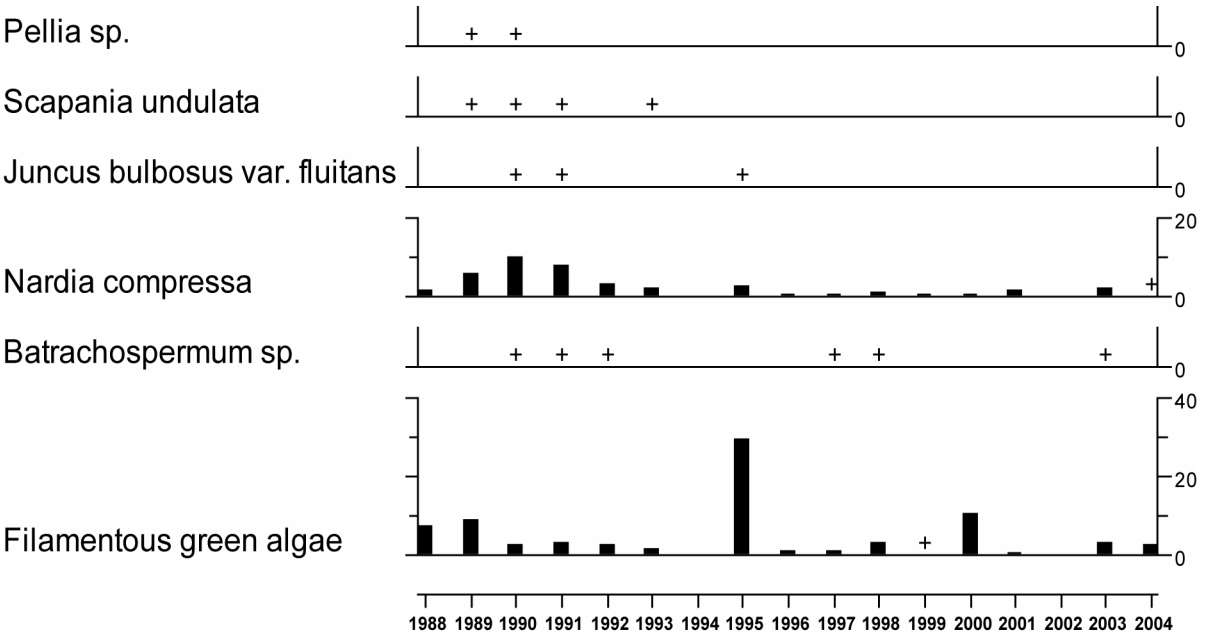


7.20.4.2 Summary statistics, Bencrom River



7.20.5 Aquatic macrophyte data, Bencrom River

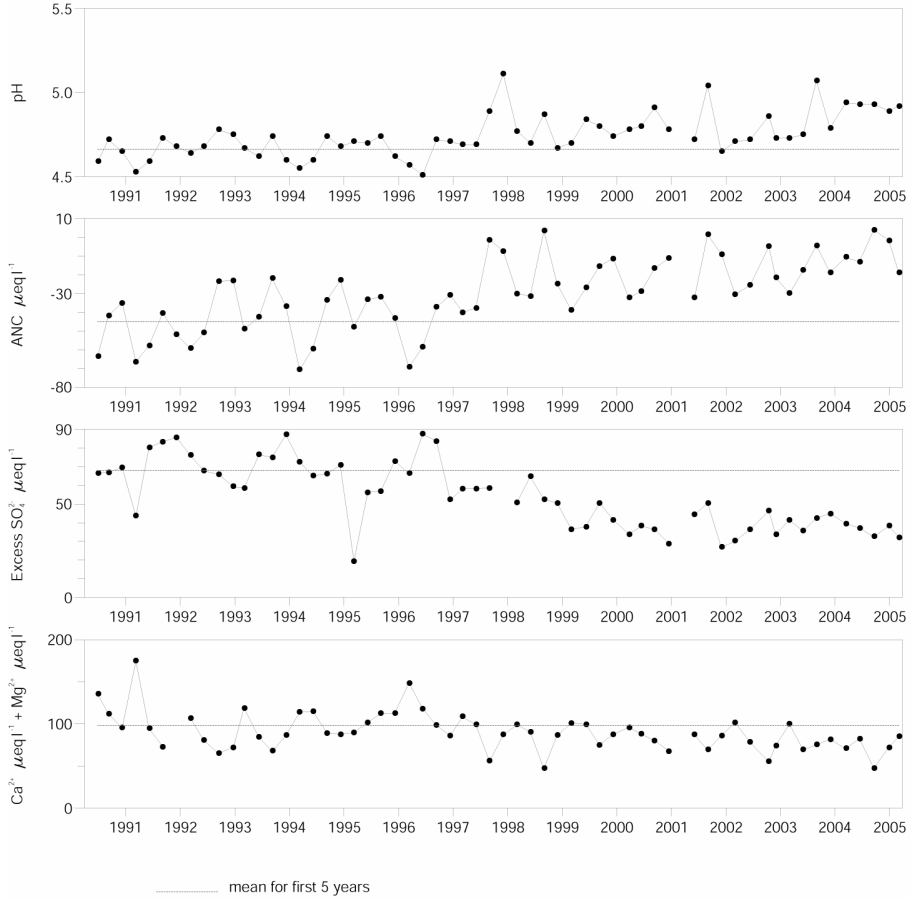
Percentage Species Cover

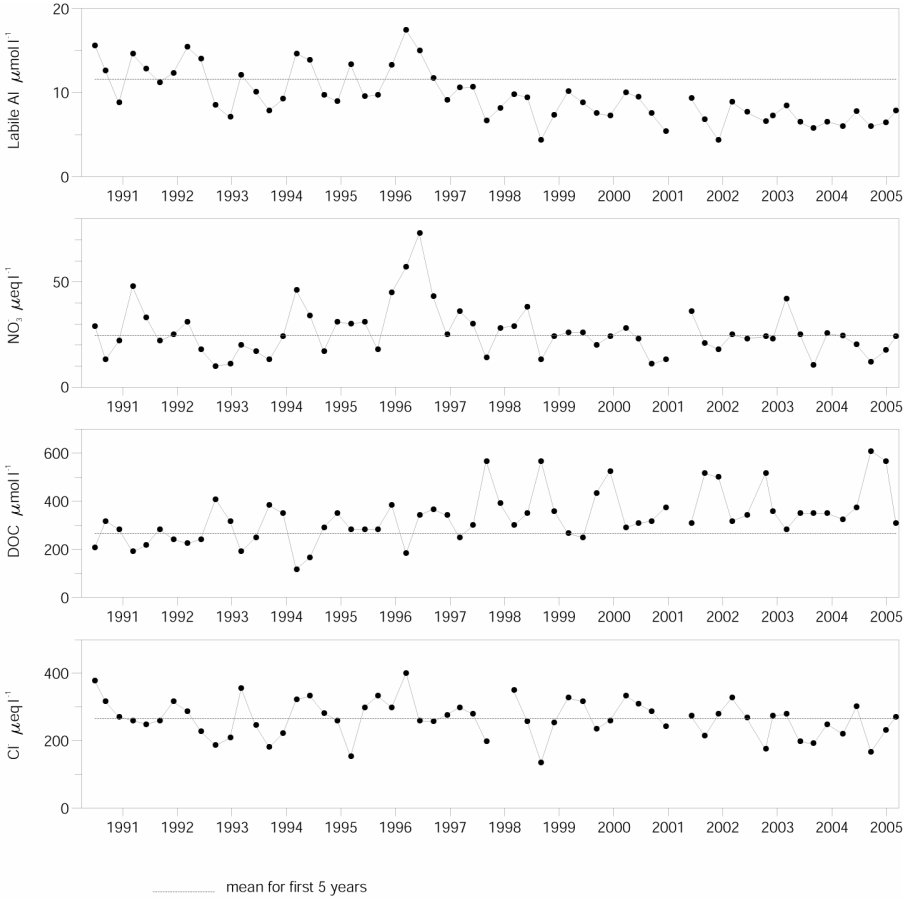


\+ Represents <0.25% abundance
No survey undertaken in 2002 due to spate conditions.

7.21 Blue Lough

7.21.1 Spot sampled chemistry data





Determinand statistics

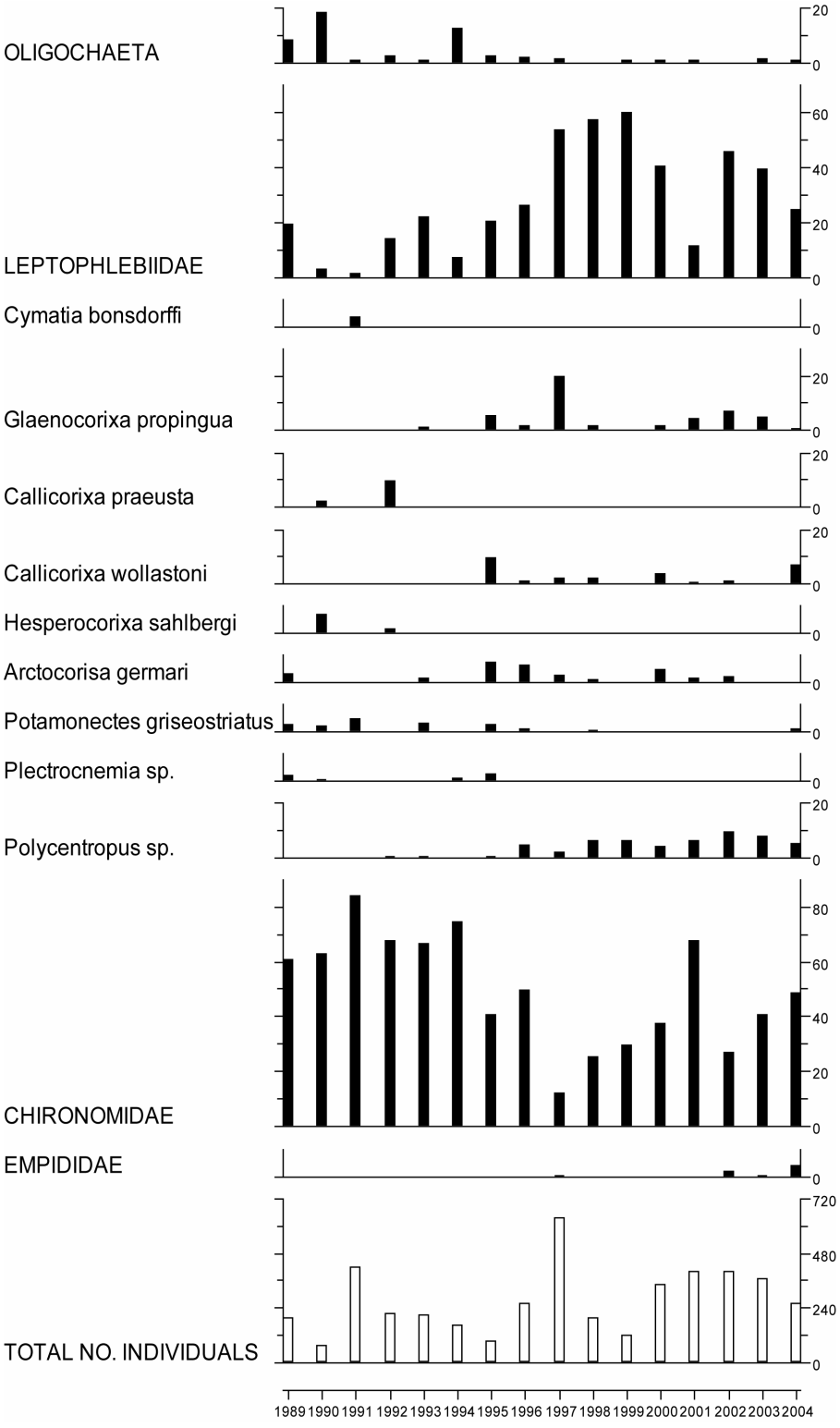
	mean 4/1990-3/1995	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1990-3/2005	p* 4/1990-3/2005
pH	4.66	4.92	0.02	**0.02**	**0.00**
ANC	-44.87	-7.38	10.36	**3.04**	**0.00**
Ca	40.74	27.25	6.33	**-0.02**	**0.00**
Mg	57.42	44.38	11.04	**-0.01**	**0.02**
Na	245.0	205.4	32.99	-0.08	0.06
K	11.38	8.97	1.59	0.00	0.46
Sol.Al	14.13	9.65	0.24	**-11.36**	**0.00**

	mean 4/1990-3/1995	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1990-3/2005	p* 4/1990-3/2005
Sol.lab.Al	11.63	6.99	0.93	**-11.39**	**0.00**
Cl	265.2	242.3	58.32	-0.10	0.18
SO_4	95.62	60.42	7.80	**-0.16**	**0.00**
XSO_4	67.77	34.98	3.16	**-0.15**	**0.00**
NO_3	24.69	18.48	5.04	0.00	0.27
Si	71.25	74.46	33.41	0.00	0.45
DOC	265.8	464.6	145.5	**0.13**	**0.00**

