Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

CEH Dorset

Winfrith Technology Centre
Winfrith Newburgh
Dorchester
Dorset DT2 8ZD

Telephone +44 (0) 1305 213500
Main Fax +44 (0) 1305 213600
www.ceh.ac.uk

Acid Waters Monitoring 2006
Report on Fish Studies

W R C Beaumont, MIFM

Project Leader:	W R C Beaumont
Report to:	ENSIS - ECRC University College London Pearson Building, Gower Street, London UK. WC1E 6BT
CEH Project No:	C01562
Date:	April 2007

INTELLECTUAL PROPERTY RIGHTS

CONFIDENTIALITY STATEMENT

'In accordance with our normal practice, this report is for the use only of the party to whom it is addressed, and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this report or any reference thereto may be included in any published document, circular or statement, nor published or referred to in any way without our written approval of the form and context in which it may appear.'

CONTENTS

List of Tables

List of Figures

1. INTRODUCTION

The UK Acid Waters Monitoring Network (UKAWMN) was set up in 1988 on the recommendation of the UK Acid Waters Review Group. It comprises 22 sites throughout England, Wales, Scotland and Northern Ireland situated in those parts of the country most susceptible to acidification. Biological and chemical parameters are monitored and collated by several specialist laboratories throughout the country and the network is managed by and administered by ENSIS Ltd at the Environmental Change Research Centre, University College London. Contact details for the contractors carrying out the fish surveys are given in Table 1.

2. OBJECTIVES

The objective of the network is to provide long-term, high quality chemical and biological data, which in conjunction with data from the existing UK Precipitation Monitoring Network will facilitate the assessment of trends in surface water acidity.

Data from all sites are collated and analysed yearly and this report details the results from the surveys of the fish populations of the sites for year 19 of the study (2006). Full site descriptions and details of the methodology used are detailed in a separate report (Patrick *et al* 1991). Results from all the biological and chemical surveys are produced in an annual report to the Department of the Environment, Transport and the Regions and the Environment and Heritage Service, Northern Ireland by ENSIS Ltd. Analysis and interpretation of the biological and chemical data at each site are presented in five yearly reports (Patrick, Monteith and Jenkins 1995, Monteith and Evans 2000).

3. FISH POPULATION DATA ANALYSIS: 2006

Fish population surveys of the UK Acid Waters Monitoring sites were carried out between 4 September and 17 October. Table 2 gives site details and dates of sampling.

Site 8 was not fished this year and sites 11 and 12 were also not fished this year due to high water levels.

Table 2 gives the data from the fish surveys. Population estimates (exact maximum likelihood) are calculated using the CEH "Remove" program (Clarke 1992). Data are stratified into 0+ and >0+ fish and are tabulated for each reach fished (lower, middle and upper). Data are presented for: catch ©; estimated population number (N), the value of 2 times the standard error of the population estimate (SE*2) which approximately equals the 95% confidence limit of the estimate where N = >30; capture efficiencies (P); and fish population densities (D), the value for twice the standard error of the density estimate (SE*2), chi square values (X2) and a code indicating the status of the data. Codes given are: ME - density value is minimum estimate based upon actual catch; LC - catch low (<30) for accurate population estimate; IV - significant chi square value renders population estimate invalid; and V - valid population estimate. It should be noted that even when there is a significant chi square value the density estimate is still based upon the estimated population number where it is considered that it is still the best estimate available.

Data are also calculated for the total site (as distinct from reach) and are presented as follows: total site catch (TC); estimated total site population number (TN), calculated by adding the estimated reach population estimates, the value of 2 times the standard error of the population estimate (SE*2), calculated from the formula: $Var(T) = \sqrt{(SE(Ni))^2}$; and the mean site density (XD) together with its 2*SE value (SE*2). Where fish have been caught in a reach but no population estimate has been possible only total catch (TC) and mean density data (XD) are shown. The data for the mean density are calculated from the reaches where population data are available and minimum population density estimates, based on actual catch, where population data are not available.

Population data have been stratified into 0-group and >0-group fish. As a result of this many of the population estimates are below the limits recommended for valid estimation of population numbers (Bohlin 1982) and error estimates may be imprecise.

Data for the sites are presented in the following tables and graphs.

3.1 Trout

Fifteen stratified population estimates were possible that fully complied with the criteria required for valid population estimation. The other population estimates therefore should be considered indicative rather than absolute. Six sites had catch patterns that resulted in invalid population estimates.

Where it was possible to calculate population data, capture efficiencies for trout ranged from 31% to 90%. Only three estimates had efficiencies below 50% and one estimate had an efficiency below 40%.

Figure 1 shows trout densities at each site. Densities are for all age groups combined. Due to low densities at most sites values are expressed as trout per 100 m^2. Where trout were found to be present, site mean densities ranged from 0.97 to 103.4 fish per 100 m^2.

Figure 2 show age-stratified trout data at each site since 1988. Data are also expressed as trout per 100 m^2 (NF indicates the site was not fished that year). Note that sites 17 and 18 have changed during the course of the project. 0+ trout had their highest ever densities at two sites and their lowest at one, >0+ trout densities were at their highest ever at two sites and lowest ever at two sites. Full analyses of these data are incorporated in the 5-year interpretative reports.

3.2 Salmon

Salmon data are presented in Table 3 and Figure 3. Data for the past eight years have been age stratified in a similar manner to the trout, however data before 1999 is total site density data. Two new sites (Afon Gwy and Coney Glen Burn) recorded salmon for the first time this year.

3.3 Minor Species

Information on the non-salmonid species caught at each site is shown in Table 4. Sites where presence is recorded are probably a minimum.

3.4 GPS Locations

Table 5 shows GPS locations for the sites fished. Where possible contractors should obtain GPS fixes for the top and bottom of all the reaches fished. This will reduce reliance on continuity of personnel and allow long-term site continuity.

5. ACKNOWLEDGEMENTS

This is the last annual fish data report that I will coordinate and analyse. I would like to thank all the contractors for providing data from the various sites over the 19 years that the project has run. I know from experience that getting the data can be very arduous to obtain and be fraught with problems regarding weather. I would also like to thank the staff at ENSIS for their support. Finally I would like to acknowledge the late Dr Chris Mills who was responsible for designing the framework of the fish data collection methodology that has proved so successful over the years.

6. REFERENCES

Bohlin T (1982) The validity of the removal estimate for small populations - Consequences for electrofishing practice. *Rep. Inst. Freshwat. Res. Drottningholm. 60, 15-18.*

Clarke R (1992) REMOVE - a program for fish population estimation. *IFE program.*

Milner N J, Hemsworth R J and Jones B E (1985) Habitat evaluation as a fisheries management tool. *J. Fish Biol. 27 85-108.*

Monteith D T and Evans C D (2000) UK Acid Waters Monitoring Network: 10Year Report. Analysis and Interpretation of Results, April 1988 - March 1998. *Report to DETR and EHS (NI) March 2000 ENSIS Ltd.*

Patrick S, Waters D, Juggins S and Jenkins A (1991) The United Kingdom Acid Waters Monitoring Network: Site descriptions and methodology report. *Report to DOE and DOE (NI) April 1991 ENSIS Ltd.*

Patrick S, Monteith D T and Jenkins A (1995) UK Acid Waters Monitoring Network: The First Five Years.

Table 1 Contractor contact details

Contractor and Contact name	Site	Address
FRS Iain Malcolm 01796 472060 I.A.Malcolm@marlab.ac.uk	1. Loch Coire nan Arr outflow 2. Allt a Mharcaidh outflow 3. Allt na Coire nan con (Pollock Burn) 4. Lochnagar outflow 5. Loch Chon outflow 6. Loch Tinker outflow 7. Round Loch of Glenhead outflow 8. Loch Grannoch outflow 9. Dargal Lane 23. Loch Coire Fionnaraich	Freshwater Fisheries Laboratory Faskally PITLOCHRY Perthshire PH16 5LB
CEH Dorset William Beaumont 01305 213500 wrb@ceh.ac.uk	10. Scoat Tarn outflow 11. Burnmoor Tarn outflow	Winfrith Technology Centre Winfrith Newburgh DORCHESTER Dorset DT2 8ZD
EA NW-Region	12. River Etherow	NOT FISHED
QMuL Alan Hildrew 0207882 3299 A.Hildrew@qmul.ac.uk	13. Old Lodge	School of Biological Sciences Queen Mary University of London Mile End Road LONDON E1 4NS
Plymouth University Roger Haslam 01752 232900	14. Narrator Brook	Department of Biological Sciences University of Plymouth Drake Circus PLYMOUTH Devon PL4 8AA
EA Wales - Bangor Rhian Thomas 01248 484022 rhian.thomas@environment-agency.wales.gov.uk	15. Llyn Llagi outflow 16. Llyn Cwm Mynach outflow	Environment Agency Llwyn Brain Ffordd Penian PARK MENAL Gwynedd LL57 4BP
EA Wales Paul Hyatt 01792 325612 Paul.Hyatt@environment-agency.gov.uk	17. Afon Hafren 18. Afon Gwy	Environment Agency Maes Newydd Llandarcy Neath PORT TALBOT SA10 6JQ
afbi Ian Moffett 028207 31435	19. Beaghs Burn 20. Ben Crom River 21. Blue Loch outflow 22. Coney Glen Burn	River Bush Salmon Station 21 Church Street BUSHMILLS County Antrim BT57 8QJ

Table 2 Sampling dates and conditions

Site	Date Sampled	Flow Conditions	Comments
1. Loch Coire nan Arr outflow	-	-	Replaced by Site 23.
2. Allt a Mharcaidh outflow	4/9/06	Moderate	
3. Allt na Coire nan con (Pollock Burn)	3/11/06	Moderate	Some localised felling by lower section
4. Lochnagar outflow	8/9/06	Low	
5. Loch Chon outflow	11/9/06	High	
6. Loch Tinker outflow	27/9/06	Mod/High	
7. Round Loch of Glenhead outflow	16/10/06	Mod/High	
8. Loch Grannoch outflow	Not fished		
9. Dargal Lane	13/9/06	Moderate	
23. Loch Coire Fionnaraich	11/9/06	Mod/High	
10. Scoat Tarn outflow	Not fished		Not fished due to high water
11. Burnmoor Tarn outflow	Not fished		Not fished due to high water
12. River Etherow	Not fished		
13. Old Lodge	5/10/06	Very Low	
14. Narrator Brook	18/9/06	Average	
15. Llyn Llagi outflow	16/10/06	Normal	
16. Llyn Cwm Mynach outflow	17/10/06	Normal	
17. Afon Hafren	26/9/06	Normal	
18. Afon Gwy	25/9/06	Normal	
19. Beaghs Burn	16/10/06	Moderate	
20. Ben Crom River	28/9/06	Mod/High	
21. Blue Loch outflow	4/10/06	Moderate	
22. Coney Glen Burn	17/10/06	Mod/High	

Table 3

TROUT 2006			LOWER REACH												
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P (%)	D	SE*2	X2	CODE
1	Coire nan arr		No longer fished												
2	Allt a Mharcaidh	0+	130	38	10		178	173	181	4.17	73	1.046	0.02	0.14	V
		>0+	29	7	2		38		38	0.00	78	0.220	0.00	0.21	V
3	Coire nan Con	0+	29	8	4		41	381	42	2.48	68	0.110	0.01	0.57	V
		>0+	4	0	0		4					0.010			ME
4	Lochnagar	0+	10	5	0		15	73	15	0.00	75	0.205	0.00	2.54	LC
		>0+	1	3	2		6					0.019			ME
5	Water of Chon	0+	29	6	4		39	323	39	0.00	74	0.121	0.00	2.33	V
		>0+	10	2	2		14		14	0.00	70	0.043	0.00	1.72	LC
6	Loch Tinker	0+	0	0	0		0	99				0.000			
		>0+	0	0	0		0					0.000			
7	Round loch of Glenhead	0+	5	2	0		7	63	7	0.00	78	0.111	0.00	0.82	LC
		>0+	0	0	0		0					0.000			
8	Loch Grannoch	0+	NOT FISHED												
		>0+													
9	Dargal Lane	0+	1	0	1		2	139				0.013			ME
		>0+	2	1	0		3		3	0.00	75	0.022	0.00	0.51	LC
23	Loch Coire Fionnaraich	0+	0	0	0		0	368				0.000			
		>0+	2	1	0		3		3	0.00	75	0.008	0.00	0.51	LC
10	Scoat Burn	0+	NOT FISHED												
		>0+													
11	Burnmoor Tarn	0+	NOT FISHED												
		>0+													
12	Etherow		NOT FISHED												
13	Old Lodge	0+	3	2	1		6	99	6	0.00	60	0.061	0.00	0.63	LC
		>0+	18	3	2		23		23	0.00	77	0.232	0.00	1.44	LC
14	Narrator Brook	0+	2	1	1		4	67	4	0.00	57	0.060	0.00	0.84	LC
		>0+	23	19	7		49		60	15.74	43	0.896	0.24	1.77	V
15	Llyn Llagi	0+	6	5	4		15	145	22	15.63	31	0.152	0.11	0.28	LC
		>0+	0	0	0		0					0.000			
16	Llyn Cwm Mynach	0+	2	1			3	165	3	0.00	75	0.018	0.00	0.51	LC
		>0+	0	0			0					0.000			
17	Afon Hafren	0+	11	3	1	1	16	184	16	0.00	67	0.087	0.00	1.05	LC
		>0+	11	0	1	0	12		12	0.00	86	0.065	0.00	4.52	IVLC
18	Afon Gwy	0+	5	2	1		8	229	8	0.00	67	0.035	0.00	0.33	LC
		>0+	7	4	0		11		11	0.00	73	0.048	0.00	2.30	LC
19	Beagh's Burn	0+	16	9	4		29	116				0.000			
		>0+	2	0	0		2					0.000			
20	River Bencrom	0+	16	9	4		29	212	32	5.78	53	0.151	0.03	0.19	V
		>0+	2	0	0		2					0.009			ME
21	Blue Lough	0+	0	0	0		0	97							
		>0+	1	2	1		4					0.041			ME
22	Coney Glen Burn	0+	6	2	0		8	244	8	0.00	80	0.033	0.00	0.69	LC
		>0+	6	4	1		11		11	0.00	65	0.045	0.00	1.07	LC

Table 3 (continued)