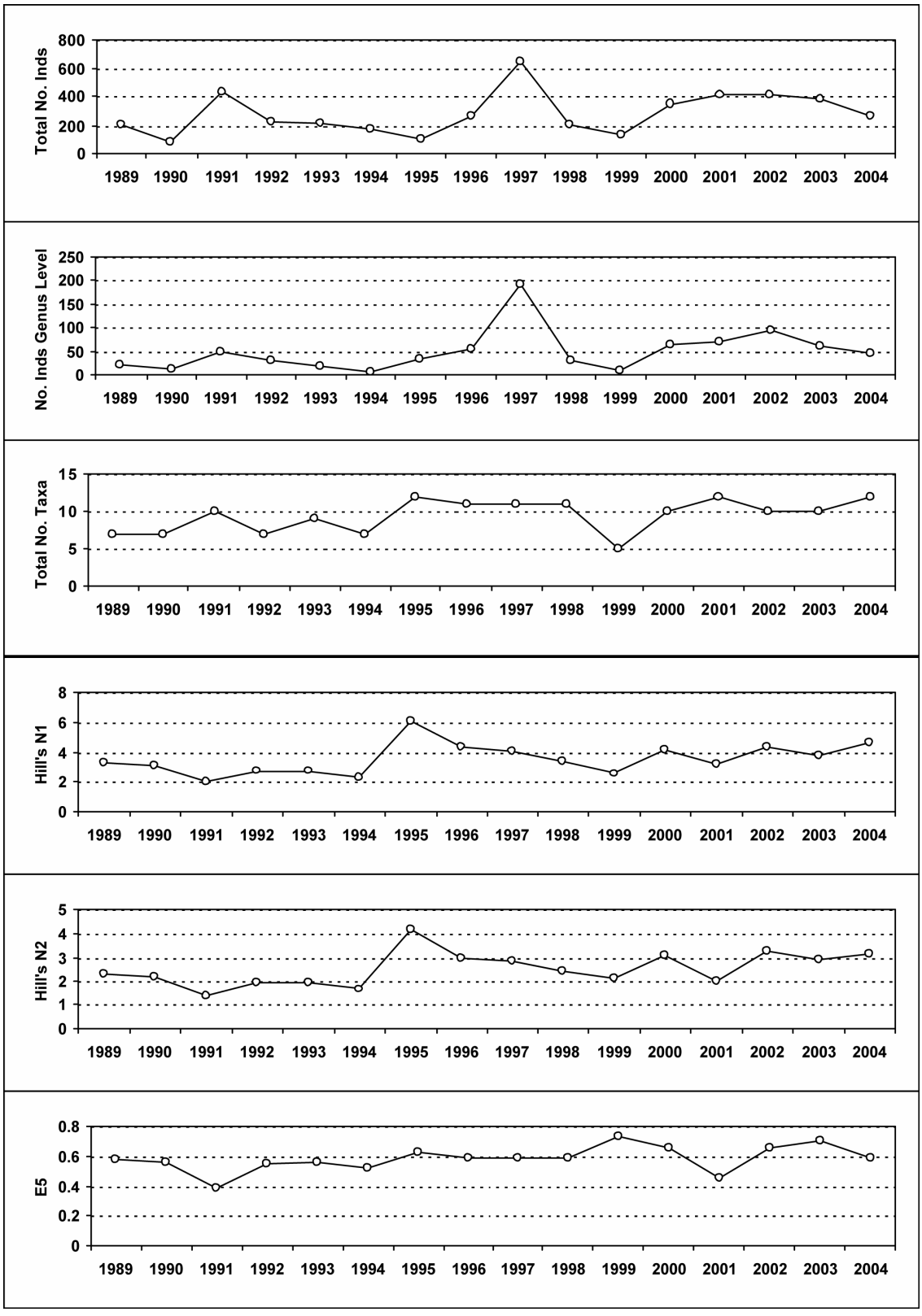
* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.21.2 Macroinvertebrate data

7.21.2.1 Percentage abundance summary, Blue Lough

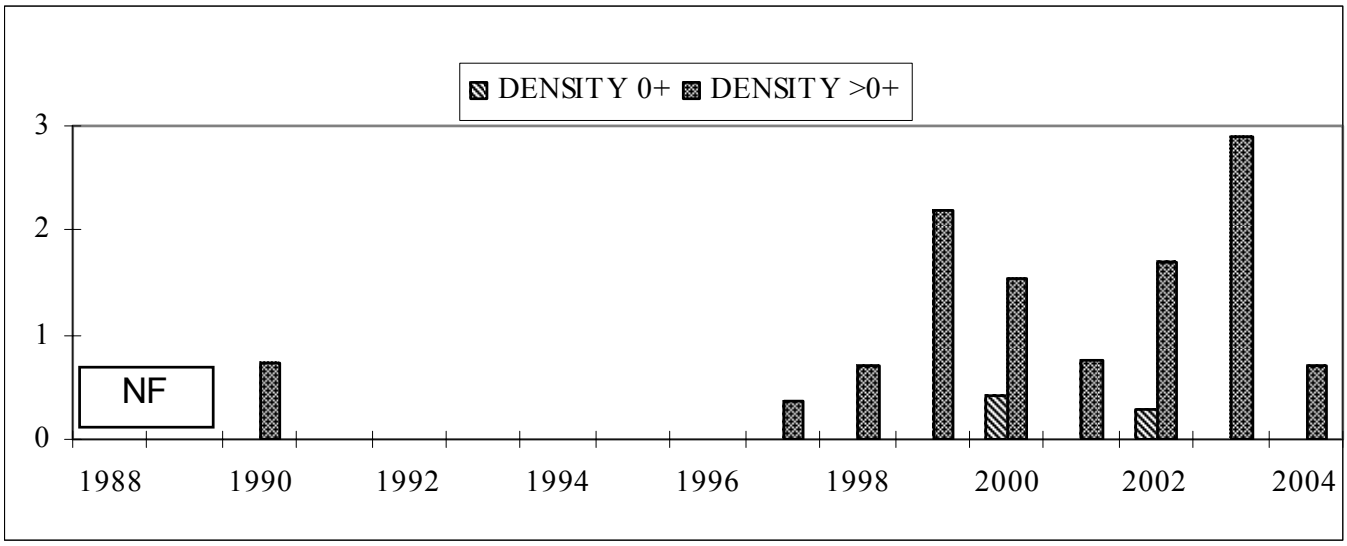


7.21.2.2 Summary statistics, Blue Lough



7.21.3 Fish data (for outflow stream)

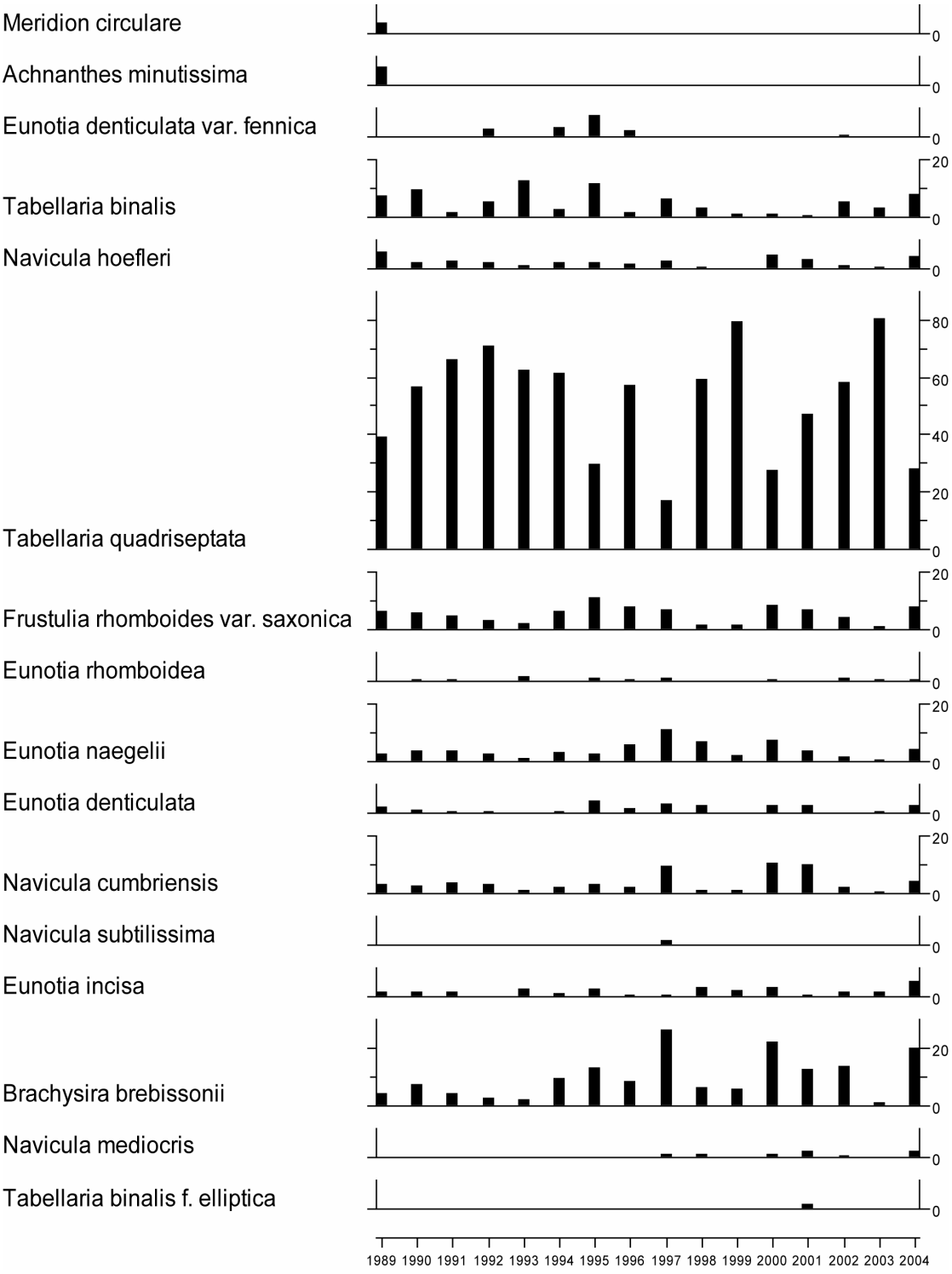
7.21.3.1 Summary of mean Trout density (numbers 100m^{-2}), Blue Lough