TROUT 2006			MIDDLE REACH												
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P (%)	D	SE*2	X2	CODE
1	Coire nan arr		No longer fished												
2	Allt a Mharcaidh	0+	171	65	19		255	229	265	8.79	66	1.157	0.04	0.63	V
		>0+	20	12	1		33		66	0.15	0	0.148	0.01	3.75	V
3	Coire nan Con	0+	13	3			16	220	17	0.00	77	0.077	0.00	0.15	LC
		>0+	1	1			2		2	0.00	67	0.009	0.00	0.93	LC
4	Lochnagar	0+	40	15	2	1	58	66	58	0.00	73	0.879	0.00	1.58	V
		>0+	3	4	0	0	7		7	0.00	64	0.106	0.00	4.78	IVLC
5	Water of Chon	0+	98	36	16		150	357	159	9.24	61	0.445	0.03	0.21	V
		>0+	0	2	0		2					0.006			ME
6	Loch Tinker	0+	2	0	0		2	90				0.022			ME
		>0+	2	0	0		2					0.022			ME
7	Round loch of Glenhead	0+	9	2	0		11	70	11	0.00	85	0.157	0.00	0.46	LC
		>0+	0	0	0		0		0			0.000			
8	Loch Grannoch	0+	NOT FISHED												
		>0+													
9	Dargal Lane	0+	3	1	2		6	115	6	0.00	55	0.052	0.00	2.77	LC
		>0+	5	4	0		9		9	0.00	69	0.078	0.00	3.10	LC
23	Loch Coire Fionnaraich	0+	1	1	0		2	329	2	0.00	67	0.006	0.00	0.93	LC
		>0+	4	2	3		9		6	0.00	75	0.018	0.00	1.02	LC
10	Scoat Burn	0+	NOT FISHED												
		>0+													
11	Burnmoor Tarn	0+	NOT FISHED												
		>0+													
12	Etherow		NOT FISHED												
13	Old Lodge	0+	0	0	0		0	100				0.000			
		>0+	10	1	1		12		12	0.00	80	0.120	0.00	1.45	LC
14	Narrator Brook	0+	10	0	1		11	122	11	0.00	85	0.090	0.00	4.24	IVLC
		>0+	28	14	5		47		50	5.11	59	0.410	0.04	0.36	V
15	Llyn Llagi	0+	5	2	1		8	144	8	0.00	67	0.056	0.00	0.33	LC
		>0+	1	0	0		1					0.007			ME
16	Llyn Cwm Mynach	0+	2	0	1		3	130	3	0.00	60	0.023	0.00	2.50	LC
		>0+	0	2	0		2					0.015			ME
17	Afon Hafren	0+	5	1	0		6	108	6	0.00	86	0.056	0.00	0.20	LC
		>0+	4	2	1		7		7	0.00	0	0.065	0.07	0.42	LC
18	Afon Gwy	0+	1	1	0		2	250	2	0.00	67	0.008	0.00	0.93	LC
		>0+	2	3	1		6		6	0.00	55	0.024	0.00	2.19	LC
19	Beagh's Burn	0+	1	0	0	0	1	164				0.006			ME
		>0+	1	0	2	0	3		3	0.00	43	0.018	0.00	6.99	IVLC
20	River Bencrom	0+	5	2	0		7	235	7	0.00	78	0.030	0.00	0.82	LC
		>0+	11	2	1		14		14	0.00	78	0.060	0.00	0.47	LC
21	Blue Lough	0+	0	0	1	0	1	91				0.011			ME
		>0+	7	0	1	0	8					0.088			ME
22	Coney Glen Burn	0+	13	4	0		17	255	18	0.00	75	0.071	0.00	0.16	LC
		>0+	9	0	0		9					0.035			ME

Table 3 (continued)

TROUT 2006		UPPER REACH													
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P (%)	D	SE*2	X2	CODE
1	Coire nan arr		No longer fished												
2	Allt a Mharcaidh	0+	78	29	5		112	307	114	3.39	71	0.371	0.01	1.95	V
		>0+	26	16	4		46		49	5.09	58	0.160	0.02	1.81	V
3	Coire nan Con	0+	7	4	0		11	243	11	0.00	73	0.045	0.00	2.30	LC
		>0+	6	1	1		8		8	0.00	73	0.033	0.00	0.97	LC
4	Lochnagar	0+	20	5	2		27	72	27	0.00	75	0.375	0.00	0.43	LC
		>0+	3	1	0		4		4	0.00	80	0.056	0.00	0.34	LC
5	Water of Chon	0+	13	13	2		28	371	31	5.74	52	0.084	0.02	4.96	IV
		>0+	20	5	6		31		33	4.04	57	0.089	0.01	3.14	V
6	Loch Tinker	0+	7	0	1		8	77	8	0.00	80	0.104	0.00	3.50	LC
		>0+	1	1	0		2		2	0.00	67	0.026	0.00	0.93	LC
7	Round loch of Glenhead	0+	5	2	0		7	40	7	0.00	78	0.175	0.00	0.82	LC
		>0+	0	0	0		0					0.000			
8	Loch Grannoch	0+	NOT FISHED												
		>0+													
9	Dargal Lane	0+	10	4	2		16	131	16	0.00	67	0.122	0.00	0.66	LC
		>0+	5	2	1		8		8	0.00	67	0.061	0.00	0.33	LC
23	Loch Coire Fionnaraich	0+	0	0	0		0	260				0.000			
		>0+	2	1	0		3		3	0.00	75	0.012	0.00	0.51	LC
10	Scoat Burn	0+	NOT FISHED												
		>0+													
11	Burnmoor Tarn	0+	NOT FISHED												
		>0+													
12	Etherow		NOT FISHED												
13	Old Lodge	0+	1	0	0		1	80				0.013			ME
		>0+	9	6	3		18		20	4.47	50	0.250	0.06	0.40	LC
14	Narrator Brook	0+	16	15	3		34	133	38	6.85	51	0.286	0.05	4.35	IV
		>0+	24	7	5		36		37	2.49	64	0.278	0.02	1.54	V
15	Llyn Llagi	0+	7	2	1		10	139	10	0.00	71	0.072	0.00	0.30	LC
		>0+	1	0	0		1					0.007			ME
16	Llyn Cwm Mynach	0+	5	2	0		7	122	7	0.00	78	0.057	0.00	0.82	LC
		>0+	0	0	0		0					0.000			
17	Afon Hafren	0+	4	0	0		4	136				0.029			ME
		>0+	7	3	1		11		11	0.00	69	0.081	0.00	0.31	LC
18	Afon Gwy	0+	3	1	1		5	190	5	0.00	62	0.026	0.00	0.75	LC
		>0+	3	2	1		6		6	0.00	60	0.032	0.00	0.63	LC
19	Beagh's Burn	0+	0	0	0		0	186				0.000			
		>0+	0	1	0		1					0.005			ME
20	River Bencrom	0+	4	2	0		6	189	6	0.00	75	0.032	0.00	1.02	LC
		>0+	13	1	2		16		16	0.00	76	0.085	0.00	3.78	LC
21	Blue Lough	0+	0	0	0		0	83				0.000			
		>0+	2	1	1		4		4	0.00	57	0.048	0.00	0.84	LC
22	Coney Glen Burn	0+	8	1	0		9	225	9	0.00	90	0.040	0.00	0.13	LC
		>0+	8	3	1		12		12	0.00	71	0.053	0.00	0.23	LC

Table 3 (continued)

TROUT 2006		SITE TOTAL						
Site No	Name	AGE	TC	TN	SE*2	XD	SE*2	
1	Coire nan arr		No longer fished					
2	Allt a Mharcaidh	0+	545	560	3.43	0.858	0.02	
		>0+	117	153	1.70	0.176	0.01	
3	Coire nan Con	0+	68	70	0.83	0.077	0.00	
		>0+	14			0.017		
4	Lochnagar	0+	100	100	0.00	0.486	0.00	
		>0+	17			0.060		
5	Water of Chon	0+	217	229	4.62	0.217	0.02	
		>0+	47			0.046		
6	Loch Tinker	0+	10			0.042		
		>0+	4			0.016		
7	Round loch of Glenhead	0+	25	25	0.00	0.148	0.00	
		>0+	0			0.000		
8	Loch Grannoch	0+	NOT FISHED					
		>0+						
9	Dargal Lane	0+	24			0.062		
		>0+	20	20	0.00	0.054	0.00	
23	Loch Coire Fionnaraich	0+	2			0.002		
		>0+	15	12	0.00	0.013	0.00	
10	Scoat Burn	0+	NOT FISHED					
		>0+						
11	Burnmoor Tarn	0+	NOT FISHED					
		>0+						
12	Etherow		NOT FISHED					
13	Old Lodge	0+	7			0.025		
		>0+	53	55	1.49	0.201	0.02	
14	Narrator Brook	0+	49	53	2.28	0.145	0.02	
		>0+	132	147	5.58	0.528	0.08	
15	Llyn Llagi	0+	33	40	5.21	0.093	0.04	
		>0+	2			0.005		
16	Llyn Cwm Mynach	0+	13	13	0.00	0.033	0.00	
		>0+	2			0.005		
17	Afon Hafren	0+	26			0.057		
		>0+	30	30	0.00	0.070	0.02	
18	Afon Gwy	0+	15	15	0.00	0.023	0.00	
		>0+	23	23	0.00	0.035	0.00	
19	Beagh's Burn	0+	30			0.002		
		>0+	6			0.008		
20	River Bencrom	0+	42	45	1.93	0.071	0.01	
		>0+	32			0.051		
21	Blue Lough	0+	1			0.004		
		>0+	16			0.059		
22	Coney Glen Burn	0+	34	35	0.00	0.048	0.00	
		>0+	32			0.044		

Table 4

SALMON 2006		LOWER REACH													
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P (%)	D	SE*2	X2	CODE
2	Allt a Mharcaidh	0+	1	1	1		3	173				0.017			ME
		>0+	3	0	0		3					0.017			ME
3	Coire nan Con	0+	64	18	8		90	381	92	3.46	69.0	0.241	0.01	0.78	V
		>0+	10	0	1		11		11	0.00	85.0	0.029	0.00	4.24	IVLC
18	Afon Gwy	0+	2	1	0		3	229	3	0.00	75.0	0.013	0.00	0.51	LC
		>0+	2	0	0		2					0.009			ME
22	Coney Glen Burn	0+	0	0	0		0	244				0.000			
		>0+	1	0	0		1					0.004			ME

SALMON 2006		MIDDLE REACH													
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P	D	SE*2	X2	CODE
2	Allt a Mharcaidh	0+	21	12	1		34	229	35	2.54	67.0	0.153	0.01	3.50	V
		>0+	4	0	1		5		5	0.00	71.0	0.022	0.00	2.79	LC
3	Coire nan Con	0+	33	10	6		49	220	51	3.80	64.0	0.232	0.17	0.96	V
		>0+	11	3	1		15		15	0.00	75.0	0.068	0.00	0.14	LC
18	Afon Gwy	0+	0	0	0		0	250				0.000			
		>0+	0	0	0		0					0.000			
22	Coney Glen Burn	0+	0	0	0		0	255				0.000			
		>0+	2	1	0		3		3	0.00	75.0	0.012	0.00	0.51	LC

SALMON 2006		UPPER REACH													
Site No	Name	AGE	C1	C2	C3	C4	TC	Area	N	SE*2	P	D	SE*2	X2	CODE
2	Allt a Mharcaidh	0+	60	17	10		87	307	91	5.74	64.0	0.296	0.02	1.60	V
		>0+	3	1	0		4		4	0.00	80.0	0.013	0.00	0.34	LC
3	Coire nan Con	0+	21	12	2		35	243	36	2.45	65.0	0.148	0.01	2.26	V
		>0+	35	15	8		58		63	7.30	56.0	0.259	0.03	0.20	V
18	Afon Gwy	0+	0	0	0		0	190				0.000			
		>0+	2	1	0		3		3	0.00	75.0	0.016	0.00	0.51	LC
22	Coney Glen Burn	0+	0	0	0		0	225				0.000			
		>0+	0	0	0		0					0.000			

SALMON 2006		SITE TOTAL													
Site No	Name	AGE					TC		TN	SEx2		XD	SEx2		
2	Allt a Mharcaidh	0+					124		126			0.155			
		>0+					12		9			0.017			
3	Coire nan Con	0+					174		179	1.90		0.207	0.06		
		>0+					84		78	2.43		0.110	0.01		
18	Afon Gwy	0+					3		3			0.004			
		>0+					5		3			0.005			
22	Coney Glen Burn	0+					0		0			0.000			
		>0+					4		3			0.004			

Table 5 Minor Species Present

Minor Species Present 2006																
		LOWER					MIDDLE					UPPER				
Site No	Name	"No Other Spp" Recorded	Minnow	Eel	Stickleback	Other	"No Other Spp" Recorded	Minnow	Eel	Stickleback	Other	"No Other Spp" Recorded	Minnow	Eel	Stickleback	Other
2	Allt a Mharcaidh															
3	Coire nan Con		✓	✓									✓	✓		
4	Lochnagar								✓							
5	Water of Chon															
6	Loch Tinker							✓		✓			✓		✓	
7	Round loch of Glenhead			✓					✓					✓		
8	Loch Grannoch															
9	Dargal Lane															
23	Loch Coire Fionnaraich			✓					✓					✓		
10	Scoat Burn															
11	Burnmoor Tarn															
12	Etherow															
13	Old Lodge															
14	Narrator Brook															
15	Llyn Llagi	✓					✓							✓		
16	Llyn Cwm Mynach	✓					✓					✓				
17	Afon Hafren															
18	Afon Gwy															
19	Beagh's Burn								✓					✓		
20	River Bencrom															
21	Blue Lough															
22	Conyglen Burn			✓												

Table 6 GPS locations

Site No	Name		Lower	Middle	Upper
1	Coire nan arr	Bottom of Reach			
		Top of Reach			
2	Allt a Mharcaidh	Bottom of Reach			
		Top of Reach			
3	Coire nan Con	Bottom of Reach			
		Top of Reach			
4	Lochnagar	Bottom of Reach			
		Top of Reach			
5	Water of Chon	Bottom of Reach			
		Top of Reach			
6	Loch Tinker	Bottom of Reach			
		Top of Reach			
7	Round loch of Glenhead	Bottom of Reach			
		Top of Reach			
8	Loch Grannoch	Bottom of Reach			
		Top of Reach			
9	Dargal Lane	Bottom of Reach			
		Top of Reach			
23	Loch Coire Fionnaraich	Bottom of Reach			
		Top of Reach			
10	Scoat Burn	Bottom of Reach	NY 15240 09883	NY 15712 10228	NY 15763 10309
		Top of Reach	NY 15276 09887	NY 15736 10270	NY 15800 10339
11	Burnmoor Tarn	Bottom of Reach			
		Top of Reach			
12	Etherow	Bottom of Reach			
		Top of Reach			
13	Old Lodge	Bottom of Reach			
		Top of Reach			
14	Narrator Brook	Bottom of Reach			
		Top of Reach			
15	Llyn Llagi	Bottom of Reach			
		Top of Reach			
16	Llyn Cwm Mynach	Bottom of Reach			
		Top of Reach			
17	Afon Hafren	Bottom of Reach	SN 84306 87876	SN 84244 87869	SN 84234 87956
		Top of Reach			
18	Afon Gwy	Bottom of Reach	SN 82401 85400 +/- 6m	SN 82273 85415	SN 82211 85470 +/- 8m
		Top of Reach			
19	Beagh's Burn	Bottom of Reach			
		Top of Reach			
20	River Bencrom	Bottom of Reach			
		Top of Reach			
21	Blue Lough	Bottom of Reach			
		Top of Reach			
22	Conyglen Burn	Bottom of Reach			
		Top of Reach			