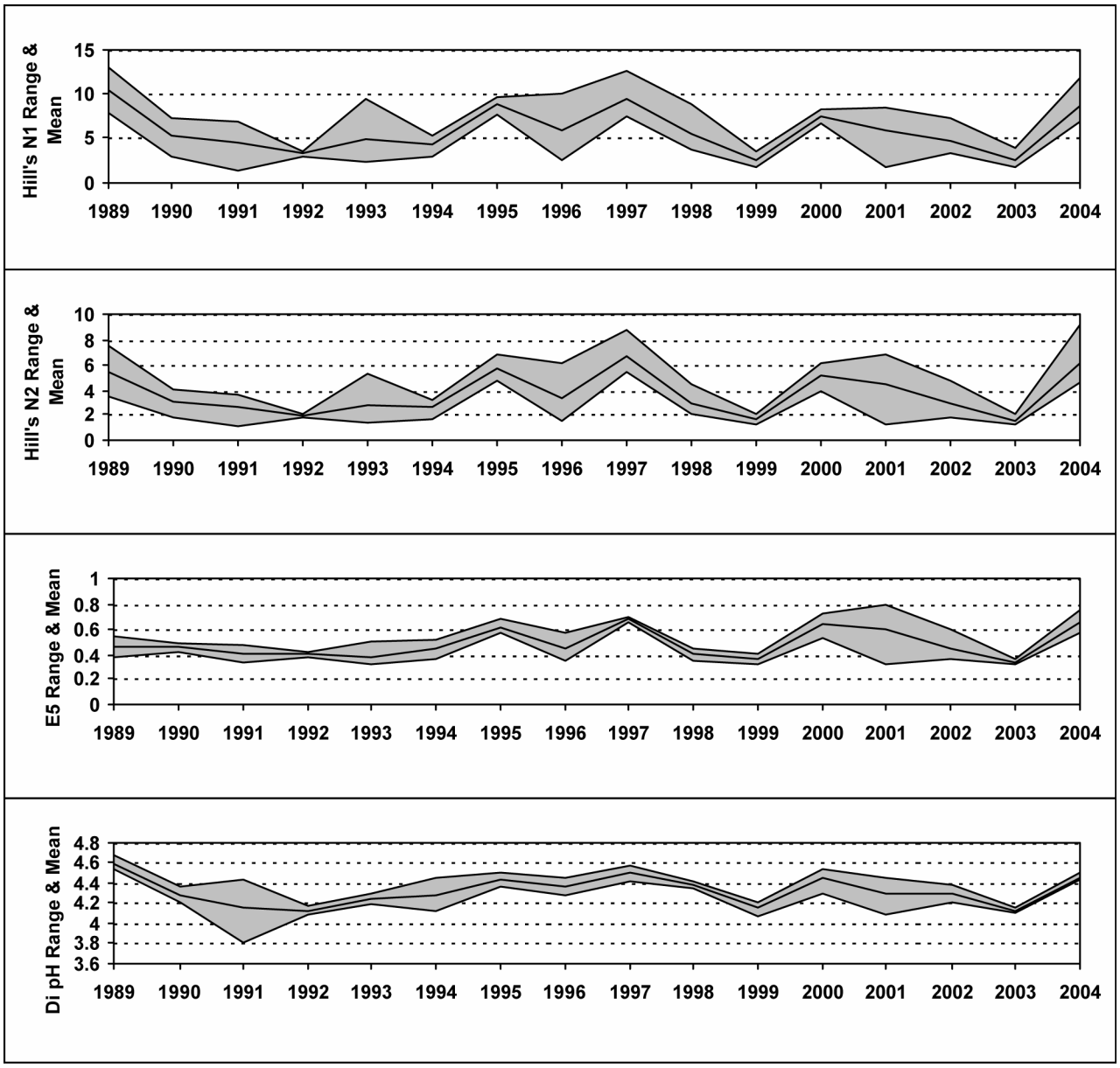
NF = Not fished

7.21.4 Epilithic diatom data

7.21.4.1 Percentage abundance summary, Blue Lough

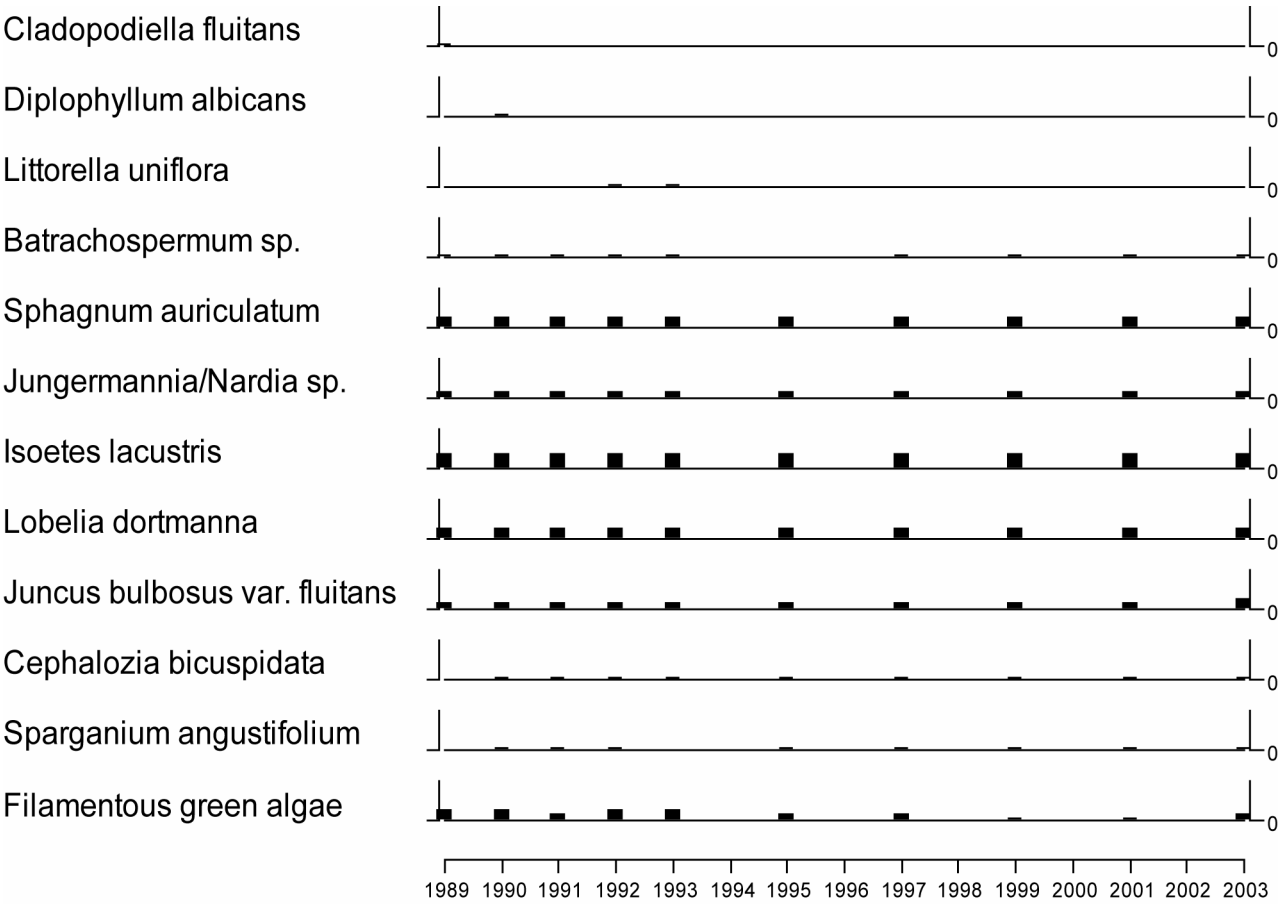


7.21.4.2 Summary statistics, Blue Lough



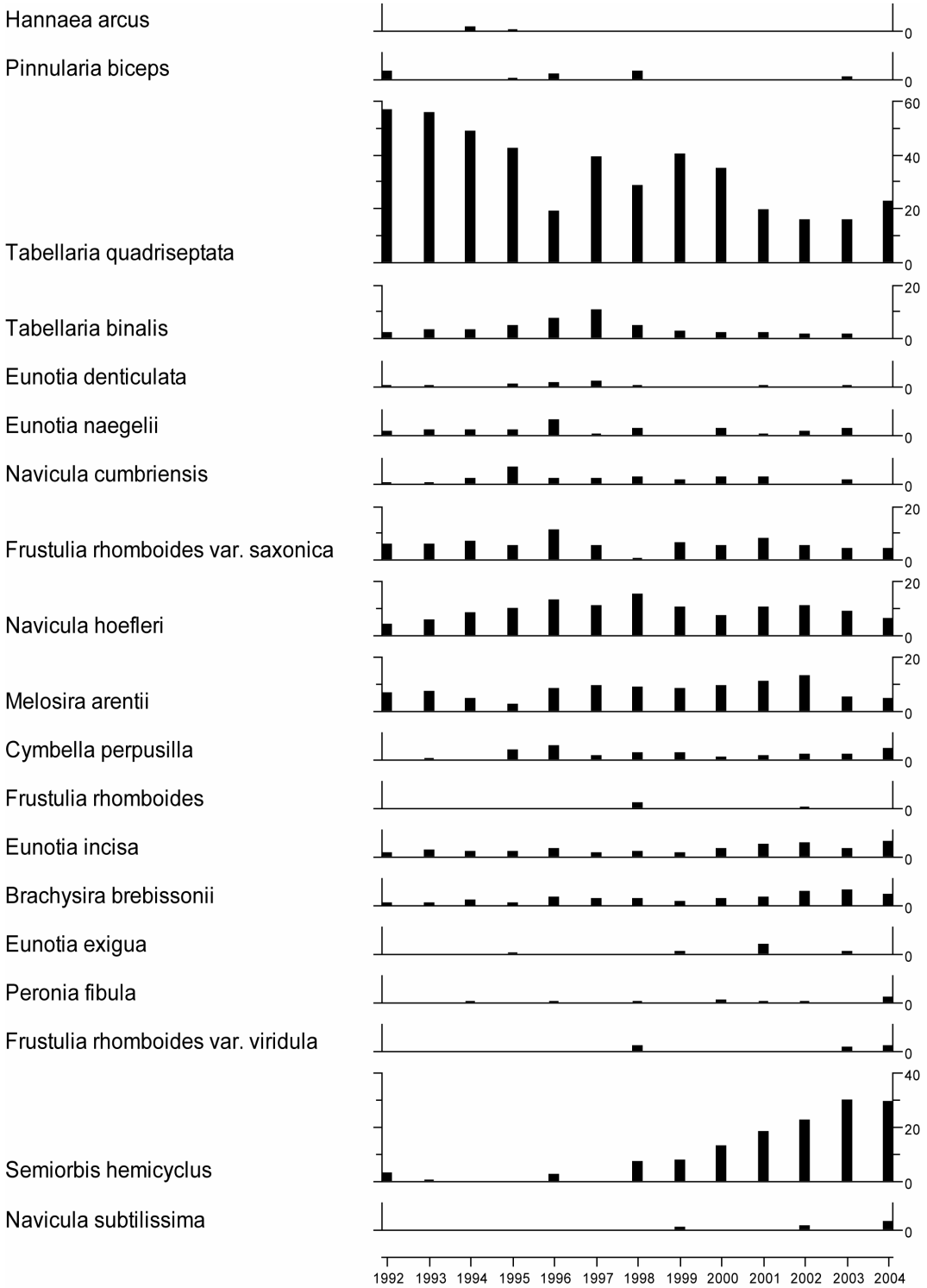
7.21.5 Aquatic macrophyte data, Blue Lough

Species Scores (1-5)