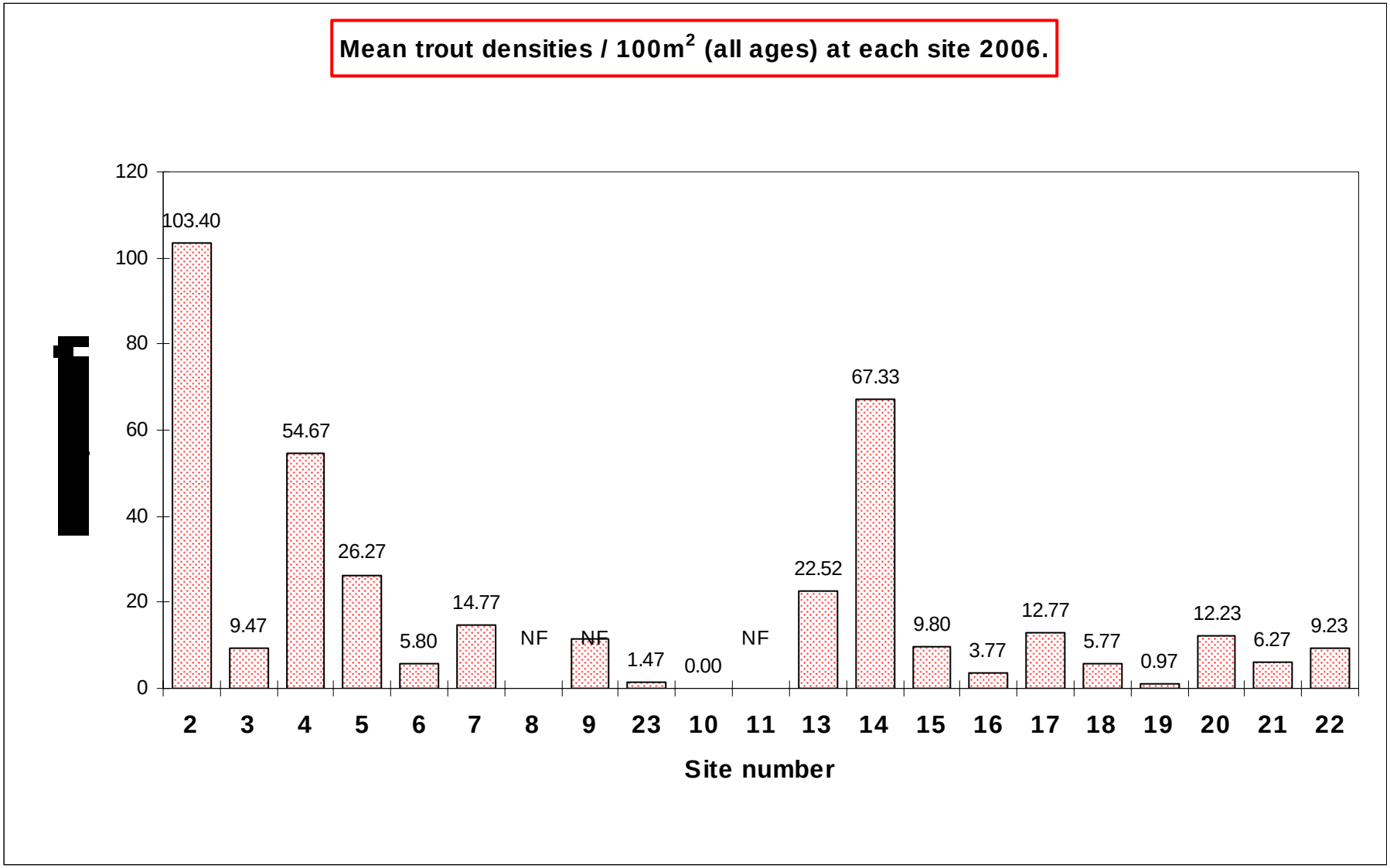
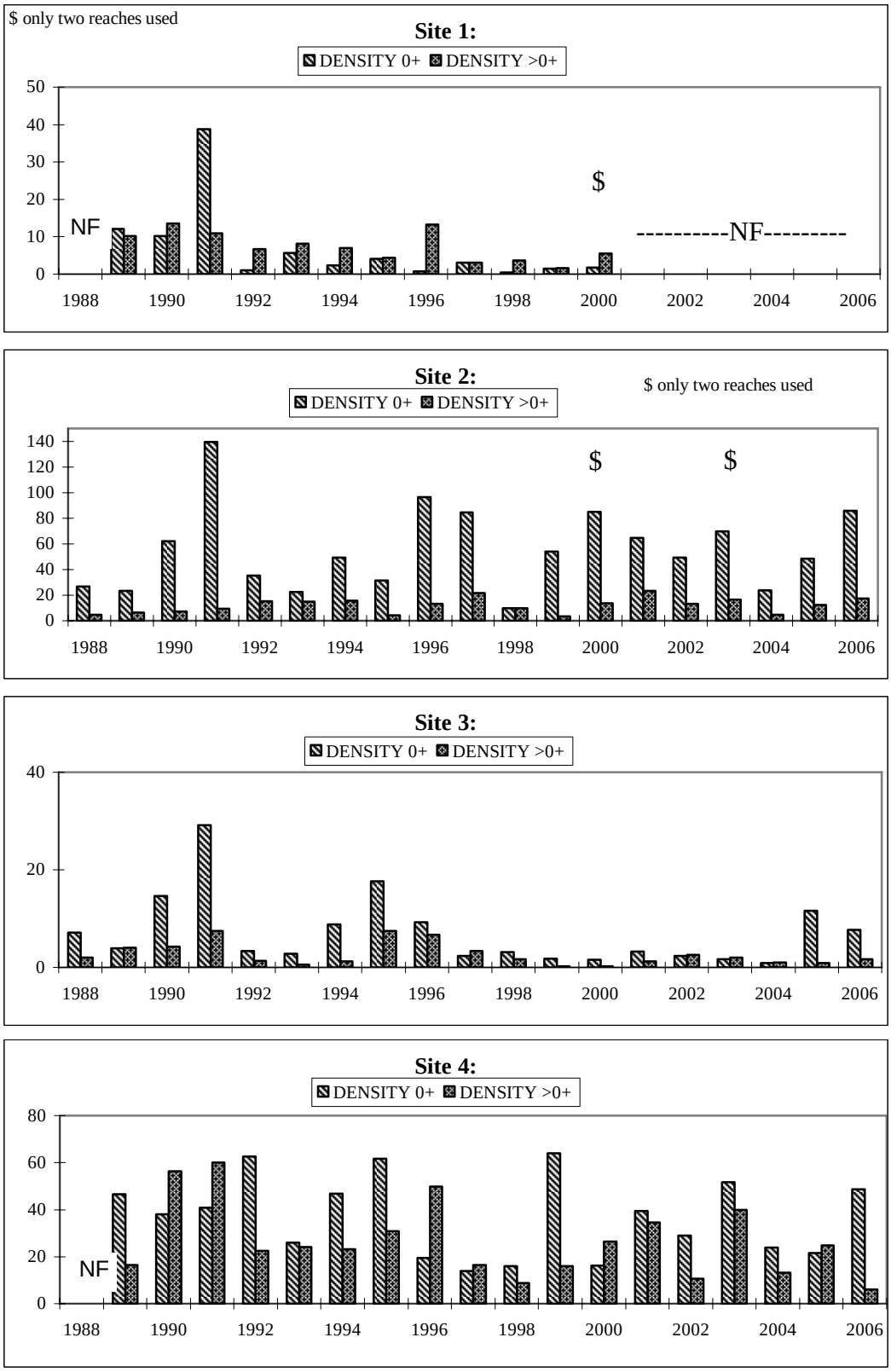