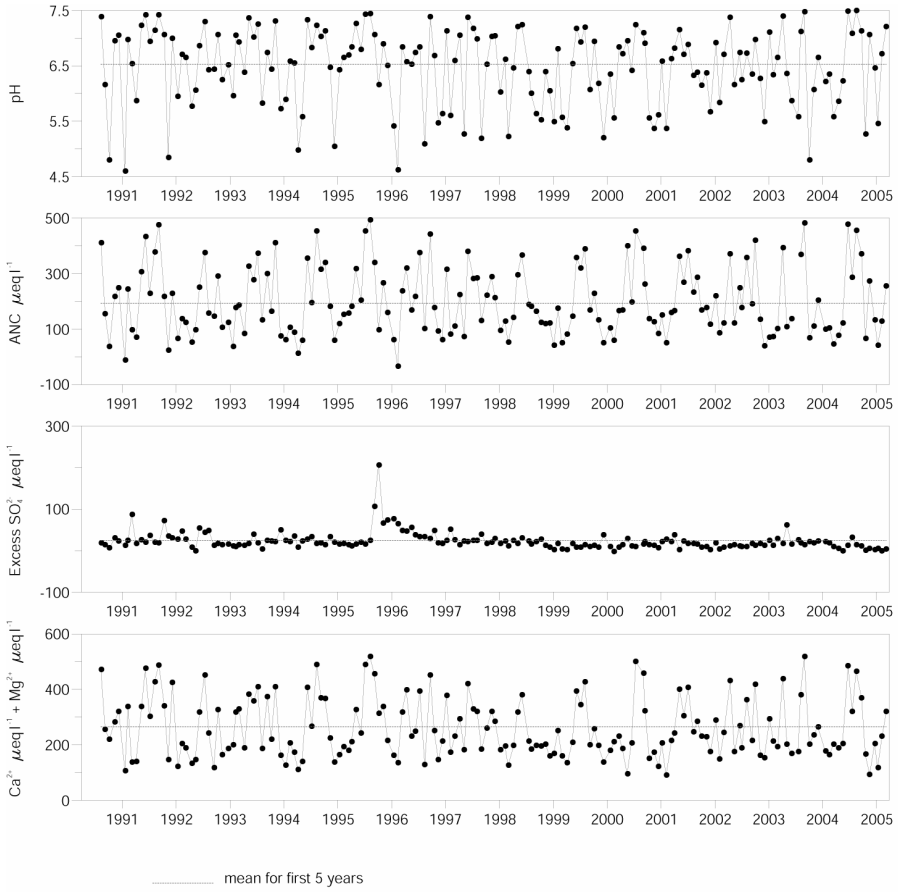
7.21.6 Sediment trap data, Blue Lough

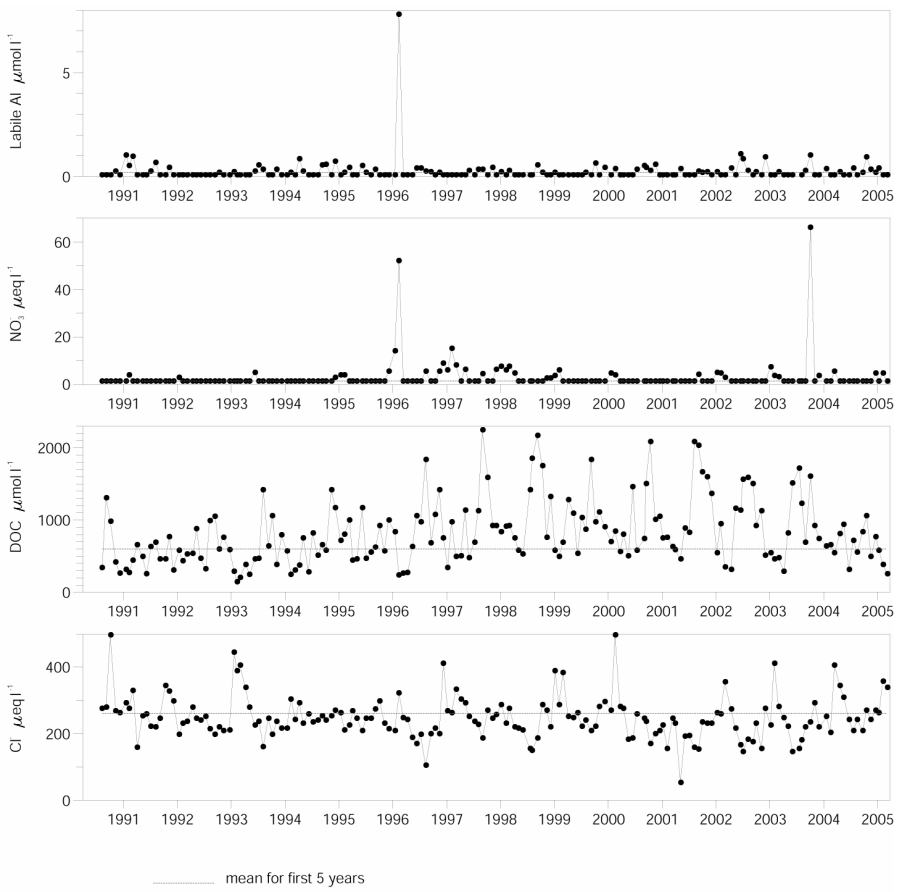
Relative percentage frequency of diatom taxa



7.22 Coneyglen Burn

7.22.1 Spot sampled chemistry data





Determinand statistics

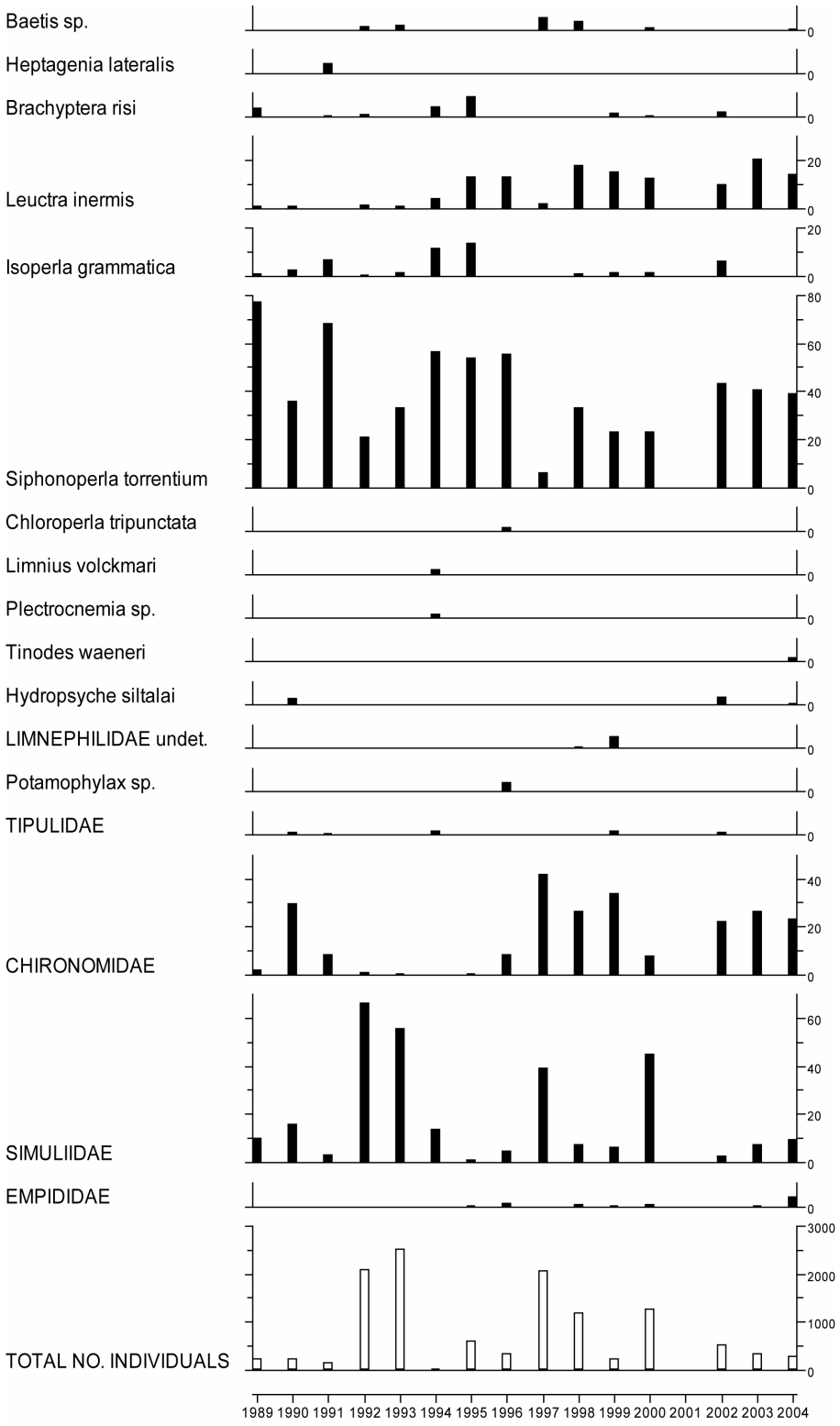
	mean 4/1990-3/1995	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1990-3/2005	p* 4/1990-3/2005
pH	6.53	6.62	0.77	-0.01	0.29
ANC	193.9	223.5	152.2	-0.05	1.00
Ca	146.8	144.7	80.29	-0.02	0.36
Mg	118.7	118.3	48.23	-0.01	0.38
Na	241.1	220.3	27.77	**-0.06**	**0.02**
K	8.91	8.38	2.41	0.00	0.69
Sol.Al	1.35	0.94	0.64	-0.33	0.49

	mean 4/1990-3/1995	mean 4/2004-3/2005	std.dev. 4/2004-3/2005	SK* 4/1990-3/2005	p* 4/1990-3/2005
Sol.lab.Al	0.22	0.25	0.25	0.00	0.10
Cl	261.5	274.6	51.38	-0.08	0.25
SO_4	52.05	36.63	6.85	**-0.06**	**0.01**
XSO_4	24.58	7.79	9.12	**-0.05**	**0.02**
NO_3	1.56	1.86	1.35	0.00	0.46
Si	89.29	91.96	44.17	-0.01	0.24
DOC	597.8	641.7	253.0	**0.31**	**0.02**

* Seasonal Kendall trend analysis: slope estimate (SK) and significance level (p)
Most units μeq l^{-1}, except Sol.Al, Sol.lab.Al and DOC (μmol l^{-1})

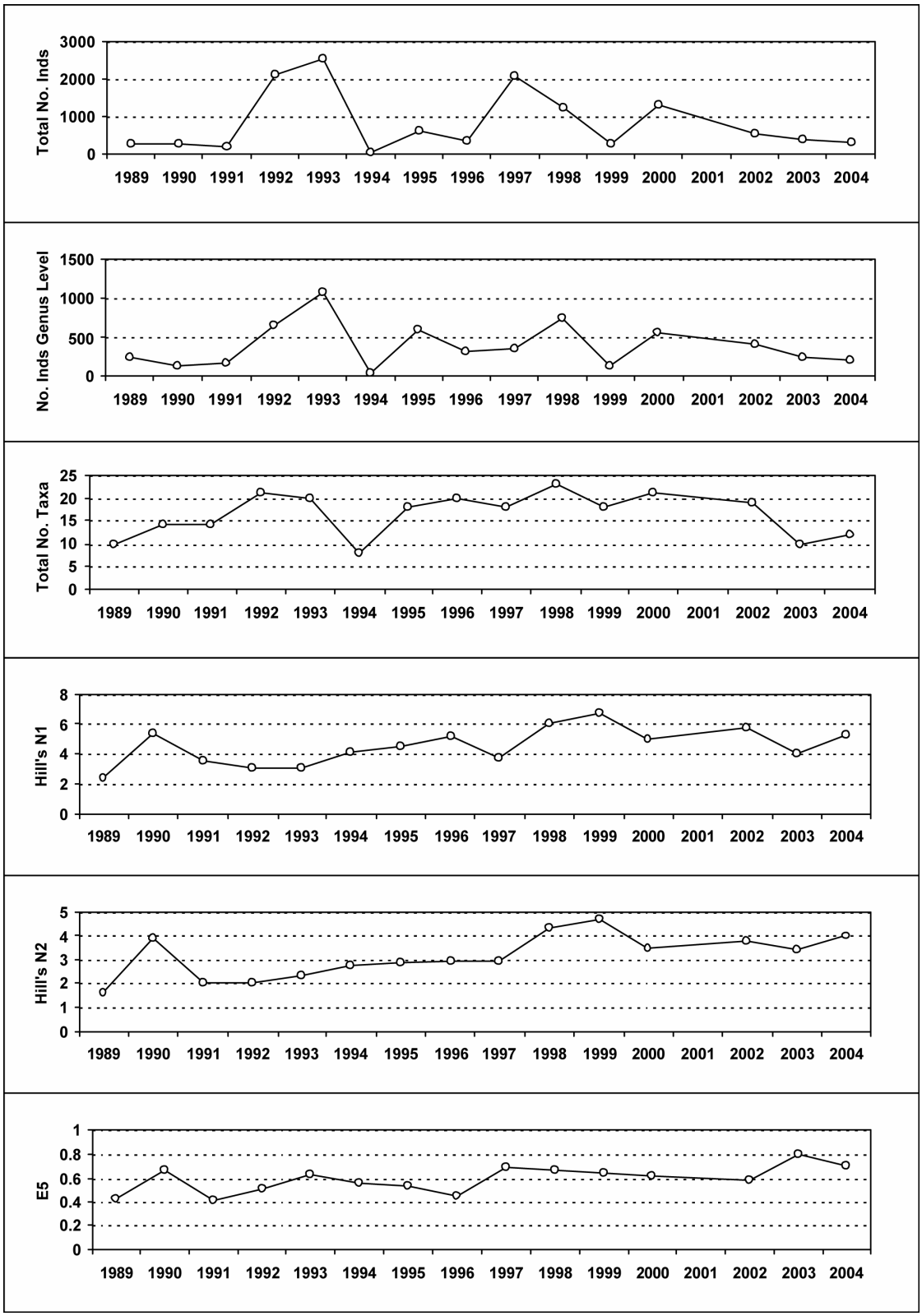
7.22.2 Macroinvertebrate data

7.22.2.1 Percentage abundance summary, Coneyglen Burn



No sampling in 2001 due to Foot and Mouth restrictions.

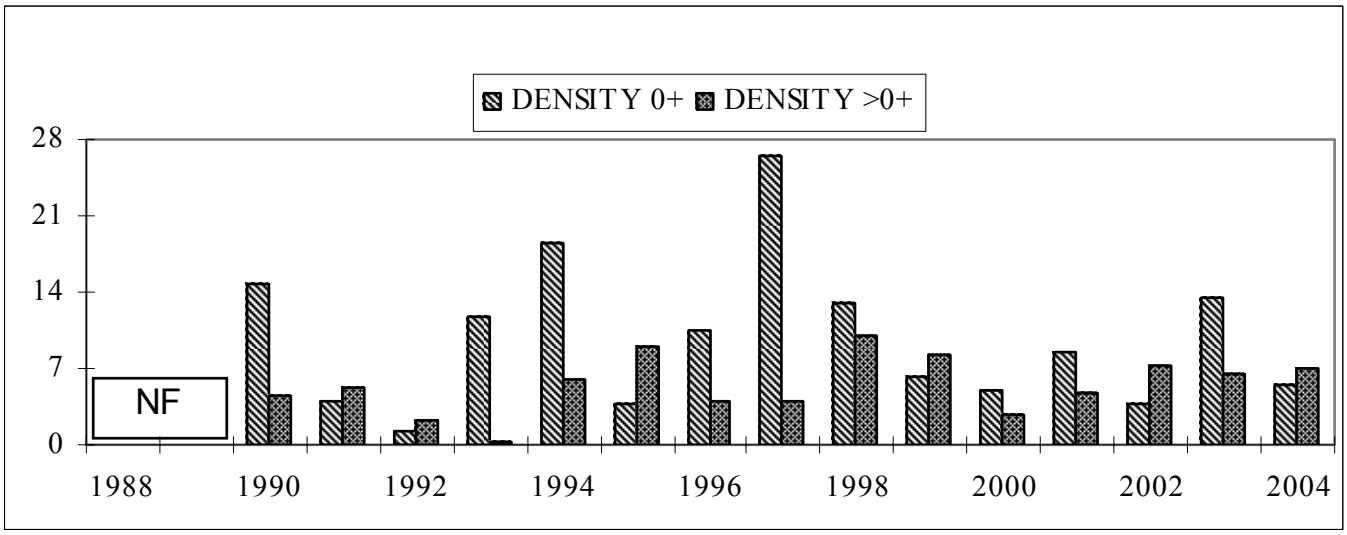
7.22.2.2 Summary statistics, Coneyglen Burn



No sampling in 2001 due to Foot and Mouth restrictions.

7.22.3 Fish data

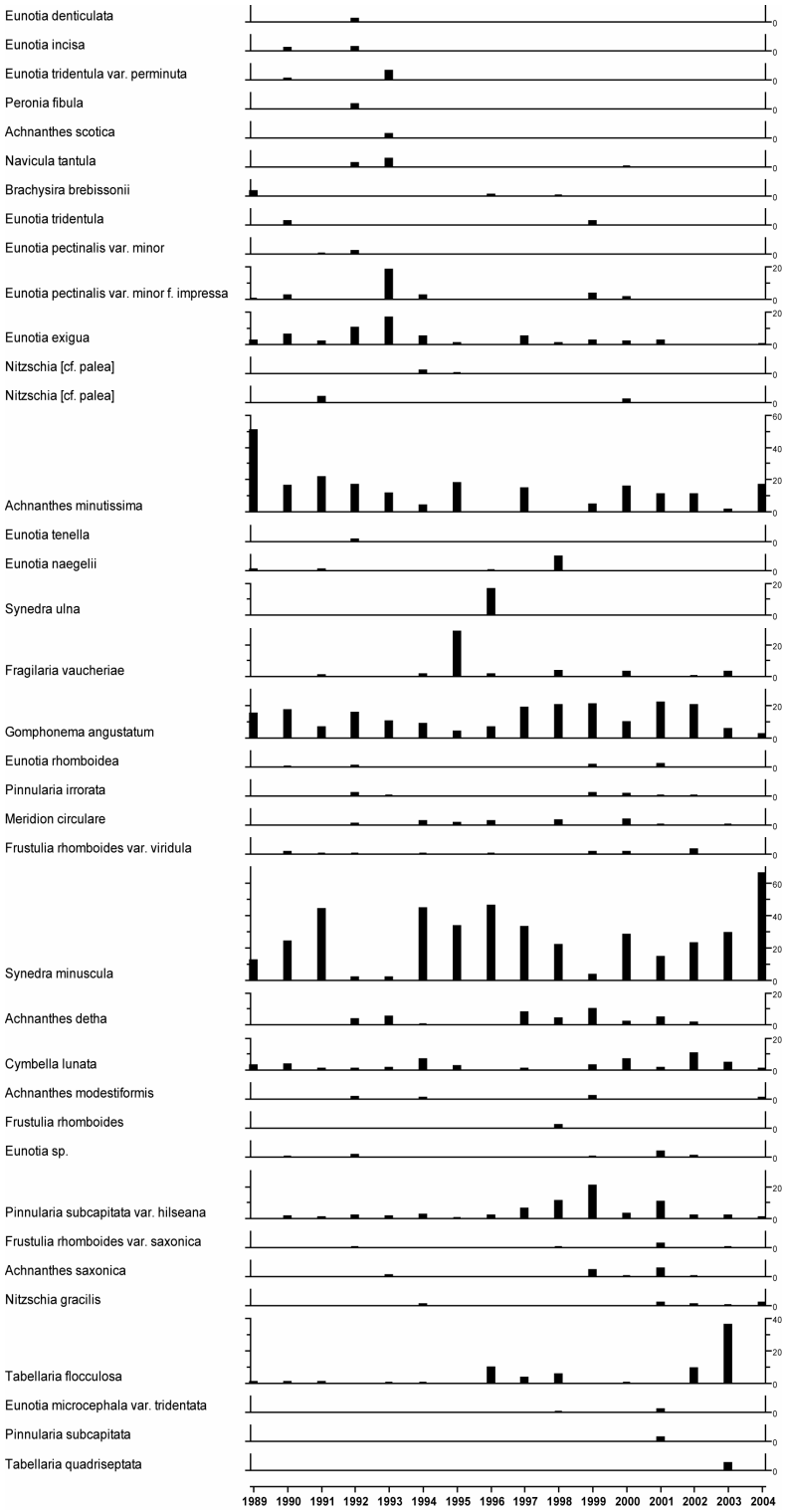
7.22.3.1 Summary of mean Trout density (numbers 100m^{-2}), Coneyglen Burn