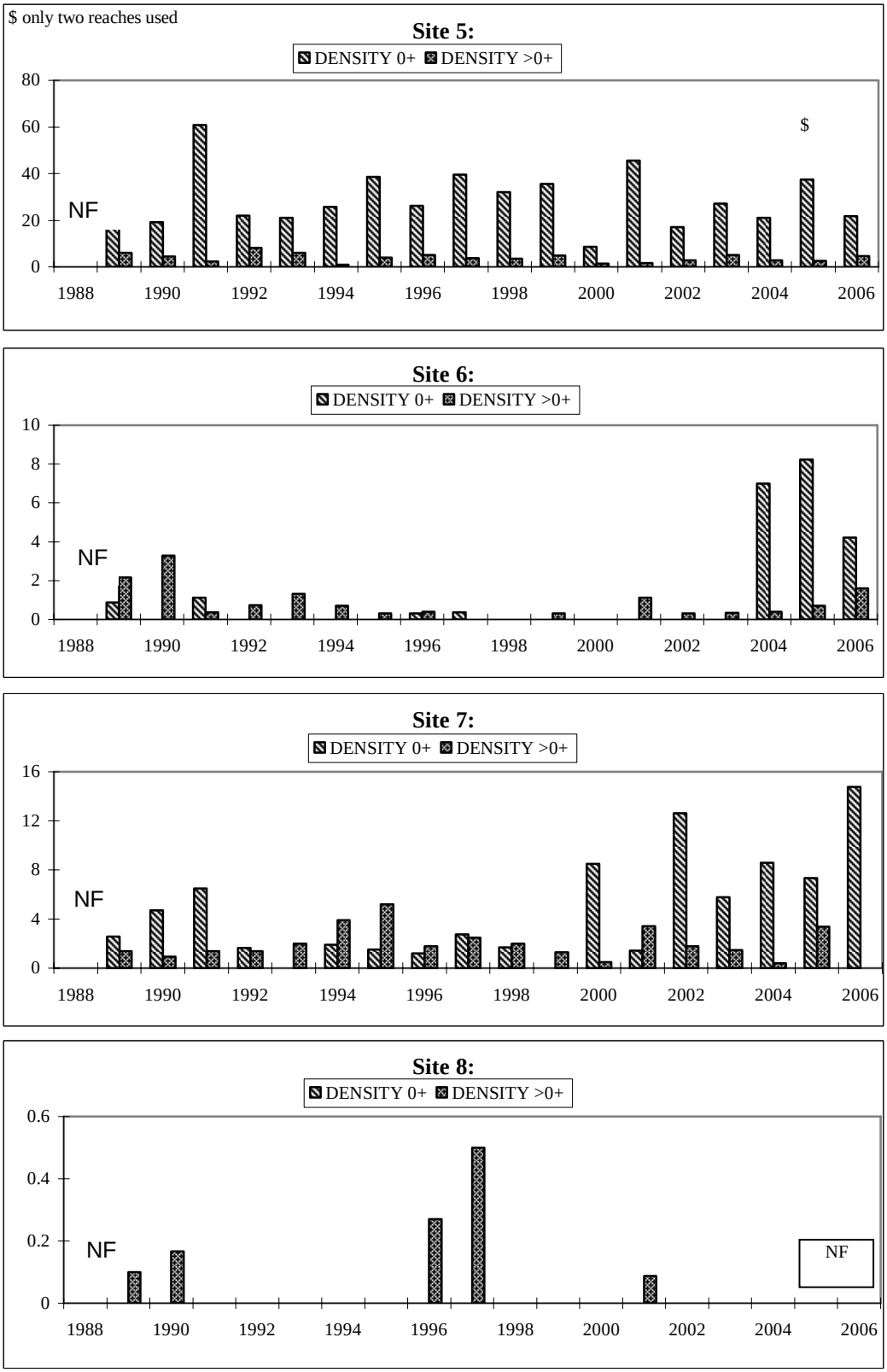
Figure 1 **Mean density of trout (all age groups) per 100 m^2**



NF denotes site not fished

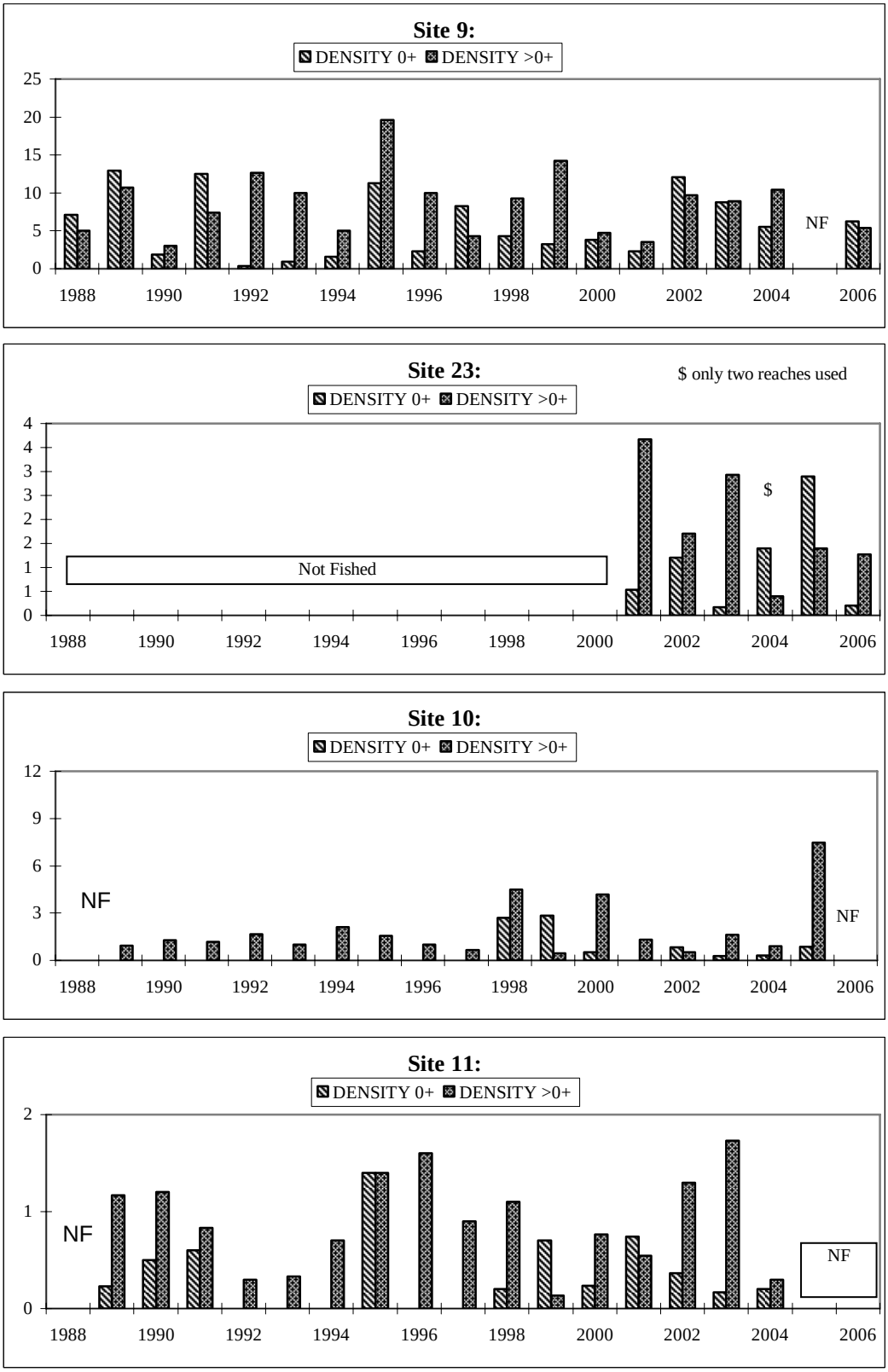
$ denotes that not all three reaches fished