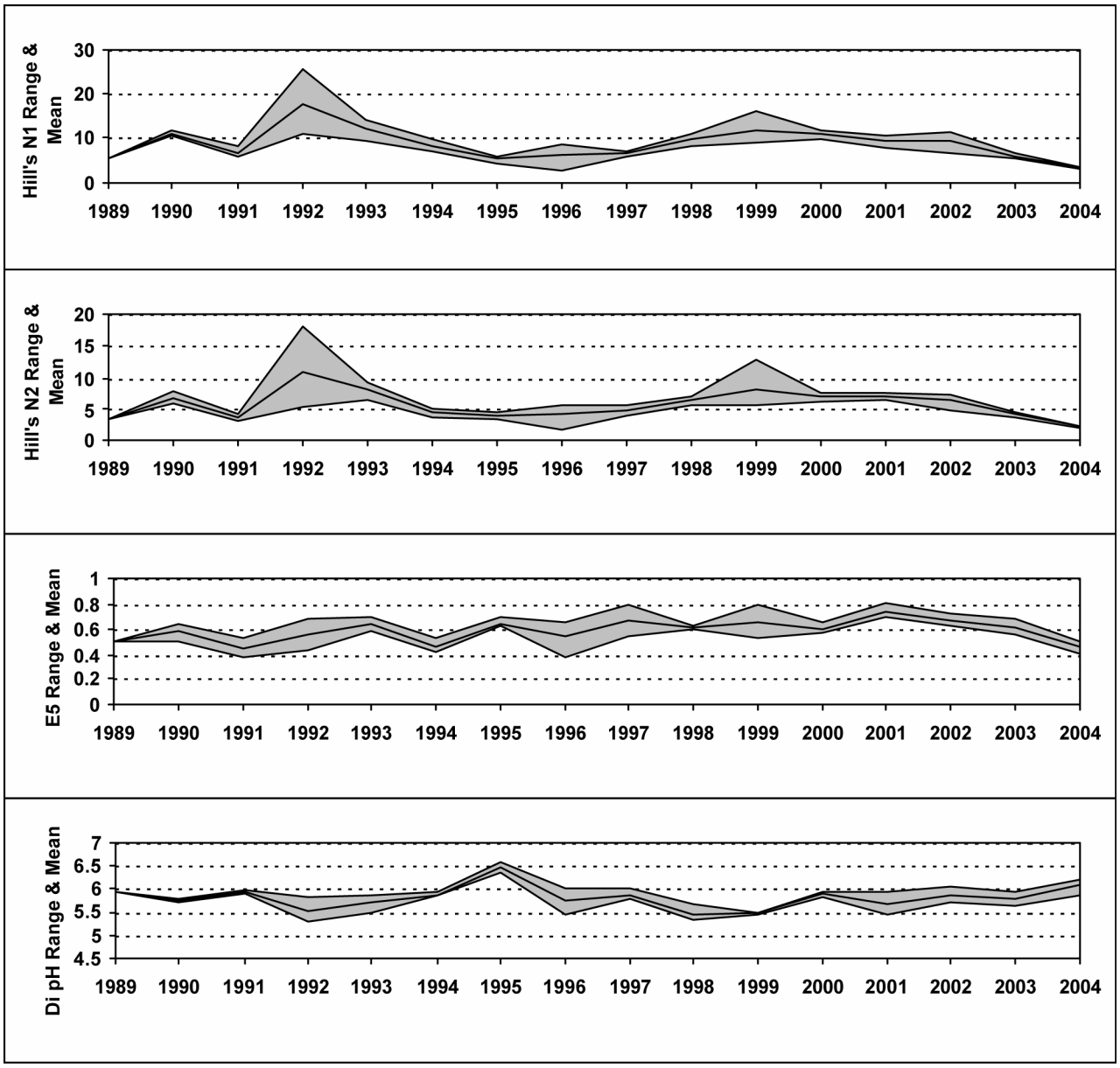
NF = Not fished

7.22.4 Epilithic diatom data

7.22.4.1 Percentage abundance summary, Coneyglen Burn

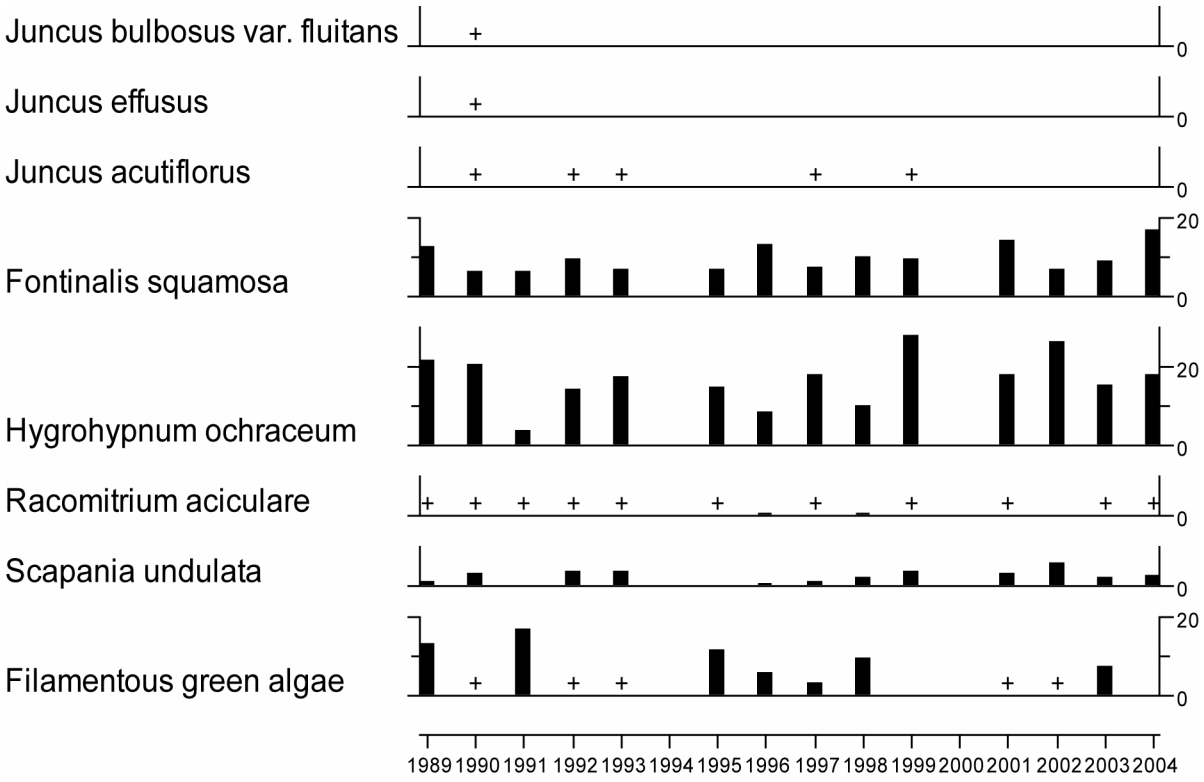


7.22.4.2 Summary statistics, Coneyglen Burn



7.22.5 Aquatic macrophyte data, Coneyglen Burn

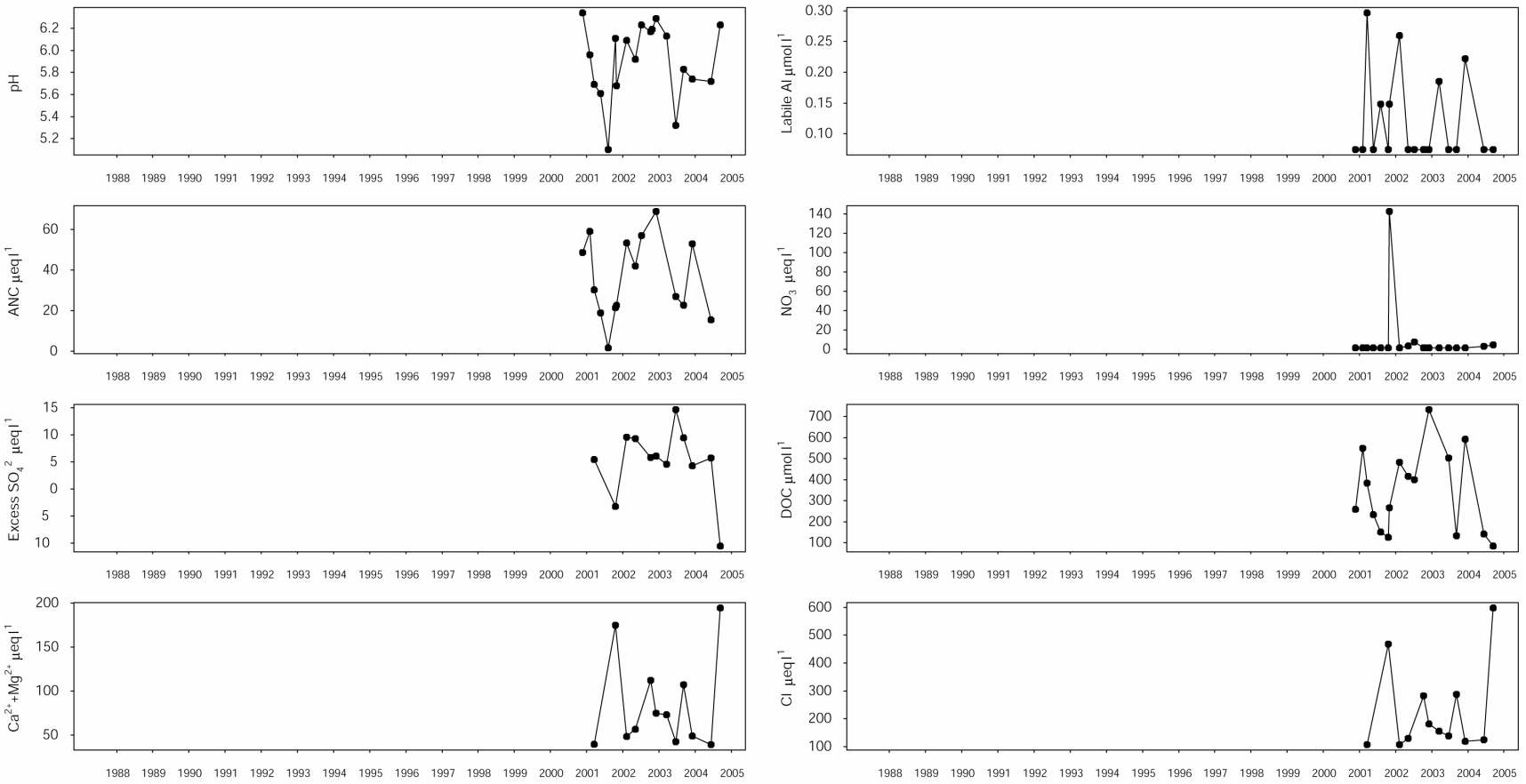
Percentage Species Cover



\+ Represents <0.25% abundance

7.23 Loch Coire Fionnaraich

7.23.1 Spot sampled chemistry data



Determinand statistics

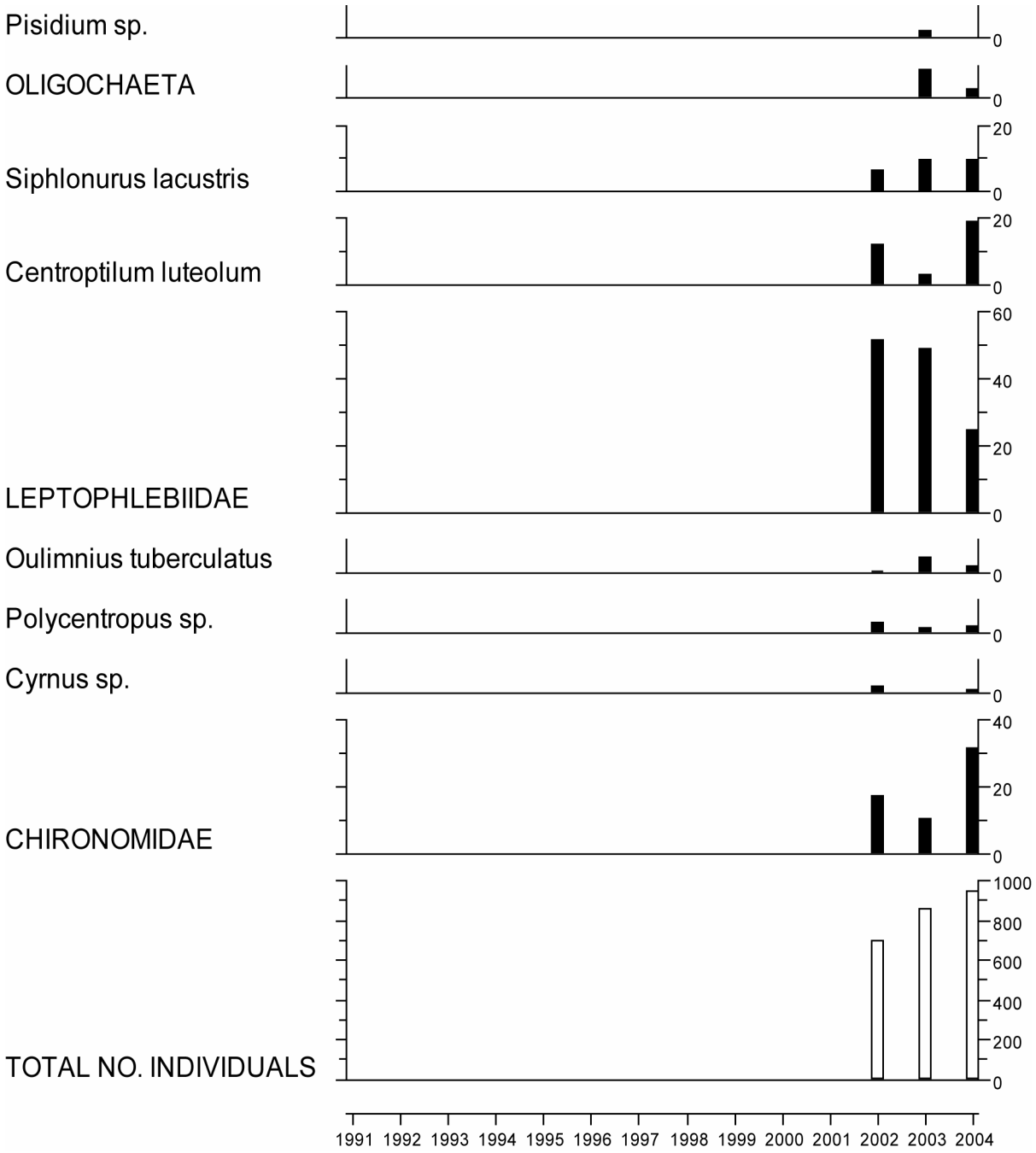
	mean 4/2004-3/2005	std.dev. 4/2004-3/2005
pH	5.90	0.29
ANC	34.11	26.48
Ca	33.77	27.89
Mg	60.34	58.96
Na	211.63	174.66
K	6.31	4.52
Sol.Al	0.74	0.54

	mean 4/2004-3/2005	std.dev. 4/2004-3/2005
Sol.lab.Al	0.12	0.09
Cl	280.18	275.23
SO_4	29.15	19.86
XSO_4	-0.22	9.04
NO_3	2.95	1.64
Si	30.15	13.78
DOC	271.97	277.93