Figure 2 Mean Site Density of Trout/100 m^2



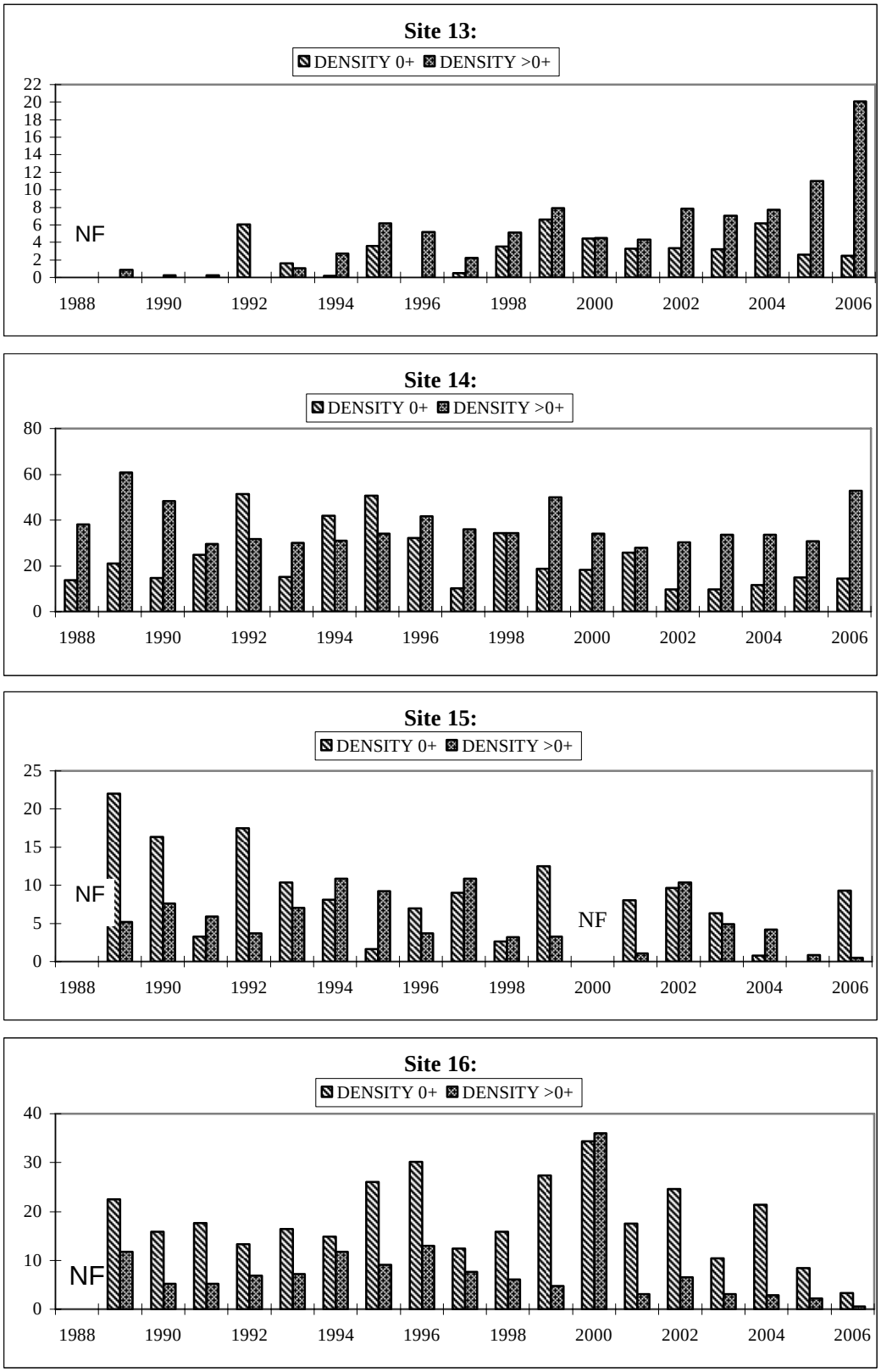
NF denotes site not fished

Figure 2 (continued)



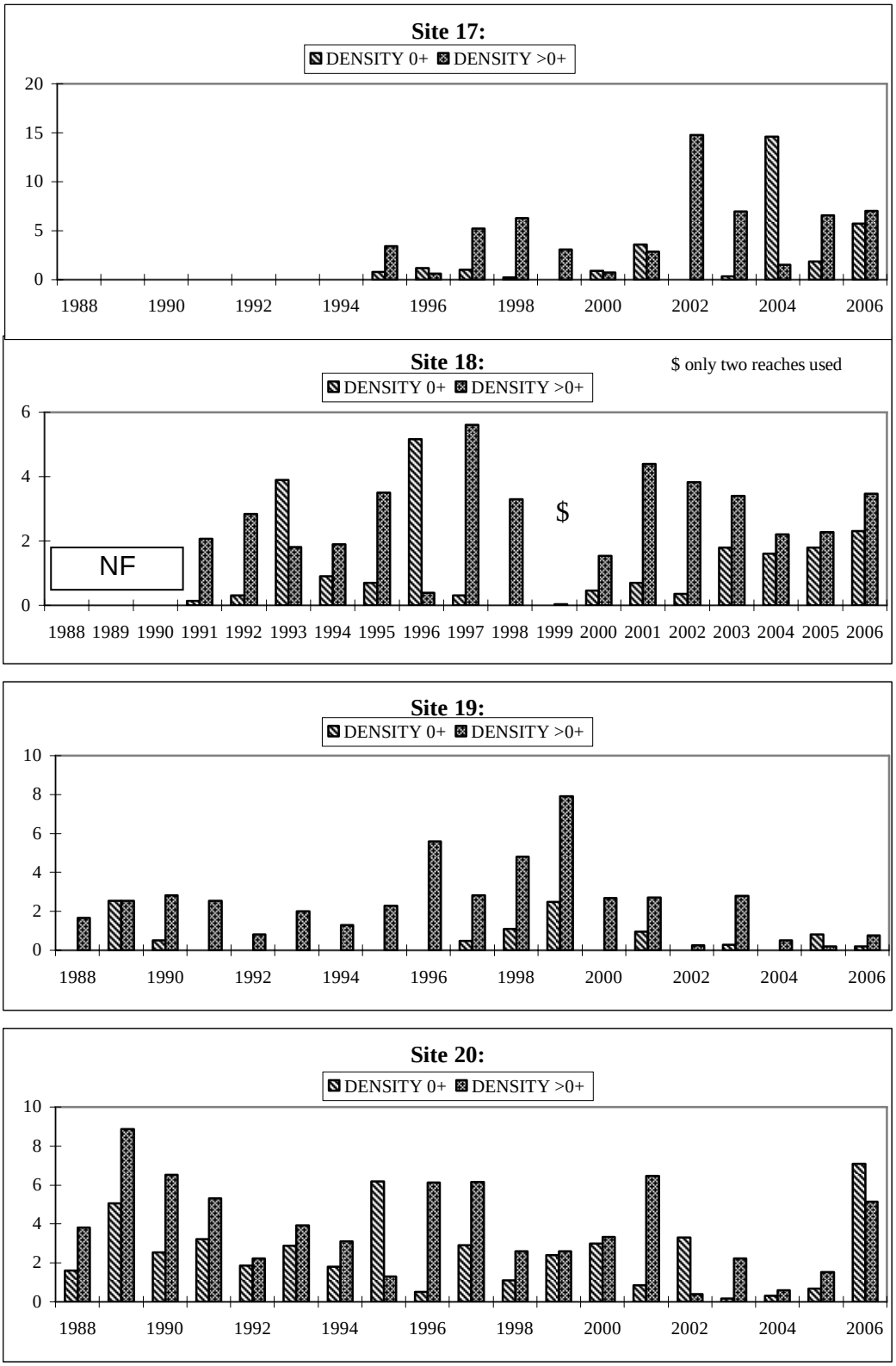
NF denotes site not fished

Figure 2 (continued)