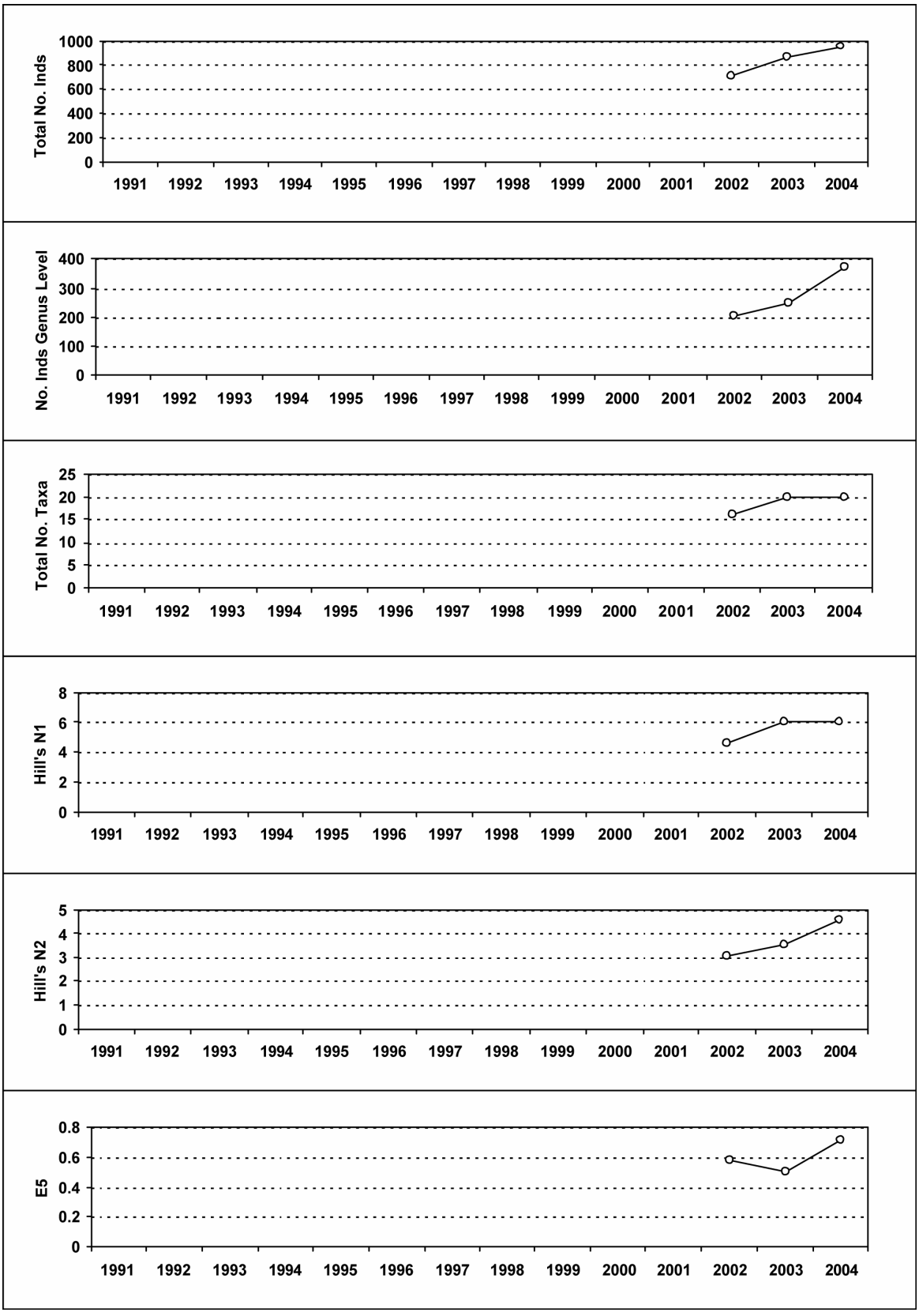
Most units $\mu eq\,l^{-1}$, except Sol.Al, Sol.lab.Al and DOC ($\mu mol\,l^{-1}$)

7.23.2 Macroinvertebrate data

7.23.2.1 Percentage abundance summary, Loch Coire Fionnaraich

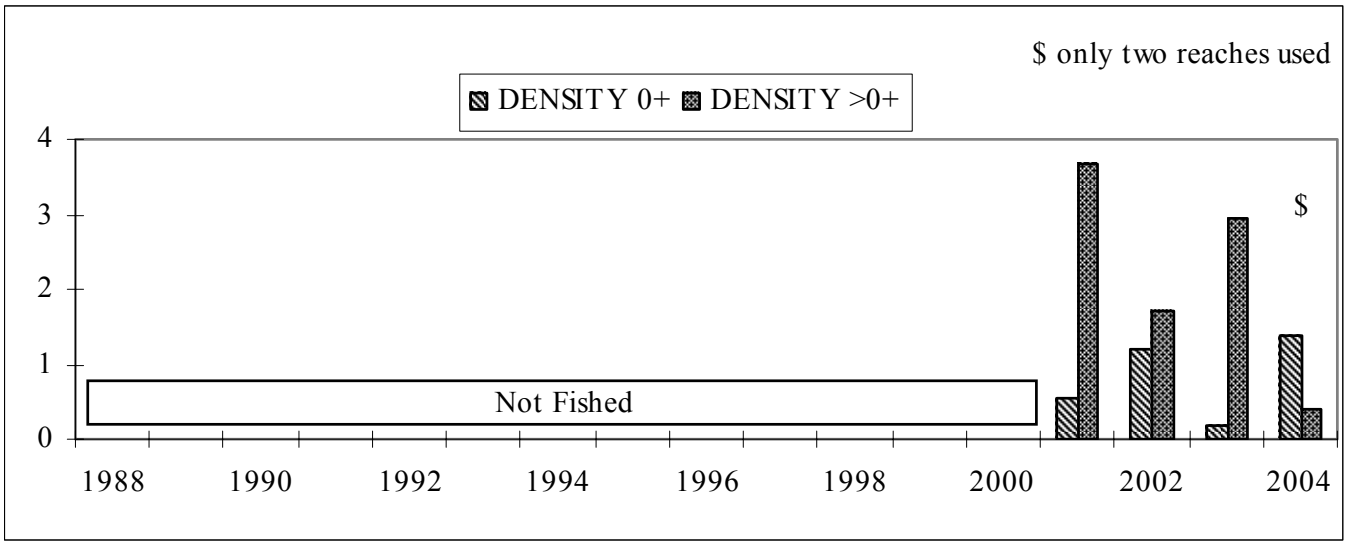


7.23.2.2 Summary statistics, Loch Coire Fionnaraich



7.23.3 Fish data (for outflow stream)

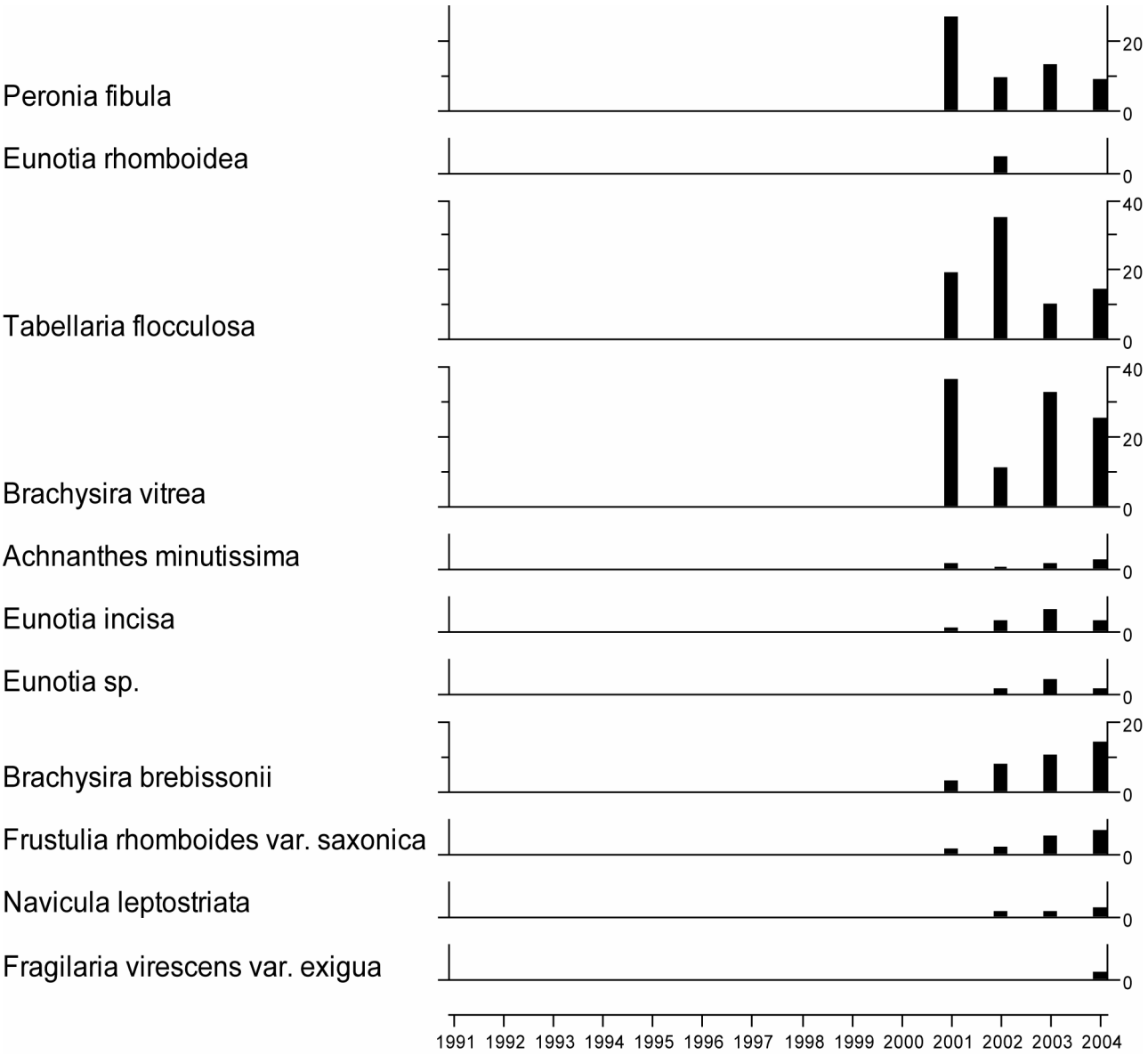
7.23.3.1 Summary of mean Trout density (numbers 100m^{-2}), Loch Coire Fionnaraich