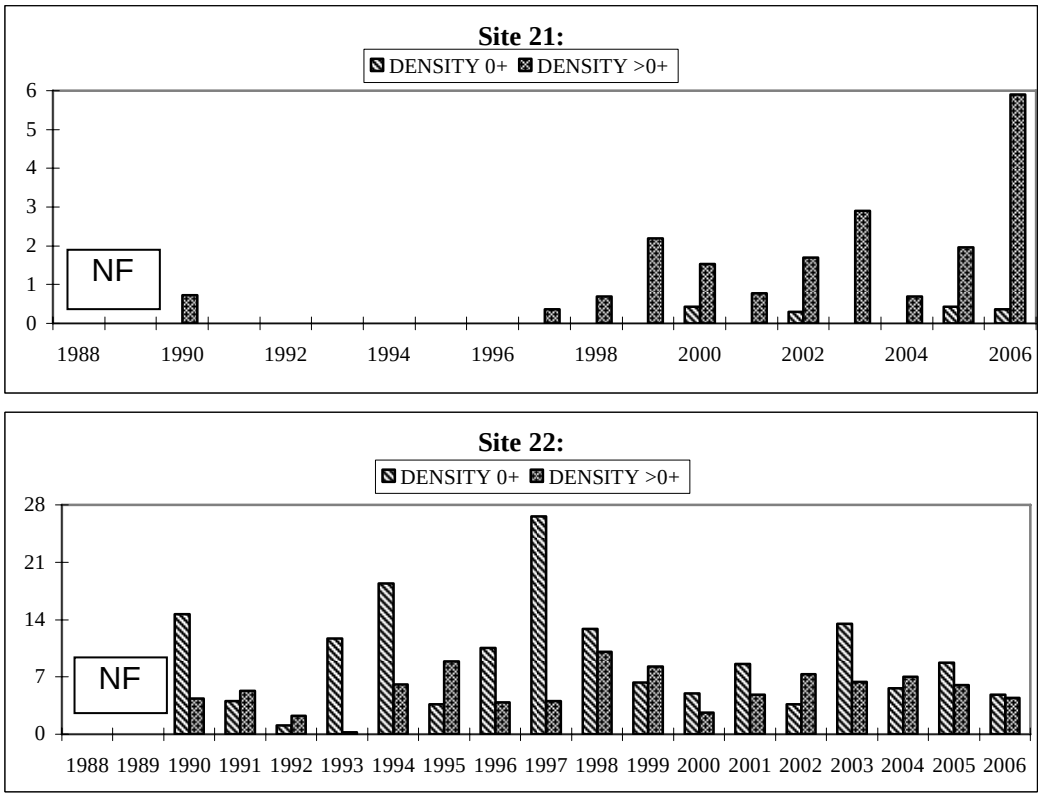
NF denotes site not fished

Figure 2 (continued)



NF denotes site not fished

Figure 2 (continued)



NF denotes site not fished

Figure 2 (continued)

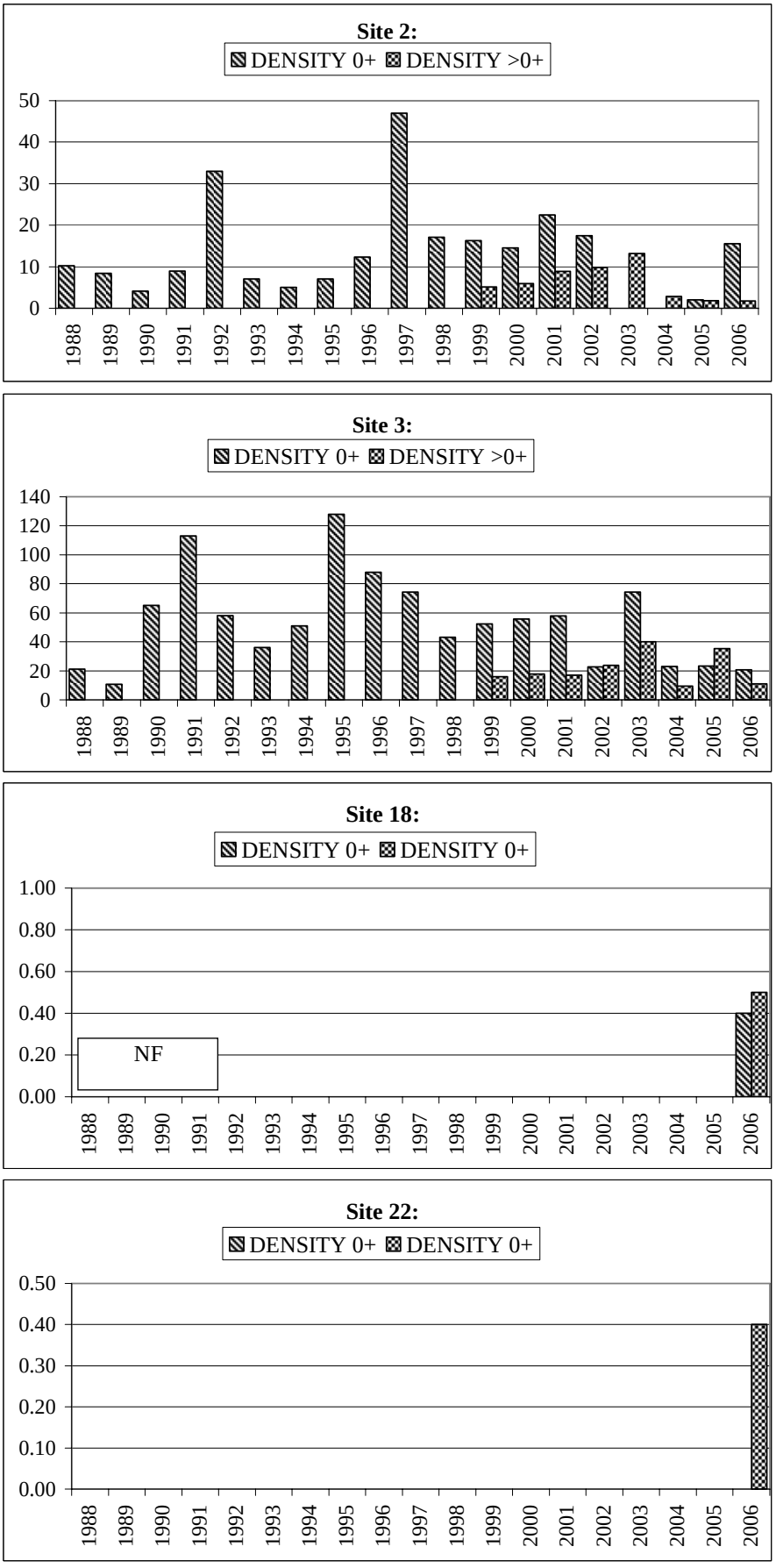


Figure 3 Mean Site Density of Salmon/100 m^2