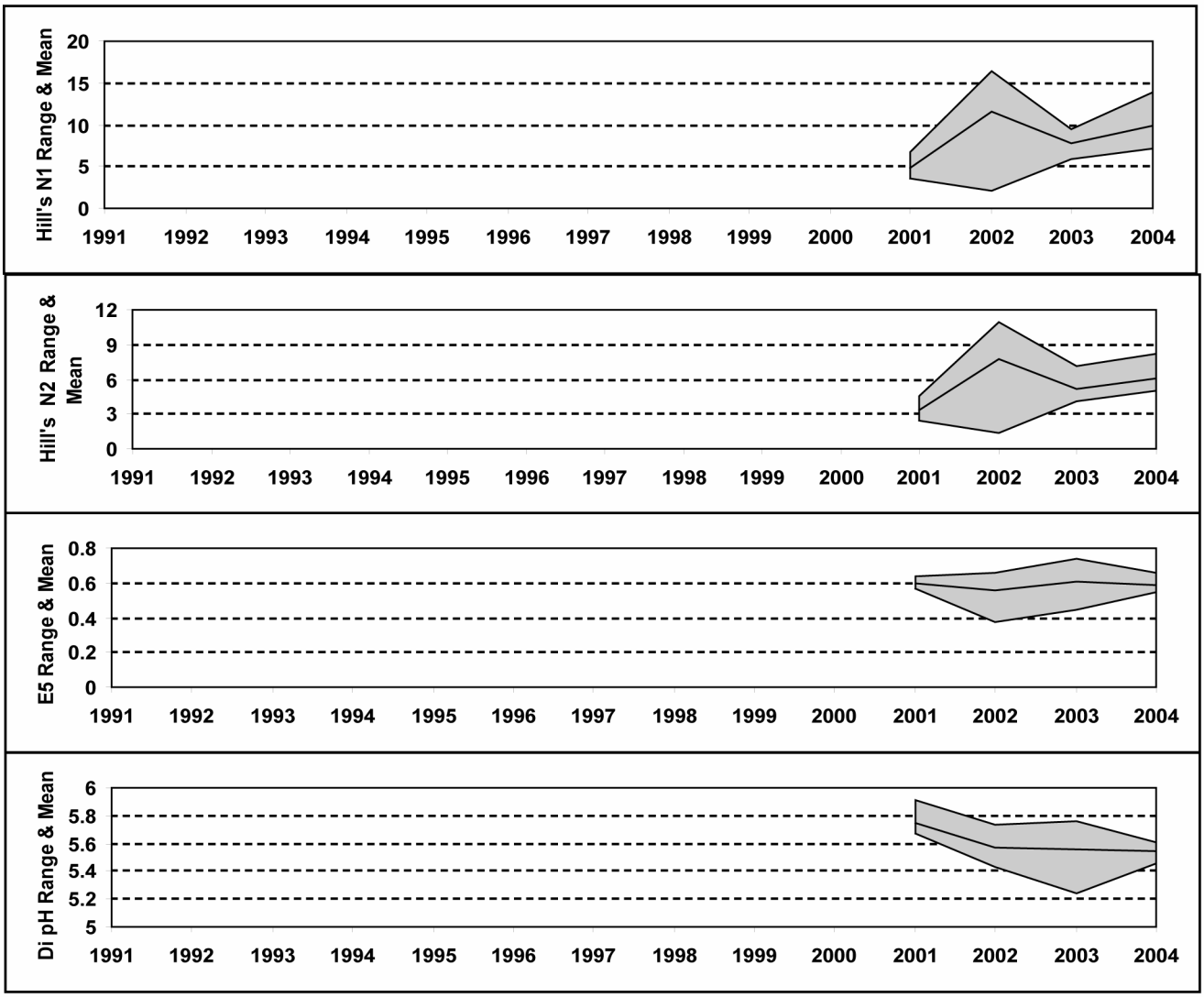
NF = Not fished

7.23.4 Epilithic diatom data

7.23.4.1 Percentage abundance summary, Loch Coire Fionnaraich



7.23.4.2 Summary statistics, Loch Coire Fionnaraich



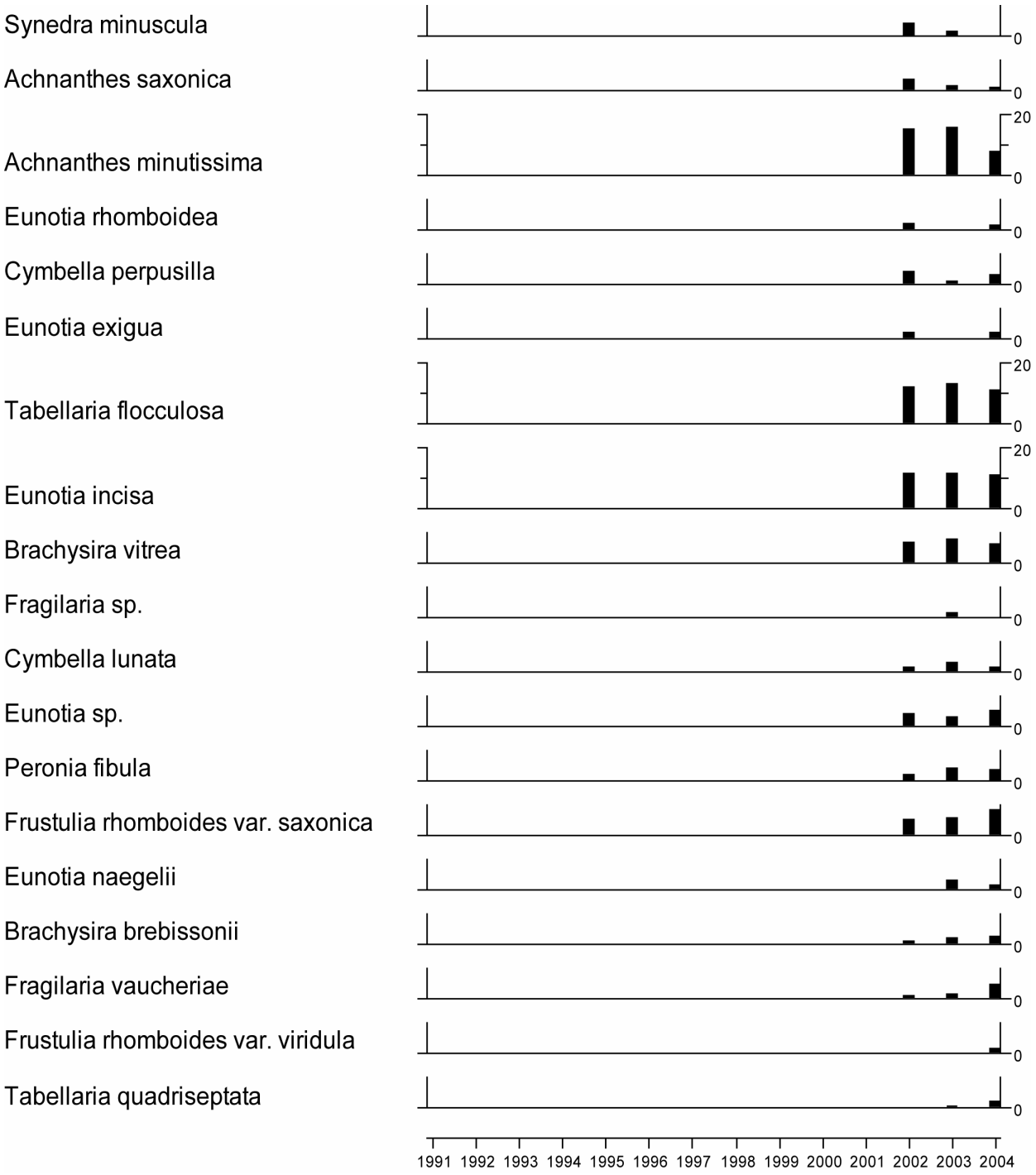
7.23.5 Aquatic macrophyte data, Loch Coire Fionnaraich

Species Scores (1-5)

Species	2003 Score
Sphagnum auriculatum	2
Scapania undulata	2
Fontinalis antipyretica	2
Isoetes lacustris	4
Lobelia dortmanna	4
Littorella uniflora	4
Myriophyllum alterniflorum	2
Callitriche hamulata	2
Subularia aquatica	3
Juncus effusus	2
Carex nigra	3
Ranunculus flammula	3
Juncus bulbosus	3
Potamogeton polygonifolius	1
Sparganium angustifolium	2
Nitella flexilis agg.	2
Batrachospermum sp. Filamentous algae	3 2

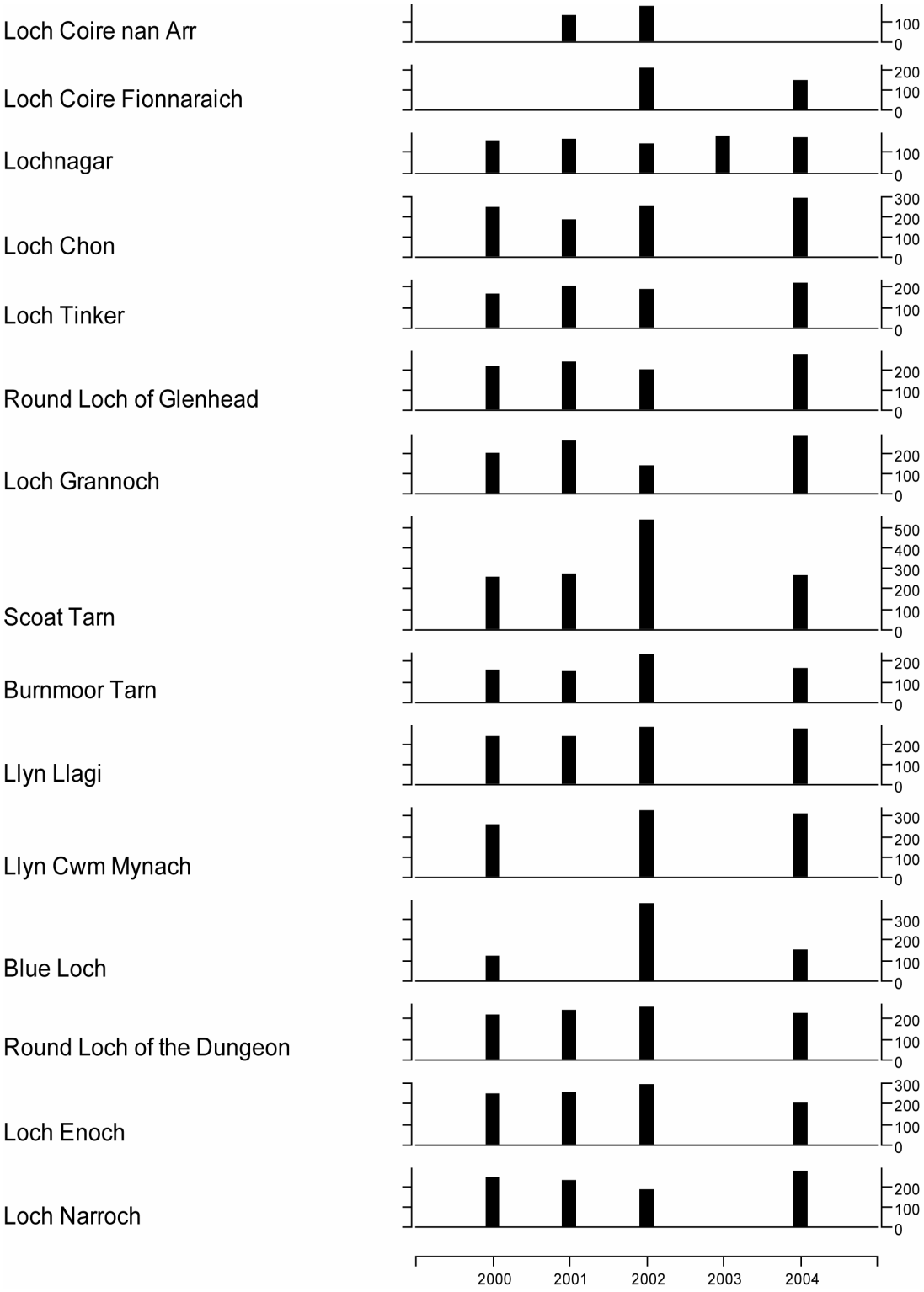
7.23.6 Sediment trap data, Loch Coire Fionnaraich

Relative percentage frequency of diatom taxa



7.24 Sediment Trap Metals Data

7.24.1 Sediment Trap Mercury Concentrations (ng g^{-1})



7.24.2 Sediment Trap Lead Concentrations (μg g^{-1})